Wialon Local

User Guide

as of October 23, 2017

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This manual contains a detailed description of the satellite tracking system ⊙Wialon Local. Version release date: May 23, 2017.

To find needed information quickly **use the search field** at the left.

Basic Definitions and Components

GPS tracking system Wialon Local is a software product that allows the end users to control their units (vehicle fleet, machinery, employees, pets, etc.).

Unit tracking includes:

- detecting units' position and watching their movements on the map;
- observing dynamic changes of various units' parameters such as speed, fuel level, temperature, voltage, etc.;
- managing units (sending commands and messages, assigning jobs and routes, adjusting notifications, etc.) and drivers (phone calls, SMS, work shifts);
- controlling units' movements along the routes;
- interpreting the information derived from unit in various kinds of reports (tables, charts);
- and much more.

Tracking results can be presented on the computer screen as well as exported to files in different formats.

The main components of Wialon Local are described below.

Administration Panel

The administrator of Wialon Local can start and stop Wialon, watch its operation, monitor errors, take care of memory consumption and CPU load, etc.

In addition, the configuration of the system is adjusted in the Administration Panel where one can purchase components, install updates, add maps, sites, and modems, etc.
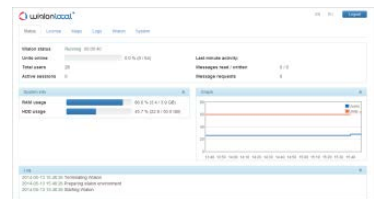
⚠ The detailed description of Administration Panel can be found in the section 'Administration Panel' of this guide.

CMS Manager (Management System)

CMS Manager is a special interface developed for the managers of Wialon Local. CMS refers to Content Management System. Content in this context is **system macro objects** which are:

- **accounts (resources)**,
- **billing plans**,
- **users**,
- **units**,
- **unit groups**,
- **retranslators**.
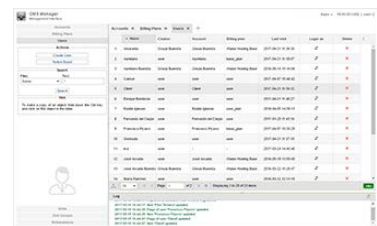
Macro objects differ from micro objects in several ways:

- They exist independently and are not a part of a bigger object like resource.
- They can include smaller items as their contents, and those items are deleted together with the macro object they belong to. As mentioned above, a resource can hold geofences, jobs, notifications, drivers, and report templates. A unit can contain sensors, commands, custom fields, and service intervals. Users and unit groups can only contain custom fields.
- Access rights are assigned to macro objects, and they affect these objects themselves as well as their contents. That is why the dialog of macro object properties usually has a special 'Access' tab to manage rights.
- Some macro objects like retranslators, accounts (resources), and billing plans can be accessed only

through the management interface that is CMS Manager.

CMS Manager is designed to work with these items: create, configure, update, copy, import, export, delete them, and, what is the most important, distribute **access rights** to these objects. An access right is a possibility to view some system objects and perform allowed actions over them.

These functions can be also partially fulfilled in the user interface. However, the main difference here is that CMS Manager has a handy easy-to-use interface that allows to work with a great number of items, filter them by different criteria, display them in the form of a table, create tabs with search results, and much more. Besides, the exclusive privilege of CMS Manager is the possibility to work with accounts (that is to control payment, restrict services and adjust their cost) and retranslators.

Note.

There is one type of macro object that is not available in CMS Manager — route. Routes can be created only in the user interface of Wialon Local. They store check points and schedules inside and do not depend on any resource. However, it is possible to manage access to routes — through user properties dialog.

⊕ The detailed description of CMS Manager interface can be found in the section 'Management System' of this guide.

Main Interface (Tracking System)

The main interface of Wialon Local is an interface where the end users watch their units and create and configure diverse **system micro objects** for their tracking purposes:

- **geofences**,
- **jobs**,
- **notifications**,
- **drivers**,
- **trailers**,
- **report templates**.
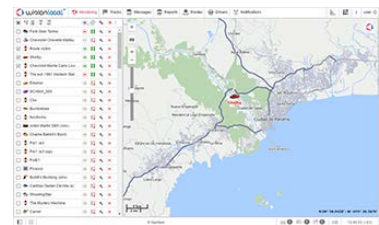
These items cannot exist independently and are a part of some resource.

⊕ The detailed description of Wialon Local user interface can be found in the section 'Monitoring System'.

Wialon DB

Wialon Local has an embedded data storage system ⊕Wialon DB, a proprietary DBMS with stable support for transactional processing and replication features. Physically it is located in the folder *storage* of your Wialon Local. All kind of communication with the database is done either via the provided web interfaces or using various ⊕development tools.

WebGIS

WebGIS is a cartographic server included in Wialon Local. All the address information used for the tracking of units and for the reports is taken by default from it.

⊕ The detailed description of WebGIS can be found in the corresponding section.

Wialon Administration

Wialon administration is described in the following sections:

- **Tecnical Specification and Requirements**
- **Installation of Wialon Local**
- **License**
- **Administration Panel**
  - **Status**
  - **License**
  - **Maps**
  - **Logs**
  - **Wialon**
  - **System**
- **Local Communication Gate**

Tecnical Specification and Requirements

Operation System and Accompanying Software

Wialon Local is an all-in-one solution installed from an ISO file that inludes:

- base operating system Debian GNU/Linux 8 («Jessie») in form of an image *netinstall* (the missing files are installed from network package repositories);
- additional software for proper functioning of the server (nginx, postfix, ntp, openssh, iptables, fail2ban and some other);
- Wialon Local and its components.

Some OS components, hardware drivers and the modules of Wialon Local itself require network access during the installation process.

It is not recommended to install other software packages apart from the ones that are needed for proper operating of Wialon Local.

Server Requirements

Wialon Local can be installed and work only on a 64-bit operating system.

See below the minimum requirements to the server with the data storage for 2 years. These requirements were calculated on the basis of typical tasks solved by the servers and their configuration.

For a server with 100 units:

1. CPU: Core i7;
2. RAM: 16 GB (only Wialon);
3. HD: soft-based RAID1 from 250 GB;
4. Internet channel width (from the server): from 25 Mbit/s.

For a server with 4000 units and its own WebGIS:

1. CPU: Xeon E31230 and higher;
2. RAM: from 64 GB (Wialon + maps);
3. HD: soft-based RAID10, 4×2 TB and more;
4. Internet channel width (from server): from 50 Mbit/s.

For a server with 10000 units:

1. CPU: 2 up-to-date Xeon CPUs;
2. RAM: from 128 GB;
3. HD: software-based RAID10, 8×2 TB and more;
4. Internet channel width (from server): from 100 Mbit/s.

⚠ In some cases the automatic installation can be unavailiable.

You should undertand that the above listed requirements are for guidance only and the selection of the hardware that Wialon Local is going to be installed on is particular and should, first of all, be based on the volume of the information you are planning to work with.

Installation of Wialon Local

The distribution of Wialon Local contains also operating system Debian Linux ('Jessie'). In case of installation onto a Windows server, use a virtual machine.

First, download ISO image from the distribution server and write it onto a CD, DVD, or USB flash drive.

Adjust BIOS configuration in such a way to boot from CD/DVD drive. Then follow the instructions on the screen:

1. Choose the installation type: on one drive, two (RAID-1), four (RAID-10) or eight (RAID-10) drives.

2. If more than one network is detected, you will be asked to select one to be used during the installation process.

However, if DHCP server is not available during the installation, check network availability and repeat network adjustment or set network parameters manually:
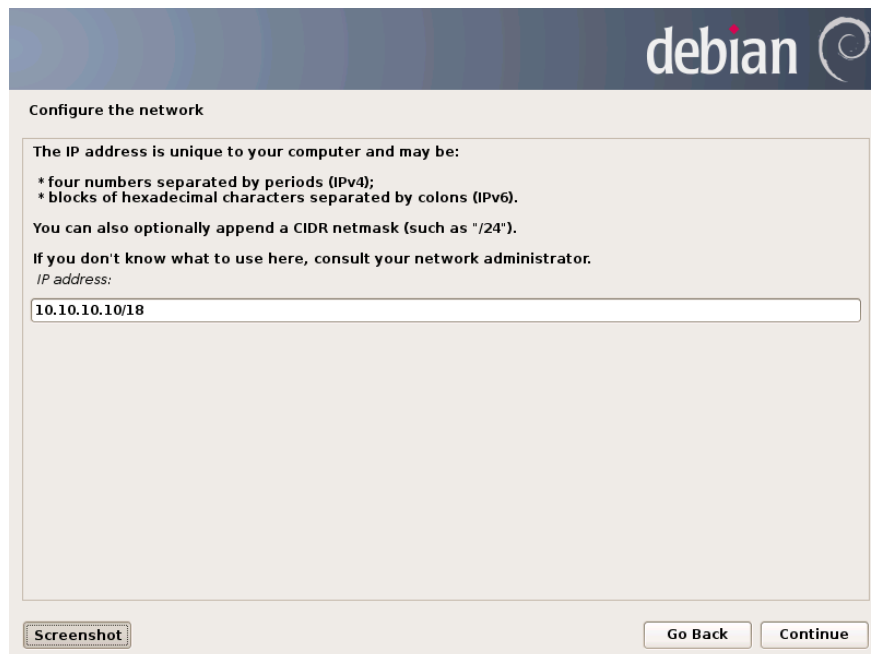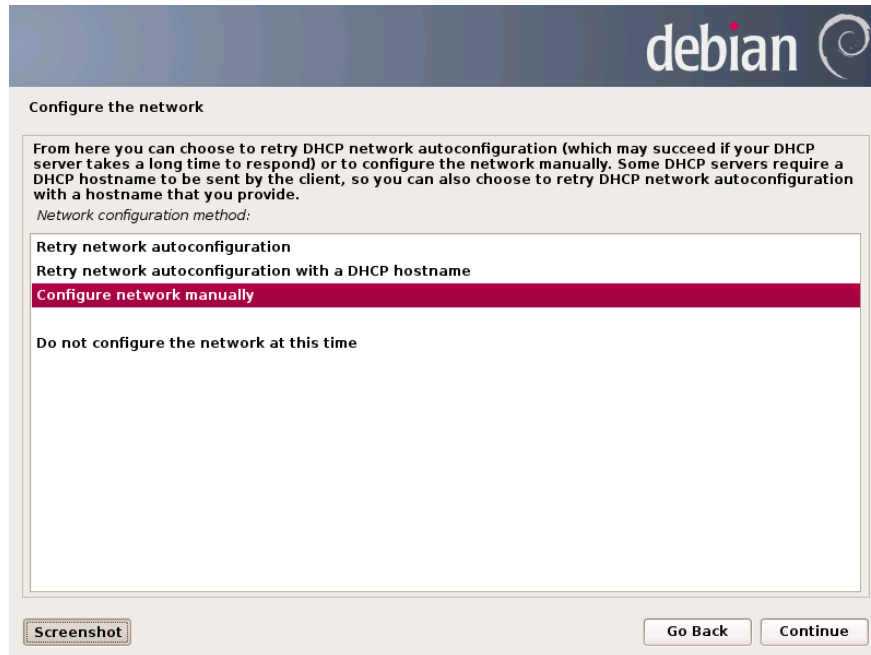
3. Set up password for *root* account — main account of your Debian OS.
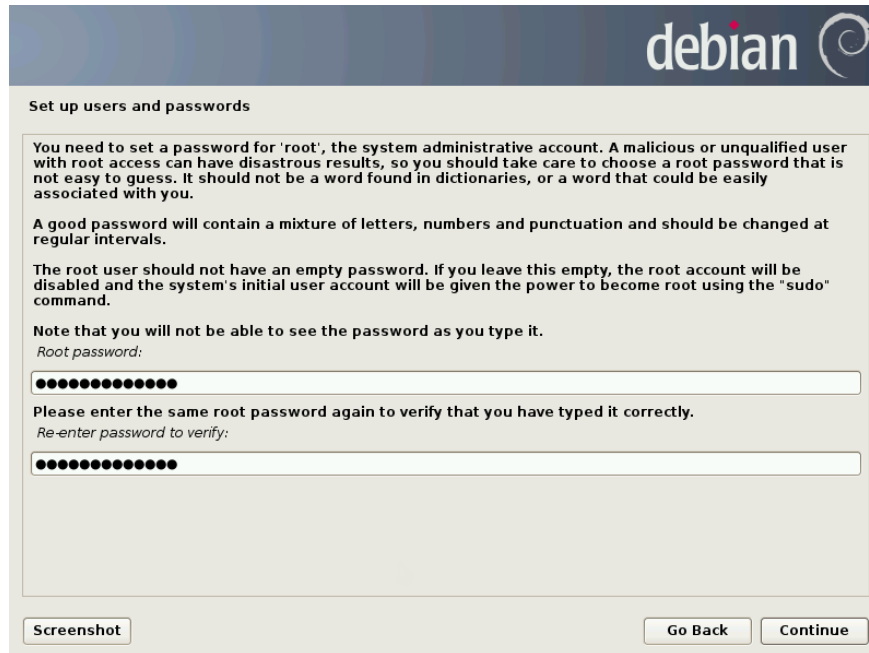
4. If installation on one drive was chosen at the beginning, select a particular drive here.
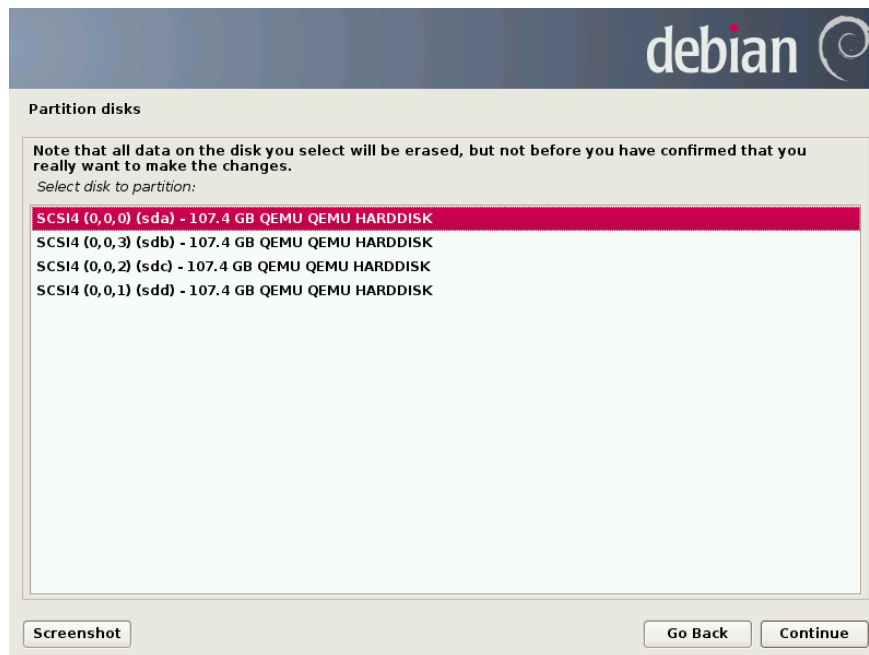
5. When the installation process is complete, the system will reboot automatically (do not forget to readjust BIOS settings back). After the reboot, the URL address of Wialon Local administration system will be shown.
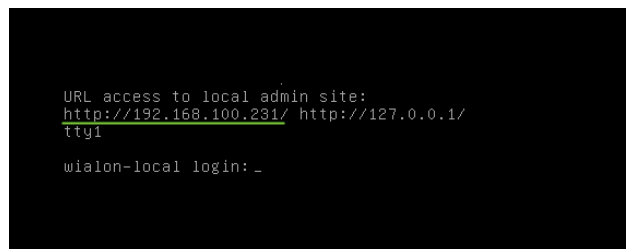
6. Enter this URL in your browser's address bar. To authorize, use the user name and the password given to you when purchasing Wialon Local.

7. After a successful authorization, Wialon Local will be downloaded and installed. It may take some time.
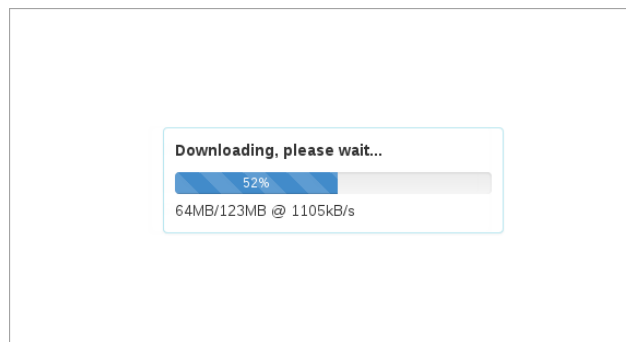
8. When the process is complete, the Administration Panel will show up.

Entering administration system, you can get a warning like on the image below (*You are looking for site that is not available here. Please check your DNS configuration.*)

In this case, you should write your new address for the administration system in the file /etc/nginx/conf.d/lcm.conf. For example,

```
server_name        192.168.100.231 127.0.0.1 your-new-name.server;
```

The default interfaces of Management and Tracking systems are available on the ports 8025 and 8024, respectively.

⚠ Depending on the configuration of your server a non-standart installation may be required. In case of difficulties, contact ◉tecnical support.

License

The license is integrated into your personal build of software.

Every day, Wialon Local connects to the license server *lic.gurtam.com* (port 31176) and confirms the usage of the product on one server at a time. If this license check is blocked because of firewall or lack of Internet connection, it will cause a ban to use the program. In this case, you will not be able to create new units and use Gurtam Maps. Some time later, however, all services of Wialon Local get denied except for the Administration Panel.

Several times a day Wialon Local connects to the server *local-api.wialon.com* to fetch updates. This server is also responsible for the authorization of the administrator. A successful authorization of the administrator, as well as successful purchases are possible only with enabled Internet connection.

If there is a problem with the license, you cannot create any units, and phrases like *Error fetching license: 'avl.unit'* can be found in log files.

Administration Panel

The configuration of the system is adjusted in the Administration Panel where one can purchase components, install updates, add maps, sites, and modems, etc.

The administrator of Wialon Local can start and stop Wialon, watch its operation, monitor errors, take care of memory consumption and CPU load, etc.

- **Status**
- **License**
- **Maps**
    - **Gurtam Maps**
    - **WebGIS**
- **Logs**
- **Wialon**
    - Root User
    - Default Billing Plan Settings
    - Sites
    - Modems
    - Trash
- **System**
    - Backup Server
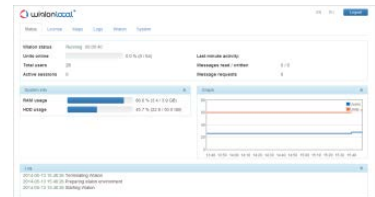
Status

On this page you can find the basic and the most important parameters of the operation of the service.
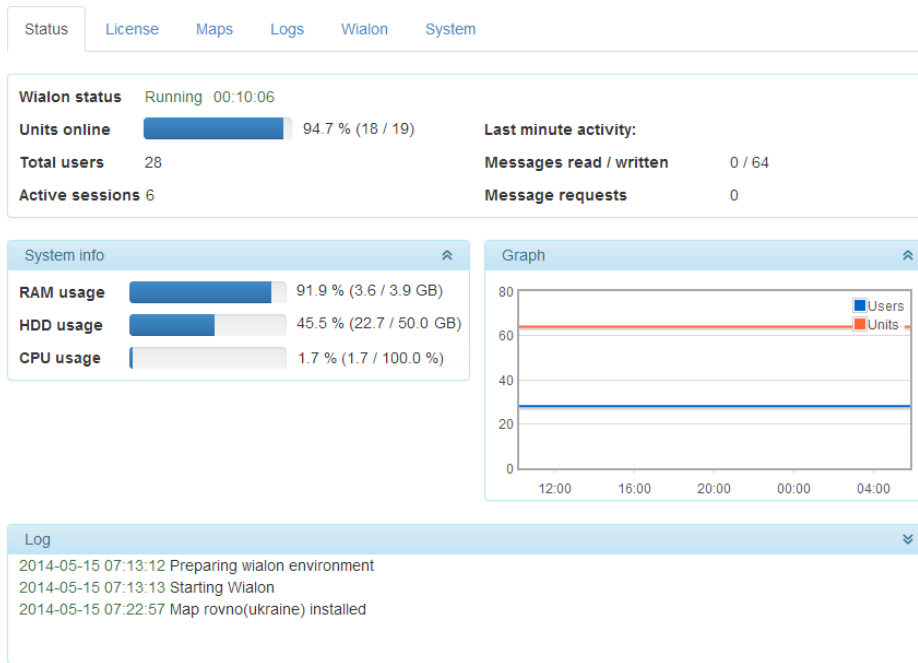
Wialon status

Your Wialon Local can be either running or stopped. If it is running, you can also see for how long — in the format hh:mm:ss. The time is zeroed when you restart Wialon.

⚠ Wialon can be started/stopped on the 'System' page. It is also restarted when updates are installed.

Units online

This row shows the percentage of online units (figure before slash) relative to all the created units (figure after slash).

Total users

The number of all the users created in the system.

Active sessions

The number of active sessions at the moment. Note that one user can create multiple sessions.

In the **'Last minute activity'** section, the database load is shown:

Messages read / written

The number of messages read from the database (first figure) and written to the database (second figure) within the last minute.

Message requests

The number of requests for providing messages that the database received within the last minute.

In the **'System info'** section, you can see the following data:

RAM usage

The percentage and the absolute volume of memory being used.

HDD usage

The percentage and the absolute volume of the disk space being used. If 90 and more percent of disk space is reached, a warning is sent to the administrator (whose e-mail is adjusted on the 'System' page). Besides, if the disk

usage has reached a critical point (5 GB left), the service will be stopped in order to avoid database damage, and the administrator will be notified about that as well.

Graph

The graph shows the dynamics of the service operation for the last 24 hours (or since the last global launch). The blue line represents the number of users, the orange one — units.

Log

The Log is located at the bottom of each page in the Administration Panel. Here current events occurring in the system are reported. For example, Wialon starting and terminating, availability of new updates, installation of components, etc. The log clears when you reload the page.

License

⚠ *Attention!*

The amount of available system functionality depends on the configuration of the distributive included in your package.

On this page, you can control your license — see what you already have and activate new components according to your needs. There are three types of components: modules, retranslators, and hardware.

Modules

The modules are mostly helpful for extending the possibilities of your service. These can either be new features for the end users (like 'Notifications', 'Fuel Control', 'Advanced Reports', etc.) or an enhancement of the general qualities of the service (like 'Hot Backup', 'Personal Design', 'Extra Site', etc.).

Retranslators

Here you can activate new retranslation protocols for your service.

Hardware

Here you activate new types of devices to be used in your system. They go in groups according to the manufacturer. This means that purchasing a XYZ hardware you purchase all types of devices produced by the XYZ company. Visit '🌐GPS Hardware' to find the full list of supported devices and for further information.

In all the blocks, items are sorted alphabetically, however, the purchased items are placed above forming their own sublist. The sorting type can be changed — by current usage, price, or purchase status. Just click on the corresponding column title once (for direct sorting order) or twice (for reverse sorting order). To quickly find a certain item, use the text filter which is located in the header of each of three blocks.

The division of the items by status (purchased or not) can be disabled. Just click on 'Status' in the header twice (unlike other titles, this one has three states — up, down, and none). With sorting by status disabled, you can get the list of items strongly alphabetically or by other criteria.

The activated components have the status *Purchased*. The components available for purchase have the *Add to cart*
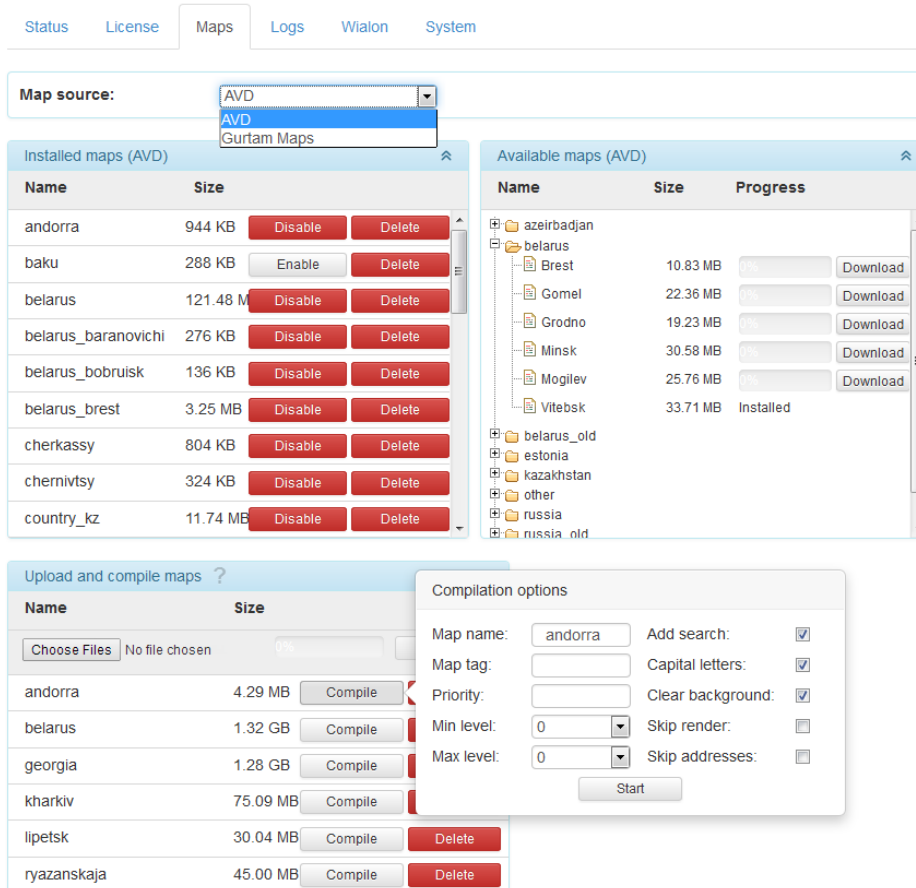
button in their status. Press this button to add new components to your service. The total cost of your purchase is indicated below. When finished, press *Buy selected* and confirm your actions.

In order the changes to take effect, go to the 'System' page and install the updates. To complete the procedure, Wialon will be automatically restarted. Sometimes you may also need to refresh the page and clear the cache.

Current amount is indicated for such components as units, extra sites, mobiles, and personal designs. When purchasing them, the price is given for one piece, and in case of units — for a package of 25 units.

Maps

On this page, the cartographic system is being configured. The maps are important for the end users in two ways. First, they serve as a background to place tracking units on it, build tracks of movements, draw geofences, etc. Second, the maps define the accuracy of the address information that appears during online tracking and in reports.

Map Source

First of all, choose the map source: either AVD or Gurtam Maps (they cannot be used together).

Choosing **Gurtam Maps** means that Gurtam will be responsible for maintaining the map server and updating cartographic data. That is why if you select Gurtam Maps, other sections on this page collapse indicating that you will not need them.

Choose **AVD** if you prefer to create and manage your own WebGIS server. The process is described below.

Configuring AVD Maps

Installed maps (AVD)

Here you see the list of the installed maps. Maps can get here either from the section on the right or from the section below. A new map is added as enabled, however, you can disable it. In this case, it still will stay on your server but will be invisible to the users. A map can be also deleted permanently, that is erased from the server.

Available maps (AVD)

This is the list of the ready-to-use AVD maps provided by Gurtam. To install one of them, select it in the list and download it. The map will appear in the *Installed maps* section immediately after downloading. For quicker search, all

available maps are sorted into folders by country.

Upload and compile maps

If you have your own maps, you can upload them and then install on your server. If an uploaded map is in AVD format, it gets into the 'Installed maps' section at once. If you have another kind of source map, it will need compilation after uploading. Press the 'Compile' button, adjust the compilation parameters, and press 'Start'. How to create maps...

⚠ Files for loading should be zipped and contain no nested folders.

Gurtam Maps

By choosing Gurtam Maps as a map source all the address information used for online tracking and reports will be taken from Gurtam Maps.

- Conversion Table: Polyline (PL)
- Conversion Table: POI
- Conversion Table: Polygon (PG)
- Scale Gurtam Maps

Conversion Table: Polyline

.MP	.OSM				Gurtam Maps					
Code	Key	Value	Keys	Key_ values	Type	GM Type	Data level (0-2)	Comment	Image	Icon
0x0001	highway	motorway			PL	1	2	A restricted access major divided highway, normally with 2 or more running lanes plus emergency hard shoulder. Equivalent to the Freeway, Autobahn, etc.		0-4 ▪ 5-9 ▪ 10-12 ▪
	highway	motorway_link			PL	2	2	The link roads (sliproads/ramps) leading to/from a motorway from/to a motorway or lower class highway. Normally with the same motorway restrictions.		0-4 ▪ 5-7 ▪
0x0002	highway	trunk			PL	3	2	Important roads that are not motorways. Typically maintained by central, not local government. Need not necessarily be a divided highway.		0-4 ▪ 5-9 ▪ 10-12 ▪
	highway	trunk_link			PL	4	2	The link roads (sliproads/ramps) leading to/from a trunk road from/to a trunk road or lower class highway.		0-4 ▪ 5-7 ▪
0x0003	highway	primary			PL	5	2	Roads generally linking larger towns.		0-5 6-12 ▪
	highway	primary_link			PL	6	2	The link roads (sliproads/ramps) leading to/from a primary road from/to a primary road or lower class highway.		0-5 6-7 ▪
								Roads generally linking		0-5

0x0004	highway	secondary			PL	7	2	smaller towns and villages.		6-9 ▪
	highway	secondary_link			PL	8	2	The link roads (sliproads/ramps) leading to/from a secondary road from/to a secondary road or lower class highway.		0-5 6-7 ▪
0x0000	highway	tertiary			PL	9	2	Minor roads.		0-5 6-8 ▪
	highway	tertiary_link			PL	10	2	The link roads (sliproads/ramps) leading to/from a tertiary road from/to other minor roads.		0-5 6 ▪
0x000a	highway	unclassified			PL	11	1	Unclassified roads typically form the lowest form of the interconnecting grid network.		0-3 4-7 ▪
0x0042	highway	unsurfaced			PL	12	1	Unpaved roads.		0-3 4-7 ▪
	highway	track			PL	13	1	Roads for agricultural use, gravel roads in the forest etc., usually unpaved/unsealed but may occasionally apply to paved tracks as well.		---
0x0005	highway	residential			PL	14	1	Roads accessing or around residential areas but which are not a classified or unclassified highway. Streets.		0-4 5-7 ▪
0x0006 0x000b 0x0008 0x0009 0x0049	highway	living_street			PL	15	1	A street where pedestrians have priority over cars, children can play on the street, maximum speed is low. Sometimes called 'Home Zone'.		0-2 3-5 ▪
0x0007	highway	service			PL	16	1	Generally for access to a building, motorway service station, beach, campsite, industrial estate, business park, etc. This is also commonly used for access to parking and trash collection.		0-2 ▫ 3-5 ▪
	highway	bridleway			PL	17	1	Roads for horses, cartage.		---
	highway	cycleway			PL	18	1	Cycleways for bicycles.		---
	cycleway	lane			PL	18	1	A lane is a route for bicycles that lies within the roadway.		---
	cycleway	track			PL	18	1	A route for bicycles that is separate from the road.		---

	highway	footway			PL	19	1	Footpaths for pedestrians, e.g., walking tracks and gravel paths.		····
0x0048 0x0016	highway	pedestrian			PL	19	1	For roads used mainly/exclusively for pedestrians/shopping areas. Also for tagging squares and plazas.		····
	highway	bus_guideway			PL	20	1	A busway where the vehicle guided by the way (though not a railway) and is not suitable for other traffic.		0-3 4-7 ▪
	junction	roundabout			PL	21	1	Circle movement.		0-3 4-6 ▪
0x0014	railway	rail			PL	25	1	Full sized passenger or freight trains in the standard gauge for the country or state.		⊨
	railway	tram			PL	26	1	One or two carriage rail vehicles, usually sharing motor road for trams.		⟵
0x001f	waterway	river			PL	30	2	For narrow rivers which will be rendered as a line.		▪
0x0018	waterway	canal			PL	30	1	An artificial open waterway used for transportation, waterpower, or irrigation.		▪
0x0026	waterway	stream			PL	30	1	A naturally-formed waterway that is too thin to be classed as a river. An active, able-bodied person should be able to jump over it if trees along it are not too thick.		▪
0x0044	waterway	drain			PL	30	1	An artificial waterway for carrying storm water or industrial discharge.		▪
	waterway	weir			PL	30	1	A barrier built across a river, sometimes to divert water for industrial purposes. Water can still flow over the top.		▪
	waterway	dam			PL	31	1	A wall built across a river or stream to impound the water. A dam normally does not have water flowing over the top of it.		▪
	aeroway	runway			PL	35	1	A strip of land kept clear and set aside for aeroplanes to take off from and land on.		▪
0x0045 0x001d	boundary	administrative	admin_level	8	PL	191	1	State, county, local council.		····
0x001c					PL	192	1	Region boundary.		‒‒

| 0x001e | boundary | administrative | admin_level border_type | 2 nation | PL | 193 | 2 | National boundary. | | ----- |

Conversion Table: POI

| .MP | | | | | | | | Gurtam Maps | | |
Code	Key	Value	Type	GM Type	Data level (0-2)		Comment		Image	Icon
0xf201	highway	traffic_signals	POI	50	0		Lights that control the traffic.			
0xf002 0x2f08 0x2f17 0xf001 0xf003 0xf004	highway	bus_stop	POI	51	0		A small bus stop.			A
	highway	metro	POI	500			Metro.			M
	highway	tram	POI	501			A tram stop.			T
0x5900 0x5901	highway	airport	POI	503			Airport.			
0x2f03	highway	services	POI	52	0		A service station to get food and eat something, often found at motorways.			
0xf007	railway	station	POI	53	0		A railway station.			
0x4600	amenity	pub	POI	55	0		A place selling beer and other alcoholic drinks; may also provide food or accommodation.			
0x2d02 0x2d00	amenity	nightclub	POI	55	0		A nightclub.			
0x2a0e	amenity	cafe	POI	55	0		A cafe.			
0x4500	amenity	restaurant	POI	55	0		A restaurant.			
0x2a0d	amenity	fast_food	POI	55	0		An area with several different restaurant food counters and a shared eating area. Commonly found in malls, airports, etc.			
0x2f0b	amenity	parking	POI	56	0		Car park or a parking.			P
0x2f02	amenity	car_rental	POI	56	0		A place to rent a car.			P
	amenity	taxi	POI	56	0		A place where taxis wait for passengers.			P
0x2f01 0x4400	amenity	fuel	POI	57	0		Petrol station, gas station, marine fuel, etc.			
0x2e05	amenity	pharmacy	POI	58	0		A pharmacy.			
	amenity	hospital	POI	58	0		A hospital.			
0xf001	amenity	bus_station	POI	60	0		Bus station.			
0x2f06	amenity	bank	POI	61	0		A bank.			$
	amenity	bureau_de_change	POI	61	0		Currency exchange, a place to change foreign bank notes and travellers cheques.			$
	amenity	atm	POI	61	0		An ATM or cash point.			$
0x2b00 0x2b01 0x2b02	tourism	hotel	POI	62	0		A hotel, a motel, a guest house			
	tourism	hostel	POI	62	0		A hostel.			

.MP	.OSM		Type	GM Type	Data level	Comment	Image	Icon
0x0100			POI	302		Capital.		◉
0x0200			POI	63	2	A megalopolis over 5 million people.		○
0x0300 0x0400	place	city	POI	64	2	A city of 1-5 million people (MP). A city over 100 thousand people (◉OSM).		○
0x0500 0x0600 0x0700 0x0800 0x0900 0x0a00 0x0006 0x0004	place	town	POI	65	1-2	A town from 10 to 100 thousand people.		○
0x0b00 0x0c00 0x0d00 0x0e00 0x0f00 0x1000 0x1100 0x0010	place	village_greenhamlet	POI	66	1	A village below 10 thousand people.		
0x640a			POI	67	0	Captions.		
	place	continent	POI	195	2	A continent.		
0x6602	place	state	POI	196	2	A state.		
0x1e00	place	region	POI	197	1	A region.		
0x1f00	place	country	POI	198	1	A country, area.		

Conversion Table: Polygon

.MP	.OSM		Gurtam Maps					
Code	Key	Value	Type	GM Type	Data level (0-2)	Comment	Image	Icon
0x0047 0x003b 0x0045 0x0049 0x0040 0x0041	waterway	riverbank	PG	130	2	Used for large rivers, to define an area between the opposite riverbanks.		■
divided by size	natural	water	PG	131	2	Lakes, water bodies, etc.		■
divided by size	landuse	reservoir	PG	131	2	An artificial reservoir.		■
0x0028			PG	132	2	Sea, ocean.		■
	waterway	riverbank	PG	133	2	A large river.		■
	leisure	park	PG	140	1	A park, open green area for recreation.		■
0x004e 0x004f 0x008e 0x0086 0x0087 0x0088	leisure	garden	PG	141	1	A garden.		■
0x006d	amenity	townhall	PG	145-	1	A town hall building (mayor's office),		0-2 ■

				146		administrative building.	3
0x001a	landuse	grave_vard	PG	147	1	A graveyard, a cemetery	+
0x000a	amenity	school	PG	148	1	A school.	
	amenity	university	PG	148	1	A university.	
	amenity	college	PG	148	1	A college.	
0x3002	amenity	hospital	PG	149	1	A hospital.	
	shop building	supermarket	PG	151	1	A supermarket.	0-2 3
	tourism	camp_site	PG	153	0	Camping, a place where you can pitch a tent.	
	tourism	caravan_site	PG	153	0	A place where you can park a caravan overnight or for longer periods.	
	tourism	picnic_site	PG	154	0	A place where you can have an outdoor picnic. May have facilities such as tables and benches.	
	tourism	theme_park	PG	155	1	Theme park, amusement park.	
	tourism	attraction	PG	156	0	A general tourism attraction.	
	tourism	zoo	PG	157	1	A zoo.	
	tourism	artwork	PG	158	1	A tag for public pieces of art.	
	historic	archaelogical_site	PG	159	0	Archaeological museum.	
0x0050 0x0081 0x0082 0x0083 0x0084 0x0085 0x0052 0x008f 0x0090 0x0091	landuse	forest	PG	165	2	Managed forest or woodland plantation.	
0x0001 0x0002 0x0003	landuse	residential	PG	166	1	Predominantly houses or apartment buildings.	0-3 4-7
	landuse	retail	PG	167	1	Predominantly shops.	0-3 4-7
	landuse	commercial	PG	168	1	Predominantly office buildings, business parks, etc.	0-3 4-7
0x000c	landuse	industrial	PG	169	1	Predominantly workshops, factories, warehouses.	0-3 4-7
0x0006			PG	169	0	Garages, vehicle sheds.	0-3 4-7
	landuse	blownfield	PG	170	1	A district to be developed, an empty area.	
	landuse	greenfield	PG	170	1	Describes land scheduled for new development where there have been no buildings before.	

	landuse	railway	PG	171	1	Area for railway use, generally off-limits to the general public.	
	landuse	construction	PG	172	1	Something under construction.	
0x0004	landuse	millitary	PG	173	1	For land areas owned/used by the military for whatever purpose.	
	landuse	airport	PG	401	1	Airport area.	
0x0014 0x000d 0x0015 0x0016 0x0017 0x001e 0x001f 0x0020 0x0098	natural	wood	PG	184	2	Natural woodland (trees). Only for completely unmanaged/wild areas.	
0x0051 0x0096 0x008b	natural	marsh	PG	185	1	Low poorly drained land that is sometimes flooded and often lies at the edge of lakes, streams, etc.	
0x0018	sport	golf	PG	194	1	Golf course, football, stadium.	
	building	palace	PG	207	1	A palace.	0-2 3
	building	postoffice	PG	208	1	A post office.	0-2 3
	building	restaurant	PG	209	1	A restaurant.	0-2 3
0x006f 0x006f	amenity	public_building	PG	210	1	Public building.	0-2 3
0x0013 0x006c	building	yes	PG	210	1	General tag for buildings.	0-2 3
	denomination	baptist catholic christian evangelical lutheran roman_catholic	PG	211	0	A church.	0-2 3
0x9999	surface		PG	212	2	Bottom surface.	

Scale (Gurtam Maps)

Scale (km)	Scale (m)	Data level	Zoom level	Value
0,02	20	0	0	2000
0,05	50	0	1	5000
0,1	100	0	2	10000
0,1	100	0	3	10000
0,2	200	0	4	20000
1	1000	1	5	100000
1	1000	1	6	100000

2	2000	1	7	200000
5	5000	1	8	500000
10	10000	1	9	1000000
20	20000	1	10	2000000
50	50000	2	11	5000000
100	100000	2	12	10000000
100	100000	2	13	10000000
200	200000	2	14	20000000

WebGIS

Standard WebGIS server is included to the Wialon local. By default any address information used for online tracking and reports is taken directly from it.

AVD format files are used in WebGIS. Files of such a format could be created from other vector data formats, such as MP, MapInfo, ESRI Shape, ⊚OSM (OpenStreetMap). Note that the source map should be done in WGS-84 coordinate system (in grades).

Source maps in the supported vector format should be downloaded to the server. Source maps' files should be given as data archive including a set of configuration files. Depending on the source map format, the archive should include a particular set of files. To successfully unpack the archive on the server, the first one should not contain subfolders.

Compilation Parameters

Map name
Map name, for example, the name of the city for which the map is created.

Map tag
Map tag like city, country, etc. Could be used for a search or as a drawing filter.

Priority
Map priority; 100 by default. Bigger priority means earlier map render. Maps with minor priority are rendered later and are situated above those with bigger priority.

Min level
Min level to draw the map. Default — to be detected automatically.

Max level
Max level to draw the map. Default — to be detected automatically.

Add search
Add search info to the map.

Capital letters
Consider letter case (lower/upper) in the MP file address info (Cities, Regions, Countries).

Clear background
Clear background on render map flag is used for combining multiple maps. Maps with higher priority situated in lower layers are not displayed. If maps overlay, the top (more detailed) map is displayed. The background will be white. The flag is highly recommended to be used.

Skip render
Skip map rendering means not to include drawing information for the map (then the map will be used for a search only).

Skip default render
The drawing information for the map should not be included into the file by default. Map rendering will be available only for the billing plans with the corresponding map tags.

Skip addresses
'Skip addresses' means not to enable the possibility for reverse geocoding (address search by coordinates). The map will be used for rendering only.

Creating a Map from MP Format

To create a map from the Polish MP format, you have to use a special XML configuration file. To download it on server, an archive consisting of a source map in MP format and of a configuration XML file should be created.

Standard configuration file transforming MP files to AVD files (pfm.xml) can be downloaded here: http://distro.gurtam.com/maps_cfg/. You can create your own configuration file according to your requirements.

Example:

```
<pfm>
<feature type="0x0001" shape="PL" avd_type="1" max_level="2" name="A restricted
access major divided highway, normally with 2 or more running lanes plus emergency
hard shoulder. Equivalent to the Freeway, Autobahn, etc." use_addr="1"
is_street="1"/>

<feature type="0x0002" shape="PL" avd_type="3" max_level="2" name="      Important
roads that aren't motorways. Typically maintained by central, not local government.
Need not necessarily be a divided highway." use_addr="1" is_street="1"/>

<feature type="0x0003" shape="PL" avd_type="5" max_level="2" name="Roads generally
linking larger towns." use_addr="1" is_street="1"/>

<feature type="0x0004" shape="PL" avd_type="7" max_level="2" name="Roads generally
linking smaller towns and villages." use_addr="1" is_street="1"/>

<feature type="0x0000" shape="PL" avd_type="9" max_level="2" name="Minor roads."
use_addr="1" is_street="1"/>
<feature type="0x000a" shape="PL" avd_type="11" max_level="1" name="Unclassified
roads typically form the lowest form of the interconnecting grid network."
use_addr="1" is_street="1"/>
<feature type="0x0042" shape="PL" avd_type="12" max_level="1" name="Unpaved roads."
use_addr="1"/>

<feature type="0x3008" shape="POI" avd_type="59" max_level="0" name="A fire station."
use_addr="1" is_house="1"/>
<feature type="0xf001" shape="POI" avd_type="60" max_level="0" name="Bus station."
use_addr="1" is_house="1"/>
<feature type="0x2f06" shape="POI" avd_type="61" max_level="0" name="A bank."
use_addr="1" is_house="1"/>
<feature type="0x2b00" shape="POI" avd_type="62" max_level="0" name="A hotel."
use_addr="1" is_house="1"/>
</pfm>
```

The following parameters are used in the configuration XML file:

use_addr
Use this element when searching an address by coordinates.

is_city
Use this element when searching a place by name (city).

is_street
Use this element when searching a street by name (street). Locking (snap) to roads function can also use this element.

is_house
Use this element when searching a house by name or number (house).

is_road
The road. This element can also be used to lock unit's movements to existing roads.

type

Source type from MP file (Polish format).

shape:

PG — polygon, *PL* — polyline, *POI* — point.

avd_type

Resulting map type in AVD file (0—255).

max_level

Maximum level to store map data in AVD format. Levels depend on metrage: o level — from 10 to 250 meters, 1 level — from 250 m to 20 km, 3 level — from 20 to 500 km.

name

The name of an object, area, point, that is custom mark.

⚠ *Note.*

The following conditions should be met in order to store map inscriptions properly:

- source MP file must be encoded in Win 1251, and the inscription (IMG ID) must contain the string *CodePage=1251*;
- source MP file must be encoded in Win UTF-8, and the inscription (IMG ID) must contain the string *CodePage=1252* or other value different from 1251.

Creating Maps From OSM Format

To create maps from OSM format files, a configuration XML file or allCountries.txt are used. To download on server, an archive containing OSM format source map, configuration XML file, and allCountries.txt should be formed. The last one (allCountries.txt) is an additional file for address binding. The document consists of world cities list in which the population size is indicated. An approximate radius of a city is calculated on the basis of the special algorithm and depends on the population size.

osm.xml is a configuration file transferring OSM files to the standard AVD files.

Standard configuration file transferring OSM files to AVD files (osm.xml) and allCountries.txt could be downloaded here: ◉ http://distro.gurtam.com/maps_cfg/.

Maps from Other Vector Formats

To create maps from other vector formats such as MapInfo, ESRI shapefile, etc., it is necessary to download an archive consisting of the source map layers in a corresponding format and of a configuration XML file.

XML file should be encoded in UTF-8 without BOM:

```
<conv name="cheljabinskaja" encoding="utf8">
        <layer file="chel-roads-l.shp">
                <features max_level="1" name="$NAME" use_addr="1" is_street="1"
region="$ADDR_REGIO" street="$NAME">
                        <mod filter="(highway ='bridleway') or (highway
='living_street')" type="14"/>
                        <mod filter="(highway ='path') or (highway ='steps')"
type="16"/>
                </features>
        </layer>
        <layer file="chel-buildings-a.shp">
                <features type="210" max_level="1" name= "$ADDR_HOUSE" is_house="1"
region="$ADDR_REGIO" street="$ADDR_STREET" house="$ADDR_HOUSE" use_addr="1"/>
        </layer>
        <layer file="chel-city-p.shp">
                <features type="64" max_level="2" name="$NAME" address="$NAME">
                        <mod filter="PLACE ='village'" type="66" is_city="1"
region="$ADDR_REGIO" max_level="1" name="$NAME" address="$NAME"/>
```

```
                            <mod filter="PLACE = 'town'" type="65" is_city="1"
 region="$ADDR_REGIO" max_level="1" name="$NAME" address="$NAME"/>
                            <mod filter="PLACE = 'city'" type="64" is_city="1"
 region="$ADDR_REGIO" max_level="1" name="$NAME" address="$NAME"/>
                </features>
        </layer>
        <layer file="chel-landuse-a.shp">
                <features type="166" max_level="1" name="$NAME">
                        <mod filter="LANDUSE ='Military'" type="173" max_level="1"
 name="$NAME"/>
                        <mod filter="LANDUSE ='cemetery'" type="147" max_level="1"
 name="$NAME"/>
                        <mod filter="LANDUSE ='commercial'" type="151" max_level="1"
 name="$NAME"/>
                        <mod filter="LANDUSE ='forest'" type="165" max_level="1"
 name="$NAME"/>
                        <mod filter="LANDUSE ='nature_reserve'" type="184"
 max_level="1" name="$NAME"/>
                        <mod filter="LANDUSE ='residential'" type="166" max_level="1"
 name="$NAME"/>
                </features>
        </layer>
        <layer file="chel-admin-a.shp">
                <features type="0x004a" shape="PG" avd_type="0" max_level="0"/>
        </layer>
</conv>
```

The file starts and ends with the **conv** tag. The following keys can be used inside this tag: **name** — map name, **encoding** — file encoding for a conversion.

The main part of a map conversion is the description of the layers used to receive data. The **layer** tag allows to describe each layer individually and, if provided by different attributes, converse a map according to them.

The **file** key is used to define the layer file.

Then you should indicate the **features** layer properties. In the **type** key it is necessary to indicate the elements' type value from the map in the format *.avd (see it in *pfm.xml* or *osm.xml*). The **name** parameter is used to display any properties of a converting objects. This parameter will be used as a caption for objects on the map. Only Latin letters and $ sign are accepted. In the above mentioned example the names for the used fields could be found in the files indicated there,i.e., in *.shp. If other symbols are used, the file may be converted with errors or not converted at all. If you would like to convert such files, you should change the fields' names for the latin ones.

It is also necessary to indicate the level on which the maps from the file will be situated. The **max_level** parameter is in charge for it. Depending on your preferences, you can vary these parameters from 0 to 2 or leave them as in *pfm.xml* or *osm.xml*.

The following parameters are optional:

- **data_type** — object type: polygon (pg), polyline (pl), point (poi). Example: *data_type="pg"*.
- **address** — define address by the indicated value.
- **region** — define region name by the indicated value. Example: *region="$Region"*.
- **street** — define street name by the indicated value. Example: *street="$st"*.
- **street_type** — define street type by the indicated value. Example: *street_type="$sts_type"*.
- **house** — define house number by the indicated value. Example: *house="$number"*.
- **is_city** — define if this object is a city. If it is not, do not use this parameter. Example: *is_city="1"*.
- **is_street** — define if this object is a street. If it is not, do not use this parameter. Example: *is_street="1"*.
- **is_house** — define if this object is a house. If it is not, do not use this parameter. Example: *is_house="1"*.
- **dump_attr** is responsible for displaying particular object properties (in *stdout*). It works in the same way as the **name** parameter, but it displays information for a user who is converting the map.

Dollar sign in quotes ("**$**") means that letters which follow will be used as a variable and substituted with this variable

value. To use a usual text together with a variable, it is necessary to mark it with '**|**' sign from both sides. To retrieve data from some other layer, use the hash sign (**#**). After '**#**', set three parameters. In the first parameter indicate the field from which the value should be taken, and then put a dot (**.**). The second parameter indicates the layer (filename without extension) to be used to get data, put a dot again. The third parameter indicates which field from the indicated layer should be used. The forth parameter can be used if the value is hidden in a string field or among a number of values — enter field, equal sign (**=**), and '%' sign in single quotes (**'%'**). Do not forget to separate all parameters with dots.

Here is an example.

Let us assume, that we have two layers:

- the *cities* layer with the fields *ID*, *Name*, *Region*;
- the *streets* layer with fields *ID*, *City*, *CityID*, *Name*.

Then,

- to get street name and the city, use
  $Name|, |#CityID.Cities.Name;
- to get the city and region while searching by another field, use
  $Name|, |#City.Cities.Region.Name='%'.

If you have noticed that the layer file contains objects of different types (you can check it with the **dump_attr** parameter), and you want to display them as different types, use the '**mod**' tag. There you set filtration conditions and object type expected as the result of conversion process. In the **filter** parameter enter the condition as SQL query. The **type** parameter is set in the same manner as it was described above.

In one *layer* there can be any number of *features*. In one *feature* there can be any number of *mod*.

If there is an error when reading the file, try to open it in another program, for example, Internet Explorer: if there are any errors in file body, IE displays only the correct part of the file. However, note that the check is performed only for opening/closing tags.

Use comments to make further editing and usage of the file easier.

Format Specification

Vector maps in the closed AVD format allow rendering map images in various projections, fulfill the search of named objects, and detect location by given coordinates.
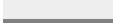
- Conversion Table: Polyline (PL)
- Conversion Table: POI
- Conversion Table: Polygon (PG)
- Scale (AVD)

Conversion Table: Polyline

.MP	.OSM				.AVD					
Code	Key	Value	Keys	Key_values	Type	AVD Type (0-255)	Data level (0-2)	Comment	Image	Icon
0x0001	highway	motorway			PL	1	2	A restricted access major divided highway, normally with 2 or more running lanes plus emergency hard shoulder. Equivalent to the Freeway, Autobahn, etc.		
	highway	motorway_link			PL	2	2	The link roads (sliproads/ramps) leading to/from a motorway from/to a motorway or lower class highway. Normally with the same motorway restrictions.		
0x0002	highway	trunk			PL	3	2	Important roads that are not motorways. Typically maintained by central, not local government. Need not necessarily be a divided highway.		
	highway	trunk_link			PL	4	2	The link roads (sliproads/ramps) leading to/from a trunk road from/to a trunk road or lower class highway.		
0x0003	highway	primary			PL	5	2	Roads generally linking larger towns.		
	highway	primary_link			PL	6	2	The link roads (sliproads/ramps) leading to/from a primary road from/to a primary road or lower class highway.		
0x0004	highway	secondary			PL	7	2	Roads generally linking smaller towns and villages.		

	highway	secondary_link			PL	8	2	The link roads (sliproads/ramps) leading to/from a secondary road from/to a secondary road or lower class highway.	
0x0000	highway	tertiary			PL	9	2	Minor roads.	0-6 7-8
	highway	tertiary_link			PL	10	2	The link roads (sliproads/ramps) leading to/from a tertiary road from/to other minor roads.	
0x000a	highway	unclassified			PL	11	1	Unclassified roads typically form the lowest form of the interconnecting grid network.	0-6 7-8
0x0042	highway	unsurfaced			PL	12	1	Unpaved roads.	
	highway	track			PL	13	1	Roads for agricultural use, gravel roads in the forest etc., usually unpaved/unsealed but may occasionally apply to paved tracks as well.	
0x0005	highway	residential			PL	14	1	Roads accessing or around residential areas but which are not a classified or unclassified highway. Streets.	0-6 (7-9)
0x0006 0x000b 0x0008 0x0009 0x0049	highway	living_street			PL	15	1	A street where pedestrians have priority over cars, children can play on the street, maximum speed is low. Sometimes called 'Home Zone'.	(0-5) (6)
0x0007	highway	service			PL	16	1	Generally for access to a building, motorway service station, beach, campsite, industrial estate, business park, etc. This is also commonly used for access to parking and trash collection.	(0-5) (6)
	highway	bridleway			PL	17	1	Roads for horses, cartage.	
	highway	cycleway			PL	18	1	Cycleways for bicycles.	
	cycleway	lane			PL	18	1	A lane is a route for bicycles that lies within the roadway.	
	cycleway	track			PL	18	1	A route for bicycles that is separate from the road.	
	highway	footway			PL	19	1	Footpaths for pedestrians, e.g. walking tracks and gravel paths.	
0x0048								For roads used mainly/exclusively for	

0x0016	highway	pedestrian			PL	19	1	pedestrians/shopping areas. Also for tagging squares and plazas.		
	highway	bus_guideway			PL	20	1	A busway where the vehicle guided by the way (though not a railway) and is not suitable for other traffic.		0-6 (7-9)
	junction	roundabout			PL	21	1	Circle movement.		
0x0014	railway	rail			PL	25	1	Full sized passenger or freight trains in the standard gauge for the country or state.		
	railway	tram			PL	25	1	One or two carriage rail vehicles, usually sharing motor road for trams.		
0x003f	railway	subway			PL	26	1	A city passenger rail service running mostly grade separated. Metro/underground/subway lines.		
	railway	disused			PL	25	1	A section of railway which is no longer used but where the track and infrastructure remains in place.		
	railway	monorail			PL	27	1	A railway with only a single rail.		
0x001f	waterway	river			PL	30	2	For narrow rivers which will be rendered as a line.		
0x0018	waterway	canal			PL	30	1	An artificial open waterway used for transportation, waterpower, or irrigation.		
0x0026	waterway	stream			PL	30	1	A naturally-formed waterway that is too thin to be classed as a river. An active, able-bodied person should be able to jump over it if trees along it are not too thick.		
0x0044	waterway	drain			PL	30	1	An artificial waterway for carrying storm water or industrial discharge.		
	waterway	weir			PL	30	1	A barrier built across a river, sometimes to divert water for industrial purposes. Water can still flow over the top.		
	waterway	dam			PL	31	1	A wall built across a river or stream to impound the water. A dam normally does not have water flowing over the top of it.		
								A strip of land kept clear and set aside for		

Code	Key	Value		Type	AVD Type (0-255)	Data level (0-2)	Comment	Image	Icon
	aeroway	runway			PL	35	1	aeroplanes to take off from and land on.		
0x0045 0x001d	boundary	administrative	admin_level	8	PL	191	1	State, county, local council.	------------	
0x001c					PL	192	1	Region boundary.	—·—·—·—·—	
0x001e	boundary	administrative	admin_level border_type	2 nation	PL	193	2	National boundary.	————	

Conversion Table: POI

.MP	.OSM		.AVD					
Code	Key	Value	Type	AVD Type (0-255)	Data level (0-2)	Comment	Image	Icon
0xf201	highway	traffic_signals	POI	50	0	Lights that control the traffic.		
0xf002 0x2f08 0x2f17 0xf001 0xf003 0xf004	highway	bus_stop	POI	51	0	A small bus stop.		
0x2f03	highway	services	POI	52	0	A service station to get food and eat something, often found at motorways.		
0xf007	railway	station	POI	53	0	A railway station.		
0xf006	railway	halt	POI	53	0	A small railway station, may not have a platform, trains may only stop on request.		
0x4600	amenity	pub	POI	55	0	A place selling beer and other alcoholic drinks; may also provide food or accommodation.		
0x2d02 0x2d00	amenity	nightclub	POI	55	0	A nightclub.		
0x2a0e	amenity	cafe	POI	55	0	A cafe.		
0x4500	amenity	restaurant	POI	55	0	A restaurant.		
0x2a0d	amenity	fast_food	POI	55	0	An area with several different restaurant food counters and a shared eating area. Commonly found in malls, airports, etc.		
0x2f0b	amenity	parking	POI	56	0	Car park or a parking.		
0x2f02	amenity	car_rental	POI	56	0	A place to rent a car.		
	amenity	taxi	POI	56	0	A place where taxis wait for passengers.		
0x2f01 0x4400	amenity	fuel	POI	57	0	Petrol station, gas station, marine fuel, etc.		
0x2e05	amenity	pharmacy	POI	58	0	A pharmacy.		
	amenity	hospital	POI	58	0	A hospital.		
0x3001	amenity	police	POI	59	0	A police station.		
0x3008	amenity	fire_station	POI	59	0	A fire station.		
0xf001	amenity	bus_station	POI	60	0	Bus station.		

0x2f06	amenity	bank	POI	61	0	A bank.		[?]
	amenity	bureau_de_change	POI	61	0	Currency exchange, a place to change foreign bank notes and travellers cheques.		[?]
	amenity	atm	POI	61	0	An ATM or cash point.		[?]
0x2b00	tourism	hotel	POI	62	0	A hotel.		[?]
0x2b01	tourism	motel	POI	62	0	A motel.		[?]
0x2b02	tourism	guest_house	POI	62	0	Guest house.		[?]
	tourism	hostel	POI	62	0	A hostel.		[?]
0x0100 0x0200			POI	63	2	A megalopolis over 5 million people.		[?]
0x0300 0x0400	place	city	POI	64	2	A city of 1-5 million people (MP). A city over 100 thousand people (◉OSM).		[?]
0x0500 0x0600 0x0700 0x0800 0x0900 0x0a00 0x0006 0x0004	place	town	POI	65	1-2	A town from 10 to 100 thousand people.		[?]
0x0b00 0x0c00 0x0d00 0x0e00 0x0f00 0x1000 0x1100 0x0010	place	village_greenhamlet	POI	66	1	A village below 10 thousand people.		[?]
0x640a			POI	67	0	Captions.		
0x3002 0x6408			POI	149	0	A hospital.		[?]
	place	continent	POI	195	2	A continent.		
0x6602	place	state	POI	196	2	A state.		
0x1e00	place	region	POI	197	1	A region.		
0x1f00	place	country	POI	198	1	A country, area.		

Conversion Table: Polygon

.MP	◉.OSM		.AVD					
Code	Key	Value	Type	AVD Type (0-255)	Data level (0-2)	Comment	Image	Icon
0x0047 0x003b 0x0045 0x0049 0x0040 0x0041	waterway	riverbank	PG	130	2	Used for large rivers, to define an area between the opposite riverbanks.		▪
divided by size	natural	water	PG	131	2	Lakes, water bodies, etc.		▪
divided by size	landuse	reservoir	PG	131	2	An artificial reservoir.		▪
0x0028			PG	132	2	Sea, ocean.		

	waterway	riverbank	PG	133	2	A large river.		
	leisure	park	PG	140	1	A park, open green area for recreation.		
	leisure	common	PG	140	1	An area where the public can walk anywhere.		
0x004e 0x004f 0x008e 0x0086 0x0087 0x0088	leisure	garden	PG	141	1	A garden.		
0x006d	amenity	townhall	PG	146	1	A town hall building (mayor's office).		
0x001a	amenity	grave_vard	PG	147	1	A graveyard.		
	landuse	cemetery	PG	147	1	A cemetery.		
0x000a	amenity	school	PG	148	1	A school.		(0-5) (6)
	amenity	university	PG	148	1	A university.		(0-5) (6)
	amenity	college	PG	148	1	A college.		(0-5) (6)
0x3002	amenity	hospital	PG	149	1	A hospital.		(0-5) (6)
	amenity	pharmacy	PG	149	1	A pharmacy.		(0-5) (6)
0x6408	building	clinic	PG	149	1	A clinic.		(0-5) (6)
0x000b	building	hospital	PG	149	1	A hospital.		(0-5) (6)
	shop building	supermarket	PG	151	1	A supermarket.		
	building	shopping	PG	151	1	A shop.		
	tourism	camp_site	PG	153	0	Camping, a place where you can pitch a tent.		
	tourism	caravan_site	PG	153	0	A place where you can park a caravan overnight or for longer periods.		
					1	A place where you can have an		

	tourism	picnic_site	PG	154	0	outdoor picnic. May have facilities such as tables and benches.		🔲
	tourism	theme_park	PG	155	1	Theme park, amusement park.		🔲
	tourism	attraction	PG	156	0	A general tourism attraction.		🔲
	tourism	zoo	PG	157	1	A zoo.		🔲
	tourism	artwork	PG	158	1	A tag for public pieces of art.		🔲
	historic	archaelogical_site	PG	159	0	Archaeological museum.		🔲
0x0050 0x0081 0x0082 0x0083 0x0084 0x0085 0x0052 0x008f 0x0090 0x0091	landuse	forest	PG	165	2	Managed forest or woodland plantation.		🔲
0x0001 0x0002 0x0003	landuse	residential	PG	166	1	Predominantly houses or apartment buildings.		🔲
	landuse	retail	PG	167	1	Predominantly shops.		🔲
	landuse	commercial	PG	168	1	Predominantly office buildings, business parks, etc.		🔲
0x000c	landuse	industrial	PG	169	1	Predominantly workshops, factories, warehouses.		🔲
0x0006			PG	169	0	Garages, vehicle sheds.		🔲
	landuse	blownfield	PG	170	1	A district to be developed, an empty area.		⬜
	landuse	greenfield	PG	170	1	Describes land scheduled for new development where there have been no buildings before .		⬜
	landuse	railway	PG	171	1	Area for railway use, generally off-limits to the general public.		🔲
	landuse	construction	PG	172	1	Something under construction.		🔲
0x0004	landuse	millitary	PG	173	1	For land areas owned/used by the military for whatever purpose.		🔲
0x0014 0x000d 0x0015 0x0016 0x0017 0x001e 0x001f 0x0020 0x0098	natural	wood	PG	184	2	Natural woodland (trees). Only for completely unmanaged/wild areas.		🔲
0x0051 0x0096 0x008b	natural	marsh	PG	185	1	Low poorly drained land that is sometimes flooded and often lies at the edge of lakes, streams, etc.		🔲
0x0018	sport	golf	PG	194	1	Golf course.		🟨
	sport	horse_racing	PG	194	1	Hippodrome, racecourse.		🟨
	sport	multi	PG	194	1	Sports ground, playing field.		🟨
	sport	football	PG	194	1	Football.		🟨
	sport	soccer	PG	194	1	Football or soccer.		🟨

	Key	Value	Type	Value	Zoom	Description		Icon
	building	stadium	PG	194	1	A stadium, a major sports arena with substantial tiered seating.		■
	leisure	golf_course	PG	194	1	Golf course.		■
	leisure	stadium	PG	194	1	A stadium.		■
	leisure	track	PG	194	1	A track, e.g. running, cycle-racing, greyhound, horses.		■
	leisure	pitch	PG	194	1	A field for playing football/soccer, cricket, baseball sports, etc.		■
	building	palace	PG	207	1	A palace.		(0-5) ■ (6) ■
	building	postoffice	PG	208	1	A post office.		(0-5) ■ (6) ■
	building	restaurant	PG	209	1	A restaurant.		(0-5) ■ (6) ■
0x006f 0x006f	amenity	public_building	PG	210	1	Public building.		(0-5) ■ (6) ■
0x0013 0x006c	building	yes	PG	210	1	General tag for buildings.		(0-5) ■ (6) ■
0x006e	building	terminal	PG	210	1	A building.		(0-5) ■ (6) ■
	denomination	baptist catholic christian evangelical lutheran Roman Catholic roman_catholic	PG	211	0	A church.		(0-5) ■ (6) ■
0x9999	surface		PG	212	2	Ground surface.		(0-5) ■ (6) ■

Scale (AVD)

Scale (km)	Scale (m)	Data level	Zoom level	Value
0,02	20	0	0	2000
0,05	50	0	1	5000
0,1	100	0	2	10000
0,1	100	0	3	10000
0,2	200	0	4	20000

1	1000	1	5	100000
1	1000	1	6	100000
2	2000	1	7	200000
5	5000	1	8	500000
10	10000	1	9	1000000
20	20000	1	10	2000000
50	50000	2	11	5000000
100	100000	2	12	10000000
100	100000	2	13	10000000
200	200000	2	14	20000000

Logs
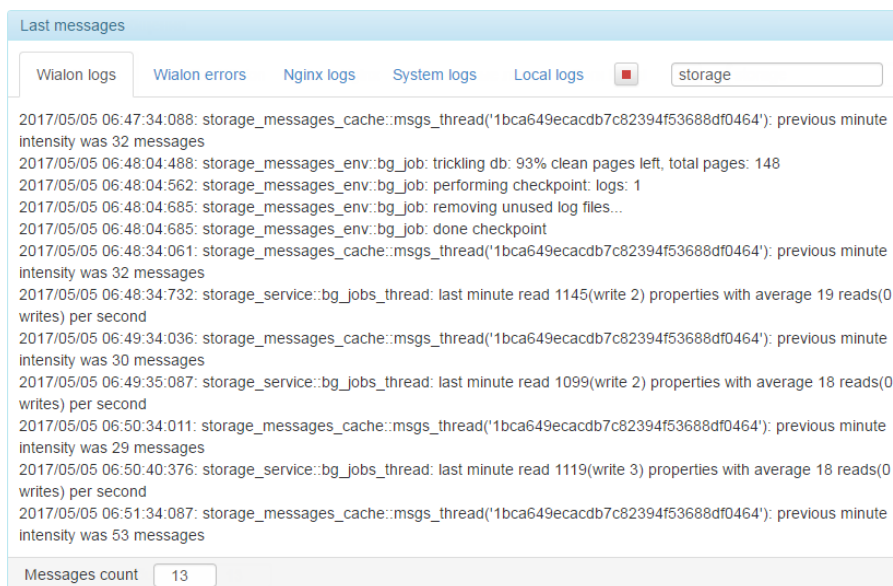
On this page, you can observe different kinds of logs kept in the system. The last hundred messages are available for (in parentheses you can see their physical location on your server):

- Wialon logs (/home/wialon/wlocal/logs/trace.log*);
- Wialon errors (/home/wialon/wlocal/logs/error.log*);
- Nginx logs (/var/log/nginx/error.log*);
- System logs (/home/wialon/wlocal/logs);
- Local logs (/home/wialon/wlocal/lcm/lcm.log*).

New messages are added to the bottom.

In the upper right corner there is a dynamic filter that allows to sort the log's contents according to the introduced value (corresponds to the utility 'grep').

You can also adjust the quantity of lines shown in the log. To do this, enter the necessary number in the line 'Messages cont' below (corresponds to the utility 'tail').

It is possible to stop or start the los using the buttons ▪ and ▶, respectively. If the log is stopped, the two options described above cannot be applied to it.

The system checks for errors once an hour, and if there are any, a report is sent to the administrator (whose e-mail is adjusted on the 'System' page).

A system administrator also has access to the following additional logs in the console:

- Logs of the access to web and cms (/var/log/nginx/*).
- Logs of the mail system if the SMTP is not adjusted (/var/log/mail.log*).
- Wialon logs without users' work, that is automatic processes only (/home/wialon/wlocal/logs/service.log*).
- Logs of working with the hardware (/home/wialon/wlocal/logs/). You can see the contents of a log using the command 'cat'. As a rule, you can understand which log to what type of hardware belongs. For example, from the contents of the log '2016/05/02 06:25:13:284: Received GPRS message from unknown unit (Wialon Retranslator): ID: 123456789000121' you can see that Wialon Retranslator is used as hardware type.
- The logs of the administrator of the website (/home/wialon/wlocal/logs/lcm/*). These logs are divided into general, errors and messages about restarts and sessions.

All the logs are rotated by means of the preinstalled and adjusted logrotate. By default the previous 10 days of logs are stored, but it's possible to enlarge this period by means of changing the corresponding configuration file in the directory /etc/logrotate.d/ (replace rotate 10 with the value you need). For instance, for Wialon Local logs that is /etc/logrotate.d/wlocal. After you have changed the file, update the configuration using the command 'logrotate -f -v /etc/logrotate.d/$filename$', where $filename$ is the name of the file you have changed.

Wialon

This page is accessible only when Wialon is operating. Here you configure sites and modems, manage recycle bin, etc.

Further information:

- Root User
- Default Billing Plan Settings
- Sites
- Modems
- Trash

Root User

The root user is 'wialon'. With this username and initially the same password, you can login to the main tracking interface (Wialon Web), CMS Manager, and other Wialon services (sites). ⚠ To prevent unauthorized access to the capabilities of the top user it's recommended to change the password immediately after installing Wialon Local.
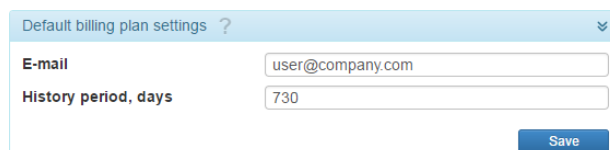
On the Wialon page, you can enter e-mail address and password for the root user. E-mail is required for reset password procedure, password — for login action.

Note that only the root user can create and manage billing plans, Apps, and perform conversion.

Default Billing Plan Settings

In this section you can configure the root user's billing plan:

- **E-mail** — the root user's (wialon) e-mail. It is used for sending system messages.
- **History period, days** — the data storage period for the root user's billing plan (that is, of the whole server). The messages deleted on the expiry of the indicated period, cannot be restored.

Default billing plan settings ?		⮟
E-mail	user@company.com	
History period, days	730	
		Save

Sites

⚠ By default, two sites are available: one of Wialon Web type and one of CMS Manager type. More sites can be activated through the 'License' page.

⚠ For your first login use the root user's login and password.

There are five types of sites:

- CMS Manager (management system where accounts, users, units, retranslators are created);
- Wialon Web (the main tracking interface where the end users watch their units, generate reports, etc.);
- Wialon Mobile (a simplified tracking interface for mobile devices);
- Logistics (service for working with orders);
- ActiveX (a third-party software solution providing possibility to connect to Wialon database from external applications).

You can have only one CMS Manager site and one ActiveX, however, several Wialon Web sites ('Extra Site' module) and Wialon Mobile sites can be added, each located on its own DNS and, perhaps, wearing personal skin (paid option for Wialon Web sites).

Press the 'Edit' button to adjust site configuration — mainly DNS. Additional options are available for sites of Wialon Web type, CMS Manager and Logistics (if available). You can define your custom title for a site, add a copyright (this link will be displayed in the bottom panel), and apply a personal design.

In the table, you can see site DNS, type, and two buttons: to reconfigure a site and to stop/start it. Stopping a site means that users will not be able to login. Click on DNS link to open a site.

⚠ Note.
After (re)starting Wialon, all sites are restarted, too, regardless what state they were before.

Personalization

Personalization of Wialon Web

The sites of Wialon Web type (main tracking interface) can have a personalized look (each of them).

First of all, there is a paid option of 'Personal Design'. It provides a possibility to customize color scheme, fonts, and styles specially developed for your site (in addition to logos, favicon, and copyright link). However, no changes can be made to the layout of the functional blocks (like panels and menus) and standard icons. Usually, new look is appealing to your corporate style.

Personal designs are known also as skins. To apply one, choose its name in the appropriate dropdown list.
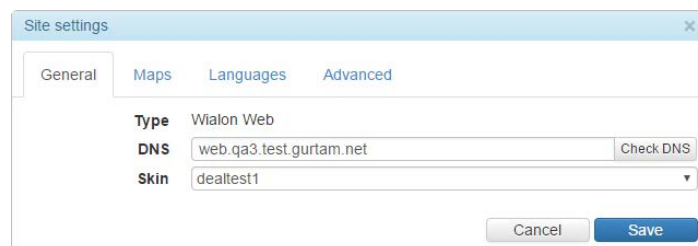
Some level of customization is possible even without a personal design. You can give a title to your site, place your logos, and add copyright information. For the logos and favicon, make sure they meet the requirements introduced in corresponding tooltips. After choosing an image, do not forget to press 'Upload'. In addition, URL addresses of support and help services can be indicated on this tab. Such services could be used in the main tracking interface.

Moreover, the corresponding fields allow you to indicate an external script which will be available in the monitoring system and login script as well.

For any site you can choose the protocol (http/ http+https/ https) and load a SSL certificate and a SSL key. If the latter ones haven't been loaded, a self-signed certificate will be created.

Press 'Save' to finalize changes.

To come back to the initial look, empty all text fields on this tab and reset all images to 'Default'.
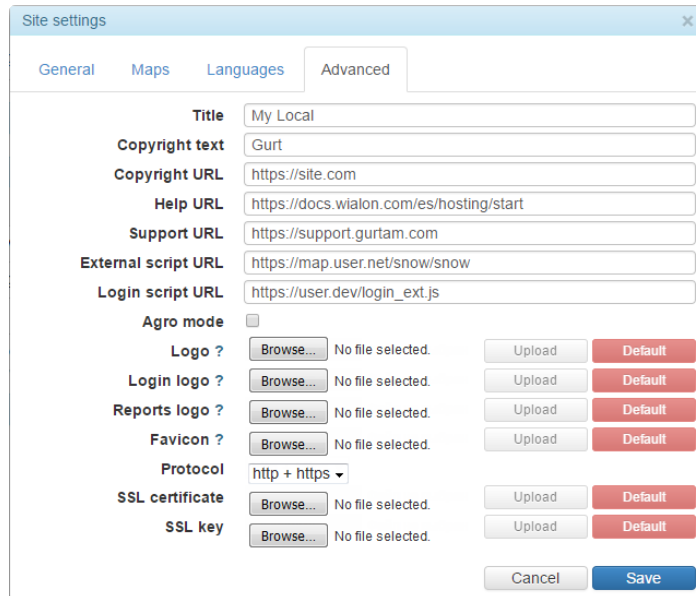
Here is where you can find all these things:
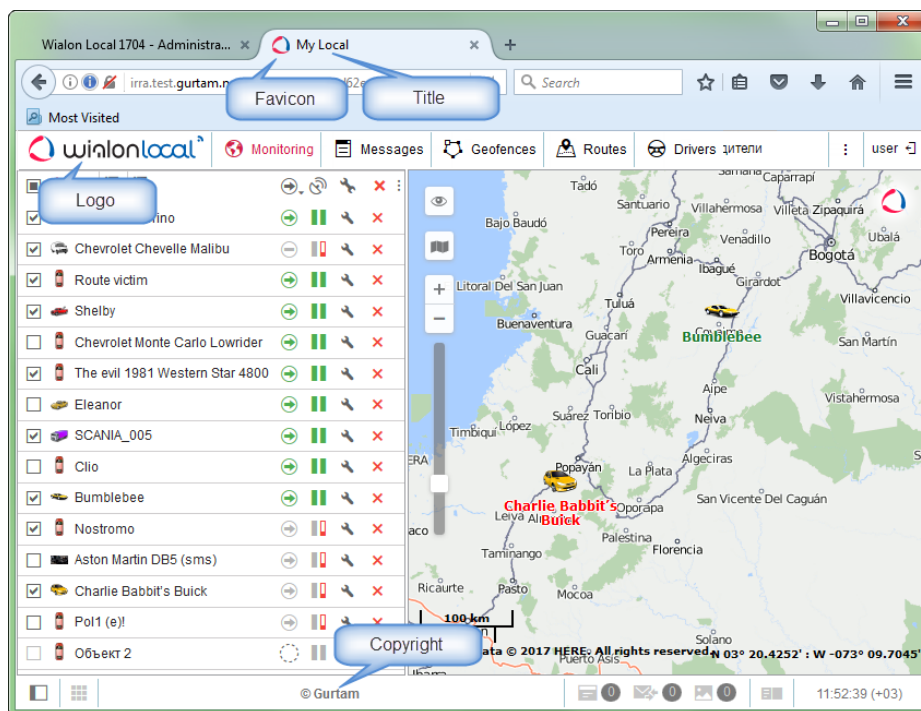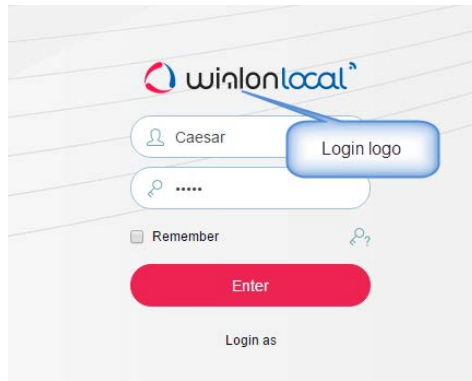
Personalization of CMS Manager

Some personalization options are also available for the site CMS Manager.
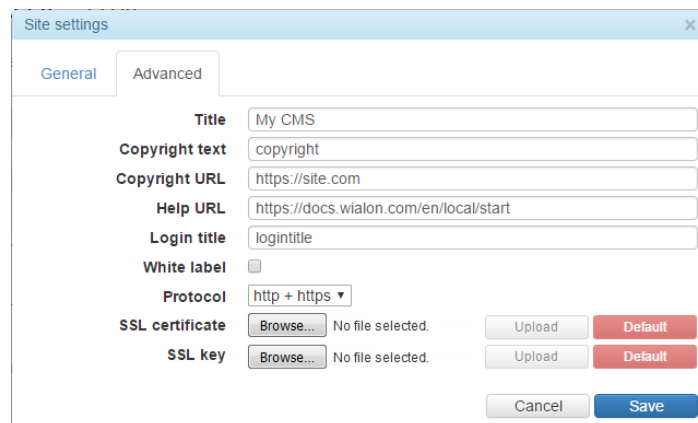
You can choose titles for the site and the login (it is shown on the login page if the 'White lable' option is activated), indicate the copyright information (text and URL), select the protocol (http/http+https/https), load a SSL certificate and a SSL key. You can also hide the logos ('White label' option) and enter the Help URL. Note that if there is no Help URL indicated, in CMS Manager there will be a link to the default documentation, taking into account the language of the interface. If there is a URL indicated, the language of the interface will not be taken into account. To disable the link to the documentation, you need to type 'skip' in this field.

After making changes to a site, it is recommended to restart it and clear the cache.

Personalization of Logistics

For the Logistics site you can choose the protocol (http/http+https/https), load the SSL certificate and a SSL key.
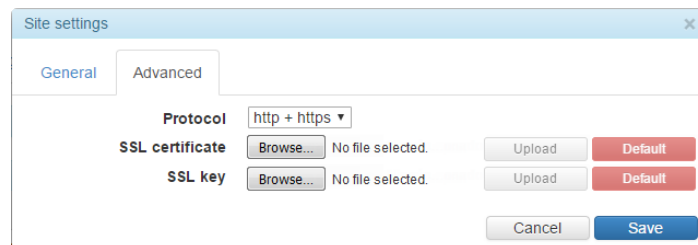
Note that for the operation of Logistics via the https protocol, at least one of the sites Wialon Web or CMS Manager needs to use the https protocol as well (that is, in the 'Protocol' field 'http+https' or 'https' must be chosen for it).

The presence of the logo on the login page depends on the settings of the 'White label' option of the CMS Manager site. In that way, if it is activated, the logo on the login page of the Logistics site will not be shown.

Maps and Languages

Maps should be enabled for each site separately. By default, users get access to Gurtam Maps / WebGIS (according

to your system configuration) and OpenStreetMap. Other maps can be used as background for tracking units, too. The list of such maps includes Google, Yandex, Bing, WikiMapia, Navitel, Visicom, Regio, ArcGIS, 2GIS, Luxena, MyIndia, Mapbox, what3words. However, most of them require activation keys.

Select the maps you need and enter activation keys (if needed) on this tab. Note that even with maps enabled for the site, users still have to activate the maps they need in their own settings. For Google maps you can indicate 'client ID' in the corresponding field. Moreover, if the 'Https' flag is indicated, then while working with maps a secure protocol will be used.

On the 'Languages' tab, select necessary languages. Note that if no flag is chosen, then all the languages will be available by default.

If you don't see the language you need in the list, please, contact the technical support.

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Modems

⚠ This component requires separate licensing.

To create a new modem, press the 'Add modem' button at the top of the section. Three types of modems are supported: GSM modem, SMPP gateway, and network modem. Some of the parameters of their configuration are common and others differ.

To delete a modem, open its settings and press 'Delete' at the bottom of the dialog.

Modem Common Parameters

Name
Enter a name for the modem.

Phone
Enter the phone number of the SIM card installed in the modem.

Link priority
Define communications channel priority. The modem with the highest priority will be chosen the first (the higher the number, the higher the priority).
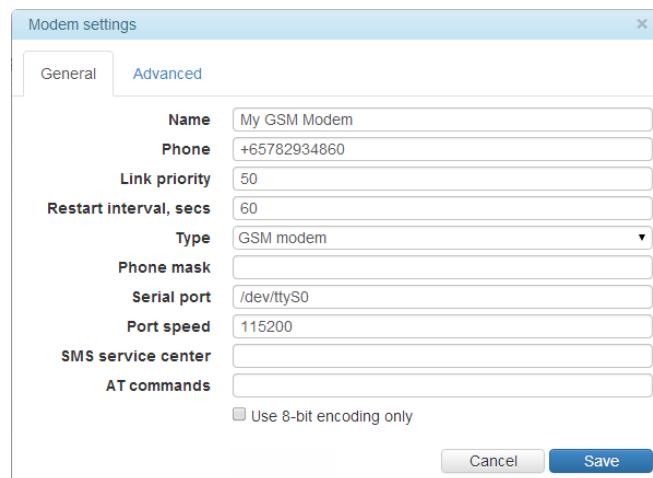
Restart interval
Indicate restart interval in seconds. If the connection with the modem is broken by any reason, after the time it will be automatically restarted. Note that if the restart interval is zero, the modem is not started when restarting the service.

Phone mask
Use this field if you want the messages to the phone numbers that correspond to the indicated mask to be sent from this particular modem. Otherwise, the messages will be sent via another modem or won't be sent at all. If the same mask is indicated for several modems, the values of the field 'Priority' are taken into consideration.

GSM Modem Parameters

⚠ To use a GSM modem execute in the server's console the command 'addgroup wialon dialout' .

Serial port
Indicate serial port where the modem is located.

Port speed
Indicate port speed. If any errors appear while operating, descend this value.

SMS service center

Usually, SMS service center is strictly indicated on the SIM card, and you will not have to enter it here.

AT commands

Indicate additional initialization AT commands if they are required according to modem instructions manual. If you need to indicate several commands, use commas to separate them from each other.

Use 8-bit encoding only

Check this option if you want to exclude other kind of encoding (if you are going to receive information that includes only Latin letters and special characters).

SMPP Gateway Parameters

Server …

Indicate server host (IP address or DNS name), server port, and password to connect to the server. If needed, indicate server type, which can be *VMS* (voice mail system), *OTA* (over-the-air activation system), or other.

Account name & **Source address**

Enter account name (login) and the source address to recognize the sender (like phone number, company name or both).

TON/NPI

Define format if necessary.

Enable synchronous mode

SMPP synchro mode may be useful to make hardware diagnostics. This works by the following algorithm: while there is no notification that the first SMS was delivered, the second one will not be sent.

Use GSM03.38 encoding

Check this option if you want to exclude other kind of encoding.

Split long SMSs using SAR method
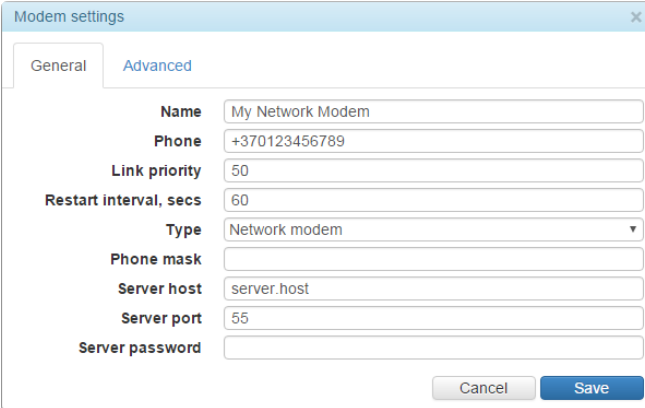
By default, SMS messages are transmitted with UDH method (User Data Header) where system information is placed at the beginning. SAR method (segmentation and reassembly) allows to place this information at the end in TLV format, which is essential for several languages that have characters which cannot be transmitted in 8-bit encoding. In these cases, enable the option 'Split long SMSs using SAR method' to solve the problem.

Remove '+' in destination number

Check the option to eliminate the plus symbol from destination phone numbers.

Parameters for Network Modem

⚠ To connect a remote physical modem send a request for the installation of a special utility to the 🌐technical support.

Indicate server host, server port, and password to connect to the server.
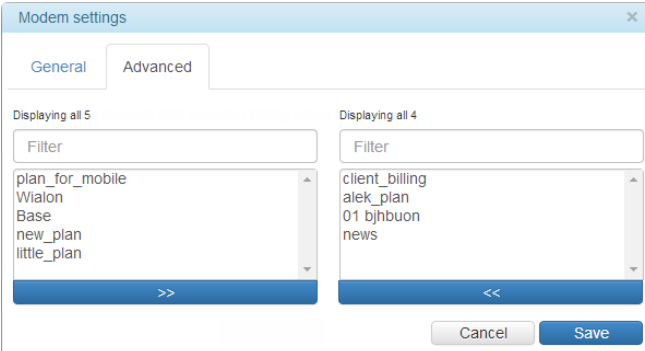
Server host is an IP address or a DNS name where the utility is installed.

Server port is a port where the utility is waiting for connection.

Server password is an optional field that is adjusted in the configuration file of the utility.

Advance Parameters

Modem activity can be restricted to selected billing plans. Modem is unavailable for all billing plans by default. To use a modem for a billing plan it is necessary to move the corresponding billing plan from the right column to the left one.

SMS sending

The mechanism of the selection of the channel for sending SMS is as follows:

1. The billing plan from the account from which the sending is realized (which belongs to the resource with a job/driver/notification o where a unit has been created) is being checked.
2. All the available modems in this billing plan are found.
3. The modems are organized according to their priority from the highest to the lowest.
4. A search of the phone number according to the mask is realized, and the modem that corresponds to it receives the highest priority. If there are several modems like this, the values of the field 'Priority' from their properties are taken into consideration.
5. If the current found modem is stopped, the following one by turn is chosen for sending SMS.

Trash

The objects deleted from the system are placed in trash. It means that they can be restored. A required term of storage should be chosen from the dropdown list in the header of a trash block (30 days by default).

On the list, you can observe object's name, type, and date and time of deletion. Object types are the following:

- *avl_unit* — unit;
- *storage_user* — user;
- *avl_resource* — resource;
- *avl_unit_group* — unit group;
- *avl_retranslator* — retranslator;
- *avl_route* — route.

Any object from the list can be restored or deleted from the system completely. To restore/delete multiple objects at once, select them with mouse click and then click 'Restore all' or 'Delete all' in the header.
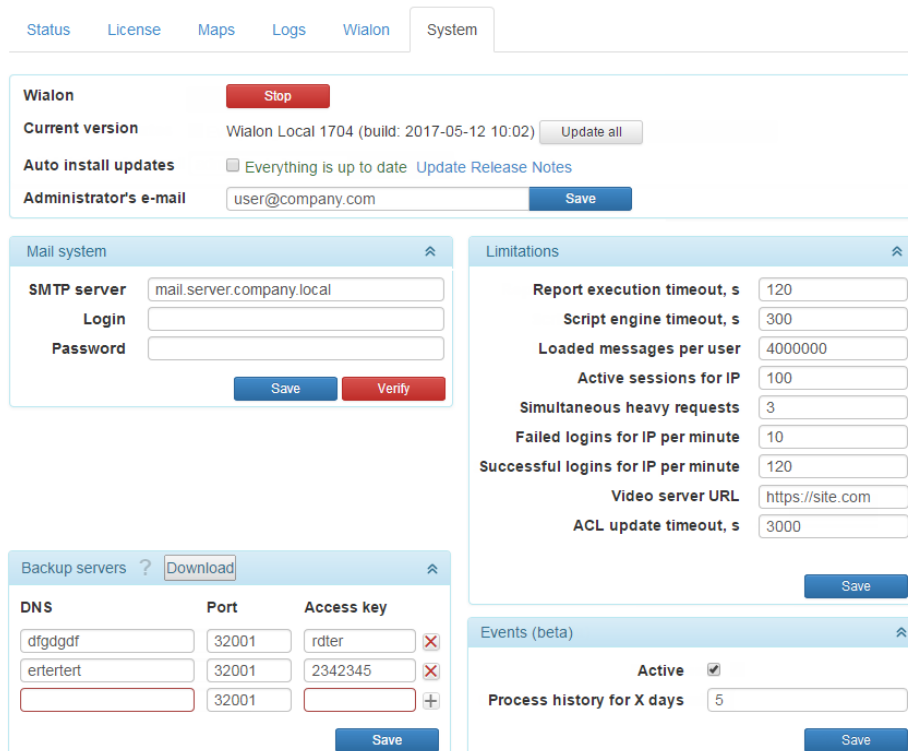
⚠ *Attention!*
Deleted objects are *always* restored into the root account 'wialon'. If needed, you can transfer them later to the accounts that stay lower in the hierarchy. Moreover, you should take into consideration that restoring objects is, in fact, their re-creation, which means that it requires free slots.

System

On this page, you can start/stop Wialon manually, install updates, adjust mail server, and set important limitations.

Here you can also indicate your e-mail ('Administrator's e-mail') which will be used for the following:

- to reset the password in case you lose it;
- to send system reports about available updates, occurring errors, deficient disk space, etc.

Updates

Updates can come from two sources: either you have purchased something on the 'License' page or Gurtam has published a new release for Wialon Local.

You can choose to install updates manually or automatically. If you enable the option 'Auto install updates', the system will automatically detect the availability of updates and install them immediately. If the option is disabled, you will be informed about updates in the Log, and a corresponding phrase (like '3 updates available' instead of 'Everything is up to date') will appear near the checkbox. To install updates manually, press the link 'Install now'.

No matter how you install updates, manually or automatically, Wialon will be restarted. This will cause restarting of sites, modems, etc., and all active sessions will be forcibly finished.

The currently used version of Wialon Local is indicated in the appropriate row.

Upon the arising of any failures connected with modules, you can change the situation by reinstalling them. To do so, click on the button 'Update all' situated on the tab 'System' and then install the uploaded update.

Mail System

Among the additional software provided and installed together with the operational system Debian there is *postfix* specially adjusted for Wialon Local. It is used for sending mail (either to administrator about Wialon operation or to end

users with reports and notifications).

Sender's address is chosen in the following order (if one is empty, the following is taken):

1. e-mail from billing plan
2. administrator's email (from the System page)
3. noreply@gurtam.com

You may also adjust another SMTP server. In this case, all mail except for messages to the administrator will go through it.

Enter your SMTP server address. It may prove to be enough if you have your own SMTP server. However, if you use an external server for sending mail (like gmail.com, for example), you will need authorization. In this case, you enter your login and password you obtained in that mail system.

⚠ *Attention!*
When connecting to a third-party SMTP server, use the authorization without plain text encryption.

When finished, press 'Save' and restart Wialon. To check if the mailing system is configured properly, you can press 'Verify'. A test message will be sent to the administrator's e-mail. You can also see the results of this check in the Log below.

Most mail systems perform special checks for spam messages. They compare the original IP address from which the messages go with the MX record of the sender's domain. If the MX record is not found, sending messages might be suspended, or the sender's address might be added to the 'grey list' (this eventually might lead to total denial of processing and sending messages). To avoid such situation, when you register your Wialon-related sites, make sure that external IP address of the server is included in the MX records of the domain.

Limitations

In order to provide actual data, all the online queries have their execution time. If it is exceeded, the browser doesn't wait for an answer from the server and the query's execution stops. This restriction is 3 minutes for the reports and 5 minutes for the scripts.

To ensure a stable operation of the server and to prevent it from overloading you can adjust the limitations listed below.

Report execution timeout, secs
If a report execution takes more time than it is indicated here, it will be aborted.

Script engine timeout, secs
If the execution of scripts exceeds this time, it stops.

Loaded messages per user
The number of messages that can be loaded by a user into all user's sessions. If this limit is met, this user may have difficulties in executing reports, building tracks, importing messages, etc.

Active sessions for IP
The maximum number of active sessions of one user from one IP address.

Simultaneous heavy requests
By heavy requests, we mean message loading, report execution, etc. In this field, you indicate how many heavy requests can be processed simultaneously in a session.

Failed logins for IP per minute
Maximum unsuccessful logins from one IP address in a minute.

Successful logins for IP per minute
Allowed successful logins from one IP address in a minute. If these two limits are met, IP address will be temporarily blocked. It can cause difficulty to log in to the system.

Video server URL
Address of the video server.

ACL update timeout, s

The interval of recalculation of users's access rights to their units. The smaller the interval is, the higher is the load on the server.

⚠ If you leave these fields empty o fill them in with zeroes, there will be no restrictions. See the recommended 🔘default adjustments.

Events

In the 'Process history for X days' field indicate the number of days valid for events module. In other words, if 5 days is indicated in this field, and your equipment sends messages for the past 30 days (stored in black box), then events will not be recalculated.

⚠ *Note.*
If the events are not activated (the corresponding flag is not checked),

1. only online data will be shown in the tab 'Info' of the Wialon Mobile Client, and the 'History' of movements will be empty;
2. drivers' activities concerning their assignment to units will not be formed.

Note that the maximum number of days for history processing corresponds to 365 days. Though, a large amount of information needs the corresponding time for processing, therefore it is recommended not to exceed the value of several days.

Backup Server

'Hot Backup' installation software is installed to provide online data backup. This installation software is recommended to be installed and activated on the server different from the one where your operating Wialon Local is launched.

Hot backup server provides real time full replication of Wialon Local database ('storage' directory). There is a possibility of simultaneous usage of several hot backup servers with no additional licensing needed.

Installation

Requirements:

Backup server needs to be installed on the 64 bit Linux operating system. The key requirement is a HDD capacity. It should be no less than the HDD of the main server. If this server is supposed to be used as the main, its parameters must be similar to the parameters of the original server.

Installation process:

- download the archive;
- unpack the archive in the working directory;
- to activate hot backup system it is necessary to set the variable in the configuration file (custom/config.txt):

```
ADF_STORAGE_SYNC_SERVER = interface:port:access_key
```

where *interface* is the backup server's address (if there are several interfaces, choose the one that will be used for backup); *port* is the port where the backup server will listen for connections; *access key* is an optional parameter necessary for additional protection of the connection to the port (it is mainly used with remote backup servers);

- launch *adf_script* start.

Enter the same parameters (address, port and access key if set) of your backup server on the site of Wialon Local administrator.

Recovery from Failure

See below two variants of actions in case of a failure of the main server.

Recovery of the Main Server's Work

The steps that should be followed to use reserve server database copy in case of Wialon Local server failure:

- stop Wialon Local on the main server;
- stop hot backup server;
- recover main server's working capacity;
- reinstall Wialon Local on it;
- move 'storage' directory from backup server to the main one;
- start Wialon Local on the main server.

If AVD cards are used, it is not necessary to restore the contents of the folder *maps* from the backup. However, downloading and readjustment of maps may slow down the process of restoring the service for the end users.

☺ To save as much data as possible, the devices must have a black box. In this case the messages will be downloaded completely within several hours after launching the service (if there are thousands of units; if there are fewer — the downloading will take less than an hour).

Using Backup Server as the Main One

This alternative allows reducing the time of server's inaccessibility to the end users.

Since it is supposed that in case of hardware failure the backup server will become the main one, it is strongly recommended that their characteristics coincide, including the supplementary equipment (backup power supply, modems, etc.).

The action sequence in this case is as follows:

- Install Wialon Local on the backup server. The installation steps must be performed up to the step 5 inclusive. To avoid accidental or intentional executing of the step 6, it is recommended to restrict the access to the administration system to the local IP. To do this, it is necessary to change the line *server_name* in the file */etc/nginx/conf.d/lcm.conf* leaving only *localhost* (127.0.0.1) in it and restart *nginx*.
- Install backup module to the backup server, define the path for saving *storage* by means of a symlink.
- In case of a failure of the main server stop the backup module and transfer the main IP to the backup server (that is switching the cable or changing the network settings).
- Log on to the administration system of the backup server, enter user name and password, repeat the configuration of the administration system of the main server (sites, maps, skins, restrictions, modems, etc.).
- Start Wialon Local on the backup server.

In order to back up maps, administration system's configuration or other necessary archives you can add *lsyncd* — the utility will instantly synchronize the files' changes on local and remote servers.
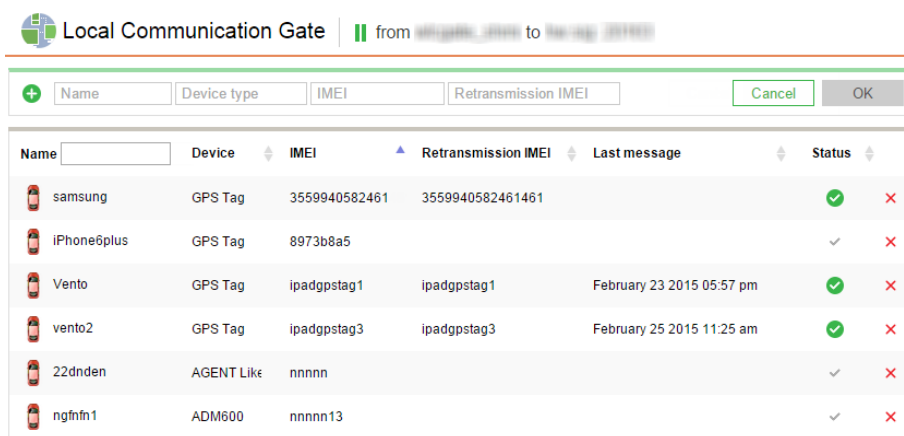
Local Communication Gate

Local Communication Gate is a service enabling retransmission of messages from any type of hardware to your Wialon Local server. Data coming from a device is transmitted by the protocol Wialon Retranslator in real-time mode.

To get access to the app, contact ⊙Gurtam Help System and provide the following information:

- external IP address of the server with actual Wialon Local,
- agreement number (the same as login to the Admininstration Panel).

To start using the service, direct your device to the IP address 193.193.165.169 (⊙check port). Then add a unit in Local Communication Gate and launch retransmission.

To add a new unit to the retranslator, give it a name, indicate device type, IMEI (unique ID) and retransmission IMEI. For existent units, not only these parameters are displayed but also the time of the last message received and the status (being retransmitted or not). Any of these parameters can be used to sort the list of units. Besides, to quickly find a unit, you can use the dynamic filter by name.

Retransmission of a unit can be stopped or restarted at any moment. Apart from that, in the top panel there is a button to start/stop the process altogether.

Select a unit with a single click to edit its settings. Note that IMEIs cannot repeat within one type of hardware. Duplications are emptied automatically.

Management System

The management of GPS tracking system Wialon is fulfilled through a special interface — CMS Manager. It is specially designed for Wialon managers. CMS Manager allows you to manage your tracking service by means of system macro objects, which are accounts, billing plans, users, units, retranslators, and others.

For further information, please see:

▸ **Managing Wialon Service: First Steps**
▸ **Service Structure**
▸ **Access Rights**
▸ **CMS Interface**
▸ **Accounts**
▸ **Billing Plans**
▸ **Users**
▸ **Units**
▸ **Unit Groups**
▸ **Retranslators**
▸ **Import and Export**
▸ **Measurement System and Conversion**
▸ **Service Hierarchy**
▸ **Apps**

Managing Wialon Service: First Steps

The correct organization of accounts, sub-accounts, and billing plans from the very start can, to a great degree, determine the easiness with which your team members and customers will manage Wialon service. Our downloadable ⊕pdf manual will help you in setting Wialon service hierarchy.

Service Structure

Effectiveness of the service management depends on the account structure created by you. Perfect structure has a clear hierarchy. Below there are recommendations necessary to help you clarify accounts' hierarchy peculiarities. Understanding of such peculiarities will help you to build a proper service structure meeting the needs of your business.

When creating the structure, it is important to understand the following rule: an item cannot have more privileges, possibilities, or rights then its superior item has. This is true for services in accounts, for access rights, etc.

First Log in to the System
Upon the first logging in to the system (CMS Manager) such elements as account, user, and appointed billing plan are available to the service owner. These elements have an identical name. Further, the account will be discussed in depth.
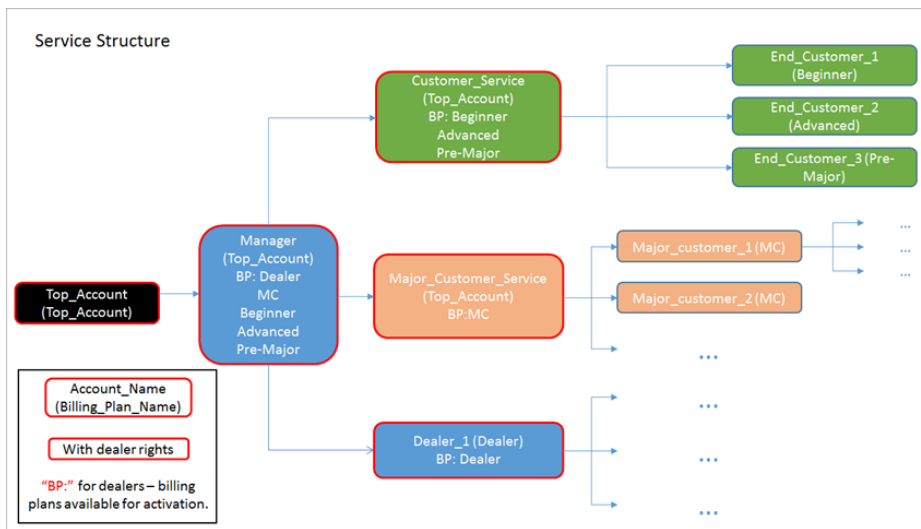
System Account

Top_account (individual name for every client) is an account of the top level. It is created automatically upon new service activation. Top account for every client is created with its own individual name, serving as a global identifier of a service in Wialon Local. Billing plan name is the same as an account name. This billing plan has all the available functionality by default. Top account is considered to be a system one that is why a service owner does not have access rights either for its editing or for the editing of its billing plan.

⚠ Therefore, the first obligatory step for the Top_account user is creation of a managing account.

Creating Accounts

Manager is an account which should be created for the service management. It is created from the top level account. Access rights and available capabilities of the Manager user can be restricted by the Top_account user only. This account is considered to be a starting point for the creation of the proper accounts structure. Due to its high place in the hierarchy the Manager user can create new accounts as well as manage them (changing access rights, payment control, blocking, etc.). This account receives the same billing plan as the Top_account. All the necessary billing plan restrictions can be added in the account properties.

⚠ The next step for the Manager user is to make estimations on the number of end customers. Depending on the result of the estimation, the corresponding account should be chosen and created (Customer_Service or Major_Customer_Service).

Customer_Service is an account which should be created for managing users with a small number of units

(End_Customer_1,2,3). Such an account can be utilized in the sphere of personal tracking or private vehicle tracking. Set of functionality for a user of this account includes creating, changing, controlling, and providing technical support for users/accounts belonging to this account. Process of account capabilities configuration for every end user (manual enabling of the available functionality) could be rather time-consuming. Therefore, in order to automate this process, a set of ready-to-use billing plans (for example, Beginner, Advanced, Pre-Major) can be created in Customer_Service account. Note that these billing plans should be paid individually. Service charges are varied depending on the available functionality of the created billing plans.

Perfect structure implies an individual account for every end user, as well as creating units with necessary restrictions inside the own account (restriction on deleting a unit and its messages is considered to be a minimum required restriction).

Major_Customer_Service is an account for managing major clients with dozens/hundreds units (Major_Customer_1,2,3). Such an account provides a possibility to activate individual special billing plan either for all major customers (Major_Customer_1,2,3) or for every customer individually. Major_Customer_Service can provide with a developed hierarchy of subordinate accounts similarly to the structure of the whole service.

Besides, there is one more account to be spoken about (see below).

Dealer_1 is an account which should be created for a dealer. Dealer user possesses high degree of independence, its own customer support service, and also maximum of the available functionality. Dealer subordinate accounts structure can be created similar to the whole service structure.

Access Rights

Access Control List, or ACL.

Access rights refer to the possibility to see certain system objects and carry out permitted actions over them. In the first place, access rights are applied to the system macro objects such as accounts (resources), units, users, units groups, and retranslators. See more...

Access rights are defined primarily by service manager of the management interface — CMS Manager. However, in some cases it can be done by end users. Rightholders can be any users of the system including managers and end users of any level.

Rights are assigned to each user individually when creating or editing this user, on the *Access* tab. Alternatively, access rights can be rearranged through dialogs of other macro objects, on their *Access* tab.

Types of Rights

The set of **standard rights** ('Item ACL') that are applicable to any type of macro object is as follows:

- View item and its basic properties
- View detailed item properties
- Manage access to this item
- Delete item
- Rename item
- View customs fields
- Manage custom fields
- View admin fields
- Manage admin fields
- Edit not mentioned properties
- Change icon
- Query messages or reports
- Edit ACL propagated items
- Manage item log
- View and download files
- Upload and delete files

See more about standard rights...

Besides, **special rights** can be applied to each object type — a list of permitted/prohibited actions that make sense for those particular types of objects. For example, unit ACL includes a special right to create, edit and delete service intervals, user ACL includes a right to act as given user, resource ACL includes the right to create, edit, and delete geofences, etc. See more information about special rights for each type of object in the following sections:

- Unit ACL
- Unit Group ACL
- User ACL
- Resource/Account ACL
- Route ACL

On the '*Access*' tab of every item, all rights are divided into two sections. The left section displays standard rights, and it is the same for any object. The contents of the right section depend on item type as it represents special rights.

Hierarchy

It is important to maintain the hierarchy when assigning rights:

- The user-creator has all the rights on created item, and they can be limited only by the user of a higher level.
- It is impossible to give a user more rights on an item, than the creator of this user has towards this item.
- If a user is allowed to define rights for other users, no more rights than this user has can be given.

Standard Rights (Item ACL)

There are 16 standard rights, i.e., rights that every macro object has.

Type of right	Code	Description
View item and its basic properties	0x1	Allows seeing the item in different lists and panels. The 'General' tab (at least, name, creator, and resource or account) is available in item properties dialog. However, no property can be changed without additional rights. This right is basic, no other rights have any sense without it. This access right is often referred to as 'minimum access' or 'view right'. Units: to see counters, sensors, some advanced properties (color schemes for sensors and tracks), drivers, current location on map, to control unit groups. User: the 'General' tab with all its contents and the 'Advanced' tab (access to Wialon Mobile v1 and e-mail).
View detailed item properties	0x2	Allows viewing more properties of the item. It influences either units (viewing 'Trip Detection' and 'Fuel Consumption' tabs) or accounts (the contents of the 'General' tab in the account properties dialog are added by two additional sections, as well as 'Services' and 'Restrictions' tabs appear in this dialog; 'Account' tab is added in the user settings dialog.)
Manage access to the item	0x4	Allows transferring rights on this item to other users, i.e., the 'Access' tab becomes available in the item properties where user can establish which actions are allowed to other users in relation to this item. User: this user can be assigned to the rights of settings by other users.
Delete item	0x8	Allows deleting the item from the system.
Rename item	0x10	Allows renaming the item.
View custom fields	0x20	The 'Custom fields' tab becomes available for viewing in the properties of an object (unit, unit group, user, resource). Moreover, 'Profile' tab also becomes available for viewing in the properties of a unit. Both 'View custom fields' right and the next one ('Manage custom fields') influence the above mentioned objects (units, unit groups, users, resources).
Manage custom fields	0x40	Allows creating, deleting, and changing custom fields in unit/group/user/resource properties, as well as editing contents of 'Profile' tab in unit properties. This right is valid only together with the previous one.
View admin fields	0x1000	Allows user to view custom fields with limited access (admin fields) on the 'Custom Fields' tab of unit/group/user/resource properties.
Manage admin fields	0x2000	Allows user to create, delete, and edit admin fields.
Edit not mentioned properties	0x80	Allows editing some advanced item properties. This right is applicable only to units – i.e., gives the opportunity to edit color schemes for track/sensor on the 'Advanced' tab, or enable icon rotation on the 'Icon' tab.
Change icon	0x100	Allows changing item's icon. It is valid only for units and unit groups, because other items do not have such feature as an icon.
Query reports or messages	0x200	You can query messages and create reports for given item. Units: it allows user to view messages for the selected interval, query reports, and build tracks in all modes. User: the tab 'Logs' provides access to viewing the user activity (logins, logouts) and advanced reports of users. Resource: it allows using the 'Statistics' tab (history of payments).
Edit ACL		

propagated items	0x400	Only for unit groups.
Manage log	0x800	Allows seeing item log in reports (or messages).
View and download files	0x4000	Allows a user to use file server for viewing and downloading files for the chosen item.
Upload and delete files	0x8000	Allows a user to use file server for uploading and deleting files the chosen item.

If a user has rights to see a unit's creator and account, its groups, assigned driver, etc., these rights can be fully sensible only if this user has also at least view access to those items (user-creator, account, group, driver).

See also:

- Unit ACL
- Unit Group ACL
- User ACL
- Resource/Account ACL
- Route ACL

Unit ACL

A user can obtain abilities to see unit on map, track its state (speed, sensor values, etc.), change its properties, executed commands, generate reports about its activity, use unit in jobs and notifications, etc.

Standard access rights have been described above. Below is the list of special rights which can be applied specifically for units:

Unit ACL	
View connectivity settings	Allows user to view device type, unique ID, phone number(s), device access password on the 'General' tab, and messages filtration parameters on the 'Advanced' tab. Device type, phone(s), and UID appear also in unit's tooltip and in extended unit information. If SMS service is activated, then the user can also send SMS messages to this unit.
Edit connectivity settings	Allows user to edit device type, unique ID, phone number(s), device access password on the 'General' tab, and messages filtration parameters on the 'Advanced' tab.
Create, edit, and delete sensors	Sensors and their values are available without any particular rights, however, this access flag allows to edit and delete them as well as create new. Besides, calculation tables of created sensors become available for editing.
Edit counters	Allows changing values of the counters (GPRS traffic, mileage, engine hours) and methods of their operation.
Delete messages	Allows deleting data messages and messages about sent commands in the Messages panel. It also allows deleting records from the log (if the 'Manage log' flag is enabled). Works only in combination with 'Query messages or reports'.
Execute commands	Allows executing commands over the unit (for example, sending them from the Monitoring panel).
Manage events	Allows user to register such events as fuel fillings, maintenance work, custom event, and unit status. A special registrar in the Monitoring panel is used for that. Having such flag activated user can also delete registered events. If the flag 'Manage log' is enabled, user can also add a record to a unit log.
View service intervals	Allows viewing the 'Service Intervals' tab in unit properties dialog as well as viewing maintenance state in unit's tooltip and in extended unit information.
Create, edit, and delete service intervals	Allows user to edit and delete service intervals as well as create new. Works only in combination with the previous flag.
Import messages	Allows importing messages to a unit database. Works only in combination with 'Query messages or reports'.
Export messages	Allows exporting messages from this unit to a file. Works only in combination with 'Query messages or reports'.
View commands	Enables the 'Commands' tab in unit properties.
Create, edit, and delete commands	Allows to create, edit, and delete command on that tab. Works only in combination with the previous flag.
Edit trip detector and fuel consumption	Allows editing such tabs as 'Trip Detection', 'Fuel Consumption', 'Eco Driving', and report parameters on the Advanced' tab. Works only in combination with 'View detailed item properties'.
Use unit in jobs,	

notifications, routes, retranslators	Allows user to create jobs and notifications for this unit, assign it to routes, and use it in retranslation.

Some details about standard rights for units:

View item and its basic properties
The following information is available in unit properties dialog: on the 'General' tab — name, creator, account, counters; on the 'Advanced' tab — color schemes for sensors and tracks; on the 'Sensors' tab — list of sensors; on the 'Unit Groups' tab — list of groups where unit belongs (if those groups are accessible). Information about unit's current state can be seen in its tooltip and in extended unit information: last message time, current location, speed, altitude, satellites, values of counters, sensors, and parameters as well as presence in geofences and assigned driver. Unit can be displayed in different lists and panels, watched on the map in real time (although tracks cannot be built), its performance on routes can be observed (although assigning it to a round is prohibited). This flag also allows controlling unit groups, i.e., add/remove unit to/from groups which can be done through unit group properties dialog.

View item detailed properties
The user can see properties applied to reports: the 'Trip Detection' and 'Fuel Consumption' tabs, reports parameters and messages filtration settings on the 'Advanced' tab. Editing these things is not allowed, neither is report execution.

Edit not mentioned properties
These properties are color schemes for sensors and tracks on the 'Advanced' tab.

Query messages or reports
Allows to view messages for the selected interval (except for the log), query reports (except for the tables 'Log' and 'Custom Fields' which require additional rights), and build tracks.

Manage log
Allows to query unit log through messages or reports (if the flag 'Query messages or reports' is enabled) and make custom records in the log (if the flag 'Manage events' is enabled).

Other standard access rights ('Manage access to this item', 'Delete item', 'Rename item', 'View custom fields', 'Manage custom fields', 'View admin fields', 'Manage admin fields', 'Change icon', 'View and download files', 'Upload and delete files') work as has been described above. The flag 'Edit ACL propagated items' does not affect units at all.

Unit Group ACL

The set of rights for unit groups is the same as for individual units. Access given to a group is applied for units that belong to it. For example, if the right to view commands is given to a user, then the user will be able to see commands of each unit in the group.

Besides, some access rights can affect not only units in a group but a group itself. For example, if the right to change icon is given to a user, then this user will be able to change both the icon of any unit in the group and the icon of the group itself. Here is the list of rights with dual action:

- View item and its basic properties
- Manage access to this item
- Delete item
- Rename item
- View custom fields
- Manage custom fields
- View admin fields
- Manage admin fields
- Change icon
- Query reports or messages
- Manage item log
- View and download files
- Upload and delete files

The flag **Edit ACL propagated items** is the right that allows adding and removing units to/from the group.

The rest of access rights affect only units. See Unit ACL for details.

User ACL

Users can receive rights on any system objects including other users. Put it differently, user can be both a subject and an object of ACL relations. If User A has access to user B, then User A can see User B in the system, view and edit its properties and individual settings, control its activity in the system, etc.

Standard Rights

Some of the standard access rights are applicable to users:

- **View item and its basic properties**
  User appears in various panels and lists. The 'General' tab with all its contents and the 'Advanced' tab (access to Wialon Mobile and e-mail) are available in the User Properties dialog (only view). User name can be displayed in different reports and in 'Creator' field.

- **Manage access to this item**
  User appears on the 'Access' tab of the User Properties dialog of other users, where access to this user (as system object) can be adjusted.

- **Edit not mentioned properties**
  Allows to edit the 'Advanced' tab in the User Properties dialog and change individual user settings as well as send notices to this user from CMS Manager.

- **Query reports or messages**
  Enable the 'Logs' tab in the User Properties dialog — there you can observe user's activity (logins, logouts to different services of the system). This flag also gives permission to generate report about this user. Note that to query the 'Custom fields' report, one needs to have access to custom fields of this user. And one more report — 'Log' — can be executed in case one has 'Manage item log' access right in addition.

Standard flags **Delete item**, **Rename item**, **View custom fields**, **Edit custom fields**, **View admin fields**, **Manage admin fields**, **Manage item log**, **View and download files**, and **Upload and delete files** work for users as described above.

Access rights such as 'View detailed item properties', 'Change icon', and 'Edit ACL propagated items' do not affect users at all.

Special Rights

Special rights that can be applied to users:

User ACL	
Manage user's access rights	In the User Properties dialog, the 'Access' tab becomes available where the user can be given rights to various system objects. Besides, user's rights can be changed automatically – through appropriate jobs and notifications.
Act as given user	Right to log in to the system as given user, make this user creator of system objects, etc.
Change flags for given user	Allows changing properties on the 'General' tab of the User Properties dialog. However, changing password requires also the previous right.

Resource/Account ACL

Access to a resource means access to its contents such as geofences, jobs, notifications, drivers, report templates, etc. User can have either just view access to those items or edit privileges. Manipulations with those items are possible in the main interface of Wialon.

If a resource is actually an account (which means that it has its billing plan activated), then more access rights can be applied, like add payments, define permitted service and their cost, etc. Such manipulations are possible only in CMS Manager.

Standard Rights

The following standard (Item ACL) rights can be applied to resources/accounts:

- **View item and its basic properties**
  Allows to see whether system objects like units, users, units groups belong to this account. It is usually written on the first tab of their properties dialog.

- **View detailed item properties**
  Makes sense for account only. The second and third sections of the Account Properties dialog become visible as well as the tabs 'Services', 'Restrictions', and 'Advanced'. If the end user gets this right to their own account, they can see the 'Account' tab in User Settings (it gives information on used and available services, account's balance, etc.

- **Delete item**
  Allows deleting resource with all its contents. However, to delete an account, you should additionally have the flag 'Manage account'.

- **Query reports or messages**
  For resources, this flag allows to generate the 'Log' table and see how different users created, edited, and deleted resource's contents (at that, the flag 'Manage item log' is required). This access flag allows also user to generate reports on drivers and trailers as well as driver and trailer groups if they belong to this resource. For accounts, this flag gives possibility to see the 'Statistics' tab (history of payments and withdrawals) but only if you have the flag 'View detailed item properties', too. The similar sub-tab appears on the 'Account' tab of the Account Properties dialog.

- **Edit not mentioned properties**
  Allows editing FTP-server settings on 'Advanced' tab of an account.

Standard access rights **Manage access to this item**, **Rename item**, **View custom fields**, **Edit custom fields**, **View admin fields**, **Edit admin fields**, **Manage item log**, **View and download files**, **Upload and delete files** work for resources/accounts as described above.

Such flags as 'Change icon' and 'Edit ACL propagated items' do not affect resources or accounts at all.

Special Rights

The following special rights can be applied to resources/accounts:

Resource ACL	
View geofences	Allows to view geofences belonging to this resource.
Create, edit, and delete	Allows to edit and delete geofences belonging to this resource as well as create new.

geofences	
View jobs	Allows to view jobs belonging to this resource.
Create, edit, and delete jobs	Allows to edit and delete jobs belonging to this resource as well as create new.
View notifications	Allows to view notifications belonging to this resource.
Create, edit, and delete notifications	Allows to edit and delete notifications belonging to this resource as well as create new.
View drivers	Allows to view drivers and driver groups belonging to this resource. Moreover, allows to view the drivers' automatic binding list.
Create, edit, and delete drivers	Allows to edit and delete drivers and driver groups belonging to this resource as well as create new. Moreover, allows to create and edit drivers' automatic binding list.
View passengers	Allows to view passengers belonging to this resource. Moreover, allows to view the passengers' automatic binding list.
Create, edit, and delete passengers	Allows to edit and delete passengers belonging to this resource as well as create new. Moreover, allows to create and edit passengers' automatic binding list.
View trailers	Allows to view trailers and trailer groups belonging to this resource. Moreover, allows to view the trailers' automatic binding list.
Create, edit, and delete trailers	Allows to edit and delete trailers and trailer groups belonging to this resource as well as create new. Moreover, allows to create and edit trailers' automatic binding list.
View report templates	Allows to view report templates belonging to this resource.
Create, edit, and delete report templates	Allows to edit and delete report templates belonging to this resource as well as create new.
Manage account	For accounts only. Combined with the flag 'Delete item', allows to delete an account from the system completely, including resource with its contents, account's creator and all objects created by this user. In combination with the flag 'View detailed item properties', gives possibility to control billing plan and payment (the 'General' tab), number and cost of services (the 'Services' tab), and some other parameters (the 'Restrictions' tab).
View orders	Allows to view orders belonging to this resource.
Create, edit, and delete orders	Allows to edit and delete orders belonging to this resource as well as create new.

⚠ *Note*.

In the main Wialon interface, only manipulations with inner resource contents is possible (i.e., geofences, notifications, report templates, drivers, etc.), including the possibility to see the log of changes concerning this contents. Actions concerning accounts (such as payment control, tariffication, etc.) can be performed only in CMS Manager.

Route ACL

Route access rights could be the following:

- **View item and its basic properties**
  Having this right indicated allows a user to see the route in the 'Routes' panel.

- **Manage access to this item**
  When this right is indicated, a user can transfer the right to the routes on other users. Moreover, this right allows a user to see the route not only in the panel but also on the map. A user is enabled to edit the route (add, delete check points, and change their radius), add schedules, show list of rounds for the route, and copy the route.

- **Delete item**
  Allows deleting a route.

- **Rename item**
  Allows renaming a route.

- **Query reports or messages**
  Allows a user to receive reports containing data for the available route.

Creator

Creator is a user that initially has full access rights to an object being created and can define access rights for other users. The creator of a user also automatically gets manage rights to the objects created by this user. Afterwards creator's rights can be changed if needed.

Building hierarchy with the help of creator allows to divide the whole work among several users, assign different rights to objects, as well as reduce information content processed on the screen.

In the system, there can be no objects without a creator. The creator is assigned when creating an object and cannot be changed later. Usually (when a user, a unit or a unit group is created) the creator is selected from the list of existent users. However, when a new account is created, its creator can be created with it simultaneously.

To assign a user the creator of an object, you need the access right 'Act as given user' to it, as well as a direct hierarchical relationship with it. The users than cannot be assigned creators of an object, are not shown in the list of available users. If an object is created by means of copying or you do not have manage rights to any user, the field of selecting a creator is unavailable and the current user (you) is assigned the creator. While viewing the properties of an object, the creator is only shown if there is some access to this user.

It is impossible to delete a user that is the creator of some object. You first should delete this object. For usual users it is done manually. What concerns an account creator, it can be deleted only deleting this account.

⚠ To establish access rights it is necessary to have the flag '*Manage access to this item*' both for the user who is supposed to obtain rights and the object to which the access is given.

Access Dialog

⚠ To manage access to system objects, you are required to have the flag *'Manage access to this item'* toward these objects and the flag *'Manage user's access rights'* toward users to give them rights.

To establish access to an object, go to its properties dialog and open the *Access* tab. This tab is displayed only if you have the right 'Manage access to this item'.

On the left, you will see the list of users (only those on which you have the right 'Manage user's access rights'). Users already having some access to the item are highlighted with colored background and displayed on the upper part of the list. To quickly find a user, enter user's name or its part into the filter above.

Another way to facilitate your work with a list is to use sorting. You can sort the items in the list either in alphabetic or access right order. To do so click on the corresponding button to the right of the dynamic filter. ⚠ The button shows the variant of sorting different from the used one.

▤ — access rights sorting to be used.

ᴬ↕ — alphabetic sorting to be used.

⚠ *Note.*
If the number of items exceeds 1000, then the default setting for sorting is alphabetical.

On the right, you see the list of access flags. When you switch users on the left, checkboxes on the right change depending on access that is provided to the selected user.

Rights are divided into two sections — standard (see Item ACL) and special (lower part). Special rights differ according to item type:

- Unit ACL
- User ACL
- Unit Group ACL
- Resource/Account ACL
- Route ACL
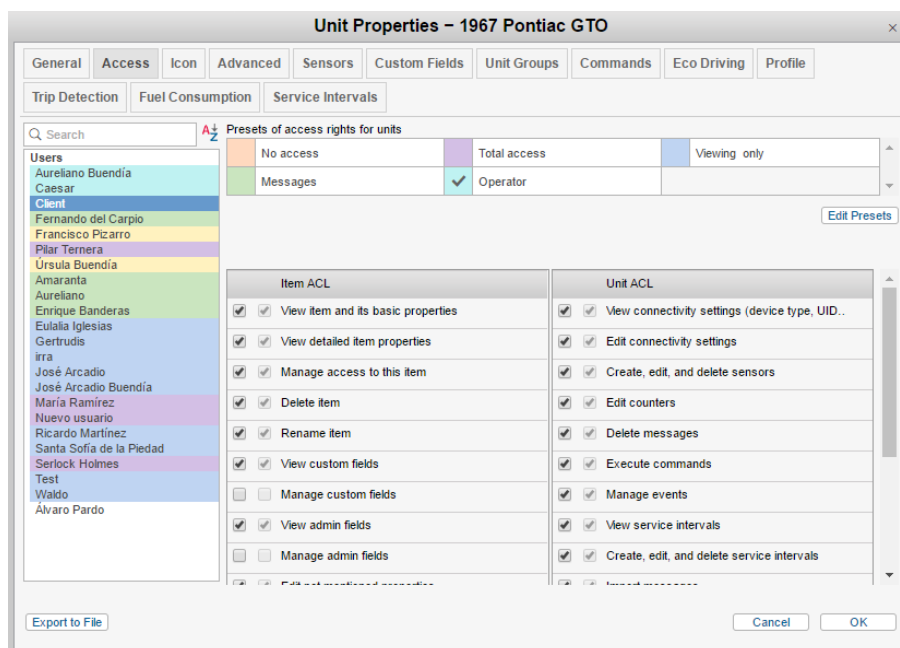
There are 2 columns of flags in each section of the access rights. The first one (direct rights) is used to enable/disable rights. The second one (combined rights) is used to show the rights currently possessed by a user (the column is for

viewing only).

There may be a case when direct rights are enabled but not applied to a chosen user. The case occurs when users superior to the chosen one do not possess these rights (hierarchy restriction). Such a restriction may be shown by the absence of flags in the second column.

Dealing with units there can be a reversed situation — direct rights are disabled while combined ones enabled. This means a unit is included into a group towards which a user possesses more rights then towards a unit itself. Therefore until a unit belongs to this group, a user will possess the same rights for this unit as for the group.

Here are some principles to bear in mind when assigning access:

- To set rights, select a user on the left and assign access flags or a preset on the right.

- Several users can be selected at once — use <shift> or <ctrl> keys for that.

- If you are trying to set a flag which does not work without another flag, that another flag will be marked automatically. For example, if you mark the flag 'Manage custom fields', the flag 'View custom fields' will be added to it, because it is impossible to edit something you cannot even see.

- The same is with removing flags. It is impossible to remove a flag while there are other flags depending on it. Those subordinate flags must be removed first.

- To place or remove all flags in one section at once, hold on the <ctrl> key and click on any flag.

- If you are trying to assign a right you do not have yourself, it will be reset upon saving action.

When finished, click OK to apply new rights.

Access Rights Presets

Presets facilitate the assigning of access rights. Different sets of rights could be created for different roles, for example, operator, manager, customer, etc. Moreover, personal presets can be made for any type of an object (unit, route, etc.). The created presets can be applied to the chosen user within one mouse click.

Presets section is situated in the dialog at the top of access rights list. You can edit or delete the presets provided by default as well as create new ones. 'Edit Presets' button situated at the bottom of presets list provides such an opportunity. Upon the clicking of this button the left part of the dialog and access rights list is shown as disabled, and the buttons of working with presets appear.

To create a new preset, click the 'Create' button. A new preset appears in the presets list. Name it (double click on the name field), and then put the necessary flags in the activated access rights list below. Click 'Save'.

A new preset can be created by making a copy of an existing one. To do so, click on the corresponding button which appears when you point on a preset with mouse cursor. Make changes (edit name and flags), and then click 'Save'. Note that you cannot create presets with identical flags for the elements of the same type. Such copies will be deleted.

To delete access rights preset click on the corresponding button ✕ which appears when you point a mouse cursor on a preset.

Each preset has its own color which is given to it upon creation. The color cannot be changed. If a preset is applied to any user, then the user name will be highlighted in the corresponding color in the left part of the dialog. Though there are some exceptions in color appliance. If there are no flags chosen in the preset (for example the 'No Access' preset), then its color is not applied (users without access are not highlighted in the list). The users which have an access different to all the presets are highlighted in yellow in the list. This color differs from all the other colors of the presets. The same color is given to the users to which the preset cannot be completely applied (when the 'distributing' user does not have the rights which he is going to pass to the others). Moreover, the yellow is applied to users possessing combined rights but lacking direct ones.

⚠ *Attention!*

Establishing access to users as system objects is a bit different from other objects (see user properties dialog).

⚠

Hint.
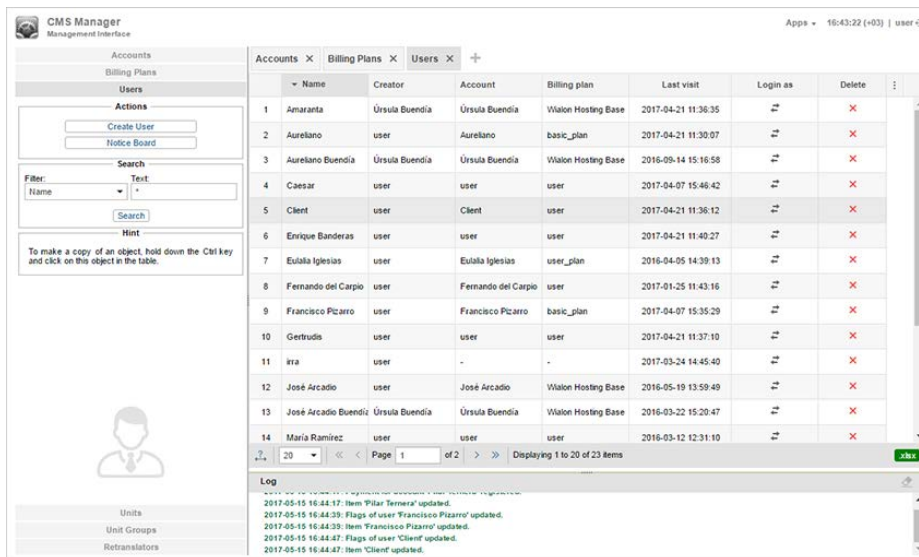
User's access to units can be changed not only manually but also automatically — through some types of jobs and notifications.

CMS Interface

CMS interface is simple and in many cases intuitively intelligible. There is plenty of screen tips associated with various buttons, icons, dialog boxes and other controls.

The work area can be divided into several sections:

- **Top panel** is situated at the top of the window. It shows your login, current time, and some buttons (Logout, Settings, Import/Export, English/Russian, Help). Here, in the top panel, all warnings are shown.

- **Navigation and search panel** is a panel at the left of the window. It contains five tabs — in accordance with five object types: accounts, billing plans, users, units, unit groups, and retranslators.

- **Results panel** is the largest, central part. Here you can manipulate system objects (create, edit, delete, configure, assign rights, etc.).

- **Log** is situated at the bottom of the window. Here you can view messages about succeeded actions or occurred errors.

Sizes of all panels are customizable. To adjust the size of the results panel and the log in relation to each other, drag the horizontal slider between them up or down. To adjust the width of the navigation panel, find a vertical slider and drag it right or left.

Top Panel

There is a logo of CMS Manager system in the left corner of a top panel. The right side of the top panel contains the following elements:

- number of days till account blocking (displayed in green, though to be turned red when the number of days left reaches 0);
- 'Apps' button — opens the list of available applications;
- current time (time zone in brackets);
- login (right corner) — a name used to enter the management system (another login can be displayed in brackets if the main user is acting as another user).

If the current time is displayed in red, then server connection loss has occurred. It may be caused by internet connection failure, or by some internal service problems.

⚠ *Note.*

In the top panel you can see the number of days left till the blocking (if blocking by days is activated for the account or the billing plan). For the top account this panel can also display the number of available SMS is a SMS package has been purchased.

User menu

User login is displayed in the right corner of the top panel. Click it in order the additional menu to be opened. The menu contains the following items:

- **User Settings**
  Opens the user settings dialog for viewing and/or editing.
- **Import/Export**
  Can be used to transfer the settings of units, users, as well as the contents of resources (ref. Import and Export).
- **Manage Applications**
  Allows you to view and edit the list of authorized applications, and mobile notifications.
- **Service Hierarchy**
  Allows you to view information on the service structure.
- **Help**
  Help request. Could be unavailable.
- **Logout**
  Button to log out of the system (session termination).
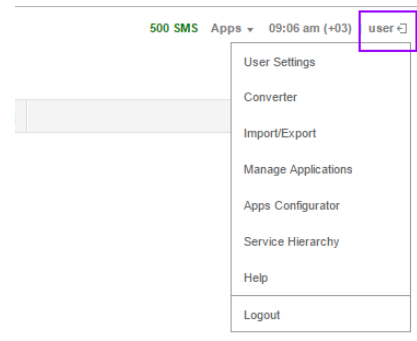
⚠ *Note.*

Additional menu items are available for top users:

- Conversion — enables transferring some objects from one measurement system to another;
- Apps Configurator — enables adding applications, and adjusting their settings.

Login as Another User

It is possible to login to the system as another user. To do so, you need to possess the 'Act as given user' right towards a user.

To switch for another user (log in as another user), it is necessary to click

on the icon (door with arrow) situated in the top panel to the right of the username. Afterwards the dialog containing the list of available units is opened. You can use filter in order to facilitate a search of a unit. The search is made either by unit name or account name. Click the line of a necessary user to fulfill an authorization in the current tab, or click an icon in the end of the line to do it in a new tab.

There is also an alternative way to log in as another user. Go to the 'Users' tab in the navigation panel. In the table of results click on the 'Login as' icon in the corresponding line.

After authorization as another user, the user name is written in brackets to the right of the main one (in the right corner of the top panel). To switch back to the main user, click on the icon (door with arrow) to the right of the name, and confirm your action by pressing OK in appeared window.

Information notices

Information notices from service administrator can appear in the top panel, as well as notices on the number of days left before blocking the tracking system (if stipulated by the tariff agreement). Information notices are shown in the window with a blue outline. For alarm notices a red outline is used.
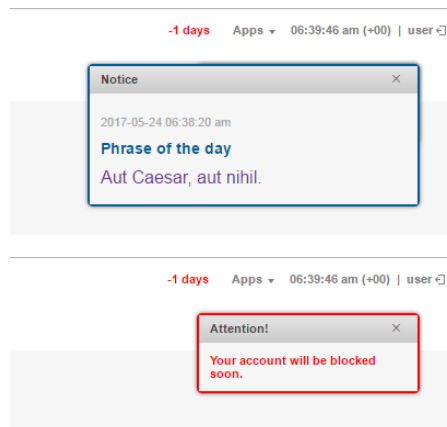
Navigation and Search

Navigation and search panel is situated on the left of the window. Here you form a query for items to be displayed in the results panel.

Navigation

There are several tabs in the navigation panel. Each of them represents some system object: *Accounts, Billing Plans, Users, Units, Unit Groups, Retranslators*. To move to a tab, just click on its name.

Each tab consists of two sections: *Actions* and *Search*. The **Actions** section contains a button to create a new object of the selected type. The detailed instructions for creating and configuring objects are given in the further topics of this guide.

The **Search** section is used to find already created objects and display them in the results panel where you can manage objects, view and edit their properties.

Search

To search objects:

1. Specify a filter;
2. Form a request in the 'Text' field;
3. Push the 'Search' button or <enter>;
4. Observe the found objects in the results panel on the right.

⚠ *Note.*

To simply **find all objects** of some kind (for example, all users), leave the Text field empty (or with just a single asterisk) and press <enter>.

Search Filter

In the *'Filter'* field choose the criterion on the basis of which a search is made. It can be:

- *Name*: the name given to the object when it was created;
- *Creator*: the creator of the object;
- *Account*: account to which required object is attached.

Individual filters for accounts:

- *Parent account*: search by an account from under which an object have been created;
- *Billing plan*: search by a billing plan used;
- *Blocked accounts*: search is implemented among blocked accounts;
- *Custom fields*: custom fields configured in unit properties;
- *Admin fields*: administrative fields configured in unit properties.

Individual filters for resources:

- *Custom fields*: custom fields configured in unit properties;
- *Admin fields*: administrative fields configured in unit properties.

Individual filters for users:
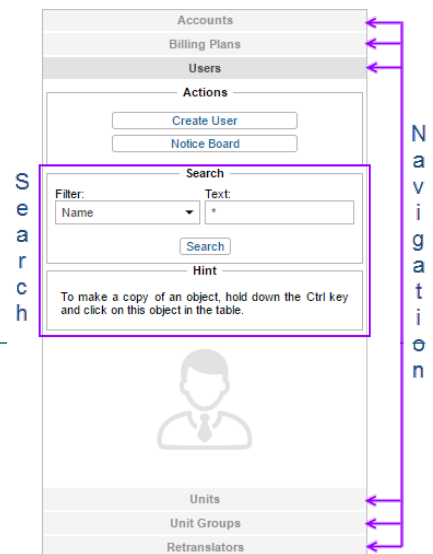
- *Billing plan*: search by a billing plan used;
- *Custom fields*: custom fields configured in unit properties;
- *Admin fields*: administrative fields configured in unit properties.

Individual filters for units:

- *Unique ID*: unique identification number given to a unit when creating it;
- *Phone number*: the phone number of a SIM card embedded to equipment (or two);
- *Device type*: equipment type/name;
- *Unit group*: a group where a unit is included;
- *Custom fields*: custom fields configured in unit properties;
- *Admin fields*: administrative fields configured in unit properties;
- *Profile fields*: profile fields configured in unit properties.

Individual filters for unit groups:

- *Custom fields*: custom fields configured in unit properties;
- *Admin fields*: administrative fields configured in unit properties.

Individual filters for retranslators:

- *Protocol*: search by the used protocols;
- *Server*: search by server name;
- *Unit name*: search by unit name;
- *Started*: search by started retranslators.

If any of these properties is not available to you according to your access rights, searching by this criteria will be unsuccessful.

Search Text

Formulate you request in the *'Text'* field. Use any characters allowed and the asterisk sign (*). The asterisk is a wildcard sign that represents any combination of characters. The asterisk can be placed at the beginning, at the middle or at the end of the request text. It can be used even several times. For example, to find all MANs, select search by name, type ***man**** in the Text field, and click the 'Find' button (or <enter>). All units which names contain this combination of characters (both at the beginning and at the end of the name) will be found and displayed. The request is not case sensitive.

Another wildcard character that can be used is the question sign (?). It replaces any single character. As well as the asterisk sign, it can be put at any place of the query.

Comma sign (,) can be applied to string together several requests. For instance, you would like to find all MANs and all Ivecos. In this case, type ***man*,*iveco****.

Results Panel

The results panel is located at the right top part of the window. Here the results of search are displayed.

It is possible to create up to five tabs in the results panel. To create a new tab, press on an inactive '**New**' tab that is situated on the right of all created tabs. To navigate between tabs, just click on a needed one. To close a tab, press on a red cross near its name.

The caption on the tab displays item type: users, units, accounts, retranslators, or unit groups. Besides, when switching tabs, if they represent different item types, the navigation and search panel changes, too.

Your actions (such as search) are always applied to an active tab. If this tab already contains any records, they will be replaced.

Managing Tables

The data is given in the form of a table. Records are sorted by name in the direct order that is from *A* to *Z*. To sort the data by any other criterion presented in the table, it is necessary to click on the corresponding name of the table. Note that the sorting by a criterion is available if the mouse cursor changes its shape for a pointer.

Table contents, and number of columns, correspondingly, depend on the type of objects displayed. For example, accounts table contains the biggest number of columns.

The set of columns can be adjusted according to your needs. To do so, click on the last column in a table header (arrow down). Afterwards, in the appeared menu select the flags for the necessary columns, or deselect them for the columns which are not currently needed.

At the bottom of the table, there is **tools panel** that can be used to perform several tasks such as deleting items, moving to another page, etc. Moreover, working with such system elements as accounts (resources), users, units, and unit groups, there is a possibility to save table data in Excel format. To do so, click on the corresponding icon in the right corner of the tools panel.

Columns width can be adjusted manually. To do this, click and drag a column edge in the needed direction. To restore auto width, push 'Columns auto width' button.

Adjust the number of rows to be displayed on one page (10, 20, 50, 100, 500, 1000 are available).

To navigate between pages, use the corresponding arrow-shaped buttons. It is also possible to enter page number manually and press <enter> to move to an indicated page.

Standard Operations

Usually, a number of standard actions can be performed over any object displayed in the table (accounts, billing plans, users, units, unit groups, or retranslators): create a new item of this kind (except billing plans), view or edit objects' properties, copy or delete an object.

Creating New Items

To create a new object, open the corresponding panel on the left and press the '**Create…**' button. The button is disabled if the current user does not have enough rights.

Fill in necessary fields and tabs of the dialog and press OK. OK button remains disabled until information in the dialog is enough and correct. For example, it is impossible to create an item with no name or with name shorter than 4 characters. Do not use any prohibited symbols in text fields of the dialog. Read Input Rules for details.

A newly created object will not be displayed in the table until you apply some search parameters.

Copying

Copying is a quick way to create new objects having similar properties with existent objects. Units, users, unit groups, retranslators, and billing plans can be copied (but not accounts/resources).

To make a copy of an object, hold the <ctrl> key and click on the needed object in the table. A properties dialog with information identical to the properties of the object being copied will open (at least, those properties which can be shown according to your access level). You can alter any properties if needed, e.g., unique information like name, phone number, etc. Then press OK to complete creation.

⊙ *Hint.*
In many situations, instead of copying you can use 'Import/Export' tool.

View and Edit

To view or change item's properties, click on it in the table. A dialog with its properties will open. If you have not enough access to the item, OK button is not available and you cannot save any changes. Besides, some properties and even the whole tabs can be hidden.

If you have made any changes and want to save them, press OK. To quit dialog without saving changes, press Cancel or click on a small cross sign in the right-hand corner of the dialog.

Deleting Items

To delete an item, check it in the 'Select' column. To select all the items at once, press <ctrl> on the keyboard and put any flag in the corresponding column. Then push the button 'Delete checked items' × at the bottom of the table. When getting a warning message, confirm your intentions or cancel the action. Several items can be selected, too. The result of the action is displayed in the log.

Remember that a certain right is needed to delete items ('Delete items'). Items that are not allowed to be deleted cannot be checked.

You should know some particularities of deleting different types of objects:

- Deletion of a unit group or retranslator does not result in deletion of units that are included in them.
- To delete a user, use the red *delete* button that is displayed against each user in the table. However, only users who are not creators for any system objects can be actually deleted. See more...
- An account can be deleted only with all its contents and depending objects, that is why deleting accounts is different from deleting other system objects. See more...

Log

The log is situated at the bottom of the window. It contains records of current events and operations running in the system.

The structure of a record is simple: date, time, text (description of the event).

The log uses fonts of different colors in order to separate different type of entries from each other. Black color is for information messages, for example, about the number of tabs allowed to create. Green color is used for preventive messages, for example, when a new object is created or successfully deleted, or its configuration is changed. Red records mean error messages.
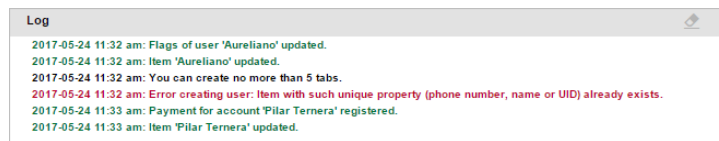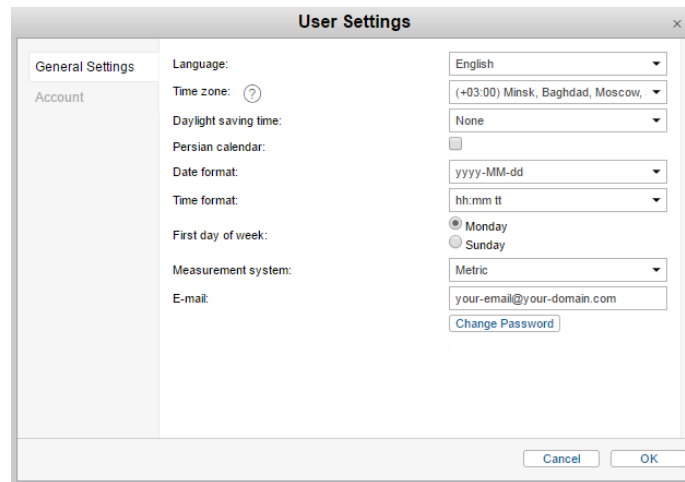
You can clean up the log using the 'Clear log' button situated in the right top corner of the log panel.

![wialonlocal logo]

CMS Settings

To view and change CMS settings, choose the User Settings item in the user menu. Here you can customize some parameters.

The 'User Settings' dialog contains two tabs:

1. **General Settings** — here you can indicate your time zone, e-mail, change password, etc.
2. **Account** — here you can see your current balance and days left, services used and left, transactions made, etc.

The User Settings dialog in CMS Manager is a reduced version of the User Settings dialog in the main interface.

Accounts

In most cases, resource and account can be used as synonymous notions, however, sometimes it is needed to understand the difference between them.

Resource is a system macro object which includes different micro objects as its contents, which are, geofences, jobs, notifications, drivers, trailers, passengers, and report templates. Availability of a resource gives user an opportunity to create such objects. These contents can be easily saved to a file or copied to another resource (see Import and Export).

A distinctive characteristic of an account is considered to be a billing plan usage. An account may contain more than one resource (or even dependent account). The point is that an account can hold not only a resource and its contents (micro objects mentioned above) but also information about other macro objects, such as units, users, unit groups, routes as well as other dependent resources and accounts.

The count of both macro and micro objects is supported in the account and money is written off for their usage. A billing plan is applied to an account and not to a user. Therefore, Wialon manager uses account to limit users' activity, define number and cost of available services, control payment, etc.

Creator is a crucial part of an account. Micro objects are classified to an account by their resource, but macro objects reveal their belonging to an account through their creator. All macro objects created by the same user who is a creator of an account (or by other users whose creator is this user) are automatically attached to this account.

An account is usually created for each client individually, however, a number of users can exist within one account and have different rights and access to units. For instance, we can create an account *Vehicle Fleet* with users *Boss*, *Accountant*, *Machinist*, *Manager*, etc., and each of these users will use Wialon in their own way.
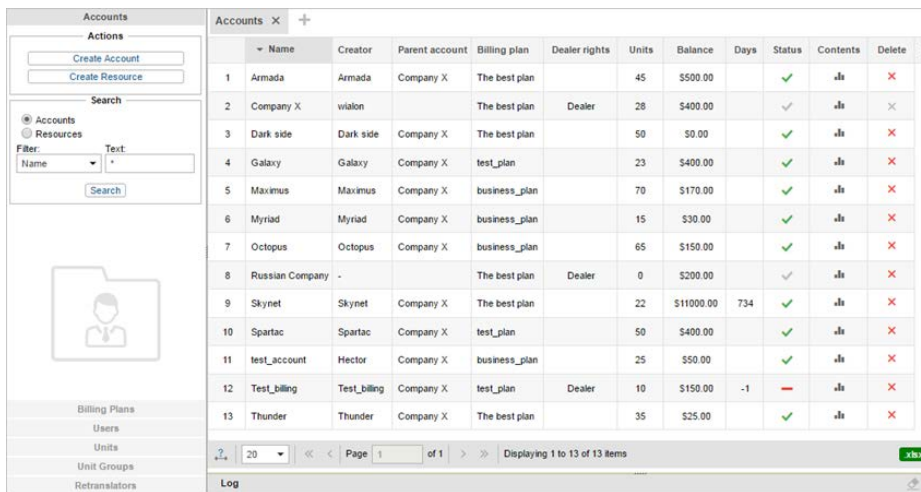
All dependent macro and micro objects are deleted together with their account. More...

- Working with Accounts
- Creating Accounts
- Creating Resources
- Account Properties
- List of Services
- Report on Account Contents
- Deleting Accounts/Resources
- Transferring Units from One Account into Another

Working with Accounts

Working with accounts is possible only in CMS Manager. Click on *'Accounts'* in the navigation panel. Here you can:

- create new accounts and resources;
- find and display existent accounts and resources;
- control clients' balance, add payment and days;
- allow/deny/limit access to different services;
- edit and delete accounts and resources;
- view contents of accounts.

On the 'Accounts' tab of the navigation panel you can create new account/resource, or find it among the created ones. This tab contains a switcher which allows displaying either accounts (default position) or resources. To refresh table data after changing position of the switcher, click 'Search'.

There are only three columns for resource — name, creator, and account. Dealing with accounts, a table contains (apart from name and creator) parent account, billing plan, dealer rights, number of units in the account (including units from subsidiary accounts), balance, days left (see estimated blocking date in the tooltip), status (active or blocked), date of blocking (if blocked), buttons to query a report on contents, and buttons for deletion. Note that accounts and resources differ by the way of their deletion.

If blocking by days is activated in the account, then the amount of days left will be shown in the table of results with the black color. If the same is activated in the billing plan, then gray color will be used. If blocking by days is disabled, nothing is displayed in this column.
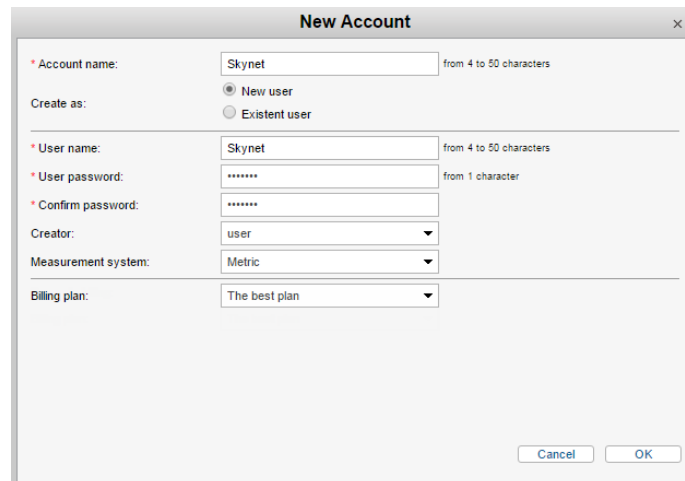
To open the properties of an account or resource, click on its row in the table. Depending on the level of access possessed, certain tabs and fields of the dialog may be unavailable for editing or hidden at all. The Resource Properties dialog can contain up to 3 tabs — 'General', 'Access', and 'Custom Fields'. Meanwhile, the Account Properties dialog can contain up to 6 tabs. The 'General' tab is available in all cases.

Besides, it is possible to store resource contents in a file or copy elements from one resource to another. See Import and Export for details.

Creating Accounts

Accounts can be either created or deleted in the interface of CMS Manager only. To create a new account, click the corresponding button on the 'Accounts' tab of the navigation panel.

Further there is a list of parameters used upon account creation.

Account name
Enter a unique name from 4 to 50 characters. In the system, there can be no accounts with the same name.

Create as
A creator for a new system object can be either an existent user or a new one created together with an account.

- *New user*
  A new user will be created and assigned as creator. Enter login name for a new user. Primarily, account's name is offered as login name but you can enter any other name as well. Then choose a password and confirm it. You can also specify a creator for a new user if you do not want it to be a current user. Similar situation with a measurement system — normally, it is inherited from a current user but you can readjust it here. Note that if a creator of a new user cannot distribute billing plans (account is not a dealer one), then the billing plans section becomes disabled.

- *Existent user*
  In the dropdown list, choose a user. Note that the user which appears to be a creator of system macro objects cannot become a creator of new accounts as such an operation violates current hierarchy. However, such a user can create a resource. When an account is created by an existent user, its measurement system is taken from its creator. However, it can be changed afterwards through the conversion.
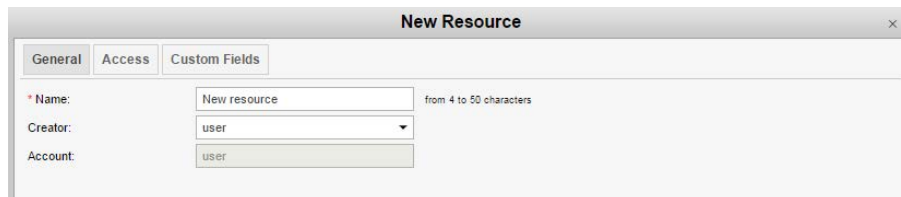
Billing plan
Billing plan usage is considered to be a distinctive characteristic of an account. Select an available billing plan for the account from the dropdown list. If there are no billing plans available, then account cannot be created.

When all the fields are set correctly, click OK and check a result in the log. Depending on parameters chosen before, a new account or a new account and a user is created. Account creator automatically receives full access rights towards created objects.

Creating Resources

Resources can be either created or deleted in the interface of CMS Manager only. To create a new resource, click the corresponding button on the 'Accounts' tab of the navigation panel.

Further there is a list of parameters used upon resource creation.

Name
Enter a unique name from 4 to 50 characters. In the system, there can be no resources with the same name.

Creator
Choose a creator for a new resource.

Account
Here it is shown an account to which a created resource belongs. In other words, this is a creator's account.

Note that a measurement system is taken from its creator by default. However, it can be changed afterwards through the conversion.

When all the fields are set correctly, click OK and check a result in the log. A resource is created. Resource creator automatically receives full access rights towards created objects.
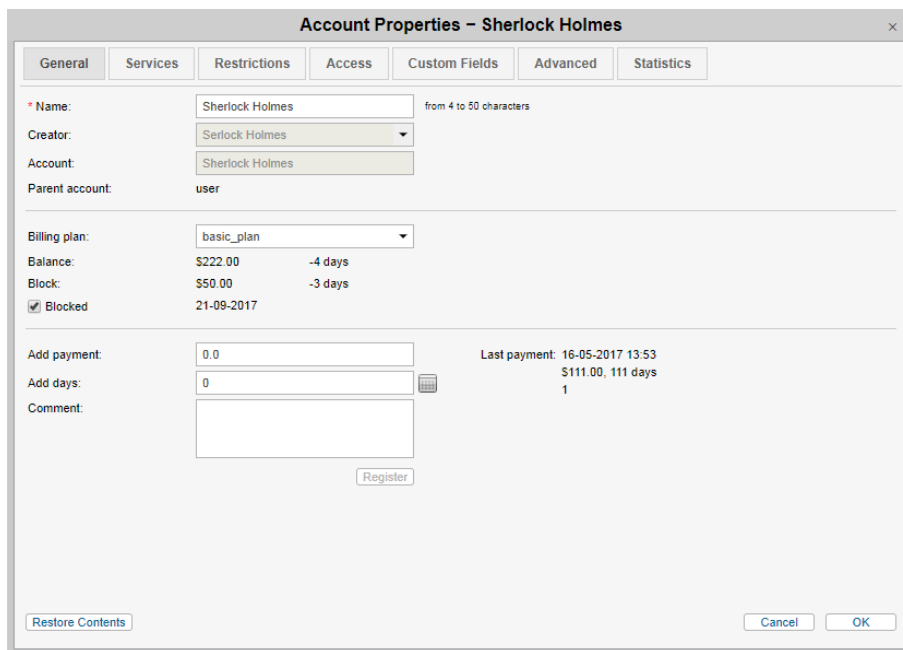
Account Properties

Account Properties dialog can contain up to 6 tabs. Their availability depends on access rights.

General

The 'General' tab has 3 sections. However, only the first of them is available to users with minimum access. This section holds account's name, information about creator, account, and parent account.

The second and third sections are designed mainly to add payment and block/unblock account.

The second section lists billing plan, current balance, blocking limits, and account's status: active or blocked.

The row 'Balance' shows current monetary balance as well as days left (if the option 'Block by days' is enabled on the Restrictions tab of the same dialog). One row below, you see limits, at which the account is supposed to be blocked. This is just a reminder of these limits; they can be modified on the same Restrictions tab.

If account is blocked, the flag 'Blocked' is checked and the date when it happened is shown in addition. If account is active, the flag is unchecked and the date of estimated blocking is displayed (only if the option 'Block by days' is enabled for the account). You can change this flag's position manually. This may prove useful, for instance, to promptly unblock an account when required payment arrived. This flag can be also applied to manually block an account, however, this strategy will work correctly only if money/days balance if zero or negative. Note that to alter this flag's position, there is no need to open the dialog at all — it can be done in the list of accounts itself, in the Status column.

Adding payment and days is available in the third section of the 'General' tab.

To register a payment, enter sum and comment (comment is mandatory) and click on 'Register'. The sum will be added to the current balance, and the payment will be saved in payment history (see the Statistics tab).

If the option 'Block by days' is enabled, the field to amend days will be available as well. Days are added in the same manner as payment. Indicate the needed number of days or choose the final day in the calendar (the button on the right). Then enter comment and press 'Register'. Days and money can be added simultaneously in the same payment or separately from each other.

Services

The 'Services' tab in the Account Properties dialog allows managing the number of available units, SMS, geofences and other system objects, as well as enable or disable access to different services (such as retranslator, Wialon Mobile, jobs, etc.) and define their cost. The list of available services depends on billing plan and activated modules.
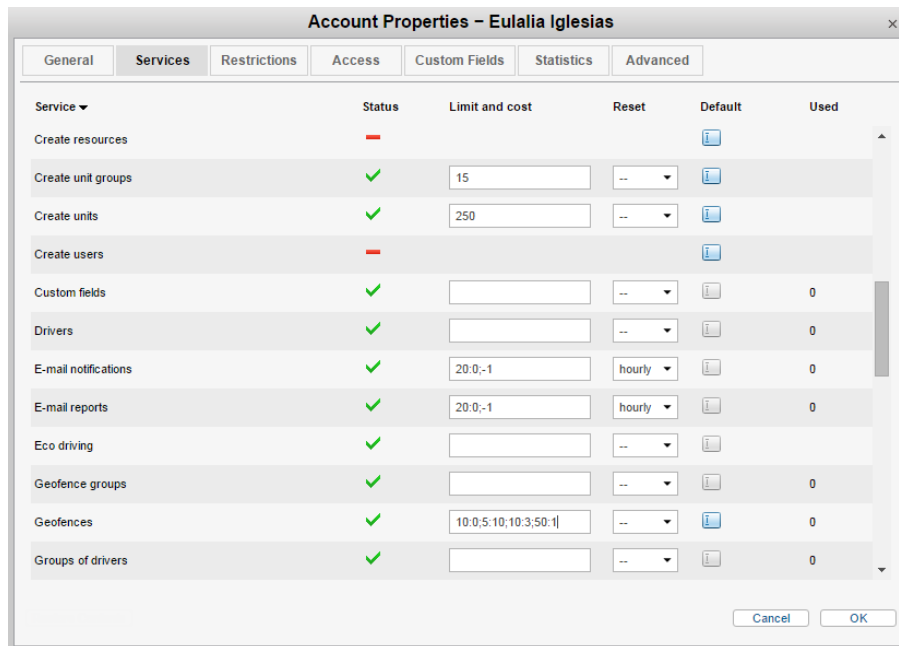
Services can be sorted by first and second columns, that is by name (alphabetically) or status (enabled/disabled).

Service statuses:

✔ — service enabled

− — service disabled

For enabled services, one can additionally adjust allowed number, cost, and reset interval (if necessary). To establish a simple quantitative limit on a service, just enter the necessary number in the corresponding field. For example, if you input 11 opposite 'Geofences', it will mean that only 11 geofences can be created within this account.

In some cases, reset interval should accompany quantitative limit. For example, to establish the limit of 5 SMS messages hourly. Other possible reset intervals are weekly, daily, monthly.

Together with quantitative limitations, cost can be adjusted. Cost line is set in the format: COUNTER1:VALUE1;COUNTER2:VALUE2;VALUE3. A counter must be positive integer (but values can be fractional). Each next counter must be greater than the previous one. Here are some examples of cost lines:

Service	Cost line	Interpretation
SMS messages	1:0;10:1.5;-1	The 1st SMS is free, from 2nd to 10th the cost for one SMS is 1.5 charge units. The 11th SMS is denied.
Units	1:0;5:10;10:3;50:1	The first unit is free, from 2nd to 5th they will cost 10 charge units, from 6th to 10th — 3 charge units, from 11th to infinity — each for 1.
Geofences	5:0;-1	5 geofences can be created for free. The creation of a 6th geofence is prohibited.

A gray icon opposite a service means that the state of this service is taken from billing plan assigned to the account. If state or limitations have been modified at some point and thus redefined for the account individually, the button unblocks ⓘ. Press it to restore default billing plan's values.

In the '**Used**' column, you can see the number of objects of appropriate type, which are already in use in this account. It concerns only countable services (such as units, drivers, etc.) and makes no sense for uncountable (such as SKD, Eco driving, etc.).

Restrictions
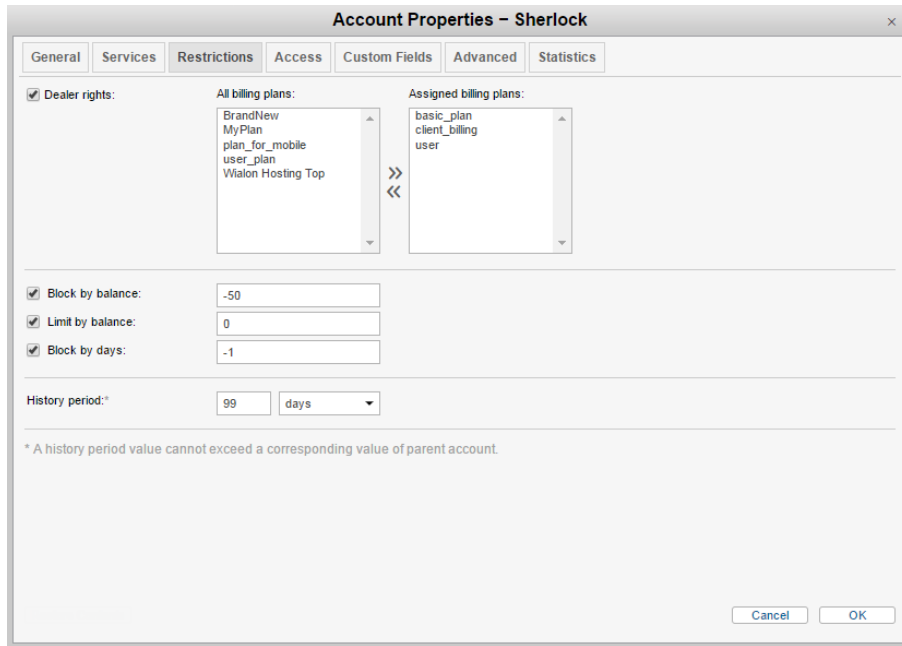
Dealer rights

Activate this flag to create a subdealer. It means this account will possess the same rights as you (access to modules, services, billing plans). Then specify billing plans that will be available to this account.

The next three options refer to restricting user's activity in case of nonpayment. Usually, these values are either zero or negative (to give users possibility to use the tracking system for a while even when payment date has expired). If these options are not enabled here, in this dialog, they will take over from assigned billing plan or parent account.

Block by balance

Enter balance reaching which the account will be blocked.

Limit by balance

Enter balance reaching which paid services will be denied.

Block by days

Enter days counter reaching which the account will be blocked. This will work independently of 'Block by balance' option. If both of these parameters are adjusted, an account will be blocked when meeting either of set conditions. In this case, the account can be blocked automatically not only when the balance is low, but also if there are no days left. It can be useful for demo access, for example, or to control monthly fee. When the days counter embedded in the system says that days left on an account have reached the value indicated in this field, the account is blocked automatically.

If the option 'Block by days' was activated and this state was successfully saved, new fields will appear on the General tab — balance of days left, input to add days when registering payment. Days counter decreases automatically every day. ⚠ The days are counted according to UTC +3.

At that, when 5 days are left, a special warning starts to come each time the user logs in to the system: 'Your account will be blocked. … days left.' When days are negative, another notification is displayed: "Attention! Your account will be blocked soon."

History period

You can set history period to store data. It can be indicated either in days or months. To choose this setting, start entering the value into the field, and then pick days/months option from the appeared dropdown list. All the messages older than this term will be automatically removed from the database. The default value of history storing is taken from billing plan settings. If the history period value indicated for an account exceeds the one indicated for the billing plan assigned to this account, then time of history storing is taken from the billing plan. If the history period value is less than the one indicated for the billing plan, then the history storing period is taken from account settings. To restore the default value, enter '0'.

Statistics

On 'Statistics' tab you can observe all additions to the balance as well as all withdrawals. Define time interval and press 'Show'. All registered payments will appear in the table regardless whether money or days were added. All payments and withdrawals will be shown in a table. Moreover, to see them separately, use a dropdown filter (in this case you should press the Show button again).
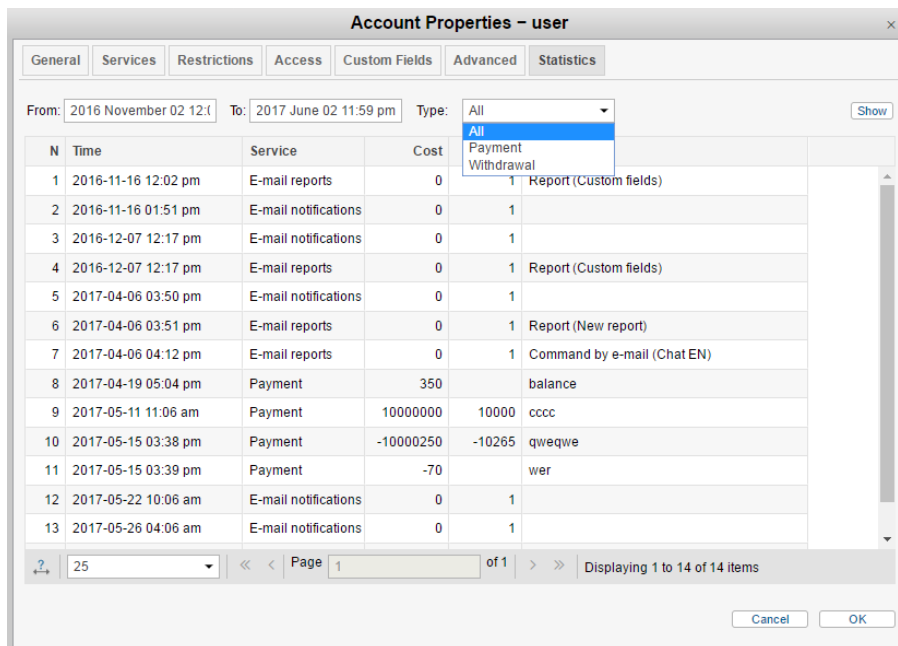
Advanced

Custom FTP server

Upon sending report on e-mail by job or notification, there is a possibility to choose if you would like to receive files/archives or a link on FTP server where corresponding files/archives to be stored. On 'Advanced' tab you can indicate an FTP server for storing files or archives.

By default Wialon FTP-server is utilized. In order to set a custom one, indicate the corresponding flag and fill in its host, login, password, and a directory for files/archives storage.
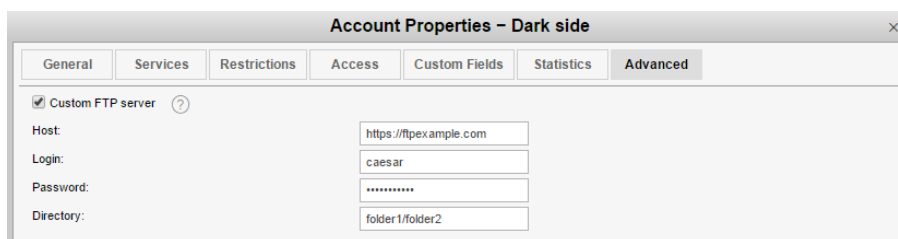
Custom letter template

To indicate theme and body of a letter automatically sent by e-mail upon job or notification execution, it is necessary to activate this flag and fill in the corresponding fields. Necessary text can be either entered manually or chosen from the set of standard parameters (click appropriate ones) which will be transformed into latest values upon e-mail sending.

Other tabs of 'Account' or 'Resource' Properties dialog — Access and Custom Fields — have standard contents

described above.

List of Services

Here is the full list of services available in Wialon system.

Service	Description
ActiveX	Remote access to the system via ActiveX.
Admin fields	The possibility to create admin fields in the properties of unit, user or group (on the 'Custom Fields' tab); defines cost and quantity (summarized, by objects of different types) of admin fields.
Advanced reports	The possibility to quire reports on unit groups. Within the limits of the general module 'Reports'.
Commands	Activates the corresponding tab in the 'Unit Properties' dialog; defines the quantity (all units in sum) and cost of commands.
Create resources	Activates the button to create resources and accounts on the corresponding panel (in CMS Manager only).
Create unit groups	Activates the button to create unit groups on the corresponding panel.
Create units	Activates the button to create units on the corresponding panel.
Create users	Activates the button to create users on the corresponding panel.
Custom fields	Activates the corresponding tab in the properties of unit, user or group; defines cost and quantity (summarized, by objects of different types) of custom fields; does not affect drivers and trailers.
Drivers	Activates Drivers module and defines cost and quantity of drivers; if disabled, the Drivers panel is not shown, and any mention of drivers disappears from notifications, user settings, and 'SMS' dialog.
E-mail notifications	The possibility to send notifications by e-mail. Recommended limitation — 10 reports in an hour (not to overload the server).
E-mail reports	The possibility to send a report by e-mail (within the Jobs module). Recommended limitation — 10 reports in an hour (to avoid server overload).
Eco driving	Activates Eco Driving tab in the 'Unit properties' dialog, as well as same-name table in reports. Besides, this service is required for same-name app.
Geofences	Activates 'Geofences' module and defines cost and quantity of geofences; if disabled, the 'Geofences' panel is not shown, and any mention of geofences disappears from reports and user settings.
Google Service	Activates the possibility to regulate access to the Google maps, geocoding, and routing for the lower accounts.
GPRS traffic	The possibility to control GPRS traffic through jobs, notifications, reports, and unit properties.
Groups of drivers	Defines quantity and cost of driver groups; works within 'Drivers' module.
Groups of geofences	Defines quantity and cost of geofence groups; works within 'Geofences' module.
Groups of trailers	Defines quantity and cost of trailer groups; works within 'Trailers' module.
Import/Export	Enables access to the dialogs of import/export in the user menu; enables using of 'Create from WLP' button in the 'Units' panel and 'Export in file' button in the unit properties dialog.
Jobs	Activates the 'Jobs' panel and defines cost and allowed quantity of jobs.
Locator	Activates 'Locator' option in the user menu.
Maintenance	Defines cost and quantity of service intervals; if activated, the 'Service Intervals' tab appears in the 'Unit Properties' dialog, maintenance can be registered in the Monitoring panel, and corresponding notifications and reports appear.
Management	Access to CMS Manager.

system	
Messages	Access to the 'Messages' panel.
Mobile notifications	Activates the corresponding action in notifications, as well as corresponding tab in 'Manage Applications' dialog (in user menu).
Notices to users	Possibility to receive notices from the administrator of the service.
Notifications	Activates the 'Notifications' panel and defines cost and allowed quantity of notifications.
Orders	Activates an access to the ◉Logistics application and provides a possibility to generate corresponding reports either on units or drivers.
Passengers	Activates the 'Passengers' panel and defines cost and quantity of passengers.
Profile	Activates the tab 'Profile' in the 'Unit Properties' dialog and the table of the same name in the reports.
Reports	Activates 'Reports' module and defines cost and allowed quantity of report templates; if disabled, associated jobs and notifications disappear and trip detector cannot be used.
Resources	Activates the 'Accounts' panel in CMS Manager; defines quantity and cost of resources and accounts.
Retranslators	Possibility to transmit messages from units to other servers and systems; activates the corresponding panel in CMS Manager; defines allowed quantity and cost of retranslators.
Route rounds	Defines the count of allowed rounds and their cost (within Routes module).
Route schedules	Defines the count of allowed schedules and their cost (within Routes module).
Routes	Activates Routes module — enables the 'Routes' panel and associated reports and notifications.
SDK	Remote access to the system via SDK and access to Apps.
Sensors	Defines the count of sensors (calculated for all units in overall) and their cost.
Site access	Here you can allow/deny access to different sites within your system (like Wialon Mobile v2, extra sites, etc).
SMS messages	Count and cost of SMS messages.
Tachograph	Activates 'Driver activity' and 'Infringements' tables in reports on drivers.
Toll roads	Activates the 'Toll roads mileage' and 'Toll roads cost' columns in the 'Trips' report and adds the corresponding statistics fields in the advanced settings of a report template.
Trailers	Activates the 'Trailers' panel and defines cost and quantity of trailers.
Unit groups	Activates the corresponding panel and defines cost and quantity of unit groups.
Units	Activates the corresponding panel and defines cost and quantity of units.
Users	Activates the corresponding panel and defines cost and quantity of users.
Wialon Mobile (2)	The possibility to track unit from a mobile phone (Wialon Mobile v2). ⚠ If mobile service URL is different from *m.wialon.com*, it can be disabled only through the feature 'Site access'.
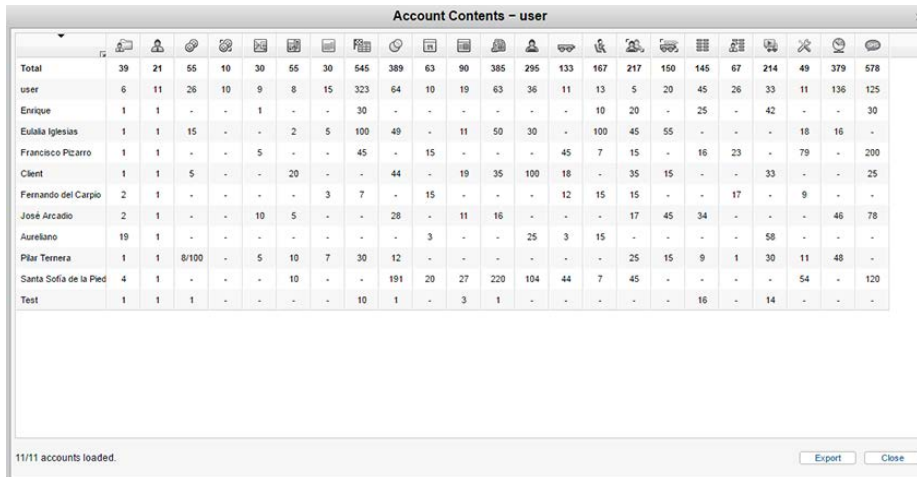
⚠ *Note.*

If you see 'Apps' in front of a service name, it means this service is an application.

Report on Account Contents

CMS Manager provides with a possibility to view a report on the contents of an account. The report is presented as a table displaying the amount of all the macro and micro objects included into an account.

On the 'Accounts' tab in the table of results click the button in the 'Contents' column to view the report on the contents of the corresponding account.

To adjust the table, click the corresponding button ⌐ (left top corner of the table), and choose the necessary columns. The table is automatically rebuilt according to the chosen parameters. To facilitate the work with data presented in the table, you can highlight any line by clicking on it.

By default the sorting in the table is made by account name (alphabetic order). Though, data from the table can be sorted by columns (from maximum to minimum value of the column, or vice versa). To do so, click on the necessary column.

A table may contain numeric values divided by slash ('/'). It is used when any features have been indicated. For example, the available amount of units is 20, but only five of them are currently used. Therefore, in the table it will be displayed as 5/20.

Left bottom corner of the dialog contains information on the amount of accounts loaded and the total amount of accounts. If the total amount of accounts exceeds 100, then the data on the accounts is loaded by parts. In other words, if there are 200 accounts available, you will receive information on the first 100, then press 'Show more' link button, and receive the rest 100.

A report on account contents can be exported into CSV file. To do so, click on the 'Export' button in the bottom corner of the table.

Deleting Accounts/Resources

To delete an account or resource, you should possess the appropriate level of access to it. In most cases, accounts are deleted when a service agreement is broken and a client stops using the system.

To delete an account, click delete button in the corresponding column and confirm your intentions. Upon deleting an account, all its contents (geofences, drivers, trailers, passengers, jobs, notifications, report templates) will be deleted, too. Besides, all users, units, unit groups, resources, routes, retranslators belonging to this account and created by this account's creator (or other user established as account's creator) will be deleted as well.

To delete a resource, apply a standard method: choose the corresponding flag in the 'Select' column, and click delete button in the bottom of the table. Note that all the contents of a resource will be deleted along with it (geofences, drivers, trailers, passengers, jobs, notifications, report templates).

Transferring Units from One Account into Another

You can transfer units from the currently used account to the lower standing ones or between the lower standing ones. In order the feature to be available your account needs to possess dealer rights.

The following access rights towards a unit are necessary for transferring it from one account into another:

- Manage access to this item;
- Delete item;
- Edit connectivity settings;
- Delete messages.

Moreover, it is necessary to possess the right 'View item and its basic properties' towards the creator of the unit and 'Act as given user' towards the creator of the account you want to transfer the units to. This last one, in his turn, needs the right of viewing items and their basic properties towards the units from the left list of the dialog of switching account.

The units are transferred in the management interface. To begin with, open the tab 'Units'. Then click on the 'Switch account' button ⊟⊞ (unavailable if the account does not have dealer rights) situated to the right of the button 'Delete selected items'.
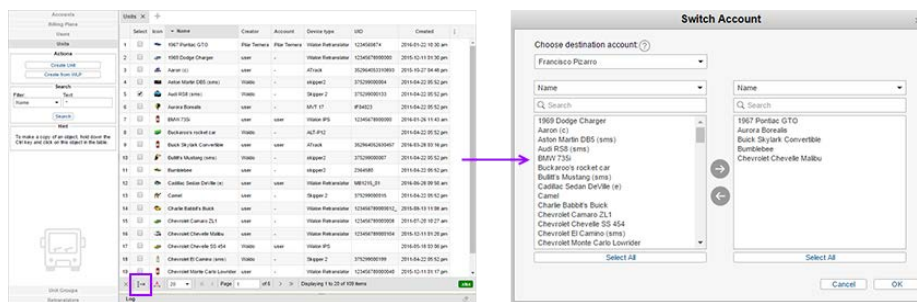
The 'Switch Account' dialog is as follows:
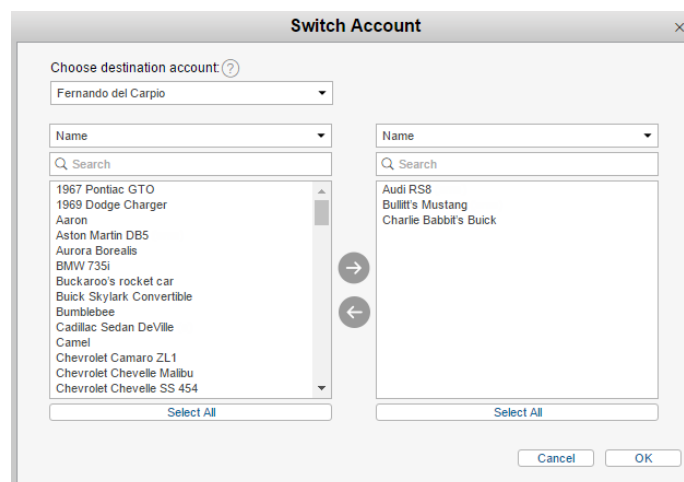
There are two lists in its central part. The left list contains all the units that can be transferred, that is, the units towards which you have appropriate access rights. The list on the right shows the units you want to transfer. The units' selection is done according to the principles described in the section 'Multiple Select Box'. To transfer units from the left list to the right one and vice versa, use the arrows between them. To make the units' selection easier, there are filters above each list.

After selecting the units you can see in the dropdown list in the upper part of the dialog the accounts (according to the

access rights) these units can be transferred to. Choose the necessary account and click OK. Confirm your actions. As a result, some parameters will be changed. For units it concerns the creator and belonging to an account; for accounts it concerns the counter of created/available units.

Billing Plans

⚠️ *Attention!*
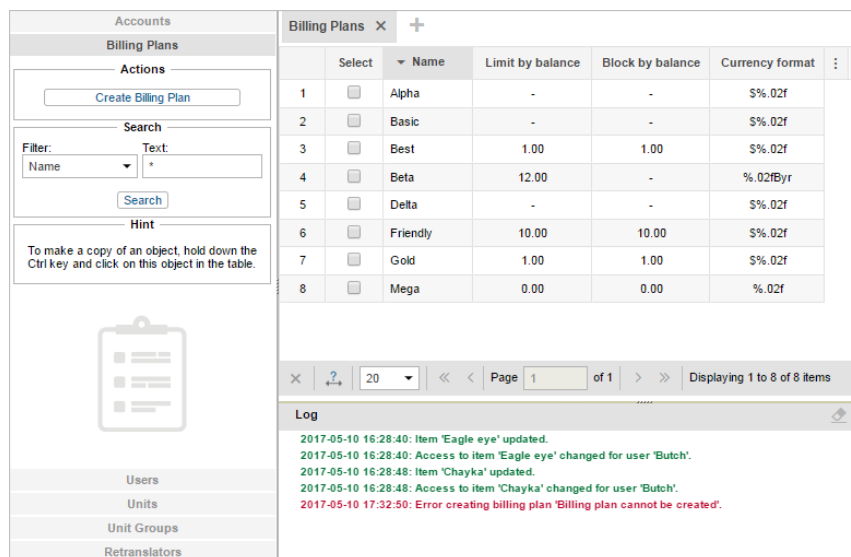
Only the top user can create and manage billing plans.

Billing plan defines the set of available services, their cost, and some basic properties such as minimum balance to block an account, minimum balance to deny services, currency format, etc.

A billing plan assigned to an account defines initial set of allowed/denied services, which can be redefined later (extended or narrowed) for each account individually. If you adjust services through a billing plan, you can apply limitations and costs to several accounts at once (which are associated with this plan). If you adjust services in accounts themselves, each account is to be edited separately.

Working with Billing Plans

You can work with *Billing Plans* only in the interface of CMS Manager. Open 'Billing plans' tab in the navigation panel of the management system. Here you can create new billing plans, as well as view, edit, and delete created ones.

Table of results for billing plans contains the following columns: name of a billing plan, limit by balance, block by balance, block by days, and currency format.
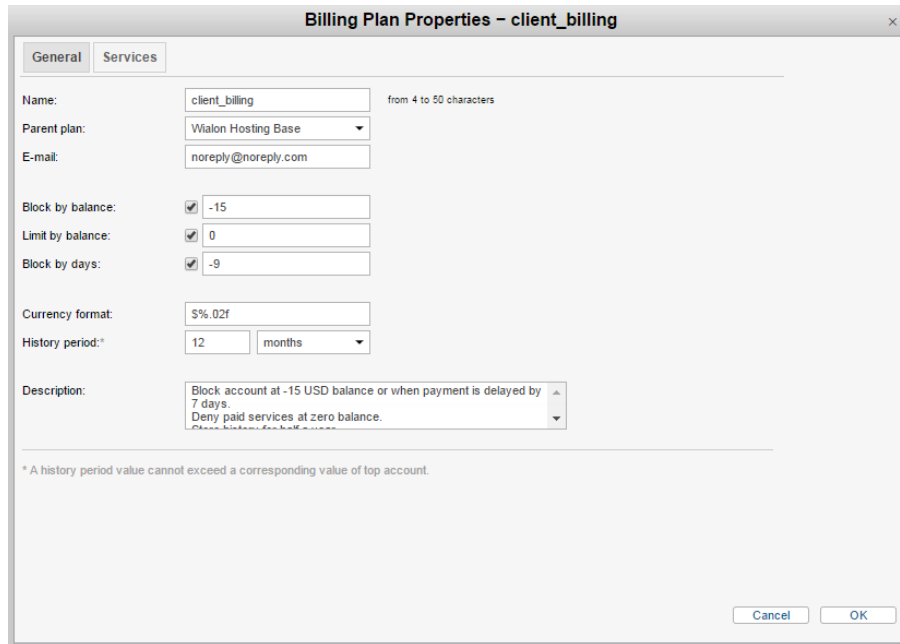
The above mentioned criteria are described in depth in the following sections:

- General Properties
- Services

General Properties

To create a new billing plan, click on the corresponding button. In the appeared dialog it is necessary to indicate general parameters of the billing plan. Some of them may be redefined in a particular account separately.

Editing a list of services available to this billing plan is implemented on the 'Services' tab in the properties dialog of a created billing plan.

Name
Billing plan name (from 4 to 50 symbols).

Parent plan
Select the parent (recursive) billing plan, if necessary. If it is assigned, the current billing plan inherits all its properties. These properties can be changed later, but considering that the capabilities of a filial billing plan can not exceed the capabilities of the parent one.

E-mail
In this field you can introduce the e-mail to be used for sending various system messages (notifications, reports, etc.). Read more about the mail system.

Block by balance
Enter balance reaching which the account will be blocked.

Limit by balance
Enter balance reaching which paid services along with some free services (messages, apps) will be denied.

Block by days
Works independently of 'Block by balance' option. If both of these parameters are adjusted, an account will be blocked when meeting either of set conditions. When the days counter embedded in the system says that 'Days left' on an account have reached the value indicated in this field, the account is blocked automatically. At that, when 5 days are left, a special warning starts to come each time when the user logs in to the system: 'Your account will be disabled in … days.'

⊙ *Note.*
The three above-mentioned features can be enabled or disabled according to your needs. Usually, their value is zero.

Currency format

Enter currency sign before or after '%.02f'.

History period

The time period to store unit history. This time period can be entered either in days or months (choose from the dropdown list). For example, if the value is 100 days, then messages older than 100 days are automatically deleted. This parameter can also be redefined for each account separately.

Map tags

This field makes sense only if own cartographical service is used by the system. Enter tags of maps that should be available with this billing plan. Separate tags with commas. If the field is empty, it assumes that all default maps will be available.

Tags are indicated in the following way:
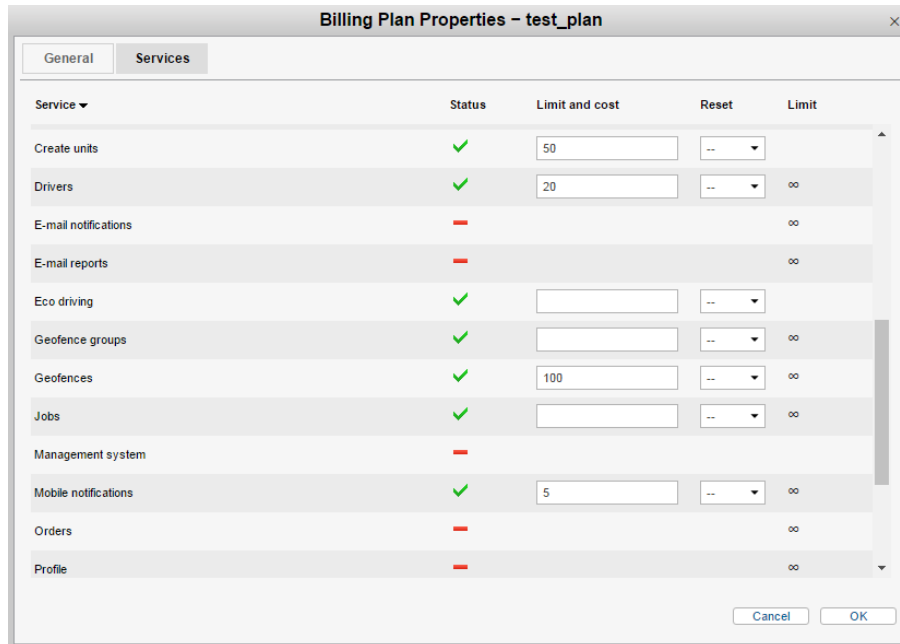
- Map name — an indicated map will be available as main one.
- '**+**' symbol is indicated before a map name — an indicated map is enabled in addition to the main one.
- '**-**' symbol is indicated before a map name — an indicated map is disabled.

Description

Give a description (optional).

Services

This tab provides the list of all services possible for this billing plan, their state and cost.

Adjustments of limit and cost of services are made in the same manner as for accounts. However, there are some differences. For example, the 'Limit' column shows the maximum allowed quantity of a service considering top account limitations.

Availability of services, their cost and allowed number can be also set (redefined) for each account separately, on the same name tab.

⚠ *Attention!*
Disabling a feature in a billing plan does not mean that the same feature will be automatically disabled in an account which is associated with this plan. If a feature is redefined (that is not default) in the account itself, the priority is given to the account. The state of services is borrowed from the billing plan, if in account it says 'By default'.

Users
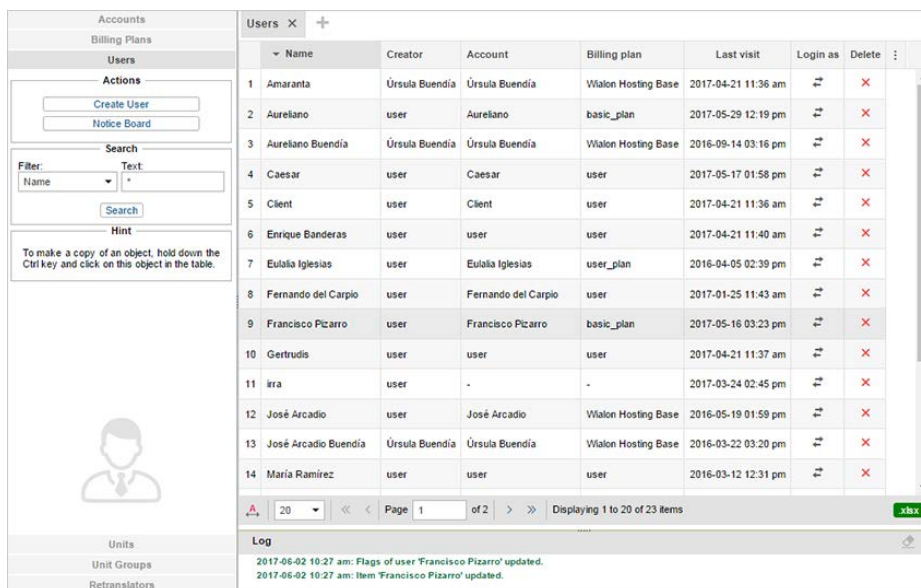
User is a system macro object defined by its specific name (login) and password. Using these login and password users can enter one of Wialon interfaces where they can control their units (end users) or manage the system itself (users-managers).

A user has access rights to interact with other system objects (units, other users, resources, etc.). These rights are assigned by a system manager. Besides, a user can be a creator of these objects, which also affects right hierarchy. Manager's duty is to properly build this hierarchy.

Users as system objects also have some specific applications in Wialon main interface that is described below (send SMS, control user activity, etc.).

Working with Users

Working with users is possible both in CMS Manager and in the main interface. In CMS Manager, open the 'Users' tab in the navigation panel on the left of the window.

There is a button to create a new user, a filter to search existent users, and a button (optional) to send informational notices to your users.

In the table of results, you can see user's name, creator, account, billing plan, date and time of a last visit in the system, buttons to delete users and login as them. Availability of buttons and information depends on your access rights.

Standard operations described below (such as create, view, edit, copy) can be applied to users in the same way as to other system objects. However, the following particularities should be taken into consideration:

- A user can be created not only independently but also together with an account or resource.

- Users cannot be as easily deleted as other system objects. Actually, only users who are not creators of any other system objects can be deleted. To delete a user, press the red *delete* button against their name and confirm your intentions (a dash is displayed instead of the button if you have no rights for deletion). If you are trying to delete a user who is a creator of any items in the system, you will get a alert which cites all those objects, and they should be deleted prior to their creator. Nevertheless, automatic deletion of all subordinated items together with their creator is still possible — through deleting an account they belong to.

Straightaway from the table, you can login to the system as another user (access flag 'Act as given user' is required). To do this, use buttons in the right column of the table. If connected as different user, both user names are displayed on the top panel. To return to the main user, click on their name in the top panel (before brackets, in bold).

User Properties

User properties are configured when creating, editing or copying a user. The properties are divided into several tabs. Availability of different tabs and parameters depends on access you have to the user. Two tabs are available in any case — 'General' and 'Advanced'. Furthermore, some properties become uneditable when the account of this user is blocked.

General

Here the basic properties like name, password, allowed activity, etc. are set. They are defined while creating a user and can be altered only if you have *manage* access to this user.

Name
User name (login) from 4 characters.

Password
Password is required for each user. When you set a password, you are asked to input it twice — the second time is for confirmation.

These login and password will be used by this user to enter the system.

Host mask
Host mask can be applied to user to restrict IP addresses from which to enter service sites. For example, to allow user to login to sites from office only. To set a mask, use the wildcard character *, for example, host mask can be set like this: '212.0.13.*'. If no mask is set, the user can login from any computer.

Creator
Select creator from the dropdown list. User's creator can be any other user. Creator is important to build hierarchy of access rights. A user inherits account and billing plan from the creator. Creator is assigned when a user is being created and cannot be changed afterwards.

Account
Here you can see to which account the user belongs (if you have any access to this account). Account and creator cannot be changed.

Measurement system
Choose a measurement system which will be applied to a current user. This parameter is shown only upon creating a new user. For existing users, it can be changed by the converter. Moreover, users can change a measurement system by themselves in the monitoring system. To do so, it is necessary to summon the user settings dialog and choose a proper measurement system on the 'General Settings' tab.

Can create items

This checkbox defines if user can or cannot create units, users, accounts, resources, unit groups, routes, and retranslators.

Can change password

If disabled, user cannot change their password used for login action.

Can send SMS

If disabled, user cannot send SMS messages to drivers, units, and other users from Wialon main interface. SMS buttons will be then hidden.

⚠ However, this option does not affect execution of commands via SMS channel.

Enabled

If disabled, user cannot login to any interface of the system.

Can change settings

If disabled, user cannot change their own settings (see User Settings), however, can see them.

⚠ To edit most of these properties, you should have the access *Change flags for given user*. Changing password requires also the right *Act as given user*.

Access

⚠ Access required: *Manage user's access rights*.

Here you give user access rights to objects existing in the system: units, resources (accounts), unit groups, routes, and other users.

On the left, you select objects. To quickly find a needed object, use filters — choose object type in the dropdown list and set a name mask below. Objects that meet your request will be displayed in the list. Also, to facilitate a search the list can be sorted alphabetically or by access rights. To use the sorting you should click the corresponding button to the right of the dynamic filter.

Colored background highlights objects to which the edited/created user already has any access.

Select an object on the left and mark actions allowed to the user on the right. More about access rights...
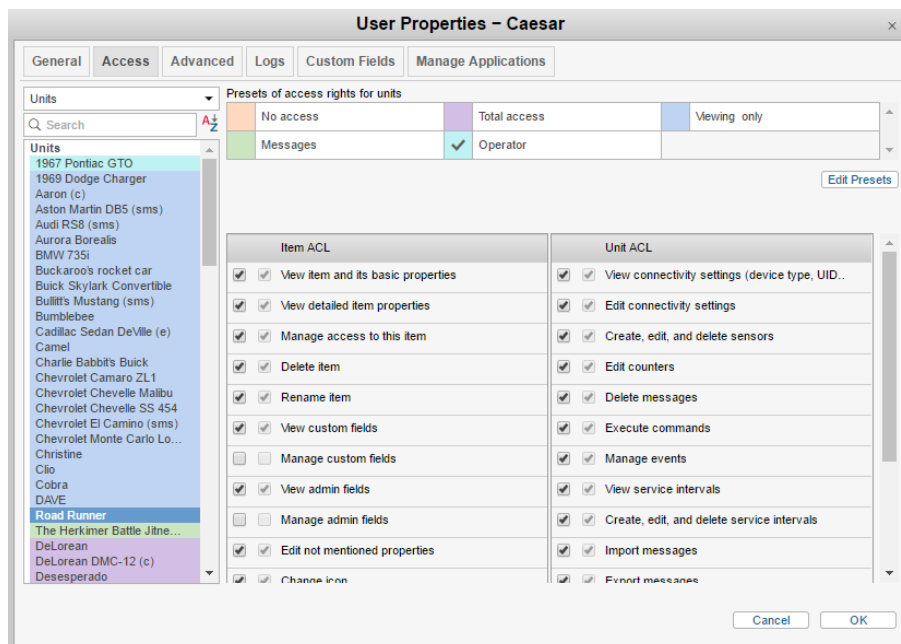
Note that this tab allows you to set access rights for a user to different system objects. However, user as such is a system object, too, and therefore can be accessed by other users. In other words, other users can obtain access rights toward this user. To set access to a user as system object, open the properties dialog of some other user and choose *Users* in the dropdown filter.

Advanced

On this tab, you can enter e-mail address that will be used to send notifications to the user from the service administration.
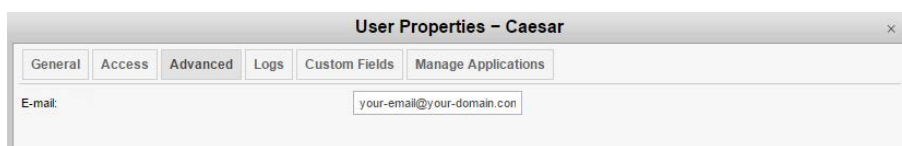
These settings can be changed by users themselves — in their 'User Settings' dialog.

⚠ To edit those properties, the access flag *Edit not mentioned properties* is required.

Custom Fields

⚠ Access required: *View custom fields* — to view general custom fields; *Manage custom fields* — to create, edit, and delete general custom fields for given unit; *View admin fields* — administrative custom fields; *Manage admin fields* — to create, edit, and delete administrative fields.

Any kind of information can be added to a user with the help of custom fields. This can be private phone, home address, post, experience, working shift, and so on. Administrative fields (seen only to users with special access rights) are marked in the first column.

On the left enter field name, and on the right field value. Then press the 'Add' button. When finished, press OK.
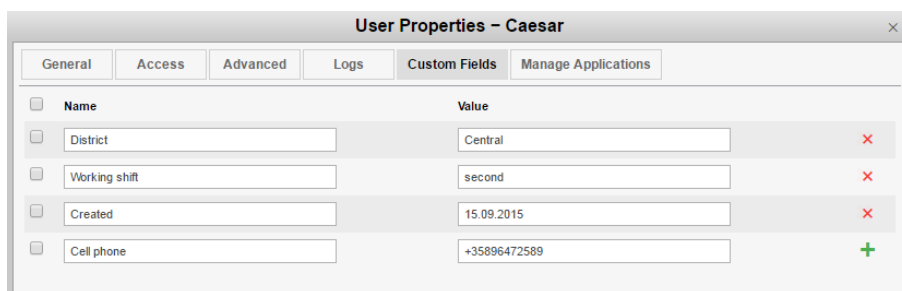
Next time you open the dialog custom fields will be automatically alphabetized.

Logs

⚠ Access rights required: *Query reports or messages*.

Here you can view all users' logins/logouts to/from different system interfaces for an indicated period. Specify the period and push 'Show'.
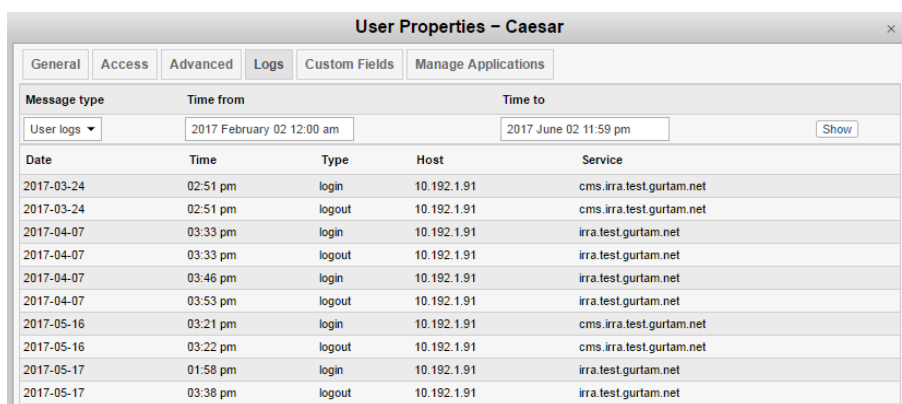
⚠ *Note*.
Besides the log, user's activity can be controlled through different reports that are available in Wialon main interface. More...

Manage Applications

Authorized Applications

This tab contains the list of applications having any access to your account and data. To the left there is an application name, to the right you can see access rights possessed by an application towards your data or account. To block an access for the application it is necessary to delete the corresponding application from the list.

Mobile Notifications

This tab contains the list of applications which are allowed to send notifications to your mobile devices. To the left there is an application name, to the right you can see a device type. To block mobile notifications sending it is necessary to delete the corresponding application from the list.

Notice Board

You can send information messages (notices) to the users of the system. To send them you need the access to the user 'Edit not mentioned properties'. The billing plan of the user must also have the service 'Notices to users' and his account must be active (not blocked). Otherwise, the user will not be shown in the list of the supposed recipients.

To open the dialog of the 'Notice Board', click the corresponding button in the 'Users' panel.

If there are some sent notices, the list of their subjects is shown in the left part of the dialog.
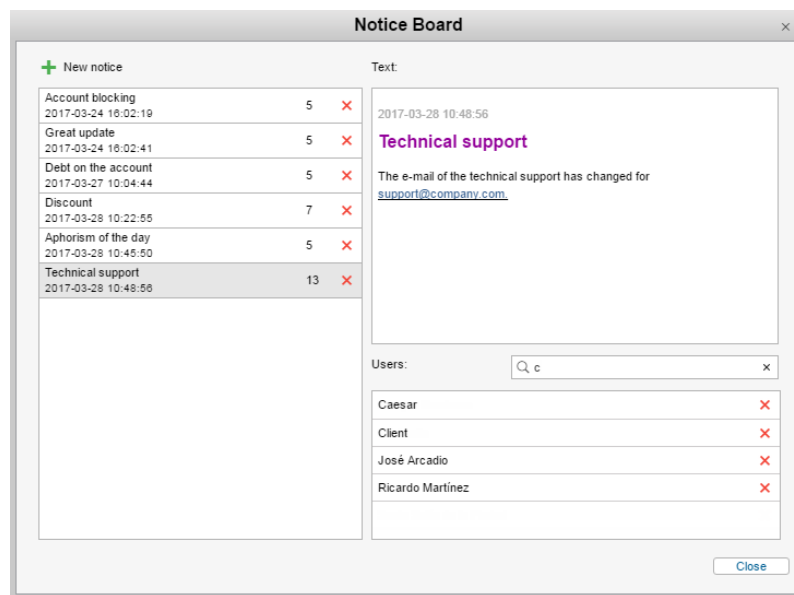
If you click a notice's subject, its text is shown in the field at the right. To delete a notice, click the red cross opposite to its name. ⚠ Apart from being deleted from the list, the notice's sending to the addressees is cancelled as well.

Below the field with the text there is the list of the users the selected notice has been sent to. To find necessary users quickly, use the dynamic search. It is possible to delete users (the notice will stop being showed to them) by clicking the red cross opposite to their names.

Creating Notices

To create a new notice press the button 'New notice' in the upper left corner of the dialog. The following dialog will open:
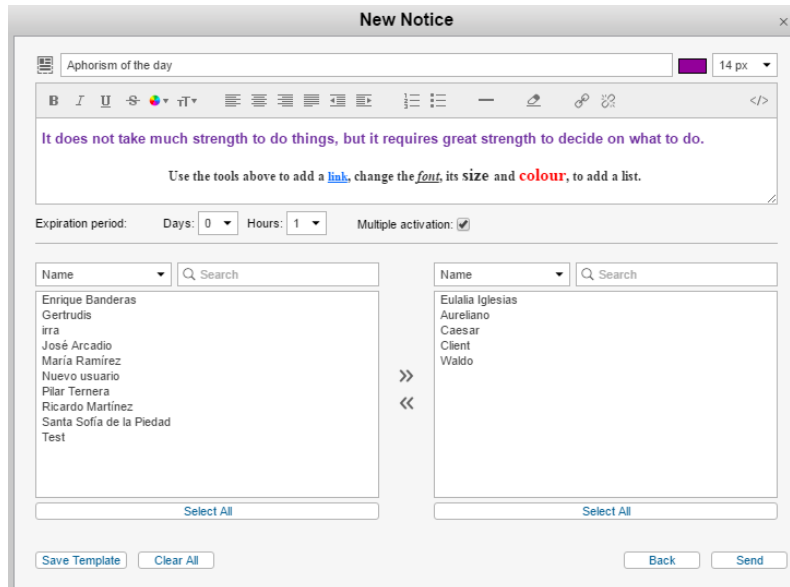
Introduce the title of the notice in the field 'Subject' and a text of any length below. Above the field with the text there are the tools that can be used for changing the font and its color, aligning the text, adding lists (numbered o bulleted) or a horizontal rule, add an outdent o an indent. You can also add hyperlinks in the text of your message. To do so, introduce the text you need to be shown as a hyperlink, click on 'Add link' button, enter or paste the necessary link in the appeared field and click on the green flag on its right. In the left part of the tools' panel there is the button 'Show code' by pressing which you can see the text in the form of a code.

Once you have entered and configured the text, adjust the expiration period (from 1 hour to 30 days) and enable the option 'Multiple activation' if you need the notice to be shown to the addressee during his every login in the system within the indicated period. If the option is disabled, the notice will only be shown once (till the user closes it).

Continue with choosing one or several addresses in the lower part of the dialog. The selection is done in the list on the left. Transfer the necessary users to the right list (by double clicks or using the button 'Add').

To find necessary users quickly, use the dynamic filter above the list. Users can be searched by different criteria: name, creator, account, billing plan, custom fields, and admin fields. To select all the users at once, click on the button 'Select All'.

The sent notices are shown to the corresponding users in a popup window (in both systems: management and monitoring).

Notices' Templates

The system provides a possibility to save the created notices as templates, which can be used later for creating new information messages. To do this, use the 'Save Template' button at the bottom of the dialog. Please note that the minimum input information required to save a template is its subject.

To open the list of available notices' templates, click on the button 'Templates' (⊞) in the upper right corner of the dialog of creating a notice. If you want to use a created template, press its name. You can also copy and delete templates using the buttons ⊡ and ✕, correspondingly.

Units

Unit is a system macro object defined by its specific ⊙device type and unique identification number (UID). It represents a vehicle, machine, person, pat or any other mobile or stationary object that can be controlled with the help of a GPS tracking system.

Working with units is possible both in CMS Manager and in the main Wialon interface. To work with units in CMS Manager, open the *Units* tab in the navigation panel. Units configured here become available for tracking (watch on the map, control different parameters, etc.).

Here you can create a new unit, observe existent units, view or edit their properties, define access rights to units, and remove units from the system. Read Standard operations for details. Besides, you can transfer units from one account into another.

Moreover, there is a possibility to create units with settings imported from WLP files. To do so, click the 'Create from WLP' button. Choose a file, indicate the necessary parameters, and click 'Next'. Afterwards, a unit with the indicated parameters is created, and a properties dialog of the created unit is opened.

Unit Properties Dialog

Unit properties dialog is displayed when you create, edit or copy a unit. It contains many tabs and fields that define different unit parameters and how the program will interpret data received from this unit.

The number of tabs can vary depending on your access rights (max — 11).

Use the following links to get to know the details about each parameter:

- **Sensors**
  - Sensor Properties
  - Sensor Types
  - Sensor Parameter
  - Validation of Sensors
  - Calculation Table
  - Signed Parameters Converting

Sensors

On the Sensors tab of Unit Properties dialog, sensors connected to equipment are added and configured as well as edited and removed.

On the list of available sensors you see sensor name, type, metrics, parameter, and custom description.

To create a new sensor, push the *'New'* button (**+**), fill in the fields and press OK. If you use similar devices for different units, it is convenient to configure sensors once, and then import them to other units.

Such buttons as 'Properties', 'Copy', and 'Delete' are used for the work with created sensors, and situated in the end of the line opposite to the sensor name. To quickly create a sensor with similar settings, press *'Copy'* in the line of a template sensor. To edit an existing sensor or just view its settings, press *'Properties'*. To delete a sensor, press *'Delete'*.

⚠ To make any alterations on this tab, you need access right *Create, edit, and delete sensors*. Otherwise, you can only observe existing sensors and their settings.
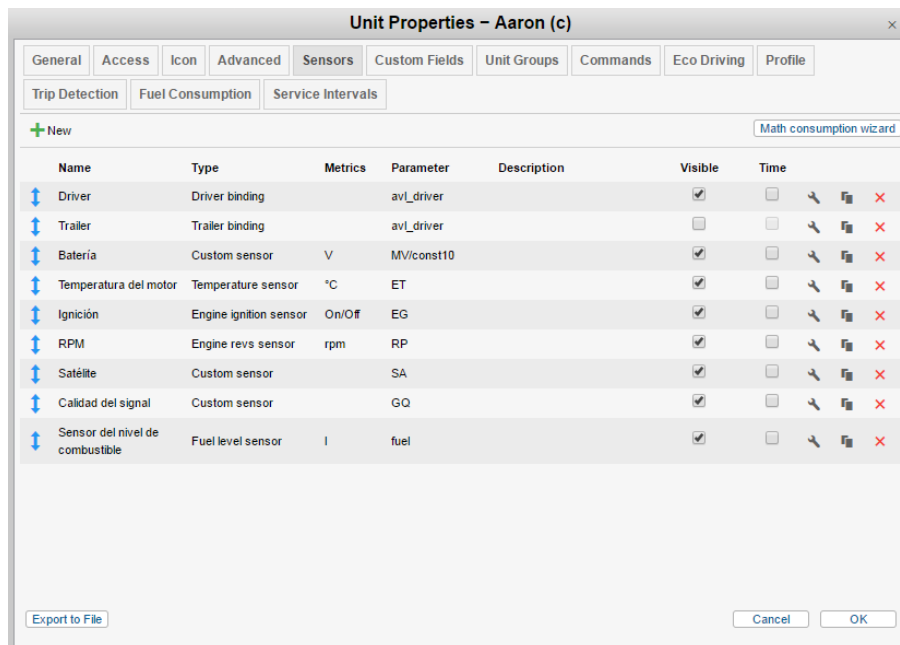
There is the **Visible** checkbox against each sensor. It controls whether sensor is shown or hidden. By default, the checkbox is enabled or disabled depending on sensor type. However, you may want to hide or show some particular sensors. Hiding is reasonable especially if a sensor is used as a validator and does not have its proper meaning.

If a sensor is visible, then the **Time** flag may become available for it. If you would like unit's additional information to contain time duration for how long parameter's value stays unchanged (for example, *Ignition: On (47 minutes 33 seconds ago)*), then activate this flag.

⚠ *Attention!*
Some limitations are applied to this feature. The sensor should have no calculation table, validators, custom intervals, nor contain references to other sensors in its parameter. In these cases, the Time checkbox will be unavailable.

Sensors' order on the list can be changed manually. To place sensors in a desirable order, just drag them up and down holding on the arrow-shaped icon on the left. Sensors' order and visibility is considered in unit's tooltip, extended unit information, track player, track hittest, and in the Messages panel. Only visible sensors are shown and they follow in the order as given here, in unit properties dialog.

Sensor Properties

When creating, editing or copying a sensor, an additional dialog with sensor properties is displayed. It consists of several tabs. On the first one, the basic properties are adjusted:

Name

Give a name to the sensor. It must consist of one or more characters. The name will be visible in unit's tooltip, in reports and messages.

Sensor type

Choose the sensor type to form the dropdown list of available types.

Measurement system

In the dropdown list choose a measurement system in which the sensor values will be received. This property and the corresponding dropdown list are displayed only for those sensors the metrics of which can be different depending on the measurement system chosen.

Metrics

Metrics is presented in reports (also in chart legends), tasks, tooltips etc. As a rule, every kind of sensors has its own default metrics (units of measurement). For some sensor types, units of measurement could not be changed, for the others you could do it manually. This is particularly applicable for digital sensors such as engine operation sensor or custom digital sensors. Instead of default On/Off values you can input *Activated/Deactivated*, *Laden/Unladen*, and the like.

Parameter

Parameters come in messages. If the unit already has messages, parameter name can be picked up from the list of available in the last message.

Last message only

This flag affects sensor's value in unit's tooltip and similar places. If enabled, sensor's value will be calculated only from the most recent message, and in case when no required parameters are present in the last message, there will be 'Unknown'. If disabled, the *last known* values are displayed even if they appear invalid (and no matter how up-to-date they are).

Description

This field is optional. Add any description and options if needed.

Validator and **Validation type**

This is optional. Validation defines dependency of sensors from each other.

Then you have to set calculation table for the sensor. It is especially needed for analogue sensors. Not all sensors send ready values that can be put into a report and be intelligible to any user. If the possibility to transform parameters is not provided with device itself, this transformation is adjusted with special Calculation Table or wizard.

Intervals and colors

Wialon system provides a possibility to differentiate sensor values by color. For this purpose in sensor properties it is necessary to create intervals of values and choose their colors. There is also a possibility to accompany received digital values by a text.

By default any sensor values (from -∞ to +∞) are displayed in black color. To set an interval, choose custom color, and indicate a text, click + button near the scale. Note that values are set for each interval individually. Further there are some peculiarities of setting intervals and choosing their color that could be helpful:

- No value in the first field corresponds to -∞, in the second — to +∞;
- Adding an interval which crosses an existing one and reaches beyond it, the added interval is set instead of existing one;
- Adding an interval which crosses an existing one without reaching beyond it, the added interval is inserted inside the existing one. Moreover, both the intervals on which the existing one has been cut, receive its text and color;
- You can either choose a necessary color from a color picker or indicate its text value (in HEX) in the corresponding field.

Upon completion, all the set intervals of a chosen color along with their text info are shown on the scale. Each interval of the scale, its color, and text can be edited. To do so, click the corresponding interval on the scale and set the necessary parameters. To delete all set intervals from the scale, click the 'Delete' button to the right of it.
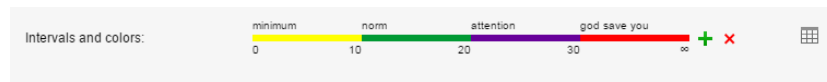
An alternative method is supported for adjusting intervals — table view. To switch to the table view, click the corresponding icon to the right of the scale. Click the same button to switch back to the scale. Note that upon creating more than 10 intervals, the scale is automatically switched to the table view.

⚠ If a sensor sends values smaller than ones indicated in the first interval, then such values are considered to be part of the first interval.

Created intervals can be used in several cases:

- To visualize sensor state in the corresponding column of the Monitoring panel;
- To display multicolor tracks of unit's movements;
- To show unit on the map according to sensor's state (if it is chosen to replace usual icons with motion state signs);
- To quickly pick a necessary information on sensors either in unit's tooltip or in extended unit information;
- To visualize sensor's state in the 'Nearest Units' tool.

In the first three cases, you need to specify sensor for each case separately, on the Advanced tab of the Unit Properties dialog.

Additional Properties

More properties can be applied to some specific types of sensors:

Redefine filtration level

This property is specific for fuel level sensors. Filtration degree is adjusted traditionally on the Fuel Consumption tab. However, in some cases each sensor needs to be set up individually. This option gives such a possibility.

Filtration level

The possibility of indicating filtration level is applicable to the following sensors: temperature sensor, engine revs sensor, voltage sensor, accelerometer, custom sensor, weight sensor. This option allows to apply smoothing algorithm to sensor values. It is necessary to indicate the level of such a smoothing (from 0 to 255) in the corresponding field. Filtration level for the sensors of such type is indicated individually. ⚠ The filtration level is only taken into account in reports (in tables and in charts while drawing smoothed lines).

Validate unbinding

This property is specific for sensors of driver/trailer binding. If the option is activated, a driver bound to a unit automatically can be unbound from this unit only if empty value comes from the same parameter which was used to bind the driver. Otherwise, driver reset coming from any parameter will lead to the reset of all drivers bound to the unit. And similar with trailers.

Unbinding code

This property is also applicable to the drivers/trailers binding sensors. Any code could be entered in the Unbinding code field. If the code is entered, then driver/trailer unbinding will be implemented either receiving an empty value or receiving the code.

Overflow by raw data

This option appears only for differential counter sensors with overflow. If it is activated, raw data is analyzed first, and then calculation table is applied. It means that raw data (and not data processed with calculation table as in case when the option is disabled) is taken to estimate overflow.

Timeout

This property is a specific feature for engine ignition sensor and custom digital sensor. Indicate time value (in seconds) in this field. If nothing is indicated in the field or 0 is entered in it, then the option is considered to be disabled. If time between messages exceeds the one indicated by you, then the period of time on which the timeout has been exceeded will be considered invalid, and the remaining time will be divided into intervals (before and after the invalid time period). In other words, the last message before, and the first message after the invalid time period will be considered the end of the first and the beginning of the second interval, correspondingly.

For example, custom digital sensor is used and 1 hour timeout has been indicated. The following data comes from digital sensor: 1 (22:00), 1 (22:10), 1 (07:50), and 1 (08:00). If timeout property had not been indicated, then we would have one continuous interval (from 22:00 to 08:00). But using 1 hour timeout we receive the following situation: there is less than 1 hour between 1st and 2d message, so we have first interval (from 22:00 to 22:10); between 2d and 3d message more than 1 hour pass, so this data is considered to be an invalid time period (from 22:10 to 07:50); and there is less than hour between 3d and 4th message, so we receive the second interval (from 07:50 to 08:00).

Consumption, l/h

This option is destined for the motor operation sensors and is used for calculating the fuel mathematically. ⚠ If the ignition is off, the consumption is considered to be 0 l/h.

With overflow

This option is available for the sensors, which could be influenced by occasional resets (mileage sensor, absolute engine hours, absolute fuel consumption sensor). Enabling this option the system uses the following algorithm. The value from the latest message is compared to the previous one. If the value is greater than the previous one, the difference of these values is added to the previous value. If it is less, then the value from the latest message is added. Therefore, this function guarantees receiving correct mileage data.

Text parameters

This option is available only for custom sensors. It is to be activated if a sensor sends text parameters instead of numeric. In this case, in the table of intervals and colors you can list those parameters and give them broader descriptions. For example, device sends parameters 'error1', 'error2', 'error3', etc. You can specify their meaning in the 'Text' column (like 'Power supply disconnected', 'Invalid data', etc.). Besides, you can use special characters like * (asterisk). For example, the values could be entered as 'error*' and its text would be simply 'Error'.

Sensor Types

There are many types of sensors. When configuring a sensor (see sensor properties), the choice of sensor type depends on used device and its principle of operation.

The table contains all sensor types currently available in the Wialon system. Moreover, here you can find units of measurement for the sensor values (either in metric or American/imperial systems), as well as short description for every sensor type.

Mileage			
Mileage sensor	kilometers (km)	miles (mi)	The sensor showing the distance traveled. It can be used to detect trips and stays.
Relative odometer	kilometers (km)	miles (mi)	The sensor shows the distance traveled since the previous message. It can be used to detect trips and stays.
Digital			
Engine ignition sensor	On/Off or any		This is engine operation sensor that is used in the report on engine hours as well as in trips/stays detection and counters. It also allows to configure the fuel consumption during idling.
Alarm trigger			Sensor which non-nil value allows marking a message as an alarm message (SOS).
Private mode	On/Off or any		This sensor is used to determine trip type ('Business', 'Private').
Real-time motion sensor	On/Off		The sensor determines units' motion state in real time. Its values are used to show the motion state in the 'Monitoring' panel and on the map (if the option 'Replace unit icons with motion state signs' is activated in the 'User Settings' dialog). The sensor can be based on such parameters as speed, ignition, engine revolutions, etc. Its parameter can contain formulae, which allows using validation.
Custom digital sensor	On/Off or any		This sensor can register two states. Its values can be displayed in unit's tooltip, in extended unit information or sent to report.
Gauges			
Voltage sensor	volts (V)		The sensor showing some parameter value (not necessarily voltage). It can be used to analyze input data.
Weight sensor	tons (t)	pounds (lb)	This sensor is used to detect weight of transported cargo.
Accelerometer	g		This type of sensor is used to measure acceleration at X, Y, Z axes and immediately detect a collision of cars.
Temperature sensor	Celsius degrees (°C)	Fahrenheit degrees (°F)	The sensor showing some parameter value (not necessarily temperature). It can be used to analyze input data. See an example of configuration.
Temperature coefficient			Temperature coefficient that affects fuel level calculations at different temperature in the tank.
Engine			
Engine revs sensor	rounds per minute (rpm)		The sensor displays engine speed.
Engine efficiency sensor	any		The sensor determines the coefficient when working under load used for the mathematical calculation of the fuel consumption. Can function as a reduction coefficient if its values are between 0 and 1.
Absolute	hours		The sensor registers the total amount of engine hours. It also allows to

engine hours			configure the fuel consumption during idling.
Relative engine hours	hours		The sensor registers the amount of engine hours subject to intensity of work. It also allows to configure the fuel consumption during idling.
Fuel			
Impulse fuel consumption sensor	liters (l)	gallons (gal)	The sensor shows an accumulated value of impulses. To convert the incoming value into the amount of consumed fuel, a calculation table should be applied. For such sensor type a calculation table is applied to the difference between two adjacent messages. After sensor creation and adjustment it is necessary to enable impulse fuel consumption sensor on the corresponding tab. ⚠ Note that if a device sends not an accumulated value of impulses, but the number of impulses between messages, then it is necessary to use instant fuel consumption sensor.
Absolute fuel consumption sensor	liters (l)	gallons (gal)	The sensor detects fuel consumption over all period of vehicle operation. After sensor creation and adjustment it is necessary to enable absolute fuel consumption sensor on the corresponding tab.
Instant fuel consumption sensor	liters (l)	gallons (gal)	The sensor shows fuel consumed from the previous measure (message). After sensor creation and adjustment it is necessary to enable instant fuel consumption sensor on the corresponding tab.
Fuel level sensor	liters (l)	gallons (gal)	This sensor is placed in the tank. After sensor creation and adjustment (see examples) it is necessary to enable fuel level sensor on the corresponding tab.
Fuel level impulse sensor	liters (l)	gallons (gal)	The sensor detects the number of impulses in a period. Fuel level in the tank is calculated from received values.
Other			
Counter sensor	any		The sensor can show passenger traffic or count the number of some actions like opening/closing the door, etc. Several types of counters are known: — instant (counts the number from the previous to the current message), — differential (shows total number), differential with overflow (2 bytes), — switcher from OFF to ON (counts the number of activations), — switcher from ON to OFF (counts the number of deactivations). Besides, you can enter any unit of measurement for this sensor.
Custom sensor	any		This is a custom sensor for which you can set any unit of measure. Its values can be displayed in unit's tooltip, in extended unit information or sent to report.
Driver binding			This sensor can be used to detect drivers assigned to units.
Trailer binding			This sensor can be used to detect trailers attached to units.
Passengers sensor			This sensor supports detection of passengers entering and leaving a vehicle.

Sensor Parameter

Parameter is a required sensor property. Most of sensors are based on a parameter coming in messages.

Parameters can be of any names. These names are normally predefined in ⊙device configuration, for example, *param199, param240, TEMP, pwr_int, gsm, can6*, and the like. Read device specification to find out which parameters are available and what they measure.

If the configured unit already has any messages, it is recommended to explore them and find available parameters (go to the 'Messages' panel). Parameters from the last message appear on the dropdown list of available parameters when creating or editing a sensor. However, even if the parameter you need is not on the list, you can enter its name manually.

One parameter can be used to create as many different sensors as you want. The maximum number of sensors allowed can be viewed on the Account tab of User Settings dialog.

Virtual Parameters

Some of supported parameters are reserved in the system as default:

speed	speed of motion
altitude	altitude above sea level (may be not supported by some devices)
sats	satellites count
course	course (direction of motion)
lat	geographical latitude
lon	geographical longitude
time	Unix time in message

⚠ *Note.*
Some rare devices may not support all of the parameters mentioned above, e.g., altitude or speed.

Inputs and Outputs

The system supports up to 32 digital inputs and outputs. They are adjusted in the following format:

inN	digital input parameter, N — input number
outN	digital output parameter, N — output number
adcN	analog input parameter, N — input number

For example, *adc8* is referred to as parameter that registers the values coming from the eighth analog input.

Normally, data from digital inputs and outputs are presented in messages in the following format: I/O = 0/0, where I refers to inputs, O — outputs. If I/O = 0/0, it means all bits (inputs and outputs) are inactive. If any of them is not zero, it means that an input/output or several of them are active. To define, which of them exactly, hexadecimal number (which you see in message) must be converted into bit number.

For example, when ignition was activated, the message with parameter I/O = 10/0 was received. We need to retrieve bit (input in our case) number from the received value — 10. To achieve this, open the calculator in the HEX mode and key in 10. Then switch to the BIN mode and get the binary number — 10000 in our case. Now count in which position 1 appeared (count from right to left). In our example, this is the 5th position, so, the ignition is connected to digital input 5. This means that the required parameter is *in5*.

Constant Parameter

Besides, **constN** parameter can be used to create a sensor that always returns the same value. N is any number, e.g., const10, const-8.5. Such a sensor can be helpful in charts or as a validator.

Such a sensor can be used both independently (for example, in charts to mark some critical line) or as a part of validation chain or in expressions.

Expressions

Parameter for a sensor can be set in the form of expression. In those expressions you can use:

- parameters in the current message (*adc1*, *in1* etc.),
- parameters in the previous message (they begin from the hash sign #, for example, *#adc1*),
- bitwise parameters (like *param199:3*),
- sensors (sensor name must be in square brackets, for example, *[Fuel level]*),
- constant numbers (*const10*, *const-4.54* etc.),
- mathematical operation signs:

+	addition
−	subtraction
	multiplication
/	division
^	exponentiation & rooting
( )	brackets of priority
|	value availability check
:	conversion operation

For example, *^const2* — square, *^const0.5* — take the square root.

🛈 *Note.*
Parameters from the previous message are not available in notifications and in tooltips for charts.

Expressions allow creating a great variety of sensors, which can satisfy any needs and assigned tasks.

Example 1: Detecting Speed by GPS Coordinates

It is possible to create a sensor to detect speed by coordinates. It will have the following parameter:

```
((lat-#lat)^const2+(lon-#lon)^const2)^const0.5/(time-#time)*const200000
```

Explanation:
The traditional formula to calculate the speed of movement is 'distance divided by time'. To calculate the distance, we apply Pythagorean theorem: squared difference of latitudes in neighboring messages plus squared difference of longitudes in neighboring messages, and then the square root is taken from this sum. So, we get the distance (in degrees). This value is divided by the difference of time in two neighboring messages. As the result, we have the distance in degrees per second. To convert this to more habitual kilometers per hour (or miles per hour), we apply a special coefficient. It varies depending on geographical position. In the example above it is equal to 200000 and applicable to Moscow.

If you have the ignition sensor, the parameter can be set like this:

```
((lat-#lat)^const2+(lon-#lon)^const2)^const0.5/(time-#time)*const200000*[Ignition
sensor name]
```

Example 2: Relative Engine Hours Sensor

To get real engine hours in report, create two sensors:

1. relative engine hours sensor,
2. coefficient sensor which depends on engine revolutions.

First, create a sensor of *Relative engine hours* type. The parameter for the sensor will be:

```
(time-#time)*[Name of coefficient sensor]/const3600
```

The meaning: time difference in neighboring messages multiplied by the coefficient of intensity of work and divided by 3600. The division by 3600 is applied to convert seconds into hours.

Then, create the coefficient sensor that will define the intensity of work depending on engine revolutions. Dependency scheme can be like this:

- 1 minute work with intensity of 2000 rpm correspond to 90 seconds of engine work   coefficient 1.5
- 1 minute work with intensity of 1500 rpm correspond to 60 seconds of engine work   coefficient 1
- 1 minute work with intensity of 1000 rpm correspond to 40 seconds of engine work   coefficient 0.67
- 1 minute work with intensity of 500 rpm correspond to 20 seconds of engine work   coefficient 0.33

Let us assume that *param1* sends engine revolutions. Then the coefficient parameter will be like this:

```
(param1+#param1)/const2
```

The meaning: arithmetic average of engine revolutions between neighboring messages.

To convert revolutions into coefficient, adjust the calculation table for this sensor:

- x=500 y=0.33
- x=1000 y=0.67
- x=1500 y=1
- x=2000 y=1.5

Do not forget to set the relative engine hours sensor as the counter of engine hours (the General tab).

Example 3: Value Availability Check

There is an equipment installed on the vehicle. It sends some parameter (for example, in1). Then the equipment gets out of order. A new one is installed. The new equipment sends the same data in the other parameter (for example, in2). To exclude data loss during report generation, it is necessary to use value availability check in 'Parameter' field upon creating a sensor. The old equipment has lasted all December, the new one — all January, and we need a report for these two months. If the value availability check is used during parameter indication ('in1|in2' entered as sensor parameter), then the system takes a value from 'in1' parameter, and if the 'in1' value is invalid (for example, an equipment is broken), then the system takes a value from 'in2' parameter. In other words, upon using the value availability check, the system takes into account the first valid parameter value received.

Textual Parameters

Most parameters are designed to send numeric data, however, in some cases they may provide textual data. This can be, for example, a name of a status (business/private), some state (free/waiting/busy, on/off), time passed since a certain event, etc.

Sensors with textual parameters do not require calculation table. Textual data is displayed as it is. However, the application of text-based sensors is limited — their values can be shown only in additional information about the unit, in messages panel, in track player, and in track hittest.

Parameters' Conversion

The parameters' conversion can only be applied to the parameters that are received directly from the hardware. The cases of application are described below.

Bitwise parameter control

The bitwise parameter control gives an opportunity to control a specific bit and not the whole parameter. For example, in order to control the third bit of the parameter *param199* it is necessary to put a colon and the number of the necessary bit after its name.

```
param199:3
```

This feature is applicable when a device sends various data in one parameter: for example, the first bit shows alarm condition (on/off), the second bit indicates driver's door state (open/closed), the third — headlights, etc. Thus, using bitwise control it is possible to create several sensors on the basis of one parameter.

⚠ *Note.*
The parameters of the *double* type are converted into *int*, and only then the bit is retrieved.

If it's necessary to address a but over 32, you can keep to the following scheme:

1. Create a sensor in which comes the parameter you need. For example, *Sensor1* .
2. Create another sensor. For example, *Sensor2* .
3. For the second sensor's parameter, specify the formula *[Sensor1] / const4294967296*. In that way, a shift of 4 bytes to the right will occur.

Textual parameters' conversion

If a textual parameter is used in an expression, it is converted into 64-bit integer. By default, it is interpreted as decimal, however, positional notation can be specified after colon. For example, there is a parameter called 'text_param' and it has the value '100', then:

```
text_param = 100
text_param:16 = 256
text_param:2 = 4
```

Determination of the day number in a year

To determine the number of a day in a year (regarding January, 1) it is necessary to indicate 'd' after the colon. For example, for the 28 of March, 2017 11:00:00 the Unix time corresponds to the value '1490698800'. Therefore,

```
time = 1490698800
time:d = 87
```

Validation of Sensors

Validation defines dependency of sensors from each other. It is adjusted in sensor properties.

Validator is a sensor that affects the current sensor. Validator is another sensor which must be created in advance. It is chosen from the list of available sensors.

Validation type defines in which way the validator will affect the current sensor. The following validation methods are available:

- *Logical AND*: values of both sensors are analyzed, and the logical function AND is applied. That means, the output is true (1) if both values are not null. As a result, current sensor value can be either 0 or 1.

- *Logical OR*: both values are analyzed, and the logical function OR is applied. That means, the output is true if at least one value is not null. As a result, current sensor value can be either 0 or 1.

- *Not-null check*: if validator is not null, current sensor value is considered true and displayed without transformations. In the other case, it is blank.

- *Mathematical AND*: the mathematical function AND is applied.

- *Mathematical OR*: the mathematical function OR is applied.

- *Sum up*: values are summed up.

- *Subtract validator from sensor*: validator value is subtracted from sensor value.

- *Subtract sensor from validator*: sensor value is subtracted from validator value.

- *Multiply*: values are multiplied.

- *Divide sensor by validator*: sensor value is divided by validator value.

- *Divide validator by sensor*: validator value is divided by sensor value.

- *Replace sensor with validator in case of error*: if the main sensor has no available data, all values are taken from the validator.

⚠ *Note*.
Validation chain can consist of any number of sensors. So, one sensor can be a validator for another sensor and at the same time depend on the third sensor.

Examples

Logical OR

The example is the following: every door of a vehicle is equipped with a sensor. Every sensor indicates whether the door is opened or closed. It is necessary to know if the vehicle is opened or closed, and the state of the particular door does not really matter.

For this purpose the sensor with 'Custom digital sensor' type should be created in Wialon for every door. Then, one by one, validate the sensors indicating 'Logic OR' as validation type. Using 'Logic OR' function, the vehicle is considered to be opened if any of its doors is opened (the 1st, or the 2d, or the 3d…). If it is more convenient, then the visibility for all the sensors used except for the last validated one could be switched off. Therefore the visible sensor shows whether the vehicle is closed or opened.

Mathematical AND

In the following example there is a vehicle with the sensors installed on every door, and these sensors show whether the door is opened or not. In this example it is necessary to know the state of every door individually. The equipment used in our example sends the doors' state value in one parameter (each bit represents the door).

The sensor with 'Custom sensor' type is created in Wialon and the parameter for incoming value of the doors' state is indicated. Then the sensor with 'Customer digital sensor' type is created for every door individually indicating constant parameter (for the first — const1, for the second — const2, for the third — const4, for the fourth — const8). The earlier created custom sensor should be indicated as the validator with the validation type 'Mathematical AND' for every created custom digital sensor. Therefore, using 'Mathematical AND' the verification of a received parameter is implemented, and we find out the state of every door.

Mathematical Operations Usage

Example 1

Let us suppose, three different kinds of equipment is installed on a unit (brush, plough, and thrower). Each of them is connected to a digital input which shows whether it is active at the moment or not. Using the validation system, we can control all three pieces of equipment not separately from each other but at once, in one sensor.

For each piece of equipment, we create a sensor, so, as a result we have three sensors — A, B and C. Let them all be custom digital sensors. With this, each sensor must have a calculation table adjusted in such a way that each sensor has a unique value. For example, one sensor (brush) if activated, will send 1, as usual; the second sensor (plough) will send 10; and the third sensor (thrower) will send 100. Thus, if you sum up the received values, you can easily estimate which sensor(s) are activated. Possible values:

- 0 — all equipment is off;
- 1 — the brush is on;
- 10 — the plough is on;
- 11 — the brush and plough are on;
- 100 — the thrower is on;
- 101 — the brush and thrower are on;
- 110 — the thrower and plough are on;
- 111 — all equipment is on.

To make this scheme work, adjust dependency between the sensors. Let us make Sensor A basic. Then the validator for Sensor A will be Sensor B, with validation type 'Sum up'. Sensor C will be validator for Sensor B (with the same validation type).

It is also useful to assign a color to each possible value (see Advanced Properties) so that these colors could be used to visualize sensor in the Monitoring panel, on the map or in tacks.

Example 2

Supposedly, there is a vehicle with two fuel tanks. Each tank has its own fuel level sensor. We need to know total fuel level of the two tanks.

Two sensors with 'Fuel level sensor' type should be created in Wialon. One of them is set to be a validator for the other with 'Sum up' validation type. If it is more convenient, then the visibility flag for the validated sensor should stay, for the other — could be unchecked. Therefore we can see the validated sensor value which is the total fuel level for these fuel tanks.

🙂 Using any mathematical operation as a validation method is equal to indicating sensor parameter using formula. In other words, any mathematical operation as a method of validation has an alternative without validation usage. In order to understand how it works, we shall use the above mentioned example with two tanks where we should know the total fuel level of two tanks.

Three fuel level sensors should be created in Wialon ('Tank1', 'Tank2', and 'Total'). In the parameter of 'Total' sensor enter the formula [Tank1]+[Tank2]. 'Tank1' and 'Tank2' sensors show their own fuel level, and 'Total' sensor shows us the total fuel level of both the tanks.

The advantage of using formulas is in the amount of information received. For example, if 'Tank2' is validated by 'Tank1', then we would know 'Tank1' fuel level, but 'Tank2' would show us only the total fuel level for these two tanks. Using formulas, we will also know 'Tank2' fuel level.

The only disadvantage for formula usage is creating of greater amount of sensors than during validation usage.

Calculation Table

Calculation table is very important in sensors configuration (see sensor properties). According to the calculation table adjusted, raw data coming in a parameter is transformed into sensor values, for instance, some abstract 86 is interpreted as 10.5 liters of fuel.

Calculation table is not always needed. It is especially true for digital sensors that send 1 or 0, and this corresponds to 'On/Off'. So, there can be no need in transforming this data in some way. On the contrary, analog sensors usually require calculation table.

⚠ *Attention!*
Filled calculation table is essential for analog engine ignition sensor because it must be defined how all available analog values are transformed into two available states — On/Off.

Calculation table recalculates data according to straight-line equation **Y = a×X + b**, where

- **X** is input value — values coming from device;
- **Y** is output value — processed values which gets into reports, charts, tooltips, etc.;
- **a** is a coefficient that determines the slope or gradient of that line (tangent of angle, or relation of the opposite cathetus to the adjoining one);
- **b** determines the point at which the line crosses the y-axis.

When a new message comes, necessary parameters are retrieved and substituted into the formula as *X* values; *a* and *b* are computed automatically according to the calculation table adjusted for the sensors. As a result, *Y* values become known.

Each row of the table operates only within its segment that is till the *X* value of the next row. That is why *X* values cannot be repeated.

It is possible to get the tangent of angle (that is needed to be substituted for *a* coefficient) using mathematics. To do this, find on *X* and *Y* axes segments of values operation (deltas). Then divide the values Δ**y**/Δ**x**. The result value is the tangent of angle.

Lower and upper bounds are used to set limits for input values. Note that the bounds correspond to the half-open interval. In other words, the lower bound is included in the interval of valid values while the upper one is not. In case of receiving values beyond the indicated interval, these values are considered to be invalid. Moreover, depending on the enabling/disabling of the 'Apply after calculation' flag, the indicated limits are applied to the raw values X (disabled flag), or to the processed values Y (enabled flag).

Incorrect pairs of values can be removed with the button ✕ . To remove all pairs at once, click the delete button in the header of the table.

A graphic for the created calculation table can be viewed by clicking 'Show chart' icon at the top of the table header.

Table Filling

Here are several ways to compile a calculation:

1. Fill in all available fields (*X*, *b*, and *a*). Use this method to get the calculation table under your complete control.
2. Fill in only *X* and *b* values, and *a* set as zero. This method is convenient if converting a analogue signal to a digital.
3. Fill in only *X* and *a* values. In this case, *b* is calculated automatically. This method is convenient if needed to get a curve knowing the angles.
4. In many cases it is possible to adjust the calculation table knowing input *X* values and corresponding

output *Y* values. In these cases use the calculation table wizard.
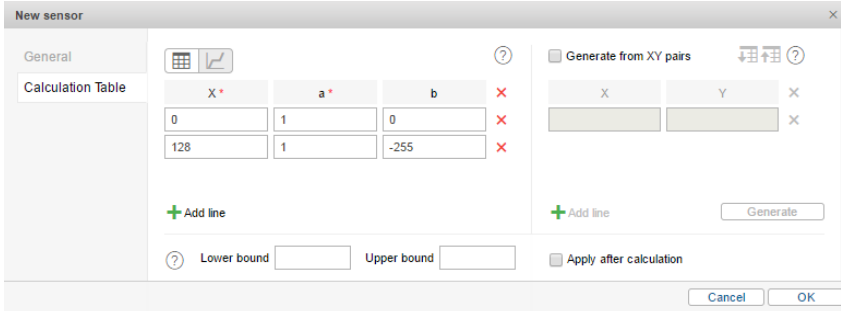
Chart Managing

A chart can be managed using the following buttons:

Area selection	Activate the button in order to zoom in any selected chart area. Select an area holding left mouse button. This operation can be repeated multiple times.
Autoscaling	Go back to a default chart scale by clicking this button.
Zoom in/zoom out	The buttons to scale a chart along the X axis. Click a button in order to make a visible area of the chart twice as wide/narrow in regard to the current position. Yet the center of the chart stays in its place.
Save as PNG	To save a visible chart area along with the axis in PNG format, click this button.

Example 1: Temperature Sensor

As an example, let us create a calculation table for a temperature sensor. Let us assume that data is coming in complement code. Thus, the positive values are form 0 to 127, and negative from 128 (which corresponds to -127 degrees) to 255 (which corresponds to -1 degree).

On the basis of values indicated in the table, a chart is made. To view a chart, click the 'Show chart' icon on top of the table header.
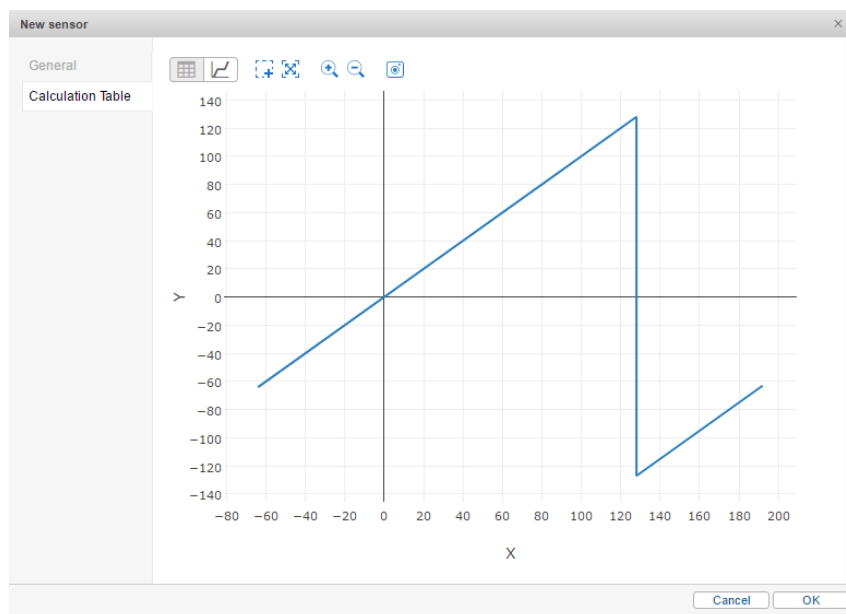
⊕ *Note*.

The function continues operating to infinity if there are no limitations. The chart extends also to the left to minus infinity. If there are limitations, the chart expands quarter-size to both sides, right and left.

Example 2: Engine Ignition Sensor

It is possible to configure a non-digital ignition sensor based on the parameter sending voltage. For instance, the voltage up to 0.5 V would mean 'ignition off', and over 0.5 V — 'ignition on'. For such a sensor, we should create a calculation table like this one:

Move to the *Calculation Chart* and see if the result meets your expectations.
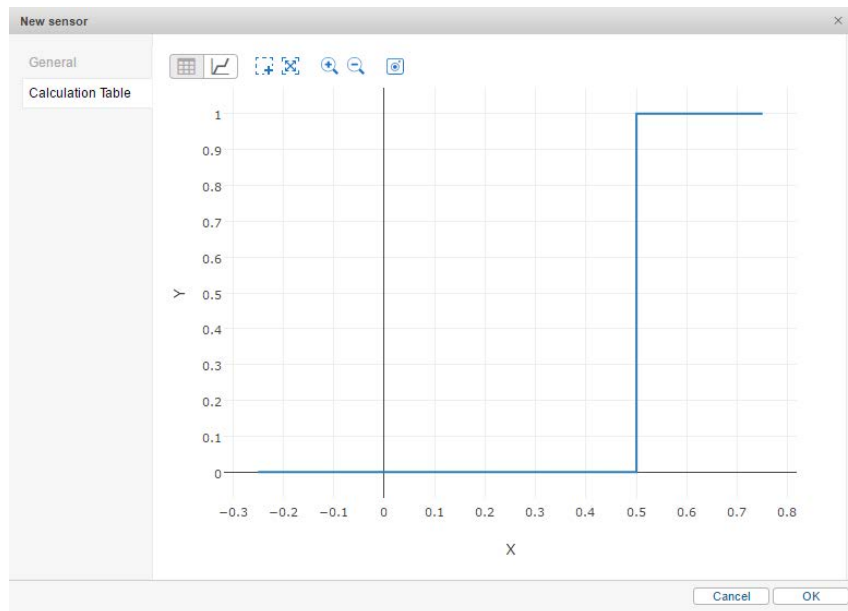
Calculation Table Wizard

A calculation table wizard is a tool simplifying a process of calculation table creation. In this tool it is sufficient to indicate input *X* values and corresponding output *Y* values. You can use the calculation table wizard to calibrate a sensor experimentally. For instance, you fill different volumes of fuel into the tank and each time you take the readings from the sensor. The calculation table wizard is situated in the right side if the dialog window. It is disabled by default. To use a wizard, indicate the 'Generate from XY pairs' flag.

Enter the pairs and click 'Generate' in order them to be processed by the system. On the basis of values indicated in the wizard, a calculation table will be created.

The program calculates *a* and *b* using the following algorithm:

- **a** is calculated by the formula $\Delta Y/\Delta X$. X- and Y-axial displacement is calculated separately for each interval, and then Y-axial displacement is divided by X-axial displacement, that is $\Delta Y/\Delta X$.
- **b** is calculated by the formula **b = Y — a × X**.

⚠ *Note.*
In the upper right corner of the table wizard there are buttons for exporting the introduced XY pairs into a CSV file and importing values from CSV or TXT files.

Example 1: Fuel Level Sensor

Let us imagine that we poured 10 liters of fuel and the sensor returned the value 86, then we poured 20 liters and got 173, and so on. In the end, we can form a table:

Input values (X)	Output values (Y)
0	0
86	10
173	20
252	30
330	40
405	50
477	60
546	70
618	80
686	90
749	100

Enter these pairs into the wizard and click 'Generate'. A calculation table will be created on the basis of values from the wizard:

In order to view a chart, click the 'Show chart' icon.
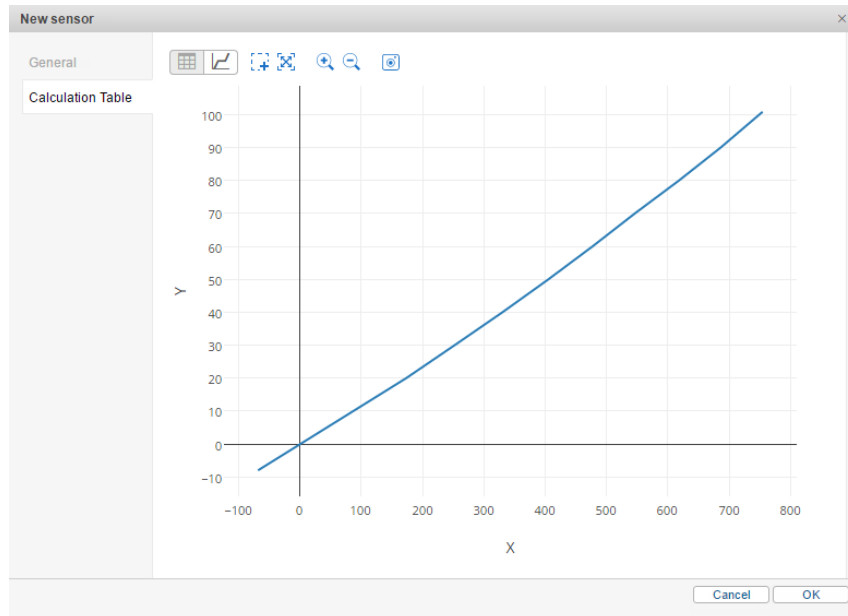
⚠ *Note.*

When reopening the dialog, all data entered on this tab is preserved. However, note that if any changes were made to the Calculation Table, they will not affect the Wizard. In other words, the Wizard displays only values you entered but doesn't reflect the real situation.

Now let us see how *a* and *b* were calculated. The first interval starts with 0 and lasts until 86. At that, in the last point the output is 10. So, *X* displacement is ΔX = 86 — 0 = 86, and *Y* displacement is ΔY = 10 — 0 = 10. Now *a* coefficient can be calculated: **a** = $\Delta Y / \Delta X$ = 10 / 86 = 0,11627906976744186. The same algorithm is applied to all intervals:

Interval	X	Y	a	b
N	X	Y	$(Y_{(i+1)} - Y_{(i)}) / (X_{(i+1)} - X_{(i)})$	$Y - a \times X$
1	0	0	(10 — 0) / (86 — 0)	0 — a×0
2	86	10	(20 — 10) / (173 — 86)	10 — a×86
3	173	20	(30 — 20) / (252 — 173)	20 — a×173
4	252	30	(40 — 30) / (330 — 252)	30 — a×252
5	330	40	(50 — 40) / (405 — 330)	40 — a×330
6	405	50	(60 — 50) / (477 — 405)	50 — a×405
7	477	60	(70 — 60) / (546 — 477)	60 — a×477
8	546	70	(80 — 70) / (618 — 546)	70 — a×546
9	618	80	(90 — 80) / (686 — 618)	80 — a×618
10	686	90	(100 — 90) / (749 — 686)	90 — a×686
11	749	100	(110 — 100) / (812 — 749)	100 — a×749

Example 2: Fuel Level Sensor

In this example, input *X* values decline while output *Y* values grow. Insert the pairs into the wizard in any order — they will be rearranged automatically.

Initial data:

Input values (X)	Output values (Y)
2.8	0
2.58	10
2.18	20
2.0	30
1.65	40

1.3	50
1.25	60
1.1	70
0.96	80
0.6	90
0.32	100

Insert these pairs into the wizard, generate the calculation table and view the calculation chart.
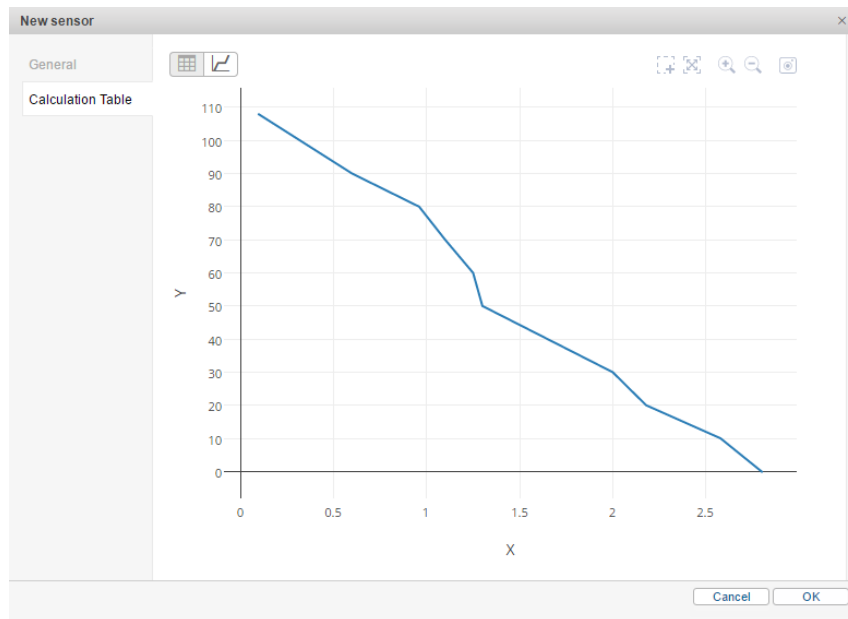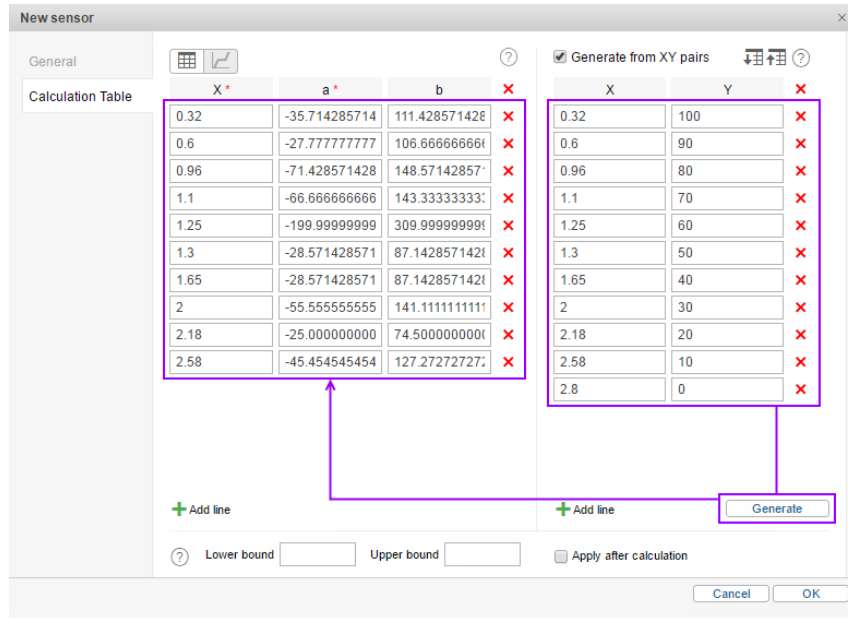
Calculated intervals for this sensor are as follows:

Interval	X	Y	a	b
N	X	Y	$(Y_{(i+1)} - Y_{(i)}) / (X_{(i+1)} - X_{(i)})$	$Y - a \times X$
1	0,32	100	(90 — 100) / (0,6 — 0,32)	100 — a×0,32
2	0,6	90	(80 — 90) / (0,96 — 0,6)	90 — a×0.6
3	0,96	80	(70 — 80) / (1,1 — 0,96)	80 — a×0.96
4	1,1	70	(60 — 70) / (1,25 — 1,1)	70 — a×1.1
5	1,25	60	(50 — 60) / (1,3 — 1,25)	60 — a×1.25
6	1,3	50	(40 — 50) / (1,65 — 1,3)	50 — a×1.3

7	1,65	40	(30 — 40) / (2,0 — 1,65)	40 — a×1.65
8	2,0	30	(20 — 30) / (2,18 — 2,0)	30 — a×2
9	2,18	20	(10 — 20) / (2,58 — 2,18)	20 — a×2.18
10	2,58	10	(0 — 10) / (2,8 — 2,58)	10 — a×2.58

Signed Parameters Converting

It is supposed that data received by Wialon in the format of two- and four-byte integer appears to be unsigned. In other words, all the incoming values (both positive and negative) are displayed as unsigned, i.e., positive.

In case when equipment used by you sends signed values in any parameter (for example, temperature parameter), it is necessary to create a sensor on the basis of this parameter and adjust a calculation table in a proper way.

Parameter Analysis

Switch to the 'Messages' panel and request messages for any interval of time. Indicate *Show parameters as raw data*. In the column 'Parameters' find the necessary parameter and analyse its incoming values.

Time	Altitude, m	Parameters	
2015-12-11 13:38:28	206	adc1=2.586, param240=1, pwr_ext=28.138, param24=6, battery_charge=0, I/O=5/0	☐
2015-12-11 13:38:59	210	adc1=2.608, param240=1, pwr_ext=28.138, param24=4, battery_charge=0, I/O=5/0	☐
2015-12-11 13:39:09	223	adc1=2.564, param240=1, pwr_ext=28.129, param24=3, battery_charge=0, I/O=5/0	☐
2015-12-11 13:39:39	223	adc1=2.608, param240=1, pwr_ext=28.157, param24=2, battery_charge=0, I/O=5/0	☐
2015-12-11 13:39:50	232	adc1=2.586, param240=1, pwr_ext=28.138, param24=2, battery_charge=0, I/O=5/0	☐
2015-12-11 13:40:20	247	adc1=2.586, param240=1, pwr_ext=28.119, param24=1, battery_charge=0, I/O=5/0	☐
2015-12-11 13:40:50	263	adc1=2.556, param240=1, pwr_ext=28.138, param24=0, battery_charge=0, I/O=5/0	☐
2015-12-11 13:40:50	260	adc1=2.578, param240=1, pwr_ext=28.157, param24=0, battery_charge=0, I/O=5/0	☐
2015-12-11 13:41:20	267	adc1=2.578, param240=1, pwr_ext=28.157, param24=4294967295, battery_charge=0, I/O=5/0	☐
2015-12-11 13:41:51	257	adc1=2.556, param240=1, pwr_ext=28.148, param24=4294967295, battery_charge=0, I/O=5/0	☐
2015-12-11 13:42:42	265	adc1=2.549, param240=1, pwr_ext=28.129, param24=4294967295, battery_charge=0, I/O=5/0	☐
2015-12-11 13:42:42	258	adc1=2.549, param240=1, pwr_ext=28.129, param24=4294967295, battery_charge=0, I/O=5/0	☐
2015-12-11 13:42:52	244	adc1=2.556, param240=1, pwr_ext=28.138, param24=4294967295, battery_charge=0, I/O=5/0	☐

You can see that when temperature goes down and crosses 0 degrees threshold the necessary negative numbers are constituted with enormously large ones.

Defining the Maximum Value

Firstly, you should define the maximum threshold for such numbers. In order to do so, take any of such numbers appeared in parameter values and put it into a calculator in the decimal mode (Dec.). Afterwards, switch to the hexadecimal displaying (Hex. mode).
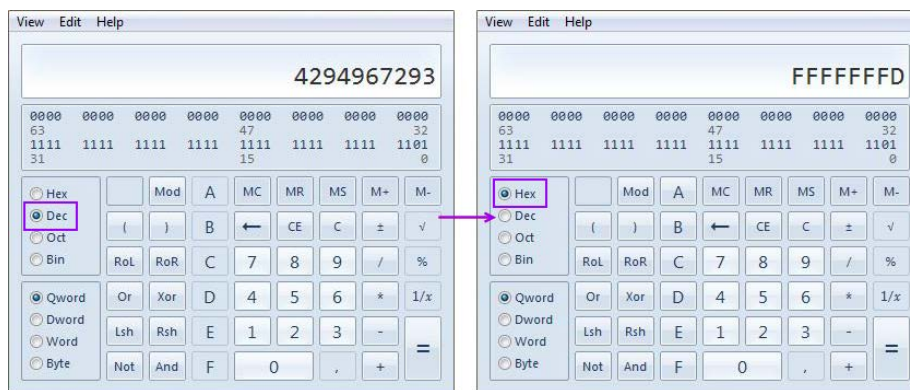
Count the register length in the number appeared. Possible values are: 2, 4, 8. If the register length is less, we should round it up (for example, 5 should be rounded up to 8). In our case the register length is 8.

Now letter *F* should be put in to the calculator in Hex. mode as much times as the register length appears to be after rounding up. Afterwards, switch to the 'Dec' mode. Appeared result is the maximum possible number. You should write it down or memorize.

Sensor Calculation Table

Switch to the unit properties dialog and create a sensor on the basis of this parameter. Now you should create a calculation table for it. Switch to the 'Calculation Table' tab and deselect *Continue last segment* checkbox.

We have found out that all the interval of possible values is from 0 to 4294967295. Therefore possible values start from 0 to the half of the maximum number and negative numbers go from the half to the end of the maximum number (where the maximum number is the smallest negative number module). Divide the maximum number by 2, which equals 4294967295 : 2 = 2147483647,5. It means that positive values start from 0 to 2147483647 and negative —from 2147483648 to 4294967295.

In the calculation table **X** is a raw data sent by parameter, **a** — coefficient, **b** — necessary correction. And all these values are needed to get some **Y** which appears to be a real temperature value.

Whether (**a**) coefficient is used for this parameter you can find out in the equipment specification. In our case coefficient equals 0.1, therefore if parameter's value sent by equipment equals 6 then the real temperature is 0.6 degrees.

The first piece doesn't need **b** correction (i.e., 0) but the second piece needs it because the values go in reverse order (maximum number corresponds to the smallest negative temperature value module). To calculate **b** shifting it is necessary to add one (because we already have 0) and multiply by coefficient. Therefore we have: (4294967295+1)x0.1 = 429496729.6. The received value should be deducted that's why it should be put to the calculation table as negative.

Now you can insert both the intervals (either for positive and negative numbers) in the calculation table.

⚠️ *Note.*

Calculation could be also made in 'Hex' mode. In this case you should put letter *F* as much times as the register length appears to be (which is 8 in our case) and then divide by 2. Afterwards, switch to the 'Dec' mode (decimal numbers) and save or memorize a number received. This is the maximum positive value.

Result Analysis

You can analyse received table, switching to the 'Calculation Table' tab and pressing 'Refresh' button.
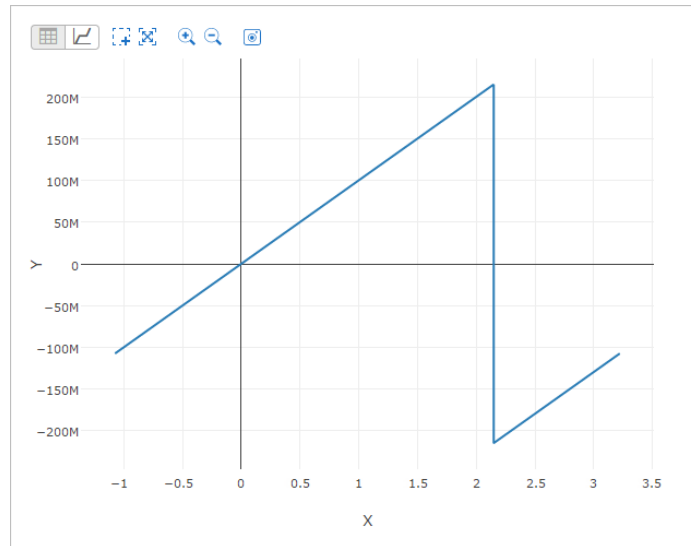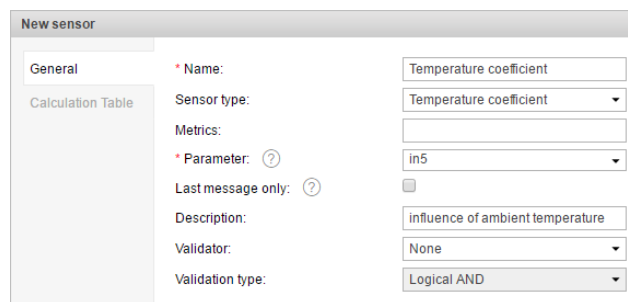
Besides, you can estimate sensor's adjustment in the Messages panel. Request messages on the unit for the same time interval and this time choose 'Show parameter as sensor values'.

1	2015-12-11 13:38:28	0	0.60
2	2015-12-11 13:38:59	0	0.40
3	2015-12-11 13:39:09	0	0.30
4	2015-12-11 13:39:39	0	0.20
5	2015-12-11 13:39:50	0	0.10
6	2015-12-11 13:40:20	0	0.30
7	2015-12-11 13:40:50	0	0.00
8	2015-12-11 13:40:50	0	- 0.10
9	2015-12-11 13:41:20	0	- 0.30
10	2015-12-11 13:41:51	0	- 0.30

Temperature Coefficient

Temperature coefficient is a sensor which is created on the basis of a parameter sending temperature/voltage and applicable for a fuel level correction. Any liquids depending on ambient temperatures could occupy different volume, that's why fuel level sensor's information, especially of high volumes (for example, tanker), could seem to be incorrect without considering temperature values.

Temperature coefficient sensor as well as the other sensors is created in the unit's properties in the tab 'Sensors'. Press 'New' button and fill in the necessary fields. Sensor type is *Temperature coefficient*, name and description is any of your choice. Unit of measurement is not necessary to be indicated. The parameter sending temperature data is obligatory for indication.

Afterwards, switch to the 'Calculation Table' tab and using wizard put in two coefficient values, maximum and minimum temperature coefficient. Beforehand, some preliminary preparations should be done:

1. Look through the specification and find out maximum and minimum working temperatures of your fuel level sensor. In our case they will be: t_{max} = +100 and t_{min} = -60°C.

2. Find out rated temperature for the reference amount, in other words the temperature which doesn't change fuel amount and and won't require a coefficient application. In our case the value is the following: t_{rated} = +20°C.

3. Find out the density of a fuel used by you (ρ). In our case it is diesel, the density of which is 0.89 t/m^3.

Calculate coefficients' values using the following formulas:

$$P_1 = \frac{(t_{rated} - t_{min})p}{1000} + 1$$

$$P_2 = 1 - \frac{(t_{max} - t_{rated})p}{1000}$$

Thus we have:

$$P_1 = \frac{(20 - (-60)) \times 0.89}{1000} + 1 = 1.0712$$

$$P_2 = 1 - \frac{(100 - 20) \times 0.89}{1000} = 0.9288$$

Now insert the data found for the minimum and maximum temperature values into the fields of 'Calculation Table Wizard' and generate a calculation table.

⚠️*Note.*

If not the temperature, but, for example, voltage is sent by parameter, then instead for the minimum, maximum, and rated temperature it is necessary to know the minimum and maximum voltage and also a rated voltage of a reference amount, and do the calculations on the basis of this data.

Math Consumption Wizard

The wizard simplifies the process of creating and configuring the sensors for the mathematical calculation of fuel consumption.

To open the wizard, click on the corresponding button in the upper right corner of the 'Sensors' tab of the unit properties.
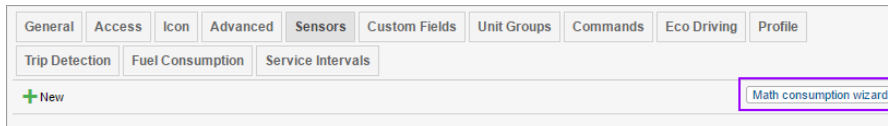
While opening the math consumption wizard, the system searches for existing engine operation sensors (ignition, relative and absolute operating hours) and engine efficiency sensors, and also checks the values of the previous settings.

The window of the wizard consists of three sections and has the following appearance:
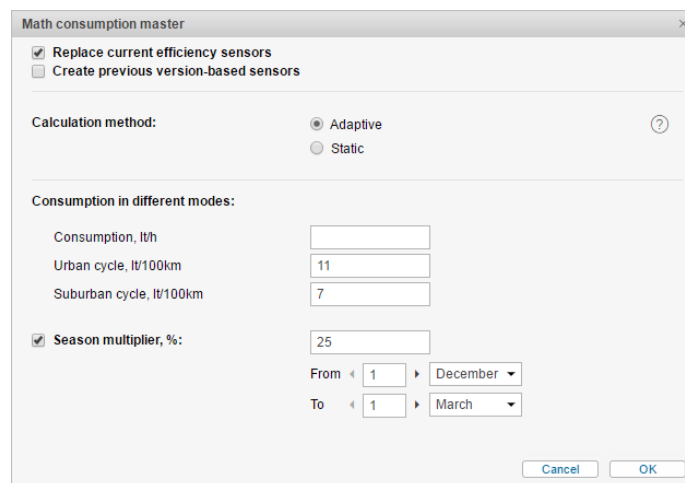
In the right section two options may be available for activation according to the previous properties of the unit:

- **Replace current efficiency sensors**
  Is shown if engine efficiency sensors have been found. The option's flag is activated by default. In case of pressing *OK* the sensors created before will be replaced by the new ones. If the flag is not activated, the new sensors will be added to the existing ones.
- **Create previous version-based sensors**
  Is shown if some configured before flags of calculating fuel have been found. If the option is activated, the two sections of the wizard situated below become inactive and are filled with the available data.

In the second section it is necessary to choose the calculation method: adaptive or static. The **adaptive** method supposes the calculation of fuel according to the unit's speed; the **static** — that the introduced consumption will be used for calculating fuel by rates.

The contents of the third section depend on the chosen calculation method. If the **adaptive** one is chosen, it will be as follows:

- **Consumption in different modes**:
  Consumption, l/h — the fuel consumption during idling. If the field is filled in, its value is put in the first ignition sensor. If it is not, then the fuel consumption during idling is calculated as [urban cycle/10] (according to the statistic data).
  Urban cycle, l/100 km — fuel consumption in urban cycle (obligatory option).
  Suburban cycle, l/100 km — fuel consumption in suburban cycle.

After pressing the OK button, an ignition sensor will be created (or the consumption during idling for the existing sensors will be modified) as well as an engine efficiency sensor with the parameter *(speed + #speed)/const2*. The data for the consumption in urban and suburban cycles and the minimum moving speed from the trip detector will be used for the calculation table.

- **Seasonal multiplier, %**
  In this part of the math consumption wizard the multiplying or reduction coefficient for different seasons is adjusted. In the field 'Seasonal multiplier' the coefficient in per cent is indicated (for the reduction coefficient it should be a negative number). In the fields 'From' and 'To' the time frames of the season are entered.

If the values for the seasonal multiplier are indicated, then after pressing the OK button an engine efficiency sensor with the parameter *time: d* will be created.

If the **static** calculation method is selected, the values indicated in the fields below will be used for calculating fuel by rates.

- **Consumption, l/100 km** — fuel consumption per 100 km. As a result an engine ignition sensor with the parameter *(speed+#speed)/const2* (the consumption is calculated as [fuel consumption/10]) and an engine efficiency sensor with the parameter *(speed+#speed)/const20* are created. If a unit had a relative odometer configured, the engine efficiency sensor will have the parameter *([odometer]/((time - time)/const3600))/const10*.
- **Seasonal consumption, l/100 km** — fuel consumption according to the season. The time frames of the season are indicated in the fields 'From' and 'To'. As a result an engine efficiency sensor with a multiplying (the indicated value is higher than the consumption per 100 km) or a reduction (the indicated value is lower than the consumption per 100 km) coefficient *time:d* will be created.

⚠ All the sensors created by means of the math consumption wizard will have the word '(wizard)' in their names.

General Properties

⚠ Access required: *Edit connectivity settings* — to view and edit devices type, phone number, UID, and access password.

On the 'General' tab of the Unit Properties dialog the following parameters are set:

Name
Enter a name for the unit from 4 to 50 characters.

Device type
Select device type from the list of ◉supported hardware. Three devices most used by the current user are listed on the right and can be easily chosen by simple click. To display the full list of available device types, click on the entry field once (at that it should be empty). To quickly find a necessary device type, use the dynamic filter. On the right of the entry field there is a button which can be used to configure device parameters for the given unit, however, it is active only if this facility is supported within selected device type. ⚠ Note that upon creating a unit from WLP file there can be a situation when the device type used by the source unit is not available for your account. In this case the device type of a new unit is automatically changed for the Wialon Retranslator.

Unique ID
Enter a unique ID for the unit to be identified by the system. Usually it is IMEI or serial number. Some types of devices may support two unique IDs. In this case, an additional input field appears on the right. Maximum number of symbols for an ID is 100.

Phone number
Here type phone number of the unit if it has embedded SIM card. Phone number should be in the international format, e.g., +15557654321. If your device supports two SIM cards, you can enter the second phone number on the right.

Device access password
This password is required for some device types to execute commands or send data.

Creator
User who is creator for this unit (if you have any access to this user).

Account
Here you can see to which account the unit belongs (if you have any access to this account). Like creator, account is set while creating a unit cannot be changed later.

⚠ *Attention!*
Units with the same unique IDs within certain device type as well as units or drivers with the same phone numbers cannot exist in the system. If you are attempting to create a unit with a repeated ID or phone number, a special alert will be displayed. However, unit will be created anyway but with *empty* ID or phone number which could be edited later.

⚠ *Note*.

Parameters of units could be set in different measurement systems. Systems of measurement for new units created is taken from current user settings. Therefore, to choose a system of measurement for a unit, it is necessary to choose a corresponding system of measurement in the settings of a current user. System of measurement for already existing units can be changed by conversion.

Counters

⚠ Access required: *Edit counters* — to edit counters current values and calculation methods.

Parameters for counters are adjusted on the 'General' tab. Counters are widely used in the system — in online monitoring as well as in reports. Three types of standard counters are supported: mileage counter, engine hours counter, and GPRS traffic counter.

Mileage Counter

Mileage counter is used to calculate distance in reports.

Four methods are suggested for calculating mileage:

- GPS: mileage is calculated by GPS coordinates. It means if the change of coordinates was detected, the distance between them is added to mileage.
- Mileage sensor: mileage is calculated by mileage sensor.
- Relative odometer: mileage is calculated by relative odometer sensor.
- GPS + engine ignition sensor: mileage is calculated by GPS coordinates considering ignition state.

⚠ Note that if a sensor (including sensor-validator) needs a parameter from the previous message, then such a sensor cannot be used as a method of mileage calculation.

Be careful when selecting a method. If you choose to calculate mileage by a sensor, and your unit does not have this sensor, then mileage values will be zero.

Engine Hours Counter

Engine hours counter calculates engine hours by one of three sensors (engine hours are measured in hours):

- engine ignition sensor,
- absolute engine hours sensor,
- relative engine hours sensor.

⚠ Note that if a sensor (including sensor-validator) needs a parameter from the previous message, then such a sensor cannot be used as a method of engine hours calculation.

Engine hours counter is widely used in tabular reports.

GPRS Traffic Counter

GPRS traffic counter is used to calculate Internet traffic consumed by the unit to transmit and receive data. Traffic is measured in kilobytes (KB). At any moment, you can reset this counter manually if pressing the *Reset counter* button. You will be offered to save the event of reset and the current value in unit events history to be exported to a report later.

Counter Properties

You can set the **Current value** for each counter, and the further calculations will start from the indicated point. In order the new data were added to the current value automatically, activate the **Auto** option at the right of the counter. You can manually zero counters if entering '0' to the current value field.

Counters values can be altered not only in this dialog but also with the help of appropriate jobs and notifications. Values of mileage and engine hours counters can be shown in unit's tooltip and in extended unit information.

Access to Unit

⚠ Access required: *Manage access to this item* on the unit you are editing; *Manage user's access rights* on the users in the left part of the dialog.

On the *'Access'* tab of the Unit Properties dialog you can define access to the unit on behalf of different users.

The list of users whose access can be changed is displayed on the left. Users with colored background on the top of the list are those who already have some access to this unit.

On the right, the list of both standard and special access rights is displayed where allowed actions are ticked.
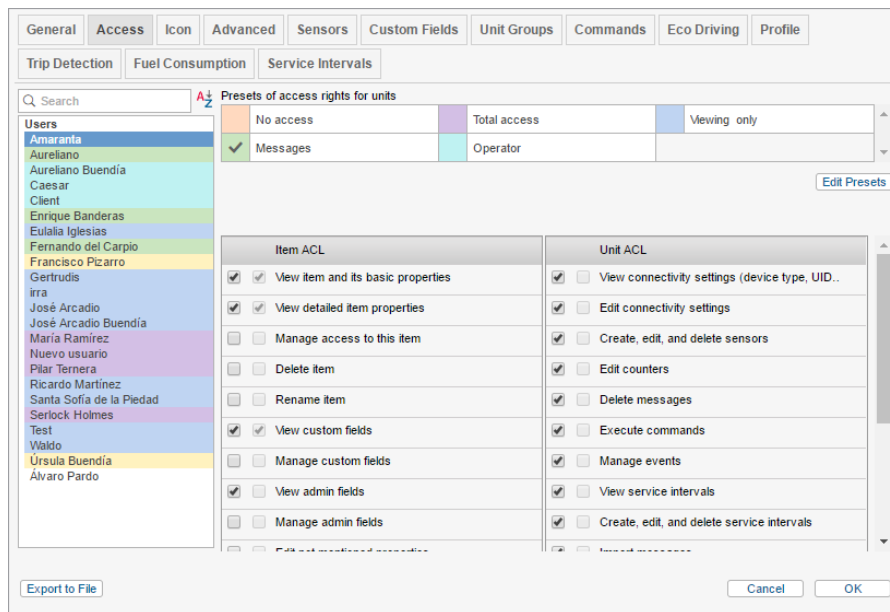
See the main topic about Access Rights for details.

Icon

⚠ Access required: *Change icon* — for choosing an icon for a unit; *Edit not mentioned properties* — for unit's icon rotation.

On the *'Icon'* tab of the Unit Properties dialog you can select or load any image to display your unit on the map and on different lists.

To display a unit, you can either use standard icons (choose after clicking 'Icon Library' button) or upload custom image from your computer. To upload an image from computer, click a current icon, choose an image on your computer, and click OK. Supported formats are PNG, JPG, GIF, and SVG.

If you would like to quickly change a current icon to a default one, point a cursor over it and click delete button.
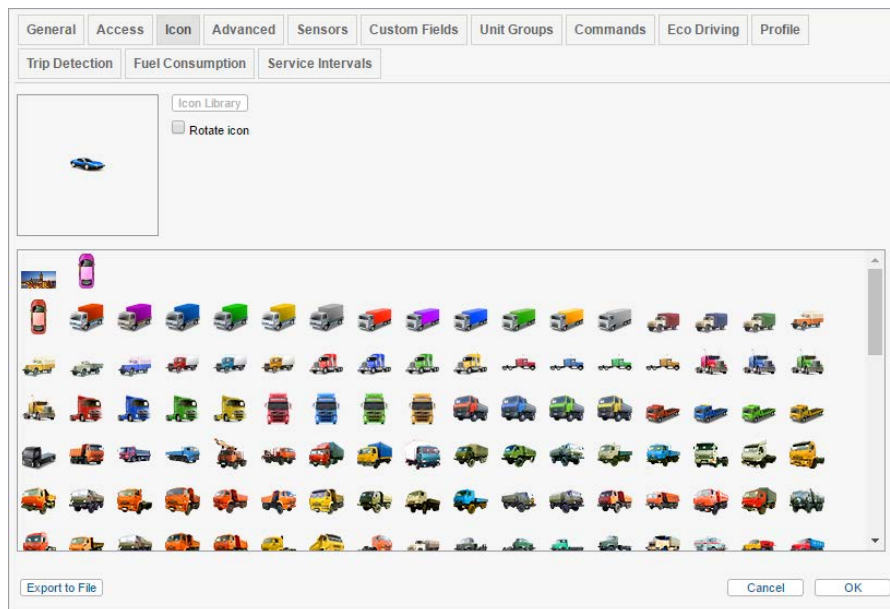
Depending on course, unit icon can be rotated to show direction of movement. For this, enable *Rotate icon* option. Rotated icon should be faced North, otherwise it may confuse you. You can find some images suitable for rotation in the Icon Library.
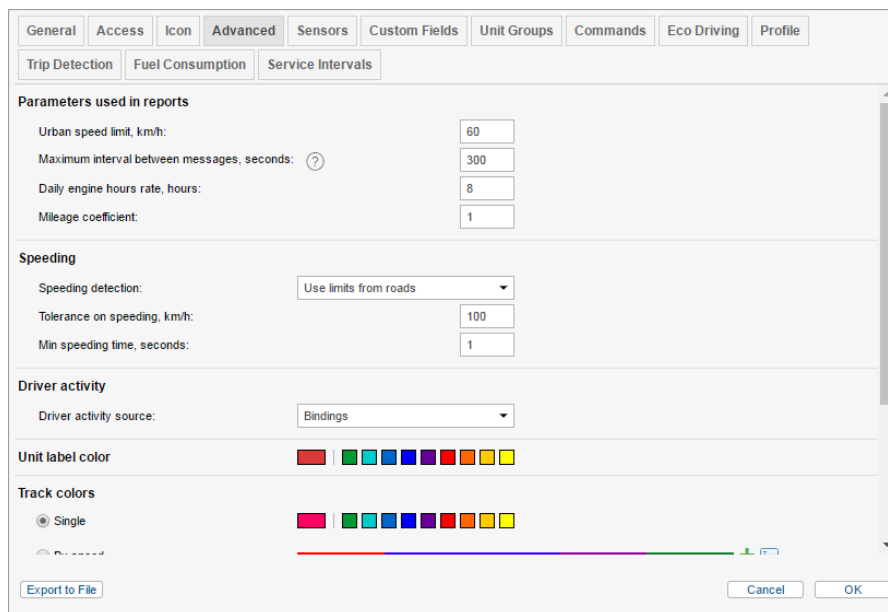
Default icon may be useful sometimes. If a unit has a default icon, and a unit group where it belongs has a non-default icon, then unit acquires the icon of this unit group. Note that in this case a group icon will not be rotated even if the corresponding flag is chosen.

Note that in order to upload individual icons for units, unit groups, and geofences you can use the ◉Icon Library application (for top accounts only). Icons uploaded to the system using this application will be available for you in the standard icon library. To facilitate the work with the library, the uploaded icons are placed in the same list, but separately from the standard ones (at the top).

Advanced Properties

⚠ Access required: *View detailed properties* — to view parameters for reports, driver's activity source, and messages filtration settings (the first, the second, the third, and the last sections); *Edit not mentioned properties* — to edit color schemes for track/sensor (middle sections); *Edit trip detector and fuel consumption* — to edit report parameters, and driver's activity source; *Edit connectivity settings* — to edit parameters of messages filtration (last section).

On the *'Advanced'* tab of the Unit Properties dialog messages validity parameters are defined, colors for tracks are adjusted, and speed limitations are set.

Parameters Used in Reports

Consumption by rates, l/100 km
In this field the fuel consumption per 100 km is indicated. To modify it, you need the 'Edit trip detector and fuel consumption' access right to the unit. Positive digital values can be introduced here. The default value is 0.

Speed limit
Enter the maximum speed allowed. All messages with higher speed will be detected as cases of violation and exported to the report on speeding.

Urban speed limit
This setting is used in report on trips. If the unit goes with the speed under indicated here, it is considered as urban mileage. If the speed is higher, this mileage is regarded as suburban mileage. This property can be used in reports on speed, in statistics, and in advanced reports on drivers.

Maximum interval between messages
Indicate the maximum interval between messages (in seconds). An excess of the specified value will be interpreted by the system as a connection loss. This will be reflected in the report on connection problems, while calculating intervals in the report on engine hours and during the mathematical calculation of fuel consumption.

Daily engine hours rate
If the unit has an engine hours sensor, here you can indicate the daily rate of engine hours to use this value in the report on engine hours (to estimate utilization and useful utilization). Engine hours operation is defined by the corresponding counter.

Mileage Coefficient

Mileage coefficient is useful to compare detected mileage with mileage by odometer. The corresponding column can be included in any tabular report containing information about mileage, and in statistics.

Speeding

This block deals with speeding detection method. The chosen variant defines the sequence of further actions.

None
The default setting for this method is set to 'None'. It means that speedings are not registered by the system (this option is relevant, for example, for nonmoving units, because such data brings no sense for them).

Use fixed limit
Fixed limit as a method of speeding detection means that the speed limit for a unit is chosen individually. In other words, maximum speed limit for a unit is indicated in the corresponding field. Upon receiving messages with speed higher than the indicated one, the speeding is registered by the system. Moreover, here you can enter the minimum speeding duration (1 second by default). Any speeding with duration less than the indicated one is not registered by the system as speeding.

Use limits from roads
⚠ *Attention!*
The 'Use limits from roads' method is supported only by Gurtam Maps cartographic service.

Using this method you do not indicate any particular speed limit, but the registration of speeding depends on the current speed limitation road signs used on any road sections. In other words, the system contains data on speed limits for the particular road section, and if a unit exceeds this speed limit, then the speeding is registered. If this method have been chosen, then you can indicate tolerance on speeding value. It means that speeding consists of a total of speed limit and tolerance values. For example, in some countries exceeding speed limit by 10 km/h is not a violation, that is why you can indicate 10 km/h tolerance on speeding. Therefore, on the road section with 60 km/h speed limit sign a unit can be driven 70 km/h, and this speed will not be a speeding. Moreover, here (the same as for the previous method) the minimum speeding duration can be indicated.

⚠ In order the speeding to be registered it is necessary to receive not less than two speeding messages in a row.

Speedings are registered in the system, and subsequently you can generate a report on speedings. Moreover, during building a track you can enable speeding markers which highlight the corresponding events on track.

Driver Activity

Driver's activity information helps to control whether a driver follows the AETR standards or not. Such information will be displayed in unit's or driver's tooltips as well as in extended unit information if the corresponding flag is indicated in the 'User Settings' dialog.

This section allows choosing driver's activity source, in other words, the way information on driver's activity is received. The dropdown list contains 3 items: 'None', 'Tachograph', and 'Bindings'. If the 'None' item is chosen, then unit's or driver's tooltips, or extended unit information do not show the current data on driver's activity. If the 'Tachograph' item is chosen, then information on the activity of a driver bound to this unit will be received from a tachograph installed in the vehicle. If the 'Binding' item is chosen (for example, is a vehicle is not equipped with a tachograph), then activity of a driver bound to this unit will be determined in the following way:

- 'Driving' status is registered as driver's activity when either trip or stop have been detected for a unit.
- 'Work' status is registered when parking have been detected.
- 'Rest' status is registered upon unbinding a driver from such a unit.

Unit label color

By default, unit names on the map are red. However, you can change this color here and even set different colors for different units.
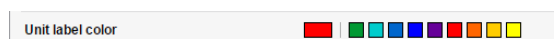
Track Colors

Different colors can be used to show on the map not only unit itself, but also its movements (tracks). Tracks can be built in the Tracks panel, Messages panel, Reports panel, or in the Monitoring panel (quick tracks).

Track segments can be colored differently depending on speed, sensor values, and so on. These properties are set individually for each unit. Note that such settings of colors as 'By speed', 'By sensor', and 'Single' are mutually exclusive (only one can be chosen).
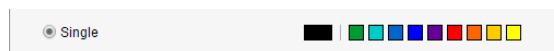
Single (constant track color)
Track color set here is applied to all tracks of a unit regardless to its speed or sensor values. This option allows assigning an individual track color for each unit, which is very useful for rendering unit group tracks on the map. Individual colors help to differentiate tracks from each other.

By Speed (speed based track colors)
Activate this option in order a track color to be changed depending on unit's speed. To set values for speed intervals and indicate their colors, click an interval adding button (+). Track color is set for each interval individually. In other words, it is necessary to set an interval, pick its color, and click OK. Afterwards, the same procedure should be done for the rest intervals. Further there are some peculiarities of setting intervals and choosing their color that could be helpful:

- No value in the first field corresponds to -∞, in the second — to +∞;
- Adding an interval which crosses an existing one and reaches beyond it, the added interval is set instead of existing one;
- Adding an interval which crosses an existing one without reaching beyond it, the added interval is inserted inside the existing one. Moreover, both the intervals on which the existing one has been cut, receive its text and color.
- You can either choose a necessary color from a color picker or indicate its text value (in HEX) in the corresponding field.

Upon completion all the set intervals of a chosen color are shown on the scale. Each interval of the scale and its color can be edited. To do so, click the corresponding interval on the scale and set the necessary parameters. To reset all created intervals for the default ones, click the corresponding button to the right of it ( ).
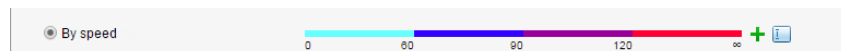
By Sensor (sensor based track colors)
Activate this option in order a track color to be changed according to a sensor state. Choose a necessary sensor from the dropdown list (the list is formed on the basis of all the sensors created for a unit). For each sensor created you can set value intervals and pick their colors on the corresponding tab. Therefore, activation of this option enables visualization of a track according to the colors indicated on the intervals' scale of a chosen sensor.
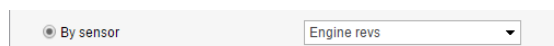
Usage of Sensor Colors

From the dropdown list choose a sensor the colors of which you would like to use for visualization of a sensor state in the monitoring panel or for the alternative displaying of units on the map.
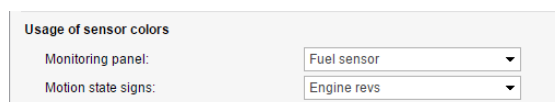
Messages Validity Filtration

All the messages without any exception are stored in the system. However, if having outlying data, it can affect reports and other processes based on database analysis. That is why, it is recommended to enable filtration of data. For example, if there are outlying data, messages without coordinates, etc., these messages can be marked as invalid and ignored when generating reports, calculating mileage, and so on. To adjust filtration settings, fill in the fields described below. Please note, that the filtration will only be applied to *new* messages.

Allow positioning by cellular base stations

Positioning by cellular base stations ('LBS detection') is an alternative method of defining unit's location. This method implies using cellular base stations as a guide for location detection. Note that the method is inferior to using of GPS data, and just allows to receive the approximate location. Note that enabling of this flag does not mean 'LBS detection' method is constantly applied, but that it will be applied only if LBS detected data to be more recent than GPS one.

Skip invalid messages

Some controllers may send a flag about coordinates validity/invalidity in messages. A message with invalid coordinates is marked by the flag of invalidity, and when sending such a message to the server, the current time and the last valid coordinates are given. Wialon will consider this message as a message without position data, and it will be not used when constructing movement tracks, detecting location in reports, etc. However, if this message contains other parameters (such as sensors), they will be used.

Minimum satellites

If the number of satellites locked is lower, the message considered to be invalid. Recommended value is three and more, but some equipment can give correct coordinates beginning from two satellites.

Maximum HDOP value

HDOP refers to Horizontal Dilution of Precision. Here you set the minimum HDOP value for messages to be regarded as valid. The lower this parameter, the more accurate the coordinates.

Maximum speed value

The messages containing speed higher than or equal to one set here are marked as invalid.

Custom Fields

⚠ Access required: *View custom fields* — to view general custom fields; *Manage custom fields* — to create, edit, and delete general custom fields for given unit; *View admin fields* — to view administrative custom fields; *Manage admin fields* — to create, edit, and delete administrative fields.

On the 'Custom Fields' tab of the Unit Properties dialog you can input information of any type. This can be some notes or precisions about the equipment, vehicle or any other information needed. Moreover, you can indicate any external links in this field. Administrative fields (seen only to users with special access rights) are marked in the first column.

Input a field name and its value and click the 'Add' button. To delete an incorrect field, click 'Remove'.

When the next time you will open unit properties dialog, the entered fields will be alphabetized. The same will happen when displaying custom fields in unit's tooltip.

Application of unit custom fields:

- In unit's tooltip and in extended unit information (if enabled in User Settings);
- In Custom Fields table that can be generated both for a unit and for a unit group;
- In the Monitoring panel to search units by some property;
- In the text of notifications.

Unit Groups

On the 'Unit Groups' tab of the Unit Properties dialog you can view whether the unit is included in some group or not. You can also see the list of all existent groups and include the unit to one or several groups if needed.

To include/exclude the unit in/from groups, use the appropriate buttons 'Add' and 'Remove' or double-click on a group in the appropriate list.
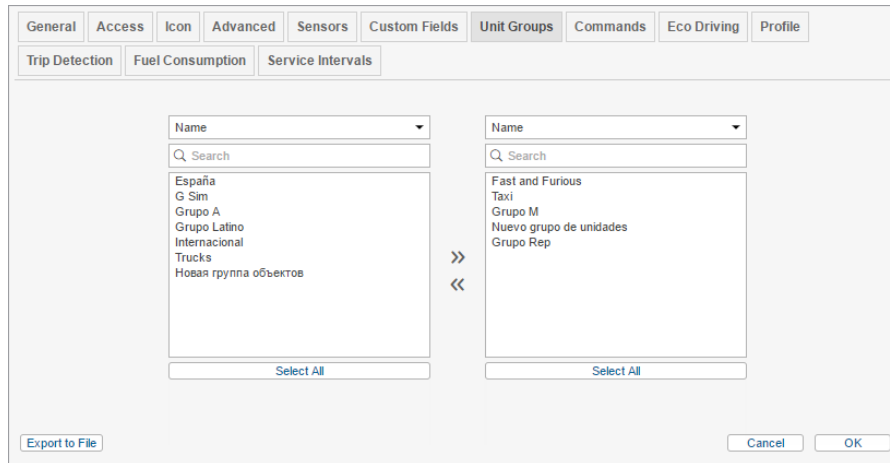
Commands

⚠ Access required: *View commands* — to view this tab and its contents; *Create, edit, and delete commands* — to create, edit, and delete commands.

The 'Commands' tab of the Unit Properties dialog gives possibility to create and configure commands for the given unit. To be able to send a command to a unit, it is crucial that this command is registered here.

A command can be sent both manually (from the Monitoring panel) and automatically (with the help of notifications and jobs) as well as via SMS. A command can be executed for several units at once, but in this case it should be configured in the properties of all those units and bare exactly the same name.

To create a new command, click the 'New' button (**+**). Afterwards fill in the necessary fields, and press OK. Such buttons as 'Properties', 'Copy', and 'Delete' are used for the work with created commands, and situated in the end of the line opposite to the command name. Sometimes it is convenient to create a new command using existing one as the basis — press 'Copy' in the template command line. To view or change configuration of an existing command, press 'Properties'. To delete a command, press 'Delete' (**×**).

Command Properties

A command has the following properties:

Command name
Input command name. Names cannot be repeated within one unit.

Command type
Choose command type from the list of commands supported by the device used. See the list of standard commands supported in Wialon.

Channel
Select the channel (link type) to be used each time when sending the command (Auto, TCP, UDP, Virtual, SMS). If *Auto* link type is set, the program will automatically select a channel which is available at the moment of execution (if several are available, then the priority is given like in the list of link types). The list of link types also depends on the device type indicated on the 'General' tab.

Note that if the link type is TCP or UDP, it is required that the unit was connected at the moment of execution. If the command is executed through GSM channel, a phone number in the international format should be present in unit properties and the user is supposed to have rights to send SMS messages.

Phone number
Phone number is required for SMS commands only. Some types of devices can support two SIM cards, so a unit can

have two different phone numbers. Here you choose which of them will be used to send the command: first/second/any. Like with parameters and link type, the phone number selected here cannot be changed at the moment of sending the command.

Access rights

Indicate access rights which would be required for users to execute this command. To choose a combination of rights, press <ctrl> key and select several items. Regardless of selected rights, the flag 'Execute commands' is required anyway.

Parameters

Additional parameters may be necessary for some commands. It can be like input/output number, report interval, etc. Those parameters can be set when configuring the command, and in this case, they will be applied automatically each time when the command is being executed. Thus, several commands with different parameters and link types can be created on the basis of one command type. However, it is not obligatory to set parameters when creating command, because you can indicate them when executing (manually only). To do so, mark the checkbox *'Without parameters'*. It will be impossible to change parameters (as well as link type or phone number) if they are set.

More about commands...

Eco Driving

⚠ Access required: *View detailed item properties* — to view the tab; *Edit trip detector and fuel consumption* — to edit the tab.

Driving behavior influences condition of a transported cargo, as well as technical condition of the vehicle used. Wialon system possesses the functionality enabling to receive the estimation of driving quality. The functionality helps to evaluate how a driver treats the entrusted vehicle, and as a result promote driving safety, prolong vehicle life, reduce fuel costs, and ensure cargo safety.

With these settings properly adjusted, you can get the special Eco Driving report as well as include columns with penalties and rank into many other reports.

Settings

'Eco Driving' tab is presented by the form where you should indicate parameters used for penalty scoring. It is conditionally divided into 2 sections: key parameters (obligatory ones), and additional ones (optional for indicating). Criterion, name, sensor (if 'Custom' criterion is chosen), penalty value are considered to be the key parameters. Moreover, in this section you can indicate minimum/maximum violation value. Additional parameters section contains validator, multiplier, averaging, minimum/maximum duration and speed. After indicating all the necessary parameters, you can either save them or clear the form by using the corresponding buttons.

Note that employing parameters' presets (for automobile, truck, or bus) can be used along with a manual setting of parameters. Choose a necessary preset (top left corner of the form) and click "Add". Parameters of a chosen preset are added to the ones saved earlier.

To calculate positive (speedup) or negative (slowdown) acceleration, the system uses different data analysis methods. By default data is analysed on the basis of received GPS coordinates or accelerometer readings. However, there is a possibility to choose either only GPS or only accelerometer. If GPS is chosen as data analysis method, then positional data will be considered for acceleration calculation. If accelerometer is chosen, then calculation will be made on the basis of parameters received from the corresponding equipment. If GPS and accelerometer is chosen as a method, then the system chooses the bigger acceleration value calculated either considering positional data, or received parameters. All the methods work for such criteria as acceleration, braking, turn, and reckless driving. Note that a chosen method is applied to all the created criteria.

Criteria

Criterion is a key parameter on the basis of which a driving quality can be determined. Wialon system supports the work with the following criteria: speeding, acceleration, braking, turning, reckless driving, and custom one. The detailed information on every criterion is presented below.

Speeding

In the corresponding fields indicate a speeding value (min — max) in km/h which should be detected as violation, and also a penalty value charged for this violation. Moreover, additionally you can choose validator (multiplier), averaging, and also indicate min/max duration and min/max speed on which a violation to be detected. Note that speedings are detected by road speed limits, however if it is necessary, the min/max speed option provides a possibility of indicating custom limits.

Acceleration

A parameter which is used for detection of unreasonably hard vehicle speedups. In the corresponding fields indicate an acceleration value (min — max) measured in g which should be detected as violation, and also a penalty value charged for this violation. Moreover, additionally you can choose validator (multiplier), averaging, and also indicate min/max duration and min/max speed on which a violation to be detected. Such option as min/max speed can be applied, for example, in order to exclude low speed accelerations from a report.

Braking

A parameter which is used for detection of unreasonably hard deceleration. In the corresponding fields indicate a braking value (min — max) measured in g which should be detected as violation, and also a penalty value charged for this violation. Moreover, additionally you can choose validator (multiplier), averaging, and also indicate min/max duration and min/max speed on which a violation to be detected. Such option as min/max speed can be applied, for example, in order to exclude low speed braking from a report.

Turn

A parameter which on the basis of vehicle turning direction and acceleration in the moment of turning helps to evaluate the quality of passing the maneuver. In the corresponding fields indicate a value (min — max) measured in g which should be detected as violation, and also a penalty value charged for this violation. Moreover, additionally you can choose validator (multiplier), averaging, and also indicate min/max duration and min/max speed on which a violation to be detected.

Reckless Driving

A parameter which is used for detection of unreasonably hard accelerations prior to deceleration. In the corresponding fields indicate a value (min — max) measured in g which should be detected as violation, and also a penalty value charged for this violation. Moreover, additionally you can choose validator (multiplier), averaging, and also indicate min/max duration and min/max speed on which a violation to be detected.

According to the indicated settings the system detects so called peaks of violations, afterwards sets value for every peak, and also identifies intervals on which the peaks can be found. Furthermore, if you have several 'Reckless Driving' criteria with different violation settings, the system determines which one of them suits most. Afterwards, filters indicated in the additional parameters section come into action:

- **min/max speed** — on the basis of received parameters the system determines top speed on the interval. Then a determined speed is compared to an indicated speed range. If a determined speed matches this filter, then such a violation gets into a report. Otherwise, a violation does not get into it.

- **min/max duration** — if a criterion's duration exceeds the *minimum* duration value indicated as filter, then such a violation gets into a report. If a criterion's duration exceeds the *maximum* duration value, then a penalty is multiplied by the number of maximum values detected on a violation interval.

As it has been mentioned before, a validator (multiplier) can be used for this criterion. The basic principles of using a validator (multiplier) are described below, in the 'Additional parameters' section.

Custom

A parameter which uses any sensor created in the system for a violation detection. Using a custom criterion, it is necessary to choose a sensor itself (from the dropdown list), indicate min/max violation value, and a penalty charged for it. Afterwards, you can choose validator (multiplier), averaging, and indicate min/max duration and min/max speed on which a violation to be detected.

Key Parameters

Criterion

Violation type (speeding, acceleration, braking, turn, reckless driving, custom).

Name

Any name for the criterion chosen above. It is considered to be an obligatory field because the system allows the same criterion to be chosen multiple times.

Penalty

A number of penalty points charged for the violation of such a type.

Sensor

This parameter is available upon choosing the 'Custom' criterion. Any sensor created for the unit can be used. Violations are registered using the values of the chosen sensor. Note that working with a digital sensor you can indicate additional settings:

- Violations from device — indicate this flag in order a violation's duration to correspond to the sensor's working interval (from on to off state).

Min/max value

Is a range of violation values. If a received parameter value falls within the range, then a violation is recorded (minimum value is included into the range, and the maximum is not).

⚠ *Note.*

Intervals of violations for such criterion as acceleration/braking can be connected. In other words, if a repeated violation occurs during 30 seconds after the end of a primary one, then both these violations will be connected into one.

⚠ *Note.*

Take into consideration that evaluating the driving behavior the speeding is determined by limits from roads.

Additional Parameters

Validator

Any of the sensors created for a unit. It is applied to confirm or contradict the received values of a chosen criterion. A violation gets into a report upon receiving any positive value from validator. Otherwise, the violation does not get into it.

Moreover, if you check the 'Multiplier' flag, then the sensor chosen as a validator is used as a coefficient multiplying a penalty score.

Here it is an example. If the main objective of the company is to provide a cargo safety during its transportation, then the violations evaluation severity should become higher. It is necessary to create a weight sensor and use it as a validator-multiplier. 0 value is received when the vehicle is empty, any positive value received for the loaded one. So, in case of speeding by the loaded vehicle the penalty value is multiplied by a validator's value.

Min/max duration, sec

Criterion's duration range (from — to) on which a violation is recorded. If criterion's duration exceeds the *minimum* value indicated in a duration range, then such a violation gets into a report. If criterion's duration exceeds the *maximum* value indicated in a duration range, then a penalty is multiplied by the number of maximum values detected on a violation interval.

Min/max speed, km/h

Speed range (from — to) on which a violation is recorded. The system determines top speed on a violation interval. Afterwards, a determined speed is compared to an indicated speed range. If the determined speed matches an indicated speed range, then such a violation gets into a report. Otherwise, a violation does not get into it.

Averaging

There are 3 variants to work with averaging:

- **Averaging is disabled**. Penalty points received for the trip are summarized. Besides, they are

accumulated in a linear progression. So, the more trip interval is, the more violations to be registered.

That is why this way cannot match everyone. Therefore, there is a possibility to connect penalties with time or mileage intervals, and receive average value of penalty points for the interval.

- **Averaging by mileage**. Using the averaging by mileage, the total amount of penalty points is divided by the number of 1 kilometer intervals of the trip. Therefore, as a result we receive average amount of penalty points for every kilometer of the trip.

⚠ Note that if a trip is less than 1 kilometer, then averaging by mileage cannot be applied to the trip.
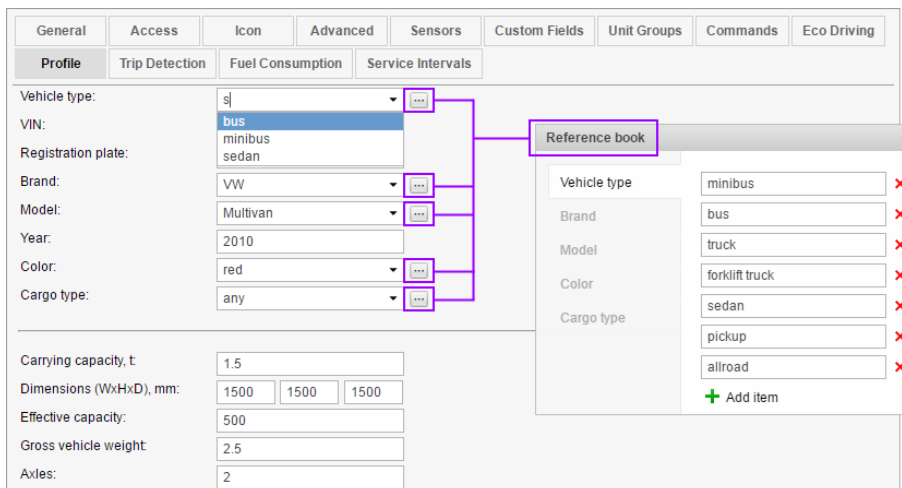
- **Averaging by time**. Using the averaging by time, the total amount of penalty points for the trip is divided by the number of 1 minutes intervals of the trip. Therefore, as a result we receive average amount of penalty points for every minute of the trip.

⚠ Note that if a trip is less than 1 minute, then averaging by time cannot be applied for the trip.

Profile

⚠ Access required: *View custom fields* — to view this tab, *Manage custom fields* — to edit this tab.

On the 'Profile' tab of the unit properties dialog in the corresponding fields you can enter registrational and technical information concerning a vehicle. Depending on the flags indicated in user settings, profile information can be displayed either in the work list or in unit's tooltip. Besides, a corresponding report can be generated on the basis of profile data. Moreover, profile data as well as the other unit properties can be imported or exported.

On the 'Profile' tab combo boxes are used along with standard input fields. Combo box is a field where you can indicate a value, choose a value in the dropdown list, or filter the dropdown list by an entered value. The dropdown list consists of values saved in the reference book. The reference book may contain up to 100 values for each combo box. The reference book can be filled in manually (open using the button to the right of a combo box and add new values) or automatically (enter values in combo boxes and save indicated characteristics).

⚠ Note that depending on a unit settings, different measurement systems can be used in profile data.

Trip Detection

⚠ Access required: *View detailed properties* — to view this tab; *Edit trip detector and fuel consumption* — to edit this tab.

On the 'Trip Detection' tab of the Unit Properties dialog you define parameters to detect movement intervals (trips) and idles (stops, parkings). Trip is a period of time when a unit was moving. Stay is a period of time when a unit was motionless.

Depending on the equipment installed and the parameters set on this tab, reports can look rather different.

Movement Detection

There are five main methods to detect movement:

- **GPS speed**
  This method is universal and can be applied to any device type and configuration. The parameters of this method are described below.

- **GPS coordinates**
  This method can be used for devices sending location data only, because in this method speed parameter does not influence a movement detection. The movement is detected if coordinates in two successive messages are different. This type of movement detection needs GPS correction activation.

- **Engine ignition sensor**
  This method is available for units having ignition sensor. A trip is detected upon meeting 2 conditions: a sensor should be switched on and a speed value from a message should be higher than minimum moving speed. A trip ends when the sensor is switched off or incoming speed value is less then the indicated minimum moving speed. Also a trip is considered to be terminated when exceeding a timeout.

- **Mileage sensor**
  This method can be used for units which have a mileage sensor. The sensor transmits an absolute mileage. A movement is detected upon receiving messages with an increased mileage sensor value and speed value higher than minimum moving speed. Moreover, a movement can be detected using mileage sensor values only, if speed parameter is missed or invalid.

- **Relative odometer**
  Shows what distance was travelled from the previous message. A movement is detected upon receiving a message with more than 0 value of a relative odometer and speed value higher than minimum moving speed. Moreover, a movement can be detected using relative odometer values only, if speed parameter is missed or invalid.

After a movement detection method is chosen, use the parameters described below. These parameters provides the possibility to detect movement states, such as trips, parkings, and stops.

Detection of Movement States

Min moving speed

Specify which speed should be considered as the beginning of the motion. This is needed to exclude outliers of data. The equipment can locate coordinates with some inaccuracy, so a speed of 1-2 can be assigned to the unit that is not moving in fact. To exclude such cases from the trips, set this parameter. When defining movement by a sensor (for example, ignition), this parameter is used to detect stops inside a trip.

Min parking time

Set time in seconds how long the unit should be immovable to register this as a parking. This option allows you to include stops (in traffic jams, at lights or intersections) in a trip (instead of breaking the trip). However, if the time interval between two closest messages is longer than the minimum parking time, the trip will be broken into two parts. Defining movement by a sensor (for example, ignition), this parameter is applied only to intervals on which a sensor is off or speed is less then a minimum moving speed. If 'Allow GPS correction' is on, the value of the minimum parking time should be no less than 10 seconds. Note that to detect a parking duration, it is necessary to receive not less than 2 messages with a speed value below the min moving speed indicated.

Allow GPS correction

For non-sensor-based detection, this option is applied automatically. In case you use one of the sensors (ignition, mileage, or odometer), you can use GPS correction in addition — to receive more precise data in reports. To activate GPS correction of trip/stay detection, put a check mark near 'Allow GPS correction' and configure the parameters described below.

Min satellites count

It means how many satellites are needed to consider data to be valid. Recommended number is three and more, but two are enough for some types of equipment.

Max distance between messages

If according to the message received the unit moved relatively to the previous message greater distance, then the previous trip is over and a new trip begins. The value in this field should be at least 50 meters or 150 feet.

Min trip time

This is to exclude cases of outliers of data. For example, the unit on the parking moved from one place to another, and movement during 40 seconds was detected. To exclude such cases from trips, set minimum trip time (in seconds).

Min trip distance

This is a similar parameter. But here you indicate the minimum trip distance. For example, the car is parked, and the device sends coordinates according to which the car has moved slightly. It can happen because of permissible equipment error. In order to not count such situation as movement, indicate how far the unit has to move to consider it as the start of a trip.

Fuel Consumption

⚠ Access required: *View detailed properties* — to view the tab; *Edit trip detector and fuel consumption* — to edit the tab.

Fuel fillings and thefts can be detected only if a unit has fuel level sensors and has the option 'Fuel level sensors' activated. Fuel consumption is calculated if there are fuel consumption sensors. The determination accuracy depends on the accuracy of the installed sensors as well as on their correct configuration. The parameters adjusted on this tab are used during the calculations. For your convenience they are divided into several sections.

Fuel Fillings/Thefts Detection

Minimum fuel filling volume
The minimum increase of the fuel level that should be considered a refueling.

Minimum fuel theft volume
The minimum decrease of the fuel level that should be considered a theft.

Ignore the messages after the start of motion
This feature allows to skip the indicated number of seconds at the beginning of the movement, when due to different factors the received fuel level data may not be very accurate. The beginning of the movement is registered when the minimum moving speed adjusted in the 'Trip detection' tab is achieved.

Minimum stay timeout to detect fuel theft
The minimum duration of the interval with no movement followed by a decrease of the fuel level in the tank for more than the minimum fuel theft volume indicated above.

Timeout to separate consecutive fillings
The system can sometimes detect more than one fuel filling during a short time interval. In such cases they can be united in one if the time between them (timeout) doesn't exceed the time indicated here.

Timeout to separate consecutive thefts
This feature is similar to the previous one, but regarding fuel thefts. The thefts are not united if the timeout is exceeded and if the fuel level has increased between them.

Detect fuel filling only while stopped
If this feature is activated, the changes of the fuel level are searched only within the intervals with no movement. This allows reducing the number of false refueling that may be caused, for example, by the fuel level fluctuation during the

movement. The initial fuel level is taken from the first message without movement or from the last message with movement.

Timeout to detect final filling volume

During a filling there may be interruptions. This option appears if the previous one is selected and allows setting the duration of such interruptions. In this case not the last message that corresponds to a filling is used to determine the fuel level after a refueling, but the one that follows the indicated timeout.

Detect fuel thefts in motion

Traditionally, fuel thefts are searched during the stops. This feature allows searching for them during the motion, too. That may be of use for ships, for example. However, in many cases it may cause the detection of false fuel thefts due to probable fuel level differences while, for instance, moving by a rough terrain.

Time-based calculation of fillings

It is recommended to use this calculation method for the units with high fuel consumption during the idling (generator, tower crane, etc.). When it is activated, the whole time period is taken into account regardless trips/stops.

⚠ For a time-based fuel calculation the options 'Time-based calculation of fillings', 'Time-based calculation of thefts' and 'Time-based calculation of fuel consumption' should be activated at the same time.

Time-based calculation of thefts

The feature is similar to the previous one, but regarding fuel thefts.

Calculate fuel filling volume by raw data

With this feature activated the initial and the final fuel levels on an interval corresponding to a refueling are replaced by the values from the messages before applying the filtration.

Calculate theft volume by raw data

With this feature activated the initial and the final fuel levels on an interval corresponding to a fuel theft are replaced by the values from the messages before applying the filtration.

⚠ *Note.*

Fuel fillings and thefts can be controlled by means of tabular reports 'Fuel Fillings' and 'Fuel Thefts', as well as the job 'Send fuel information by e-mail or SMS' or the notification about fuel fillings/thefts.

$((k1+ (k2-1) + (k3-1))*N$, where //k// are the sensors' values and //N// is the volume of the fuel consumed during the interval. If the sum of the coefficients is less than 0, the total coefficient will be 1. - If the ignition is on, the consumption during stops (idling) is calculated. Let us suppose, that we have two messages from a unit with the speeds V1 = 0 km/h, V2 = 1 km/h and 65 seconds between them. Using the parameter 'Idling' (2 l/h by default) we determine the total fuel volume consumed: 2 * 65 / 3600 = 0.0361 (l). If the unit has an engine efficiency sensor, its values are used also for calculating the fuel consumption during idling (see point 3).\\ :!: //Note.//\\ If the parameters of consumption in urban and suburban cycles are zero, the average speed is not being checked, and all the consumption is calculated as during the idling. - The total consumption consists of the consumption during the movement and during the idling. A sign of movement is considered to be the speed between two messages higher than 3 km/h. ===== Consumption by Rates ===== Unlike the previous method, the fuel consumption by rates only takes into consideration mileage and season (summer/winter). Specify the rates for fuel consumption in summer and in winter and the duration of winter period. The following algorithm is used for the calculation. Let us assume, that we have the mileage of 0.15 km between two messages on January, 13. The fuel consumption in winter (from the 1st December till the 29th February) is: 0.15 * 12 / 100 = 0.018 (l). The consumption for the same mileage in summer (10 l /100 km) will be: 0.15 * 10 / 100 = 0.015 (l). -->

Fuel Level Sensors

When this type of sensors is used, the fuel consumption is determined on the basis of its level in the tank according to the following scheme: [fuel level value at the beginning of the interval] — [value at the end of the interval] + [fillings] — [thefts].

⚠ *Note.*

The intervals are different for different tables. You can learn more about the intervals from the description of the tables.

Replace invalid values with math consumption

If the feature is activated, in case of erroneous values on an interval they will be replaced by the values calculated

mathematically. The mathematical calculation uses the data indicated in the properties of ignition, relative and absolute engine hours sensors (option 'Consumption, l/h') and the value of the engine efficiency sensor.

Time-based calculation of fuel consumption

If the option is enabled, while calculating the fuel, all the time is taken into consideration, doesn't matter whether the unit has been moving or not. If it is disabled, the fuel level during the intervals with no motion is not considered during the calculations.

Filter fuel level sensors values

This feature allows to apply median filtering to the received values of the sensor to exclude data emissions (sudden increases or decreases). The minimum filtration level is 0 (zero) — the smoothing is realized according to 3 messages. Then all the filtration levels from 1 to 255 are multiplied by 5 to determine the number of messages which will be used for smoothing. Therefore, the higher the filtration level is, the more the fuel chart will approximate to a straight line, that is why it is not recommended using the filtration level higher than 8 (the optimum is from 0 to 3).

Example. Let us suppose that at the beginning of a period covered the value of a fuel level sensor is 230 l, and at the end — 150 l. The consumption by the FLS will be: 230 — 150 = 80 (l).

Impulse Fuel Consumption Sensors

Two types of impulse fuel consumption sensors are used in Wialon: a simple accumulative and with overflow (on reaching a definite value, the impulses counter resets and the calculation restarts from zero). It is not practical to use the first type, while the sensors with overflow are widely spread.

This calculation method takes into consideration the values of the sensors from the previous and the current messages: the previous value is subtracted from the current one and, if needed, the calculation table is applied to the received value. The sum of the values received on the interval corresponds to the amount of the fuel consumed.

Every sensor of this type needs a calculation table from impulses into liters (gallons).

Two options are available in this section:

Max impulses

If there is a limit after which the impulse counter is zeroed (overflow), it can be indicated in this field. However, with this limit adjusted in case of an emergency reset, the calculations will have no sense.

Skip first zero value

This feature allows to ignore the indications of consumption with zero level at the beginning of the motion.

Absolute Fuel Consumption Sensors

The sensors of this type show fuel consumption during all the period of a vehicle operation. The values of an AbsFCS increase all the time, therefore such a sensor is not supposed to have an overflow.

The fuel consumption is calculated in the following way: the sensor's value at the beginning of an interval is subtracted from the sensor's value at the end of the interval and, if needed, the calculation table is applied (to every sensor of this type individually).

Instant Fuel Consumption Sensors

If this type of sensors is used, the hardware sends messages that contain the amount of the fuel consumed from the previous message till the current one. Accordingly, to determine the fuel consumption on an interval, the values of the InsFCS are summed.

For instance, a hardware has sent three messages with the following values: $x1 = 0,01$ l, $x2 = 0,023$ l, $x3 = 0,048$ l. The fuel consumption during this interval will be: $x1 + x2 + x3 = 0,01 + 0,023 + 0,048 = 0,081$ (l).

Service Intervals

⚠ Access required: *View service intervals* — to view this tab and its contents; *Create, edit, and delete service intervals* — to create, edit, and delete service intervals for given unit.

On the 'Service Intervals' tab of the Units Properties dialog, you can define maintenance intervals to perform all necessary routine servicing in time. These can be oil change, yearly checkup or just a washing.

In the list you see the name of each interval, its description (if available) and the state — how many days, engine hours or mileage have left or are already expired to do this service. Depending on the state (time left or expired), the lines are red or green.

To add a new service interval, click the 'New' button (**+**). Then enter necessary parameters: name, description, interval and last execution time.

Three ways to indicate an interval are possible:

- **Mileage interval** means that the service has to be done every indicated number of kilometers (miles) traveled.
- **Engine hours interval** means that the service must be done every indicated number of engine hours.
- **Days interval** means that the service must be done every indicated number of days.

You can simultaneously choose several interval types at once, and each of them will be tracked independently. For example, the term by days can be expired, and at the same time, the term by mileage has not passed yet.

When choosing an interval, indicate which counter value (or day) was when this kind of service was made the previous time. Enter this value into the **'Last Service'** field. For your convenience, the current values of the counters are indicated below.

⚠ *Attention!*
Check your counters properties on the *'General'* tab, and do not forget to mark the 'Auto' checkbox.

Done times: here you indicate how much time this kind of service was already done. This number can be entered into this field manually or changed automatically when registering a service of this kind. Besides, after registration the time of the Last Service changes, and the count of days/mileage/engine hours will be zeroed and started again.

At the end press OK. The newly created service interval will appear on the list. To manage intervals, use the buttons situated in the end of the line opposite to the interval name:

- *Copy* opens a dialog with all parameters of the selected interval. You can edit these parameters and save the interval under another name.
- *Properties* opens a dialog to view and/or edit the interval.
- *Delete* deletes the selected interval.

Service Intervals in Use

Tracking

Service intervals with their terms can be indicated in unit's tooltip and in extended unit information. See User Settings.

Events Registration

Maintenance works can be registered in unit history and used in report later. When registering maintenance, it can be bound to a certain service interval (existing in unit properties). After registration, the count of days/mileage/engine hours will be restarted, done times will be added, and the last service term will change. The changes can be estimated in unit's tooltip, in extended unit information as well as in unit properties dialog.

Notifications

There is a notification of the 'Maintenance' control type. With the help of this tool you can receive automatic notifications by e-mail, SMS, in online popup window or by other means about service terms which are approaching or expired.

Reports

Three tables concerning service intervals can be generated for units or unit groups: *Maintenance*, *Upcoming maintenance*, and *Utilization cost*. The report on maintenance presents the list of registered maintenance works. The report on upcoming maintenance contains a list of service works set for a unit, and status of their execution. The report on utilization cost includes maintenance works as well as fillings.

Some information about maintenance can be shown in Statistics: total duration of maintenance works, total cost of maintenance works, the number of services done, total utilization cost, and the number of fillings and services.

Unit Groups

Unit group is a system macro object incorporating several units that have something in common. Unit groups have broad application in Wialon and are useful both for managers and for end users. That is why working with unit groups is possible both in CMS Manager and in the main interface.
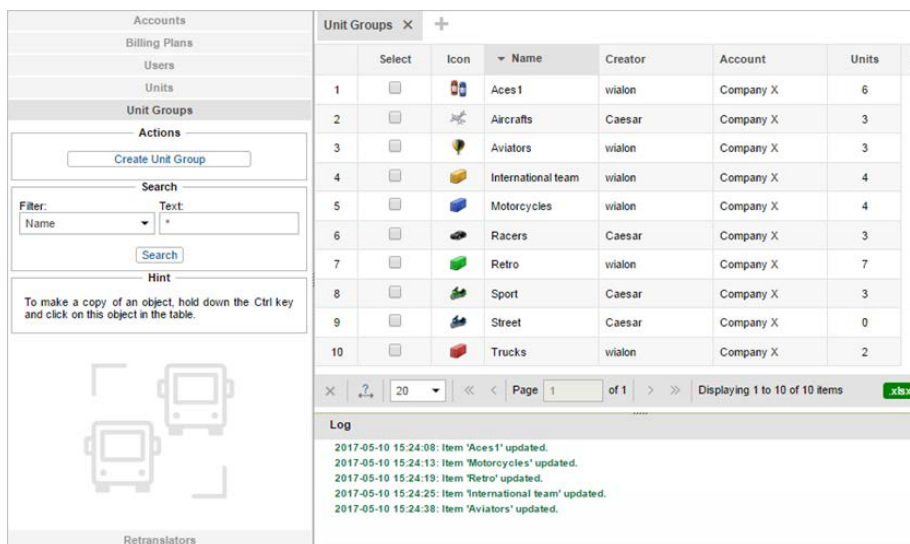
Unit Groups in Management

Unit groups can be used in management system in two ways: they make easier assigning access rights to units. You can give a user access to a group of units at once.

Unit groups are widely used for the monitoring purposes.

Working with Unit Groups

To work with groups of units, open 'Unit Groups' tab in the navigation panel of CMS Manager. Here you can create, view, edit, copy, and delete unit groups.

There is a button to create a new unit group and a filter to search existent groups. In the table of results, you can see group's name, image, creator, account, and number of units. Standard operations with objects (create, view, edit, copy, delete) were described below.

Unit Group Properties

When creating, copying, editing or just viewing unit group properties, you see a dialog with several tabs on which group configuration is adjusted. The number of tabs can vary depending on your access rights (max — 4).

General

Name

Give group a valid name (see Input Rules).

Creator

Creator is important to build hierarchy of access rights. Do not forget that the creator automatically gets manage access to units in the group.

Account

Here you can see to which account the unit group belongs (if you have any access to this account). Account and creator cannot be changed afterwards.

Units

Add units to the group. On the left, there is a list of all units available. To facilitate a search of the necessary units you can use dynamic filter. Here units can be filtered not only by name, but also by phone number, unique ID, device type, fields, etc. On the right, there is a list of units in the group. To add a unit to the group, double-click on it or push the 'Add' button. To remove a unit from the group, push 'Remove' or double-click on the unit in the right column.

⚠ If you are editing an existing group, you are required to have *'Edit ACL propagated items'* access to this group to add/remove units. Otherwise, all units in both sections will be gray and you will not be able to move them.
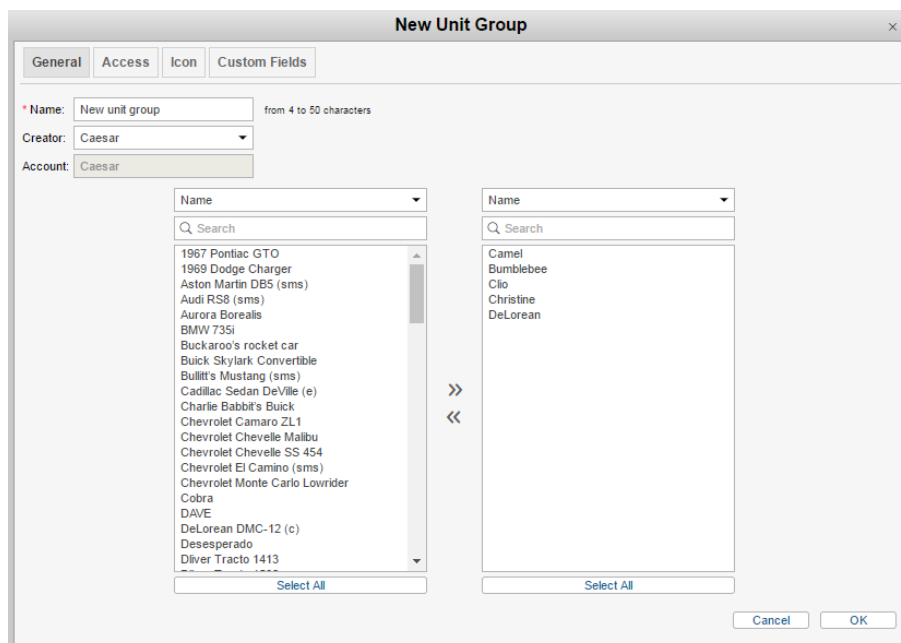
⚠ *Note.*

Along with the manual way to manipulate groups, there is an automated way to add/remove units to/from a group. See Notification Action for details.

Access

⚠ Access required: *Manage access to this item* — to group; *Manage user's access rights* — to users.

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On this tab, you can define access that different users will have to this group.

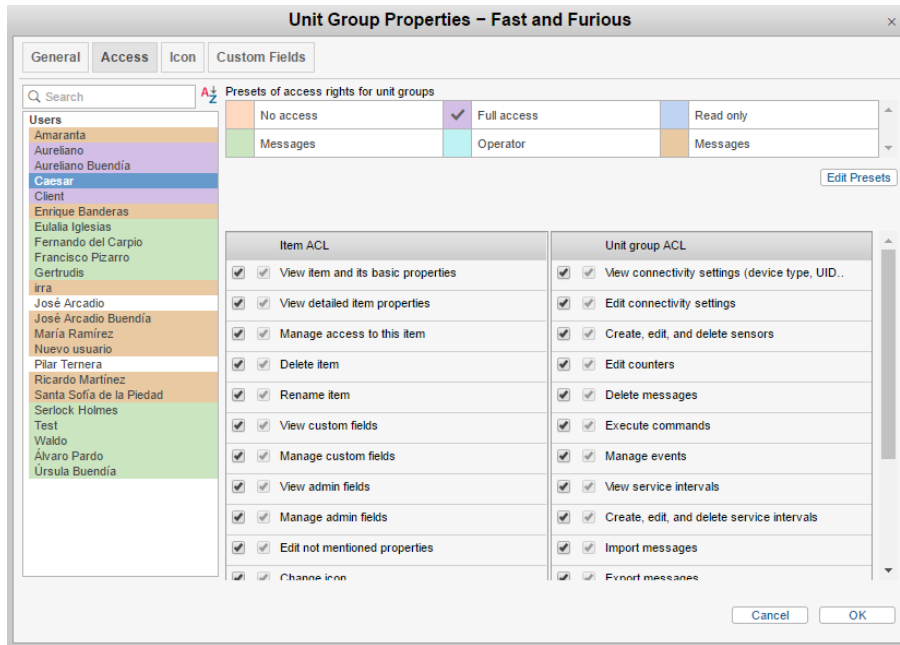On the left, there is a list of users whose access rights can be controlled. Colored background indicates those users who already have any access.

Select a user on the left and check access flags for this user on the right. Access rights are divided into two sections — standard rights (Item ACL) and special rights (Unit group ACL).

More about access setup...

Icon

⚠ Access required: *Change icon* — to view this tab and change icon.

Image for the group can be selected from a set of standard icons (the *'Icon Library'* button) or loaded from disk (the *'Browse'* button).

Icon is used mainly to display group in the Unit Groups list. However, it may be applied also to display units that belong to this group. If a unit has a default icon, and a unit group where it belongs has a non-default icon, then unit acquires the icon of this unit group. More about icons...

Custom Fields
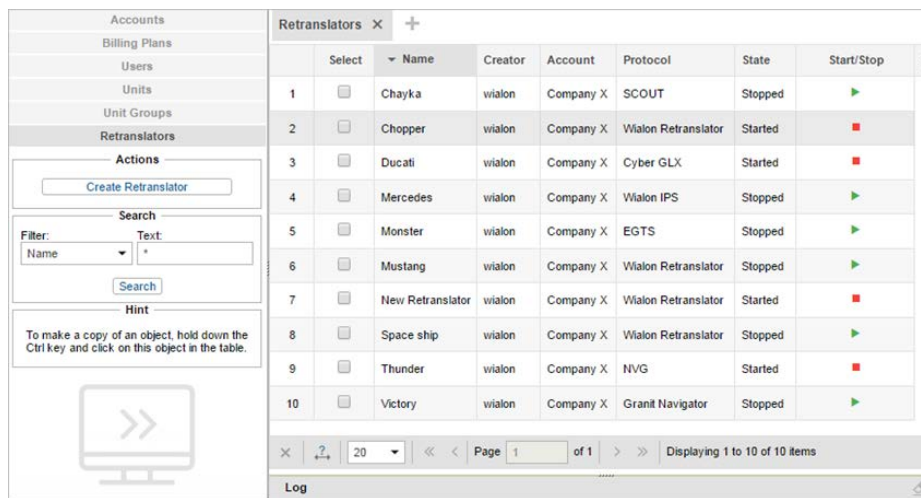
⚠ Access required: *View custom fields* — to view general custom fields; *Manage custom fields* — to create, edit, and delete general custom fields for given unit; *View admin fields* — to view administrative custom fields; *Manage admin fields* — to create, edit, and delete administrative fields.

Here you can enter any additional information about this unit group. Information is entered in the form of fields: <field_name> — <field_value>. Key in a field name and its value and press the 'Add' button. To delete a field, press 'Remove'. Administrative fields (seen only to users with special access rights) are marked in the first column.

Retranslators

Messages from units can be retranslated in real-time from your server to other servers or systems. It is possible to retransmit data to several servers simultaneously and at different protocols. The ID of a retranslated unit can be different from its ID in Wialon.

Retranslation is possible only in CMS Manager and it is done in the Retranslators panel. There you can create any number of retranslators that will transmit messages of selected units to other systems. At any moment, any retranslator can be stopped or started again.

To create a retranslator, press the **'Create Retranslator'** button. In the dialog input a name for the retranslator (at least 4 characters) and choose a retranslation protocol.

⚠ The number of available retranslation protocols depends on your license. The full list of protocols is the following:

- Wialon Retranslator,
- Nis (M2M),
- Granit Navigator,
- SCOUT,
- Cyber GLX,
- Wialon IPS (1.1),
- VT 300,
- EGTS,
- SOAP,
- TransNavi,
- NVG,
- RTTI.

Then indicate retranslation server, port, and in some cases authorization (*auth*). If the port is not indicated, it is set to defaults. Authorization for Nis protocol is login and password separated by colon (login:password). As for the EGTS protocol, you can disable authorization if it is irrelevant, indicate time interval (in seconds) at the end of which authorization will be repeated, and set dispatcher ID. Also, you can indicate carrier ID for the RTTI protocol. Moreover, note that such retranslation protocols as Wialon Retranslator and Wialon IPS support an option of calculated sensor values retransmission. Check the corresponding flag ('Add calculated sensor values') to enable the option.

Below select units for retranslation. To facilitate a search of the necessary units you can use dynamic filter. Here units can be filtered not only by name, but also by phone number, unique ID, device type, creator, profile fields, etc. After the necessary units have been found, move them from the left list (available units) to the right one (units for retranslation) by double-clicking on a unit or using the arrow-shaped buttons. Note that dynamic filter can be applied to the list of

units for retranslation as well (filtering by name, and redefined ID). To delete added units, move them from the right list to the left one using 'Remove' button (arrows pointing left). Besides, you can input a new ID for units to be retranslated. To retransmit data by Granit Navigator protocol, unit ID should be a number in the range from 0 to 65535.

⚠ *Attention!*

- Data from units with empty IDs cannot be transmitted. For that reason, such units are not saved in the list of units for retranslation and when you reopen the dialog, you will see them in the left part again.
- For units with two IDs, the first is shown.
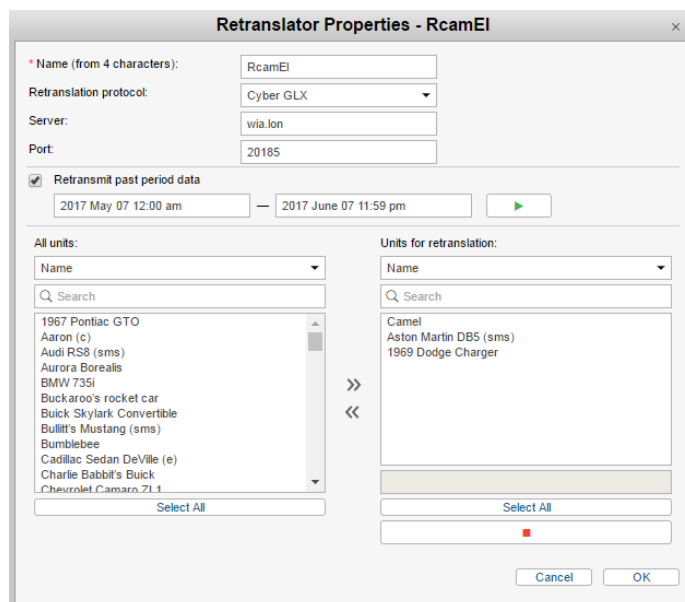
When a new retranslator is created, it is stopped. It can be started from the list of retranslators or in the dialog of its properties.

In the results panel, you can see retranslator's name, creator, retranslation protocol, server address, state, and buttons to start/stop retranslator and delete it. Click on a retranslator to view/change its properties.

There is a specially developed app to work with retranslators — ⦿Protocoller.

Past Period Retranslators

This option makes possible retransmitting messages from units for the past period of time. In other words, you can specify particular period of time in the past for which you would like to retransmit data of the chosen units. ⚠ Note that data retransmission for the past period does not start immediately (it could take up to 10 minutes before beginning).

The necessary actions:

- In retranslator dialog check the box 'Retransmit past period data';
- Indicate the period of retransmission (from — to);
- Press start button to the right of the retransmitting period field.

⚠ *Note.*
This option is active only if the prime retranslator have already been started.

Retransmitting data progress is shown in percentage on the 'History' column of the results panel. The indicated value shows percentage of the units for which data retransmission has been already finished.

Import and Export

The Import/Export tool is designed to easily transfer and copy different objects and their properties. The Import/Export tool is available in both Wialon interfaces — manager's and user's. To open the tool, click on the corresponding item in the User Menu of CMS Manager or main interface.

Import/Export Subject

You can import/export:

- unit properties (sensors, commands, fuel consumption settings, etc.),
- contents of a resource (geofences, drivers, notifications, etc.),
- user settings (Monitoring panel settings, contents of user's tooltip, user's custom fields, etc.).

Moreover, you can choose particular items to be imported/exported, for example, you can indicate not all but certain service intervals or sensors (for units), certain geofences and jobs (for resources), etc.

Import/Export Destination

Data can be imported and exported via files or directly from one object into another.

Exporting **to a file** gives you possibility to store data on disc and use it when necessary. For instance, you can create templates of unit properties, which makes it considerably easier to create and configure new units. Two file formats are supported:

1. *WLP* is a native format for Wialon. It can be used to store and transfer different kinds of data like unit properties, resource contents, and user settings.
2. *KML* (if compressed — *KMZ*) is a widely known file format used to display geographic data in Google Earth and Google Maps. This format can be used in Wialon to exchange geofences between resources as well as import and export them from/to external sources.

Exporting **to an object** allows you to transfer data (properties or contents) straight from an object to another object of the same type or to several objects at once. For example, you can copy geofences from one resource to another.

Required Access

Access rights are important for import/export. Bear in mind two simple rules:

1. You can export from an object only those properties or contents that are available to you (you should have at least view access to these properties in the originated object).
2. You can import into an object only those properties or contents that are editable for you (you need 'create, edit, delete' access to these properties of the destination object).

See more:

- Import from WLP
- Export to WLP
- Import from KML/KMZ
- Export to KML/KMZ
- Unit Properties Transfer
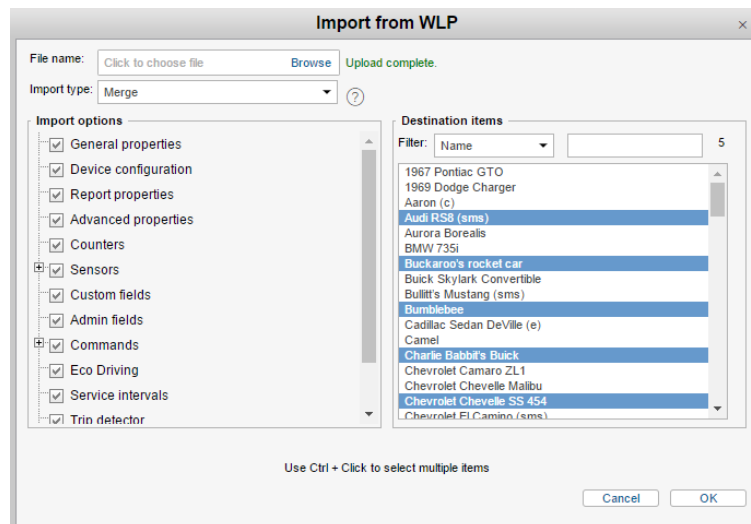- Resource Contents Transfer
- User Settings Transfer

Import from WLP

This option allows you to import unit properties, resource contents, or user settings from a WLP file to an object of the appropriate type. It makes sense only if you already have any WLP files.

Choose a file and press 'Upload'. Afterwards, the chosen file is processed on the server, and available contents are displayed in the section 'Import options'. At the same time, objects of a proper type are displayed in the section on the right (*Destination items*).

⚠ *Note.*
Filtration by measurement system takes place in this list, because you cannot import data if the source and destination items have different systems of measurement. For more information see the section Measurement System and Conversion.

If the uploaded file contains unit properties, then all available units are displayed in the 'Destination items' block; if it is resource contents uploaded, then the 'Destination items' block displays all available resources; if it is user settings uploaded, then the block displays all available users.

Check data to be imported on the left and select destination objects on the right. Use the dynamic filter to quickly find a necessary object (works by various criteria).

For unit properties (such as sensors, custom fields, commands, service intervals) and resource contents you should also choose import type:

- *Replace:*
  data will be replaced completely.
- *Merge:*
  items with the same name will be replaced and the new items will be added.
- *Append:*
  items with the same name will be left intact and the new ones will be added.

At the end press OK. See the log to check a status of an operation.

Export to WLP

This option allows you to export data from an object to a WLP file or straight to another object.

Choose object type (unit/resource/user) in the dropdown list *Export from*. Then select export destination — to a file or an item.

<u>**Export to an item**</u>

In the *Source items* section, select a necessary item (just one). To quickly find certain object, use the dynamic filter (works by various criteria). When the item is selected, its <u>available</u> properties or contents are displayed on the right, in the section *Export options*. Choose data for export. To tick all items at once, hold <ctrl> key and select any item. Repeat the same operation to uncheck all items at once.
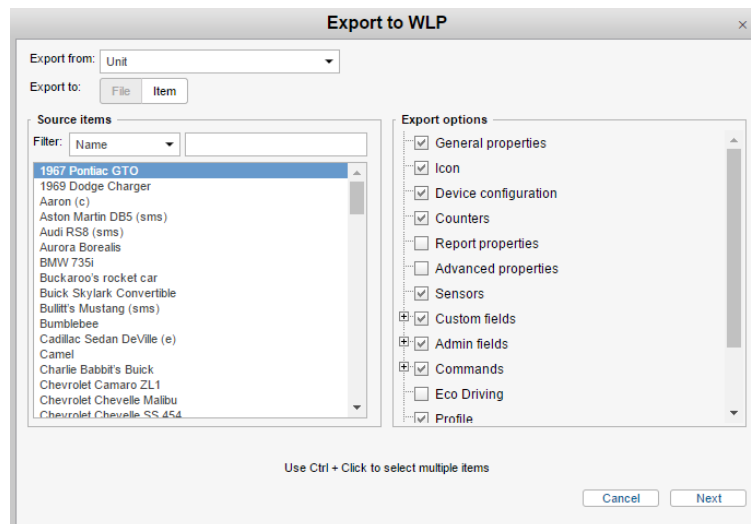
If you perform export to an item, then the Import dialog described above is displayed. Select destination objects there and press OK.

<u>**Export to a file**</u>

You can choose one or more objects to export them to a file. To select multiple items, use <ctrl> or <shift> keys. However, note that when exporting several objects subitems of Commands, Sensors etc. cannot be expanded. Thus, you can export only the whole contents of such tabs.

You can additionally type a name for the file. Otherwise, the file will be named after the origination item (if only one is chosen) or have a name like 'Units'/'Resources'/'Users' (if multiple items are selected).
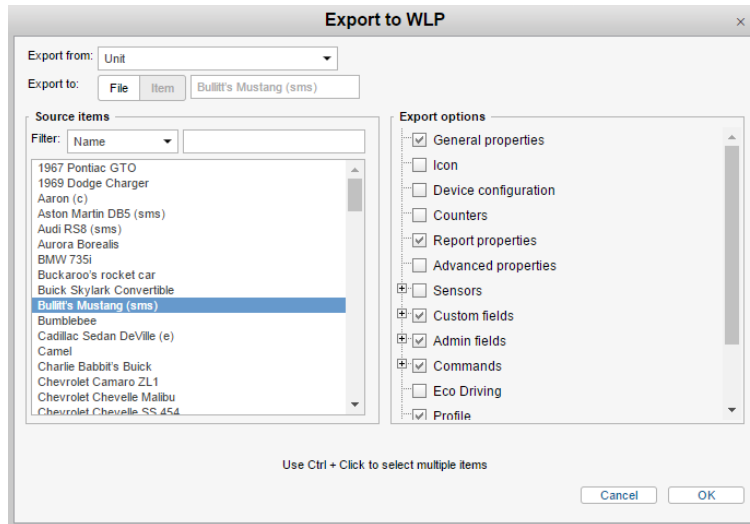
If you export to a file, then after you press OK, file is stored on the disk. As a result, you get a single WLP file (in case of one source item) or an archive with several files (in case if multiple source items).

Import from KML/KMZ

This option allows you to import geofences from a file to a resource.

Indicate the path to a proper file and press 'Upload'. The file will be processed on the server, and its contents will be displayed below. Check items to be imported and select a destination resource. In the dropdown list, you can see only those resources to which you have access *'Create, edit, and delete geofences'*.
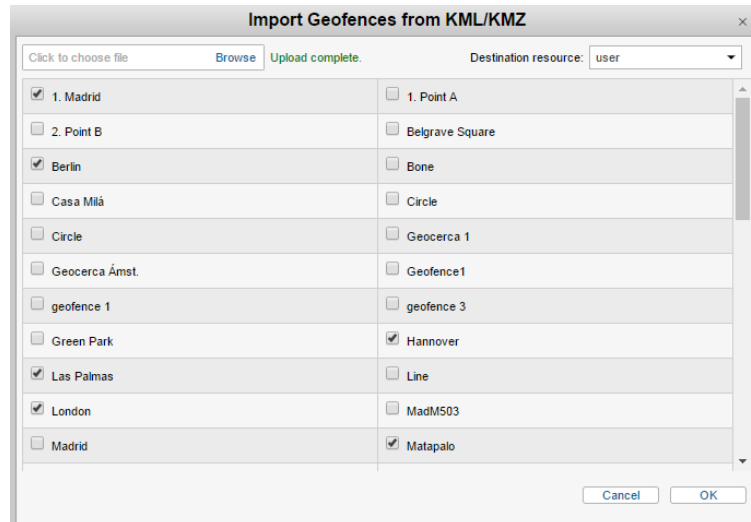
See the log to check how the operation goes. If the import failed, you get a warning alert.

You can check the result of the operation if you open the appropriate panel (Geofences) and apply a filter by resource. New items will be selected in the first column of the list. It allows to not only see them on the map, but also easily delete them all together if necessary.

Export to KML/KMZ

This option allows you to export geofences from all available resources to a file.

When you export to KML/KMZ, the list of all available geofences (depending on item type chosen) is displayed. Check the items you want to export and press OK. Optionally, you can enter file name and compress file as KMZ. After that, press OK and save the file.
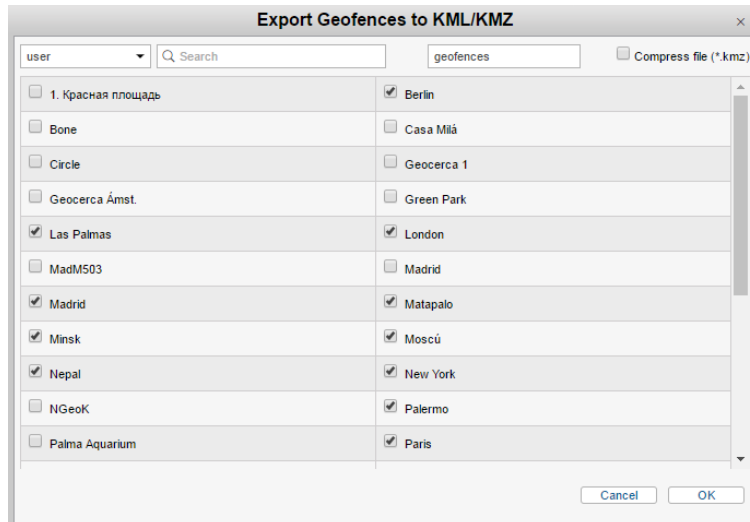
Unit Properties Transfer

Almost any unit properties can be imported and exported:

- **General properties**

  Unit name, device type, phone number(s), unique ID(s), device access password (from the 'General' tab).

- **Icon**

  Unit's icon and the state of 'Rotate icon' flag. Note that transfer of an individual icon requires possession of the 'View item and its basic properties' right towards a unit the icon of which you are going to transfer.

- **Device configuration**

  Device configuration parameters (from the 'General' tab).

- **Counters**

  Current values of counters and their calculation parameters (from the 'General' tab).

- **Report properties**

  Parameters used in reports, as well as speeding and driver activity parameters from the 'Advanced' tab.

- **Advanced properties**

  Color parameters and messages filtration parameters from the 'Advanced' tab.

- **Sensors**

  Contents of the 'Sensors' tab.

- **Custom fields**

  Contents of the 'Custom Fields' tab.

- **Admin fields**

  Available admin fields from the 'Custom Fields' tab.

- **Commands**

  Contents of the 'Commands' tab.

- **Eco Driving**

  Contents of the 'Eco Driving' tab.

- **Profile**

  Contents of the 'Profile' tab.

- **Trip detector**

  Contents of the 'Trip Detector' tab.

- **Fuel consumption**

  Contents of the 'Fuel Consumption' tab.

- **Service intervals**

  Contents of the 'Service Intervals' tab.

Exceptions are access, groups, and information about account and creator. These properties cannot be transferred. In case you need this data to be transferred (except account/creator), use the copying option.

Units with the same unique IDs within one device type as well as units or drivers with the same phone numbers cannot exist in the system. If you are attempting to import such fields, their values will be emptied, and you can edit them later.

Resource Contents Transfer

Any contents of a resource can be imported and exported:

- **Geofences**
- **Jobs**
- **Notifications**
- **Drivers**
- **Trailers**
- **Passengers**
- **Report templates**

Transferring geofences from one resource to another, geofences' standard library icons can be transferred using one of the earlier described methods (KML/KMZ, and WLP import/export). The other geofences' images are transferred using KML/KMZ files only.

Photos of drivers and trailers cannot be exported. If you need to transfer them, you can use the copying option instead of import/export.

Drivers with the same phone numbers (or with phone numbers that belong already to some units) cannot exist in the system. If you are trying to import such phones, their values will be emptied, and drivers will be created without phone numbers.

Note that importing drivers and trailers by the way of merge or replacement leads to the loss of all their attachments (bindings).

If a report template contains parameters to filter intervals by geofences, these parameters should be checked (and probably corrected) when the template is copied to another resource. It is because geofences can be tied to a template only within the same resource. It is also possible that connection with units could be lost because the new owner of the template may not have enough access to those units.

This is a similar situation with jobs and notifications if they concern geofences, units, users, reports, groups etc. Remember that imported jobs and notifications can work correctly only if geofences and templates are checked and access to units/users/groups is proved.

User Settings Transfer

Individual settings can be transferred from one user to others or stored in a file.

You can import data from 'User Settings' dialog, the tabs 'Settings', 'Maps', and Monitoring Panel. For this, you are required to have access 'Edit not mentioned properties' to a user you are importing into. Most of User Properties can be imported, too (the tabs 'General', 'Advanced', 'Custom Fields'). To import them, you should have access rights 'Change flags for given user', 'Edit not mentioned properties', and 'Manage custom/admin fields', accordingly. Such unique settings as e-mail, password, account information, access rights, etc. cannot be transferred.

Here is the list of settings that can be chosen for import/export:

- **Time zone**: time zone and DST.
- **Date and time settings**: date and time format, first day of week, and Persian calendar.
- **Additional information about the unit**: options from the section 'Show additional information about the unit' (they affect contents of unit's tooltip and unit extended view in the work list).
- **Monitoring panel configuration**: columns chosen in the Monitoring panel.
- **Unit visualization on map**: options from the section 'Unit visualization on map'.
- **Other items on map**: options from the section 'Other items on map'.
- **City**: the 'City' field on the 'Settings' tab.
- **Address format**: parameters for address format form the 'Maps' tab.
- **User interface parameters**: state of the log (open/hidden), shortcuts (on/off), settings for online notifications and messages.
- **Format of coordinates**: degrees or degrees and minutes.
- **Maps and layers**: choice of activated maps.
- **General flags**: checkboxes from the 'General' tab of 'User Properties' dialog (including host mask).
- **Custom fields**: custom and administrative fields from User Properties dialog.
- **Templates of access rights**: templates of access rights created by this user.

You can also create a **complete copy** of a user. It will include not only above-mentioned parameters but also some hidden parameters (like operational settings for Apps).

⚠ *Note.*
Settings imported to a user can be applied only after this user refreshes the page or reenters the system.

Measurement System and Conversion

Wialon works with different measurement systems: metric, U.S., imperial, and metric with gallons. The corresponding feature could be set for units, resources, and users during their creation. Measurement system for routes depends on user settings at the moment of creation.

The table below provides you with the units of measurement (and their abbreviations) for the systems used:

|	Metric	U.S./imperial	Metric with gallons
Mileage (large values)	Kilometers (km)	Miles (mi)	Kilometers (km)
Mileage (small values)	Meters (m)	Feet (ft)	Meters (m)
Speed	Kilometers per hour (km/h)	Miles per hour (mph)	Kilometers per hour (km/h)
Fuel amount	Liters (lt)	Gallons (gal)	Gallons (gal)
Fuel consumption	Liters per 100 kilometers (lt/100 km)	Miles per gallon (mpg)	Kilometers per gallon (kpg)
Temperature	Degrees Celsius (°C)	Degrees Fahrenheit (°F)	Degrees Celsius (°C)
Area	Hectares (ha)	Square miles (mi^2) or feet (ft^2)	Hectares (ha)
Weight	Tons (t)	Pounds (lbs)	Tons (t)
Carrying capacity	Tons (t)	Pounds (lbs)	Tons (t)
Dimensions	Millimeters (mm)	Inches (in)	Millimeters (mm)

Actually American and imperial systems both use the same units of measurement. The major difference is only in fuel amount calculation. You can find the difference between American and imperial gallon:

1 U.S. gallon ≈ 0.833 imperial gallon
1 imperial gallon ≈ 1.201 U.S. gallons

Conversion

The system of measurement for the elements which already exist could be changed with the help of conversion. Only top users have the 'Conversion' item in the user menu. The conversion can be made by a top user only. Conversion is available in the interface of the management system. To summon a conversion dialog, it is necessary to choose the corresponding item in the user menu. The Converter dialog has the following view:
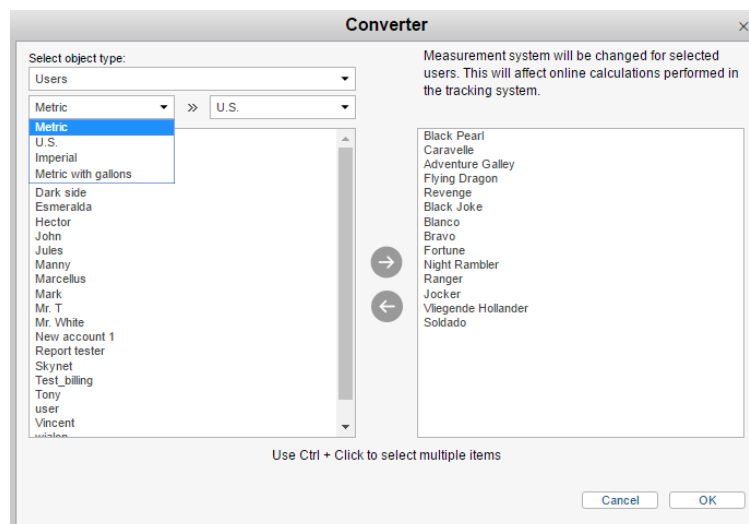
In the dropdown list, choose an object type (units, resources, users, routes) over which a conversion will be made. To the right of the dropdown list there is a brief description of the actions to be made over the objects of a corresponding type.

Below the object type choose initial and target measurement systems for a conversion. On the basis of an initial measurement system chosen a list of elements is formed. For example, if you choose 'Metric → U.S.', a list of elements currently using the metric system is formed below.

In the list you choose the objects which should be converted. To add these objects for a conversion, use double-click or select an object and press the corresponding button (right arrow) between the lists. The added objects form the list on the right. To remove items from this list, either double-click them or select and press the corresponding button (left arrow). To select multiple items, click them holding <ctrl> on the keyboard. To convert the added items click OK and confirm your actions in the appeared window. A conversion result can be observed in the log.

Conversion Effects

Ideally, users have the same measurement system as resources and units used by them. In this case everything that the user can see during online tracking in different panels and dialogs and also everything that is received by e-mail using jobs and notifications has the same system of measurement.

For Units

If a conversion is made over units, then units' parameters such as trip detector, fuel consumption settings, counters, etc. will be recalculated. This affects units' representation in the tracking system. Changes will affect not only units' properties, but also displaying of their messages, tracks, tooltips and etc.

⚠ *Note.*
A conversion doesn't influence unit sensors. If it is necessary, their measurement system could be changed manually choosing the proper one in the corresponding dropdown menu.

For Resources

If a conversion is implemented over resources, then some contents of these resources, particularly, circle-shaped geofences, different settings of jobs and notifications, etc. will be recalculated to the other measurement system.

⚠ *Note.*
Measurement system could be set individually in the section of advanced settings for every report template regardless of the resource it belongs to. Units of measurement chosen for one or another report template are given in the resulting report (whether made online or received according to a job or notification). Neither resource measurement system nor measurement system of a unit is taken into account.

For Users

If a conversion is made over users, then the measurement system for the chosen users will be changed. It will affect different online calculations, particularly the work of such tools as Distance, Area, Routing, Nearest units. Address defining parameters will be recalculated as well.

Besides, a measurement system set for the current user is chosen automatically during creating report templates, units, other users, resources (regardless of who is chosen as creator or in which resource an item is created). Herein, on the stage of the items' creation, a measurement system could be changed manually. It doesn't affect such items as geofences, jobs and notifications, because their measurement system is taken from a resource they belong to.

For Routes

Conversion made over routes affects only the radius of checkpoints.

Service Hierarchy

⚠ *Attention!*

This feature is available both for top users and dealers.

Service hierarchy is a sort of report providing you with schematic representation of the information concerning the structure of your service. Choose the corresponding item in the user menu in order to generate a table containing information on the types of macro objects used in your service, their amount, and the way these objects correlate with each other.
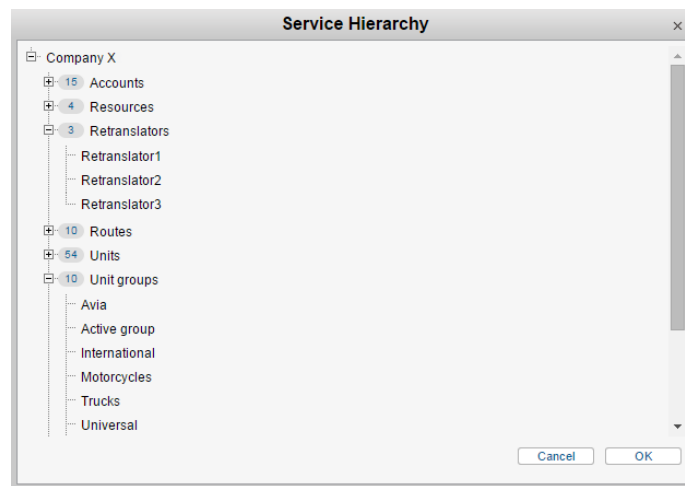
Apps

Using ⚪SDK, you can implement your own tools and features and add them to your Wialon as additional applications.

Applications can be managed only by top users. 'Apps Configurator' item of the user menu allows you to do this. Click on this item in order the 'Apps Configurator' dialog to be opened. It contains two tabs: 'Installed' and 'Library'. On these tabs you can have a look at all the applications available, as well as adjust the settings of the new ones and add them.

Installed

A list of added apps can be found on 'Installed' tab. To add an application, click 'Create' and indicate the following information:

This tab also serves for adding new applications. To do so, choose the upper item 'New' and enter parameters. The parameters to configure an application are the following:

Name
Enter a visible name for your app (at least 4 characters).

Description
Enter any text as a description of your app (optional).

URL
Type URL address where your application is placed. Name and URL are mandatory, other parameters are optional.

Advanced URL parameters
Specify advanced URL parameters if necessary (Active SID, Current user, Base URL, Host URL, Language, Authorize hash).

Required services
Choose services (features) which are required for default activation of the application. If the list of features available to a user does not fit this list (or if you leave this section empty), the application will be disabled for this user.

Billing plans
Select billing plans this application will be available to.

Compatible languages
Application availability can be limited by chosen interface language. For example, if you tick English here, it will mean that the application will be available only when English is chosen as interface language. If no languages selected, it assumes that the application is compatible with all languages.

After setting all parameters, press 'Add' and when closing the dialog press OK to save the changes.

Other operations with applications:

- To change an application, select it on the left, edit parameters, and press 'Apply', and then, when closing the dialog, press OK.
- To delete an application, select it on the left and press Delete, and then, when closing the dialog, press OK.
- To create a new application from an existing one, select the base application on the left, edit parameters, and press 'Apply', and then, when closing the dialog, press OK.
- To ignore all the changes made, press Cancel.
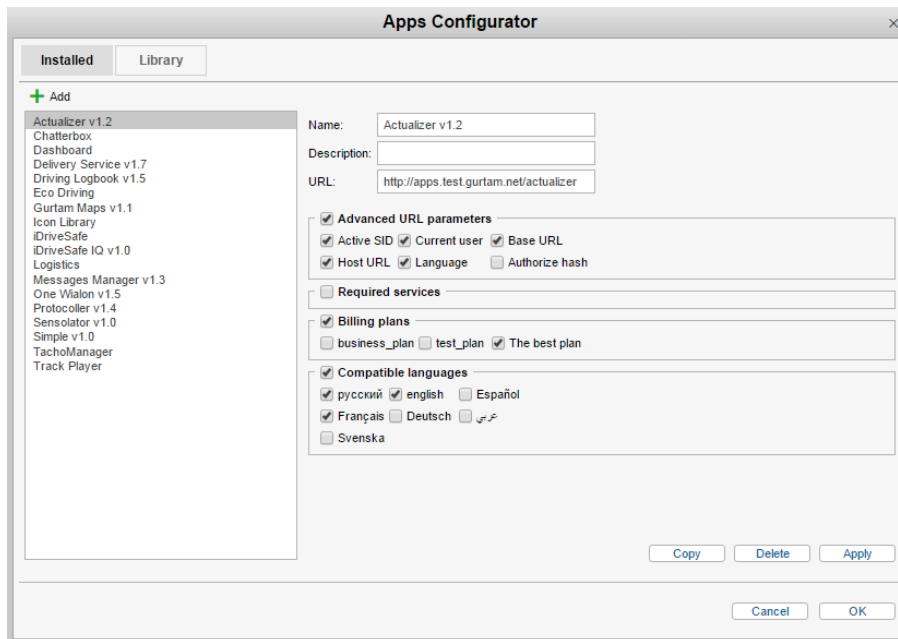
Added applications become available in billing plans and in account properties on the 'List of Services' tab. They look like other services, but with 'Apps': in front of a name of an app. You can enable and disable applications added by you and control their availability to other users.

Library

The list of all standard apps is situated on the 'Library' tab. Adding application from the library is a little bit easier as all the mandatory parameters and also the advanced URL parameters are indicated by default.

Choose an app on the list to see detailed information about it on the right: an app's icon, its name, short description, URL address, and the date of release. If the application has not been added before, the 'Add' button should be active. Pressing this button will switch you automatically to the Installed tab. There you can edit app operational parameters if needed (for example, you can change or translate a description). To complete the procedure click 'Apply' and then OK.
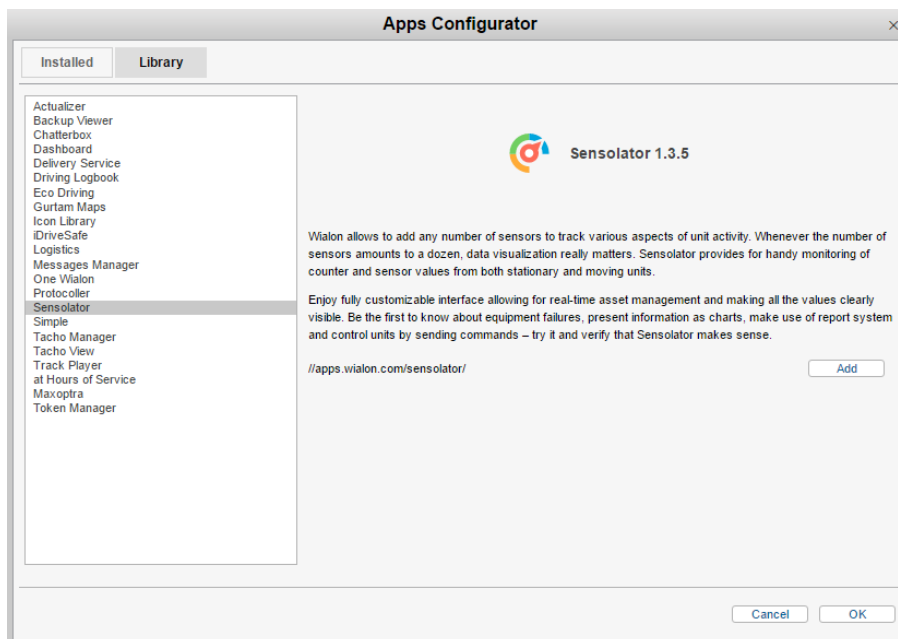
See also ◉Wialon Apps review.

Starting Applications

To start an application, click on the 'Apps' item in the top panel. This action opens the menu containing the list of all the applications available (in the alphabetic order). Dynamic filter is used to quickly find the necessary one. Click on

the app's name in order it to be opened in a new tab of the browser.
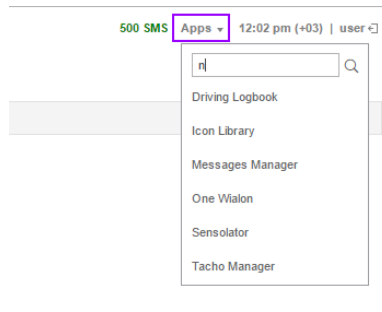
Monitoring System

The monitoring system is used by end users to control their units (vehicle fleet, machinery, employees, pets, etc.).

Unit tracking includes:

- detecting unit position and watching its movement on map;

- observing dynamic change of various unit parameters such as speed, fuel level, temperature, voltage, etc.;

- management of units (sending commands and messages, assigning jobs and routes, adjusting notifications, etc.) and drivers (phone calls, SMS, registering work shifts, binding to unit, etc.);

- interpreting information derived from a unit in various kinds of reports (tables, charts, movement tracks, event markers, complete statistics, etc.);

- and much more.

Tracking results can be either presented on a computer screen or exported to files in different formats.

System Requirements and Optimization

Consider these requirements to get the most from Wialon.

Web Browser

Supported browsers are:

- **Google Chrome 49+**
- **Mozilla Firefox 45+**
- **Opera 36+**
- **Internet Explorer 11 (EDGE)**

If you use a browser not mentioned above, Wialon may function incorrectly.

Computer Capability

Computer capability affects browser operation. The key points of high performance are **CPU** (central processor) and **RAM** capacity. Multi-core processors do not affect browser operation in most cases. The exception is Google Chrome that can use more than one core in its operation.

Considering all above mentioned, the *minimum requirements* are:

- CPU at 1,6 Hz clock rate;
- 512 MB of RAM.

and *recommended requirements*:

- CPU at 2,4 Hz clock rate
  (if Google Chrome is used as web browser, a processor with two and more cores is recommended);
- 2 GB of RAM.

Monitor size and screen resolution should be also considered. The bigger the monitor is, the more data is queried from server and processed by CPU. It is especially true for the maps and when the Internet connection is slow. The solution for big monitors is to not use browser in full-screen mode.

Antivirus software can slow down computer performance as well as gathering actual data from units. If Wialon is getting slower, you can add it to the list of exceptions or simply disable antivirus monitoring during Wialon session. You can also create a rule which allows Wialon to develop any activity.

Internet Connection

Wialon requires 1 Mbit Internet connection channel for one computer. If more than one operator will work simultaneously, do some tests and choose the most appropriate speed.

⚠ Furthermore, when working with Wialon, your IP address should not be changed within a session.

Optimization Measures

Here are some tips, which will help you to improve Wialon performance in cases when more than a hundred units are connected.

1. Web Browser

Web browser is very important. See the list of supported browsers above. The most efficient is Google Chrome. It is followed by Mozilla Firefox and Opera. The slowest, according to our tests, is Internet Explorer.

Wialon efficiency strongly depends on browser event system. Each browser has its individual event model. As the tracking system is rather dynamic and tracks change with up to 2-second delay, some browsers (like Internet Explorer) cannot process such a large quantity of events. The solution here is to use a more powerful computer.

2. Graphics & Tooltips

Graphic elements displayed on the map and in lists are resource-consuming. If you notice that your browser is getting slower, try to disable the mapping of the following elements: units, geofences, places, tracks, as well as names, direction arrows, and 'tails' for units (these elements are disabled with the three corresponding buttons in the 'Visible layers' menu). Limit the number of units displayed in the Monitoring panel. Limit the number of other objects displayed on other panels that are frequently used (apply the filter for doing that). Enable only those elements that are necessary for your work at the moment. Several settings to adjust the way units are displayed are set in user settings in the section 'Unit visualization on map'.

Unit's tooltip contents are also important. In User Settings dialog in the section 'Show additional information about the unit', you select which information should be presented in unit's tooltip and in extended unit information. To avoid browser overload, disable unusable items or even all items. If there are a lot of geofences or geofences composed of multiple points and the option 'Presence in geofences' is enabled, then your browser could be strongly overloaded. So, make sure this option is disabled.

If Internet connection is slow, disable geofences' rendering on map. Besides, if you query reports (containing map), messages, and tracks, clear your request as soon as it is no longer useful.

Pay attention to the fact that in order the charts to be shown the browser you use has to support the WebGL component. If the browser or the operating system cannot support it, you should enable the option 'Render charts on server' in User Settings (limited functionality will be available).

3. Queries to Server

When Wialon starts, not all data is loaded at once. It is made to speed up the loading and operation. That is why some action that done for the first time may take more time than for future work. Resource-consuming reports (such as reports on groups or reports with grouping and detalization) should be avoided. Enclosed rows of detalization stay hidden until you expand them, and if there is a hundred or more enclosed rows the browser may hang.

User Interface

User interface of Wialon is simple and in many cases intuitive. There are plenty of screen tips and helpers associated with various buttons, icons, dialog boxes, edit fields, and other elements of the interface. Moreover, special icons are situated in the interface②. They are used to deal with the most 'difficult places', as a help text will be opened by clicking on any of them.

Generally, the following basic structural elements could be distinguished in the interface design:

- work area
- map
- top panel
- bottom panel
- log

There are also a lot of other different panels and windows which could be activated if necessary.
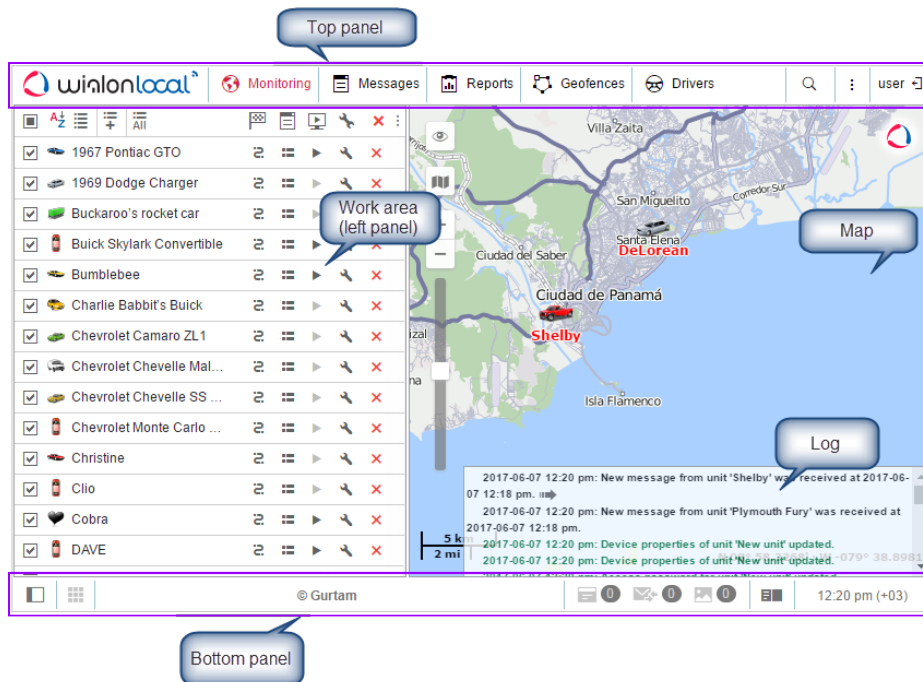
⚠ *Note.*
To switch for the full-screen mode, press <F11> button. This feature is provided by the majority of browsers.

Further information:

- Login
- Top Panel
- Work Area
- Bottom Panel
- Map
- Log
- Shortcuts
- Calendar
- Filters and Masks
- Input Rules
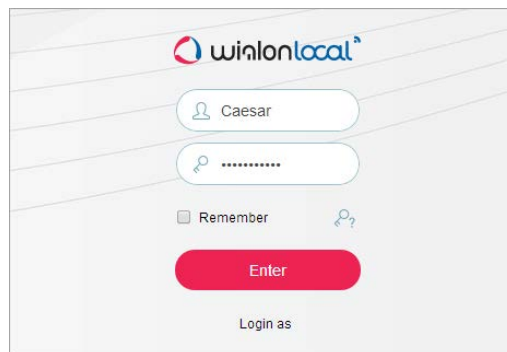
Login

Enter service URL into the address line of your browser.

On the login page, type your **username** and **password** given to you while registering. Note that characters used in these fields are case sensitive. Afterwards choose the interface **language**.

After all the necessary fields are indicated, click 'Enter'.

If you are using a private computer, you can additionally put a check mark near **'Remember'**. In this case, the next time you enter the system you will not be asked to input your login and password again. Moreover, this flag is necessary to automatically enter the system in case of session loss. Note that the term of use of this flag is limited to 30 days. Besides, the flag is unchecked if you logout from the system.

⚠ *Note.*

If current time is displayed in red and in the middle of the screen you can see a warning message ('Unable to connect to the server. The page will be reloaded automatically when connection is restored'), then connection to the server has been lost for more than two minutes. It could be caused by Internet connection failure or some internal system problems. After connection is restored the message disappears automatically, and the system continues its work. In case of server connection loss for 5 minutes and more the session will be finished. However, upon server connection restoration, an automatic entrance to the login page takes place.

A quick login without entering (or even knowing) user name and password is possible, provided that there is an active session available. Then URL link should contain the *sid* parameter, e.g., http://wialonb3.gurtam.com/?**sid=3086417ea744b0dbb85202cebe3ff134**. Note that a login to the system through such a link can be successful only within one IP address. However, be careful giving away such links as while the session is alive anyone having this link can login to the system and perform different actions allowed to that user. To abort a session, just exit the system (press 'Logout').

New Password Receiving

If you have already registered in the system but forgot the password, please, follow **'Forgot your password?'** link. There you will be asked to enter your user name and e-mail address indicated during registration. Then push the **'Reset password'** button. A password reset link will be sent to you. Follow this link to get your new password.
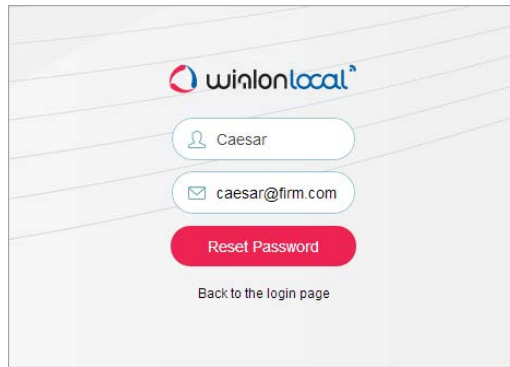
If you have pressed 'Forgot your password?' by accident, just ignore the e-mail with password reset link and use your former login and pass. If you still follow this link, you will have to accept the new password.

How to Change Your Password

The current password can be changed after authorization in the 'User Settings' dialog. However, not all the users are allowed to do this. Contact your service administrator for additional information.

Login as Another User

It is possible to login to the system as another user (either to the monitoring interface or to CMS Manager). To do so, you need to possess the 'Act as given user' right towards a user.

If you would like to login as another user from the authorization page, it is necessary to enter your username and password, as usual, and then click on **'Login as'** caption and enter login name of a needed user in the appeared field. When you are logged in as another user, you can see only items available to this user and perform actions allowed to this user. Note that login history is saved to this user as well.

You can switch to another user even after entering the system, however, in this case your logging in will not be saved in the user's history. To do so, it is necessary to click on the icon (door with arrow) to the right of the username. Afterwards, the dialog containing two columns (user name and

account name) is opened. Filter may help you to facilitate a search of a user. The search is made either by user name or account name. Click the line of a necessary user to fulfill an authorization in the current tab, or click an icon in the end of the line to do it in a new tab.
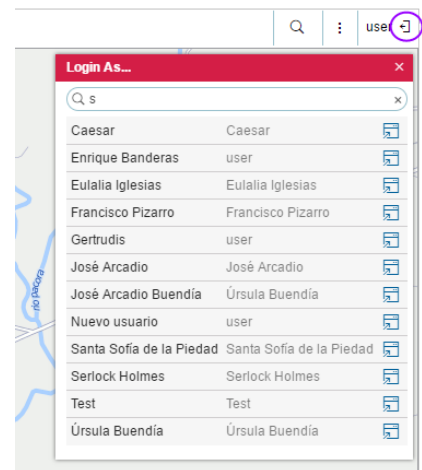
There is also an alternative way to log in as another user. Go to the Users panel and you will find the 'Login as' button against each user. If you do not have enough access privileges, the button will be disabled.

After authorization as another user, the user name is written in brackets to the right of the main one (in the right corner of the Top panel). To switch back to the main user, click on the icon (door with arrow) to the right of the name, and confirm your action by pressing OK in appeared window.

Top Panel

The logo of tracking services provider is situated in the left corner of the top panel and in the right corner you can see the setting menu button and user name under which you have logged in to the system.

The main menu of the program occupies the central part of the top panel. It could contain different elements depending on the settings applied and also on the modules provided.
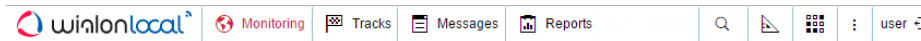
User Menu

User login is displayed in the right corner of the top panel, under which an authorization has been made. Meanwhile, the other login could be specified in brackets if the main user logged in under the other user's name.

Clicking on the user's name an additional menu appears. It contains the following options:

- **User settings**

  Opens the user settings dialog for viewing and/or editing.
- **Manage applications**

  Opens the manage applications dialog.
- **Locator**

  Opens the locator's dialog.
- **Import/Export**

  Enables to transfer units' settings, users, resources' contents (refer to Import and Export).
- **Help**

  Help request. Could be unavailable.
- **Technical support**

  Technical support request. Could be unavailable.
- **Logout**

  Button to log out of the system (session termination).
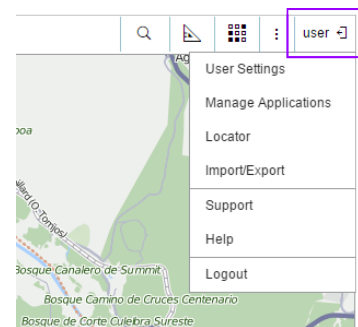
'Help' and 'Technical support' are links to outside Internet resources containing either documentation or technical support. By default, they are disabled. To activate those options, contact ●Gurtam Help System and provide corresponding URL addresses.

Information Notices

Information notices from service manager could appear in the top panel under the user's name, as well as notices on the amount of days left before blocking the tracking system (if stipulated by the tariff agreement).
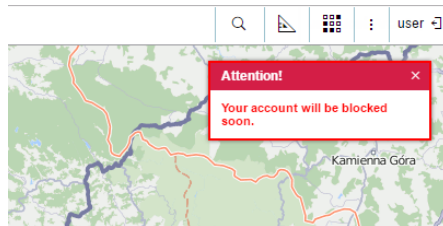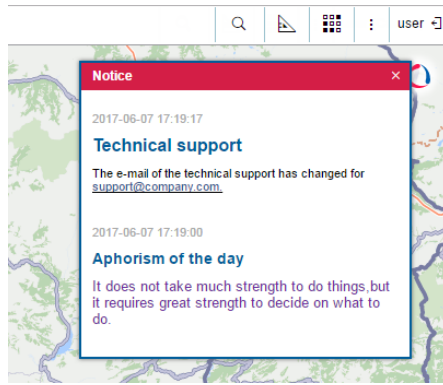
Work Area

Work area, where different actions with various elements of the system take place and different requests to be composed, is situated in the left part of the screen.

Depending on the tag chosen in the top menu, one of the following panels could be opened in the work area:

Monitoring — tracking units position, state and movements.

Tracks — viewing movement history.

Messages — viewing messages come from units.

Reports — wide range of survey instruments and sorting of data received from a unit.

Geofences — creating, editing, removing geographical areas.

Routes — creating and monitoring a unit's traffic route according to its schedule.

Drivers — creating drivers and assigning them to units.

Trailers — creating trailers and binding them to units.

Passengers — creating passengers and binding them to units.

Jobs — creating, editing, removing jobs performed by schedule.

Notifications — creating, editing and removing events' notifications.

Users — managing other users.

Units — managing available units.

Top menu also could include two panels which are not shown in the work area. They have their separate windows. They are:

Search on Map — dynamic search of system's micro objects on the map;

Tools — tools for calculation distance and area, laying the best routes, searching for the nearest units, etc.

Apps — applications enabling to tackle with various user's targets.

The width of the work area could be changed. To do this, please click on its right border and drag to the direction needed, holding the mouse button pressed. Moreover, work area could be hidden completely by pressing the button situated in the left bottom corner ☐.

Main Menu Adjustment and Navigation

To adjust the main menu click the customizer icon ⋮ and select the menu items to work with. The chosen ones should immediately appear in the top menu.

A name of a panel currently opened in the work area has a darker ground. To navigate through the menu, you just need to click on the necessary name. Contents of the left panel (work area) will change automatically.

Keyboard shortcuts are used to facilitate navigation through the panels.
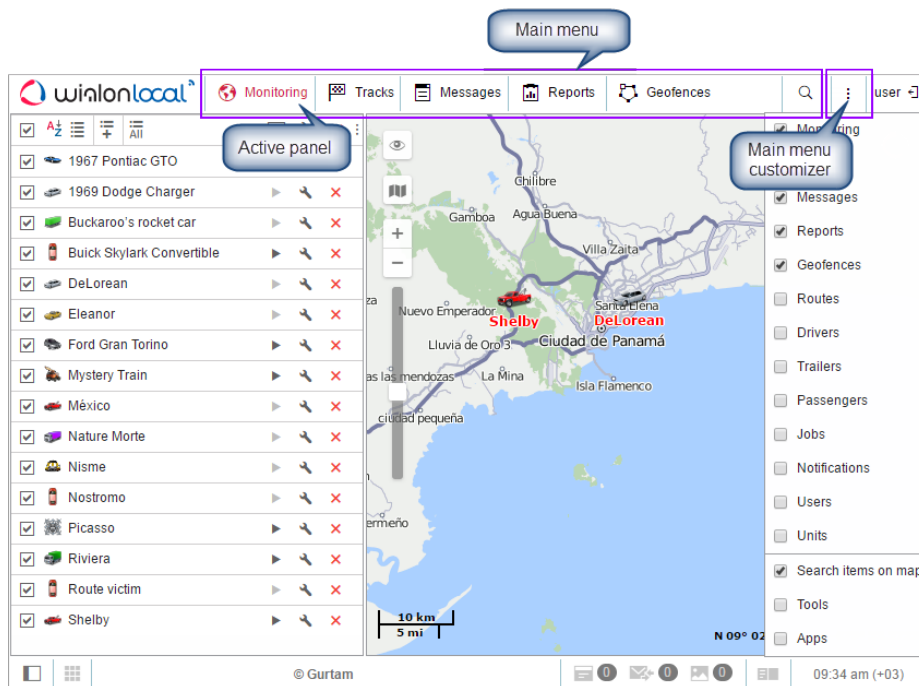
All the range of items chosen for the main menu is displayed at the top. The names of the panels will be shortened if there is a lack of space. That is why you should choose only those items which you are currently using.

Alternative Means of Navigation

If size of a browser window is not large, but there are a lot of panels selected, inscriptions could possibly be not visible, and menu panels would be presented just with icons. In such cases clicking on the icon mostly leads to switching on/off the layer on the map. Therefore, in such cases to switch the panels you should additionally hold <ctrl> on the keyboard.

Another means of navigation is through the menu settings window. Clicking on the name of any clause in settings window, transition to the corresponding panel occurs. In such case, if it were not displayed in menu, it would show up. Also, don't forget, that the layer will be activated automatically after panel's selection in menu settings window.

The same occurs in case of 'forced' transitions between panels, for example, during report request out of monitoring panel or during transition *from reports* to *messages*. Even if requested panel is not displayed in main menu, a transition takes place successfully. In this case the corresponding clause is added to the menu and the layer becomes active.

Bottom Panel

| ☐ ⊞ | © Gurtam | ☰ **12** ✉ **0** 🖼 **0** | ⊟ 🗺 | 17:37 (+03) |

At the left end of the bottom panel you see three buttons to manage unit display mode as well as SMS button:

☐ — hide/show work area;

⊞ — hide/show minimaps.

In the right corner of the bottom panel the following buttons are situated:

☰ — hide/show online notifications window;

✉ — hide/show messages from drivers or SMS;

🖼 — hide/show pictures from units;

⊟ — hide/show log.

Current time and time zone shown in brackets (which could be changed in User Settings) are displayed in the right bottom corner.

Your copyright with the hyperlink to our web-site could be situated in the middle of the bottom panel.

Map

The map is available regardless of which panel is activated. Usually, it occupies the most of the screen. Units and their traces, geofences and other elements can be displayed on the map.

Map size can be adjusted in relation to work area and log. To do so, drag map scale slider, which is situated in the middle left part of the map, up or down.

To maximize the map size as much as possible, you can hide the work area and the log completely (□ and ▣ buttons) and switch to the full-screen mode by pressing <F11> that is supported by most of browsers.
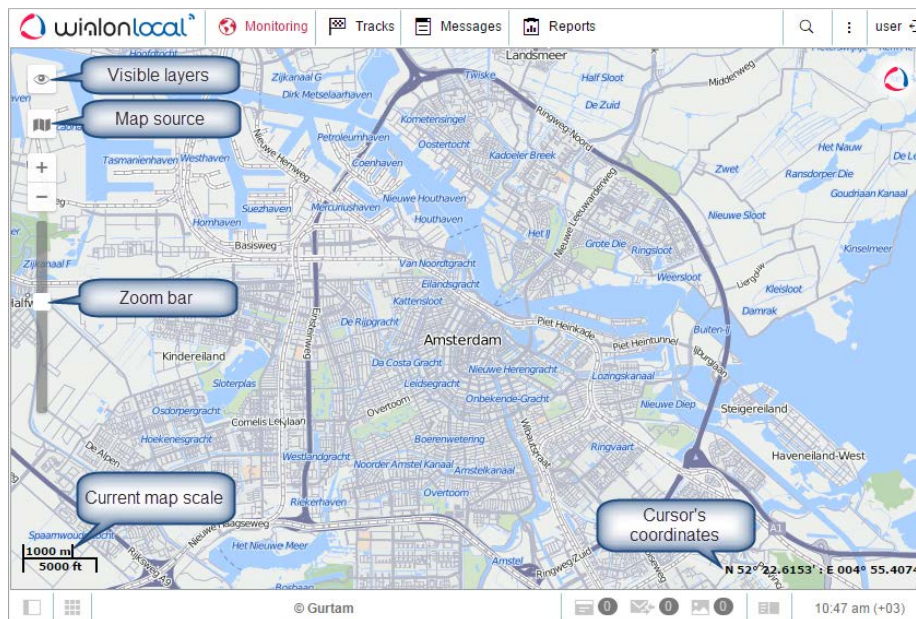
Visible Layers

The map provides a possibility of working with graphical layers. In other words, different graphical layers can be enabled/disabled on the map. The layers display graphical elements of such panels as monitoring, tracks, messages, reports, geofences, routes, drivers, trailers, and passengers.

Layers can be displayed on the map upon presence of the corresponding panels in the main menu only. For example, if the main menu contains a monitoring item, then on the map you can enable the same layer showing a current location of indicated units. Add an item to the main menu, and a corresponding layer will be automatically enabled on the map. Remove an item, and a layer will be disabled.
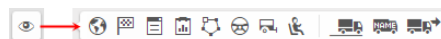
Enabling/disabling of a graphical layer is implemented in the layers menu. To summon this menu, click the 'Eye' icon (top left corner of the map). The layers menu is divided into 2 sections: panels' layers (left) and units' layers (right). Every graphical layer is presented by the icon of its panel. The work with the panels' layers is described above. The units' layers serve to control units' view on the map (arrows, traces, and names).

### Using the Map While Working with Different Panels

The map is common for all panels. It means that while switching the panels, zoom and coordinates of the map center remain the same. Graphic elements such as track lines, markers, geofences, units' icons stay on their places as well. Therefore, for example, if you've made a report showing parking locations on the map, and then switched to the *tracks* panel to create tracks for unit's movement (even if this is an absolutely different unit), all the graphical elements, lines,

markers, etc. still will be shown on the map, until you delete them or switch them off.

A lot of panels could have their layers on the map, such as: 'Monitoring', 'Tracks', 'Messages', 'Reports', 'Geofences', 'Routes', 'Drivers' and 'Trailers'. Graphical elements plot on the map in any panel, can be easily switched on/off. Displaying or hiding one or another layer is adjusted for every layer individually — using special switch-button, situated in front of the panel's name in top menu. More...

Map Source

To change a map source, click [image] button in the top left corner of the map. Map choosing menu is conditionally divided into two sections, top and bottom one. Top section contains main map layers, i.e., map sources. Bottom section contains additional or, in other words, informational layers which overlay the main ones (traffic, maritime navigation, etc.). Choose another map from the list and the map area already displayed on your screen will be reloaded from the other source. It is applicable to the main map as well as to the mini-map.
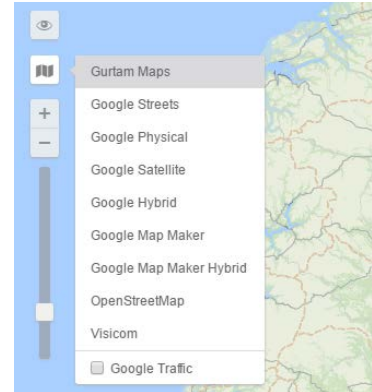
To activate more maps, go to User Settings. There, as well, you can save current position of the map for the further system logins. If you don't have an option for enabling some particular kinds of maps, please, contact your tracking system administrator.

If additional map layers are available, then they can be displayed on the main ones. In other words, all the maps can display the information on road traffic condition or maritime navigation. To enable it, you should select the corresponding flag in the section of additional layers in the map choosing menu ('Google Traffic', 'Yandex Traffic', etc.).

⚠ *Attention!*
A map, chosen in this menu influences only the displayed (graphical) map layer. Geocoding (address definition, etc.) is implemented mainly in Gurtam Maps.

Map Navigation

To navigate through the map (to move a map on the screen), click the map (left mouse button) and drag it to the side needed.

Zooming the Map

Map zooming can also be implemented in several ways:

1. **Using scale on the map**
   Zooming scale is situated in the top right corner of the map under navigation buttons. The scale allows to zoom in (+) or zoom out (-). At the same time, the center of the map is staying stable. You can press '+' and '-' buttons to change zoom in step by step mode, or click on any place on the gradation scale.
2. **Using mouse scroll wheel**
   It is even more convenient to adjust zoom level using mouse scroll wheel. Scroll up corresponds to zoom in, scroll down — to zoom out. During the scrolling action, point a mouse cursor on the place needed so that it would not get out of sight.
3. **Using mouse and <shift> button**
   To zoom in the chosen area, hold <shift> button and select some area of the map with the left mouse button, the map will be zoomed within this area.
4. **Using double-click**
   Double-click on any place of the map to zoom it in.

In the left bottom corner of the map the current scale of the map is indicated. Right bottom corner shows us geographical coordinates, mouse cursor is pointed on. Coordinates' format can be either degrees or degrees and minutes. It can be selected in User Settings => Maps.

Log

Log is an interface element, enabling to look through records of current operations, such as new message/SMS receiving, unit configuration changing, etc. The log contains messages from units in the work list. Depending on quantity of units and equipment configuration, the messages in the log can be received even every second.

'Show/hide log' button ▣ is situated on the bottom panel. A size of the log could be adjusted. Pointing on the upper border of the log a cursor changes its shape to a vertical double arrow. It means that by clicking on this border and dragging it up or down you can change the size of the log. The log window is semitransparent, this allows map and units to be always visible under the log.

If an event registered in the log happens in a certain place (for example, a new location of a unit is detected), you can move to this place on the map clicking on the black arrow at the end of the entry ⇒.

The log uses fonts of different colors in order to separate different type of entries from each other. The black color is used for registering unit's state, changing of its location, receiving new SMS messages from units and etc. The green indicates user's activity: creation and editing of places, geofences, user settings changes, etc. Red color is used to display error messages and alarm messages from units.

⚠ *Note.*
When emptying a black box or retransmitting past data, messages older than an hour from latest known positional message of a unit are omitted in the log.

Shortcuts

Keyboard shortcuts ensure more convenient and quick means to navigate through the system. This feature is activated in User Settings.

Shortcuts for panels navigation:

- **M** — Monitoring;
- **T** — Tracks;
- **E** — Messages;
- **R** — Reports;
- **G** — Geofences;
- **O** — Routes;
- **D** — Drivers;
- **I** — Trailers.
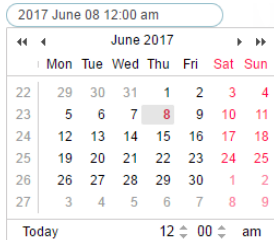- **J** — Jobs;
- **N** — Notifications;
- **U** — Users;
- **Y** — Units.

Shortcuts for tools activation:

- **1** — Track Player;
- **2** — Distance;
- **3** — Area;
- **4** — Address;
- **5** — Routing;
- **6** — Hittest;
- **7** — Nearest units;
- **8** — LBS Detector;
- **9** — SMS;
- **F** — Search on Map.

Other shortcuts:

- **A** — Apps;
- **S** — User Settings;
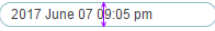- **~** — show/hide Left Panel;
- **L** — show/hide Log.

Calendar

The calendar is used in many cases: specifying time intervals to generate reports, indicating date and time in notifications, jobs, routs, etc.

The calendar date includes year, month (word) and day. Date mask chosen in a current user settings dialog influences only the arrangement order of a year, month and day. The earliest possible date is the 1st January 1971.

Concerning time, its format corresponds to the mask chosen in the user settings dialog. The only exception is that regardless of the mask chosen, seconds are not displayed in the calendar.

There are several methods to handle the calendar and quickly set up a desired date and time: manual input, clicking buttons, using mouse scroll, etc.
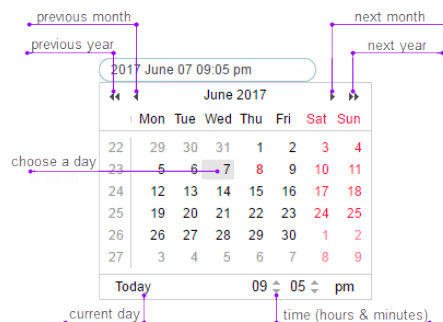
Method 1.

Date and time can be adjusted without opening the calendar itself — in the text field above it. You can input numbers straight from the keyboard or use the mouse scroll. Place the cursor over time element you want to alter and scroll up (increase value) or down (decrease value).

Method 2.

If you open the calendar, you can adjust date and time clicking on the appropriate buttons: on the top of the calendar — single arrows for months, double arrows for years; on the bottom — arrows for hours and minutes. To change these values you can either click on these buttons or use the mouse scroll. Besides, time can be time on the keyboard.

To finish with date/time selection, choose a day in the central part of the calendar. Only then your adjustments will be applied and the calendar will close.
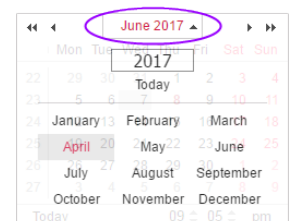

Method 3.

Today's date can be set with one click. Open the calendar and press the 'Today' button. This action affects year, month and day but not exact time.


Method 4.

Click on month and year area in the top of the calendar. Year field will appear below. Enter a year using keyboard, click on a month below and then select a day.

The Persian Calendar

There was the usual Gregorian calendar. However, Wialon works also with the Iranian calendar also known as Persian solar calendar. It is used in Iran and Afghanistan.

The Persian calendar can be activated in 'User Settings'. At that, if Persian (Farsi) is selected as interface language, the calendar will also be in Persian and shown from right to left. Otherwise, it will be in English (in Latin characters and Arabic numbers) and shown from left to right.
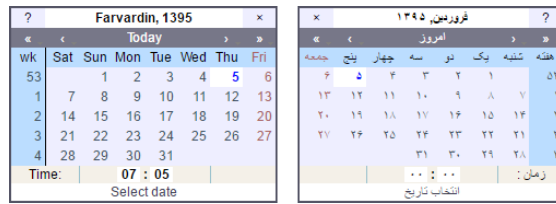
In this calendar, you can adjust year, month, day and time, set the today's day with one click, etc. Click on the question sign on the top to invoke the help window with detailed information. To close the calendar, click on a cross. Besides, you can drag the calendar to any place of the screen.

Filters and Masks

Lists are composed of various objects created in tracking system (geofences, drivers, custom fields, sensors, etc.) Objects from the lists are shown in the alphabetic order, provided that the figures go first, then Latin alphabet letters, and then Cyrillic. Capitalization is not taken into account. New object created (for example, new job or custom field) is originally added to the end of a list. Next time you open this list the objects will be arranged in the alphabetical order. After renaming an object it remains at its former place until reopening the list.

Filters and masks are applied for users' convenience. They enable to narrow a list of items in such a way that only the objects necessary for users will be shown. Also, you can find objects with particular characteristics or name in a list and specify the objects of tracking system towards which a report, notification, etc. will be applied.

Dynamic Search

If a list contains a great number of items, it may not be so easy to find a necessary one quickly. For your convenience, you can use quick dynamic search. It is applicable for most panels. Start entering item's name (geofences, units, routes, etc. — depending on the panel you currently in). A name could be typed beginning from any part. While typing items that correspond to your query will be immediately displayed.
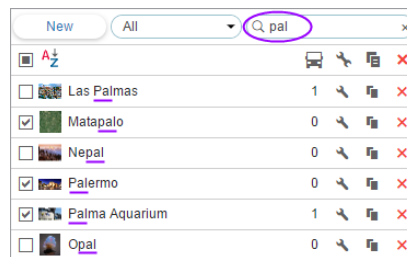
If you leave the filter field empty, *all* the available items will be displayed in a list.

The dynamic filter can also be found in unit properties dialog, unit groups, and users when adjusting access rights. Moreover, dynamic filter is used for choosing a resource upon creation of notifications, jobs, geofences, drivers/trailers (their groups, automatic binding lists), and also report templates.

The peculiarities of the dynamic filter usage in the Monitoring panel are described in 'Unit List Management' section.

Searching you can enter special characters such as * and ?, the usage of which is described below.

Name Mask

Besides the dynamic search, filters are also used for specification of an item, which will be effected by report, notification, etc. Item's name mask is created for this purpose, there you can apply special characters: **asterisk (*) and question mark (?)**.

The asterisk sign is a special symbol, which could be inserted in any place of the word in a search field to represent any combination of symbols allowed. The asterisk sign could be put in any place of a search field It can be placed in any place of the query (at the beginning, in the middle, at the end) or in several places at once, depending on which part of the name is known or is the same for a number of items. For example, if you type *h*nda*, all *Hondas* and *Hyundais* will be found.

Another special symbol that can be used is the question sigh (?). It replaces any single character (only one character). As well as the asterisk sign, it can be put at any place of the query.

The request is not case sensitive.

For example, a unit has two fuel sensors with the names *Sensor fuel level* and *Fuel in tank.* We are going to create a

notification that would be based on both of them. To achieve it, in notification properties we must set sensor name mask in such a way that it would correspond to the names of both sensors. In our case, the best choice is *fuel*:

You can do a search without using the asterisk but then you have to indicate the name (geofence, driver, sensor, etc.) exactly as it exists in the system.

To find *all* items of some kind (users, sensors, geofences, etc.), simply type one asterisk in the input box of search terms.

Masks are employed:

- in notifications to specify sensor, route or driver under control as well as set SMS text mask or parameter in messages;
- in user properties to set host mask for users;
- in reports to specify driver, sensor, event/violation, route and its geofence, and when selecting geofences;
- in the Messages panel to filter found messages;
- in all panels masks can be used instead of the dynamic filter.

Manipulations with Lists

Keyboard keys and their combinations can be used working with lists. Using the keys facilitates a lot of operations, such as list navigation, search of necessary items, and their selection.

Dropdown Lists

Dropdown lists are commonly used in the monitoring system. They provide a possibility to work with large amount of items. For example, this could be the list of units available during reports' generating, messages' request, etc., list of tables during report templates' editing and so on.

Upon building tracks or querying messages and reports, you can use dynamic search in dropdown lists. Dealing with tracks and messages you can quickly find a necessary unit in the dropdown list, dealing with reports you can find templates or objects. To use a dynamic search, click a corresponding dropdown list and start entering a name of a necessary unit/template/object. Special character asterisk (*) can be used to facilitate a search. As a result, a dropdown list is filtered according to the indicated symbols.

To work with a dropdown list, you can use a keyboard. Utilize arrows (up/down) for navigation through the list and <enter> for choosing a necessary item.

Multiple Select Box

In the lists of such type you can choose multiple items. To choose several items throughout the list, hold <ctrl> button, and consequently click on the necessary items.
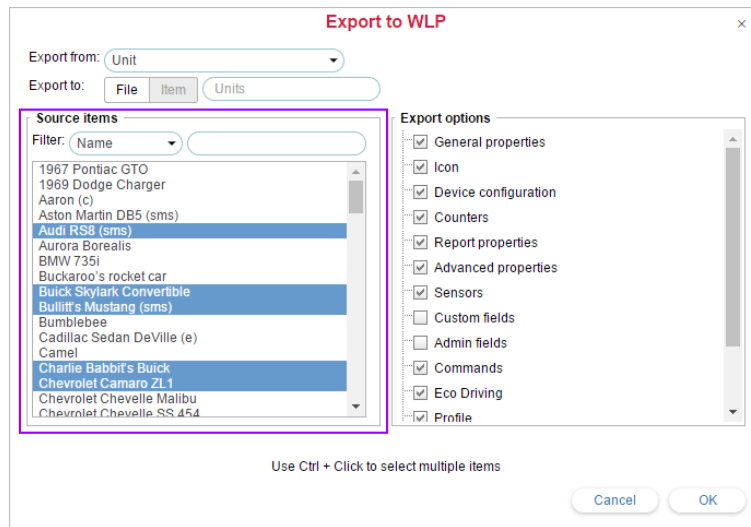

Moreover, the following keys, and their combinations can be used:

<home> — move to the list beginning;

<end> — move to the list end;

< > (arrow up) — move to the previous item;

< > (arrow down) — move to the next item;

<ctrl + A> — choose all;

<shift + home> — choose everything from the current place to the list beginning;

<shift + end> — choose everything from the current place to the list end;

<shift +   > — consequently choose the items going up from the current one;

<shift +   > — consequently choose the items going down from the current one.

Checkbox list

Multiple choice lists may contain checkboxes indicating whether the item is chosen or not. <ctrl + click> combination can be used in such lists in order to check/uncheck all the items at once.
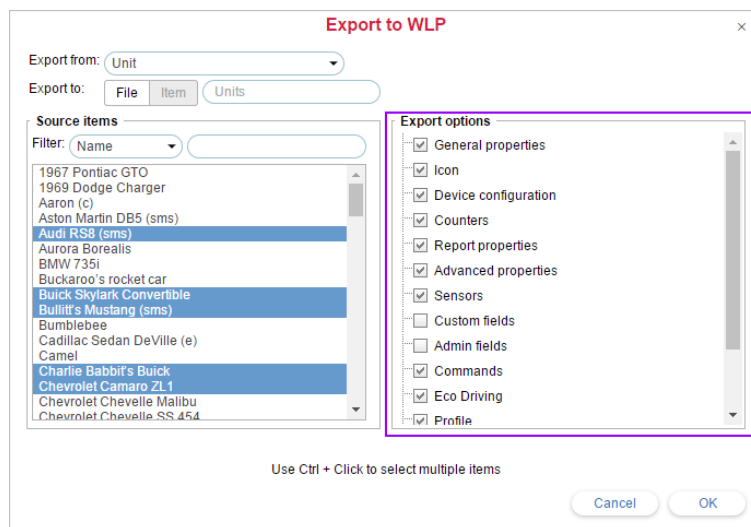
☺ *Attention!*

Working on MacOS it is necessary to use <cmd + click> combination instead of <ctrl + click> one.

Input Rules

All editable fields are checked to approve that entered data is valid. If there is incorrect data, the field is highlighted red.

Incorrect entries are:

- Not enough characters in the name or a phone number. Names of monitoring units, units groups and users must consist of at least 4 characters. Other objects like places, geofences, drivers, report templates, etc. can have names from one character.

- Excessive number of characters (more than 50) in names of monitoring units, units groups and users.

- Letters in numeric fields (phone numbers, sensor values, radius, fuel consumption and trip detector settings, etc.)

- Forbidden characters:
    - double quotation marks **"**
    - curly brackets **{ }**
    - the backslash ****

- Partly forbidden characters:
    - **spaces** are not allowed at the beginning and at the end of editable fields, however, they are allowed at the middle);
    - **comma** cannot be used in numeric fields as the delimiter (for entering fractional numbers the dot is used).
    - in report templates (column names, table titles, and statistics fields) you cannot use comma, colon, or & symbol.

Using angle brackets ('>' and '<') is allowed but not recommended as, in some cases, they will be automatically substituted for '>' and '<'.

If any entry in a dialog is not valid, it is impossible to save changes or create an object, because OK button becomes not available. There can be also an alert when trying to save incorrect data — *Incorrect entry*.

Phone numbers and e-mail addresses

Phone numbers must be in international format. They must contain all necessary codes (country code, communication statement or city code, and then the phone number itself). Brackets, spaces and hyphens are not allowed. The only character that is used entering phone numbers is **plus** (+) which, if necessary, could be typed before the digits. Examples: *+19176726154, +15551234567.*

E-mail addresses must be in the format *user name — the 'at' sign (@) — domain name*. E-mails can contain letters of Latin alphabet as well as dots (.), hyphens (-) and underscores (_). Example: *username@domain.net*.

User Settings

Users can configure some system operation parameters according to their needs and tasks.

⚠ *Note.*

User settings can be changed if the corresponding flag has been indicated in user properties dialog.

To view user settings click on the username in the top panel and then choose *User Settings* in the menu.

The 'User Settings' dialog can contain up to three tabs that depend on system configuration:
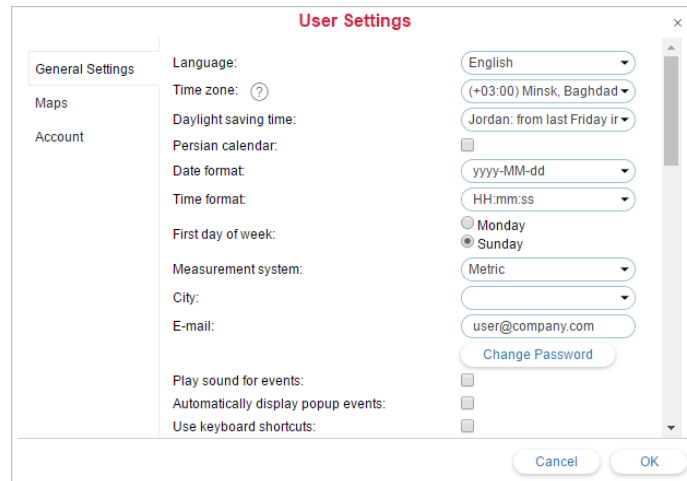
- General Settings
- Maps
- Account

⚠ *Hint.*

Settings from one user can be imported to other users. More....
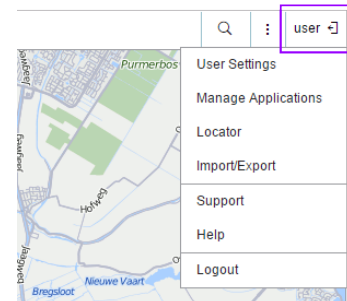
General Settings

The first tab of the User Settings dialog contains general settings. Here you indicate your time zone, input your e-mail address, change the password to enter the system, and set many other parameters.

Language
The language menu. Contact your service administrator to enlarge the list of available languages.

Time zone
Indicate your time zone accurately because all time values in messages got from devices are displayed in accordance with time zone selected. Changing time zone requires reloading the page.

Daylight saving time
Specify DST options if you use summer and winter time in your region — choose the most appropriate DST schedule on the dropdown list. *None* — summer time is not used.

Persian calendar
This option allows to activate the Iranian calendar also known as Persian solar calendar. It is used in Iran and Afghanistan. If the option is chosen, the Persian calendar will replace usual (Gregorian) calendar in the places where a user should indicate some time interval (to build a track, to query messages or a report, to setup a job or assign a route, etc.) Note that the Persian calendar can be used to indicate particular dates of an interval only (from – to). Working with 'quick intervals' ('Today', 'Yesterday', 'Week', 'Month', 'Year'), the Gregorian calendar is applied. If Arabic is selected as interface language, the calendar will be in Farsi (language spoken in Iran) and shown from right to left. Otherwise, it will be in English (in Latin characters and Arabic numbers) and shown from left to right (see details). Enabling/disabling the Persian calendar requires reloading the page.

Date and time format
These masks of date and time format define date and time presentation throughout the system. For example, months can be written in words or numbers, year can consist of two or four digits, day of week can be included or not. Moreover, you can change the order in which those items appear in the date. Instructions upon the syntax of these fields is given in their tooltips. Besides, you can just choose one of predefined masks in the dropdown list. Here are some examples of formats:

Date mask	Time mask	Result 1	Result 2
yyyy-MM-dd	HH:mm:ss	2014-01-25 09:45:33	1987-12-02 17:20:00
d/MM/yy	HH:mm	25/01/14 09:45	2/12/87 17:20
d MMMM yyyy dddd	hh:mm:ss tt	25 January 2014 Saturday 09:45:33 am	2 December 1987 Wednesday 05:20:00 pm
dd MMM yyyy ddd	hh:mm tt	25 Jan 2014 Sat 09:45 am	02 Dec 1987 Wed 05:20 pm

First day of week

Choose Monday or Sunday as the first day of week. This will affect the appearance of the calendar and the manner of counting weeks in general.

Measurement system

Choose one of the measurement systems available. The corresponding units of measurement will be used in tools like Distance, Area, Routing, Nearest Units. A chosen measurement system also influences address processing in some way, as well as creation of routes. However, the earlier created units and resources (together with geofences, jobs, and notifications) possess the measurement system chosen upon their creation. Speaking about reports, their measurement system is set separately (refer to 'Advanced settings of a report template').

City

In this field you can indicate your city. It will be used in the Nearest Units and Address tools as the default city. Enter the name of the city. Upon entering of the first letters the dropdown menu with the names corresponding to the request will be automatically opened. You can either continue typing in the name or choose it from the dropdown menu (there can be several towns with the same names in different countries).

Position of the map upon entering the tracking system is stipulated by the city indicated in this setting (if the field is blank, then Minsk is considered to be a chosen city by default). However, if there are any units displayed on the map, then upon the entering the map will be scaled in such a way that all of them will be visible.

E-mail

This e-mail address will be used to send you a reset password link in case you forget your password.

Change password

If you push this button, some additional fields will appear. You will be asked to input your current password, and then your new password (two times). New password can be applied on the login page. *Note*: However, not all users are allowed to change their passwords.

Play sound for events

The sound can be played for online notifications and drivers' messages. When a notification or message from driver pop up, the browser will play sound. In Windows OS, QuickTime Alternative can be used as media player.

Automatically display popup events

In order online notifications and messages from drivers to be automatically shown on the display, it is necessary to indicate this flag. If you remove the flag, only a number on red background in the bottom panel indicates receiving of new events.

Closing online notifications window or chat with driver window using the cross in the upper right corner leads to unchecking the 'Automatically display popup events' flag. The flag can be checked again either in the user settings window or by clicking on the 'Online notifications' or 'Chat with drivers' buttons in the bottom panel.

Use keyboard shortcuts

Check this box to activate Shortcuts.

Infinite map

Allows moving (dragging) the map infinitely right or left. This option is to be activated *only* in the case when tracking occurs in the region of 180th longitude (Fiji, Chukotka, etc.).

Driver's activity

Check this box in order an information on driver's activity to be shown in unit's and driver's tooltips, as well as in extended unit information.

Render charts on server

Indicate this flag in order static charts to be used in the monitoring system.

Show Additional Information about the Unit

Here you choose additional information about the unit to be displayed in different places of the tracking system.

In the **left column**, check information to be shown in unit's tooltip (displayed as you hover mouse pointer over unit's icon).

In the **right column**, check items to be shown in extended unit information in the work list.

To check all the items from any column, hold <ctrl> on the keyboard and check any box of the corresponding column.

Last message
Time when the last message was received and how long ago.

Location
The last detected address or coordinates (if address info is unavailable).

Presence in geofences
If unit is situated in a geofence, geofence's name will be displayed in unit's tooltip and in extended unit information with sorting by area (from small to large), and it will have the same color as assigned in geofence properties. This option also affects units count in the Geofences panel.

Speed
Speed in the latest message.

Altitude
Altitude in the latest message (if device is able to give such data).

Counters
Values of mileage counter and engine hours counter. See Counters.

Satellites
The number of satellites locked.

Coordinates
Unit's GPS coordinates from the latest message received (in decimal degrees).

Connectivity settings
Device type, unique ID(s), and phone number(s) specified in unit properties. This information is available to users with 'Edit connectivity settings' access flag.

Sensors values
Sensors configured for the unit and their known values will be listed. Custom sensor name is displayed and the value processed according to calculation table of this sensor.

Parameters
Latest known parameters like CAN bus, power voltages, and many others. Their names (as they come in messages) and their raw values can be shown as additional information.

Drivers
Name, photo, and phone number of the driver(s) currently bound to the unit.

Trailers
Name and photo (if available) of the trailer(s) currently bound to the unit.

Custom fields
Custom fields from unit properties (general or/and admin fields depending on access).

Profile
Unit's profile information.

Maintenance state
Service intervals together with their states (days/engine hours/kilometers left or expired) are shown.

⊙ *Note.*
Counters are refreshed once a minute, as well as information about drivers and trailers. The check for presence in geofences is performed every two minutes. Other information is refreshed immediately.

Unit Visualization on Map

Replace unit icons with motion state signs
If marked, unit icons are hidden, and all units are displayed with motion direction arrows (if they are in motion) or with

blue rhomb shaped marker (if they are stationary). See also Unit presentation on map.

Display overlapping units in one icon

If two or more units overlay each other on the map, then their icons are grouped into the common one. It facilitates visual perception of the map. The common icon has a value indicator showing a number of units in it. To see a list of units the common icon contains, summon its pop-up window by pointing mouse cursor over the icon. Upon clicking the common icon the map is scaled in such a way that all units of the common icon get into vision field. Note that overlaying icons cannot be grouped into the common one on the 2 largest scales. Accuracy is the topic issue viewing map on such a scale, therefore all unit icons will be displayed regardless to the overlaying.

Show unit icons at map borders

If a unit gets out of view, its icon will be displayed at map border in the direction where the unit is located. Click on this icon to move to this unit on the map.

Blur icons of inactive units

Indicate this flag in order to differentiate unit states on the map.

Trace

It is possible to indicate the length of the trace which is added to a moving unit on the map (the 'Points in traces' parameter), and choose the color and width for it.

Multicolor sensors in unit's tooltip

Sensors, if chosen to be displayed in unit's tooltip, can change their colors according to received values. Color scheme can be adjusted on the first tab of sensor's properties. In unit's tooltip, color can be applied either to the whole row with sensor (both its name and value) or only to its value — select desired option in the dropdown list. If the option 'Multicolor sensors in unit's tooltip' is disabled, default color (black) will be employed.

Other Items on Map

Display names of routes' check points on map

Depending on the flag, routes' check points can be displayed with or without their names on the map.

Display names of geofences on map

Depending on this flag, geofences can be displayed on the map with their names or without them. The color of the captions is adjusted in geofence properties.

Display overlapping geofences in one icon

If several icons of geofences overlap when displayed on the map, they can be grouped into one. Place the cursor over this icon to know which geofences are hidden behind it. Note that for reports this option is set independently — in advanced options of report template.

Render geofences on server

By default, all geofences are rendered in browser. This may slow down browser work if your computer is not very powerful. But if you have good Internet connection, it is possible to increase Wialon system performance by enabling the option of rendering on server.

Maps

Maps settings are adjusted in User Settings dialog on the 'Maps' tab.
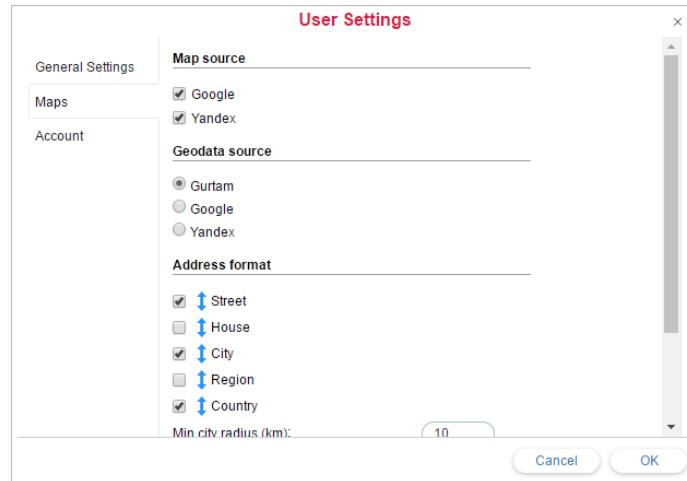
Map source

To activate necessary map layers, indicate corresponding flags. Changes are applied after clicking 'OK' and refreshing the page. To choose a different map as a base layer, choose it in the maps menu.

The following maps can be used in Wialon Local: Google Maps, Bing Maps, OpenStreetMap, Kosmosnimki, 2GIS, WikiMapia, Visicom, Yandex, HERE, Regio, Luxena, MyIndia, ArcGIS, GoMap.az, Mapbox, OpenSeaMap (additional layers). By default, Wialon Local uses WebGIS server as a source of address information. Though, there is a possibility of taking all the address information from Gurtam Maps cartographic service (paid option).

Some maps go in blocks. For example, when you enable Google Maps, several map layouts appear on the menu at once: Google Streets, Google Physical, Google Satellite, Google Hybrid, Google Map Maker, Google Map Maker Hybrid, and Google Street View for tracking on mini map. Moreover, if the additional layers are available (for example, traffic layer, maritime navigation), then they can be visually put over any chosen map.

If a map you need is not available, address your request to ◉Gurtam Help System.
⚠ Usage of cartographic services is stipulated by the procedures established by the author or by other right holder of such services. By choosing cartographic service you confirm that you acknowledge and accept the full responsibility for its possible misuse.

Geodata source

In this block you can choose the source of address information used in the 'Monitoring' panel, in the tooltips of units and tracks, in the 'Messages panel', while creating geofences and routes. Possible sources of geodata are Gurtam, Google, Visicom, Yandex, Mapbox, HERE, Luxena, what3words, ArcGIS. Only the maps activates in the site's properties are shown in the list of available.

⚠ If a geodata source that is not Gurtam is chosen, the block 'Format of coordinates' becomes unavailable.

Address format (for Gurtam Maps only)

Here you can define how addresses will look in tooltips, tools, messages, and other places. Choose which of standard address components to be displayed: country, region, city, street, and house (at least one of these items should be selected). For example, if your units move mainly within the same city or town you can omit country, region, and city and leave only street name and house number in addresses. Address components can be put in any order. To change this order, drag components up and down sticking to arrow-shaped buttons. This format affects addresses mainly in cities/towns/villages.

When out of cities/towns/villages (on motorways between them), address information is given according to the following

parameters:

- *Max distance from unit* defines that if unit is on a road or close to it and there is a city/town/village in the indicated distance then the address is displayed as name of the road and distance to that city (if several cities fit, we take the nearest).
- *Min city radius* defines that if no cities/towns/villages have been found in the distance indicated as 'Max distance from unit' then the address is bound to the nearest city which radius is equal or larger than 'Min city radius' values. This parameter can be used to eliminate small towns from address information and stick to large cities instead.

Format of coordinates

The coordinates of the cursor shown in the lower right corner of the map can be either in degrees or in degrees and minutes. This option *only* influences the cursor's position format.

For the blocks 'Map source' and 'Format of coordinates' there is a possibility to check all the boxes at once. To do so, hold <ctrl> button on the keyboard and check any box of the corresponding block.

Account

⚠ *Attention!*

This tab could be unavailable due to the service configuration peculiarities.

On the 'Account' tab of User Settings dialog you can view information on the billing plan, current state of account, services used and available, etc.

The tab contains two sections: General and Statistics. In the General section, information on billing plan, current state of account, balance and days left is presented. You see also how many objects (like geofences, devices, users, etc.) you can create and how many of them already exist. The table specifies services, their status, limit and reset interval. If the limit is 0, it means the service is unavailable. If you see a dash in the limit, it means that no limitations are applied to this service.

In the 'Statistics' section, you can see transactions for given period. Specify time period and push the 'Show' button to see statistics.

Monitoring

The 'Monitoring' panel displays the work list of units and gives access to the basic features connected with tracking.

The work list can contain either all units available to the current user or just some of them. Units can be easily added and removed from the work list, which does not lead to their removal from the system. See how to manage the work list...

Near the name of each unit, there can be a number of buttons and signs that allows to estimate unit's state or perform an action over it. The choice of signs and buttons to be displayed in the Monitoring panel is customizable. These columns can be also used to sort units in the work list.

To open 'Monitoring' panel, choose a corresponding name in the top panel or click on the necessary item in the main menu customizer.
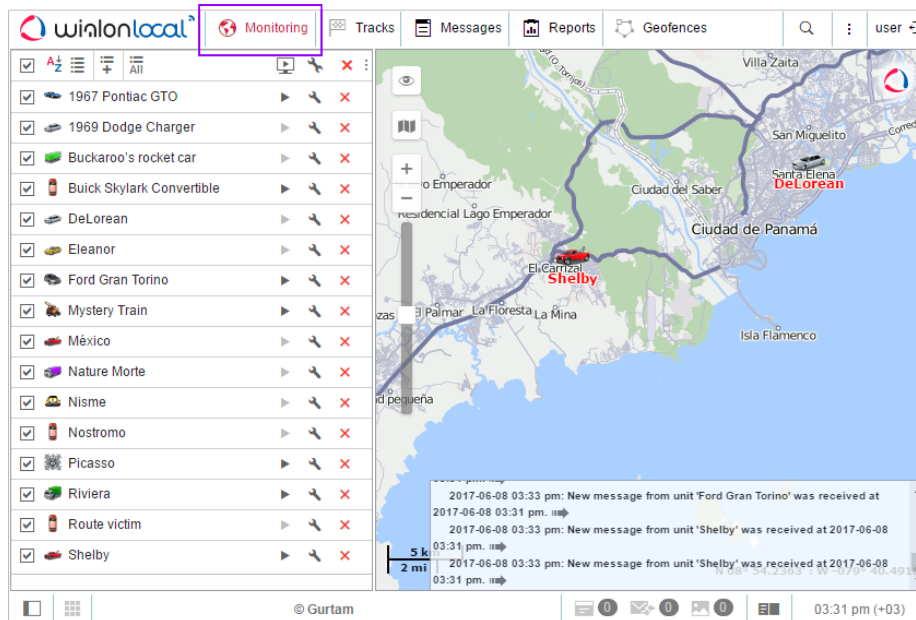
To locate a unit on the map, click on its name in the work list. The map will be centered on this unit. At that, current map zoom will remain the same.

Only units checked in the first column of the work list are shown on the map. To display all units from the work list, mark a check box in the left top corner of the list. Remove this checkbox to remove unit icons from the map.

⚠ Note that in order *units* to be displayed on the map, you should check if the corresponding layer is active.

Units are seen on the map if they get into view according to the current map position. You can move and zoom the map according to your needs.

However, if the option **'Show unit icons at map borders'** is selected in User Settings, in case a unit gets out of view, its icon is displayed by map border. Click on the icon to move to the unit on the map.

It is possible to watch a unit constantly. For this, enable the option **'Watch unit on map'** against a necessary unit in the corresponding column (⊕) of the Monitoring panel. Units marked in this column are always seen on the map. If such a unit gets out of view, the map automatically centers at this unit each time when a new message comes.

To track stationary units, make use of a specially designed app — ⬤ Sensolator.

Unit Presentation on Map

By default, units on the map are displayed with icons assigned to them and their names (captions color is red). Icons for units can be selected from a standard set, e.g. , or you can load your own image. See the dialog Unit Properties => Image. Unit icon can be rotated on the map according to course (movement direction). This feature is also defined in unit properties.
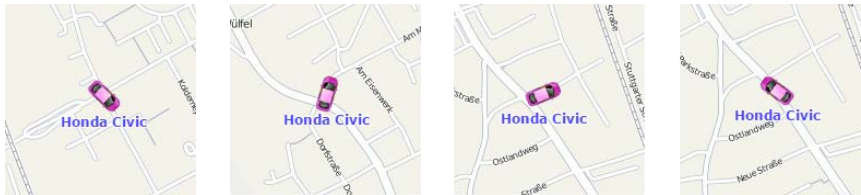
Icons overlaying each other on the map can be replaced by the common icon with a number indicator. To do so, choose the option 'Display overlapping units in one icon' in the 'User Settings' dialog.

Alternatives for Icons

Unit icons can be replaced with motion state signs:

- yellow circle — the unit is not moving but the engine is on;
- red square — the unit is not moving, and the engine is off (if the unit has ignition sensor);
- green arrow — the unit is moving, and the arrow showing movement direction.
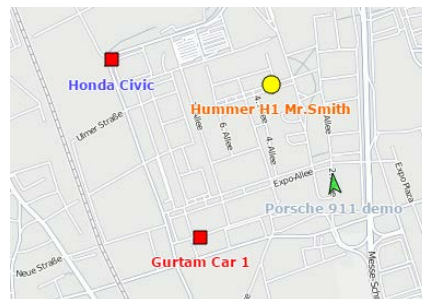
This option is called 'Replace unit icons with motion state signs' and set in User Settings.

Besides, the colors of these icons (arrow, square, circle) can be different and depend on a sensor value. This functionality is adjusted on the 'Advanced' tab of unit properties. In other words, the shape of the icon is defined by state (standing still — square, moving — arrow), and the color depends on sensor value (intervals and colors are adjusted in sensor properties).

Unit names can be either shown or hidden upon displaying a unit on the map. It depends on the state of the button ( ) in the layers menu on the map.

Displaying Inactive Units

Monitoring units are conditionally divided on active and inactive ones. If data messages from a unit have not been received for more than 48 hours, then a unit is considered to be inactive.

The system supports the possibility of differentiating unit states on the map. To do so, indicate the flag 'Blur icons of inactive units' in user settings. In this case inactive units are displayed on the map with a blurred icons and transparent names. If signs of motion are used instead of icons, then transparency will be used both for signs and names. If the flag 'Display overlapping units in one icon' is chosen in 'User Settings', and all the units with overlapping icons are inactive, then the icon for them will be displayed blurred. Moreover, either drivers' or trailers' icons binded to

an inactive unit are also displayed blurred until unbinding.

Displaying Units with 'LBS Detector'

'LBS detection' is an alternative method of finding units on the map. The accuracy of this method is inferior to the defining location using GPS, but in case of experiencing any troubles with GPS connection you can switch to the 'LBS detection' method. To do so, it is necessary to activate the flag 'Allow positioning by cellular base stations' on the 'Advanced' tab of unit properties dialog. Therefore, if 'LBS detected' data is more recent than GPS one, then it will be used for determining current unit's location.

Upon using 'LBS detection', units are displayed on the map the following way: current icon is placed into a transparent white circle with a red dashed line border, the brightness of an icon is reduced.
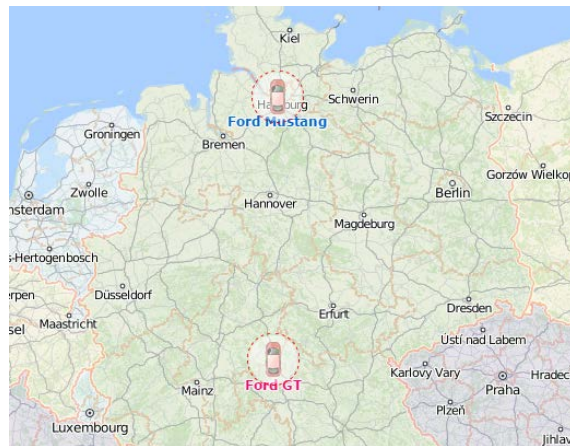
Other Markings

If a unit is currently in motion, a green arrow shows movement direction, and the unit can be followed by a blue 'tail' (trace) which shows unit track for several latest messages. If the unit is stationary (according to the last message), this arrow is not shown. If there was no motion within several latest messages, the trace is not shown (or the page has been just loaded). Trace default length is 5 messages, however, it can be changed together with trace width and color in User Settings.

Direction arrows, traces, and names can be disabled. To do so, use the corresponding buttons in the layers menu on the map:

 — hide/show unit traces;
 — hide/show unit movement directions;
 — hide/show names of units.

Minimaps

Minimap is an additional window (help window) focused on the current information about the chosen unit. Double click on unit's name in the monitoring panel list to open its minimap. The chosen unit is also centered on the map. Moreover, the window can be open by double-clicking a unit on the map. However, in this case the unit is not centered on the map.

⚠ Note that if no messages with coordinates have been received from a unit, then no actions take place when you double click on it.
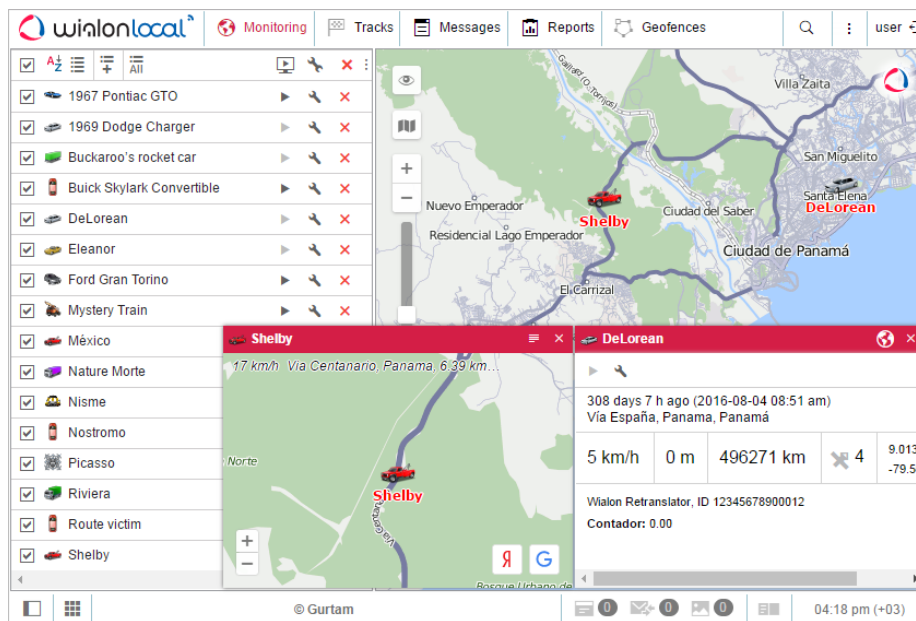
Minimap Modes

There are two modes available for minimaps: map mode, and info mode. They can be switched using the corresponding button in the right corner of a help window header .

Map

The main purpose of a map mode is to show a unit location, as well as its speed and address from the last received message. The map cannot be moved, because it is automatically centered on the unit's last location and the unit does not leave the field of view. Except for this peculiarity, working with help windows in map mode is completely identical to working with the main map.

Moreover, in the map mode you can activate ⊕ Google Street View or Yandex Panorama. These are submodes which provide a possibility of tracking units on 'real' streets. Google Street View is a technology featured in Google Maps that provides panoramic views from positions along many streets in the world. Its coverage spreads throughout Western Europe, North America, Australia, Japan, Brazil, and some other countries. Yandex Panorama is also a panoramic view technology featured in Yandex map. It has coverage for Russia, Ukraine, Belarus, Kazakhstan, and Turkey.

Google Street View works only upon Google Maps activation ('User Settings') and requires ⊙coverage for requested geographical area. Yandex Panorama works upon Yandex map activation and requires coverage of the corresponding area as well.

Info

Switch to the info mode using the corresponding button in the minimap header. This mode mirrors an extended unit information chosen in the right column of flags in the corresponding block of 'User Settings'.

Online Notifications in Minimaps

Minimaps provide you with an alternative way of viewing online notifications. Upon online notification triggering an opened minimap of a corresponding unit is highlighted in red. If the minimap is hidden, then it will be shown automatically upon receiving of a notification. To receive and view online notifications in minimaps, it is necessary to check the 'Blink minimap' flag while choosing a notification action.
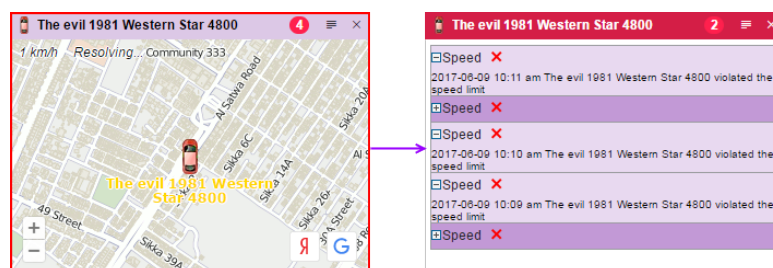
An icon indicating a number of unread notifications appears in a minimap's header near the mode switcher. Click the icon to view received notifications. The concept of work with notification is identical to the one used in online notifications window. To return to the initial mode used, click the notifications icon once again. ⚠ Note that a minimap is not synchronized to the online notifications window, therefore an activity of reading or deleting notifications in a minimap does not lead to any changes in the window of online notifications.

The maximum number of minimaps corresponds to 9 items. That is why if all the available windows are already opened, and a notification has come for a unit not opened in a minimap, then a notification will be available in the window of online notifications only.

Manipulations with Minimaps

There is a scaled icon and a unit name in the header of every help window in order to simplify the search of the necessary one. A mode switch and a close button are also situated in the header. You can open up to 9 help windows in the tracking system. Besides, you can use only one minimap per unit.

The button ⊞ in the left corner of the bottom panel can be used to hide/show all minimaps at once. Apart from that, to avoid excessive information, minimaps are automatically hidden when you switch to the 'Reports', 'Messages', and 'Routes' panels (but even then, they can be shown forcibly if necessary). Minimaps are shown automatically upon leaving these panels.

The latest used layout of minimaps is restored each time a user authorizes in the system.

Unit Additional Information

Additional information includes the following items: last message, location, presence in geofences, speed, altitude, coordinates, counters, satellites, connectivity settings, sensor values, parameters, drivers, trailers, custom fields, and maintenance intervals.

Additional information can be found in a unit's tooltip as well as in the extended unit information of the monitoring panel work list.

Unit's Tooltip

Hover the mouse pointer over the unit on the map, in the work list, or in a dialog to see detailed information about unit current state in a popup info tip. The content for this tooltip is selected in User Settings.

For example, a unit's tooltip can look like this:
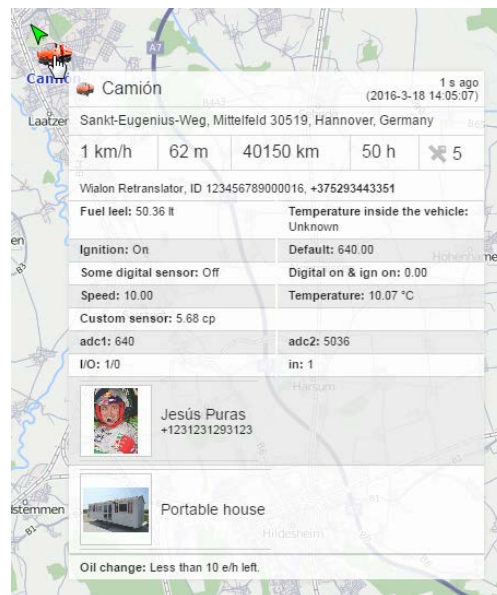
⚠ *Note.*
All measurements used in the tooltip are taken from corresponding properties of the unit itself.

Extended Unit Information

Apart from that, additional information about the unit can be summoned and displayed stationary in the work list itself. Click on unit's icon in the Monitoring panel to see extended information. Content of the extended unit view is also regulated through User Settings.
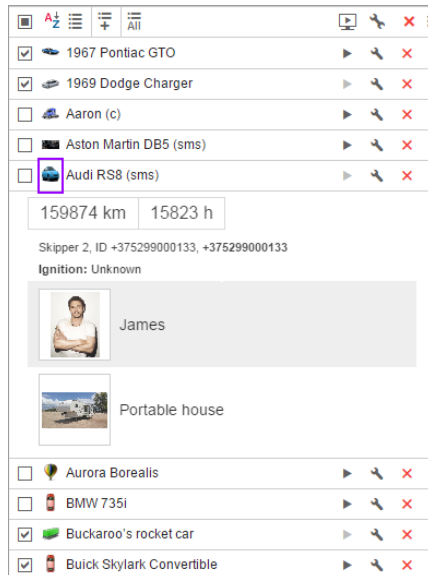
You can apply extended view to any number of units on the work list. To hide the extended information back, just click on unit's icon again.

⚠ *Attention!*
Extended information is not available in the treelike view of units with sorting by groups.

Monitoring Options Menu

To summon the monitoring options menu, click a necessary unit on the map. This menu contains the same functionality chosen as the monitoring options. Moreover, regardless to the chosen icons/units the menu always contains the buttons for generating quick report and building quick track. The menu does not contain the following items even if they are chosen as the monitoring options — unit location icon, tracking option, and clear list button.

During a movement of a unit the menu moves with it and always displays updated unit information. To close it, click any place outside this menu.
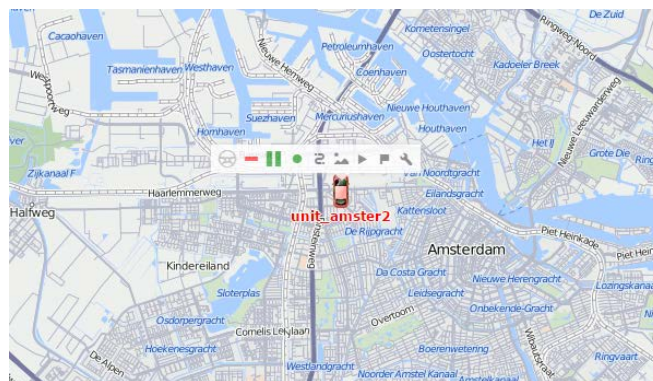
Monitoring Options

Monitoring options: choose a functionality to be used for the work list's units monitoring. The chosen functionality is also available in the monitoring options menu.

The functionality can be conventionally divided into 2 categories:

- **Statistics** — options providing you with current information regarding a unit (locations, drivers, trailers, motion state, data accuracy, connection state, sensor state).

- **Actions** — options providing you either with the possibility to perform actions on the basis of data received from a unit or to view/edit unit properties (quick track, messages, quick report, photo/video viewing, commands, SMS, events registrar, unit tracking).

To choose monitoring options, click 'Options customizer' button (⋮) in the header of the work area. The summoned menu contains all the monitoring functionality items. These items can be placed either into the monitoring options area (select the first column of flags) or into the additional menu (select the second column of flags). To apply changes and close the options customizer, click any area outside this menu.

By default units in the work list are sorted alphabetically ^A_Z / ^A_Z . Moreover, the system provides the possibility to sort the work list on the basis of some monitoring options chosen (motion state, data accuracy, connection state, sensor state).
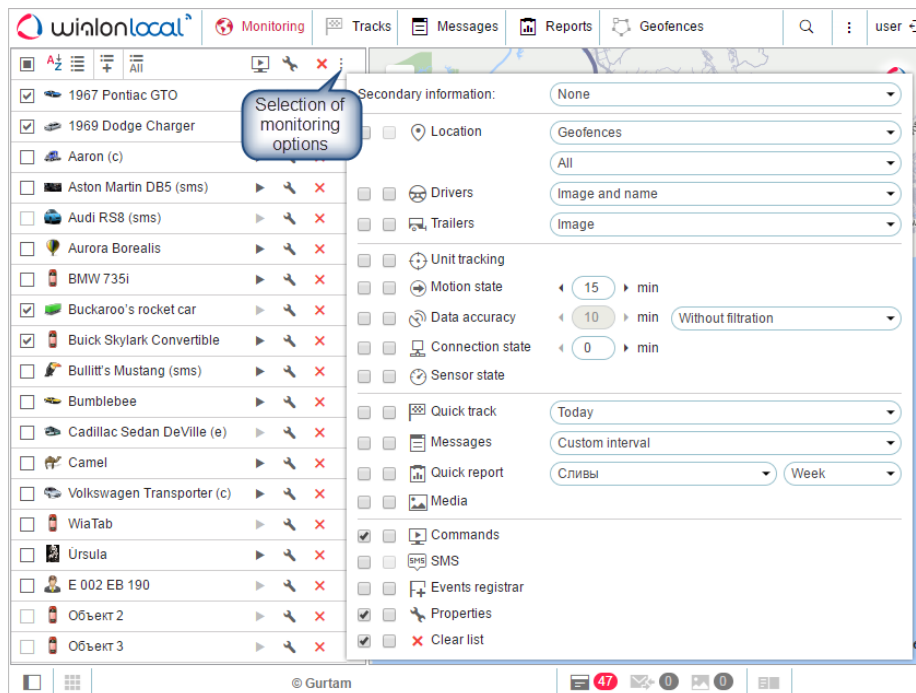
Secondary Information

Here you can choose the type of information to be shown under a unit name (address, geofences, driver name, driver's phone number, trailer).

Location

A column with units' last location — either in the form of addresses or in the form of geofences. By pressing the icon in the header, units in the work list can be sorted according to their location (by alphabet in direct or reverse order). 'Resolving' means an address is being searched. 'N/A' goes for units which location is not available, for example, in case a unit has never sent any messages.

- Addresses

  If you use Gurtam Maps in the system, depending on chosen format, addresses can be longer (including state, region, etc.) or shorter (e.g., just street and building number). If you use your own WebGIS, addresses can have only full format, and if no address information is available, then coordinated are displayed instead.

- Geofences

  If a unit gets into several geofences, all of them are displayed. At that they are sorted by area (from small to large) and written in color set in geofences' properties. If a unit is outside of all geofences available, then its location will be indicated by an address.

⚠ *Attention!*

To calculate units inside geofences, the option *Presence in geofences* should be activated on the 'General Settings' tab. That is why this flag is enabled automatically if you choose geofences for the location column.

Unit Tracking

◇ / ◈ In order the map's vision field to be automatically focused on a particular unit upon receiving a message from it, click the icon opposite to the name of the unit. It will become green and get a point inside. The unit should be previously marked in the first column ('Show on map'). If you click the icon in the header, the option will be applied to all the units checked in the first column.

Motion State

➡ This column shows whether a unit is moving or stationary, as well as whether ignition is on or off (if there is an appropriate sensor).

To monitor unit motion states, it is necessary to indicate a validity period of motion state icons (the corresponding line in the monitoring panel customizer). Here validity period corresponds to a time interval (in minutes) upon an expiry of which current motion state icons become inactive. Moreover, upon the expiry of validity period, unit movement directions become hidden. Validity period may posses a value from 1 to 999 minutes.

- ➡ — unit is moving,
- ➰ — unit is moving, engine is on,
- ⊖ — unit is stationary,
- ⊖ — unit is stationary, engine is on;
- ➡ — the last message from unit was received over an hour ago: unit was moving;
- ⊖ — the last message from unit was received over an hour ago: unit was stationary;
- ((•)) — unit data is received by LBS detection;
- ((•)) — data received by LBS detection is outdated;
- ⭕ — no messages are received from a unit.

Unit state is detected according to its speed value in the last message and ignition sensor state (if there is such). If the unit has a real-time motion sensor, its motion state in real time is detected according to this sensor. Apart from that, if a unit is stationary, in the tooltip you can see for how long.

Data Accuracy

◎ This column indicates data accuracy — shows a number of satellites locked and time of the latest message received. Exact time of the latest information update can be viewed in icon's tooltip.

First bar shows satellites availability:

- ▌ green — satellites are available (see the precise number of satellites locked in the tooltip),
- ▌ red — satellites are not available,
- ▌ grey — satellites are not available for the time period exceeding motion state value indicated in the 'Options customizer' menu.

Second bar shows the latest data received from a unit:

- green — unit sent data less than 5 minutes ago,
- yellow — unit sent data within the last hour,
- orange — unit sent data within the last day,
- red — no messages for a long period of time,
- grey — no messages ever.

Units can be automatically displayed or hidden on the basis of their latest message's time. To do so, change *Without filtration* to *Monitoring panel* or *Panel + Map* and specify filtration interval in minutes. The filtration can affect only the work list in the monitoring panel or both the work list and the map. More...

There is a special app designed to reveal inactive units — Actualizer. The application allows setting any period of inactivity.

Connection State

Shows whether there is a connection with a unit at the moment.

- — unit is connected,
- — unit is not connected.

Unit is considered to be connected if it has TCP or UDP commands available or it has sent messages within last X minutes. A necessary value of minutes you can indicate in the corresponding line of the monitoring panel customizer (from 0 to 999). The default value is 0. It means that connection state is defined automatically regardless to a time of receiving messages.

Sensor State

In this column sensor state can be shown with different colors.

- (or a small square of any other color) — visualizes sensor's value;
- T — text parameters (can be properly adjusted through custom sensor);
- ? — the option is not activated for this unit;
- ⚠ — the value is unknown.

When putting a cursor over the square, in the tooltip you can see the value or description. Colors are adjusted in sensor properties and sensors are chosen on the 'Additional' tab of unit properties.

Drivers

The column with information on drivers. Depending on the option chosen in the monitoring panel customizer for driver's presentation, this column may contain photo, photo and name, or photo and phone number. A tooltip always contains photo, name, and phone number of a driver assigned to a unit.

- — no drivers bound,
- — a driver assigned has no photo,
- — several drivers are bound to the unit.

Trailers

The column with information about trailers. Depending on the option chosen in the monitoring panel customizer for trailer's presentation, this column may contain photo or photo and name. A tooltip always contains photo and name of a trailer bound to a unit.

- — no trailers bound,
- — a bound trailer has no photo,
- — several trailers are bound (see more information in the tooltip).

Quick Track

⊞   The column of buttons to build tracks of unit movements. In panel settings, you should also specify the interval for quick track building: 'Yesterday', 'Week', 'Month' or 'Other' (manual mode).

- ⊟ — show track on the map,
- ⊟ — remove track from the map,
- ⊟ — not enough rights to query tracks for this unit.

When pressing the 'Show Track' button opposite a unit, a track of this unit appears on the map. Many parameters for quick track building are borrowed from the 'Tracks' panel: line width, annotations, markers, trip detector, etc. Moreover, the interval is also taken from there if it is set as 'Other'. Track colors can be set in unit properties ('Advanced' tab) or in the 'Tracks' panel as well.

All 'quick' tracks are displayed in the Tracks panel where you can manipulate them in the same way as usual tracks: show/hide, remove from the map, focus, apply hittest, etc.

Messages

⊟   Buttons to query data messages.

- ⊟ — display messages,
- ⊟ — not enough rights to query messages from this unit.

When pressing the button, you will automatically move to the Messages panel where requested data will be displayed in the tabular form. Time interval ('Today', 'Yesterday', 'Week' or 'Month') for the query is set in the Monitoring panel customizer. In case of 'Other', the interval is taken from the 'Messages' panel. Only messages of data time are loaded in this way. Parameters can be displayed in raw form or as sensors. It depends on what is chosen in the 'Messages' panel itself a the moment.

Quick Report

⊡   Quick report generation.

- ⊟ — execute a report,
- ⊟ — not enough rights to execute reports for this unit or report template is unavailable.

When pressing the active button, a report is generated for the unit. A template for the quick report is selected in the Monitoring panel customizer as well as time interval ('Today', 'Yesterday', 'Week' or 'Month'). Choose a template from the dropdown list. Note, this list contains only templates dedicated to single units. Time interval can be either standard or 'Other', which means it will be taken from the 'Report' panel. The requested report itself is displayed in the 'Reports' panel and navigated/managed from there.

Media

⊡   View the latest media files (pictures or video) received from a unit (useful if such functionality is provided for type of device used).

- ⊡ — the button to view pictures (video),
- ⊡ — no pictures (video) available.

Commands

⊡   Buttons to send commands to units:

- ▶ — there are available commands,
- ▶gprs — there are available commands, including GPRS commands (using TCP or UDP channel),
- ▶gprs — there are available commands, including GPRS commands, however, the current user has not

enough access rights to execute them,

- ▸ — there are no commands available or no rights to execute them.

SMS

[SMS]   Send SMS to unit or driver (the addressee is selected in the dropdown menu if both options are available).

- ✉ — send SMS to unit or driver,
- ● — sending SMS is not possible.

To explore the full functionality of this option, the current user must have rights to send SMS messages, access to unit *Edit connectivity settings*, a driver must be bound to the unit, and both (unit and driver) must have phone numbers in their properties.

Events Registrar

⊞   This column contains buttons to display event registrar dialog. It is used to register fuel fillings, maintenance service and other events to unit history.

- ▌ — open registrar,
- ▌ — not enough rights to register an event for this unit.

Properties

⚒   View unit/group properties dialog (depending on work list display mode). In case of groups, the button can be different regarding [[cms/rights/rights|access rights.

- ⚒ — some properties of the group are editable;
- ⚒ — only view access.

Clear List

✖   Buttons to remove individual units/groups from the work list or clear the whole list at once.

- ✖ — remove all units/groups from the work list (if pressed in the header of the table) or remove a group (if pressed against a group),
- ✖ — remove a particular unit from the work list.

⚠ If an option is selected for the additional menu (that is checked in the second column of the Monitoring panel customizer), you will find it in the column with the icon 🗐 under the button ⊙ . The additional menu that can contain any of the above mentioned buttons and signs.

Other

Other buttons and signs can be found in the 'Monitoring' panel:

☑	The first column in the table is filled by check boxes. Put flags near units you want to be displayed on the map. Put a flag at the top of the table to mark all units at once.
A↕	A switch-button showing that items of the work list are sorted by name in direct order.
A↕	A switch-button showing that items of the work list are sorted by name in reverse order.
≣	A switch-button showing that the work list displays singular units.
≣	A switch-button showing that the work list displays a tree view of units (with grouping). More about the work list settings...
⊤	The button to add units/groups to the list using a filter.
≣All	The button to add all available units/groups to the work list.
⋮	Monitoring panel customizer that helps you to choose columns to be displayed and options for the additional menu.

Work List Management

To perform monitoring upon units, it is necessary to place necessary ones in the work list. Only units presented in the work list can be used for either displaying on the map or implementing various types of control over them: jobs and notifications execution, reports generating, drivers and trailers assigning, messages or tracks viewing, nearest units searching, etc.

The work list supports two modes of units displaying:

- ☰ simple list mode;
- ☰ tree mode.
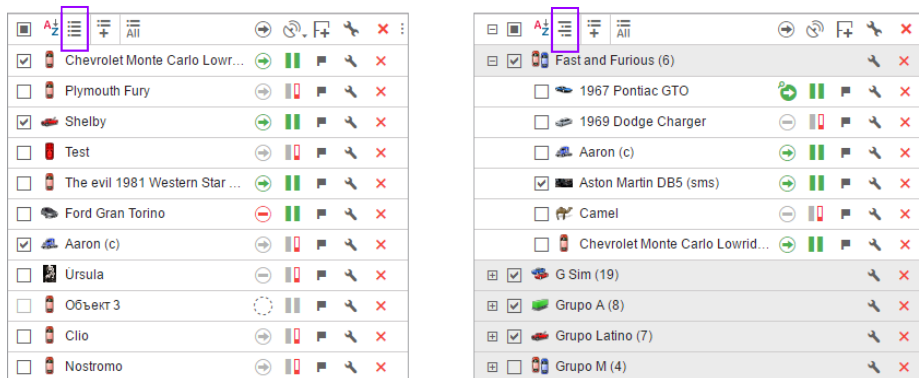
The modes' settings are stored separately, therefore a list of units may be adjusted differently for each mode.

Simple List Mode

Adding units to the work list

To add units to the work list, use the following buttons in the list's header:

- ☰ — add *all* units available;
- ☰ — add particular unit(s). Search tool is used.

Moreover, there are alternative ways of adding units to the work list:

- from the Online Notifications window (adding a unit upon which a notification has triggered);
- dynamic formation of the list according to data accuracy.

Removing units from the work list

Units can be removed from the work list individually or all together:

- ✕ — a button against each unit to remove this particular unit from the list;
- ✕ — a button in the header of the list to clear the work list (to remove all units).

Note that deleting units from the work list doesn't lead to their deleting from the system. They can be added back to the work list using the ways described above. Units can be deleted from the system in 'Units' panel.

Sorting

By default, the work list is sorted by names arranged in direct alphabetic order. The order can be reversed. To do so, use the switch button $A^{\downarrow}_{Z}$ or $A^{\downarrow}_{Z}$ in the header.

Besides, it is possible to sort units by other attributes such as motion state, connection quality, etc. To do so, click the

appropriate button in the header. These are the possible variants of sorting:

- ⊘ — sensor state;
- ▣ — commands;
- ⊕ — motion state;
- ⊚ — last message time;
- ⌨ — online connection state;
- ▦ — media files;
- ▩ — quick track;
- ⊜ — driver information;
- ⊟ — trailer information.

For instance, to sort units by motion state, use the corresponding button ⊕ . Afterwards, a list is rearranged in such a way that all the moving units appear in the top of the list while not moving ones appear in the bottom. To reverse the motion state order of units, click the button one more time.

Available columns are defined in 'Monitoring Panel Customizer'. Icons used in the columns are described in 'Monitoring Options'.

Tree Mode

The work list's tree mode deals with unit groups. In the other words, a list is presented by groups containing units. You can find a number of units a group contains in brackets to the right of its name. To view units of a group or current information on them, expand a group ('+' in front of a group's name). Any unit of a group can be removed from the work list (though it is not removed from a group itself).

To add all groups currently not presented in the work list, click 'Add all available' button ▦ . A newly added group contains a complete set of units. On the other hand, if a group has been in the list upon clicking 'Add all available' button, then its current set of units remains unchanged.

In case of adding units not included in any group, those units are automatically placed in special group called 'Units outside groups' ▨ . Such a group cannot be edited, though it possesses characteristics of an ordinary unit group.

To expand/collapse a unit group (i.e. show/hide its units), use '+'/'-' button in front of a group's name. To display group's units on the map, indicate a corresponding group by the flag. To display a particular unit from a group, expand a group and indicate this unit by the flag.

If a list of units in an expanded group ends with an ellipsis symbol ('…'), then not all units available are displayed in a current list. To view a number of units not included in the current list, point the cursor over the symbol. To add missing units, click the ellipsis symbol.

Unit group's tooltip shows the list of all units inside it.

The following actions can be performed over a unit group from 'Monitoring' panel:

- ▸ — commands sending;
- ⚗ or ⚒ — unit group's properties viewing/editing.

Search Tool

There is a convenient tool to search necessary units and add them to the work list. To summon a unit search dialog, click 'Add to the list' button ⯮ in the work list's header.

Unit search dialog displays all the available groups (in square brackets) and units in the alphabetic order. To add units or unit groups, double click them. If the simple list mode has been activated, then units are added to the work list (single or multiple) even upon double clicking a group.

If the tree mode has been activated, then the work list is added by unit groups in collapsed view. To add a unit group with complete set of units, double click a unit group. To add a unit group with some particular unit, click this unit then. In case of adding units not included in any group, those units are automatically placed in a special group called 'Units

outside groups' 📦.

In order added units to be instantly displayed on the map, activate 'Show added units on map' flag in the unit search dialog.

Search by criteria

Special filters can be applied in order to facilitate search of a necessary element upon working with large amounts of units or unit groups. The dropdown list contains the following search criteria: name, creator, custom fields, profile fields, phone number, unique ID, device type, access from user, geofences, sensor, drivers, trailers, passengers, etc.

Select a search parameter and then type a key word into the next field. For instance, to find all MANs, select search by name, and in the template field type *man*. All units and groups which names contain the combination of characters *man* (both at the beginning and at the end of the name) will be found and displayed immediately. Comma sign (,) can be applied to string together several requests. For example, to find all MANs and all Ivecos, type ***man*,*iveco****.

If you leave the search field empty, all units possessing the selected property (sensors, ID, etc.) will be displayed, for example, all units having a driver assigned to them. Then you can type driver's name or code to narrow a selection.

Most of search parameters (except for geofences, drivers, and trailers) are taken from, and can be viewed and changed in Unit Properties. Upon using a search by sensor, not only sensor's name can be entered in the template field, but also a part of its description, parameter type or parameter name.
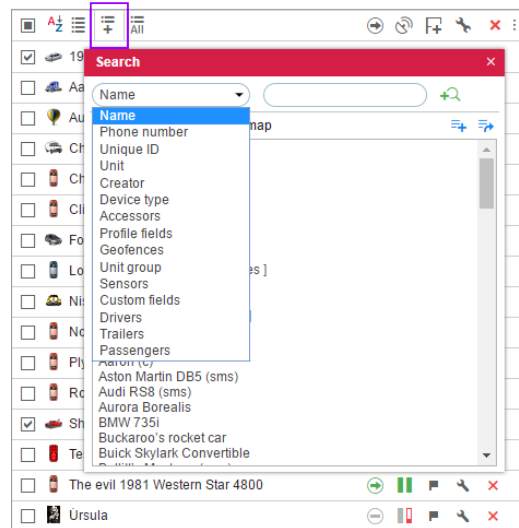
After the first search is complete, another search can be done on the second (third, etc.) level: a search among the first search results. To do so, click **'Add to the search list'** 🔍. The principles of inquiry formation remain the same.

If your search is successful and you want to include the results in the work list, you can do it by double clicking (described above) or using the following buttons:

- ⊞ — add search result to the work list;
- ⊞ — replace a current work list with search results.

Dynamic Work List

The work list in 'Monitoring' panel can be formed dynamically according to the time the last message from a unit received. Units are removed and added to the list and map automatically. The work list updated each 10 seconds.

The function can be enabled in the Monitoring panel customizer. Change *'Without filtration'* option to *'Monitoring panel'* or *'Panel + Map'* and specify filtration interval in minutes. Such a filtration can affect either the work list in the monitoring panel or both the work list and the map.

⚠ *Attention!*
With this mode enabled, some other functionality becomes unavailable or operates differently:

1. Manipulations with the work list (such as searching, adding, and removing units) are impossible.
2. The filtration by last message's time does not affect the work list if the treelike view is selected.

Commands

Command is a request that can be sent to a unit. In response, the unit can send its coordinates, take a picture, activate an output, block engine, etc. Available commands depend on ⚪type of device used and its configuration.

A command should be configured in Unit Properties beforehand. Only then users will be able to execute it. Besides, users are required to possess access rights specified for each command of a unit individually as well as the flag 'Execute commands'.

Standard Commands

17 standard commands are reserved in Wialon:

Icon	Command	Name in the system	Parameters
⊕	Query position (get unit current location)	query_pos	—
🔒	Block engine	block_engine	—
🔓	Unblock engine	unblock_engine	—
I	Activate output	output_on	output number
o	Deactivate output	output_off	output number
⬇	Download messages	download_msgs	time interval (from – to)
⏳	Set data transfer interval (how often unit sends data to the server)	set_report_interval	interval in seconds
💬	Send custom message (to send a non-standard command to a unit)	custom_msg	command text
📧	Send message to driver	driver_msg	message text
📍	Send position	send_position	coordinates
☑	Send route	send_route	checkpoints
⊡	Send waypoints	send_waypoints	checkpoints
⚙	Query configuration	request_configuration	—
👁	Start/Stop WiaTag	wiatag_service	—
⚙	Upload configuration	upload_cfg	path to configuration file
⬆	Upload firmware	upload_sw	path to firmware file
🖼	Query snapshot	query_photo	—
📷	Query snapshot from camera	query_photo_cam	camera's number
▦	Query DDD file (for tachographs)	query_ddd	—

⚠ To download a requested configuration after querying it, generate messages for a corresponding period, and download a necessary file using '⚪Disketta' application.

⚠ If your device supports a command that is not mentioned on the list above, this command can be sent anyway. To do this, use the standard command 'Send custom message'. In this case, you should know exact name for the command (how it is written in device configuration).

Command can hold predefined parameters of its execution. This is adjusted for each unit individually in its properties.

Sending and Tracking Commands

There are several ways to send a command to a unit:

- Manually from the 'Monitoring' panel, including commands sent to a group of units.
- As a job fulfilled according to schedule.
- As an action for a triggered notification (command is sent when specified conditions are met).
- From a mobile device by means of simple SMS text message.
- From the Wialon Mobile Client.

⚠ Such commands as 'Upload configuration' and 'Upload firmware' have their own peculiarities. If these commands have been saved for units without choosing a file, then sending the commands as a job/notification or sending them to a group of units is impossible.

⚠ Such commands as 'Send route' and 'Send waypoints' also have some peculiarities. Upon sending them, you should manually indicate route parameters. Therefore, these commands cannot be sent via job or notification.

Information about commands sent to a unit is available:

- In the Messages panel (all commands sent to unit).
- In Executed commands report (only successfully executed commands).
- Immediately after sending a command — in the log.

Executing Commands from the Monitoring Panel

In the Monitoring panel, there can be a button to send commands. If not, it can be activated through the Monitoring panel customizer. The button can obtain different looks:

▶ there are available commands for the selected unit;

▶gprs there are GPRS commands among available;

▶ or ▶gprs there are no commands supported by the selected unit or the current user has not enough access to the unit.

Put the cursor over the active button against the needed unit to see the list of available commands. The list can contain only commands configured in Unit Properties => Commands. Furthermore, only commands available at the moment are shown (link type availability is important here).
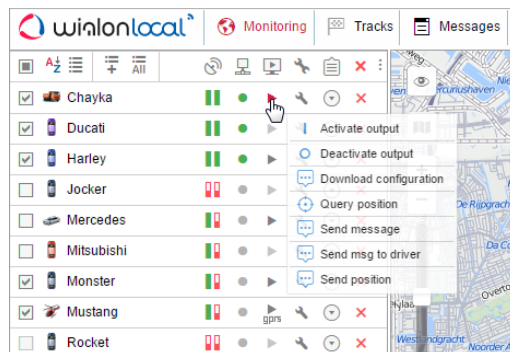
1. Push the command button ▶ or ▶gprs .
2. Select a command from the list of commands available at the moment.
3. Set additional parameters if needed, for example, input/output index, report interval, path to load configuration or firmware file, checkpoints of the route, etc. (depending on command type).
4. Press *OK*. The command will be executed immediately, and its result will be reported in the log. To show or hide the log window click on the double-arrow in the right bottom corner of the window.
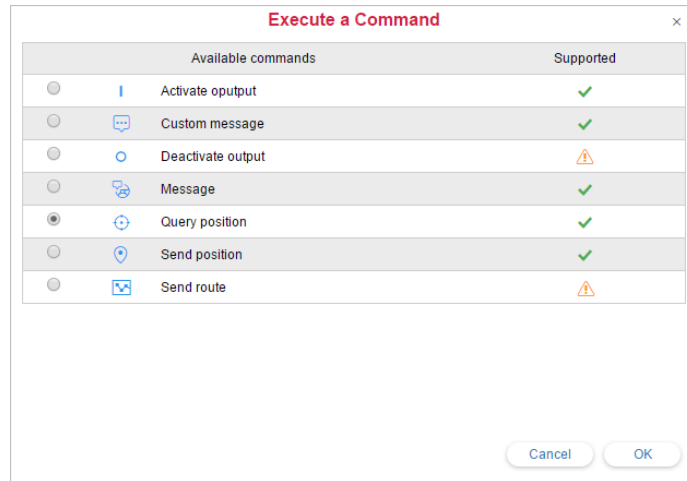
🔔 *Note.*

If a command you are trying to send has the same name but belongs to different types and parameters are not adjusted, then it will be sent without parameters and thus may not be executed properly.

Chat with Driver

Operator (dispatcher) can exchange messages with drivers. To do this, select the command **Send message to driver** and type a text.

In case the driver answers, driver's message will popup in a special window. New message can be accompanied with sound (see User Settings). If you have unread messages, the number of them is shown in red circle next to the chat icon in the bottom panel. If there are any messages in the window (either read or unread), the icon itself is active which means it is colourful and can be pressed on.
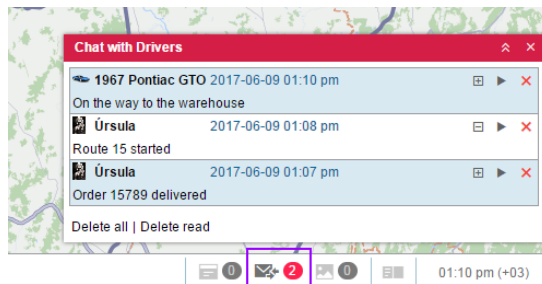
Newly received messages are added to the top of the list. Unread notifications has a sky-blue background by default. To expand/hide the full text of a message, use the switch button **+/-** or click on the header of the notification in a place with no text.

When clicking on a message, the map is focused on the place where this message was received. When clicking on a unit name, the map is focused on unit's last location.

To delete a message, click on the cross at its right. You can also delete read messages or all messages at all if you use the appropriate buttons at the bottom of the messages window. The window is closed automatically if you delete all messages. If the online notifications' window is closed by clicking on the grey cross in the upper right corner, then the window ceases to appear automatically upon receiving of notifications until the window is opened by clicking the corresponding button in the bottom panel.

The window itself can be moved over the screen and resized.

The operator can quickly send a reply to the driver (a command of the appropriate type *Send messages to driver* should be configured in unit properties in advance). When clicking on the green triangle-shaped button, command executing dialog appears and the operator can type the messages and send it.

Besides, you can generate a report called 'Chat', which will contain all chat history including operator's messages and driver's answers.

Correspondence with driver can be fulfilled with the help of a specially developed app — 🔵Chatterbox. This application

allows sending not only commands but also SMS messages.

Sending Route/Sending Waypoints

Sending a route, it is necessary to indicate its name in the corresponding field of the dialog.

To send route/waypoints it is necessary to indicate its checkpoints in the command dialog. Checkpoints can be found in various sources: addresses, geofences, routes. You can apply search filter (buttons at the top of the dialog) which helps you to expand/narrow the number of sources to be used. Enabled button means that the corresponding source is applied as a filter, disabled means the opposite.

To indicate a checkpoint start typing a text into the corresponding field, and in the dropdown list, depending on the filter used, you can find the possible variants along with their source information.

Moreover, you can add a checkpoint directly from the map. To do so, click on the map summoning button situated to the right of the field. Move on the map to the target position, and double click on it. As a result a checkpoint will be indicated automatically.

If a checkpoint is added from a route, then all the points of the route will be added. However, if the route contains moving units as checkpoints, then they will be omitted.

Coordinates of the first checkpoint are used when you add them from line or polygon type geofences.

After the necessary checkpoint is entered, a green check mark appears to the right of it. This check mark is a point validity indicator which shows that a checkpoint possesses coordinates. Checkpoint's name cannot be edited, it is filled in automatically. If you try to edit a name, the earlier search results will be reset (point validity indicator disappears) and you should begin the search once again. Every indicated checkpoint has a 'Notice' field under it. This field is not an obligatory one.

Indicated checkpoints can be saved as a route, and afterwards you can use it in the Routes panel of the tracking system. To do so, check the box in the bottom of the dialog. You can also give a name to the route during flag activation (for sending waypoints only). Click OK to complete the procedure. Route saving takes place along with sending a command.

Events Registrar

Different events can be registered in unit history and then shown in the corresponding reports. Some events such as speeding, idling, visits to geofences, sensor values, etc. can be detected automatically by the system with the help of notifications. Other events such as fuel filling, maintenance or any custom events are registered in unit history manually with the help of a special tool — **Events Registrar**.

To display the registrar, press the button on the monitoring panel ⚑ . If you do not see such a button, it can be added through the monitoring panel customizer.

⚠ *Attention!*
To register events for a unit, the access right 'Manage events' is needed. In the other case, the registrar button is dimmed.

Push the registrar button and choose a type of event to be registered:

- make a record in unit log,
- register custom event,
- register unit status,
- register filling,
- register maintenance work.
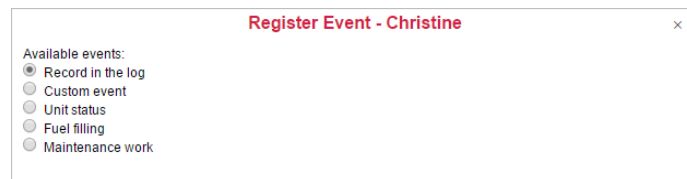
⚠ *Note.*
Units of measurement which you may encounter in the registrar dialog depend on a measurement system set in unit properties.

Record in the Log

Using this option, you can add any text note to unit log. It will be labeled as 'Manual record' and dated time you have created it. Such records can be viewed in messages (choose *Log* as messages type) and in a report generated for this unit (query the *Log* table).

⚠ To add messages to a unit log, you should have not only 'Manage events' access, but also 'Manage log' access.

Custom Event

Select **Custom event** in the registrar and click 'Next'. Give the event a name, enter description and choose the place.

There is a possibility to save events descriptions to speed up the process. To do this, enter your description and click 'Store'. The description will appear below in **Stored descriptions**. To select a previously saved description for a new event, just click on one of them. To delete a saved description, select it and click 'Delete'.

If you check **Violation**, the event will be registered in unit history as violation, otherwise it is registered as simple event. It means this event will appear in different kinds of reports: Events or Violations.

Unit Status

Using this functionality, you can register the beginning of a state, which can be afterwards displayed in some reports. For instance, the status can be like *business/private* is a vehicle is used both for personal and business needs.

The process of registration is the same as for custom event. You choose date and time and enter any text. The text can be saved and used in other registrations. The date and time chosen means the beginning of the status. The state comes to end when a new state is registered.

Statuses can be set automatically (for example, when the unit enters a geofence) — see Notifications. Columns with the corresponding contents are available in several reports which are Trips, Engine hours, Rides, and Parkings.

Fuel Filling

In the Monitoring panel, you can register fuel fillings for units manually. Manual registration helps to estimate the difference between registered and detected fuel, compare consumed fuel with consumption rates, calculate running costs, etc.

In the registrar, select **Register filling** and click 'Next'.

Enter the volume of filled fuel and its cost. Fractional numbers (up to hundredth) can be also used for fuel volume and cost. To enter fractional numbers, use *point* as delimiter. For example, to register fuel filling for 77 dollars and 88 cents you enter '77.88'.

Entered values will be automatically added into the Description field below. If necessary, you can edit the text manually. Then enter date and time when the filling happened and possible deviation from this time in minutes.

Besides, it is possible to indicate the place where the filling happened. To do this, clic the 'Select Location' button. The focus will switch to the map, and you can indicate the place by double-click. The address of the place will be detected by Web-GIS and written in the Location field. Press the 'Reset Location' button to clean this address and indicate another one. Besides, you can manually edit this field (for example, you can add gas station name). When the focus is on the map, the dialog moves to the top left-hand corner, and the Restore Dialog button appears. If you press it, the dialog becomes active again even if you do not indicate any place on the map.

Registered fuel fillings participate in the following reports: 'Fuel fillings', 'Events', 'Utilization cost'.

Maintenance Work

In the registrar choose 'Register maintenance work' and press 'Next'.

Enter the following data:

- kind of work (type from the keyboard or select from available service intervals on the right),
- custom description,
- cost,
- service duration in minutes, hours or days (choose the type of the interval in from the drop-down list),
- location (press the 'Select Location' button and double click on the map or edit this field manually),
- date and time when the work was done (be default, the current date and time are offered),
- values of mileage and engine hours counters at the moment of the event (the current values are displayed but you can edit them).

In the right part of the dialog, you see the list of service intervals contained in Unit Properties => Service Intervals. Check the services that were done that time. This this action the interval selected will be zeroed and will start the count again. Note that if you select anything here, the contents of 'Kind of work' field changes.

⚠ *Attention!*
Registered events are not editable, however, they can be deleted from the database in the 'Messages' panel (special access is required).

Registered Events in Reports

Registered fillings and maintenance can appear in the report on events together with other things. Registered custom event depending on your choice can get into report on events or report on violations. Both reports have the similar structure.

When transporting registration data to a report on events (violations), the information is distributed among columns which contents are taken from certain fields of registration dialog. The table below gives the correspondence between the column in report and the field in registrar.

Column Header	Column Content
Event time	Date and time when event happened.
Time received	Date and time when event was registered.
Event text	Text is taken from the **'Description'** field. For maintenance, if there is no description, the text can be taken from the field 'Kind of work'.
Location	Unit location at the moment of event. It is taken from the coordinates indicated while registering the event (press the Select Location button and double-click on the map).

If any of above-mentioned fields are not filled correctly, then the corresponding columns will be empty.

Other reports that use registered events are report on maintenance and utilization costs.

Media Files from Messages

If the equipment supports such an option, units can send pictures or video files along with the messages. Pictures and videos can be viewed in the 'Messages' panel as well as in the 'Monitoring' panel. To display a special column in the 'Monitoring' panel, activate the option *'Media'* in the Monitoring panel customizer.
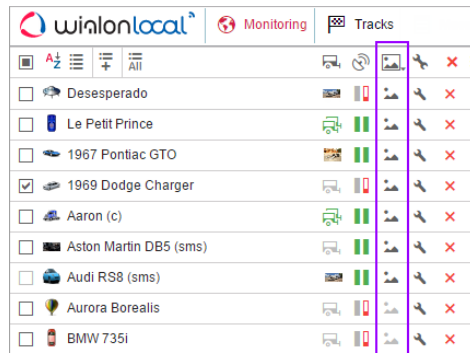
Press the button in order picture and video viewer to be displayed. The viewer window contains the latest picture (video), as well as the total number of available pictures (videos) received in the current session.

The above-mentioned way is for viewing pictures (videos) of a particular unit. To view pictures (videos) of *all* units, press the *'Media'* button at the bottom of the screen. It is active (that is colorful and able to be pressed) if there are pictures (video) available in the current session. Their number is displayed at the right of the button. If new pictures (videos) have appeared after last opening of the window, the number is displayed in red circle to attract your attention. ⚠ In this window, only images (videos) received during current session are displayed.
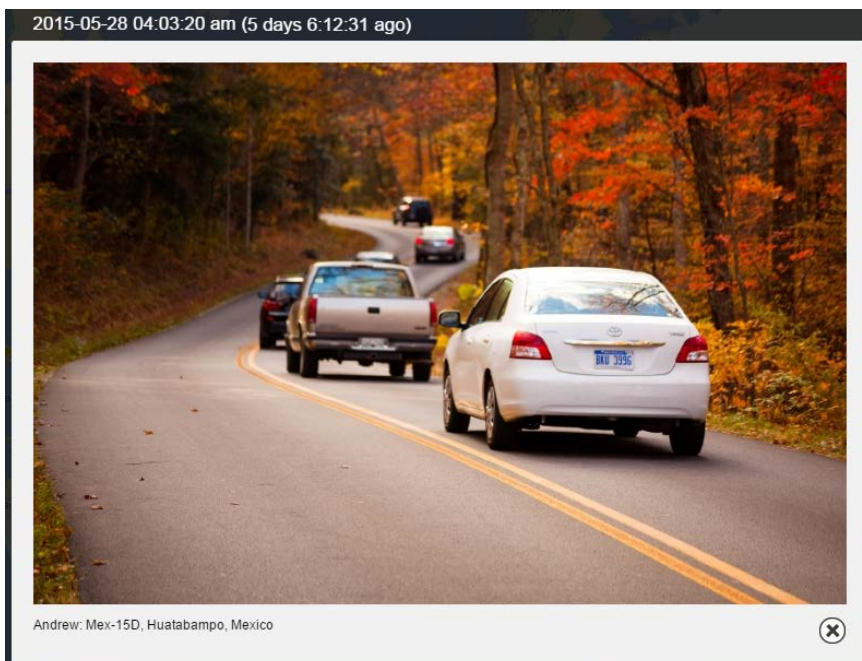
To move between images (video files), use arrows. Between them, you can see the number of the pictures (videos) viewed and the number of available images (videos). Media files are sorted according to the time they come to the server.

Date and time of picture (video) coming is displayed above each one of them. Below the media file you can see a unit name and address information from the message.

Some media files can be enlarged with a special button in the right top corner. To close a media file viewer, use the

button in the right bottom corner.

All images received from units can be observed in reports and messages. Moreover, in messages you can also view video files.

⚠ You can get a picture from a unit at any time using the *'Query snapshot'* command.

Locator

Locator is used to generate links and share current units' location. Conditionally locator can be divided into two parts — links creation, and their viewing. Links are created in the locator's dialog window. To open the dialog, choose the corresponding item in the user menu. Viewing is performed on locator's map which becomes available upon clicking on the provided link.

Viewing on the Map

Open a link to view locator's map where units to be displayed along with geofences (if they've been indicated in a link creation settings). Gurtam Maps, OpenStreetMap, and, if available, Google Maps are used to show units' location. To choose a map layer, point a cursor on the corresponding icon below the scaling buttons (left top corner). This icon also helps to enable/disable displaying of geofences on the map.
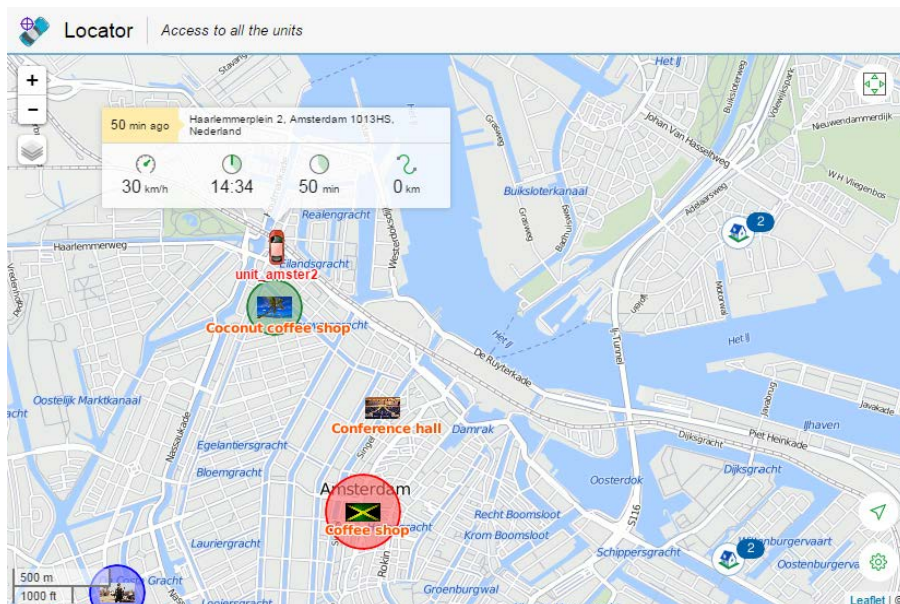
Units

A unit is presented on the map by its icon. Unit name and movement direction arrows are shown as well (by default). You can also activate unit traces, or so called 'tails' (switched off by default). Click a gear shaped button in the right bottom corner to enable/disable the above mentioned settings.

If among the number of units presented on the map you need to monitor a particular one, you can use the monitoring tool. Click on the corresponding button (quadrate with green arrows) in the right top corner and choose the necessary unit from the dropdown list. Afterwards the map will be scaled and centered on the chosen unit. To disable scaling and centering it is necessary to quit the monitoring option (choose dash from the dropdown list). Note that you cannot monitor all the available units at once. Therefore, if the 'All units' item is chosen in the dropdown list, then a search instead of monitoring will be used, and all the available units will get into vision field.

After the unit has been found, you can view its latest data. The data is shown in the window opened by clicking on a unit. The amount of provided information depends on a unit state (moving/stationary). If a unit is moving (movement arrow is an indicator), then the following parameters are shown for it: speed, time of movement beginning, its duration, and covered distance. For a unit which is not moving such parameters as speed and covered distance does not make sense, therefore only two parameters will be shown for it: time of beginning the stationary state, and its duration. Besides, regardless to the unit state the header of the opened window contains such information as time passed from the last message, and address from the last message. Note that upon receiving new messages

either position of a unit on the map or its current parameters will be automatically refreshed.

If it is necessary to know the history of unit's movement, you can generate and view its track (for the last 24 hours). To do so, click on the corresponding button in the right top corner (green points and flag), and choose the necessary unit from the dropdown list. Afterwards, a track is built, and the map scaled in order the whole track to be displayed. To remove a track from the map, click on the track building button once again. Note that in locator track color is constant (blue), and it does not depend on any unit settings.

⚠ *Note.*
A track of movements can be viewed only if a user indicates such a possibility during link creation.

Current Location

Locator provides a possibility of defining your current location on the map. It could be particularly helpful if you use a locator from a mobile device.

To define your current location press the corresponding button (green arrow) in the bottom right corner. Afterwards, the map will be scaled and centered on your location.

If a particular unit has been chosen using the monitoring tool, and afterwards you press the defining location button, then both the unit and your current location get into vision field. However, as it was stated before, upon receiving new messages from the unit chosen in the monitoring tool, the map continues scaling and centering on it until the monitoring is disabled (choose dash from the dropdown list).

Scaling

Upon locator's opening, the map is automatically scaled in such a way that all the units to get into vision field. To move around the map, drag it using the mouse.

The map can be scaled using either the corresponding buttons in the upper right corner (+/-) or mouse scroll. A graduated scale situated in the left bottom corner helps you to understand distances on the map.

Depending on the scale used and number of items available, some icons can be overlaid by each other. In this case the assembly of icons is substituted by the group icon (a number of elements is shown for every group):

— for units;

— for geofences.
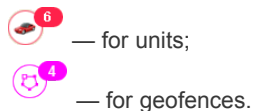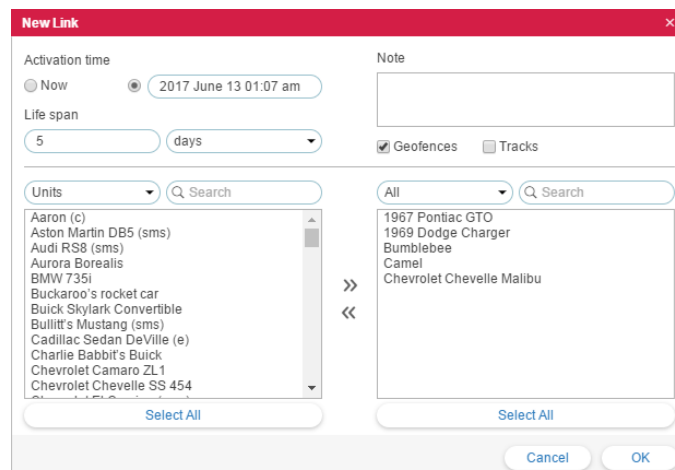
Click the group item in order the list of all items to be shown (icon + name).

Links Creation

The links are generated and edited in locator's dialog situated in the user menu.

To create a new link, click the button 'New link for sharing units' and fill in the fields of the form.

Indicate the link's activation time in the left upper corner of the dialog. It can be 'Now' or any other moment in the *future* (indicate date and time in the calendar). Note that a link's activation term cannot exceed 100 days.

Furthermore, enter the link's life span into the corresponding field. The value can be indicated in minutes, hours, or days (choose from the dropdown list). Note that a link's life span can be from 0 to 1000 or unlimited (indicate 0 in the field to apply this option).

You can enter a note for ypur link in the right upper corner of the window. This allows to identify the necessary link in the general list. Besides, the note (if entered) will be shown in the header of the locator's page itself.

You can also check the 'Geofences' checkbox here in order to share them in the link. Moreover, you can provide the possibility of generating and viewing a track of a unit by activating the 'Tracks' flag. ⓘ The user that provides the possibility of viewing a track of a unit must possess the 'Query reports or messages' right towards the unit.

Continue with choosing the units the location of which you want to share in the lower part of the dialog. The selection is done in list on the left. Transfer the necessary units to the list on the right (by double clicks or using the button 'Add').

For the convenience of choosing units or unit groups, the contents of the list can be changed using the filter above it. The following variants are available: 'All', 'Units', 'Unit groups', 'Units outside groups'. To find a necessary unit quickly, you can also use the dynamic filter.

To generate a link, click OK. To dismiss the changes, press Cancel.

List of Links

Generated links are placed in the corresponding list containing such information as sequence number, the link itself (displayed by the link beginning and termination time), notes, link's life span, units' number icon, and also the indicators of geofences' and tracks' activation. If you point with the cursor the units' number, its list will be shown in a tooltip. If there is less than one hour left before a link to be terminated, the corresponding line is highlighted in red.

Click on the link to open it in a new tab. To copy URL-address of a link, click on the button to the right of it. The link can also be edited (spanner shaped button), or deleted (cross shaped button).

ⓘ *Attention!*

- Upon exceeding of the life span the link is automatically deleted.
- Upon changing the user's password all the locator's links are automatically deleted.

Locator Integration

Use the following form of code to integrate locator into your web-site:

```
<iframe src="link_address&lang=en" width="700" height="400"></iframe>
```

Necessary actions:

- In the link list click on the icon to the right of the link and copy it.
- Paste the copied link instead of 'link address'.

Such parameters as 'width' and 'height' stand for the corresponding properties of the integrated window. 'Lang' parameter stands for the language used.

Manipulations with Link

As has been described earlier, there are 3 settings for a unit displaying (movement direction, name, 'tails'). Changing these settings the corresponding information is added to the locator's URL:

'Tail' (on/off)

```
&tails=1/0
```

Name (on/off)

```
&labels=1/0
```

Arrow (on/off)

```
&directs=1/0
```

Therefore, to save the applied settings and use them afterwards, it is necessary to utilize not the basic link (created in locator's dialog), but the modified one (received by changing settings of unit presentation on the map).

Moreover, there is a possibility to choose a map source in advance. Information on the map source is added to the locator's URL. The procedure is the same for any map available, let's see it on the example of OpenStreetMap:

```
&map=OpenStreetMap
```

Tracks

Track is a line drawn on the map to show how a unit moved during the indicated period. A track is mapped by the points from where messages came. Each point stores also date and time when the message was received and coordinates at the point as well as other parameters (speed, sensors etc.). Besides, markers indicating places of fuel fillings, parkings and other events can be drawn on the track.

Any number of tracks can be drawn on the map. They can represent different units and various time intervals. To prevent tracks from being confused with each other, you can set different colors for them. Besides, different segments of the track can be of different colors depending on speed or sensor values.

To open the 'Tracks' panel, choose a corresponding name in the top panel or click on the necessary item in the main menu customizer.
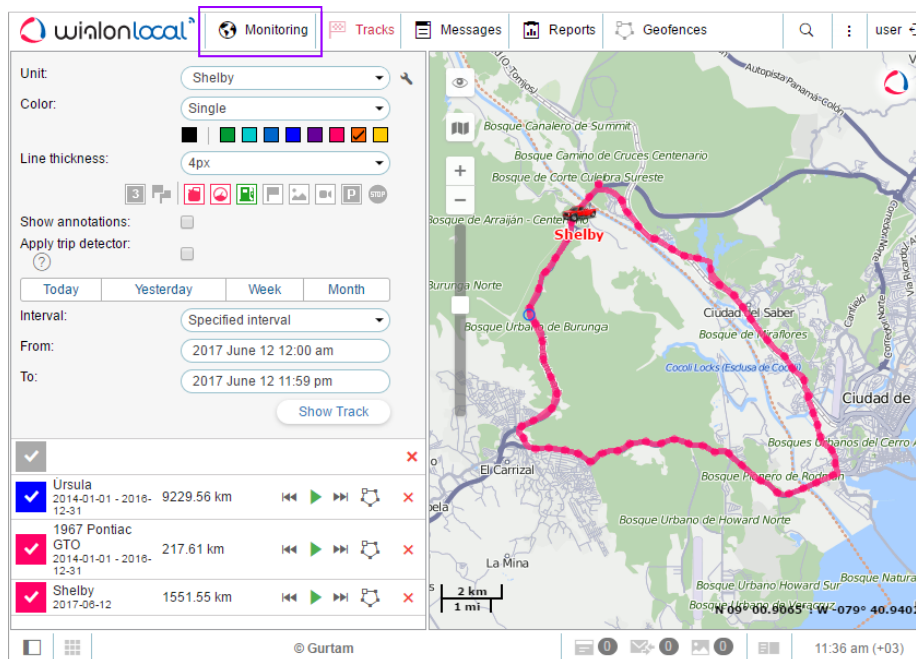
⊙ To build a track, it is necessary to possess the 'Query reports or messages' right towards a corresponding unit.

Mapping a Track

To build a track in the 'Tracks' panel, do the following:

1. Select a **unit** in the dropdown list. Its contents depend on the work list in the 'Monitoring' panel and access to those units. In case the work list is empty (when dynamic work list is used or when units have been deleted from the work list manually), the units to which you possess the corresponding rights will be displayed.
2. Adjust the desired **parameters** for the track (color, thickness, etc.).
3. Define a **time interval** within which you want to get the data.
4. After filling in all the fields, press **'Show Track'**.

⚠ Note that in order *tracks* to be displayed on the map you should check if the corresponding layer is active.

The principle of interval adjustment is the same as in reports (see Query and View Reports). The third and fourth steps can be united into one if you choose one of the 'quick intervals' (the buttons *Today*, *Yesterday*, *Week*, and *Month*).

A point-to-point track built according to preset parameters will appear on the map (if unit has any messages with coordinates for the period). If it takes too long for the track to appear on the map, it may mean you have indicated an interval that is too long or your Internet speed is too low.

If within the indicated period the unit was not moving, there will be no track on the map, however, it will be in the list of tracks below, and the distance traveled will be 0 km.

Alternative methods to build a track on the map are:

- In the 'Monitoring' panel with the help of quick track buttons.
- In the 'Messages' panel, when viewing data messages.
- In the 'Reports' panel, if the appropriate option is selected in report template.

When mapping a track you can get a dashed line that means that some track coordinates are doubtful. It may occur if there were no coordinates at all or they were invalid. This situation may be caused by connection loss or poor satellite visibility. Connection loss is detected according to the parameters set in unit properties on the Advanced tab (see the options 'Maximum interval between messages' and 'Minimum satellites').

A track or its part can be displayed on the map as a dashed line. Such situation indicates that this part of the track might be imprecise. The cause of this can be one of the following:

1. Maximum interval between messages is exceeded (see the 'Advanced' tab);
2. Not enough satellites (less than 4, and only when the messages validity filtration is *disabled*).

Track Parameters

After you have built a track, it is impossible to change its parameters (time, unit, color, annotations). In case of error, delete incorrect track and create a new one.

Track Color

A track color depends on unit settings (see Unit Properties => Advanced). There are three alternative color settings available: 'By Speed', 'By sensor' and 'Single'. Initially, one on these settings is chosen for a unit. If the setting is not specified, then track color is single. Track color for a single track is chosen before every track building. If a color is not specified in the color range, then a new color for every new track is chosen automatically from the color range going circle-wise. Also, if a unit has 'Single' color setting and you have chosen the other color from the color range manually, then a new color will be automatically chosen from the color range going circle-wise for every next track.

Track Line Thickness

Indicate **track width** in pixels (from 1 to 15). Track can be represented as a number of not connected points (from where messages were received) — for this choose the option *Points only*.
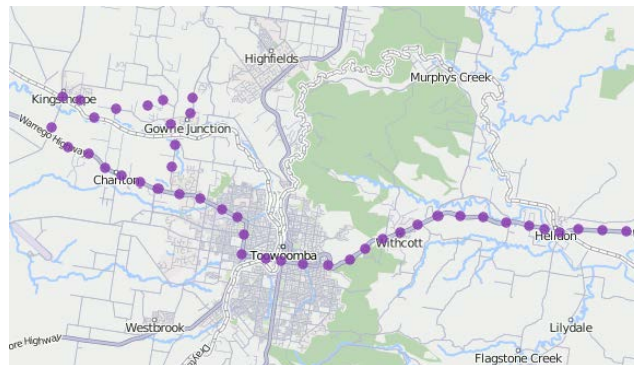
Markers

⚠ Markers in tracks are unavailable if a user has no access to reports.

You can enable markers to highlight places of significant happenings on the track. The choice of possible markers is the same as in reports:

- 🔳 fuel thefts,
- 🔲 speeding,
- 🔳 fuel fillings,
- 🔲 events (if a violation took place, the marker would be red),
- 🖼 pictures from messages,
- 📹 video from messages,
- 🅿 parking places,
- 🛑 short stops,
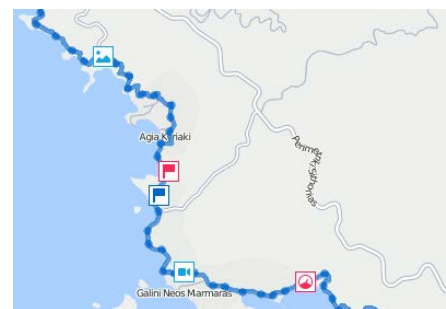
Choose desired markers before building a track. To activate a marker, just click on its icon so that it became colorful. If at least one kind of marker is selected, additional marker options can be applied:

- 🔳 numbering,
- ⚑ grouping.

Markers in tracks are drawn and used along the same principles as markers in reports.

Annotations

Indicate whether you want **annotations** to be displayed. Annotations are hints which are attached to each point of the track to show when (date and time) the message was received. On big zooms, information about speed becomes also available. Annotations are rather informative but they make visual reception of track more complicated. That is why it is reasonable sometimes to switch them off. Full information about any point of the track can be obtained from the tooltip that appears when you hover the cursor over a point. ⚠ Measurement system in annotations depends on current user's settings.
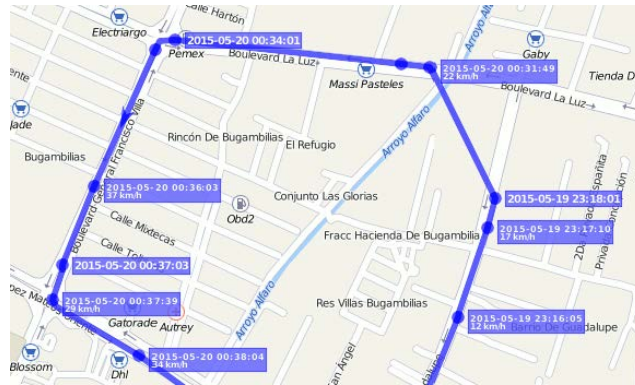
Trip Detector

Trip detector flag affects distance value and track visualization. For example, in places of stops and parkings there will be just one point instead of conglomeration of points, and the mileage will include just intervals detected as trips. Trip detector is set up in Unit Properties => Trip Detector.

⚠ Mileage in tracks can sometimes differ from mileage in reports (if there are invalid messages within the interval). In such cases, more accurate mileage is provided in reports.

Tracks Management

You can add tracks on any unit for any time interval. The list of tracks created will be displayed in the work area at the left. To prevent tracks merging, select different colors for them.

Hover the cursor over track to get accurate information about track point (points where messages were received). Messages are searched in the radius of 50 pixels to the cursor. Points found are highlighted by a pulsating circle, and a tooltip appears with the following information: time, address, speed, altitude, coordinates, satellites, and sensor values. Messages with zero speed are marked with bigger points. Measurements used in the tooltip are borrowed from unit's properties (speed in kilometers or miles per hour, altitude in meters or feet) as well as mileage in the list of tracks.
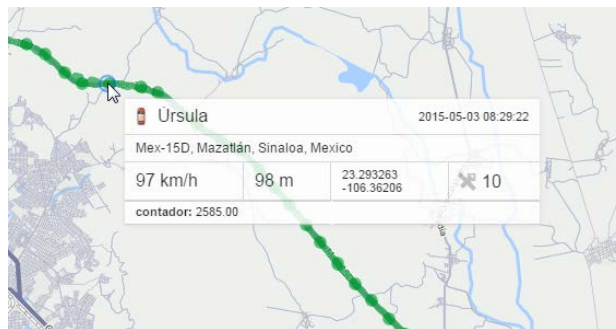
You can manage tracks in the left part of the window under the 'Show Track' button. Unit name is displayed on the list as well as time interval and traveled mileage. Mileage in tracks can sometimes differ from mileage in reports (if there are invalid messages within the interval). In such cases, more accurate mileage is provided in reports.

It is possible to view all created tracks on the map simultaneously or select just some of them. The tracks marked with flags are displayed. Unmark a track to hide it. Using the checkbox in the header, you can select/unselect all tracks at once. You can temporarily hide all tracks by disabling the corresponding layer in the top panel.

If there are several tracks available, you can sort them by length or name. To do so, click in the header of the list above mileage or name columns. Click again to reverse the sort order.

Use the arrows ⏮ ⏭ to quickly locate the initial/final point of the track. To see the whole track and focus the map on it, just click on its name in the list.

A track can be played. That means unit's icon will move along the track line with selected speed. Pressing the 'Play' button ▶ against a track will open a special tool — Track Player — and playback will launch.

Moreover, a built track can be saved as a line geofence. To do so, click the corresponding button ⬡ . Note that if the number of points of a track is more than 10000, it will be saved in several geofences with the same name and a digital index in brackets. For example, 'Geofence (1)', 'Geofence (2)', etc.

To delete a track, click on an appropriate button against it ✕ . Using a similar button at the header of the list, you can delete all tracks at once.

Furthermore, another special tool can be applied to a track — Hittest. It allows you to get the exhaustive information for any point of the track.

Messages

The 'Messages' panel gives access to units database. Here you can view messages received from units (coordinates, parameters, speed, etc.) as well as SMS messages received from units, commands sent to units and events registered in units history. Besides, data messages can be exported to a number of formats.

To open the 'Messages' panel, choose a corresponding name in the top panel or click on the necessary item in the main menu customizer. The workspace of the panel can be divided into four sections:

- in the left top corner you can set parameters of your request;
- in the bottom left part there is statistics for current request or a panel to export/import messages;
- in the top right section there is the map;
- at the right bottom there are messages themselves.

Vertical sizes of the messages panel and the map are adjustable. To control them, click on the splitter between them and holding the mouse button, drag in a required direction.

There is a specially developed app to work with messages — Messages Manager.

Working with Messages

Working with messages is query messages, view and filter them, and delete them.

Request Messages from Server

The request is formulated in the 'Messages', in top left corner of the window. You specify the following parameters:

1. Select a unit for execution. The dropdown list contains not all the units available to you, but only the units from the work list of monitoring panel. In case the work list is empty (when dynamic work list is used or when units have been deleted from the work list manually), the units to which you possess the corresponding rights will be displayed. Spanner shaped button situated to the right of the dropdown list serves to summon up a Unit Properties dialog.

2. Specify time interval to show messages for. The principle of interval adjustment is the same as in reports (see Query and View Reports). The second and fourth steps can be united into one if you choose one of the 'quick intervals' (the buttons *Today*, *Yesterday*, *Week*, and *Month*).

3. Select message type from the dropdown list (each type is described in detail below):

   - **Data messages**
   - **SMS messages**
   - **Sent commands**
   - **Registered events**
   - **Log**

4. At the end, press the **'Execute'** button. A table will be generated in the right part of the window. To clear table (and map), press **'Clear'**.

⚠ *Note.*
There are alternative ways to query messages:

- from the 'Monitoring' panel;
- from a table or chart of an online report.

⚠ Note that in order *messages track* to be displayed on the map, you should check if the corresponding layer is active.

Viewing Messages

Messages of any type are displayed in the form of a table.

If a large time interval is selected, there will be probably many messages. In this case they will be presented in several pages. Use navigation panel (blue arrows) to move through the pages, or enter page number manually and press <enter> to display certain page. Apart from that, you can set the number of messages to be displayed on one page: 25, 50, 100, 500, 1000.

The width of the columns is also customizable. To change it, drag column edge with the mouse in the required direction. To reset columns width, push **Set column auto width** button in such a way that *A* letter appeared there ⚘. In this case, column width will be set according to contents in the cells. To save columns width when moving to other page of messages, make the button inactive ⚘. Note that if loading many messages (500, 1000 per page), it is better to disable column auto width because it can considerably slow down the loading process especially if the number of parameters differs from one message to another.

Table's content is adjustable. It is possible to hide and show back any column. To choose columns to be displayed, place the cursor over table's header. Near each column name there is a button to show the dropdown list where you can choose what to display. Note that all columns cannot be hidden simultaneously. If sensors are displayed, each of them has its own column that can be enabled or disabled. By default, only visible sensors are displayed (the rest can be enabled manually).

Messages Filter

To quickly find a necessary message, use a special filter. Data messages (with parameters shown as raw data) can be filtered by parameter names and parameter values, SMS messages and registered events — by message/event text, sent commands — by additional parameters' values, log — by description of the action. The filter is disabled for data messages with parameters shown as sensor values.

Details instructions for filter usage were given above. You can use wildcard characters (* or ?) or input your query without them. For example, to find all messages with images input 'image'. Other available parameters depend on device type used.

To apply the filter, press <enter> or the Apply button on the right of the filer. At that, messages corresponding to your query will be displayed. To remove filtration and show all available messages again, clear filter text field and apply the filter again. If the filter is applies, the number of found (filtered) messages is displayed on the left.

⚠ *Attention!*
The filter affects only the current page. However, while leafing through pages, the filter is applied to each new page automatically.

Deleting Messages

Deleting a message can be applied when you think the message is invalid and can badly affect reports, tracks, etc. Deleting messages is available only if you have enough access to the unit.

In the last column of the table, tick messages to be deleted (one or more). Then click the 'Delete' button ✕ and confirm your intentions. If the checkbox at the head of the table is ticked, all messages on the current page will be selected.

After the operation, the newly deleted messages still remain on the table, however, the delete checkbox for such messages is dimmed which indicates that the messages are deleted. Next time when you load messages, the deleted messages will be completely removed from the table.

⚠ *Note.*
Deleting last incoming message or last message with position (valid coordinates) is impossible. That is why the delete

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checkbox for these messages is always dimmed.

Data Messages

If you request data messages, the table of messages will contain information about time, speed, coordinates, location, as well as parameters. Besides, resultant information will be given in statistics. You can observe messages in in the form of a table or as a chart.

The way to display parameters can be one of the following:

- **Raw data**: all parameters are displayed in one column, in one line in their initial form.
- **Sensor values**: each sensor has its individual column in the table, and the values are given according to the calculation table. By default, only visible sensors are displayed but you can enable other sensors manually (see Viewing Messages).

The table of messages has the following columns:

- **Time** when the message was received.
- **Speed** registered at that point. It is calculated as the distance traveled between the previous message and the current one divided on time between these two messages (in km/h or mph depending on unit's properties).
- **Coordinates**: latitude and longitude, in the brackets the number of satellites locked is displayed.
- **Altitude**: elevation over sea level. If there are only zeros, it may mean your device does not detect altitude (in meters or feet depending on unit's properties).
- **Location**: country, city, street, etc. (according to user's settings).
- **Parameters** (if available) can be given in one row (if *raw data* is selected) or separate column for each parameter (if *sensors values* is selected). You can filter messages by parameters.
- **Media** (if available): the button to display a picture or a video made by unit and sent with the message.
- **Delete** (if allowed): checkboxes to delete messages.

Red rows in the table mean alarm messages registered by the system.
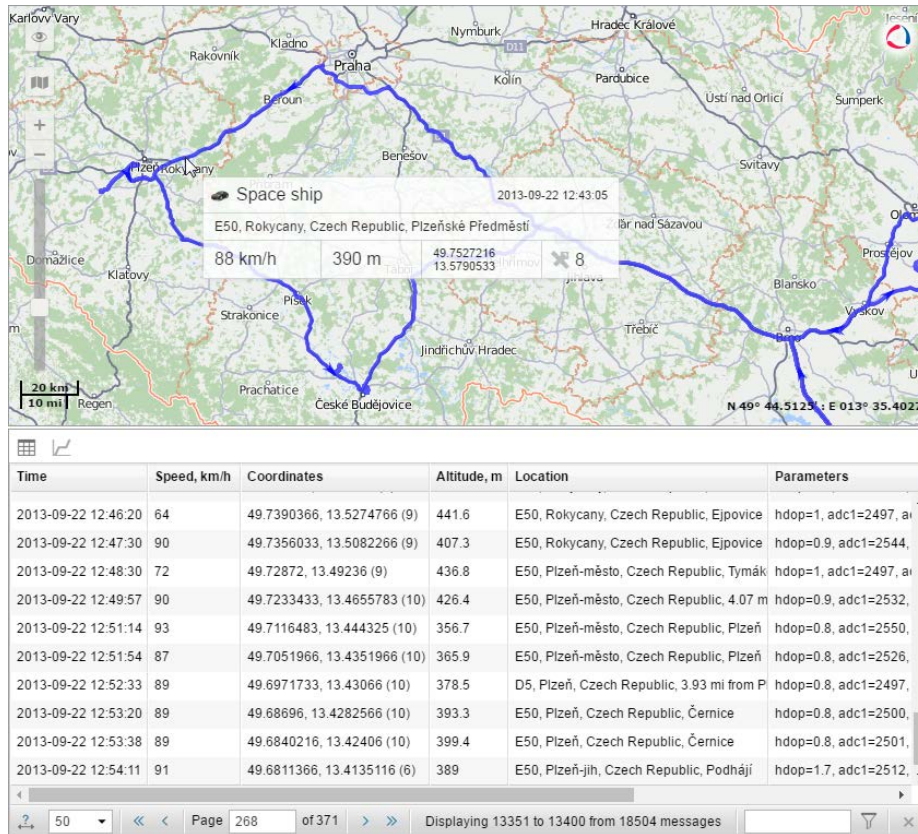
⊕ *Note.*

Measurement system (either metric or U.S.) used to display speed, altitude as well as statistic information depends on unit's properties.

Statistics

In the **'Statistics'** section the general information about the request is given:

- **Total messages**: the number of messages for the whole period;
- **Total time**: the interval between the first and the last message in the selected period;
- **Distance**: the distance traveled by the unit within the indicated time interval. Mileage in messages can sometimes differ from mileage in reports (if there are invalid messages within the interval). In such cases, more accurate mileage is provided in reports.
- **Average speed**: the average of all speed values registered during the period;
- **Maximum speed**: the maximum speed registered.

Using the Map

The track for the chosen period is displayed on the map. It is generated together with the table. Click on any message in the table to move to this point on the map. The map is centered on this point and a blue marker is set there.

By default, track color is blue, but you can adjust settings to paint the track depending on speed or sensor value. This is set in unit properties dialog on the 'Advanced' tab.

Besides, to get information about track points, hover mouse cursor over and see information in a tooltip (time, address, speed, altitude, coordinates, satellites, sensor values). Note that messages are searched in the radius of 50 pixels from the cursor.

⊕ *Note.*

If after the 'Messages' panel you switch to Map or 'Reports' panel, map layout and all track lines are preserved. To remove unnecessary graphics, go back to the 'Messages' panel and press the **'Clear'** button. More...

Charts

Besides tables, some data can be presented in the graphical form. To switch between the modes, use ⊞ and ⬚ buttons correspondingly.

In the graphical mode, parameters charts are available. When you switch to the graphical mode, the **'Chart legend'** panel opens on the left. There you tick parameters to be displayed in the chart. Several parameters can be selected simultaneously. Then the chart will contain several curves. For your convenience they will by drawn with different colors.

The chart can be zoomed with the help of a mouse. Select the necessary section holding the left mouse button. Place the mouse pointer over a point to get the precise value at the point in a tooltip.
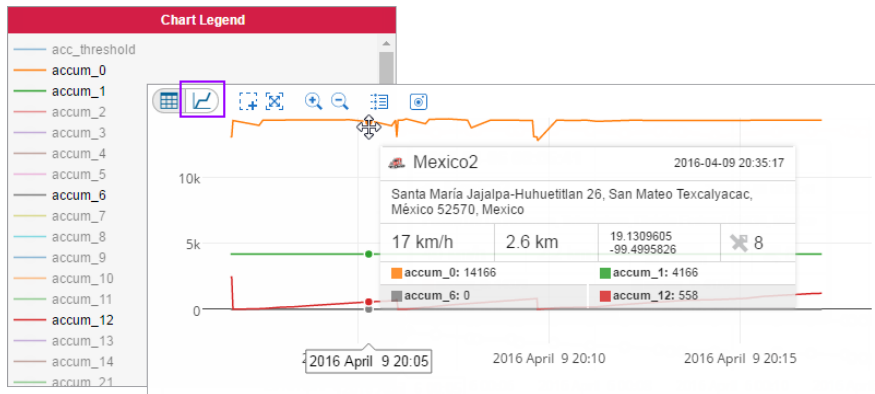
SMS Messages

SMS messages can be sent by unit while executing a command, generating an alarm or in other cases, which depend on device type. A table generated for this request will consist of three columns: time when message was received, message text, and SIM card number embedded into unit. Messages can be filtered by text.

	Time	Text	Phone	
1	2015-03-24 10:00:49 pm	SIGNAL,0002,24/03/15,19:00:46,5354.4342,N,02736.7896,E,18.0km,274.1,A,010000	+375000000000	☐
2	2015-03-24 10:01:49 pm	PC,0002,24/03/15,19:01:46,5354.8711,N,02736.2582,E,20.0km,326.9,A,010000	+375000000000	☐
3	2015-03-24 10:02:50 pm	PC,0002,24/03/15,19:02:47,5354.6567,N,02735.7368,E,70.0km,237.6,A,010000	+375000000000	☐
4	2015-03-24 10:03:50 pm	PC,0002,24/03/15,19:03:47,5354.3469,N,02735.4559,E,80.0km,210.6,A,010000	+375000000000	☐
5	2015-03-24 10:04:50 pm	PC,0002,24/03/15,19:04:47,5354.2010,N,02735.9707,E,25.0km,118.2,A,010000	+375000000000	☐
6	2015-03-24 10:05:49 pm	PC,0002,24/03/15,19:05:46,5353.5088,N,02736.7261,E,42.0km,149.8,A,010000	+375000000000	☐
7	2015-03-24 10:06:50 pm	PC,0002,24/03/15,19:06:47,5353.2661,N,02736.6971,E,42.0km,186.5,A,010000	+375000000000	☐
8	2015-03-24 10:07:49 pm	SIGNAL,0002,24/03/15,19:07:46,5353.0776,N,02736.2205,E,26.0km,238.6,A,010000	+375000000000	☐
9	2015-03-24 10:08:49 pm	PC,0002,24/03/15,19:08:46,5352.8552,N,02736.0219,E,80.0km,210.2,A,010000	+375000000000	☐

Sent Commands

Commands sent to the unit by user(s) are displayed for this request. There is a special button in the monitoring panel to send commands to units. The resulting table includes:

- **Time**: time when the command was sent to the unit.
- **User**: login name of the user who performed the command. If there is a dash in this cell, it means you have no access to this user, that is why the login name is hidden.
- **Command name**: command name as it is written in unit properties.
- **Command type**: command type (see the list).
- **Parameter**: for those commands that require additional parameters (like message to driver, input activation/deactivation, report period, custom message, etc.).
- **Execution time**: time when the command was executed. If execution failed due to billing limitations (e.g., you ran out of SMS messages), this cell will contain only dashes.
- **Channel**: channel type used to transmit the command (*TCP*, *UDP*, *Virtual*, *SMS*).

	Time	User	Command name	Command type	Parameters	Channel	
1	2016-05-21 01:35:35 pm	user	Send position	Query position		SMS	☐
2	2016-05-21 01:55:47 pm	user	Deactivate output	Deactivate output	1	SMS	☐
3	2016-05-23 01:55:53 pm	user	STOP	Block engine		SMS	☐
4	2016-05-25 00:58:08 pm	user	Message	Send custom message	Route 1675	SMS	☐
5	2016-05-27 01:58:18 pm	user	Interval	Set data transfer interval	15	SMS	☐

Registered Events

Different types of events can be registered in unit history automatically or manually.

Automatic registration is adjusted with the help of notifications (delivery method must be *Register event for unit*, *Register as violation* or *Register unit status*. In such a manner, you can control geofence visits, connection loss, idling, service intervals, etc.

Manually an event can be registered in the special registrar in the monitoring panel. With this method, you can register fuel fillings, maintenance, unit statuses, and any custom event.

Traffic counter reset and routes statuses can be saved as events.

In the table you see:

- time when the event was detected (automatic registration) or registered (manually by user);
- type: event (traffic counter reset, events from notifications, some custom events, route control statuses), violation (violations from notifications, some custom events), maintenance (registered manually).
- event text which is taken from notification text or from description entered while registering manually.

	Time	Type	Event text	
1	2015-08-21 06:16:05 am	Violation	Connection o coordinates loss.	☐
2	2015-09-15 02:00:00 pm	Event	Personal	☐
3	2015-10-06 04:16:00 pm	Maintenance	Maintenance service 'Electricity check' was registered.	☐
4	2015-10-07 01:58:00 pm	Event	Accident	☐
5	2015-10-21 04:20:00 pm	Maintenance	Maintenance service 'Oil change' was registered.	☐
6	2015-10-30 03:58:00 pm	Event	Fuel theft 20l	☐
9	2015-11-19 01:57:00 pm	Event	Business	☐
10	2015-11-19 01:57:00 pm	Maintenance	Maintenance service 'Wheel balancing' was registered.	☐

Unit Log

Any manipulations with unit properties or its database are logged in the system automatically. In addition, records can be added to unit log manually — through event registrar. To see unit log or add messages to it, you should have not only 'Query reports or messages' access but also 'Manage log'.

Any changes in Unit Properties dialog are logged as well as import, export, and removal of messages, assignment or reset of a driver and others.

Unit log contains the following information:

- **Time**: date and time when the change was done (saved).
- **User**: name of the user who did it.
- **Action**: description of the change performed. Messages can be filtered by text in this description.
- **Host**: the address of the computer from which the user did the change or it can be 'job' or 'notification' if the action was automatic.
- **Delete**: buttons to delete records.

	Time	User	Action	Host	Parameter 1	
1	2015-10-27 04:48:40 pm	user	Unit 'AARON' created	10.192.5	AARON	☐
2	2015-10-27 04:48:40 pm	user	Command 'Send Command' created	10.192.5	Send Command	☐
3	2015-10-27 04:48:40 pm	user	Command 'Locate Vehicle' created	10.192.5	Locate Vehicle	☐
4	2015-10-27 04:48:40 pm	user	Sensor 'RPM' created	10.192.5	RPM	☐
5	2015-10-27 04:48:40 pm	user	Sensor 'driver' created	10.192.5	driver	☐
6	2015-10-27 04:48:40 pm	user	Sensor 'Ignition' created	10.192.5	Ignition	☐
7	2015-10-27 04:48:40 pm	user	Sensor 'Satellite' created	10.192.5	Satellite	☐
8	2015-10-27 04:48:40 pm	user	Sensor 'Engine Temp' created	10.192.5	Engine Temp	☐

Unit log is also presented as a report.

Export/Import Messages

Messages can be imported and exported. It concerns only messages of the first type that is data messages.
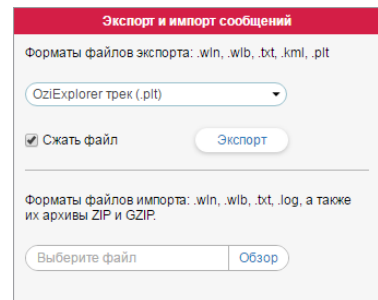
⚠ *Attention!*
Size limit for an imported file/archive is 64 MB, which, in case of archive, is approximately 3.5 million messages.

Export

Open the 'Export and Import Messages' tab in the left section of the window. Select destination format and click 'Export'. Depending on your browser configuration settings, you will be offered to open or save the file. The resulting file can be compressed. For this, indicate the flag 'Compress file'.

The supported export formats are:

- OziExplorer track(.plt): Ozi Explorer format that stores track as a list of coordinates of track's points.

- NMEA messages (.txt): National Marine Electronics Association text file, communications protocol used in sea navigation equipment.
  ⚠ *Attention!*
  Parameters (sensors) are not stored when exporting to this format.

- Google Earth (.kml): an XML-based format used in Google Earth to transmit three-dimensional geospatial data.

- Wialon messages (.wln): a format to be used with Wialon software.

- Wialon binary messages (.wlb): a binary format to be used with Wialon software.

Import

Select the 'Export and Import Messages' tab in the left section of the window.

The supported import formats are:

- Raw GPRMC navigator logs in format defined by NMEA 0183 specification — searched in files with extension .txt or .log.

- Wialon messages — searched in files with extension .wln.

- Wialon binary messages — searched in files with extension .wlb.

Click on the empty field, specify a file (or an archive) to import messages from, and click 'Upload'.

⚠ *Hint.*
To simplify and accelerate the process, you may first compress files with ZIP or GZIP. When uploading process is completed, files will be unpacked and processed on the server.

Reports

To open the 'Reports' panel, choose a corresponding name in the top panel or click on the necessary item in the main menu customizer.

As a result, reports window will appear. Units activity could be presented in reports as tables or charts. Here you can create report templates, generate reports and view them right in the browser or export them to the files of various formats like PDF, XML, XLS (Excel), HTML, CSV.

The 'Reports' panel window can be divided into four sections:

- In the top left-hand corner, the basic parameters to generate a report are adjusted.
- In the bottom left-hand corner, you create and store your report templates. After an online report is generated, this section changes for the navigation bar.
- In the top right-hand section, there is the map.
- In the bottom right-hand section, you see the report itself if it has been generated online. A report appears in the form of tables and charts.

The sizes of the sections are changeable. Click on the horizontal or vertical slider and holding the left mouse button drag it up/down or left/right.
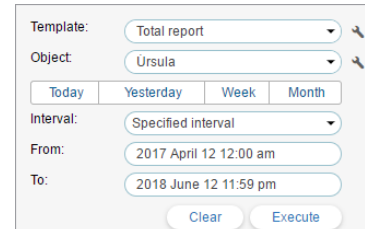
Query and View Reports

To generate a report, set the following parameters:

Template

The last created or edited report template is chosen in the dropdown list by default. Choose any other template from the dropdown list if necessary. On the right of the selected template, there is a button to display template properties for viewing and editing.

⚠ If no templates are available, it is impossible to generate a report. How to create a report template...

Object

Choose a system object to apply the report to. Depending on the template selected above, you will be offered to choose unit, unit group, user, driver, route, retranslator, or resource. As in case of templates, on the right of the selected object there is a button to check object's properties. Usually, all objects of the appropriate type and enough access (*Query messages or reports* is required) are displayed in this dropdown list. However, in case with units, *not all* units are displayed in this dropdown list but only those which are in the work list of the 'Monitoring' panel at the moment. In case the work list is empty (when dynamic work list is used or when units have been deleted from the work list manually), the units to which you possess the corresponding rights will be displayed.

Interval

Use buttons **'Today'**, **'Yesterday'**, **'Week'**, **'Month'** for quick report generation for the most frequently wanted intervals. What concerns the last two, you will get a report for *previous* week or month (that is last full week or month), and week starts on Monday. Note that if you press one of those four quick buttons, the report launches immediately (no need to press 'Execute').

Otherwise, you can select other types of intervals to specify the reporting period more accurately. Three ways to specify the interval are possible here:

- *Specified interval*: specify date and time (to minutes) of the interval beginning and end.
- *Starts 'From' until today*: specify the beginning only, and the and will be set automatically as the current date and time.
- *For previous* [select the number] minutes/hours/days/weeks/months/years. The digital value of an interval can be chosen in the corresponding field using special arrows or scroll wheel. If you press and hold an arrow, the numbers will change at an increased speed. Note that the acceptable values are from 1 to 99. The current day (week, etc.) can be included into the interval or not depending on the state of 'Include current' checkbox.

In case of setting a custom interval (from – to), click 'Execute' to generate a report. ⚠ Choosing an interval, note that the number of lines in a generated report is limited to 100 000 for the optimal system performance.

⚠ *Note.*

There are alternative ways to receive reports in the tracking system:

1. getting reports by e-mail at specified time (adjusted through jobs);
2. getting a report when an event happens (adjusted through notifications);
3. quick report generation from the Monitoring panel (see Monitoring => Icons Explanation).

⚠ Note that in order *units' tracks* to be displayed on the map, you should check if the corresponding layer is active.

Online Report

To generate a report online, adjust the parameters described above and click the **'Execute'** button. If no tables or charts appear on the right, it means there is no data about the selected object for the selected period or poor report content is selected in the template.

After executing a report, the 'Report Templates' panel changes to **'Report Results'** that displays report contents and provides navigation through the report. Usually, a report contains several pages. To switch between them, use navigation links in the 'Report Results' panel. The name of the active page is bold and highlighted with a light blue background.

The information in reports can be presented in the form of tables or charts. Some information can be visualized on the map, for example, tracks and markers.

If the text in a cell is blue, it means that there are coordinates for this point. Click on such a cell to move to that place on the map.

Table report may contain up to 100 000 lines, therefore it is divided into pages. To adjust the number of rows to be displayed on one page, choose the number in the dropdown menu: 25, 50, 100, 200, 500. To navigate between the pages, use the blue buttons in the toolkit:

› go to the next page,
‹ go to the previous page,
« go to the first page,
» go to the last page.

The page number can be entered manually. After entering a number, push <enter> on the keyboard to go to the required page.

To delete an online report, push **'Clear'**. The map and the report itself will be cleaned, and the 'Report Result' panel will be replaced by 'Report Templates' again. However, you can switch between these two panels manually. To do this, just click on the header of the corresponding panel.

Other buttons located in the toolkit allow to:

▤ — transfer to messages;
🄿 — quick export to PDF (landscape orientation, A4 format, and fixed page width is a default setting for PDF file);
🄳 — quick export to Excel;

⊞ — export report to a file;

🖨 — print report.

Transfer from tabular report to messages

The tracking system allows transferring to messages straight from a tabular online report. It can be useful for analysis of unit data messages.

To move from table to messages, it is necessary to press the 'Transfer to messages' button ▤ in the toolkit. After pressing it, text in some time cells becomes purple and works as a link. By clicking on the link transfer to messages is performed. Depending on the table type columns with time indication can vary, for instance, 'Time', 'Beginning', 'End', etc.
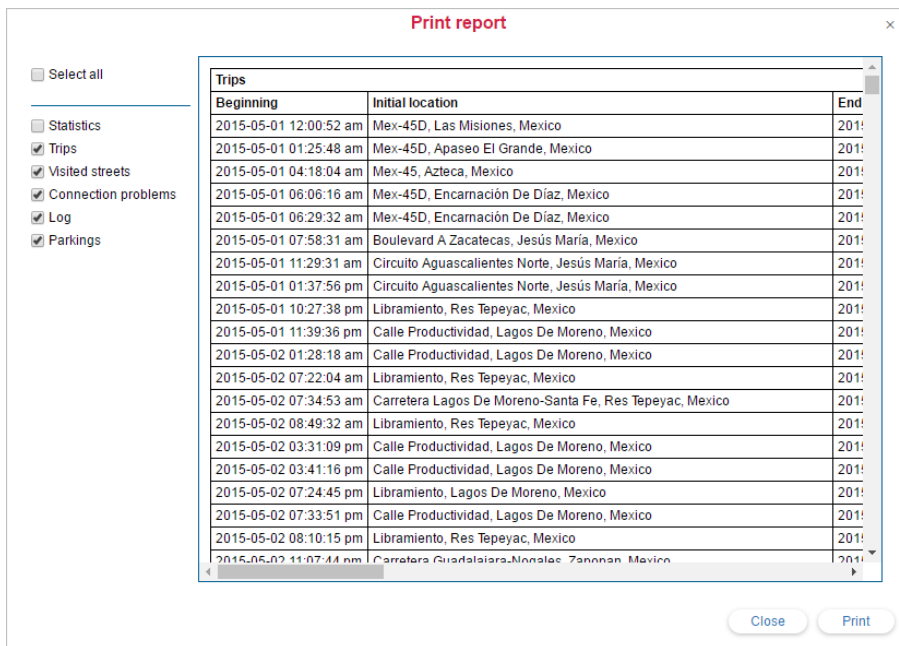
Messages are loaded for the whole report period, at that a page with selected message is opened first. The line with this message is highlighted in grey. The map is centered in regard to the selected message which is indicated with a red marker.

By default, the transfer button is released. When switching from table to chart it is restored to default state, in spite of the fact that it could be pressed before in one of report tables.

Print Report

After generating an online report, it can be printed without saving it to the disk. To do this, press the **'Print'** button that becomes accessible only when there is a report in browser window.

In the left part of the *'Print Report'* dialog, you see the list of sections which are included in the report. Check those of them that you are going to print. On the right, you can preview all these tables, charts, map, etc. To start printing, press *'Print'*. To exit, press *'Close'*.

⚠ *Note.*
In Internet Explorer 10, maps and charts cannot be printed if the option 'Enhanced Protected Mode' is on.

Export Report to File

To get a report in the form of a file that is suitable to save on disk, print or send by e-mail, push the 'Export to file' button ⊡ .

Choose desirable file format or several formats at once and specify parameters. Supported formats are HTML, PDF, Excel, XML, CSV.

ⓘ Reports in the form of files can be regularly sent to your e-mail automatically – through jobs and notifications.

Export Parameters

Give the file any name. This is optional and if left empty, a file will be given a default name (like 'Online_report').

To zip a file, indicate the 'Compress report files' flag. Note that HTML, CSV, and XML formats undergo archivation regardless to the flag availability. Moreover, archivation is applied if total size of files exceeds 20 MB. In other cases archivation is applied depending on the flag availability.

Indicate the corresponding flag if it is necessary to attach map to the exported report. Graphical objects (like map, chart) can be exported only into HTML or PDF files. Note that the map will be attached to the file only if any graphical elements (as tracks, markers, geofences, etc.) are chosen in the report template. By default the map is scaled in order track/markers/last unit position to be seen on it. If these elements are not shown on map (not chosen in report template), then the map will not be attached. If the 'Squeeze in all graphics' flag is chosen, then the map is scaled in such a way that geofences are shown on map along with the above mentioned elements. Only Gurtam Maps can be used for in exported files. Furthermore, the map layer can be hidden ('Hide cartographic basis' option) so that tracks and markers will be shown on the blank background.

A function of using a link to display location (coordinates should be available) is supported for the files exported in PDF or Excel. It works the following way: open the exported report (PDF/Excel), place a cursor on the corresponding field of a report, for example, beginning/end time or address information from a unit (cursor pointer changes its shape for a hand), click on the link, and afterwards Google Maps cartographical service is opened in your browser showing unit's location by a special marker. If there is no need in showing unit's location you can disable links to Google Maps in PDF and Excel files by indicating the corresponding flag in export parameters.

If necessary, you can disable links to Google Maps in PDF and Excel files by indicating the corresponding flag.

More parameters can be adjusted for some file formats. Those additional parameters are described below.

Usually you export to a file a report that is already in the browser. However, you can also generate a new one according to the parameters set in the left panel. In this case, you should check the 'Generate report' option.

At the end, press OK. Depending on browser settings, you will be offered to open file or save it.

Report Formats

HTML

Your report will be generated as Internet page and will open in any browser.

PDF

PDF is a widespread format suitable for electronic usage as well as for printing. To view these files Adobe Acrobat Reader is used (for Windows OS only).

You can additionally adjust such page parameters as orientation (landscape or portrait) and page size (A4 or A3). If a table in the report contains many columns, page width option can be also useful. The standard page width is *fixed* which means it depends on selected page format and orientation. However, if a table is too wide and does not match the fixed page width, this table will not be exported (only the heading will be displayed). In such cases, you can select *automatic* page width, which means it will correspond to the largest row in the table. If *Auto, compact* is selected, cell with is equal to the length of the largest word in it. If *Auto, no wrap* is selected, cell with is equal to the largest phrase in it (no line breaks are applied). Note that if automatic page width is selected, page format and orientation become relative — they define only page height.

Excel

Your report will be presented as Microsoft Excel electronic table (*.xlsx* file).

🟡 *Note*.
When exporting PDF, HTML, Excel the **alignment** is used. The columns containing text (names of sensors, geofences, drivers, users, SMS and notification text, location addresses, etc.) are aligned left. The columns containing numeric data (time, duration, speed, mileage, fuel, payments, count, etc.) are aligned right.

XML

XML is a textual data format that is notable for structured data storage and useful for data exchange between programs.

CSV

CSV is a textual data format used for the digital storage of data structured in a table of lists form, where each row in the file corresponds to a row of a table, and the columns are separated from each other by a special delimiter. You can additionally set coding (utf8, cp1251) and delimiter (comma or semicolon).

Report Templates

The list of all templates available is located in the bottom left-hand corner of the window under the header **'Report Templates'**. Here you can create, edit and delete templates for reports, as well as copy them and move them from one account to another.

Templates contain information upon which tables and charts to be included in the resulting report, what kind of content to be presented in tables, sequence order of columns in tables and sections in the report, which graphical elements to be rendered on the map, and many other parameters which define the look of the resulting report.

In the tooltip, you see the name of the resource which holds this template (if you have access to more than one resource). If clicking on a template, it becomes selected in the *Template* field of report generation parameters.

When searching for a template on the list, it is convenient to use the dynamic filter. Enter template name or its part into the search text box and observe the results. Additional search parameters are set in the dropdown list where you can choose the resource or leave *All*.

The following actions are available:

- or — edit or view a report template (depends on your access level);
- — create a new template using this one as a basis;
- — delete a template (if the button is dimmed, you have not enough rights).

⚠ *Note.*
If a template belongs to some resource to which you do not have access rights to *Create, edit, and delete report templates*, then you will not be able to edit or delete this template.

Creating Report Template

⚠ To make manipulations with reports templates, you should have at least one resource with the access right *'Create, edit, and delete report templates'*.

To create a new report template, press the **'New'** button. In the dialog enter a **name** for the template and choose its **type**:

- **Unit**: such template can be applied to separate units;
- **Unit group**: such template will be used to gather information about several units at once (see unit group);
- **User**: such template can be used to analyze users' activity in the system;
- **Drivers**: such template can be used to analyze drivers' work;
- **Resource**: such template is used to analyze how resource contents change;
- **Retranslator**: such template is used to analyze the work of retranslators;
- **Route**: such template can be used to analyze units' performance on routes;
- **Group of drivers**: such template can be used to analyze performed work of several drivers simultaneously;
- **Group of trailers**: such template can be used to analyze performed work of several trailers simultaneously;
- **Passengers**: such template can be used to analyze passengers transportation.

It is not recommended to change template type when editing a previously created template because all template contents will be lost with this action.

Report template can be bound to the particular object(s) of the system. For example, you create a report template, choose 'Unit' as its type, and you know for sure that this report is necessary for some particular units (not for all your fleet). If the corresponding units are not chosen for this report, then during request formation you will need to look through the whole list of units to find the necessary ones. However, if the necessary units are bound to the report template, then during request formation the list of elements will contain only the units you have indicated. Note that object binding works for all types of report templates.

To bind object(s) to a report template, click the 'Bind' button to the right of the report type field. In the appeared window indicate flags for the necessary objects, and click OK. Note that afterwards a number of bound objects will be shown on the 'Bind' button.

Add tables and charts to your template, choose items for statistics, adjust map output, and decide upon other parameters of the report. All added contents will be displayed at the left of the dialog.
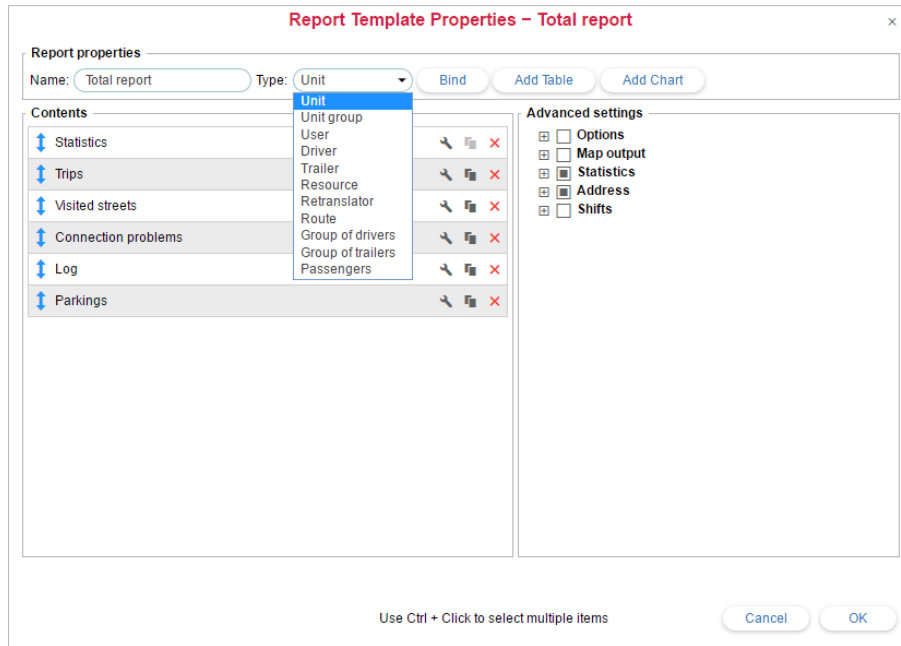
In the left part of the dialog, you can set the sequence order of the pages and give them custom names if needed. To change section name, click on it and enter any text. To manage template contents, use the following buttons:

↕ — drag up/down,

🔧 — edit a table/chart,

🖿 — make a copy of a table/chart,

✕ — delete page.

⊙ *Note.*

No matter where you place a chart, in the resulting report all charts follow after all tables, and the 'Statistics' section goes first.

Advanced Settings

The right part of the Reports Template dialog contains advanced settings. They are divided into four sections:

- Options
- Map output
- Statistics
- Address
- Shifts

Depending on template type, all or just several of these sections may be displayed.

Options

Multiple drivers/trailers option usage makes sense if a table containing such columns as 'Driver' or 'Trailer' is added to the report template. If the box is not checked, then regardless of the number of drivers/trailers appointed to a unit for the particular interval (trip, parking, etc.), only the first one of them will be shown in the table. If the box is checked, then all the drivers/trailers appointed to a unit for the particular interval are shown in the table.

Mileage/fuel/counters with accuracy to two decimal places. By default, mileage less than 20 and fuel less than 50 is displayed with accuracy to hundredths, and larger values are given as integers (if the value is rounded to 0, the result is printed as 0.00). Counter sensors of any values are by default displayed as integers, too. However, if you consider it is necessary, mileage, fuel, and counters can be shown with accuracy to two decimals (other decimal places are simply cut). If you see '0.00' in a cell, it means the initial value had thousands or even smaller fractions, which can be seen if you export report to XML, CSV or Excel.

Exclude thefts from fuel consumption can be chosen if you want to ignore thefts when calculating fuel consumption in different tables and statistics. Normally, thefts are considered as a part of fuel consumption. That is, if the option is enabled, columns like *'Consumed by FLS'* and *'Average consumption by FLS'* are calculated without considering fuel thefts.

Mileage from trips only is an option that affects mileage calculation. Mileage can be calculated either by all messages or by messages in trips (considering trip detector).

Consider track-geofence intersections is an option which allows detecting geofence visiting in case a trip intersects a geofence by any segment of its track. This option can be applied for such reports as 'Geofences', and 'Rides'.
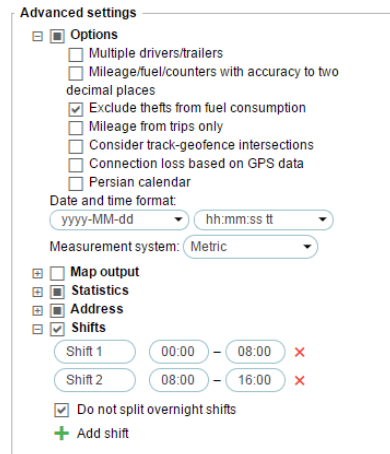
Connection loss based on GPS data option can be applied to the 'Connection problems' and 'Chronology' tables, as well as to charts upon choosing a background for connection losses. If the flag is indicated, then time intervals with no messages from units or messages without coordinates will be shown in corresponding reports or in charts. If no flag is indicated, then you can see time intervals without messages only.

'Persian calendar' and **'Date and time format'** options are applied to cells of the resulting report where time is shown. These options are adjusted in the same way as in the 'User Settings' dialog.

'Measurement system' option defines the metrics for such parameters as mileage, speed, fuel, and temperature in reports.

⚠ *Note.*
Depending on the measurement system chosen in a report template for which the intervals filtration has been applied you should consider that the values of filtration parameters will not be converted to the corresponding values of the other measurement system automatically. Nonetheless, the metrics will be changed to the corresponding metrics of

the chosen system. For example, if you have 50 kilometers mileage and 100 kilometers per hour speed, after choosing the american measurement system you will receive 50 miles mileage and 100 miles per hour speed.

One more option is provided for group reports — **'Skip empty rows'**. It is used to withdraw uninformative rows from the resulting table. For example, you create a report about fuel thefts, but not each and every unit in the selected group has thefts, so there can be a lot of empty rows in the table.

Address

Here you choose how address information is presented in the resulting report. Address information can be displayed in many reports: initial/final location in trip, place of fuel filling or theft, location where the unit parked or had speeding, location where connection was lost, message received, event registered, etc.

Addresses can be taken either from Gurtam Maps or from geofences.

Addresses from Gurtam Maps

You can select which address items to be displayed (country, region, city, street, and house are available) and specify their sequence order (for this, drag items up and down with blue arrows). If none of five address items is chosen, coordinates are displayed instead of addresses.

For addresses which fall out of city bounds (near or on roads), two settings are important:

- **Max distance from unit** says that if unit is located near a road and there is a city (i.e., city, town, village) within the indicated distance, then in the address you will have the road's name and distance to the city.
- **Min radius** says that if no city has been found within maximum distance from unit (the previous option), then the address is bound to another city. How big this city should be to form the address, you indicate here — minimum radius of a city. This can be used to eliminate small cities from addresses.

⚠ *Note*.
Addresses for reports can be taken only from Gurtam Maps (no Google, Yandex, or other services can be used). If you find inaccurate address information in the reports, updating the map of your region/city may help. For this, make a request to the technical support and enclose a new map in proper format.

Addresses from WebGIS

Address is searched in the radius of 1 km from the point where a message was received. If in this radius there is no available address information, then coordinates are displayed.

Coordinates are shown instead of addresses also in the case when the checkbox 'Address' is disabled in report template settings.

Addresses from Geofences

Sometimes Gurtam Maps may not contain precise addresses in certain regions. In such cases, you can use geofences as addresses. Besides, you can make use of this feature to customize some addresses, make them clearer.

If the option 'Use geofences for addresses' is selected, additional parameters become available. In particular, you can choose to display geofence's description alongside with its name (the option 'Add geofence description to address').

The range of geofences used as addresses is adjustable. By default, all geofences that belong to the same resource as the reports template are used. However, geofences from *all* available resources can be employed if necessary. Alternatively, to narrow this range, you can specify certain group of geofences to be used (it should be created in the same resource as report template itself). Choose one or another option in the dropdown list 'Specify geofences' (groups of geofences are in square brackets).

If you choose to use geofences as addresses and coordinates of a unit get into one, its name (and maybe

description) will be displayed in the address cell. If two or more geofences are found in this place, then the smallest one will be used. If no geofences are found in given location, the address from the map will be displayed.

Shifts

If the option is enabled, then information in the report will be structured by shifts. For example, a transport company has a vehicle and two drivers. And it has been calculated that profit from the vehicle usage comes only if it is used in two shifts: from 9 a.m. till 7 p.m., and from 9 p.m. till 7 a.m. Assume that we would like to receive any kind of report for the unit in terms of this shifts, and we need no information on what happens with the vehicle in time between shifts. So, it is necessary to adjust shifts correspondingly, and indicate its flag in order this setting to be used. Moreover, for this particular situation it is necessary to apply grouping by shifts and use intervals' retrieving.

If you need the events occurred in a shift that finishes in a new day to be attributed by the system to the previous day (that is to the day of its beginning), enable the option 'Do not split overnight shifts'.

Tables

The following tables (for units and unit groups) can be added to a report:

- Table Parameters
- Intervals Filtration
- Account Tree (for resource)
- Chat
- Check Points
- Chronology
- Connection Problems
- Counter Sensors
- Custom Fields
- Digital Sensors
- Eco Driving
- Engine Hours
- Events
- Executed Commands
- Fuel Fillings
- Fuel Thefts
- Fuel Traffic
- Geofences
- GPRS Traffic
- Images
- Logs
- Maintenance
- Messages Tracing
- Non-visited Geofences
- Orders
- Parkings
- Profile
- Rides
- Rounds (for unit)
- Rounds (for route)
- Sensor Tracing
- SMS Messages (for unit)
- SMS Messages (for resource)
- Speeding
- Stops
- Summary
- Trips
- Unfinished Rides
- Upcoming Maintenance
- Utilization Cost
- Video
- Violations
- Visited Streets
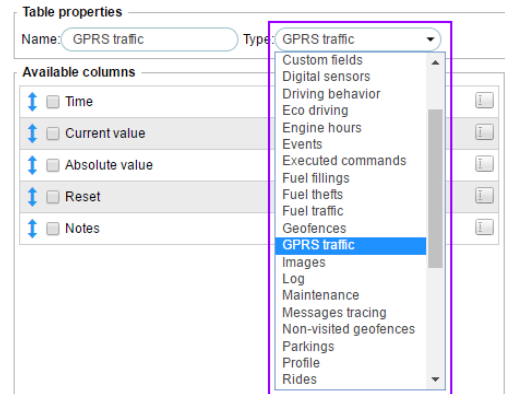
A template can contain any number of tables and charts. You can even add the same table type several times with different configuration of columns, data grouping and other settings.

To add any of above mentioned tables to the template, click the **'Add Table'** button and choose a table from the list.

Each table type has its set of columns that can form this table. After you have chosen table type, the list of columns available is displayed below. Check the columns you would like to include in the resulting table. To select all columns at once, press <ctrl> on the keyboard and click on any checkbox. To make all columns unselected, repeat the same operation. This combination works also for reports where you choose geofences, events, etc.

You can rename columns, clicking on their names and editing the text. In the same way you can change the name of the table itself (the **'Name'** text box at the top of the dialog). To restore default column names, use the button **'Restore default'** (when it is gray, it means the current name is default).

Besides, you can apply to the columns any sequence order. Move them up and down dragging the button ↕ .

Several alternatives to standard reports are available as applications:

- iDriveSafe — assessment of driving behavior;
- Dashboard — graphic presentation of key performance indicators of your fleet;
- Driving Logbook — tax report determining actual use of the company car for private and/or business purposes (on the basis of Trips report).

Table Parameters

In the right part of the report template dialog, you can set additional parameters for the table such as:

- grouping,
- detalization,
- row numbering,
- total row,
- time limitation.

These parameters can be applied to any kind of table.
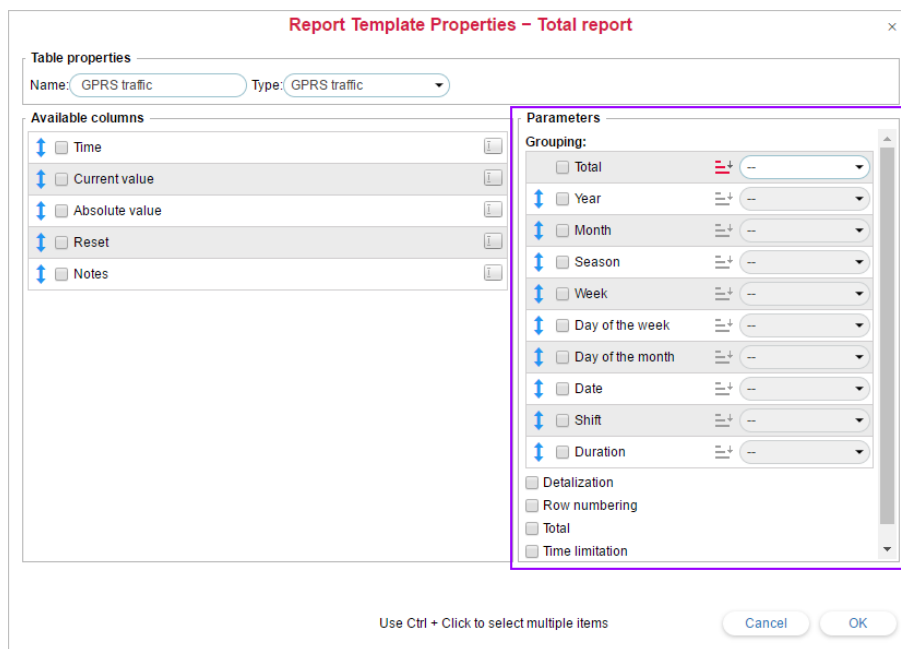
Grouping/Sorting

Grouping

Reports are supported with a grouping feature. It works in the following way: from the available time intervals (year, month, season, week, day of the week, day of the month, date, shift, duration) you choose those by which you would like to group table data. Grouping can be made either by single time interval or by several (or even by all of them). If grouping by several time intervals is chosen, you should indicate the order of nesting for these time intervals. For example, table data can be grouped by years, each year group can contain months' grouping (nested inside), and each month can contain grouping by dates (nested inside). Nesting is adjusted by dragging the corresponding time interval up/down in the list of groupings (the lower items are nested in the higher ones)

If grouping by such intervals as season and duration is chosen, then beneath you can find a special block where it is necessary to set intervals' values. Let's see it in detail:

- For season

It is necessary to indicate season's name (any), for example, summer, autumn, etc. Afterwards, using dropdown lists choose season's duration. Note that season's duration is considered to be a time period from the first day of the month in the first dropdown list to the last day of the month in the second one. Minimum season's duration is 1 month. To indicate minimum duration, choose the same month in both the dropdown lists. To activate an entered season, click '+' button. Maximum number of seasons is 12.

- For duration

It is necessary to give name for an interval (for example, interval 1), indicate interval's duration in

seconds/minutes/hours/days (choose from dropdown list), and activate it by clicking '+' button. Maximum number of durations is 5. On the example of 'Trips' report let's observe how the usage of duration periods influences report data presentation. The following periods are indicated: 'Short' — to 15 minutes, 'Middle' — to 1 hour, 'Long' — to 3 hours. Data in the report will be presented in the following way: short trips — from minimum trip time indicated in trip detector up to 15 minutes, middle trips — from 15 minutes up to 1 hour, long trips — from 1 hour up to 3 hours.

Note that depending on report type additional groupings can be used along with the standard ones (for example, by geofence, route, sensor, user, event, action type, violation type, trips, streets). In this case items in a group are arranged by their name .

Sorting

Grouped data can be sorted by any criterion chosen as a column of a table. Opposite to each interval a dropdown list is situated. Each list contains a number of sorting criteria (table columns included in a report). From this dropdown list choose a criterion which will be applied to the nested level of grouping. Moreover, to the left of the dropdown list there is an icon clicking which you can indicate the sorting direction (from min to max or vice versa).

Note that table data can be sorted even without grouping applied. To do so, choose the corresponding sorting parameter opposite to the 'Total' interval, and afterwards indicate sorting direction.

Let's explore grouping and sorting features on the example. To do so, we create report on trips. We are interested in maximum speed, duration, engine hours, and mileage criteria, so it is necessary to check these flags (table columns). Moreover, we need to divide information by years, months, and dates, and also it would be convenient for us if the dates were sorted by maximum speed (from max to min value).

By default a grouping is off, so we receive a detailed report where an individual line corresponds to every criterion, and these lines are displayed in a chronological order, or according to a sorting chosen for a table.

But in our case it is necessary to apply grouping. Check the 'Year', 'Month', and 'Date' flags. Adjust nesting (by dragging items in the list). Afterwards, choose a sorting criterion from the dropdown list, and indicate sorting direction (from max to min value). We would like to apply sorting for the level nested into the months (dates), so it is necessary to choose the corresponding criterion from the dropdown list opposite to the month interval. Then click on the sorting direction icon in order to adjust sorting from maximum to minimum values. ⚠ Note that usually if a dash is chosen in the dropdown list, then the sorting has chronological order.

The report has the following view. The table receives two additional columns, one of them shows grouping, and the other contains the buttons ('+'/'-') using which you can expand/hide nested levels of a grouping applied. Information is grouped by years. You can either expand groupings consequently (by clicking all the pluses one by one), or go straight to the necessary nested level (by clicking the corresponding one in the header of the table). The dates in the table are sorted by maximum speed (from maximum to minimum value).

Available time intervals and their application in reports:

- **Total**: the top level of grouping (cannot be moved). If the flag is checked, then we receive a groping with data resulting (total duration of any state, total number of registered events, etc.). This grouping contains all the other nested levels (if available).
- **Year**: table data is grouped by years.
- **Month**: table data is grouped by months.
- **Week**: table data is grouped by weeks. The week is presented in the table by its number (for example, week 26, etc.).
- **Day of the week**: table data is grouped by days of the week (for example, Monday, Tuesday, Wednesday, etc.).
- **Day of the month**: table data is grouped by days of the month (for example, 1st, 2d, etc.).
- **Date**: table information is grouped by dates.
- **Shift**: table data is grouped by shifts.

Note that if grouping is used, then all the events *beginning* in the analyzed interval are included in this interval even if they exceed the actual duration of an interval.

One more column can be useful for tables with grouping — **Total time**. The meaning of this column is similar to 'Duration' column but a bit different. 'Duration' shows the sum of intervals, for example, the sum of all trips detected. 'Total time' shows time from the beginning of the first interval to the end of the last, for example, time from the beginning of the first trip on a day to the end of the last trip on the same day (so, you can know real working shift).

Retrieve Intervals

This option can be applied only for reports with grouping by shifts. If the 'Retrieve intervals' flag is not indicated, then the whole interval of a trip 'crossing' the shift gets into the report. If the 'Retrieve intervals' flag is indicated, then the report will contain only data from messages received inside the indicated interval.

Detalization

A table with a grouping can be extended by the way of detalization. Detalization is actually a final level of nesting (date and time). To view this level, you can either expand all the previous ones ('+' at the beginning of the line), or click the largest number in the heading of the corresponding column (expands all the enclosed nesting levels).

Let's take the previous example with groupings, and extend it by the way of detalization (check the corresponding flag in the table parameters). This example already includes the grouping by years, months, and dates, so the option of detalization allows us to extend the level of nesting directly to the time an event has taken place (hours, minutes, seconds).

Note, as it was already mentioned before, sorting is applied to the following level of nesting. And as far as detalization corresponds to the final level of nesting, you can indicate sorting for it as well. Sorting for detalization is indicated in the same way as for the groupings.

	Grouping	Max speed	Engine hours	Mileage	Duration
☐	2014	118 km/h	20:46:51	1132 km	20:41:30
☐	November	111 km/h	6:34:56	334 km	6:33:38
☐	28.11.2014	111 km/h	0:23:59	27 km	0:23:59
	2014-11-28 10:11:15	111 km/h	0:23:59	27 km	0:23:59
☐	14.11.2014	109 km/h	0:23:02	27 km	0:23:02
	2014-11-14 09:27:36	109 km/h	0:23:02	27 km	0:23:02
☐	17.11.2014	109 km/h	0:35:55	30 km	0:35:55
	2014-11-17 09:25:15	109 km/h	0:23:09	27 km	0:23:09
	2014-11-17 12:53:35	62 km/h	0:03:51	1.55 km	0:03:51
	2014-11-17 14:03:33	76 km/h	0:08:55	1.39 km	0:08:55
☐	December	118 km/h	14:11:55	798 km	14:07:52
☐	10.12.2014	118 km/h	0:31:54	28 km	0:31:54
	2014-12-10 19:15:40	118 km/h	0:31:54	28 km	0:31:54
☐	18.12.2014	110 km/h	0:22:14	27 km	0:22:14
	2014-12-18 10:09:39	110 km/h	0:22:14	27 km	0:22:14
☐	11.12.2014	109 km/h	0:47:33	54 km	0:47:34
	2014-12-11 09:46:21	109 km/h	0:23:31	27 km	0:23:32
	2014-12-11 20:52:11	100 km/h	0:24:02	28 km	0:24:02
☐	24.12.2014	108 km/h	1:20:18	53 km	1:20:18

Year > Month > Date > Detalization

Detalization can be applied only to grouped tables; it does not affect detailed tables. An exception are reports on groups of units, drivers and trailers, as they suppose grouping by units by default.

Row Numbering

Row numeration can be added to any table type. To switch the numeration on, check **'Row numbering'** box in table advanced parameters. The numeration is added to the table as its first column.

№	Beginning	End	Duration	Location
1	2012-07-01 17:15:10	2012-07-01 17:26:58	0:11:48	Via Imbarcadero, Brenzone
2	2012-07-01 17:39:24	2012-07-02 12:00:48	18:21:24	Via Dante Alighieri, Brenzone
3	2012-07-02 13:03:30	2012-07-02 21:22:08	8:18:38	Via Derna, Stafalo
4	2012-07-02 21:33:24	2012-07-02 22:42:54	1:09:30	Via Gardesana, Lazise
5	2012-07-02 23:10:58	2012-07-03 13:13:54	14:02:56	Via Dante Alighieri, Brenzone
6	2012-07-03 13:31:04	2012-07-03 17:17:00	3:45:56	Via Navene Vecchia, Malcesine
7	2012-07-03 17:36:44	2012-07-04 11:32:38	17:55:54	Via Dante Alighieri, Brenzone
8	2012-07-04 12:05:58	2012-07-04 12:50:54	0:44:56	Via Santa Cristina, Bardolino
9	2012-07-04 14:45:54	2012-07-04 15:11:50	0:25:56	Autostrada Torino-Piacenza, 4.41 km from Tortona
10	2012-07-04 17:23:20	2012-07-04 17:51:58	0:28:38	Autostrada dei Fiori, Riva Ligure (Grange)
11	2012-07-04 19:38:04	2012-07-05 23:56:40	1 days 4:18:36	Avenue du Docteur Raymond Picaud, Cannes

When numbering and grouping meet together, you get multilevel numbering. The main level is a usual numeration of main rows with integer numbers. The following level is the numeration of nested rows as 'main row number — dot — nested row number'.

	№	Grouping	Max speed	Engine hours	Mileage	Duration
⊟	1	14.11.2014	109 km/h	0:23:02	27 km	0:23:02
	1.1	14.11.2014 09:27	109 km/h	0:23:02	27 km	0:23:02
⊟	2	15.11.2014	106 km/h	0:41:12	47 km	0:41:12
	2.1	15.11.2014 22:34	106 km/h	0:20:47	23 km	0:20:47
	2.2	15.11.2014 23:48	104 km/h	0:20:25	23 km	0:20:25
⊟	3	17.11.2014	109 km/h	0:35:55	30 km	0:35:55
	3.1	17.11.2014 09:25	109 km/h	0:23:09	27 km	0:23:09
	3.2	17.11.2014 12:53	62 km/h	0:03:51	1.55 km	0:03:51
	3.3	17.11.2014 14:03	76 km/h	0:08:55	1.39 km	0:08:55
⊟	4	19.11.2014	108 km/h	0:51:19	54 km	0:51:19
	4.1	19.11.2014 09:33	108 km/h	0:23:37	27 km	0:23:37
	4.2	19.11.2014 19:35	96 km/h	0:27:42	27 km	0:27:42
⊞	5	20.11.2014	63 km/h	0:08:48	4.65 km	0:08:48

Total

The **'Total'** row can be added to any table regardless its type, grouping or detalization applied. The total row is added as the last row in the table and contains the resulting information such as total duration of a state, total number of events registered, etc.

	№	Grouping	Beginning	End	Duration	Engine hours	Mileage	Trips count
⊟	1	2014	14.11.2014 09:27	31.12.2014 10:17	20:41:30	20:46:51	1132 km	56
⊟	1.1	November	14.11.2014 09:27	28.11.2014 10:35	6:33:38	6:34:56	334 km	20
	1.1.1	14.11.2014	14.11.2014 09:27	14.11.2014 09:50	0:23:02	0:23:02	27 km	1
	1.1.2	15.11.2014	15.11.2014 22:34	16.11.2014 00:08	0:41:12	0:41:12	47 km	2
	1.1.3	17.11.2014	17.11.2014 09:25	17.11.2014 14:12	0:35:55	0:35:55	30 km	3
	1.1.4	19.11.2014	19.11.2014 09:33	19.11.2014 20:02	0:51:19	0:51:19	54 km	2
	1.1.5	20.11.2014	20.11.2014 08:58	20.11.2014 09:06	0:08:48	0:08:48	4.65 km	5
	1.1.6	21.11.2014	21.11.2014 09:04	21.11.2014 19:42	1:23:06	1:24:24	30 km	5
	1.1.7	22.11.2014	22.11.2014 16:41	22.11.2014 17:34	0:39:11	0:39:11	32 km	2
⊞	1.2	December	01.12.2014 09:44	31.12.2014 10:17	14:07:52	14:11:55	798 km	36
	-----	Total	14.11.2014 09:27	31.12.2014 10:17	20:41:30	20:46:51	1132 km	56

In online reports the total row is located at the bottom of the window regardless the number of pages in the table or scrolling bar location.

Location information is not given in the total row (replaced by dashes).

Time Limitation

Time limitations can be applied to tables to limit data analysis by some time intervals, days of the week, days of the month or months. For example, you can select working days and working time to be considered while generating the table.

There are two algorithms available for time limitation. According to the first one ('Cut off intervals' flag is not chosen) if any state (for example, trip) begins inside the indicated time limitation interval, and ends outside it, then such a state

will not be terminated, and its full duration will be included in the report. According to the second one ('Cut off intervals' flag is chosen) if any state (for example, trip) begins inside the limitation interval, and ens outside it, then the report will include only the duration of such a state inside the indicated interval, and everything outside the interval will be 'cut off'.

For example, if the period from 9:00 till 18:00 is chosen as time limitation interval, and two trips has been registered, the first — from 7:50 till 12:00 and the second — from 13:00 till 18:20, then:

- according to the first algorithm, only the trip started inside the limitation interval will be entirely included in the report. I.e., there will be one trip from 13:00 till 18:20 in the report.
- according to the second algorithm, two trips within the indicated limitation interval will be included in the report (from 9:00 till 12:00 and from 13:00 till 18:00).

⚠ To apply time limitation equal to the whole day, insert the interval from 00:01 to 23:59.

Intervals Filtration

Several tables are supplied with additional parameters to filter intervals. There you can set conditions to select information to be displayed in the resulting report. These conditions affect reports that concern selecting intervals from the collection of messages. These reports are: Counter sensors, Digital sensors, Geofences, Engine hours, Parkings and Stops, Rides and Unfinished rides, Speedings, Trips, and others.

The set of filtration parameters varies depending on table type. The following parameters are possible: duration, mileage, engine hours, speed range, trips, stops, parkings, sensors, driver, trailer, fuel fillings and thefts, geofences. Adjusting these parameters will limit the scope of intervals getting to the report. For example, you can indicate the minimum duration and minimum mileage for the trips to be displayed. Alternatively, you can query visited geofences with a stop at least 10 minutes in them. Note that all the filters except for the mileage one work with integer values.

Counter sensor value range
This filter can only be used for the 'Counter Sensors' and 'Fuel Traffic' tables. It provides a possibility to generate a report for a period of time on which messages' values received correspond to the indicated value range.

Incomplete interval
This filter affects only the last interval in the report. In many cases, reported period ends and the last interval (trip, sensor operation, etc.) still continues. You can choose one of the following options to deal with such unfinished intervals:

- *Show and cut off*: show the incomplete interval and consider that it ends with the last message within the reported period;
- *Do not show in report*: do not show the incomplete interval in the report;
- *Show and mark as incomplete*: the incomplete interval will be shown and will have 'Unknown' as the end time.

Duration
Minimum and/or maximum duration of the interval.

Mileage
Minimum and/or maximum distance traveled in the interval. Either integer or non-integral values can be indicated as a filter. For non-integral values use dot as a delimiter.

Engine hours sensor
Enter name mask for engine hours sensor. It affects calculations in reports which contain any information on engine hours as well as engine hours filter below.

Engine hours
Minimum and/or maximum duration of engine hours. In addition, engine hours sensor mask can be specified in the filter *'Engine hours sensor'*.

Speed range
Indicate minimum and/or maximum speed to be considered. It means that only those intervals will be displayed in the report which contain at least one message with speed falling into the range. But more helpful might be retrieving intervals. If you check the *'Retrieve intervals'* box, the report will focus on intervals where *all* speeds fall into the range.

Trips
This filter is used to show only intervals which somehow intersect with trips or, on the contrary, do not intersect.

Stops

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Tick the checkbox and choose one of the two possibilities: *With stops* or *Without stops*. Then in the resulting table, only intervals that meet the given condition will be shown. If the Stops option is not selected, then all intervals are displayed regardless if there were any stops or not.

Parkings

The settings are similar to those for stops. In addition, you can indicate the minimum parking duration. For instance, you can query geofences where there is a parking of a specified time (the *'Minimum duration'* flag). Besides, the parking time can be summed up (the *Sum up intervals* flag). That means the geofences where the total parkings make up the specified time will be displayed.

Sensors

The intervals where there are messages with sensor on or off can be selected. In addition, you can indicate minimum and/or maximum time of sensor's on/off state. Like in parkings, the duration can be summed up (the *Sum up intervals* flag). Besides, the intervals of on/off state can be retrieved, and each of them can be presented as a separate row of the table (the *'Retrieve intervals'* flag). To indicate a certain sensor to be controlled, type its mask below. If you select several, then the intervals which contain points with all these sensors on/off (simultaneously) will be selected. If no masks are specified, then all sensors will be considered.

Sensors masks

Here you can enter sensor masks which will be considered upon report generating. Sensors masks can affect *'Sensors'* filter, *'Counter'* column, and information on fuel (if any of these options is selected in the report template). Note that engine hours mask is indicated individually in the corresponding field.

Driver

This filter allows selecting intervals with a certain driver or driver group or without them. Choose the option *With driver* and specify the driver's name mask. The resulting table will contain only the intervals with the corresponding driver — it does not matter whether this driver is at the beginning, in the middle, at the end or in all course of the interval. If the option *'Driver group'* is chosen, while generating a report only those intervals that have some driver belonging to a group (the group's name mask can be indicated as well) will be analyzed. In addition, you can enable the option *'Retrieve intervals'* to get only those segments that contain the specified driver or group from the scope of intervals.

If the option *'Without driver'* is selected, the resulting table will consist of intervals which contain segments without any drivers or driver groups. Those segments can be retrieved as well.

Trailer

This filter works in the same way as the previous one, but it allows to filter intervals according to presence or absence of a trailer assigned to a unit.

Fuel fillings

Intervals with fillings or without fillings can be displayed in the table. If the first case is chosen, then you can additionally indicate max and min filling volume. Fillings can be summed up. In this case, the indicated filling volume will be applied to the total of fillings found.

Fuel thefts

Intervals with fuel thefts or without thefts can be displayed. If the first case is chosen, then you can additionally indicate max and min theft volume. Like fillings, fuel thefts can be summed up.

Geofences/Units

The filter is divided into two parts — geofences and units. In the upper part you can select geofences to be analyzed for the report. You can focus on unit activity in or out of a geofence. To put a geofence under control, move the marker from *None* to *In* or *Out* against a required geofence. Only geofences that belong to the same resource as the reports template itself can be displayed here. ⓘ To facilitate the process, you can indicate flags for groups of geofences (displayed in square brackets). Indicating the flag for a group of geofences equals to indicating flags for every geofence of this group. Note that number of geofences in a group is dynamic (adding to/deleting from groups of geofences), and notifications come considering this dynamics.

In the same way you can choose units (they are considered as 'moving geofences'). In this case, indicate radius for

these units. Thus, you can get information about unit activity in or out of the area of selected units. Only units to which you have *'Query reports or messages'* access are displayed here. To quickly find a necessary geofence or unit, use the dynamic filter. To select all items at once, use the <ctrl> key.

In addition, you can enable the option *'Retrieve intervals* to retrieve only segments inside or outside selected geofences or units.

Each of described above limitations can be applied either independently or along with other limitations. If the option *'Retrieve intervals'* (in the *'Sensors'* or *'Speed'* sections) is combined with other conditions, then the filtration by other conditions is applied *after* retrieving the appropriate intervals.

The above described filters can be used either independently or in combination with each other. Each filter is applied directly to the indicated time interval, and a generated report shows a value meeting the parameters of all the filters used.

Account Tree (for resource)

This report provides you with information concerning the structure of an account. In other words, a table helps you to understand which object types an account consists of, and also understand the hierarchy among these objects.

A table may contain the following columns:

- **Object type**: accounts, resources, users, units, unit groups, retranslators, routes.
- **Name**: name of an object.

Moreover, to narrow the object type line, it is necessary to indicate the object type which hierarchy you are interested in. To do so, indicate the corresponding flags in report template parameters section.

Note that objects' hierarchy will be presented more obviously, if the grouping by object type is chosen in a report template.

Chat

This report unites commands of the kind *Send message to driver* and replies from the driver. How to carry a chat with a driver...

- **Time**: date and time when the message was received.
- **Sender**: driver or operator (operator's username in brackets).
- **Text**: message text.
- **Count**: the number of messages.
- **Notes**: an empty column to add your custom comments after printing or exporting the report.

Time	Sender	Text	Count
2016-04-07 11:34:32	Driver	Order received	1
2016-04-12 11:58:58	Driver	Filled 20 gal.	1
2016-05-20 09:55:50	Operator (user)	Route 45 for today.	1
2016-05-20 09:56:28	Driver	Connection test.	1
2016-05-20 09:59:36	Driver	Route 125. Started at 08:15.	1
2016-05-25 12:18:27	Driver	On the way to warehouse.	1

Check Points

Route points refer to check points indicated when creating a route. The table can include:

- **Point name**: the name given to this check point while creating it.
- **Real arrival**: time when the unit entered this point.
- **Scheduled arrival**: time when the unit was supposed to be there according to the schedule.
- **Initial location**: location at that time.
- **Real departure**: time when the unit left this point.
- **Scheduled departure**: time when the unit was supposed to leave the point according to the schedule.
- **Final location**: location at that time.
- **Result**: *Visited* (both entrance and exit were detected), *Entrance only*, *Exit only*, *Skipped*.
- **Route**: the name of the route to which this check point belongs.
- **Schedule**: schedule name.
- **Round**: round name.
- **Arrival time deviation**: positive value if delayed, negative value if in a hurry in regard to arrival time set in point properties.
- **Departure time deviation**: the same for departure time.
- **Presence duration**: time spent in the check point.
- **Presence mileage**: mileage in the check point.
- **Section duration**: time spent to travel from the previous check point to this one.
- **Section mileage**: mileage from the previous check point.
- **Count**: points count.
- **Driver**: driver's name if available.
- **Trailer**: trailer's name if any was bound.
- **Notes**: an empty column for your custom comments.

Point name	Result	Route	Arrival time deviation	Departure time deviation	Presence duration
Westcliff Drive	Visited	Santa Cruz Tour	0:00:00	0:00:44	0:00:00
Punto de control 3	Visited	Santa Cruz Tour Bus Route	0:00:00	0:01:08	0:00:00
Punto de control 2	Visited	Santa Cruz Tour Bus Route	0:00:43	0:00:43	0:01:00
UCSC Campus	Visited	Santa Cruz Tour	-0:02:16	-0:01:36	0:00:40
Metro Station	Visited	Santa Cruz Tour	-0:02:01	-0:01:41	0:00:20
Punto de control 1	Visited	Santa Cruz Tour Bus Route	-0:00:01	-0:00:16	0:00:45
Santa Cruz Boardwalk	Visited	Santa Cruz Tour	-0:01:42	-0:01:32	0:00:10
Punto de control 3	Visited	Santa Cruz Tour Bus Route	0:00:54	0:01:09	0:01:15
Westcliff Drive	Visited	Santa Cruz Tour	-0:00:17	0:00:43	0:01:00

Chronology

This kind of report gives information about all actions and changes in unit state during the indicated period of time. Unlike most of other tables which are dedicated to certain things (parkings, sensors, trips, etc.), this table can gather events of various kinds which allows to estimate movement history in the whole.

The following things can be included to the chronology (in the template select necessary):

- Trips
- Parkings
- Stops
- Engine hours
- Fillings
- Thefts
- Events
- Drivers
- Trailers
- Speedings
- Connection loss
- Sensor trigger (enter one or two masks to indicate needed sensors; note that when you enter a mask the sensors are firstly filtered by their type (digital sensors), and then by name)

The following columns can be selected to form the table:

- **Type**: trip, parking, stop, engine hours, filling (or reg. filling), theft, event (or violation), driver, connection loss, sensor.
- **Beginning**: when the detected activity began.
- **Initial location**: unit location at the moment of activity beginning.
- **End**: when the detected activity finished.
- **Final location**: unit location at the moment of activity end.
- **Duration**: how long this activity lasted.
- **Description**: for trips and speedings — mileage, for events and violations — the text of notification, for engine hours — duration, for drivers — driver's binding/unbinding and name, for fuel fillings and thefts — the volume of fuel and sensor name, for sensors — sensor activation/deactivation.
- **Notes** — an empty column for your custom comments.

Type	Beginning	Initial location	End	Duration	Description
Trip	2015-05-30 06:10:10	Mex-2, San Luis Río Colorado	2015-05-30 07:52:22	1:42:12	Mileage: 128 km
Engine hours	2015-05-30 06:10:10	Mex-2, San Luis Río Colorado	2015-05-30 10:19:13	4:09:03	Duration: 4 hours 9 minutes
Stop	2015-05-30 07:28:05	Mex-2, Sonoita Centro	2015-05-30 07:32:07	0:04:02	-----
Parking	2015-05-30 07:52:22	Mex-2, General Plutarco Elías Calles	2015-05-30 09:58:50	2:06:28	-----
Trip	2015-05-30 09:58:50	Mex-2, General Plutarco Elías Calles	2015-05-30 10:19:05	0:20:15	Mileage: 27 km
Parking	2015-05-30 10:19:05	Mex-2, Puerto Peñasco	2015-05-30 17:08:12	6:49:07	-----
Sensor	2015-05-30 10:19:13	Mex-2, Puerto Peñasco	2015-05-30 10:19:13	0:00:00	Deactivated sensor: Motor
Engine hours	2015-05-30 17:44:42	Mex-2, Puerto Peñasco	2015-05-30 19:38:12	1:53:30	Duration: 1 hours 53 minutes
Sensor	2015-05-30 17:44:42	Mex-2, Altar	2015-05-30 19:38:12	1:53:30	Deactivated sensor: Motor
Trip	2015-05-30 17:48:40	Mex-2, Puerto Peñasco	2015-05-30 19:37:57	1:49:17	Mileage: 131 km

⚠ Note that the system does not calculate state duration for such activity types as fillings and thefts. Therefore, beginning and end time for fillings/thefts are the same in the 'Chronology' table, and duration column displays zero value.

Connection Problems

This kind of report lists periods when no data has been generated and/or send to the system from a unit. The parameters for this report are adjusted in Unit Properties => Advanced where you set *Maximum interval between messages*.

The following information can be presented in this kind of report:

- **Beginning**: date and time when connection loss happened.
- **End**: date and time when connection was recovered. ⚠ Note that if the time passed between receiving the last message on a report interval and the end of a report interval exceeds a value of a maximum interval between messages, then a connection loss interval will be added to the report. The beginning of this interval corresponds to the time of last message receiving, and the end corresponds to the end of a report interval.
- **Duration**: time interval of connection loss.
- **Location**: the address where the unit was right before the connection broke.
- **Count**: the number of connection gaps detected.
- **Driver**: driver's name if available.
- **Trailer**: trailer's name if any was bound.
- **Notes**: an empty column for your custom comments.

Beginning	Duration	Location	Count	Driver
2015-05-30 00:00:00	13:38:28	Dózsa György utca 98-106, Noszlop	1	Jon
2015-12-14 16:38:31	15:48:25	Szent István út 2-42, Ajka	1	Jon
2015-12-15 09:12:22	0:18:28	Táncsics utca 26-34, Magyarpolány	1	Samuel
2015-12-15 16:20:23	0:06:36	Szent István út 2-42, Ajka	1	Jack
2015-12-22 21:10:52	0:05:13	Szent István út 2-42, Ajka	1	Jack
2015-12-27 23:34:00	0:17:37	Szent István út 2-42, Ajka	1	Arnold
2015-12-27 23:52:16	0:28:20	Szent István út 2-42, Ajka	1	Jon
2015-12-28 10:37:38	0:05:48	Padragi út 97-125, Padragkút	1	-----

Additional filtration by driver, trailer, and geofences/units can be applied to this report.

Counter Sensors

This table shows the operation of *counter* type sensors. In the template, you set the mask (filter) for sensors or choose **All sensors**. Possible columns are:

- **Sensor**: sensor name.
- **Activated**: activation time.
- **Deactivated**: deactivation time.
- **Duration**: operation time.
- **Total time**: time from the first activation beginning to the last activation end.
- **Location**: unit location when counter was activated.
- **Mileage**: distance traveled for the operation period.
- **Mileage (adjusted)**: mileage subject to the coefficient set in unit properties (*Advanced* tab).
- **Avg speed**: average speed in this period.
- **Max speed**: maximum speed in this period.
- **Counter**: the value (can be sown with accuracy to two decimal places — see Advanced Settings).
- **Geofences/Units** — the column that includes the names of the geofences or units which were crossed during the report's execution interval. Necessary geofences and units are to be indicated in the filtration parameters. If on some interval there were several geofences or units like that, in the report there will be the name of the geofence with the smallest surface or the name of the unit with the smallest radius of approximation. If the sizes coincide, all the names will be included.
- **Driver**: driver's name if available.
- **Trailer**: trailer's name if any was bound.
- **Penalties**: penalties calculated for adjusted Eco Driving criteria.
- **Rank**: received penalty points converted into a grade using 6 point scoring system.
- **Notes**: an empty column for your custom comments.

№	Sensor	Activated	Duration	Location	Mileage	Max speed	Counter
1	Counter sensor	2012-06-25 12:39:20	0:32:06	Joachima Chreptowicza, Augustów	42 km	136 km/h	037
2	Counter sensor	2012-06-25 13:17:02	0:44:24	Mikołaja Kopernika, Grajewo	61 km	141 km/h	732
3	Counter sensor	2012-06-25 14:12:20	0:28:04	Legionów, Łomża	39 km	118 km/h	205
4	Counter sensor	2012-06-25 15:01:42	0:12:52	Stacyjna, Stare Lubiejewo	19.14 km	125 km/h	747
5	Counter sensor	2012-06-25 15:35:30	0:16:46	E67, 0.38 km from Sadzawki	21 km	136 km/h	862
6	Counter sensor	2012-06-25 15:58:38	0:20:52	Tadeusza Kościuszki, Wyszków	29 km	122 km/h	773
7	Counter sensor	2012-06-25 16:19:30	0:48:04	Pułtuska, Serock	66 km	136 km/h	1122
8	Counter sensor	2012-06-25 17:26:00	0:12:16	E30, Sochaczew	18.13 km	145 km/h	521
9	Counter sensor	2012-06-25 17:57:32	0:16:50	Podgrodzie, Łowicz	21 km	115 km/h	998
10	Counter sensor	2012-06-25 18:15:38	0:13:44	Dorzeczna, Głowno	16.85 km	136 km/h	696
11	Counter sensor	2012-06-25 18:29:22	0:43:14	E30, 2.39 km from Zelgoszcz	96 km	158 km/h	105
12	Counter sensor	2012-06-25 19:15:38	0:10:42	E30, Piekło	24 km	167 km/h	518
13	Counter sensor	2012-06-25 19:27:08	0:17:32	E30, Wola Koszucka	38 km	156 km/h	562
14	Counter sensor	2012-06-25 20:04:18	0:10:42	E30, Nagradowice	17.68 km	145 km/h	789
-----	-----	**2012-06-25 12:39:20**	**5:28:08**	-----	**507 km**	**167 km/h**	**6067**

Intervals filtration can be applied to this table: by duration, mileage, engine hours, speed range, trips, stops, parkings, sensors, drivers, fuel fillings, fuel thefts, and geofences/units.

Counter sensor's value can be visualized in the chart that shows counter's operation intervals and its value. More about charts...
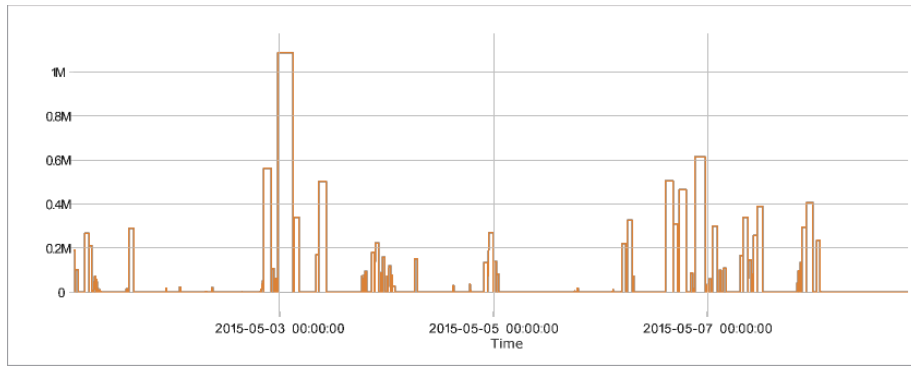
Custom Fields

The table *Custom fields* represents the list of custom fields entered in the corresponding tab of unit properties dialog (see Unit Properties => Custom Fields).

To get this report, you need the access 'View custom fields' and/or 'View admin fields' for a unit/user/unit group. The type of fields is selected in the right part of the report template dialog (all/general/admin fields).

Possible columns:

- **Name**: custom field name.
- **Value**: custom field value.
- **Notes**: an empty column for your custom comments.

Name	Value	Notes
Carrying capacity	3 t	
Fuel	diesel	
Year	2009	

There is no point to apply additional parameters such as grouping, 'Total' row, and numbering to this kind of report. It does not matter what interval you choose for the report, because only the current fields contained in unit properties can be displayed.

To get custom fields for unit group (see Other Reports), make sure the option *'Detalization'* is enabled. Pay attention that individual fields of each unit will be displayed, and not the fields of the selected unit group. To get the fields of group itself, check the option *'Group itself'* in report template.

Digital Sensors

Usually, digital sensors have two states: on/off, activated/deactivated, busy/free and so on. For example, it can be ignition sensor or cargo load sensor. All sensors are configured in Unit Properties => Sensors.

In the report template you can select up to four sensors using masks. Enter sensor's full name or a part of the name using wildcard symbols like asterisk * (replaces several characters) or question mark **?** (replaces one symbol). Sensor name cannot contain commas. Check the **'All sensors'** check box to automatically select all existing digital sensors. If no sensors are selected or sensors are indicated incorrectly, the table cannot be formed.

The table can contain the following columns:

- **Sensor**: the name of the sensor under control.
- **On**: time when the sensor was activated.
- **Off**: time when the sensor was deactivated.
- **Duration**: the interval when the sensor was on.
- **Total time**: time from the beginning of first activation to the end of last one.
- **Location**: unit location at the moment of activation.
- **Mileage**: the distance traveled while the sensor was on.
- **Mileage (adjusted)**: mileage subject to the coefficient set in unit properties (*'Advanced'* tab).
- **Initial mileage**: mileage sensor value at the moment of a sensor activating. If no saving of mileage parameter was made through the reported period, then mileage is counted from 0.
- **Final mileage**: mileage sensor value at the moment of a sensor deactivating.
- **Avg speed**: average speed of movement when the sensor was on
- **Max speed**: maximum speed detected in the interval.
- **Activations count**: the number of activations (can be helpful either in grouping table data by years/months/weeks/days/shifts or for the reports on unit groups).
- **Driver**: driver's name if available.
- **Trailer**: trailer's name if any was bound.
- **Penalties**: penalties calculated for adjusted Eco Driving criteria.
- **Rank**: received penalty points converted into a grade using 6 point scoring system.
- **Notes**: an empty column for your custom comments.

Sensor	Activated	Deactivated	Duration	Total time	Location	Mileage
Motor	2015-05-30 06:10:10	2015-05-30 10:19:13	4:09:03	4:09:03	Mex-2, San Luis Río Colorado	155 km
Motor	2015-05-30 16:55:11	2015-05-30 17:14:50	0:19:39	0:19:39	Mex-2, Puerto Peñasco	0.17 km
Motor	2015-05-30 17:44:42	2015-05-30 19:38:12	1:53:30	1:53:30	Mex-2, Puerto Peñasco	131 km
Motor	2015-05-30 20:08:35	2015-05-31 08:34:26	12:25:51	12:25:51	Mex-2, Altar	796 km
Motor	2015-05-31 17:35:05	2015-05-31 17:35:56	0:00:51	0:00:51	Avenida Monte Seir, Fracc Santa Rocío	0.01 km
Motor	2015-05-31 17:45:46	2015-05-31 18:12:54	0:27:08	0:27:08	Avenida Monte Seir, Fracc Santa Rocío	8.64 km
Motor	2015-05-31 18:56:07	2015-05-31 19:15:02	0:18:55	0:18:55	Boulevard Jesús Kumate Rodríguez, Culiacán	8.83 km
Motor	2015-06-01 21:58:49	2015-06-01 22:06:35	0:07:46	0:07:46	Avenida Quinta Poniente, Fracc Santa Rocío	0.62 km
Boton SOS	2015-06-05 03:46:14	2015-06-05 03:46:21	0:00:07	0:00:07	Avenida Monte Seir, Fracc Santa Rocío	0.00 km
Boton SOS	2015-06-05 03:48:01	2015-06-05 03:48:23	0:00:22	0:00:22	Avenida Monte Seir, Fracc Santa Rocío	0.00 km
Motor	2015-06-07 03:40:51	2015-06-07 04:36:00	0:55:09	0:55:09	Avenida Siderita 1461, Ampl Valle Del Pedregal	0.00 km

Intervals filtration can be applied to this table: by duration, mileage, engine hours, speed range, trips, stops, parkings, driver, trailer, fuel fillings, fuel thefts, and geofences/units.

Eco Driving

The report provides you with the information on how a driver treats the entrusted vehicle. Analyses of driving behaviour could help you to prolong vehicle life, reduce fuel costs, ensure cargo safety, and also understand the reason for any case of emergency.

Before generating 'Eco Driving' report it is necessary to indicate settings on the corresponding tab of unit properties dialog.

A table may contain the following information:

- **Violation**: a type of violation.
- **Beginning**: time of violation beginning.
- **Initial location**: an address of unit location on the moment of violation beginning.
- **End**: time of violation end.
- **Final location**: an address of unit location on the moment of a violation end.
- **Value**: parameter value during violation.
- **Avg speed**: average speed during violation.
- **Max speed**: maximum speed during violation.
- **Penalty**: penalty value indicated on the 'Eco Driving' tab of unit properties.
- **Rank**: received penalty points converted into a grade using 6 point scoring system (can be useful if grouping by years, months, weeks, days, shifts, or trips has been applied).
- **Rating by violations**: an individual index number of a unit/driver calculated on the basis of committed violations. The lower the rating is, the less violations are committed. ⚠ This column can be used in the report on unit groups and driver groups only.
- **Mileage**: distance covered on a violation or grouping interval.
- **Mileage (adjusted)**: mileage considering a coefficient set in unit properties ('Advanced' tab).
- **Initial mileage**: mileage counter value at the moment of violation beginning. If no saving of mileage parameter was made through the reported period, then mileage is counted from 0.
- **Final mileage**: mileage counter value at the moment of violation end.
- **Duration**: duration of a violation or grouping interval.
- **Count**: number of violations of such type.
- **Driver**: name of a driver on this vehicle.

Special attention should be paid to the 'Rating by violations' column. It can be used in the report on unit groups and driver groups only. If the column is included in a table, then units/drivers can be placed in the table according to the violations committed (from the lower rating to the highest one). To do so, choose the total grouping by rating in parameters of a report template. Rating by violations is calculated by the system on the basis of eco driving ranks. In case the ranks are similar, the system takes covered mileage into account. The higher the mileage value travelled upon the same rank, the lower the rating by violations is. Note that the system supports visual marking of rating fields according to the eco driving rank. To do so, choose colors and the values matching them in the corresponding block of report template parameters.

	№	Grouping	Beginning	End	Violation	Value	Max speed	Penalties	Rank	Duration	Mileage	Count
⊞	1	Trip 12 Aug 2015 00:00:01	12 Aug 2015 00:00:01	12 Aug 2015 00:52:49	-----	-----	96 km/h	30	5.6	0:52:48	32 km	36
⊟	2	Trip 12 Aug 2015 01:37:53	12 Aug 2015 01:37:53	12 Aug 2015 04:48:14	-----	-----	110 km/h	42	5.2	3:10:21	121 km	172
└⊟	2.1	August	12 Aug 2015 01:37:53	12 Aug 2015 04:48:14	-----	-----	110 km/h	42	5.2	3:10:21	121 km	172
└⊟	2.1.1	Wednesday	12 Aug 2015 01:37:53	12 Aug 2015 04:48:14	-----	-----	110 km/h	42	5.2	3:10:21	121 km	172
	2.1.1.1	12 Aug 2015 01:38:17	12 Aug 2015 01:38:17	12 Aug 2015 01:38:27	Braking normal	0.15 g	40 km/h	30	-----	0:00:10	0.05 km	1
	2.1.1.2	12 Aug 2015 01:39:39	12 Aug 2015 01:39:39	12 Aug 2015 01:40:23	Speeding allowed	7 km/h	67 km/h	1	-----	0:00:44	0.80 km	1
	2.1.1.3	12 Aug 2015 01:40:31	12 Aug 2015 01:40:31	12 Aug 2015 01:40:45	Speeding allowed	5 km/h	65 km/h	1	-----	0:00:14	0.89 km	1
	2.1.1.4	12 Aug 2015 01:41:41	12 Aug 2015 01:41:41	12 Aug 2015 01:41:51	Braking normal	0.15 g	26 km/h	30	-----	0:00:10	0.06 km	1
	2.1.1.5	12 Aug 2015 01:42:19	12 Aug 2015 01:42:19	12 Aug 2015 01:42:47	Braking severe	0.30 g	62 km/h	40	-----	0:00:28	0.45 km	1
⊞	3	Trip 12 Aug 2015 05:26:13	12 Aug 2015 05:26:13	12 Aug 2015 10:18:52	-----	-----	112 km/h	28	5.6	4:52:39	188 km	207
⊞	4	Trip 12 Aug 2015 10:56:02	12 Aug 2015 10:56:02	12 Aug 2015 14:06:44	-----	-----	110 km/h	38	5.3	3:10:42	121 km	156
⊞	5	Trip 12 Aug 2015 14:51:48	12 Aug 2015 14:51:48	12 Aug 2015 15:42:33	-----	-----	96 km/h	34	5.4	0:50:45	31 km	37
	-----	Total	12 Aug 2015 00:00:01	12 Aug 2015 15:42:33	-----	-----	112 km/h	34	5.4	12:57:15	493 km	608

Note that it is easier to analyse the received report, if a grouping option has been applied to a report template.

Information received in a report can be grouped on the basis of different criteria, such as time (year, month, week, day, shift), type of violation, and trips.

Moreover, in addition to grouping an option of detalization can be applied. This option allows viewing the final level of nesting (date and time) inside of grouping. Though, take into consideration that penalty and rank can be given for the violation taken place on some interval of time (not immediately). That is why on the final level of nesting (date and time) a dash is given in the 'Rank' column, and the 'Penalty' column receives the value indicated on the 'Eco Driving' tab of unit properties.

Penalty Scoring System

The value of penalty points for a particular criterion is indicated on the 'Eco driving' tab of a unit properties dialog. Afterwards the indicated points are used in the report for driving quality evaluation. The calculation of penalty points is made using the special algorithm. The main peculiarities are presented below.

Without grouping

- If no averaging has been used, then the penalty value (earlier indicated on the 'Eco Driving' tab) is displayed opposite to every criterion in the corresponding column. And the 'Total' line (if available) contains the value which corresponds to the sum of points scored for violations.
- If averaging (by mileage/by time) has been used, then the main difference is that the 'Total' value corresponds to the quotient received as a result of division of the scored penalty points total number by the number of minute intervals (averaging by time), or by the number of kilometer intervals (averaging by mileage) in a trip.

With grouping

- If no averaging has been used, then a total number of penalty points for the violations of a particular group is displayed opposite to every group in the corresponding column. And the 'Total' line (if available) contains a sum of penalty scores received for all the violations.
- If averaging (by mileage/by time) has been used, then this averaging is applied to every group of parameters in the report table. Besides, if the 'Total' line is available, then the averaging will be applied to the total number of the scored penalty points. The algorithm of averaging is described above. You can also get acquainted with it on the 'Eco Driving' tab of a unit properties dialog.

Penalty–Rank Conversion

The system provides the algorithm to convert received penalties into a rank:

Penalty	Rank
Less than 20	6.0
20-50	5.0
50-100	4.0
100-200	3.0
200-500	2.0
More than 500	1.0

Engine Hours

Engine hours report shows working actively of a unit, its productivity and utilization as well as fuel consumption and some more things. The activity and efficiency of work of attached implements can be also analyzed.

To generate this report, the unit is supposed to have sensors like ignition, engine efficiency or absolute/relative engine hours sensor.

The method of calculating engine hours is set in Unit Properties => General. In Unit Properties => Advanced you can also set *Daily engine hours rate* to calculate utilization and productivity.

There are two properties which can be used in engine hours report. They are timeout (to be indicated for a sensor) and maximum interval between messages (to be set for a unit). Both properties are used to cut off invalid intervals during defining of engine hours amount. If values for both timeout and maximum interval between messages are indicated, then the system will use the property with minimum value indicated.

Additionally, you can specify engine hours sensor to be used in this report. For this, enter its name mask in a special filter in the reports template. It allows creating a separate table for each engine if there are several.

In the table, you can see:

Beginning	Initial location	End	Engine hours	Total time	Mileage
2015-05-30 06:10:10	Mex-2, San Luis Río Colorado	2015-05-30 10:19:13	4:09:03	4:09:03	155 km
2015-05-30 16:55:11	Mex-2, Puerto Peñasco	2015-05-30 17:14:50	0:19:39	0:19:39	0.17 km
2015-05-30 17:44:42	Mex-2, Puerto Peñasco	2015-05-30 19:38:12	1:53:30	1:53:30	131 km
2015-05-30 20:08:35	Mex-2, Altar	2015-05-31 08:34:26	12:25:51	12:25:51	796 km
2015-05-31 17:35:05	Avenida Monte Seir, Fracc Santa Rocío	2015-05-31 17:35:56	0:00:51	0:00:51	0.01 km
2015-05-31 17:45:46	Avenida Monte Seir, Fracc Santa Rocío	2015-05-31 18:12:54	0:27:08	0:27:08	8.64 km
2015-05-31 18:56:07	Boulevard Jesús Kumate Rodríguez, Culiacán	2015-05-31 19:15:02	0:18:55	0:18:55	8.83 km
2015-06-01 21:58:49	Avenida Quinta Poniente, Fracc Santa Rocío	2015-06-01 22:06:35	0:07:46	0:07:46	0.62 km
2015-06-05 03:37:19	Avenida De Los Hacendados, Penitenciaría	2015-06-07 00:14:13	44:36:54	1 days 20:36:54	1225 km
2015-06-07 03:40:51	Avenida Siderita 1461, Ampl Valle Del Pedregal	2015-06-07 04:36:00	0:55:09	0:55:09	0.00 km
2015-06-07 10:26:49	Avenida Siderita 1461, Ampl Valle Del Pedregal	2015-06-07 10:39:11	0:12:22	0:12:22	0.00 km

- **Beginning**: time when engine hours interval begins.
- **Initial location**: location at that moment.
- **End**: time when engine hours interval ends.
- **Final location**: location at that moment.
- **Engine hours**: value of engine hours on the interval. For accurate engine hours calculation, the equipment should send a valid parameter value of an engine sensor. In case of receiving an invalid value, it is necessary to replace sensor with validator using the correct value (for example, 0).
- **Initial engine hours**: value of engine hours at the beginning of the interval.
- **Final engine hours**: value of engine hours at the end of the interval.
- **Total time**: duration of the interval. If grouping by days is enabled, it shows time from the beginning of the first engine hours interval to the end of last interval.
- **Off-time**: period of time passed from the end of the previous interval to the beginning of the current one (to be defined beginning from the second interval).
- **In movement**: time when the unit had been moving within this interval.
- **Idling**: time when the unit was standing with the engine on. Note that idling cannot be detected if an equipment sends no messages containing speed value.
- **Mileage**: distance traveled for an interval of engine operation.
- **Mileage (adjusted)**: mileage subject to the coefficient set in unit properties ('Advanced' tab).
- **Initial mileage**: mileage sensor's value at the moment of the beginning of the reporting period.
- **Final mileage**: mileage sensor's value at the moment of the end of the reporting period.
- **Avg speed**: average speed for an interval of engine operation.
- **Max speed**: maximum speed for an interval of engine operation.
- **Counter**: counter sensor value.
- **Initial counter**: counter value at the beginning.

- **Finale counter**: counter value at the end.
- **Avg engine revs**: average rate of engine revolutions.
- **Max engine revs**: maximum rate of engine revolutions.
- **Avg temperature**: average temperature value registered for an interval of engine operation.
- **Min temperature**: minimum temperature value registered for an interval of engine operation.
- **Max temperature**: maximum temperature value registered for an interval of engine operation.
- **Initial temperature**: temperature value upon the beginning of engine hours operation.
- **Final temperature**: temperature value upon the end of engine hours operation.
- **Status**: unit status registered during engine hours operation (if there are several, the first one is displayed).
- **Cargo weight**: weight of a transported cargo.
- **Driver**: driver's name if such was identified.
- **Trailer**: trailer's name if any was bound.
- **Movement productivity**: percentage ratio of engine hours in movement to engine hours duration.
- **Engine efficiency duration**: the duration of attached implements operation (if having engine efficiency sensor).
- **Engine efficiency idling**: engine operation time after deduction of efficiency time (total engine hours subtract engine efficiency duration).
- **Utilization**: percentage ratio of engine hours duration to engine hours rate (engine hours divided by daily engine hours rate indicated in unit properties).
- **Useful utilization**: percentage ratio of engine efficiency duration to engine hours rate.
- **Productivity**: percentage ratio of engine efficiency duration to engine hours duration.
- **Consumed**: the volume of consumed fuel detected by any sort of fuel sensor. If several such sensors are available, their values sum up.
- **Consumed by ImpFCS/ AbsFCS/ InsFCS/ FLS/ math/rates**: fuel volume used in engine hours. It can be detected by a fuel sensor (like impulse/ absolute/ instant fuel consumption sensor, fuel level sensor) or calculated by math or rates. Details about fuel in reports...
- **Avg consumption**: average fuel consumption by any sort of fuel sensor. If several such sensors are available, their values sum up.
- **Avg consumption by …**: average consumption in engine hours.
- **Consumed in motion by …**: fuel volume used in engine hours while moving.
- **Avg consumption in motion by …**: average consumption in engine hours while moving.
- **Consumed in idle run by …**: fuel volume used in engine hours during idle running.
- **Avg consumption in idle run by …**: average fuel consumption in idling.
- **Avg consumption by … in trips**: average fuel consumption in trips.
- **Initial fuel level**: fuel level at the beginning of the interval.
- **Final fuel level**: fuel level at the end of the interval.
- **Max fuel level**: maximum fuel level.
- **Min fuel level**: minimum fuel level.
- **Penalties**: penalties calculated for adjusted Eco Driving criteria.
- **Rank**: received penalty points converted into a grade using 6 point scoring system.
- **Notes**: an empty column for your custom comments.

Intervals filtration can be applied to this table: by duration, mileage, engine hours, speed range, trips, stops, parkings, sensors, driver, trailer, fuel fillings, fuel thefts, and geofences/units.

Events

All events registered by the system (including violations) can be shown in the report on events.

There are different ways to add events to unit history:

1. Triggered notifications which method of delivery is *Register event for unit*.
2. Events registered manually by the user in events registrar.
3. Manipulations with counters (change, store, reset counter value) with the help of corresponding jobs or notifications.
4. Automatically, upon completing a route by a unit.

To make a report dedicated just to events of a certain kind, in report template enter a mask to filter events text/description (like *speed*, *traffic*, *filling*, etc.). Only those messages which text corresponds to the given mask will be added to the table.

The following columns can be included to this table:

- **Event time**: time when the event happened.
- **Time received**: time when the server received this data.
- **Event text**: notification text or event description.
- **Location**: unit location at the moment of an event. If an event is registered manually then unit's location is detected on the basis of messages received upon event registration. The same is true for events registered by storing counters' values in unit properties.
- **Driver**: driver's name if identified.
- **Count**: the count of events.
- **Notes**: an empty column for your custom comments.

Event time	Time received	Event text	Location
2015-11-24 15:38:54	2015-11-24 15:38:54	Route 'España': unit is late.	Carretera de Puertollano 2
2015-11-24 15:43:05	2015-11-24 15:43:05	Route 'Nueva ruta1': unit is late.	Carretera de Puertollano 2, Ciudad Real 13002
2016-01-28 09:57:00	2016-03-28 09:57:58	Maintenance service 'Wheel balancing' was registered.	London Road 87-91, Corringham
2016-02-28 09:56:00	2016-03-28 09:56:56	Fuel filling of 50 lt to the amount of 85 was made	Lexham Gardens 48-86, Kensington
2016-03-25 11:31:00	2016-03-25 11:33:02	Maintenance service 'Oil change' was registered.	Luke Lane 1-5, Churchdown
2016-03-28 09:56:00	2016-03-28 09:56:16	Business	-----
2016-03-29 15:19:57	2016-03-29 15:19:57	Mileage counter value is 10 km.	-----
2016-04-11 12:44:23	2016-04-11 12:44:23	Mileage counter value is 200000 km.	-----
2016-05-24 16:06:10	2016-05-24 16:06:10	Mileage counter value is 200000 km.	-----
2016-05-27 10:07:01	2016-05-27 10:11:13	Maintenance service 'Oil change' was registered.	D168, Saint-Etienne-la-Geneste 19160

In addition, you can use special markers for this report: a green flag means event, a red flag means violation. In the tooltip you can find the detailed information.
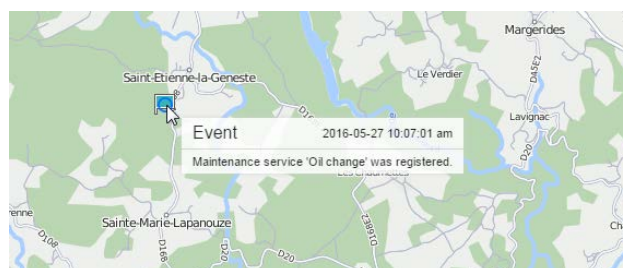
Executed Commands

This kind or report gives a list of commands sent to a unit and successfully executed. Possible columns are:

- **Sending time**: time when the command was sent to the unit.
- **User**: login name of the user who performed the command (hidden if you do not have access rights to some user).
- **Command name**: command name as it is written in unit properties.
- **Command type**: command type (see the list).
- **Parameter**: additional parameter in the command (for messages it is text).
- **Execution time**: time when the command was executed.
- **Channel**: channel type used to transmit the command (*TCP*, *UDP*, *Virtual*, *SMS*).
- **Count**: the number of sent commands.
- **Notes**: an empty column for your custom comments.

Sending time	User	Command name	Command type	Parameters	Execution time	Channel
2012-08-02 18:13:07	wialon	45645646	Query position	-----	2012-08-02 18:13:08	SMS
2012-08-02 18:18:33	wialon	Engine on	Unblock engine	-----	2012-08-02 18:18:34	SMS
2012-08-02 18:20:20	wialon	Message 1	Custom message	yahoo!	2012-08-02 18:20:20	Virtual
2012-08-02 18:23:12	user	Where	Query position	-----	2012-08-02 18:23:13	TCP
2012-08-02 18:23:17	user	Where	Query position	-----	2012-08-02 18:23:18	TCP
2012-08-02 18:23:25	user	Fridge yes	Activate output	6	2012-08-02 18:23:25	SMS
2012-08-02 18:24:31	wialon	Message 1	Custom message	hello!	2012-08-02 18:24:31	Virtual
2012-08-02 18:25:34	wialon	Where	Query position	-----	2012-08-02 18:25:35	SMS
2012-08-02 18:25:38	wialon	Where	Query position	-----	2012-08-02 18:25:39	SMS

This is a list of successfully executed commands. To see *all* commands sent to the unit regardless their execution, go to the 'Messages' panel.

More about commands...

Fuel Fillings

This report shows where and when a vehicle was filled up. Parameters for the report to be generated are set in Unit Properties => Fuel Consumption. This report is generated on the basis of fillings registered manually or detected by sensors. A table cannot be generated if no fuel fillings are found on the indicated time interval.

This report may include the following columns:

- **Time**: the moment of the most significant change of the fuel level.
- **Location**: unit location upon filling (if a filling is registered manually, then unit's location is detected on the basis of messages received upon filling registration).
- **Initial fuel level**: fuel level before the filling.
- **Final fuel level**: fuel level after the filling.
- **Filled**: the volume of filled fuel (sensor name may be indicated in brackets).
- **Registered**: the volume of registered fuel.
- **Difference**: difference between detected and registered filling volume.
- **Description**: short description indicated upon manual registration of fuel filling.
- **Sensor**: sensor which detected the filling.
- **Driver**: driver's name if one was identified.
- **Trailer**: trailer's name if any was bound.
- **Count**: the number of fillings.
- **Mileage**: distance traveled from the interval start to the filling end.
- **Notes**: an empty column for your custom comments.

Time	Location	Filled	Sensor name	Mileage
2015-12-11 13:21:56	Temasek Boulevard, 3, Singapore	15 l	Fuel level	6.23 km
2015-12-11 13:30:31	East Coast Park Service Road, Singapore	25 lt	Fuel level	14.67 km
2015-12-11 13:49:26	Temasek Boulevard, 3, Singapore	50l	Fuel level	36 km
2015-12-11 14:03:04	Temasek Boulevard, 3, Singapore	14.40 lt	Fuel level	53 km
2015-12-11 14:16:49	Temasek Boulevard, 3, Singapore	35 l	Fuel level	70 km
2015-12-11 14:30:30	Temasek Boulevard, 3, Singapore	24 l	Fuel level	87 km
2015-12-11 14:44:15	Temasek Boulevard, 3, Singapore	43 l	Fuel level	103 km

Intervals filtration by geofences/units, drivers, trailers, filling volume, and sensors' masks can be additionally applied to this table. Note that in case with sensors' masks, intervals filtration is applied to fuel filling detected by sensors only.

You can use special markers for this report to mark places of fillings on the map.

⚠ *Attention!*
If no fillings were detected, the table is not generated. Furthermore, registered fillings are ignored then, too.
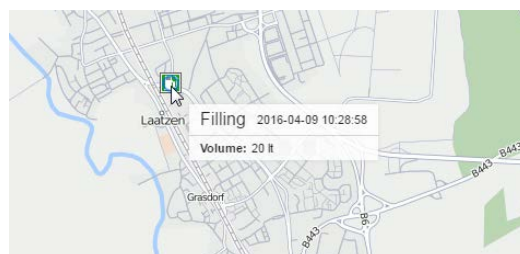
See also Fuel Thefts.

Fuel Thefts

This report is aimed to show all thefts — when, where and how much fuel was stolen. The parameters for this report are set in Unit Properties => Fuel Consumption.

In the table, you can have:

- **Beginning**: date and time when the theft began.
- **Initial location**: unit location at that moment.
- **Time**: moment of the most significant drop of fuel level.
- **Final location**: unit location at that moment.
- **Initial fuel level**: fuel level before the theft.
- **Initial speed**: speed at the beginning.
- **Stolen**: stolen fuel volume.
- **Final fuel level**: fuel level after the theft.
- **Final speed**: speed at the end.
- **Sensor name**: sensor which detected fuel theft.
- **Driver**: driver's name if any was identified.
- **Trailer**: trailer's name if any was bound.
- **Count**: the number of thefts.
- **Counter**: counter sensor value.
- **Mileage**: distance traveled from the interval start to the theft end.
- **Notes**: an empty column for your custom comments.

Beginning	Initial location	Initial fuel level	Stolen	Final fuel level	Sensor name	Driver
2012-11-19 10:26:46	Bemeroder Straße	125.04 lt	42.54 lt	82.50 lt	fuel_10	987654
2012-11-23 11:09:47	Alte Kronsbergstraße	130.20 lt	52.85 lt	77.34 lt	fuel_10	987654
2012-11-26 12:46:23	Giesener Straße	103.12 lt	20.62 lt	82.50 lt	fuel_5	987654

Intervals filtration by geofences/units, driver, trailer, and theft volume can be additionally applied to this table.

Special markers can be shown on the map in the places of thefts.
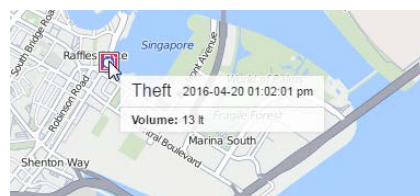
See also Fuel Fillings.

Fuel Traffic

This report is destined to show in one table the data concerning fuel fillings and thefts and the intervals of operation of a counter sensor of the unit, the report is generated for (refueller, milk tanker, etc.).

Read about setting the parameters used in the report in the sections 'Fuel Consumption' and 'Sensor Properties'.

The report 'Fuel Traffic' may include the following columns:

- **Beginning** — depending on the type (see below) — the activation time of the sensor, the time of the fuel filling or theft.
- **End** — depending on the type — the deactivation time of the sensor, the time of the fuel filling or theft.
- **Duration** — the time from the beginning to the end (0 for fuel fillings and thefts).
- **Location** — the position of the unit while sending the data (is associated with the field 'End').
- **Type** — the kind of the current activity determined by the system (filling, theft, counter's operation).
- **Volume** — depending on the type — the quantity calculated by the counter sensor or the data from the columns 'Filled' or 'Stolen' taken from the columns of the same name in the corresponding tables.
- **Sensor name** — the name of the sensor by which the type was determined.
- **Geofences/Units** — the column that includes the names of the geofences or units which were crossed during the report's execution interval. Necessary geofences and units are to be indicated in the filtration parameters. If on some interval there were several geofences or units like that, in the report there will be the name of the geofence with the smallest surface or the name of the unit with the smallest radius of approximation. If the sizes coincide, all the names will be included.
- **Filled** — the sum of the fuel fillings (if any) of the units shown in the column 'Geofences/Units'. Only the fillings registered automatically and the time of which is within the interval from 'Beginning' to 'End' are taken into account.
- **Deviation** — the difference between the values of the columns 'Volume' and 'Filled'.
- **Notes** — an empty column where you can introduce your custom comments after you've printed or exported the report.

Beginning	Duration	Location	Type	Volume	Sensor name	Filled	Deviation	Notes
2017-02-03 08:24:06	0:07:44	Windy Bank Lane, Dewsbury, England	Counter	25 l	DFM	-----	-----	
2017-02-03 08:52:51	0:09:52	Windy Bank Lane, Dewsbury, England	Counter	45 l	DFM	-----	-----	
2017-02-03 09:16:49	0:03:23	Windy Bank Lane, Dewsbury, England	Counter	78 l	DFM	-----	-----	
2017-02-03 09:22:28	0:03:06	Windy Bank Lane, Dewsbury, England	Counter	51 l	DFM	-----	-----	
2017-02-03 09:25:51	0:02:54	Windy Bank Lane, Dewsbury, England	Filling	105 l	FLS	95	10	
2017-02-03 09:28:45	0:00:16	Windy Bank Lane, Dewsbury, England	Counter	34 l	DFM	-----	-----	
2017-02-03 09:29:01	0:00:26	Windy Bank Lane, Dewsbury, England	Counter	29 l	DFM	-----	-----	
2017-02-03 09:49:27	0:08:38	Windy Bank Lane, Dewsbury, England	Counter	28 l	DFM	-----	-----	

For every type you can configure its own intervals filtration.

Geofences

This report shows when and how often a unit visited different geofences. In the right part of the template dialog, the list of all geofences is displayed. You can indicate one or more geofences to put them under control of this report, otherwise the report will not be generated. The list of geofences includes only those geofences which belong to the same resource as the report template itself (so, you need to have access to them). Geofences on the list are sorted by name.

The following columns can be selected for this table:

- **Geofence**: geofence name.
- **Type**: polygon, line, circle, unit (if units and not geofences are selected in the report template).
- **Area**: total area of the geofence (if the metric system is used, then area will be indicated in hectares).
- **Perimeter**: perimeter of the geofence. Perimeter for a line is its length (line thickness is not taken into account).
- **Description**: taken from geofence properties.
- **Time in**: the time when the unit entered the geofence.
- **Time out**: time when the unit left the geofence.
- **Duration in**: duration of the visit.
- **Total time**: time from the first visit beginning to the last visit end.
- **Parkings duration**: time spent in parkings.
- **Off-time**: time between the previous visit and the current one (to be defined beginning from the second geofence visit).
- **Mileage**: mileage in this visit.
- **Mileage (adjusted)**: mileage subject to the coefficient set in unit properties (*Advanced* tab).
- **Counter**: value of counter sensor.
- **Initial counter**: counter value at the entrance.
- **Finale counter**: counter value at the exit.
- **Avg engine revs**: average rate of engine revolutions.
- **Max engine revs**: maximum rate of engine revolutions.
- **Avg temperature**: average temperature value registered inside a geofence.
- **Min temperature**: minimum temperature value registered inside a geofence.
- **Max temperature**: maximum temperature value registered inside a geofence.
- **Initial temperature**: temperature value upon entering a geofence.
- **Final temperature**: temperature value upon leaving a geofence.
- **Off-mileage**: mileage traveled from previous visit.
- **Off-mileage (adjusted)**: mileage traveled from previous visit subjected to the coefficient.
- **Avg speed**: average speed the unit was moving in the geofence.
- **Max speed**: maximum speed detected in that visit.
- **Driver**: driver's name if available.
- **Trailer**: trailer's name if any was bound.
- **Visits**: the number of visits (can be helpful either in grouping table data by years/months/weeks/days/shifts or for the reports on unit groups).
- **Consumed**: the volume of consumed fuel detected by any sort of fuel sensor. If several such sensors are available, their values sum up.
- **Consumed by ImpFCS/ AbsFCS/ InsFCS/ FLS/ math/rates**: the volume of consumed fuel detected by a fuel sensor (like impulse/ absolute/ instant fuel consumption sensor, fuel level sensor) or calculated by math or rates. Details about fuel in reports...
- **Avg consumption**: average fuel consumption by any sort of fuel sensor. If several such sensors are available, their values sum up.
- **Avg consumption by ImpFCS/ AbsFCS/ InsFCS/ FLS/ math/rates**: average fuel consumption by one of the methods mentioned above.

- **Penalties**: penalties calculated for adjusted Eco Driving criteria.
- **Rank**: received penalty points converted into a grade using 6 point scoring system.
- **Notes**: an empty column for your custom comments.

Geofence	Type	Perimeter	Time in	Duration in	Mileage	Max speed
Grot	Polygon	17.50 km	2013-01-15 16:01:00	0:03:00	6.28 km	45 km/h
Furnaces ITK	Line	20.98 km	2013-01-15 16:04:00	0:02:00	2.88 km	35 km/h
Garage	Circle	8.53 km	2013-01-15 16:11:00	0:04:00	7.20 km	47 km/h
Furnaces ITK	Line	20.98 km	2013-01-15 16:24:02	0:01:59	6.17 km	56 km/h
Settlement	Circle	18.85 km	2013-01-15 16:24:02	0:01:59	6.17 km	56 km/h
Grot	Polygon	17.50 km	2013-01-15 16:30:01	0:03:00	6.28 km	45 km/h
Furnaces ITK	Line	20.98 km	2013-01-15 16:33:01	0:02:00	2.88 km	35 km/h

Instead of geofences, you can choose units in the reports template. Additionally, you indicate radius for these units (in meters). In this case, those units are considered as 'moving geofences', and the activity of the unit selected to generate the report is analyzed in regard to these moving geofences. The access 'Query reports or messages' is required to those units.

Intervals filtration can be applied to this table: by duration, mileage, engine hours, speed range, trips, stops, parkings, sensors, drivers, trailers, fuel fillings and thefts.

Geofences can be displayed on the map. To do so, choose *'Render geofences'* option in the report template.

⚠ Note that monitoring system provides a possibility of detecting geofence visit in case a trip intersects a geofence by any segment of its track. This option can be enabled in the advanced settings of a report template.

See related reports — Non-visited Geofences, Rides.

GPRS Traffic

To apply this report to a unit, this unit must have registered events of GPRS traffic counter reset or traffic storage should be adjusted in jobs.

№	Time	Current value	Absolute value	Reset
1	2010-11-23 12:07:08	83.22 MB	0 B	No
2	2010-11-23 12:08:46	83.22 MB	0 B	No
3	2010-11-23 12:09:14	83.22 MB	83.22 MB	Yes
4	2010-11-23 12:10:14	0 B	83.22 MB	Yes
5	2010-11-23 12:12:30	8.55 MB	83.22 MB	No
6	2010-11-23 15:29:12	8.55 MB	83.22 MB	No
7	2010-11-23 15:30:41	8.55 MB	91.76 MB	Yes
8	2010-11-23 15:32:18	0 B	91.76 MB	Yes
9	2010-11-23 15:33:02	0 B	91.76 MB	Yes
10	2010-11-23 15:34:00	72.41 MB	91.76 MB	No
11	2010-11-23 17:55:16	72.41 MB	91.76 MB	No
-----	**2010-11-23 17:55:16**	**72.41 MB**	**91.76 MB**	-----

- **Time**: time when the counter value was registered.
- **Current value**: value at the moment of registration.
- **Absolute value**: GPRS traffic total size by the moment of registration.
- **Reset**: *Yes* — reset was fulfilled, *No* — no reset was fulfilled.
- **Notes**: empty column for your custom notes.

Images

This report shows all the images received from a unit. Click on the image to open it in the image viewer.
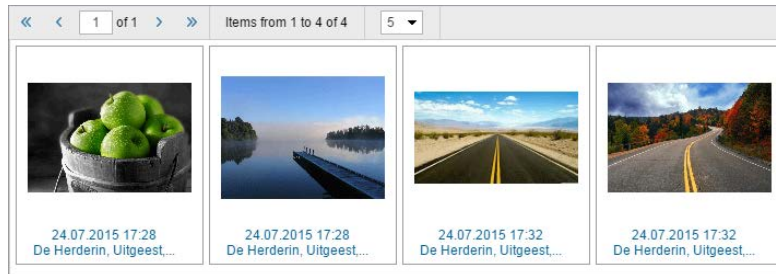
Moreover, every image contains additional information, such as date, time, and sending location. Click this information in order the map to be centered on unit's location at the moment of image sending. Location is shown on the map with the blue marker.

In addition, you can use special markers for this report.

Logs

The *Log* table can be generated for any type of an object presented in reports, i.e., for unit, unit group, user, resource, retranslator, or route. Log contains records about changes made in object's properties or its contents. To see the log of a unit, it is no enough to have 'Query messages or reports' access to it; in addition, you need 'Manage log' access.

- **Time**: date and time when the change was done (saved).
- **User**: name of the user who did it. You can specify user's name mask in report template and so get only changed made by a certain user.
- **Item name**: name of an item. ⚠ This column is used in the same report on users only.
- **Item type**: unit, unit group, user, resource, retranslator, or route.
- **Action**: description of the change performed.
- **Host**: the address of the computer from which the user did the change or it can be 'job' or 'notification' if the action was automatic.
- **Notes**: empty column for custom notes.

Log example for a resource:

Time	User	Item type	Action	Host
2012-07-13 12:42:31	Duremar	Resource	Job 'locate' switched on.	10.1.3.11
2012-07-13 12:42:31	Duremar	Resource	Job 'locate' updated.	10.1.3.11
2012-07-13 12:54:44	user	Resource	Job 'SMS SIM's' switched off.	10.1.3.11
2012-07-13 13:23:22	user	Resource	Job '1_fish-004-picasso' created.	10.1.3.11
2012-07-13 13:47:22	Duremar	Resource	Job '1_fish-004-picasso' updated.	10.1.3.11
2012-07-13 14:33:08	Duremar	Resource	Notification 'Idles' updated.	10.1.3.11
2012-07-16 16:17:58	user	Resource	Job 'locate' switched off.	10.1.3.11
2012-07-16 16:18:00	user	Resource	Job '1_fish-004-picasso' switched off.	10.1.3.11
2012-07-16 17:55:22	Duremar	Resource	Driver 'Vodilla Duremara' created.	10.1.3.11
2012-07-16 17:59:00	Duremar	Resource	Driver 'VodDur' deleted.	10.1.3.11
2012-07-16 17:59:46	user	Resource	Access rights for user 'Duremar' changed	10.1.3.11

User's log provides with two types of information: changes made by this user and changes made by other users in regard to this user as system object. One more column is available in this report — 'Item name':

Time	User	Item name	Item type	Action	Host
2012-07-19 11:58:28	Duremar	user	Resource	Notification 'Idles' updated.	10.1.3.11
2012-07-19 11:58:28	Duremar	user	Resource	Notification 'SMS ctrl' updated.	10.1.3.11
2012-07-19 11:58:28	Duremar	user	Resource	Notification 'Уведомление о входе в зону' updated.	10.1.3.11
2012-07-19 11:59:35	Duremar	Duremar	Resource	Notification '32489' created.	10.1.3.11
2012-07-19 12:03:50	Duremar	SMS Sim004	Unit	Mileage counter changed from 888 km to 32489 km	notification
2012-07-19 12:03:56	Duremar	SMS Sim004	Unit	Mileage counter changed from 32489 km to 32489 km	notification
2012-07-19 14:02:36	user	Duremar	User	User flags changed.	10.1.1.3
2012-07-19 14:02:36	user	Duremar	User	Custom field 'wer' deleted	10.1.1.3

The log of a unit group has an additional parameter — 'Group itself'. If this checkbox is disabled, the log shows changes made to units in the group (detalization is required in this case):

	Unit	Time	User	Item type	Action	Host	Count
⊟	123test	2012-07-19 10:20:29	user	Unit	Messages imported	10.1.3.11	3
	123test	2012-07-19 10:20:29	user	Unit	Messages imported	10.1.3.11	1
	123test	2012-07-19 11:30:43	user	Unit	Access rights for user 'Duremar' changed	10.1.3.11	1
	123test	2012-07-19 11:48:25	user	Unit	Custom field 'pole 2' created	10.1.3.11	1
	Picasso	-----	-----	-----	-----	-----	-----
⊞	SMS Sim004	2012-07-19 10:21:31	user	Unit	Messages imported	10.1.3.11	8
⊞	SMS Sim007	2012-07-19 10:25:10	user	Unit	Messages imported	10.1.3.11	3
	SMS Sim011	-----	-----	-----	-----	-----	-----

If the option 'Group itself' is enabled, the log shows changes made to this unit group as system object:

Time	User	Item type	Action	Host
2012-07-19 14:06:55	user	Unit group	Units in group updated.	10.1.1.3
2012-07-19 14:06:55	user	Unit group	Access rights for user 'user007' changed	10.1.1.3
2012-07-19 14:06:55	user	Unit group	Unit icon changed	10.1.1.3
2012-07-19 14:06:55	user	Unit group	Custom field 'Satus' created	10.1.1.3

Maintenance

This table contains the list of service works (maintenance) done during the indicated period and registered by users who have at least *edit* access to this unit. The table can be composed of the following columns:

- **Service time**: date and time indicated upon a registration.
- **Registration time**: date and time when the event was registered.
- **Kind of work**: the text from the field 'Kind of work'.
- **Comment**: the text from the field 'Description'.
- **Location**: location indicated upon a registration.
- **Duration**: duration of work.
- **Cost**: service cost.
- **Mileage**: mileage counter value at the moment of registration.
- **Engine hours**: engine hours counter value at the moment of registration.
- **Count**: the number of services.
- **Notes**: an empty column for your custom comments.

Service time	Kind of work	Location	Cost	Mileage	Engine hours
2012-10-15 18:24:00	TO-1	A9, Pegnitz	387.00	2193 km	2 days 7:00:00
2012-11-17 18:26:00	TO-2	-----	122.77	4610 km	7 days 21:00:00
2012-12-28 18:29:00	TO-1	A9, Pegnitz	403.00	5107 km	13 days 21:00:00
2012-12-04 16:19:00	Total condition	-----	58.00	7599 km	26 days 2:00:00
2013-02-04 16:18:00	Oil change	-----	67.00	7599 km	26 days 2:00:00
2013-02-04 16:19:00	Maintenance	Willy-Brandt-Platz	99.00	7599 km	26 days 2:00:00

⚠ *Attention!*
Blue rows mean that the place was indicated on the map during the registration.

Messages Tracing

The main target of this report is to facilitate the work with parameters from messages. To do so, parameters are not presented as single data array, but have a particular structure. It means that every parameter is located in its own column.

Along with the values of parameters this report contains other columns as well:

- **Time**: date and time of sending a message.
- **Speed**: speed of a unit.
- **Coordinates**: unit's coordinates.
- **Location**: address of a unit location.
- **Value**: value of a parameter sent in a message.
- **Driver**: driver's name if available.
- **Trailer**: trailer's name if any was bound.
- **Notes**: an empty column to add your custom comments after printing or exporting the report.

№	Time	Speed	Coordinates	Location	device_status	hdop	mileage	pwr_ext	pwr_int
1	03.06.2015 02:00:03	12 km/h	36.893184 : -119.764280	USA, Fresno, E Sarazen Avenue	131458	1.04	580125.00	12.08	0.10
2	03.06.2015 06:00:00	12 km/h	36.893184 : -119.764280	USA, Fresno, E Sarazen Avenue	131458	1.04	580125.00	12.04	0.10
3	03.06.2015 06:06:25	14 km/h	36.893184 : -119.764280	USA, Fresno, E Sarazen Avenue	143746	1.04	580125.00	14.21	0.10
4	03.06.2015 06:06:51	27 km/h	36.893264 : -119.765128	USA, Fresno, E Sarazen Avenue	160134	1.54	580125.00	14.07	0.11
5	03.06.2015 06:06:54	19 km/h	36.893236 : -119.765256	USA, Fresno, E Sarazen Avenue	160134	1.16	580125.00	14.16	0.11
6	03.06.2015 06:06:55	22 km/h	36.893156 : -119.765336	USA, Fresno, N Ponderosa Dr	160134	1.04	580125.00	14.12	0.11
7	03.06.2015 06:06:57	27 km/h	36.893028 : -119.765344	USA, Fresno, N Ponderosa Dr	160134	1.51	580125.00	14.17	0.11
8	03.06.2015 06:07:15	45 km/h	36.891404 : -119.765352	USA, Fresno, N Ponderosa Dr	4354438	0.98	580125.00	14.15	0.10
9	03.06.2015 06:07:21	38 km/h	36.890688 : -119.765288	USA, Fresno, N Ponderosa Dr	4354438	1.03	580125.00	14.05	0.11
10	03.06.2015 06:07:29	23 km/h	36.890340 : -119.765152	USA, Fresno, N Millbrook Avenue	4354438	0.97	580125.00	13.98	0.10
11	03.06.2015 06:08:30	76 km/h	36.880464 : -119.768816	USA, Fresno, N Fort Washington Rd	4354438	0.97	580125.00	13.96	0.11
12	03.06.2015 06:09:18	63 km/h	36.874244 : -119.773840	USA, Fresno, N Fort Washington Rd	4354438	0.96	580125.00	13.90	0.10
13	03.06.2015 06:09:27	59 km/h	36.873620 : -119.775352	USA, Fresno, N Fort Washington Rd	4354438	0.97	580125.00	13.93	0.11
14	03.06.2015 06:10:08	29 km/h	36.872368 : -119.778968	USA, Fresno, N Friant Rd	4354438	0.96	580125.00	13.96	0.10
15	03.06.2015 06:10:11	35 km/h	36.872168 : -119.779080	USA, Fresno, N Friant Rd	4354438	1.40	580125.00	13.85	0.11

Note that you can view the position of a unit on map by clicking on a link in such columns as 'Time', 'Coordinates', and 'Speed'.

⚠ *Note.*
This table cannot be generated for unit groups.

Non-visited Geofences

This report gives the list of geofences that were not visited during the indicated time period. In report template, choose geofences to be checked when generating the table. The list of geofences includes only those geofences that belong to the same account as the report template itself. Geofences on the list are sorted by name. If the list is large, it is convenient to use name mask to quickly find necessary geofences.

Let us assume, we have 11 stores (geofences) to be visited every day. We would like to find out whether there are geofences which were ignored within the work week from 1st to 5th of June. To do this, we enable grouping by days (with detalization), select necessary geofences and columns for the table.

- **Geofence**: geofence name.
- **Type**: geofence type (line, polygon, or circle).
- **Area**: total geofence area (if the metric system is used, then area will be indicated in hectares).
- **Perimeter**: geofence perimeter.
- **Count**: the number of geofences that were skipped.
- **Notes**: an empty column for your custom comments.

From this report we see that on 1st of June 'Point 11' and 'Point 7' were ignored, on 4th of June — 'Point 2', and on 5th of June — five geofences. 2nd and 3rd are missed in the list, and it means that all predefined geofences were visited on those days. You can click on geofences' names to move the map to the first point of a geofence.

№	Date	Geofence	Type	Perimeter	Count
1	2012-06-01	-----	-----	-----	2
1.1	-----	Point 11	Circle	2.09 km	1
1.2	-----	Point 7	Polygon	1.47 km	1
2	2012-06-04	-----	-----	-----	1
2.1	-----	Point 2	Circle	2.09 km	1
3	2012-06-05	-----	-----	-----	5
3.1	-----	Point A	Line	152.82 m	1
3.2	-----	Point 2	Circle	2.09 km	1
3.3	-----	Point B	Line	813.81 m	1
3.4	-----	Point 11	Circle	2.09 km	1
3.5	-----	Point 7	Polygon	1.47 km	1

When the table is applied to a unit group, you can find one more parameter in the report template — **Consider group as a whole**. When the flag is off, a group report is structured in the same way as individual report, and the information is given for each separate unit from the group. When the flag 'Consider group as a whole' is on, report structure is different — you get the list of geofences that were visited by none of the units in the group.

Orders

⚠ *Attention!*
To generate a report, activate the 'Orders' service first.

This kind of report shows detailed information concerning orders. A table may contain the following columns:

- **Name**: a name of an order.
- **Time from**: time from which an order should be delivered (beginning of a delivery interval).
- **Time to**: time to which an order should be delivered (end of a delivery interval).
- **Estimated arrival time**: approximate time of arriving to a destination point (system calculation).
- **Actual arrival time**: actual time of arriving to a destination point.
- **Deviation**: difference between actual and estimated arrival time.
- **Estimated mileage**: approximate distance to a destination point (system calculation).
- **Actual mileage**: actual distance covered to a destination point.
- **Estimated time to point**: approximate time for covering distance between previous and current destination points (system calculation).
- **Actual time to point**: actual time spent for covering distance between previous and current destination points.
- **Fuel consumed**: amount of fuel spent for an order delivery.
- **Avg temperature**: average temperature value registered for an interval of an order distribution.
- **Min temperature**: minimum temperature value registered for an interval of an order distribution.
- **Max temperature**: maximum temperature value registered for an interval of an order distribution.
- **Initial temperature**: temperature value upon the beginning of an order distribution.
- **Final temperature**: temperature value upon the end of an order distribution.
- **Status**: corder delivery state (confirmed/rejected/not set).
- **Comment**: comment entered upon status indication.
- **Address**: delivery point's address.
- **Weight**: total weight of goods in the order.
- **Volume**: a quantitative value (for example, items) of an order indicated upon its creation.
- **Cost**: total cost of goods in the order.
- **Client name**: client's name.
- **Driver**: driver's name.
- **Files**: the number of files attached to the order.

Order	Estimated mileage	Actual mileage	Status	Comment	Weight	Volume	Cost
Order1	3.20 km	3.50 km	Confirmed	no problem	250 kg	5	300
Order2	4.32 km	4.35 km	Confirmed	no problem	100 kg	2	500
Order3	5.38 km	4.82 km	Rejected	nobody home	600 kg	10	1000
Order4	15.27 km	13.19 km	Confirmed	no problem	50 kg	1	25
Order5	4.76 km	3.62 km	Confirmed	no problem	75 kg	2	240
Order6	5.50 km	5.35 km	Confirmed	no problem	111 kg	111	111
Order7	7.14 km	4.77 km	-----	-----	222 kg	222	22
Order8	13.37 km	13.19 km	-----	-----	45 kg	15	70
Order9	3.77 km	3.62 km	-----	-----	44 kg	44	44
Order10	5.03 km	5.25 km	Confirmed	-----	150 kg	3	600
Order11	3.85 km	3.80 km	Confirmed	-----	230 kg	5	170

Additional parameters can be chosen for this kind of report. In other words, a report on orders can be generated on the basis of orders of a particular type:

- **All orders** — all orders for an indicated time period.
- **Visited** — courier's arrival to an address is detected or any status is set.
- **Visited late** — orders are visited late or any statuses are set late.
- **Fulfilled** — courier's arrival to an address is detected, the 'Confirm' status is set.
- **Rejected** — orders with the 'Reject' statuses set.
- **Visited without status** — courier's arrival to an address is detected, a status is not set.

- **Non-visited** — courier's arrival to an address is not detected.

Parkings

Parkings are estimated according to parameters set in Trip Detection when configuring a unit. To get information as accurate as possible, it is advised that you configure each parameter individually for every piece of equipment.

A parking is an interval of time when the following conditions are satisfied:

1. **Insignificant speed**. The speed detected must fall in the range from 0 to the *Minimum moving speed*. When this speed is achieved, unit's behavior is regarded as movement (=trip), if by time and distance it corresponds to trip definition (*Minimum trip time* and *Minimum trip distance* parameters). Then the parking finishes. However, if by time or distance the movement does not fall into trip definition, the parking is prolonged.

2. **Sufficient time interval**. Insignificant speed must continue not less than *Minimum parking time*. If this time is not achieved, unit's behaviour is not regarded as parking. It may be regarded as a stop, but only in case there was a zero speed registered.

3. **Insignificant location change**. As it has been already noted above, the parking is also an insignificant movement in space, that is a travel which in not longer than *Minimum trip distance* if by time it not shorter than *Minimum parking time*.

The following information is presented in this kind of report:

- **Beginning**: the time when the parking started.
- **End**: the time when the parking ended.
- **Duration**: time interval of the parking.
- **Total time**: time from the first parking beginning to the last parking end.
- **Off-time**: time interval from the previous parking end to the current parking beginning (to be defined beginning from the second parking).
- **Location**: the address where the unit was stationary. If there was an insignificant movement detected, the initial address is used.
- **Driver**: driver's name if available.
- **Trailer**: trailer's name if any was bound.
- **Counter**: counter sensor values.
- **Initial counter**: counter value at the beginning of the parking.
- **Finale counter**: counter value at the end of the parking.
- **Avg temperature**: average temperature value registered for the parking interval.
- **Min temperature**: minimum temperature value registered for the parking interval.
- **Max temperature**: maximum temperature value registered for the parking interval.
- **Initial temperature**: temperature value in the beginning of the parking interval.
- **Final temperature**: temperature value in the end of the parking interval.
- **Avg weight**: average weight value registered for the parking interval.
- **Min weight**: minimum weight value registered for the parking interval.
- **Max weight**: maximum weight value registered for the parking interval.
- **Initial weight**: weight value in the beginning of the parking interval.
- **Final weight**: weight value in the end of the parking interval.
- **Status**: unit status registered during the current parking interval (if there are several, the first one is displayed).
- **Count**: the number of parkings (can be helpful either in grouping table data by years/months/weeks/days/shifts or for the reports on unit groups).
- **Notes**: an empty column for your custom comments.

№	Beginning	End	Duration	Total time	Location
1	2015-05-01 00:06:56	2015-05-01 01:25:48	1:18:52	1:18:52	Mex-45D, Apaseo El Grande
2	2015-05-01 02:45:42	2015-05-01 04:18:04	1:32:22	1:32:22	Mex-45, Azteca
3	2015-05-01 05:55:09	2015-05-01 06:06:16	0:11:07	0:11:07	Mex-45D, Encarnación De Díaz
4	2015-05-01 06:22:27	2015-05-01 06:29:32	0:07:05	0:07:05	Mex-45D, Encarnación De Díaz
5	2015-05-01 07:50:26	2015-05-01 07:58:31	0:08:05	0:08:05	Boulevard A Zacatecas, Jesús María
6	2015-05-01 08:02:34	2015-05-01 13:37:56	5:35:22	5:35:22	Circuito Aguascalientes Norte, Jesús María
7	2015-05-01 15:16:01	2015-05-01 22:27:38	7:11:37	7:11:37	Libramiento, Res Tepeyac
8	2015-05-01 22:40:47	2015-05-01 23:39:36	0:58:49	0:58:49	Calle Productividad, Lagos De Moreno
9	2015-05-01 23:52:45	2015-05-02 01:28:18	1:35:33	1:35:33	Calle Productividad, Lagos De Moreno
10	2015-05-02 01:50:33	2015-05-02 07:22:04	5:31:31	5:31:31	Libramiento, Res Tepeyac

See Data in Reports to learn how time (duration) can be formatted.

Intervals filtration (by parking duration, sensor state, driver, trailer, fuel fillings/thefts, and geofences/units) can be applied to this table.

The parkings can be displayed on the map. To make use of this feature, select Parking markers in the report template.
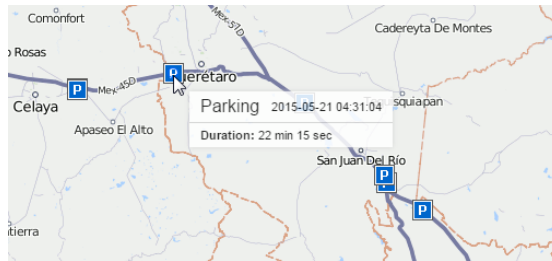
⚠ *Attention!*
You should distinguish parkings from stops.

Profile

This kind of report shows profile information indicated on the corresponding tab of unit properties dialog.

The following columns can be included in the table:

- **Name**: name of an element.
- **Value**: indicated value.
- **Notes**: an empty column for your custom comments.

Name	Value
Axles	2
Brand	VW
Cargo type	any
Carrying capacity, t	1.5
Color	red
Depth, mm	1500
Effective capacity	500
Gross vehicle weight	2.5
Height, mm	1500
Model	Multivan
Registration plate	0123oo7
Vehicle type	van
VIN	19YUA31581L000000
Width, mm	1500
Year	2010

Rides

A ride is a travel from one point (called ride beginning) to another (called ride ending). A ride can be done many times in a specified time period. Rides are useful, for example, when controlling cargo transportation form one point to another in several attempts.

For the report to be generated, two factors are significant:
1) when a unit leaves the ride beginning geofence;
2) when a unit enters the ride ending geofence.
If both of these factors occur, then a ride is completed and can be included in the report. In addition, trip detector is taken into consideration.

Preparing a Ride

To get a report on rides performed, geofences are needed to indicate ride beginning and ride end. The beginning and the end can be the same geofence if the ride starts and ends in one place, for example, if it is necessary to travel ride around some shops and come back to the base.

Let us assume that the task is to transport goods from one place to another, and more than one ride will be required for this. To control this process, we create two geofences and then assign them starting and terminal points appropriately in the report template.
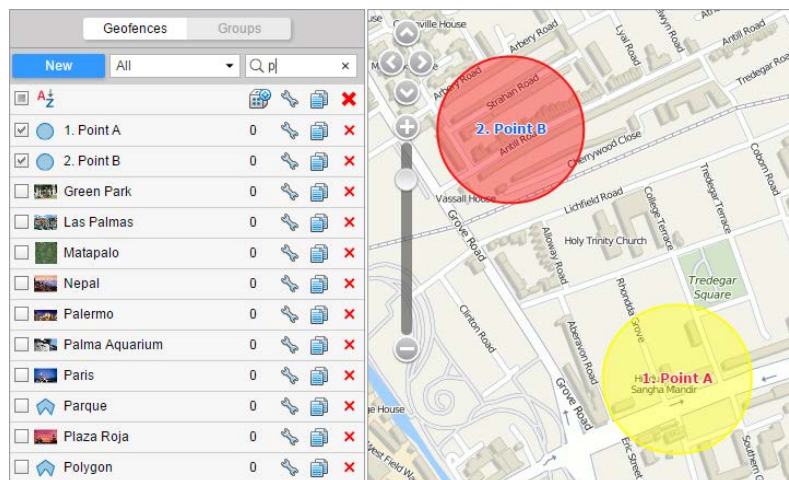
Ride Parameters

When you create a template for rides, pay attention on additional parameters to be set.

Allow circle ride
Circle ride is a ride that starts and finishes in the same geofence, that is a unit must leave this geofence and return after a while. Such a geofence must have both flags — ride beginning and ride end.

Show the rides finished with a stop
This can be used as an additional filter. If activated, it means that the ride ends if a unit stops in the destination geofence. Note that stop is considered to be a unit state in which its speed is less than the minimum moving speed indicated in trip detector. The ride begins upon leaving the departure geofence. If a unit enters a destination geofence (after the ride beginning has been detected), but does not make a stop there, then the ride is continued. The ride ends only upon making a stop in the destination geofence.

Starting and terminal points
In this section you choose which geofences and units will be analyzed in the report. The list of geofences includes only

those geofences that belong to the same resource as the report template itself. Besides, you can choose units as so-called 'moving geofences'. For them, set radius to outline unit's area. Geofences and units on the lists are sorted by name. If the list is large, it is convenient to use name mask to quickly find necessary items. You can even set ride beginning at unit's area and ride end at an ordinary geofence.
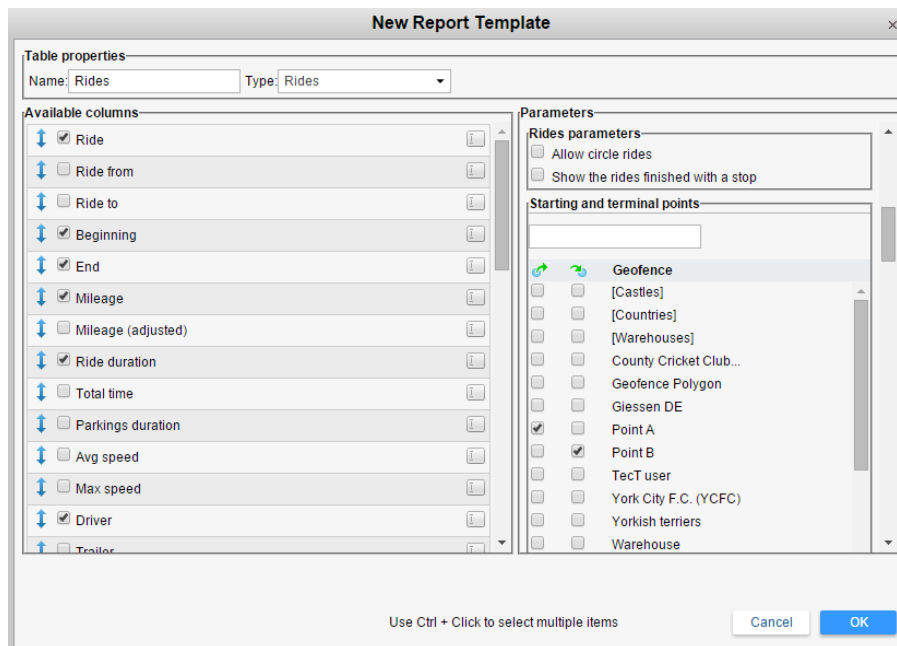
Besides, intervals filtration can be applied to this table: by duration, mileage, engine hours, speed range, trips, stops, parkings, sensor state, driver, trailer, fuel thefts, fillings, and geofences/units.

⚠ Note that monitoring system provides a possibility of detecting geofence visit in case a trip intersects a geofence by any segment of its track. This option can be enabled in the advanced settings of a report template.

Report on Rides

The report on rides gives the list of all performed rides. The table can contain the following information:

- **Ride**: ride mane consists of starting geofence name and final geofence name hyphenated compound.
- **Ride from**: can be used instead of the previous column. Only the departure geofence is indicated here.
- **Ride to**: destination geofence.
- **Beginning**: date and time when the ride began.
- **End**: date and time when the ride ended.
- **Mileage**: distance traveled in this ride.
- **Mileage (adjusted)**: mileage subject to the coefficient set in unit properties ('Advanced' tab).
- **Ride duration**: how much time it took to perform the ride.
- **Total time**: time from the first ride beginning to the last ride end.
- **Parkings duration**: time spent in parkings.
- **Avg speed**: average speed calculated for this ride.
- **Max speed**: maximum speed registered during this ride.
- **Driver**: driver's name if he was identified.
- **Trailer**: trailer's name if any was bound.
- **Counter**: counter sensor value (can be helpful either in grouping table data by years/months/weeks/days/shifts or for the reports on unit groups).
- **Initial counter**: counter value at the beginning.
- **Finale counter**: counter value at the end.
- **Avg temperature**: average temperature value registered in a ride.
- **Min temperature**: minimum temperature value registered in a ride.
- **Max temperature**: maximum temperature value registered in a ride.
- **Initial temperature**: temperature value in the beginning of a ride.
- **Final temperature**: temperature value in the end of a ride.
- **Count**: the number of rides.

- **Status**: unit status registered during the current ride (if there are several, the first one is displayed).
- **Cargo weight**: weight of a cargo transported within a trip between geofences.
- **Consumed**: the volume of consumed fuel detected by any sort of fuel sensor. If several such sensors are available, their values sum up.
- **Consumed by ImpFCS/AbsFCS/InsFCS/FLS/math**: the volume of consumed fuel detected by a fuel sensor (like impulse/absolute/instant fuel consumption sensor, fuel level sensor) or calculated by math.
- **Avg consumption**: average fuel consumption by any sort of fuel sensor. If several such sensors are available, their values sum up.
- **Avg consumption by ImpFCS/AbsFCS/InsFCS/FLS/math**: average fuel consumption in the ride detected by one of the methods mentioned above.
- **Initial fuel level**: fuel level at the beginning of the ride.
- **Final fuel level**: fuel level at the end of the ride.
- **Max fuel level**: maximum fuel level.
- **Min fuel level**: minimum fuel level.
- **Penalties**: penalties calculated for adjusted 'Eco Driving' criteria.
- **Rank**: received penalty points converted into a grade using 6 point scoring system.
- **Notes**: an empty column for your custom comments.

Ride	Beginning	End	Ride duration	Mileage	Driver	Trailer	Consumed
Settlement - Furnaces ITK	2012-08-16 18:27:20	2012-08-17 08:11:32	13:44:12	9.68 km	Eric Claptonon	trailer 3t	0.97 lt
Grot - Furnaces ITK	2012-08-18 14:04:26	2012-08-18 14:05:26	0:01:00	1.75 km	Eric Claptonon	trailer 3t	0.18 lt
Garage - Furnaces ITK	2012-08-18 20:56:36	2012-08-18 21:01:24	0:04:48	8.15 km	Mister X	trailer 3t	0.82 lt
Grot - Furnaces ITK	2012-08-18 21:07:06	2012-08-19 11:39:08	14:32:02	15.00 km	Mister X	trailer 3t	1.50 lt
Settlement - Furnaces ITK	2012-08-26 16:24:04	2012-08-27 18:04:50	1 days 1:40:46	10.21 km	Eric Claptonon	trailer 3t	1.02 lt

See also Unfinished Rides.

Rounds (for unit)

If any routes were assigned to unit and events about routes were stored in unit history, a report based on these events can be generated:

- **Route**: route name.
- **Schedule**: schedule name.
- **Round**: round name.
- **Beginning**: round beginning time (activation time or entrance in the first check point).
- **Initial location**: unit location at the beginning of the route.
- **End**: round end time (entrance to the last point).
- **Final location**: unit location at the end of the route.
- **Result**: *Finished* (the route was activated successfully, and later on the entrance to the last point was detected) or *Not finished* (the last point was not visited).
- **Skipped points**: the number of check points skipped (on this basis more detailed report can be generated — see Check Points).
- **Duration**: time taken to perform the route.
- **Total time**: time from the first route beginning to the last route end.
- **Mileage**: distance traveled while performing the route.
- **Avg speed**: average speed on the route.
- **Max speed**: maximum speed on the route.
- **Count**: the number of routes.
- **Driver**: driver's name if available.
- **Trailer**: trailer's name if any was bound.
- **Notes**: an empty column for your custom comments.

Route	Beginning	Initial location	End	Mileage
Santa Cruz Tour Bus Route	01.04.2016 00:00:44	Oxford Way 320, Santa Cruz, CA 95060, USA	01.04.2016 00:05:34	3.98 km
Santa Cruz Tour	01.04.2016 00:00:49	David Way, Santa Cruz, CA 95060, USA	01.04.2016 00:08:24	7.21 km
Santa Cruz Tour	01.04.2016 00:08:29	Pacific Avenue 802, Santa Cruz, CA 95060, USA	01.04.2016 00:20:44	11.67 km
Santa Cruz Tour Bus Route	01.04.2016 00:09:09	Laurel St Ext, Santa Cruz, CA 95060, USA	01.04.2016 00:17:54	7.87 km
Santa Cruz Tour	01.04.2016 00:20:49	Pacific Avenue 802, Santa Cruz, CA 95060, USA	01.04.2016 00:33:04	11.67 km
Santa Cruz Tour Bus Route	01.04.2016 00:21:29	Laurel St Ext, Santa Cruz, CA 95060, USA	01.04.2016 00:30:14	7.87 km
Santa Cruz Tour	01.04.2016 00:33:09	Pacific Avenue 802, Santa Cruz, CA 95060, USA	01.04.2016 00:45:24	11.67 km
Santa Cruz Tour Bus Route	01.04.2016 00:33:49	Laurel St Ext, Santa Cruz, CA 95060, USA	01.04.2016 00:42:34	7.87 km
Santa Cruz Tour	01.04.2016 00:45:29	Pacific Avenue 802, Santa Cruz, CA 95060, USA	01.04.2016 00:57:44	11.67 km
Santa Cruz Tour Bus Route	01.04.2016 00:46:09	Laurel St Ext, Santa Cruz, CA 95060, USA	01.04.2016 00:54:54	7.87 km
Santa Cruz Tour	01.04.2016 00:57:49	Pacific Avenue 802, Santa Cruz, CA 95060, USA	01.04.2016 01:10:04	11.67 km

How different route statuses are defined (route beginning, route end, point skipped, point visit, etc.), find here.

In addition, in report template, you can indicate **masks for geofences and routes**. It means you can get in a report not all routes performed by a unit within the indicated period, but only the routes which use a certain geofence or which correspond to the given mask of route name. Both filters can be used simultaneously or separately from each other.

Intervals filtration can be applied to this table: by duration, mileage, engine hours, speed range, trips, stops, parkings, sensors, driver, trailer, fuel thefts, fillings, and geofences/units.

Rounds (for route)

A special report can be built to show units' performance of a certain route. The following columns can be presented:

- **Beginning**: round beginning time (activation time or entrance in the first check point).
- **Last activity**: time of latest event concerning this round.
- **Round**: round name.
- **Schedule**: schedule name.
- **Order**: check points order.
- **Unit**: name of unit performing the round.
- **Status**: *Finished* (the route was activated successfully, and later on the entrance to the last point was detected) or *Not finished* (the last point was not visited).
- **Points**: total number of check points in the route (on this bases more detailed report can be generated — see Check Points).
- **Skipped**: the number of check points skipped.
- **Visited**: the number of check points visited.

Beginning	Round	Schedule	Unit	Status	Points	Skipped	Visited
2012-09-18 11:35:00	11:35 POA	11-50	SMS Sim012	Finished	4	1	3
2012-09-18 12:12:00	1234p 12-13	12-13	SMS Sim012	Finished	4	0	4
2012-09-18 12:39:00	1234p 12:43 - 12:59 12:39:00	12:43 - 12:59	SMS Sim012	Finished	4	0	4
2012-09-18 15:08:00	1234p 1KT - 4KT	new var 0	SMS Sim012	Finished	4	0	4
2012-09-18 15:17:00	5834-577	new all 0	SMS Sim012	Finished	4	0	4
2012-09-19 09:59:00	1234p 1KT - 4KT	10:00 - 10:10	SMS Sim012	Finished	4	0	4
2012-09-19 10:09:00	1234p 10:10 - 10:20	10:10 - 10:20	SMS Sim012	Finished	4	0	4
2012-09-19 11:49:00	POA-1408 11-50	11-50	SMS Sim012	Finished	4	2	2

Report type should be *Route*.

Sensor Tracing

This table shows sensor values in certain point in time. The table can be exported in MS Excel where you can build any custom charts based on the data provided.

The report can include *all messages* or take a value in a time interval (like take a value every 10 minutes). One or the other alternative is chosen when configuring report template. If tracing interval is indicated, the system will search and display sensor value from the message which is the closest to the necessary point in time.

Available columns:

- **Speed**: unit's speed from the message from which the value was taken.
- **Coordinates**: unit's coordinates from the message.
- **Location**: unit's location at the moment of sending the message with the sensor's value.
- **Sensor**: sensor name.
- **Time**: the time of the message from which the value was taken.
- **Value**: the value (numbers only).
- **Formatted value**: the value in the indicated units of measurement.
- **Driver**: driver's name if available.
- **Trailer**: trailer's name if any was bound.
- **Notes**: an empty column for custom notes.

Sensor	Time	Value	Formatted value
Internal battery	2015-03-26 01:00:18	4.31	4.31 V
Battery Torton	2015-03-26 01:00:18	13.36	13.36 V
SOS button	2015-03-26 01:00:18	0.00	Off
Incidents	2015-03-26 01:00:18	-----	-----
Motor	2015-03-26 01:00:18	1.00	On
Odometer GPS	2015-03-26 01:00:18	78684.16	78684.16 km
Signal GSM	2015-03-26 01:00:18	21.00	21.00

Activate the appropriate checkbox to get a separate column for each sensor. This option is available only in reports for single units, not for unit groups. If you choose this option, the columns 'Values' or/and 'Formatted value' will be generated for each sensor individually. This allows exporting sensor values to MS Excel and eventually building various charts and diagrams on this basis.

If you activate the options 'Each sensor in separate column' and 'Skip invalid values' simultaneously, only the lines that have at least one sensor's value will be shown in the generated report. The lines without any sensor's value will not be shown. A name of a column containing formatted values is marked by a special symbol (*). Formatted value fields may contain textual information (in brackets) indicated for value intervals.

Time	Internal battery	Battery Torton	Internal battery*	Battery Torton*
2015-03-26 01:00:18	4.31	13.36	4.31 V	13.36 V
2015-03-26 02:00:39	4.31	13.27	4.31 V	13.27 V
2015-03-26 03:08:06	4.31	13.27	4.31 V	13.27 V
2015-03-26 04:08:09	4.31	13.45	4.31 V	13.45 V
2015-03-26 05:08:41	4.30	13.45	4.30 V	13.45 V
2015-03-26 06:09:23	4.29	13.41	4.29 V	13.41 V
2015-03-26 07:10:06	4.29	13.41	4.29 V	13.41 V
2015-03-26 15:12:25	4.28	13.08	4.28 V	13.08 V
2015-03-26 19:36:32	4.30	13.36	4.30 V	13.36 V

In addition, you can choose a driver/trailer and geofences/units to be controlled (see intervals filtration for details).

Invalid Values

If a received value is out of range (the bounds are indicated in sensor properties), then there will be a dash (« —— ») in the lines with the sensor's values. To exclude such rows, flag the option *'Skip invalid values'* in the report template.

The cases when a sensor sends text values (as opposed to numeric) or no values at all are also considered 'invalid'.

SMS Messages (for unit)

This report gives possibility to view all SMS messages received from a unit in a specified period. Here you see date and time when the message was received and the text of the message.

- **Time received**: date and time when the data was received by the server.
- **SMS text**: message text.
- **Count**: the number of messages.
- **Notes**: an empty column for your custom comments.

Time received	SMS text	Count
2015-05-30 00:00:05	PC,0002,29/05/15,21:00:02,5352.7099,N,02736.5601,E,10.0km,117.2,A,010000	1
2015-05-30 00:01:04	SIGNAL,0002,29/05/15,21:01:01,5352.8849,N,02736.7341,E,16.0km,32.8,A,010000	1
2015-05-30 00:02:05	PC,0002,29/05/15,21:02:02,5353.0823,N,02737.2334,E,55.0km,58.7,A,010000	1
2015-05-30 00:03:04	PC,0002,29/05/15,21:03:01,5352.6586,N,02737.6424,E,43.0km,152.9,A,010000	1
2015-05-30 00:04:04	PC,0002,29/05/15,21:04:01,5352.5111,N,02737.5737,E,58.0km,197.8,A,010000	1
2015-05-30 00:05:05	PC,0002,29/05/15,21:05:02,5352.3752,N,02738.2606,E,20.0km,111.1,A,010000	1
2015-05-30 00:06:05	PC,0002,29/05/15,21:06:02,5352.1704,N,02738.8358,E,10.0km,123.7,A,010000	1
2015-05-30 00:07:05	SIGNAL,0002,29/05/15,21:07:02,5352.8444,N,02739.3751,E,33.0km,27.7,A,010000	1
2015-05-30 00:08:05	PC,0002,29/05/15,21:08:02,5353.1712,N,02739.0478,E,41.0km,332.0,A,010000	1

SMS Messages (for resource)

This report provides a possibility to view information about all the SMS messages sent by users of any resource for the indicated period of time. The information may contain the following columns:

- **Time**: time of sending a message.
- **User**: name of a user sending a message.
- **Phone**: a phone number the message is sent to.
- **Count**: number of messages sent.
- **Parts**: number of parts a message consists of.

Time	User	Phone	Parts
2015-12-03 10:03:22	user	+378297777805	1
2015-12-03 10:06:51	Client1	+355295557805	2
2015-12-15 08:36:18	user	+375297777777	1
2015-12-15 08:36:27	InKa	+342589632587	1
2016-03-25 10:01:11	user	+341578965441	1
2016-03-25 10:04:50	Client1	+375291503177	1
2016-03-25 11:04:03	user	+3752934433350	3
2016-04-07 09:59:58	user	+378956895478	1
2016-05-03 10:35:38	Client1	+375775503177	1

Speeding

This kind of report shows speed limitation violations. The parameters for this report are set in Unit Properties => Advanced in the block of speeding. The messages (at least two in succession) containing a speed value greater than set in that parameter will become the basis for this report. If these messages are several in succession, they are united in one speeding event.

The following information can be presented in this kind of report:

- **Beginning**: date and time when the speed limit was exceeded.
- **Location**: device location at that moment.
- **Duration**: how long the violation continued.
- **Total time**: time from the first speeding beginning to the last speeding end.
- **Max speed**: maximum speed within this period.
- **Speed limit**: maximum allowed speed on particular road section or in unit properties.
- **Mileage**: the distance traveled with exceeded speed.
- **Mileage (adjusted)**: mileage subject to the coefficient set in unit properties ('Advanced' tab).
- **Initial mileage**: mileage sensor value at the moment of speeding beginning. If no saving of mileage parameter was made through the reported period, then mileage is counted from 0.
- **Final mileage**: mileage sensor value at the moment of speeding interval's end.
- **Avg speed**: average speed within the interval.
- **Driver**: driver's name (if a driver was identified).
- **Trailer**: trailer's name (if any was bound).
- **Count**: the number of speed violations.
- **Notes**: an empty column for your custom comments.

Beginning	Duration	Max speed	Speed limit	Mileage	Driver
2015-05-01 00:02:44	0:00:09	95 km/h	80 km/h	0.21 km	Jon
2015-05-01 02:28:31	0:01:16	104 km/h	80 km/h	2.15 km	Jon
2015-05-01 04:23:18	0:00:59	96 km/h	60 km/h	1.55 km	-----
2015-05-01 04:34:14	0:00:17	103 km/h	90 km/h	0.52 km	-----
2015-05-01 06:40:59	0:00:58	97 km/h	90 km/h	1.50 km	Ben
2015-05-01 07:04:55	0:00:07	97 km/h	90 km/h	0.22 km	-----
2015-05-01 07:05:47	0:04:12	96 km/h	60 km/h	6.37 km	Ben
2015-05-01 14:23:47	0:03:42	105 km/h	90 km/h	6.20 km	Josh

Intervals filtration (by speeding duration, mileage, driver, geofences/units) can be applied to this table.

You can use special markers for this report:
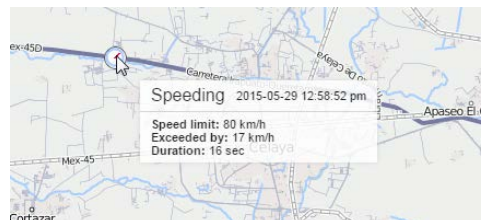
Other means to control speed are described in Notifications.

Stops

A stop is one or more consecutive messages with a zero speed. Stops can be registered at lights, intersections, in traffic jams, etc.

Stops should be distinguished from parkings. Parameters to detect trips, parkings, and stops are adjusted in the trip detector. If there are several messages in succession, they are united in one stop. If total time of such a stop reaches *Minimum parking time*, it is registered as a parking (not a stop).

The following information is presented in this kind of report:

- **Beginning**: the time when the stop started.
- **End**: the time when the stop ended.
- **Duration**: total time of the stop.
- **Total time**: time from the first stop beginning to the last stop end.
- **Off-time**: time from the end of the previous stop to the beginning of this one (to be defined beginning from the second stop).
- **Location**: the address where the unit stopped.
- **Driver**: driver's name if available.
- **Trailer**: trailer's name if any was bound.
- **Count**: the number of stops.
- **Counter**: counter sensor values (can be helpful either in grouping table data by years/months/weeks/days/shifts or for the reports on unit groups).
- **Notes**: an empty column for your custom comments.
- **Avg weight**: average weight value registered for the stop interval.
- **Min weight**: minimum weight value registered for the stop interval.
- **Max weight**: maximum weight value registered for the stop interval.
- **Initial weight**: weight value in the beginning of the stop interval.
- **Final weight**: weight value in the end of the stop interval.

№	Beginning	End	Duration	Location	Driver	Trailer
1	2012-06-25 13:11:26	2012-06-25 13:14:02	0:02:36	Grajewo, Mikołaja Kopernika	Spider Man	Milk can
2	2012-06-25 13:16:10	2012-06-25 13:17:02	0:00:52	Grajewo, Mikołaja Kopernika	Spider Man	Milk can
3	2012-06-25 14:01:26	2012-06-25 14:01:30	0:00:04	Zjazd, Łomża	Spider Man	Milk can
4	2012-06-25 14:03:28	2012-06-25 14:03:38	0:00:10	Łomża, Wojska Polskiego	Spider Man	Milk can
5	2012-06-25 14:04:14	2012-06-25 14:04:16	0:00:02	Łomża, Wojska Polskiego	Spider Man	Milk can
6	2012-06-25 14:06:38	2012-06-25 14:06:40	0:00:02	Łomża, Legionów	Spider Man	Milk can
7	2012-06-25 14:07:36	2012-06-25 14:07:38	0:00:02	Łomża, Legionów	Spider Man	Milk can
8	2012-06-25 14:11:14	2012-06-25 14:12:20	0:01:06	Łomża, Legionów	Spider Man	Milk can
9	2012-06-25 14:40:24	2012-06-25 14:41:54	0:01:30	Stare Lubiejewo, Ogrodowa	Spider Man	Milk can
10	2012-06-25 15:52:14	2012-06-25 15:55:06	0:02:52	Wyszków, Białostocka	Spider Man	Milk can
11	2012-06-25 15:58:06	2012-06-25 15:58:38	0:00:32	Wyszków, Tadeusza Kościuszki	Spider Man	Milk can
12	2012-06-25 17:07:30	2012-06-25 17:07:34	0:00:04	62, 0.85 km from Wyszogród	Spider Man	Milk can

See Data in Reports to learn how time (duration) can be formatted.

Intervals filtration (by stop duration, sensor state, driver, trailer, fuel fillings and thefts) can be applied to this table.

This kind of report can be supplemented by corresponding markers on the map.
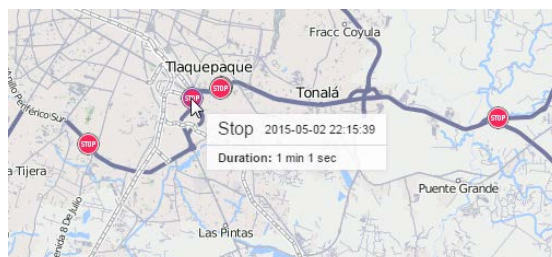
Summary

This kind of report allows to from a table with diverse data concerning a period of time and at the same independent of any conditions like trips, sensor operation, geofence visit, etc. In other words, summary report processes all the messages for the indicated period regardless to the unit's duration of work, and time spent in motion.

The following columns can be included:

- **Mileage in trips**: mileage on the interval by trip detector.
- **Mileage in all messages**: mileage on the interval by mileage counter.
- **Mileage (adjusted)**: mileage on the interval by mileage counter multiplied by mileage coefficient (a setting in unit properties). More about mileage in reports...
- **Avg speed**: average speed on the interval.
- **Max speed**: maximum speed on the interval. More about speed in reports...
- **Move time**: time in trips.
- **Engine hours**: time of engine hours operation.
- **Engine efficiency duration**: the duration of attached implements operation (if having engine efficiency sensor).
- **Parkings**: total time of parkings on the interval.
- **Counter**: counter sensor value.
- **Initial counter**: counter value at the beginning of the interval.
- **Final counter**: counter value at the end of the interval.
- **Custom sensor initial value**: custom sensor value at the beginning of the interval. If there are more than one custom sensors, a separate column is built for each of them and name is written in brackets. Custom sensors name masks can be indicated in the right part of the template dialog.
- **Custom sensor final value**: custom sensor value at the end of the interval.
- **Difference**: difference between initial and final values of custom sensor.
- **Utilization**: percentage ratio of engine hours duration to engine hours rate (engine hours divided by daily engine hours rate indicated in unit properties).
- **Useful utilization**: percentage ratio of engine efficiency duration to engine hours rate.
- **Productivity**: percentage ratio of engine efficiency duration to engine hours duration.
- **Consumed**: the volume of consumed fuel detected by any sort of fuel sensor. If several such sensors are available, their values sum up.
- **Consumed by…**: the volume of consumed fuel detected by a fuel sensor (like impulse/ absolute/ instant fuel consumption sensor, fuel level sensor) or calculated by math or rates. Besides, in report template (on the right) you can specify additional parameters to calculate fuel: on the whole intervals, in trips or in engine hours.
- **Avg consumption**: average fuel consumption by any sort of fuel sensor. If several such sensors are available, their values sum up.
- **Avg consumption by…**: average fuel consumption on the interval. Details about fuel in reports...
- **Avg mileage per unit of fuel by …**: average mileage per unit of fuel based on the indications of a sensor.
- **Initial fuel level**: counter value at the beginning of the interval.
- **Final fuel level**: counter value at the end of the interval.
- **Total fillings**: number of fuel fillings detected.
- **Total thefts**: number of fuel thefts detected.
- **Filled**: volume of filled fuel (only fuel fillings detected by a sensor).
- **Stolen**: volume of stolen fuel.
- **Penalties**: penalties calculated for adjusted Eco Driving criteria.
- **Rank**: received penalty points converted into a grade using 6 point scoring system.

Fuel can be calculated for the whole interval, in trips or in engine hours, which is chosen in additional parameters of the table. This option affects such columns as 'Consumed…' and 'Avg consumption…'.

As additional settings, you can specify masks for sensors (fuel, counters), including engine hours sensor.

'Summary' table is presented by one row — summarized data for a chosen period of time. However, report template parameters for this table contain an individual option — 'Summary by'. This option allows choosing time interval (shifts/days/weeks/months) according to which table data will be arranged. This option can be used either in reports for units or in reports for units groups.

⚠ *Note.*
Often a value received from analog sensor may differ from the corresponding value in the 'Total' row. It is stipulated by analog data leaping, and application of grouping by days/weeks/months towards the values received as a result of processing such data. In the other words, analog data values (with or without leaps) are divided into intervals and then summarized. That is why the value of the summarized intervals can be sufficiently different from the value not divided into intervals. And so far as the values in the 'Total' row are not divided into intervals, you can receive the difference comparing to the values from analog sensors. For example, calculating fuel, a value in the 'Consumed by FLS' column may differ from the corresponding value in the 'Total' row.

Trips

This kind of report shows intervals of movement with indication of time, location, and other parameters such as speed, mileage, fuel, and many others. Intervals of movement (trips) are detected according to parameters set in Trip Detection and adjusted for each unit individually.

The following columns can be included in this kind of report:

- **Beginning**: date and time when the trip began.
- **Initial location**: the address where the device was at the beginning of the trip.
- **End**: date and time when the trip ended.
- **Final location**: the address where the device was at the end of the trip.
- **Driver**: driver's name (if a driver was identified).
- **Trailer**: trailer's name if any was bound.
- **Passengers count**: number of passengers carried within a trip.
- **Duration**: time interval of the trip.
- **Total time**: time from the first trip beginning to the last trip end.
- **Off-time**: period of time passed from the end of the previous trip to the beginning of the current one (to be defined beginning from the second trip).
- **Following off-time**: period of time passed from the end of the current trip to the beginning of the next one.
- **Engine hours**: time of engine hours operation during the trip (you can specify engine hours sensor entering name mask for it in the report template).
- **Mileage**: the distance traveled in the whole trip.
- **Mileage (adjusted)**: mileage considering a coefficient set in unit properties ('Advanced' tab).
- **Urban mileage**: the distance traveled in urban area.
- **Suburban mileage**: the distance traveled in suburban area. It is calculated in regard to speed. The urban/suburban speed line is indicated in Unit Properties => Advanced ('Urban speed limit' setting).
- **Initial mileage**: mileage sensor value at the moment of trip beginning. If no saving of mileage parameter was made through the reported period, mileage is counted from 0.
- **Final mileage**: mileage sensor value at the moment of trip ending.
- **Toll roads mileage**: the distance of a trip travelled by the roads where 'Platon' system is used.
- **Toll roads cost**: a sum of money (in RUB) for the toll roads mileage calculated on the basis of covered distance and the 'Platon' tariff.
- **Avg speed**: average speed within the trip.
- **Max speed**: maximum speed registered within this interval.
- **Trips count**: the number of trips made.
- **Counter**: counter sensor value.
- **Initial counter**: counter value at the beginning of the trip.
- **Final counter**: counter value at the end of the trip.
- **Avg engine revs**: average rate of engine revolutions.
- **Max engine revs**: maximum rate of engine revolutions.
- **Avg temperature**: average temperature value registered in a trip.
- **Min temperature**: minimum temperature value registered in a trip.
- **Max temperature**: maximum temperature value registered in a trip.
- **Initial temperature**: temperature value in the beginning of a trip.
- **Final temperature**: temperature value in the end of a trip.
- **Status**: unit status registered during the current trip (if there are several, the first one is displayed).
- **Cargo weight**: weight of a cargo transported within a trip.
- **Messages count**: the number of messages that formed the trip.
- **Consumed**: the volume of consumed fuel detected by any sort of fuel sensor. If several such sensors are available, their values sum up.
- **Consumed by ImpFCS/ AbsFCS/ InsFCS/ FLS/ math/rates**: the volume of consumed fuel detected by a

fuel sensor (like impulse/ absolute/ instant fuel consumption sensor, fuel level sensor) or calculated by math or rates. Details about fuel in reports...

- **Rates deviation by ImpFCS/AbsFCS/InsFCS/FLS**: difference between consumed fuel detected by a sensor and consumption rates. If a number in this cell is negative, it means detected consumption does not exceed the indicated rates.
- **Avg consumption**: average fuel consumption by any sort of fuel sensor. If several such sensors are available, their values sum up.
- **Avg consumption by ImpFCS/ AbsFCS/ InsFCS/ FLS/ math/rates**: average fuel consumption in the trip detected by one of the methods mentioned above.
- **Avg consumption in idle run by …**: average fuel consumption in the trip during idle run.
- **Avg mileage per unit of fuel by …**: average fuel consumption (per one liter/gallon) in the trip detected by one of the methods mentioned above.
- **Initial fuel level**: fuel level at the beginning of the trip.
- **Final fuel level**: fuel level at the end of the trip.
- **Max fuel level**: maximum fuel level in the trip.
- **Min fuel level**: minimum fuel level in the trip.
- **Penalties**: penalties calculated for adjusted 'Eco Driving' criteria.
- **Rank**: received penalty points converted into a grade using 6 point scoring system.
- **Notes**: an empty column for your custom comments.

⚠ *Attention!*
Availability of the columns 'Toll roads mileage' and 'Toll roads cost' is stipulated by a special service. Contact your service provider if you would like to use this functionality.

Beginning	Initial location	End	Final location	Duration	Mileage	Consumed
2012-07-16 11:38:14	Velden am Wörther See, Seecorso	2012-07-16 11:59:06	Velden am Wörther See, Am Corso	0:20:52	2.20 mi	0.09 gal
2012-07-16 12:29:06	Velden am Wörther See, Klagenfurter	2012-07-16 12:41:14	Tibitsch, Süd-Autobahn	0:12:08	3.99 mi	0.17 gal
2012-07-16 12:51:16	Tibitsch, Süd-Autobahn	2012-07-16 16:11:00	Brünner-Bundesstraße, Hobersdorf	3:19:44	223 mi	9.48 gal
2012-07-16 16:41:16	Brünner-Bundesstraße, Hobersdorf	2012-07-16 18:34:28	Přerov, Polní	1:53:12	101 mi	4.28 gal
2012-07-16 19:22:26	Přerov, Polní	2012-07-16 22:31:12	E75, Słostowice	3:08:46	196 mi	8.34 gal
2012-07-16 22:45:48	E75, Słostowice	2012-07-16 23:36:32	Łódź, Romualda Traugutta	0:50:44	47 mi	2.00 gal
2012-07-17 12:06:32	Łódź, Brzezińska	2012-07-17 14:24:48	Warszawa, Trakt Brzeski	2:18:16	89 mi	3.77 gal
2012-07-17 15:47:00	Stara Miłosna	2012-07-17 18:12:58	E30, Kozula	2:25:58	94 mi	3.98 gal

See Data in Reports to discover more about formatting time, mileage, fuel, etc.

Intervals filtration can be applied to this table: by duration, mileage, engine hours, speed range, stops, sensors, driver, fuel fillings, fuel thefts, and geofences/units. For example, you can query trips with a sensor on

The tracks of the trips can be displayed on the map. To make use of this feature, select Tracks on map option in report template.

Unfinished Rides

See the Rides topic to learn how to prepare rides for this report.

Unfinished is a ride when a unit left a beginning-ride geofence and after a while entered a beginning-ride geofence again. This can be the same geofence (if circle rides are not allowed) or another one.

The structure of the report is the same as for usual rides:

- **Ride**: departure and destination geofences.
- **Ride from**: can be used instead of the previous column. Only the departure geofence is indicated here.
- **Ride to**: destination geofence.
- **Beginning**: date and time when the ride began.
- **End**: date and time when the ride ended.
- **Mileage**: distance traveled in this ride.
- **Mileage (adjusted)**: mileage subject to the coefficient set in unit properties ('Advanced' tab).
- **Ride duration**: how much time it took to perform the ride.
- **Total time**: time from the first ride beginning to the last ride end.
- **Parkings duration**: time spent in parkings.
- **Avg speed**: average speed calculated for this ride.
- **Max speed**: maximum speed registered during this ride.
- **Driver**: driver's name if he was identified.
- **Trailer**: trailer's name if any was bound.
- **Counter**: counter sensor value.
- **Initial counter**: counter value at the beginning.
- **Final counter**: counter value at the end.
- **Count**: the number of rides (can be helpful either in grouping table data by years/months/weeks/days/shifts or for the reports on unit groups).
- **Status**: unit status registered during the current ride (if there are several, the first one is displayed).
- **Consumed**: the volume of consumed fuel detected by any sort of fuel sensor. If several such sensors are available, their values sum up.

* **Consumed by ImpFCS/ AbsFCS/ InsFCS/ FLS/ math/rates**: the volume of consumed fuel detected by a fuel sensor (like impulse/ absolute/ instant fuel consumption sensor, fuel level sensor) or calculated by math or rates. Details about fuel in reports...

- **Avg consumption**: average fuel consumption by any sort of fuel sensor. If several such sensors are available, their values sum up.
- **Avg consumption by ImpFCS/ AbsFCS/ InsFCS/ FLS/ math/rates**: average fuel consumption in the ride detected by one of the methods mentioned above.
- **Initial fuel level**: fuel level at the beginning of the ride.
- **Final fuel level**: fuel level at the end of the ride.
- **Max fuel level**: maximum fuel level.
- **Min fuel level**: minimum fuel level.
- **Penalties**: penalties calculated for adjusted 'Eco Driving' criteria.
- **Rank**: received penalty points converted into a grade using 6 point scoring system.
- **Notes**: an empty column for your custom comments.

Ride	Beginning	End	Ride duration	Mileage	Parkings duration	Driver
Furnaces ITK - Furnaces ITK	2012-06-11 19:13:16	2012-06-12 09:43:56	14:30:40	13.60 km	13:58:18	Mister X
Furnaces ITK - Furnaces ITK	2012-06-12 18:28:42	2012-06-13 08:18:24	13:49:42	8.40 km	13:41:40	Mister X
Furnaces ITK - Furnaces ITK	2012-06-13 08:21:06	2012-06-13 10:05:10	1:44:04	4.80 km	1:35:36	Mister X
Furnaces ITK - Furnaces ITK	2012-06-14 08:19:54	2012-06-14 09:44:06	1:24:12	4.54 km	1:15:20	Mister X
Furnaces ITK - Furnaces ITK	2012-06-14 18:45:30	2012-06-14 18:46:02	0:00:32	0.09 km	0:00:00	Mister X
Furnaces ITK - Furnaces ITK	2012-06-14 18:46:02	2012-06-15 08:16:32	13:30:30	19.18 km	12:42:24	Mister X
Furnaces ITK - Furnaces ITK	2012-06-15 08:18:32	2012-06-15 16:55:08	8:36:36	9.55 km	8:31:14	Mister X
Furnaces ITK - Furnaces ITK	2012-06-15 17:01:02	2012-06-15 17:15:04	0:14:02	8.16 km	0:00:00	Mister X
Furnaces ITK - Furnaces ITK	2012-06-15 17:16:06	2012-06-15 17:16:22	0:00:16	0.32 km	0:00:00	Mister X
Furnaces ITK - Furnaces ITK	2012-06-15 17:48:14	2012-06-15 17:48:28	0:00:14	0.29 km	0:00:00	Mister X
Furnaces ITK - Furnaces ITK	2012-06-16 10:57:56	2012-06-16 10:58:08	0:00:12	0.27 km	0:00:00	Mister X
Furnaces ITK - Furnaces ITK	2012-06-16 11:04:26	2012-06-16 11:04:42	0:00:16	0.31 km	0:00:00	Mister X
Furnaces ITK - Furnaces ITK	2012-06-16 11:06:34	2012-06-16 14:24:02	3:17:28	7.57 km	2:38:16	Mister X

See Rides to find out more information about additional parameters for *'Unfinished rides'*.

Upcoming Maintenance

Upcoming maintenance table contains a list of service works set for a unit, and status of their execution. A table may include the following columns:

- **Service interval**: a name of a service work indicated on the 'Service Intervals' tab of a unit properties dialog in the 'Service name' field. The work should be repeatedly done in a particular interval which is also indicated on the 'Service Intervals' tab.
- **State**: an overall state of service work execution. In other words, it corresponds to the left or exceeded interval of mileage, engine hours, and days.
- **State by mileage**: left or expired mileage interval.
- **State by engine hours**: left or expired engine hours interval.
- **State by days**: left or expired days interval.
- **Description**: information taken from the corresponding field on the 'Service Intervals' tab.
- **Frequency**: an interval (mileage, engine hours, or days) showing how often a vehicle maintenance should be executed.
- **Notes**: an empty column for your custom comments.

Service interval	State	Description	Frequency
Oil change	10 days expired; 1 km left; 1 h left	Oil + pair of hands	1 km; 1 h; 1 days
Full diagnostics	59 days expired; 7 h left; 1 km left	Inspection, consumables	10000 km; 7000 h; 20 days
Hydraulics service	15 days expired; 5 h expired; 6 km left	Better call Saul	6000 km; 5000 h; 50 days
Electricity check	25 days expired; 5 h left; 70 km expired	Tesla service station	7000 km; 5000 h; 100 days

⚠ Note that there is no need in indicating time interval for the 'Upcoming maintenance' report generation, because this table provides you with the information on all the indicated service works regardless to the time period.

Moreover, an individual parameters of grouping (without any connection to time intervals) are used in the 'Upcoming maintenance' table. Data can be grouped on the basis of state (planned/expired maintenance), service interval, or unit (for reports on unit groups).

Utilization Cost

The table on utilization costs unites two kinds of expenses: maintenance and fillings. Both of these things have their own detailed tables (see Maintenance and Fuel Fillings). This table is designed to show running costs. Note that only fillings registered manually in a special Events Registrar get here (*no* fillings detected by a fuel sensor).

The table can be composed of the following columns:

- **Time**: date and time that were indicated during the registration.
- **Registration time**: date and time when the event was registered.
- **Expense item**: maintenance or filling.
- **Description**: custom description entered when registering.
- **Location**: location indicated while registering (together with comments entered manually).
- **Cost**: service or filling cost.
- **Count**: the number of services and/or fillings.
- **Notes**: an empty column for your custom comments.

№	Time	Expense item	Description	Location	Cost
1	2012-11-16 16:03:00	Maintenance	Oil change	Lindenstraße	33.00
2	2012-11-22 16:08:00	Filling	Fuel filling of 55 lt to the amount of 27.33 was made.	-----	27.33
3	2012-11-30 16:10:00	Filling	Fuel filling of 59 lt to the amount of 29.07 was made.	-----	29.07
4	2012-12-13 16:11:00	Filling	Fuel filling of 57 lt to the amount of 28.44 was made.	-----	28.44
5	2013-01-02 16:00:00	Maintenance	Total condition	Hasselweg, Müllingen	588.00
6	2013-02-01 16:12:00	Filling	Fuel filling of 70 lt to the amount of 33.09 was made.	-----	33.09
7	2013-02-04 16:09:50	Filling	Fuel filling of 69 lt to the amount of 30 was made.	-----	30.00

Blue rows mean that the place was indicated on the map during the registration.

Video

This report provides you with a list of video files received from a unit. The report contains the fixed number of columns:

- **Time**: time a video file being received;
- **Location**: location of a unit upon sending video file;
- **Video**: here you can find an icon clicking which a video is opened for viewing.

Time	Location	Video
2015-07-22 15:44:38	Berliner Ring, Wandlitz 16348, Barnim, Germany	🖼
2015-07-22 15:46:04	E26, Wittstock/Dosse 16909, Ostprignitz-Ruppin, Germany	🖼
2015-07-22 15:54:00	E26, Fehrbellin 16833, Ostprignitz-Ruppin, Germany	🖼
2015-07-22 15:54:26	Berliner Ring, Hohen Neuendorf 16556, Oberhavel, Germany	🖼
2015-07-22 15:54:48	Berliner Ring, Neuenhagen bei Berlin 15366, Märkisch-Oderland, Germany	🖼
2015-07-22 17:16:19	Soltauer Straße, Neu Wulmstorf 21629, Harburg, Germany	🖼
2015-07-22 17:16:33	E22, Rosengarten 21224, Harburg, Germany	🖼
2015-07-22 17:16:40	E22, Seevetal 21218, Harburg, Germany	🖼
2015-07-22 17:16:51	E22, Seevetal 21220, Harburg, Germany	🖼
2015-07-22 17:17:47	E26, Rastow 19077, Ludwigslust-Parchim, Germany	🖼

Violations

Violations are particular case of events. The report on violations gives the list of violations detected and registered in unit history.

Violations are:

1. Triggered notifications which method of delivery is *Register as violation*;
2. Manually registered custom events if they have the *Violation* flag.

To make a report dedicated just to violations of a certain kind, in report template enter a mask to filter violations text/description (like *speed*, *accident*, *temperature*, etc.). Only those messages which text corresponds to the given mask will be added to the table.

The following information can be presented in this kind of report:

- **Violation time**: time when the violation happened.
- **Time received**: time when the server received this data.
- **Violation text**: notification text or event description.
- **Location**: unit location at that moment.
- **Driver**: driver's name if identified.
- **Count**: the number of violations.
- **Notes**: an empty column for your custom comments.

Violation time	Time received	Violation text	Location
2015-08-21 06:16:05	2015-12-04 12:10:17	Connection o soordinates loss.	-----
2016-03-28 15:06:00	2016-03-28 15:07:10	Ful theft 40 l.	Amecameca
2016-03-29 09:44:00	2016-03-29 09:45:02	Unit violated speed limitations.	Avenida del Infante Don Luis 17-25, Boadilla del Monte 28660
2016-03-29 09:50:00	2016-03-29 09:50:41	Fuel theft 30 l.	Carretera El Moral, El Moral

In addition, you can use special markers for this report.
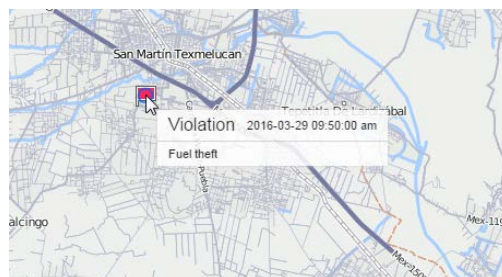
Visited Streets

This report shows which streets were visited and when. Highways, roads, and other places with available addresses are also considered as streets in this report.

The following columns can be presented in this kind of report:

- **Street**: street, roads, highway, etc. name.
- **Initial location**: place where the first messages from this street was received. It can be the same as the previous cell or more detailed (for example, it can additionally contain house number).
- **Beginning**: time when the unit started moving along this street.
- **End**: time when the unit left the street.
- **Duration**: total time the unit was there.
- **Mileage**: distance that was traveled by the unit while moving through this street.
- **Mileage (adjusted)**: mileage subject to the coefficient set in advanced unit properties. About mileage in reports...
- **Avg speed**: average speed while moving along this street.
- **Max speed**: maximum speed detected while moving along this street. About speed in reports...
- **Streets count**: the number of performed visits (can be helpful either in grouping table data by years/months/weeks/days/shifts or for the reports on unit groups).
- **Notes**: an empty column for your custom comments.

Street	Beginning	End	Duration	Mileage	Max speed
Mex-45D	2015-05-01 00:00:52	2015-05-01 01:49:04	1:48:12	39 km	106 km/h
Carretera Irapuato-Queretaro	2015-05-01 01:49:04	2015-05-01 02:00:12	0:11:08	16.52 km	98 km/h
Mex-45D	2015-05-01 02:00:12	2015-05-01 02:40:39	0:40:27	42 km	105 km/h
Mex-45	2015-05-01 02:40:39	2015-05-01 04:45:22	2:04:43	43 km	103 km/h
Carretera León-Silao	2015-05-01 04:45:22	2015-05-01 04:57:30	0:12:08	16.62 km	99 km/h
Calle Torrejón De Ardoz	2015-05-01 04:57:30	2015-05-01 04:57:35	0:00:05	0.14 km	74 km/h
Boulevard Aeropuerto	2015-05-01 04:57:35	2015-05-01 04:57:48	0:00:13	0.30 km	73 km/h
Carretera León-Aguascalientes	2015-05-01 04:57:48	2015-05-01 05:19:45	0:21:57	31 km	116 km/h
Mex-45D	2015-05-01 05:19:45	2015-05-06 06:40:39	1:20:54	74 km	118 km/h
Mex-45	2015-05-01 06:40:39	2015-05-01 07:14:02	0:33:23	23 km	97 km/h
Boulevard José María Chávez	2015-05-01 07:14:02	2015-05-01 07:19:55	0:05:53	1.39 km	33 km/h

When clicking on a green cell in the table, the map is moved in such a way to display a point where the unit entered or left the indicated street, or reached the maximum speed, and this place is highlighted by a special marker.

Sometimes there can be gaps in cells. It may happen when only one message from a place was received in succession. In such cases, just the name of the street and arrival time are given.

Intervals filtration can be applied to this table: by duration, mileage, engine hours, speed range, trips, stops, parkings, sensors, fuel fillings and thefts. For example, you can get streets where a sensor was on or the streets where a sensor was off.

Charts

Some reports give information in the form of a chart. For instance, it can be a chart showing how a unit speed varied with time or a chart showing dependence of fuel consumption on speed, and many other kinds of charts.

To receive charts in reports you need to have corresponding equipment (sensors) properly installed and configured (except for some charts like Speed or Altitude which do not require any special sensors). How to create and configure sensors, read in the section 'Sensors'.

To add a char to a report template, click the **'Add Chart'** button in the template properties dialog. ⚠ A chart cannot be included to a report if report type is *'Unit group'*.

Enter a name for a chart or live default *Chart* (the same for all charts).
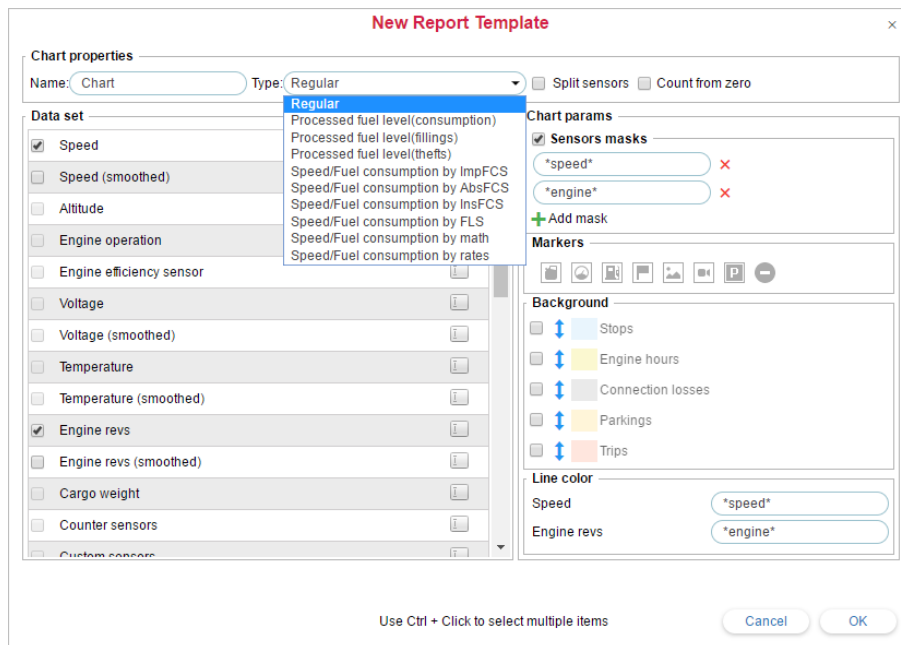
Regular Charts

There are several **types** of charts. First of all, this is Regular type. Their X axis always presents time scale, and you choose data for Y axis:

- Speed
- Altitude
- Engine operation
- Voltage
- Temperature
- Engine revs
- Cargo weight
- Counter sensor
- Custom sensors
- Custom digital sensors
- Absolute mileage
- Mileage in trips
- Instant mileage
- Fuel level (no filtration is applied)
- Processed fuel level (filtration is applied)

- Fuel consumption by ImpFCS
- Fuel consumption by AbsFCS
- Fuel consumption by InsFCS
- Fuel consumption by FLS
- Fuel consumption by math
- Fuel consumption by rates

The names of these items are editable. However, when building a curve for a sensor, it will borrow sensor name.

Select data set for the chart checking necessary items in the list. You can select two items, then the chart will contain two curves, for example, speed and engine revs. You can select even more items but note that only two variables can exist in one chart in addition to time. It means if Y axis presents speed scale at the left and temperature scale at the right, there is no place for engine revs. But if Y axis presents speed scale at the left and consumption by ImpFCS at the right, it is still possible to add consumption by AbsFLS and other methods because all they are measured in the same metrics and will use Y right scale.

In the picture below there a speed chart united with fuel level chart. To receive such a chart, it is needed to set Regular chart type and select 'Speed' and 'Fuel level' for data set.
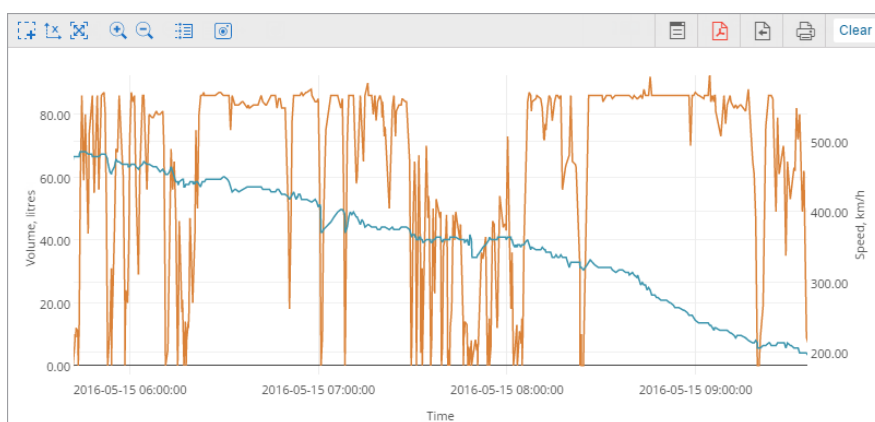
If there are more than one curve in the chart, they are displayed in different colors. At the top of the chart you can see the names of all lines as they are indicated in the report template or sensors names. In addition, the metrics are indicated for all axes.

Fuel Level Charts

'Fuel level' chart represents 'raw' data. On the contrary, *'Processed fuel level'* chart shows filtered data.

Mileage Charts

Four kinds of mileage chart can be created: absolute mileage, mileage in trips, instant mileage, and instant mileage smoothed. The first two show how mileage changed (increased) with time. Absolute mileage chart is built on the bases of *all* messages. That means any inaccuracy and outlying data affect the resulting chart. Mileage in trips chart considers trip detector that is chows mileage in trips only. Below you see the chart with curves: absolute mileage (blue) and mileage in trips (orange).

345
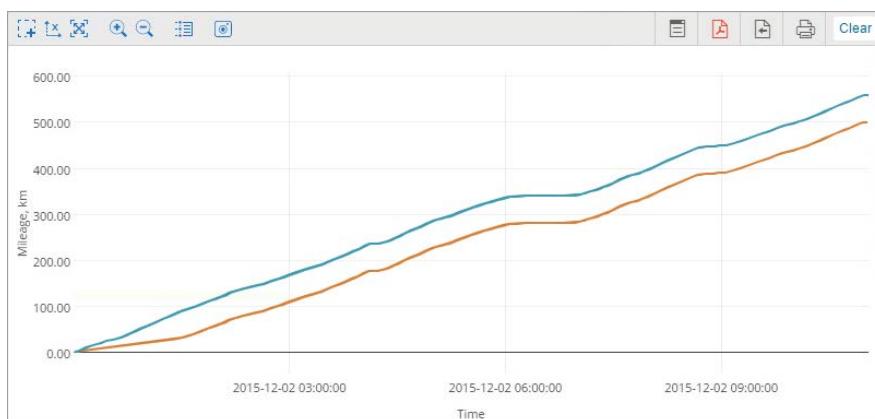
Instant mileage represents data in the form 'mileage from the previous message to the current one' that is the distance between two adjacent messages. This kind of chart can be useful to detect excessive mileage during connection loss, or to detect made-up additions to the mileage.

Chart Parameters
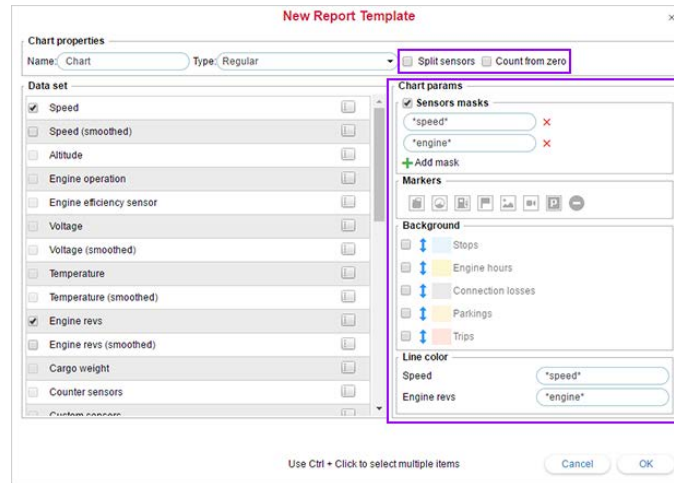
Sensors Masks

In the parameters block (right part of the dialog) you can indicate particular sensors on the basis of which the corresponding charts will be built. This selection does not affect such charts as 'Speed', 'Altitude', 'Fuel consumption by math' because these charts can be built regardless to unit sensors availability.

To indicate the necessary sensors, enter the corresponding masks. You can indicate full sensor name or its part using wildcard symbols like asterisk * (replaces any number of characters) or question sign ? (replaces one character). A sensor name cannot contain comma. If no masks are indicated, then the system automatically defines sensors of a required type to build charts.

Markers

In this section you can choose markers to visualize corresponding events on a chart. The same markers are used on the map.

⚠ Note that graphical elements filtration applied affects displaying of the corresponding markers and backgrounds of a chart.

Background

The following intervals of events can be used as a chart background: stops, parkings, trips, connection losses, and work of engine hours. Using these backgrounds you can correlate a chart value and an interval to which it corresponds. Different colors can be chosen for a background (click the color box). ⚠ Note that backgrounds are opaque and they have a priority of visualization. In other words, an upper interval covers the bottom ones. To change a priority, drag and drop a corresponding event interval.

Line Color

This section provides a possibility of using sensor's color scheme as a line color of a corresponding chart. To apply sensor's color scheme, indicate its mask in the corresponding field of the section. If no mask is indicated, then default colors are used.

Split Sensors

If there are several sensors of the same type and a chart of the same type is created, the curves for all sensors will

appear in one chart. To split them, choose the appropriate option **'Split sensors'**. Then an individual chart will be built for each sensor. For example, there is a unit with two voltage sensors — external voltage and internal voltage. If creating a voltage chart for this unit, we can get one chart with two curves on it or two chart with one curve on each (if 'Split sensors' option is enabled).
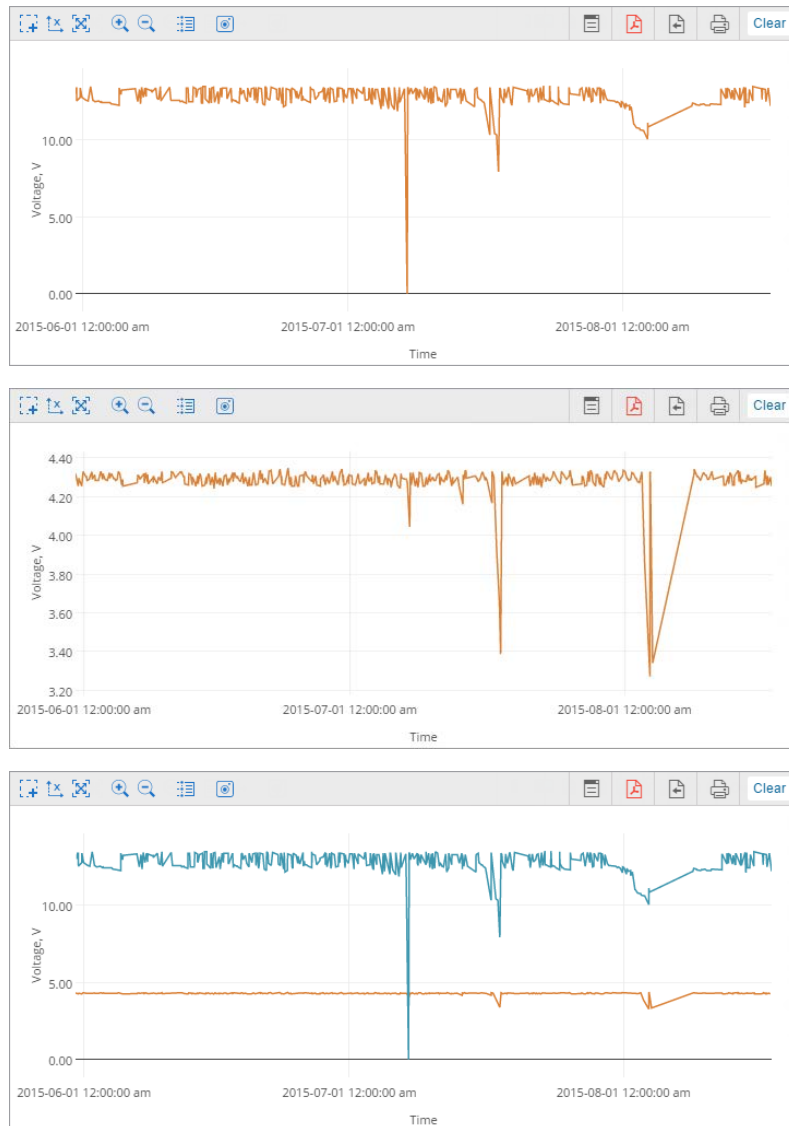
If several data is selected for the chart and for each several sensors exist, the *upper* one will be split. Let us assume that a unit has two voltage sensors and two temperature sensors, and you are building a voltage/temperature chart for it. If 'Split sensors' option is off, you will get one chart with four curves in it. If 'Split sensors' option is on, you will get two charts with three curves on each: one chart will contain the first voltage sensor and both temperature sensors, and another one will contain the second voltage sensor and again two temperature sensors.

Count from Zero

This flag is responsible for chart zoom. By default, Y scale range depends on the range of values found within the interval. For instance, if the temperature varies from 3 to 5, Y axis begins from 3, and the curve occupies maximum space in the chart. If the option 'Count from zero' is activated, Y axis is built from zero to the highest value (or from the lowest value to zero if the values are negative).

On the picture below you can see two temperature charts built for one unit for the same time interval. The first chart is regular, the second one has the flag 'Count from zero' activated.
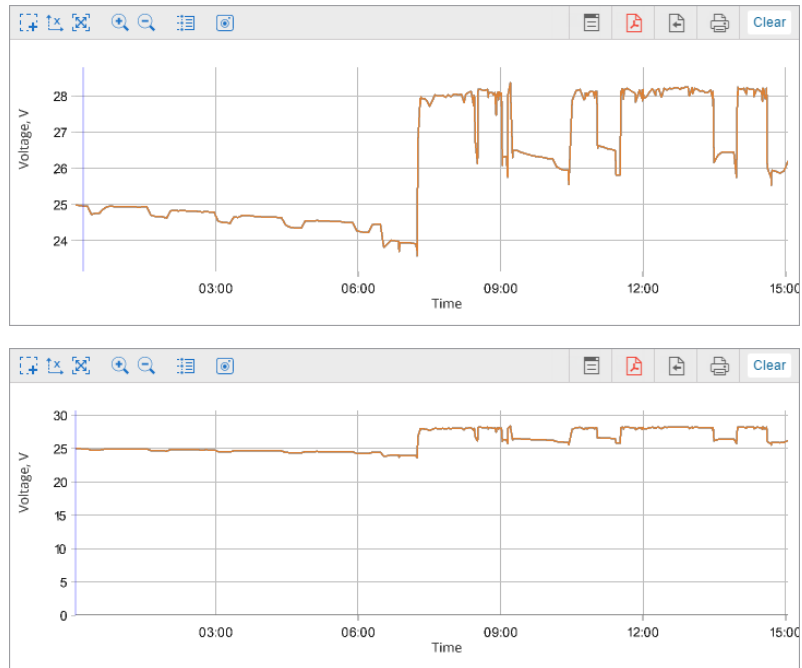
Smoothing

Almost all regular charts can be presented in two forms: raw and smoothed. Raw charts are drawn from one message to another in a linear way and have angular look. Smoothed charts look more streamlined. The smoothing algorithm is the same for all chart kinds.

Below is an example where the orange line displays a raw speed chart, and the blue line displays a smoothed speed chart.
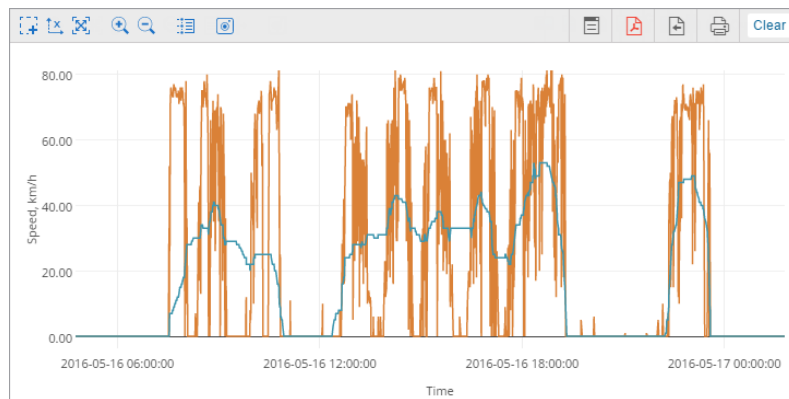
Special Charts

Along with the regular charts, you can generate the following charts:

- Processed fuel level
- Speed/Fuel Consumption by…
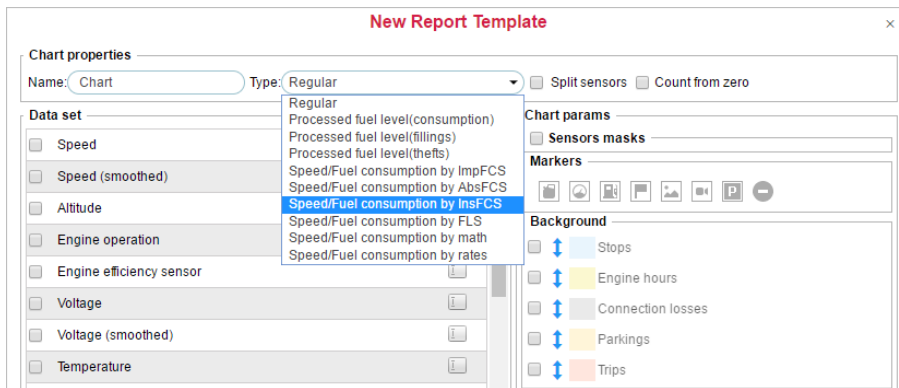
A data set for these charts is fixed. Though, you can adjust chart parameters, for example, indicate sensors' masks or split sensors.

Processed Fuel Level

Processed fuel level chart shows the values which are used while calculating fuel level, fillings and thefts in tables.

The chart shows how fuel level changes in time or depending on mileage. The caption of the tab will be correspondingly 'Time/Fuel level' or 'Mileage/Fuel level'. The chart 'Time/Fuel level' is built only if in unit configuration the option *'Time-based fuel level sensors consumption'* is on. In all other cases, the chart 'Mileage/Fuel level' is built. Besides, the data is processed according to filtration level set on the 'Fuel Consumption' tab (the option *'Filter fuel level sensors values'*) or in sensor properties.

Below are two fuel level charts: the first one is processed (time-based FLS is on, filtration is on, filtration level is 25), and the second one is not processed.

A special chart *'Processed fuel level'* should be distinguished from two similar regular charts:

1. Regular chart *'Fuel level'* represents the raw data (no filtration is applied). The flag 'Time-based fuel level sensors consumption' does not affects the chart.

2. Regular chart *'Processed fuel level'* represents dependence of filtered and smoothed on the basis of mileage data from time.

These regular charts can represent data only in the form 'Time/Fuel level'. Besides, it is possible to overlay other charts, such as voltage chart, for example. Special charts cannot be combined with other charts.

Speed/Fuel Consumption Chart

This chart shows dependence of average fuel consumption on speed. The data for these charts can be taken from fuel consumption sensors of different types (as impulse, absolute, instant) or fuel level sensor, or predefined consumption by math. The appropriate calculation methods must be indicated in unit properties on the 'Fuel Consumption' tab.

For example, to create this chart, a unit with instant fuel consumption sensor (InsFCS) was used.
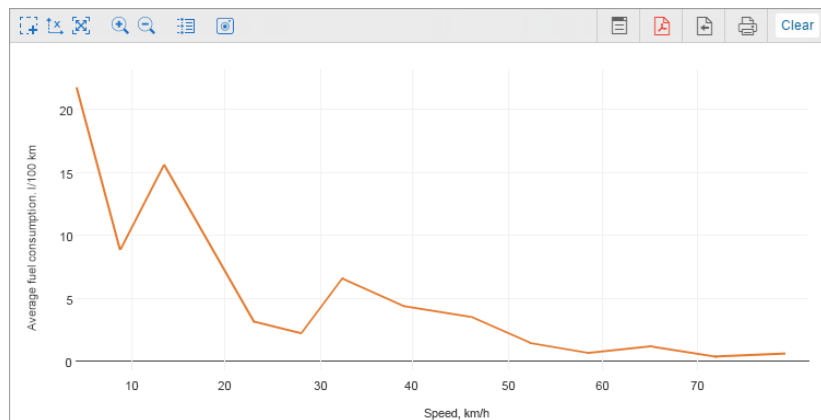
Chart Management

A handy interface provides enough tools to work with charts. You can adjust a needed zoom, move along the chart left and right, get a precise sensor value in the indicated point, etc.
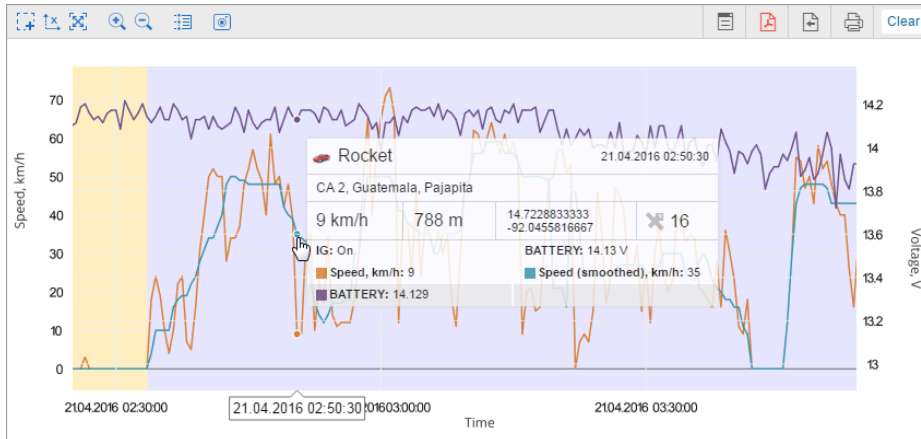
Above the chart, there is a toolkit with useful buttons:

Area selection	Activate the button in order to zoom in any selected chart area. Select an area holding left mouse button. This operation can be repeated multiple times.
Lock/unlock Y axis	Button to switch between working with a single axis (X) to multiple axes (XY).
Autoscaling	Go back to a default chart scale by clicking this button.
Zoom in/zoom out	The buttons to scale a chart along the X axis. Click a button in order to make a visible area of the chart twice as wide/narrow in regard to the current position. Yet the center of the chart stays in its place.
Messages/point tracing	Switching between these modes, you can view details either of a single chart or all the available ones.
Save as PNG	To save a visible chart area along with the axis in PNG format, click this button.

If the X axis shows time, you can click on any place of the chart to move to the corresponding location on the map.

Transfer from chart to messages

You can move to unit's messages straight from an online chart to analyze initial data. To do this, press the 'Transfer to messages' button in the toolkit. Then, click on any place of the chart to load messages for the reported period with focus on clicked point. Other functionality is the same as with tables.

Upon switching between charts, the button receives a default state automatically.

Chart Legend

A chart legend can be found in the work area. The legend contains several sections of information on the chosen charts and their parameters. Using the legend you can choose parameters to be shown on a chart (all of them are shown by default). To enable/disable any parameter, click it in the legend.

Map Output

In the 'Reports' panel, the map can be scaled and moved in the same way as everywhere else: zoom, move, apply tools, change the map source, etc. Even being in the 'Reports' panel you can still track your units. Besides, some specific map options can be applied exactly to reports.

The map with tracks can be also exported to HTML or PDF file together with report text. To include the map to the exported report, in the Export dialog check the box *'Attach map'*.

In such reports as 'Trips', 'Parkings', 'Fuel fillings' and many others which contain information about unit location, this location can be easily shown on the map. To move to a place where something happened, click on a green row of the table. The map will be centered on the place and a marker will appear there. A similar feature is available in the regular charts (where the X axis displays time): when using the trace tool, you move to the requested massage on the map.

Some elements can be drawn on the map as a part of the report. They can be selected in the *'Map output'* section of the report template dialog. These can be routes traveled by unit, created geofences, as well as special markers in the form of small icons which can be put in the places of events, fillings, thefts, speedings, etc.
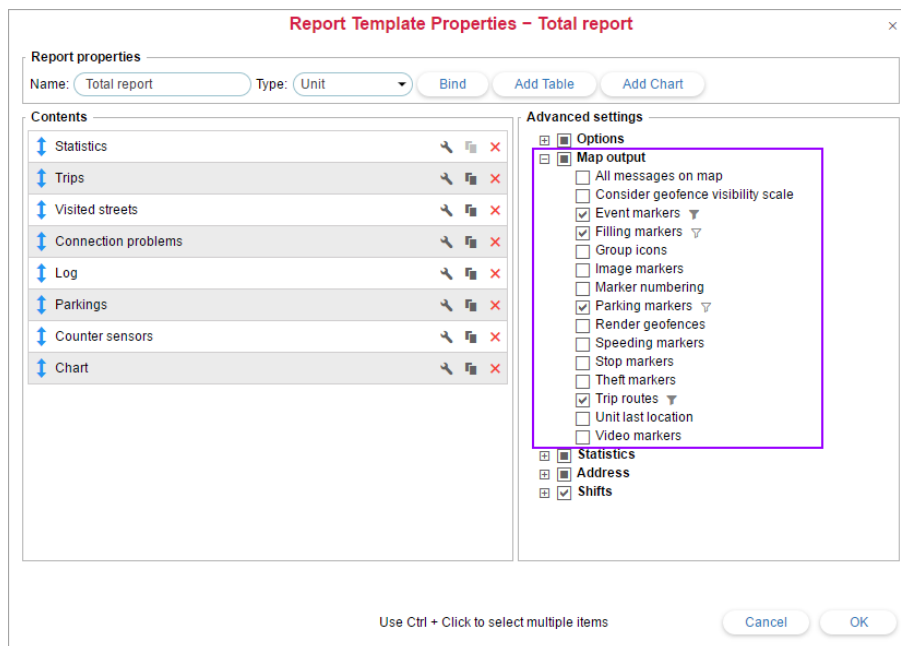
All graphical elements are shown for the current report. If generating a new report, all tracks and markers from the previous report will be erased and replaced by new.

When switching to other panels, all graphical elements from the current online report as well as map position and zoom remain on the map. To remove them, return to the 'Reports' panel and click the 'Clear' button. Alternatively, the graphics of any panel can be hidden or displayed again. To do this, check the corresponding boxes in the horizontal menu. More...

Graphical Elements Filtration

Intervals filtration is supported for some graphical elements (markers of speedings, events, fillings, thefts, parkings, and stops, as well as trip routes) adjusted upon working with a report template. To set intervals filtration means to indicate parameters considered for displaying graphical elements on the map. Filtration parameters' values are indicated for each element individually. A set of available filtration parameters for such an element corresponds to a set used for intervals filtration in a similar-type table.

To summon filtration parameters dialog, it is necessary to click the corresponding icon (▽) to the right of a graphical element. Note that to set filtration parameters, it is necessary to activate a corresponding graphical element's flag first.

If intervals filtration has been already set for a corresponding-type table, and such a filtration needs to be set for displaying graphical elements on the map as well, then you can facilitate a process of indicating filtration parameters by uploading those applied for the table. To do so, choose a corresponding table in the dropdown list (the dialog's first line) and click 'Upload'.

To reset indicated filtration parameters, click 'Clear'. To leave the dialog without applying changes, click Cancel. To apply chosen settings, click OK.

⚠ *Attention!*
Filtration set for displaying graphical elements on the map also affects the corresponding markers and backgrounds chosen for charts.

Tracks on Map

The routes traveled by a unit in a chosen period of time can be shown on the map. To do this, in advanced settings a report template dialog select the corresponding options — *'Trips routes'* or *'All messages on map'*. These options are similar but a bit different. In case of 'Trip routes', only the intervals considered as trips (according to Trip Detector) will be displayed as tracks. In case of 'All messages on map', all messages with valid coordinates will be converted into a track. If in unit history there are intervals where the connection has been lost (no messages for a long time) or coordinates miss in messages, such intervals are displayed with a dashed line.

By default the routes are drawn with blue color. However, you can choose another color or even have many-colored tracks according to speed or sensor state. The set of colors to be used in tracks is defined in Unit Advanced Properties).

Besides, to get information about track points, hover mouse cursor over and see information in a tooltip (time, speed, coordinates, altitude, sensor values). Note that messages are searched in the radius of 50 pixels to the cursor.
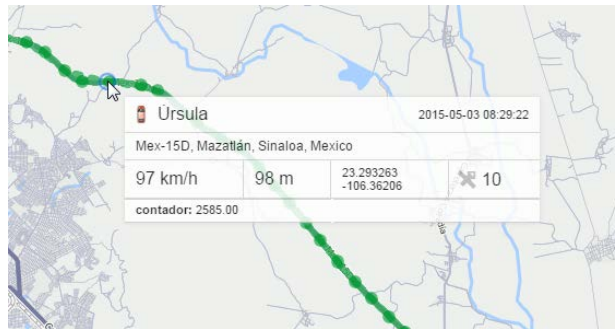
If tracks or all messages are on, then in such tables as Trips, Rides, Engine hours, Speedings will be supplied with an additional first column containing the icon of the binoculars. When clicking on the icon, the map is centered at a certain segment of the track, and this segment is highlighted by a thick red line on the map.

	Beginning	End	Duration	Total time	Mileage	Max speed	Messages count	Driver
👁	2014-11-22 11:36:48	2014-11-22 11:43:08	0:06:20	0:06:20	1.75 mi	41 mph	130	-----
👁	2014-11-22 13:20:00	2014-11-22 13:26:40	0:06:40	0:06:40	1.64 mi	34 mph	199	-----
👁	2014-11-22 14:04:52	2014-11-22 14:21:10	0:16:18	0:16:18	3.82 mi	34 mph	487	-----
👁	2014-11-22 14:37:46	2014-11-22 14:39:38	0:01:52	0:01:52	0.53 mi	23 mph	57	-----
👁	2014-11-22 15:12:24	2014-11-22 15:14:16	0:01:52	0:01:52	0.52 mi	25 mph	57	-----
👁	2014-11-22 19:53:26	2014-11-22 20:14:30	0:21:04	0:21:04	9.27 mi	48 mph	527	-----
👁	2014-11-22 22:42:16	2014-11-22 23:03:10	0:20:54	0:20:54	9.30 mi	46 mph	625	-----
👁	2014-11-23 13:24:28	2014-11-23 13:42:02	0:17:34	0:17:34	5.74 mi	42 mph	474	-----
👁	2014-11-23 14:00:08	2014-11-23 14:02:34	0:02:26	0:02:26	0.42 mi	18 mph	75	-----
👁	2014-11-24 10:55:04	2014-11-24 11:05:48	0:10:44	0:10:44	5.68 mi	66 mph	321	-----
👁	2014-11-24 19:07:10	2014-11-24 19:19:10	0:12:00	0:12:00	6.06 mi	61 mph	317	-----

Tracks can be rendered for units groups, too (see Other Reports). It is reasonable to assign different colors for units in

group to differentiate them on the map. However note that the number of simultaneously drawn messages can be limited by your service provider.

Geofences on Map

Created geofences can be a part of a report. They will be displayed on the map if you check the corresponding box — *Render geofences* — in the section 'Map' of the report template.

Geofences are displayed with their captions and images or icons (if you have chosen any). The color and the font size of the caption is taken from their properties. Apart from that, additional options can be applied to geofences:

- *Group icons*.
  The geofences that overlap each other can be replaced by one conditional item, and its tooltip will contain the detailed information. The same can be applied to markers.
- *Consider geofence visibility scale*.
  By default, all the geofences are rendered on the map. However, they can be seen or hidden according to their visibility parameter set in the properties.

⚠ *Note.*
Geofences are taken only from the same account as the report template itself.

Markers

Most kinds of reports can have additional information visualized on the map with the help of special markers. To get these markers in a report, select necessary markers in a report template.

The table below presents all possible markers and their icons.

	Parking marker	Marks a location where according to the trip detector a parking takes place. A tooltip shows the beginning of a parking time and parking duration.
	Stop marker	Marks a location where according to the trip detector a stop takes place. A tooltip shows the beginning of a stop time and stop duration.
	Filling marker	Marks a location where according to sensors data a fuel filling takes place. A tooltip shows filling time and amount of fuel filled.
	Theft marker	Marks a location where according to sensors data a fuel theft takes place. A tooltip shows theft time and amount of fuel stolen.
	Event marker	Marks a location where events were automatically registered in notifications, routes, and etc. The events registered manually, including fuel fillings, are also shown by such markers if a location (and preferably a description) is indicated upon event registration. A tooltip shows event time and text of an event.
	Violation marker	If you choose event markers, then both event and violation markers to be displayed, because violation is a special case of an event.
	Speeding marker	Marks a location where speed limits indicated in the unit properties have been violated. A tooltip shows the initial time of speeding interval (i.e., the time of receiving the first message with speed value exceeding the allowed one), the allowed speed (indicated in the unit properties), the value of speeding and the total duration of a speeding interval.
	Image marker	Marks a location where pictures from a unit have been received.
	Video marker	Marks a location where videos from a unit have been received.

⚠ *Note.*

When enabling event markers, in addition to event markers you will get violation markers because violation is a special case of event.

Markers appear on the map after report is generated. If you see no markers, it means there is no events of the indicated type or the current map scale is not enough (try to zoom in).

When hover the mouse cursor over a marker, in a tooltip you see additional information: for stops and parkings — starting time and duration, for events and violations — time and notification text, for fillings and thefts — time and fuel volume, for speedings — starting time, speed limitation as it is defines in unit properties, how much the speed is exceeded, and duration of this speeding.
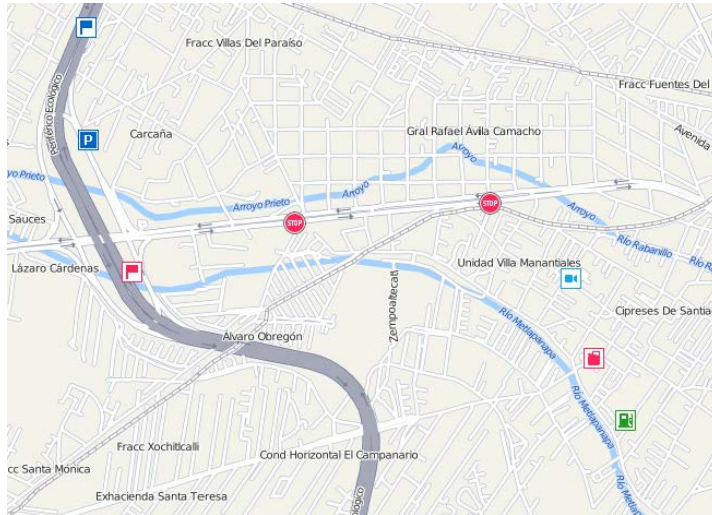
Moreover, markers as well as geofences can be grouped in case they overlap each other — indicate the *'Group icons'* option in report template for it. In case of markers grouping, a number of elements included in a group is indicated. More detailed information about what happened in that place will be available in the tooltip. However, if there are more than 100 grouped markers, only their names appear in the tooltip, without detailed information.
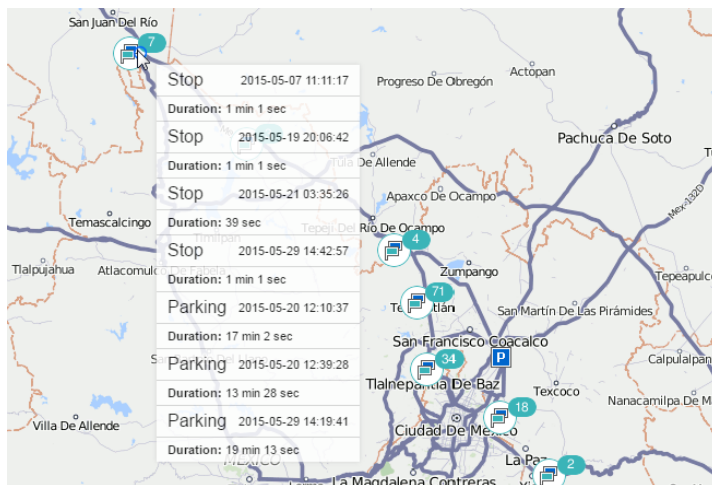
You can enable *'Marker numbering'* option in report template. In this case, each marker will have its sequence number which is indicated below the marker in red color. Numbers are assigned chronologically, and each marker type has its own numeration.
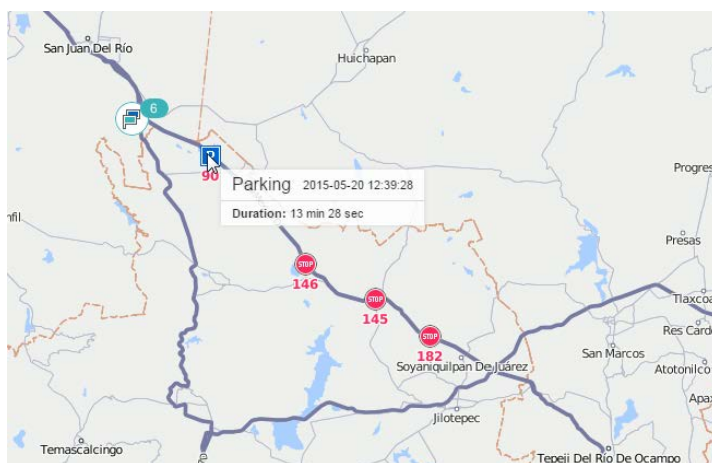
Unit Last Location

The last location of the unit can be displayed on the map. To enable this feature, select the *'Unit last location'* checkbox in map output settings of report template. Last location does not depend on the reported interval, it is taken from the latest message received from the unit. Units are displayed on the map by their icons or by motion state signs

(depending on User Settings. In the popup tooltip you will find time when message received, speed at that point, altitude, and the values of mileage and engine hours counters.
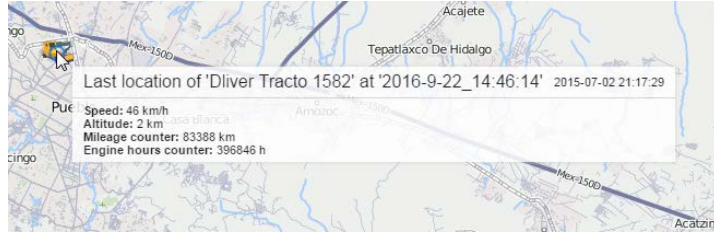
Statistics

Statistics is a table consisting of two columns where the first one contains the parameters you have chosen, and the second one shows their values.

Events count	43
Executed commands	7
Parking time	386 days 3:28:31
Parkings count	139
Stops count	303
Move time	5 days 12:04:27
Mileage in trips	9093 km
Mileage (adjusted)	9093 km
Urban mileage in trips	1202 km
Suburban mileage in trips	7891 km
Initial mileage	0.00 km
Final mileage	9229 km
Average speed in trips	69 km/h
Max speed in trips	125 km/h
Trips count	139

Statistics is a special table giving general information and results. It can contain reports name, unit name, reported interval, number of messages analyzed for the report, and any statistical information you select.

It is recommended to include Statistics to any report as it contains the basic information about the report itself.

Statistics is adjusted in report template in the section of *'Advanced settings'*. Check fields you would like to include in Statistics. For your convenience, items are divided into subgroups. To select all items in a subgroup, tick the checkbox near its name.

If any item in statistics is checked, the section *'Statistics'* appears at the left part of the report template. You can edit it if you click on the button 🔧 against it. Then you can add and remove items, rename them, and change their position. In the middle column the subgroup is indicated.
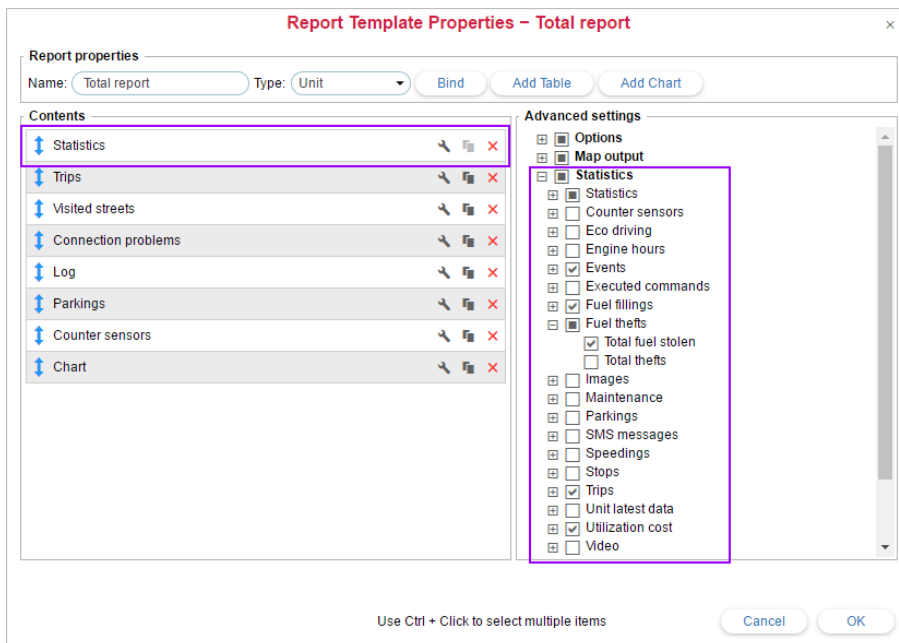
In the resulting report, Statistics is always displayed at the beginning of the reports.

The following information can be included in Statistics for reports of *'Unit'* type. For other types of reports, statistics is different and can contain just a couple of rows: report template name, object's name, report interval beginning, report interval end, and time of report generation.

Statistics

- **Report**: reports template name.
- **Unit**: unit name.
- **Report execution time**: time of report generation when a user executed the report online or it was generated automatically as a job or notification.
- **Interval beginning**: reporting interval beginning.
- **Interval end**: reporting interval end.
- **Time zone**: time zone as it is set in user settings.
- **Messages**: messages analyzed within the reporting period.
- **Mileage in all messages**: mileage in all messages according to the mileage counter selected (without filtration by trip detector).
- **Consumed**: the volume of consumed fuel detected by any sort of fuel sensor. If several such sensors are available, their values sum up.
- **Consumed by ImpFCS/ AbsFCS/ InsFCS/ FLS/ math/rates**: the volume of consumed fuel detected by a fuel sensor (like impulse/ absolute/ instant fuel consumption sensor, fuel level sensor) or calculated by math or rates.
- **Avg consumption**: average fuel consumption by any sort of fuel sensor. If several such sensors are available, their values sum up.
- **Avg consumption by ImpFCS/ AbsFCS/ InsFCS/ FLS/ math/rates**: average fuel consumption in trips detected by one of the methods mentioned above. It can be presented either as liters per 100 kilometers or miles per one gallon. The whole mileage of the reported interval is normally taken for these calculations. However, average consumption by FLS can take either all mileage or mileage by trip detector.
- **Initial fuel level**: fuel level at the beginning of the interval.
- **Final fuel level**: fuel level at the end of the interval.
- **Max fuel level**: maximum fuel level.
- **Min fuel level**: minimum fuel level. Details about fuel in reports...

Counter sensors

- **Total counter**: the sum of values of all sensors of *counter* type.

Eco driving

- **Penalties**: overall penalty for Eco Driving.
- **Rank**: received penalty points converted into a grade using 6 point scoring system.

Engine hours

- **Engine hours**: engine hours duration. It can be calculated by engine hours sensor or by ignition sensor depending on unit properties.
- **Initial engine hours**: value of engine hours in the beginning of the interval.
- **Final engine hours**: value of engine hours in the end of the interval.
- **In movement**: time when the unit had been moving within this interval.
- **Idling**: total idling time.
- **Mileage in engine hours**: distance traveled during engine hours operation.
- **Initial mileage in engine hours**: mileage sensor's value at the moment of the beginning of the reporting period.
- **Final mileage in engine hours**: mileage sensor's value at the moment of the end of the reporting period.
- **Avg engine revs**: average rate of engine revolutions.
- **Max engine revs**: maximum rate of engine revolutions.
- **Engine efficiency duration**: the duration of attached implements operation (if having engine efficiency sensor).
- **Engine efficiency idling**: engine hours minus engine efficiency time.
- **Utilization**: percentage ratio of engine hours duration to engine hours rate.

- **Useful utilization**: percentage ratio of engine efficiency duration to engine hours rate.
- **Productivity**: percentage ratio of engine efficiency duration to engine hours duration.
- **Consumed in e/h**: the volume of consumed fuel detected by any sort of fuel sensor. If several such sensors are available, their values sum up.
- **Consumed by ImpFCS/ AbsFCS/ InsFCS/ FLS/ math/ rates in e/h**: fuel volume used in engine hours. It can be detected by a fuel sensor (like impulse/ absolute/ instant fuel consumption sensor, fuel level sensor) or calculated by math or rates. Details...
- **Consumed in idle run by ImpFCS/ AbsFCS/ InsFCS/ FLS/ math/rates**: fuel volume used in engine hours during idle running detected by one of the methods mentioned above.
- **Avg consumption in e/h**: average fuel consumption by any sort of fuel sensor. If several such sensors are available, their values sum up.
- **Avg consumption by ImpFCS/ AbsFCS/ InsFCS/ FLS/ math/ rates in e/h**: average fuel consumption in engine hours detected by one of the methods mentioned above.
- **Avg consumption by ImpFCS/ AbsFCS/ InsFCS/ FLS/ math/ rates in e/h in trips**: average fuel consumption in engine hours in trips detected by one of the methods mentioned above.

Events

- **Events count**: the number of events registered.

Executed commands

- **Executed commands**: the number of commands sent to unit.

Fuel fillings

- **Total filled**: the volume of fuel filled during the reporting interval.
- **Total registered**: registered fuel volume regardless binding to sensors and calculation methods.
- **Difference**: the difference between registered and detected fillings.
- **Total fillings**: the number of fuel fillings detected within the reporting period.

Fuel thefts

- **Total fuel stolen**: the total volume of stolen fuel.
- **Total thefts**: the number of thefts detected within the reporting period.

Images

- **Images**: the number of images received from unit. And if there are any, the resulting report will contain a section with all those images. Supported format is JPEG.

Maintenance

- **Total maintenance duration**: time spent for servicing.
- **Total maintenance cost**: total cost of all maintenance works.
- **Services count**: the number of services performed.

Orders

- **Total orders**: total amount of orders within the indicated time period.
- **Orders visited**: courier's arrival to an address is detected or any status is set.
- **Orders visited in time**: an order is visited in time (in advance) or any status is set.
- **Orders visited late**: an order is visited late or any status is set late.
- **Non-visited orders**: courier's arrival to an address is not detected.
- **Orders fulfilled**: courier's arrival to an address is detected, the 'Confirm' status is set.
- **Orders fulfilled in time**: an order is fulfilled in time (in advance), the 'Confirm' status is set.
- **Orders fulfilled late**: an order is fulfilled late, the 'Confirm' status is set.

- **Orders visited without status**: courier's arrival to an address is detected, a status is not set.
- **Orders rejected**: an order for which the 'Reject' status is set.
- **Order's avg time (estimated)**: a ratio of time for orders visiting (system calculation) to a total amount of orders.
- **Order's avg time (actual)**: a ratio of time spent delivering orders to a total amount of orders.
- **Avg time deviation in orders**: a difference between actual and estimated order's average time.
- **Order's avg mileage (actual)**: a ratio of a distance covered by a courier to a total amount of orders.
- **Order's avg weight**: a ratio of orders' total weight to a total amount of orders.
- **Order's avg volume**: a ratio of orders' total volume to a total amount of orders.
- **Order's avg cost**: a ratio of orders' total cost to a total amount of orders.
- **Avg fuel consumption for an order**: a ratio of a total amount of fuel consumed to a total amount of orders.
- **Orders' estimated mileage**: total distance calculated by the system for orders delivery.
- **Orders' actual mileage**: total distance covered by a courier delivering orders.
- **Fuel consumed in orders**: total amount of fuel consumed delivering orders.
- **Orders' total weight**: overall weight of all orders created.
- **Orders' total volume**: overall volume of all orders created.
- **Orders' total cost**: overall cost of all orders created.

Moreover, the following data may be included in orders' statistics:

- **Percentage of orders visited in time**
- **Percentage of orders visited late**
- **Percentage of non-visited orders**
- **Percentage of orders fulfilled in time**
- **Percentage of orders fulfilled late**
- **Percentage of orders visited without status**
- **Percentage of orders rejected**

Parkings

- **Parking time**: total duration of parkings for the reporting period. Parkings are detected by Trip Detector. IF it is not set properly, there may be no parkings found.
- **Parkings count**: the number of parkings for the reporting period.

SMS messages

- **SMS messages**: the number of SMS messages received from unit.

For the report on *resource* the following fields are available:

- **SMS sent**: the number of sent SMS messages.
- **SMS available**: the number of SMS available at the moment.

⚠ The quantity of SMS messages shown in these fields doesn't depend on the report's execution interval. The information is shown for the period that corresponds to the option *Reset* of the 'Services' tab of the billing plan's properties.

Stops

- **Stops count**: the number of stops for the reporting period.

Trips

- **Move time**: total duration of all trips.
- **Engine hours**: engine hours worked.
- **Mileage in trips**: total distance traveled in all trips.
- **Mileage (adjusted)**: the same distance multiplied by mileage coefficient (a setting in unit properties).
- **Urban mileage in trips**: distance traveled at speed which is considered as speed in populated areas.

- **Suburban mileage in trips**: distance traveled at speed which is considered as speed outside populated areas. 'Urban speed limit' is a setting in unit properties which defines if unit is moving in urban area or outside it.
- **Initial mileage**: mileage sensor value at the moment of trip beginning. If no saving of mileage parameter was made through the reported period, mileage is counted from 0.
- **Final mileage**: mileage sensor value at the moment of trip ending.
- **Toll roads mileage**: the distance of a trip travelled by the roads where 'Platon' system is used.
- **Toll roads cost**: a sum of money (in RUB) for the toll roads mileage calculated on the basis of covered distance and the 'Platon' tariff.
- **Average speed in trips**: average speed in trips (total mileage divided by move time).
- **Maximum speed in trips**: the maximum speed registered during the trips.
- **Trips count**: the number of trips.
- **Consumed in trips**: the volume of consumed fuel detected by any sort of fuel sensor. If several such sensors are available, their values sum up.
- **Consumed by ImpFCS/ AbsFCS/ InsFCS/ FLS/ math/ rates in trips**: fuel consumed in trips. It can be detected by a fuel sensor (like impulse/ absolute/ instant fuel consumption sensor, fuel level sensor) or calculated by math or rates. Details...
- **Rates deviation by ImpFCS/AbsFCS/InsFCS/FLS in trips**: the difference between fuel consumption detected by a sensors and fuel consumption rates.
- **Avg consumption in trips**: average fuel consumption by any sort of fuel sensor. If several such sensors are available, their values sum up.
- **Avg consumption by ImpFCS/ AbsFCS/ InsFCS/ FLS/ math/ rates in trips**: average fuel consumption in trips detected by one of the methods mentioned above.
- **Avg mileage per unit of fuel by ImpFCS/ AbsFCS/ InsFCS/ FLS/ math/ rates in trips**: average fuel consumption presented as ' kilometers per liter' or as 'miles per gallon' .

Unit latest data

Note that all items in this section do not depend on report interval. The latest information is taken at the moment of report execution.

- **Mileage counter**: mileage counter value.
- **Engine hours counter**: engine hours counter value.
- **GPRS traffic counter**: consumed traffic.
- **Unit last location**: the latest unit location detected (address or coordinates).
- **Last message time**: the time when the latest messages from the unit was received.

How mileage and engine hours are calculated is adjusted in unit properties on the 'General' tab.

Utilization cost

- **Total utilization cost**: total cost of all registered service works and fuel fillings.
- **Count of services and fillings**: total number of all registered service works and fuel fillings.

Video

List of video files received from a unit.

Violations

- **Violations count**: the number of violations registered within the reporting period.

Visited streets

- **Streets count**: the number of found visits of streets.

Other Reports

⚠ *Attention!*

To create reports on users, drivers, trailers, passengers and groups of units, drivers or trailers, you need *Advanced reports* module to be included in your package.

Other reports are reports on unit groups, users (except the Log table), drivers, trailers, passengers and groups of drivers and trailers. These report types are defined upon template creation.
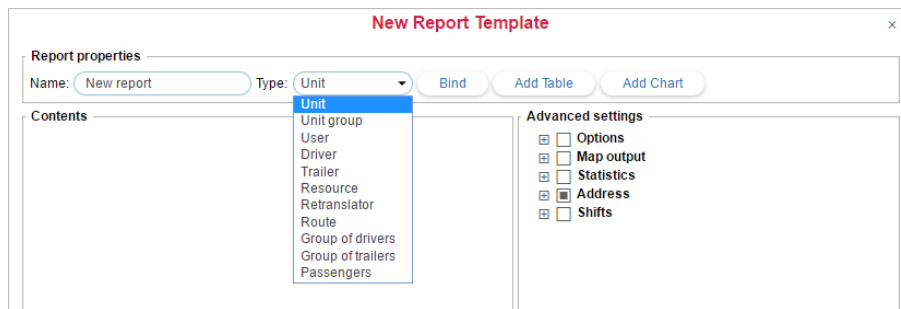
- Reports on Unit Groups
- Reports on Users
- Reports on Drivers
- Reports on Trailers
- Reports on Passengers

Reports on Unit Groups

Data from several units can be gathered in one report if these units from a unit group. To get a report on several units, select the *Unit group* type for the report template.

The functionality of these reports is very similar to reports on separate units but has a number of peculiarities and restrictions.

In *Unit group* reports the following features are **available**:

- Any tables;
- Graphical elements on map: geofences, any markers, unit last location icons, tracks and all messages on map;
- Some graphs in Statistics: 'Report', 'Group', 'Interval beginning', 'Interval end', 'Report execution time';
- Advanced options: U.S. measurements, address format, etc.

All tables available for units are available for unit groups as well. Besides, the table Unit latest data is available for unit groups *only*. Moreover, the 'Eco driving' report on unit groups contains a unique column 'Rating by violations'.

In *Unit group* reports the following features are **not available**:

- Charts;
- Most of statistics excluding those mentioned above.

Note that if in 'Total' line of unit group report you would like to receive correct data on the initial or final fuel levels, then in report template such parameter as 'Unit' should occupy the main position (drag to the top) in the grouping list.

Tables for Unit Groups

There are some peculiarities in configuring tables for unit groups. The first column of the table shows the list of all units included into a selected group (alphabetical order). This column is put in front of all the other ones indicated in a template. The 'Count' column (if included in a report template) shows the number of events registered for the reporting period of a given unit.

Below is an example of a table on parkings for a group of 5 units. The table provides us with the following data: beginning of the first parking, end of the last parking, summarized duration of all parkings for the reported period. Every line is dedicated to a single unit.

№	Grouping	Beginning	End	Duration	Count
1	Picasso	2012-08-27 18:17:00	2012-08-30 09:01:56	1 days 21:59:47	5
2	ShootingStar	2012-08-27 18:17:01	2012-08-30 09:01:57	1 days 21:52:35	4
3	SMS Sim004	2012-08-27 18:17:00	2012-08-31 13:49:22	2 days 23:39:11	6
4	SMS Sim007	2012-08-27 18:17:01	2012-08-30 09:01:56	1 days 21:52:34	4
5	Vliegende	2012-08-27 18:17:01	2012-08-30 09:01:57	1 days 21:52:35	4

If the option of **detalization** is applied, the nesting level appears. That means you can expand the contents of a basic line ('+' at the beginning of a line, or corresponding number in the heading of the column) and see a detailed list of events for a given unit. The number of hidden lines corresponds to the number in the 'Count' column.

Unit	Detalization				
	№	Grouping	Beginning	End	Duration	Count
⊞	1	Picasso	2012-08-27 18:17:00	2012-08-30 09:01:56	1 days 21:59:47	5
⊟	2	ShootingStar	2012-08-27 18:17:01	2012-08-30 09:01:57	1 days 21:52:35	4
	2.1	ShootingStar	2012-08-27 18:17:01	2012-08-28 09:03:05	14:46:04	1
	2.2	ShootingStar	2012-08-28 18:20:05	2012-08-29 09:13:58	14:53:53	1
	2.3	ShootingStar	2012-08-29 14:46:16	2012-08-29 15:01:16	0:15:00	1
	2.4	ShootingStar	2012-08-29 17:04:19	2012-08-30 09:01:57	15:57:38	1
⊞	3	SMS Sim004	2012-08-27 18:17:00	2012-08-31 13:49:22	2 days 23:39:11	6
⊞	4	SMS Sim007	2012-08-27 18:17:01	2012-08-30 09:01:56	1 days 21:52:34	4
⊞	5	Vliegende	2012-08-27 18:17:01	2012-08-30 09:01:57	1 days 21:52:35	4

In addition to detalization, you can apply the **grouping** by years/months/weeks/days/shifts. In this case table data is grouped by a chosen time interval. If several grouping intervals are chosen, then they will be arranged in several levels of nesting. In case with groupings a detalization is situated on the final level of nesting, and still shows a detailed list of events for a given unit.

Unit	Date	Detalization					
	№	Grouping	Beginning	End	Duration	Count	
⊞	1	Picasso	18:17:00	2012-08-30 09:01:56	1 days 21:59:47	5	
⊞	2	ShootingStar	18:17:01	2012-08-30 09:01:57	1 days 21:52:35	4	
⊟	3	SMS Sim004	18:17:00	2012-08-31 13:49:22	2 days 23:39:11	6	
⊞	3.1	2012-08-27	18:17:00	2012-08-28 09:03:04	14:46:04	1	
⊞	3.2	2012-08-28	18:20:05	2012-08-29 09:13:57	14:53:52	1	
⊟	3.3	2012-08-29	11:20:00	09:01:57	16:20:54	3	
	3.3.1	SMS Sim004	11:20:00	11:27:13	0:07:13	1	
	3.3.2	SMS Sim004	14:46:15	15:02:17	0:16:02	1	
	3.3.3	SMS Sim004	17:04:18	2012-08-30 09:01:57	15:57:39	1	
⊞	3.4	2012-08-30	12:11:01	2012-08-31 13:49:22	1 days 1:38:21	1	
⊟	4	SMS Sim007	18:17:01	2012-08-30 09:01:56	1 days 21:52:34	4	
⊞	4.1	2012-08-27	18:17:01	2012-08-28 09:03:04	14:46:03	1	
⊞	4.2	2012-08-28	18:20:06	2012-08-29 09:13:58	14:53:52	1	
⊟	4.3	2012-08-29	14:46:16	09:01:56	16:12:39	2	
	4.3.1	SMS Sim007	14:46:16	15:01:17	0:15:01	1	
	4.3.2	SMS Sim007	17:04:18	2012-08-30 09:01:56	15:57:38	1	
⊞	5	Vliegende	18:17:01	2012-08-30 09:01:57	1 days 21:52:35	4	

To expand enclosed information, click on the plus-shaped button at the beginning of each line. It is also possible to expand the nested levels by clicking the corresponding numbers-buttons in the heading of the nesting column. To hide all the expanded lines, click on the button '1'.

If there is no data for the given unit, all the cells except for the name will contain only dashes. In some cases it is not convenient, then you can disable such uninformative lines. To do so, enable the option *'Skip empty rows'* in the report template.

Unit Latest Data

This kind of table available only for unit groups. As for separate units, this information is available in statistics. The table presents last location and counters values known.

The following columns can be selected to form the table:

- **Grouping**: a column with units' names (appears automatically).
- **Last message**: time when the latest message form the unit was received.
- **Last coordinates**: time when the latest message with valid coordinates was received (not always coincides with the previous column).
- **Location**: address or coordinates of the last location.
- **Speed**: speed according to the last message.
- **Mileage**: mileage counter value.
- **Engine hours**: engine hours counter value.
- **Traffic**: GPRS traffic counter value.
- **Driver**: name of driver (if any detected).
- **Trailer**: name of trailer (if any detected).
- **Notes**: an empty column for your custom comments.

Grouping	Last message	Last coordinates	Location	Speed	Mileage	Traffic
Picasso	2016-03-09 17:59:51	2016-03-09 17:59:51	Narciso Mendoza, Sinaloa 81217	6 km/h	1641475 km	0 B
ShootingStar	2016-03-09 17:59:51	2016-03-09 17:59:51	Culiacán, Sinaloa	30 km/h	125943 km	759.55 MB
SMS Sim004	2016-03-09 17:59:51	2016-03-09 17:59:51	Aguaruto Centro, Sinaloa 80308	18 km/h	32489 km	0 B
SMS Sim007	2016-03-09 17:59:52	2016-03-09 17:59:52	Culiacán, Sinaloa	0 km/h	399187 km	2.48 MB
Vliegende	2016-03-09 17:51:26	2016-03-09 17:51:26	Hermosillo, Sonora	34 km/h	377776 km	0 B

By default, the latest information refers to report execution time. However, it can be bound to the end of reporting interval. To do this, enable the **'Consider report interval'** checkbox in the template.

Apart from that, filtration by geofences/units can be used for this report. This allows to quickly find units which are situated in a certain place or close to other units.

Last location can be visualized on the map by units icons — activate the option *'Unit last location'* in the report template.

Reports on Users

Several tables and charts can be generated for users. The Log is highly standard and was described above.

In the Statistics the following fields are available: report template name, user name, reporting interval (beginning/end), report execution time, total time spent in the system, and logins count.

Log Table

A set of columns for this table matches the one used in the same report on units.

Logins Table

This kind of table shows user activity: logins to different services. The table can contain the following columns:

- **Login time**: time when user logged in a service.
- **Logout time**: time when user exited the service.
- **Duration**: time interval user was online on the service.
- **Host**: the address of the computer from which user logged in.
- **Site**: the name of service where user logged in.
- **Count**: the number of logins.
- **Notes**: empty column for custom notes.

Login time	Logout time	Duration	Host	Site
10 Aug 2015 15:04	10 Aug 2015 15:04	0:00:00	212.98.173.148	hosting.wialon.com
10 Aug 2015 15:04	10 Aug 2015 15:05	0:00:18	212.98.173.148	hosting.wialon.com
10 Aug 2015 15:05	10 Aug 2015 15:05	0:00:26	212.98.173.148	hosting.wialon.com
10 Aug 2015 15:05	10 Aug 2015 15:05	0:00:02	212.98.173.148	hosting.wialon.com
10 Aug 2015 15:06	10 Aug 2015 15:09	0:02:58	212.98.173.148	hosting.wialon.com
10 Aug 2015 15:07	10 Aug 2015 15:09	0:01:17	212.98.173.148	hosting.wialon.com
11 Aug 2015 15:09	11 Aug 2015 15:15	0:06:01	212.98.173.148	hosting.wialon.com
12 Aug 2015 14:09	12 Aug 2015 19:27	5:17:39	212.98.173.148	hosting.wialon.com
12 Aug 2015 14:10	12 Aug 2015 14:12	0:02:04	212.98.173.148	hosting.wialon.com
17 Aug 2015 15:36	17 Aug 2015 15:41	0:04:13	212.98.173.148	hosting.wialon.com
18 Aug 2015 16:04	18 Aug 2015 16:04	0:00:06	212.98.173.148	hosting.wialon.com

The same parameters as for all tables can be applied to user logins table: grouping, detalization, row numbering, total row, and time limitations. In the example below you can see user logins table with grouping by days, detalization, numbering, and total row.

Date	Detalization							
	№	Grouping	Login time	Logout time	Duration	Host	Site	Count
⊞	1	10 Aug 2015	10 Aug 2015 09:40	10 Aug 2015 15:09	5:25:19	-----	-----	9
⊞	2	11 Aug 2015	11 Aug 2015 15:09	11 Aug 2015 15:15	0:06:01	-----	-----	1
⊞	3	12 Aug 2015	12 Aug 2015 14:09	12 Aug 2015 14:12	5:19:43	-----	-----	2
⊞	4	17 Aug 2015	17 Aug 2015 15:36	17 Aug 2015 15:41	0:04:13	-----	-----	1
⊟	5	18 Aug 2015	18 Aug 2015 16:04	18 Aug 2015 19:54	1:25:44	-----	-----	4
	5.1	18 Aug 2015 16:04	18 Aug 2015 16:04	18 Aug 2015 16:04	0:00:06	212.98.114.112	hosting.wialon.com	1
	5.2	18 Aug 2015 16:04	18 Aug 2015 16:04	18 Aug 2015 17:21	1:17:24	212.98.114.112	hosting.wialon.com	1
	5.3	18 Aug 2015 16:38	18 Aug 2015 16:38	18 Aug 2015 16:40	0:02:08	212.98.114.112	hosting.wialon.com	1
	5.4	18 Aug 2015 19:48	18 Aug 2015 19:48	18 Aug 2015 19:54	0:06:06	212.98.114.112	hosting.wialon.com	1
⊞	6	20 Aug 2015	20 Aug 2015 13:58	20 Aug 2015 13:59	0:37:41	-----	-----	2
⊞	7	21 Aug 2015	21 Aug 2015 17:49	21 Aug 2015 18:08	0:18:51	-----	-----	1
	-----	Total	10 Aug 2015 09:40	21 Aug 2015 18:08	13:17:32	-----	-----	20

One report can display logins of more than one user. However, in this case, report type should be not *User* but *Resource*. All users belonging to an account, for which such report is executed, will get into the report. Example:

Custom Fields Table

The table *'Custom fields'* represents the list of custom fields entered in the corresponding tab of user properties dialog. This report has the same characteristics as the same kind of report for units and groups.

Name	Value
dispatcher	yes
region	Furmankan, East 7 Road
shift	2
units under control	17
working schedule	13:00-17:00, 18:00-22:00

Charts Applied to Users

Two kinds of charts can be attached to the report on user logins: Logins/Hours and Logins/Days of week. To get these charts, in report template click the button 'Add Chart' and choose the type in the dropdown list.

'Logins/Hours' chart shows how user's activity in different hours of the day:
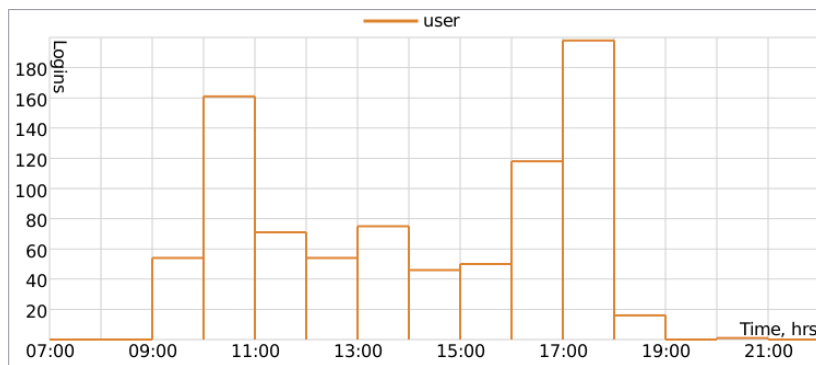
'Logins/Days of week' chart shows how often user logged to the system in different days of the week:
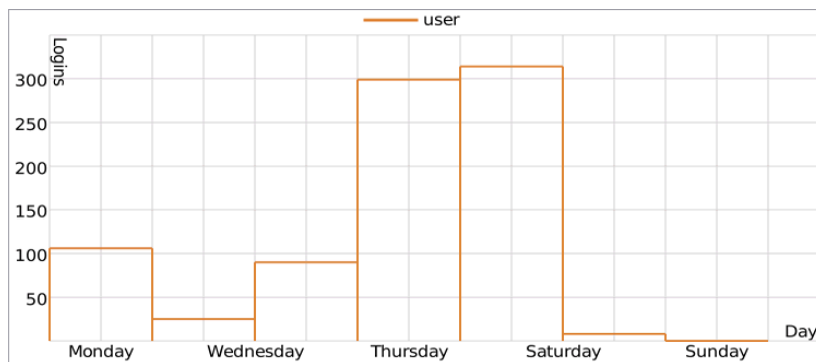
Reports on Drivers

⚠ To generate reports on drivers or driver groups, the proper access to the resource where those drivers or groups belong is required — 'Query reports or messages' flag. Moreover, a driver and a report template should belong to the same resource.

The following types of tables can be applied to drivers:

- Bindings,
- Custom fields,
- Driver activity,
- Eco driving,
- Infringements,
- Orders,
- SMS messages.

Bindings

A table of *Bindings* can be built for each driver. This report shows which units the selected driver was working on, for how long, how much fuel was consumed, distance traveled etc.

The following columns can be included in this kind of report:

- **Beginning**: date and time when the driver was assigned.
- **Initial location**: the address (if available) at that moment.
- **End**: date and time when the driver was reset.
- **Final location**: the address (if available) at that moment.
- **Duration**: duration of a working shift.
- **Total time**: time from the first trip beginning to the last trip end.
- **Engine hours**: total amount of engine hours for a working interval of a bound driver.
- **Engine hours in movement**: an amount of engine hours for an interval of unit's movement.
- **Engine hours in idle run**: an amount of engine hours for an interval of unit's idling.
- **Mileage**: the distance traveled within the period.
- **Mileage (adjusted)**: mileage subject to the coefficient set in unit properties ('Advanced' tab).
- **Urban mileage**: the distance traveled in urban area.
- **Suburban mileage**: the distance traveled in suburban area. It is calculated in regard to speed. The urban/suburban speed line is indicated in Unit Properties => Advanced ('Urban speed limit' setting).
- **Avg speed**: average speed within the interval.
- **Max speed**: maximum speed registered within this working shift.
- **Counter**: counter sensor value.
- **Status**: unit status registered during the interval (if there are several, the first one is displayed).
- **Violations**: the number of violations occurred.
- **Count**: the number of bindings found.
- **Consumed**: the volume of consumed fuel detected by any sort of fuel sensor. If several such sensors are available, their values sum up.
- **Consumed by ImpFCS/ AbsFCS/ InsFCS/ FLS/ math/rates**: the volume of consumed fuel detected by a fuel sensor (like impulse/ absolute/ instant fuel consumption sensor, fuel level sensor) or calculated by math or rates.
- **Avg consumption**: average fuel consumption by any sort of fuel sensor. If several such sensors are available, their values sum up.
- **Avg consumption by ImpFCS/ AbsFCS/ InsFCS/ FLS/ math/rates**: average fuel consumption in the trip detected by one of the methods mentioned above.
- **Initial fuel level**: fuel level at the beginning of the working shift.

- **Final fuel level**: fuel level at the end of the working shift.
- **Penalties**: penalties calculated for adjusted 'Eco Driving' criteria.
- **Rank**: received penalty points converted into a grade using 6 point scoring system.
- **Notes**: an empty column for your custom comments.

When creating/editing a report template, you can also choose units to be under control of this report. Their list is on the right of the columns list. If no units are selected, it means that all units will be considered.

The report is designed in such a way that the first column is the list of units on which the driver was working. It is recommended to apply the detalization option to this table to get a possibility to expand any unit and see more detailed information about all working shifts on it.

	Grouping	Unit	Beginning	End	Duration	Violations	Count
⊟	SMS Sim004	-----	18.03.2016 11:00	18.03.2016 11:55	0:40:15	3	3
	18.03.2016 11:00	SMS Sim004	18.03.2016 11:00	18.03.2016 11:10	0:10:05	2	1
	18.03.2016 12:00	SMS Sim004	18.03.2016 11:20	18.03.2016 11:35	0:15:03	0	1
	18.03.2016 13:00	SMS Sim004	18.03.2016 11:40	18.03.2016 11:55	0:15:07	1	1
⊟	Fish Boat	-----	18.03.2016 15:00	18.03.2016 15:55	0:35:14	4	3
	18.03.2016 15:00	Fish Boat	18.03.2016 15:00	18.03.2016 15:10	0:10:05	1	1
	18.03.2016 16:00	Fish Boat	18.03.2016 15:30	18.03.2016 15:45	0:15:05	2	1
	18.03.2016 17:00	Fish Boat	18.03.2016 15:45	18.03.2016 15:55	0:10:04	1	1
⊟	Picasso	-----	18.03.2016 18:00	18.03.2016 18:55	0:45:19	2	3
	18.03.2016 18:00	Picasso	18.03.2016 18:00	18.03.2016 18:15	0:15:10	1	1
	18.03.2016 19:00	Picasso	18.03.2016 18:20	18.03.2016 18:25	0:05:04	0	1
	18.03.2016 20:00	Picasso	18.03.2016 18:30	18.03.2016 18:55	0:25:05	1	1

Custom Fields

The table 'Custom fields' represents the list of custom fields entered in the corresponding tab of driver's properties. Possible columns:

- **Name**: custom field name.
- **Value**: custom field value.
- **Notes**: an empty column for your custom comments.

Name	Value
Age	30
Category	A, B, C
Driving experience	10
Phone number	+345458796541

Driver Activity

Driver activity table shows such information as type of driver's action, crew size of a vehicle, tachograph card state. It may include the following columns:

- **Beginning**: date and time of message coming.
- **Card**: digital tachograph card state (inserted/not inserted).
- **Activity**: type of driver's activity (rest, work, driving, available, not available).
- **Driving**: driving time interval.
- **Work**: active working hours (time spent by a driver for vehicle repairing, fuel filling, etc.).
- **Availability**: passive working hours (time spent by a second driver in the moving vehicle).
- **Rest**: driver's rest time interval (vehicle is stopped, driver takes rest in a special place or equipped cabin).
- **Overall work**: time spent by a driver working, driving, or being available.
- **Slot**: slot for digital tachograph card (Driver or Co-driver).
- **Status**: vehicle crew size (single/crew).
- **Daily mileage**: distance covered by an attached driver during the day (24 hours).

Beginning	Card	Activity	Driving	Work	Availability	Rest	Slot	Status
01.04.2014 18:37	Inserted	Rest	0:00:00	0:00:00	0:00:00	8:23:00	Driver	Single
02.04.2014 03:00	Inserted	Rest	0:00:00	0:00:00	0:00:00	3:24:00	Driver	Single
02.04.2014 06:24	Inserted	Work	0:00:00	0:48:00	0:00:00	0:00:00	Driver	Single
02.04.2014 06:25	Inserted	Driving	2:47:00	0:00:00	0:00:00	0:00:00	Driver	Single
02.04.2014 09:12	Inserted	Rest	0:00:00	0:00:00	0:00:00	0:42:00	Driver	Single
02.04.2014 09:14	Inserted	Driving	1:22:00	0:00:00	0:00:00	0:00:00	Driver	Single
02.04.2014 10:36	Inserted	Rest	0:00:00	0:00:00	0:00:00	0:46:00	Driver	Single
02.04.2014 11:22	Inserted	Driving	1:49:00	0:00:00	0:00:00	0:00:00	Driver	Single
02.04.2014 13:11	Inserted	Rest	0:00:00	0:00:00	0:00:00	2:48:00	Driver	Single
02.04.2014 15:59	Inserted	Driving	6:06:00	0:00:00	0:00:00	0:00:00	Driver	Single

⚠ While creating this report template you should choose in the parameters of the table a driver activity source: DDD files (are sent by the tachograph), online data (are formed online on the basis of the events of bindings and trips) or bindings and trips (messages are used as the source). If the option 'Bindings and trips' is chosen, the report's result changes in case of changes in the trip detector's settings, deleting messages, bindings and unbindings, etc.

Eco Driving

This reports is the same as report for a unit.

Infringements

This report shows information on the violation of labor routine by the driver. It may include the following columns:

- **Time**: date and time of violation recording.
- **Infringement**: type of driver's activity the conditions of which have been violated.
- **Description**: short description of the infringement.
- **Seriousness**: the extent of the infringement.

№	Time	Infringement	Description	Seriousness
1	05.04.2014 22:58	Rest period	Insufficient daily rest period of less than 11 h	Serious
2	22.04.2014 20:23	Rest period	Insufficient reduced daily rest period of less than 9 h	Very serious
3	02.05.2014 12:13	Rest period	Insufficient weekly rest period of less than 45 h	Very serious
4	05.05.2014 02:33	Rest period	Insufficient split daily rest period of less than 3 h + 9 h	Very serious
5	23.06.2014 23:57	Driving time	Exceeded extended daily driving time of 10 h	Minor
6	30.11.2014 14:44	Rest period	Insufficient weekly rest period of less than 45 h	Minor
7	21.01.2015 18:18	Rest period	Insufficient reduced daily rest period of less than 9 h	Minor
8	22.01.2015 20:30	Rest period	Insufficient split daily rest period of less than 3 h + 9 h	Very serious
9	23.01.2015 05:58	Driving time	Exceeded extended daily driving time of 10 h	Very serious
10	23.01.2015 09:25	Break	Exceeded uninterrupted driving time of 4 h 30 min	Minor

⚠ While creating this report template you should choose in the parameters of the table a driver activity source: DDD files (are sent by the tachograph), online data (are formed online on the basis of the events of bindings and trips) or bindings and trips (messages are used as the source). If the option 'Bindings and trips' is chosen, the report's result changes in case of changes in the trip detector's settings, deleting messages, bindings and unbindings, etc.

Orders

This reports is the same as report for a unit.

SMS Messages

This report shows chat of a dispatcher with a driver via SMS messages. A dispatcher (operator) can send messages to a driver from Wialon interface through a special SMS window. A driver sends messages from his mobile phone. This mobile phone number must be indicated in driver's properties.

The following columns can be included in the table:

- **Time**: date and time when message came.
- **Type**: message type: *sent* (a message that was sent by a dispatcher) or *received* (a message that was received from a driver).
- **Text**: text of the message.
- **Phone**: driver's phone number.
- **Modem phone**: phone number of the modem that sent/received SMS.

Time	Type	Text	Phone	Modem phone
2011-11-04 11:40:13	Sent	5 orders in Central park area.	+375299000200	-----
2011-11-04 11:40:16	Recieved	OK	+375299000200	+375000000000
2011-11-04 11:40:44	Sent	Ready?	+375299000200	-----
2011-11-04 11:40:47	Recieved	5 min	+375299000200	+375000000000
2011-11-04 11:41:00	Recieved	Got jammed	+375299000200	+375000000000
2011-11-04 11:43:11	Sent	Richard Wagner st., 7a, entrance 3; Strombringer ave., 354; West 6th st., 1667;	+375299000200	-----
2011-11-04 11:43:40	Sent	Opera house, back entrance; Kings parkway, 47.	+375299000200	-----
2011-11-04 11:44:07	Recieved	Accepted	+375299000200	+375000000000
2011-11-04 14:44:14	Recieved	Route finished	+375299000200	+375000000000
2011-11-04 14:47:43	Recieved	SOS. Broke down. Between Kings Parkway and 47th East street.	+375299000200	+375000000000

Additional Possibilities

In addition, you can query statistics for such reports, which can include the following fields: report template name, driver name, report interval (beginning and end), and report generation time.

Tracks of driver's movements can be built on the map.

Most tables can be generated for a group of drivers.

⚠️*Note.*
The Total row cannot be used in reports on driver and trailer groups.

Reports on Trailers

⚠️ To generate reports on trailers or trailer groups, the proper access to the resource where those trailers or groups belong is required — 'Query reports or messages' flag. Moreover, a driver and a report template should belong to the same resource.

Two tables are possible for trailers:

- Bindings
- Custom Fields

Bindings

This table shows working intervals if the chosen trailer if it was bound to units. It comes along with information on fuel consumed, distance traveled etc. Parameters and possible columns for this table are the same as in the similar table for drivers (with the exception that the column 'Violations' is absent). The Bindings table can be also generated for trailer groups — it gives possibility to build complicated four-level reports (trailers –> units –> dates/weeks/months –> single bindings). More...

Grouping	Unit	Beginning	End	Duration	Count
⊟ Ducati	-----	2014-06-17 16:03:30	2016-03-18 23:59:59	13:04:36	3
⊞ Comfortable house 1	-----	2016-03-18 13:32:48	2016-03-18 23:59:59	10:27:11	1
⊞ Comfortable house 2	-----	2014-06-17 16:03:30	2016-03-14 18:40:17	2:36:47	1
⊞ Comfortable house 3	-----	2016-03-18 13:31:48	2016-03-18 13:32:26	0:00:38	1
⊟ Honda	-----	2014-02-18 11:27:05	2016-03-18 13:32:30	15:00:35	3
⊞ Modern equipment	-----	2016-03-18 13:32:01	2016-03-18 13:32:30	0:00:29	1
⊟ Mixing machine	-----	2014-02-18 11:27:05	2016-03-18 13:33:06	15:00:06	2
⊞ 2010-02-18	-----	2010-02-18 11:27:05	2010-02-20 16:27:11	05:00:06	1
⊞ 2011-03-18	-----	2011-03-18 13:33:06	2011-03-18 18:33:06	05:00:00	1
⊟ 2012-03-18	-----	2012-05-10 13:33:06	2012-05-10 18:33:06	05:00:00	2
2012-03-18 13:33:06	Honda	2016-03-18 13:33:06	2016-03-18 15:30:00	02:02:54	1
2012-03-18 13:33:06	Honda	2016-03-18 15:30:00	2016-03-18 18:33:06	02:57:06	1

Custom Fields

This table represents the list of custom fields created in trailer properties. It is not available for trailer groups.

№	Name	Value
1	Mileage	55000
2	Model	Bambi
3	Year	2007

Reports on Passengers

⚠ To generate reports on passengers, it is necessary to possess the 'Query reports or messages' flag towards a resource to which these passengers belong. Moreover, a passenger and a report template should belong to the same resource.

The 'Bindings' report can be generated on passengers.

The 'Bindings' table may include time and location of passengers' boarding/leaving a vehicle, name of a unit used by passengers, duration of a trip, etc.

- **Beginning**: time a passenger was bound to a unit.
- **Initial location**: passenger's location upon binding to a unit.
- **End**: time a passenger was unbound from a unit.
- **Final location**: passenger's location upon unbinding from a unit.
- **Unit**: name of a unit to which a passenger was bound.
- **Driver**: name of a driver of a unit to which a passenger was bound.
- **Duration**: passengers time in trip (time between binding and subsequent unbinding).

Beginning	End	Unit	Driver	Duration
11 Oct 2016 12:37:24	11 Oct 2016 12:39:12	Honda	OM1	0:01:48
11 Oct 2016 12:39:39	11 Oct 2016 12:42:14	Euro0	yami_driver1	0:02:35
11 Oct 2016 12:46:38	11 Oct 2016 12:48:16	Euro0	yami_driver1	0:01:38
11 Oct 2016 12:50:57	11 Oct 2016 12:53:46	BMW	OM	0:02:49
11 Oct 2016 12:55:38	11 Oct 2016 12:58:42	BMW	OM	0:03:04
11 Oct 2016 13:03:50	11 Oct 2016 13:08:51	BMW	OM	0:05:01
11 Oct 2016 13:10:56	11 Oct 2016 13:12:31	BMW	OM	0:01:35

Data in Reports

Time in Reports

An event's occurring/beginning/finishing time is given in reports in the format indicated in 'Advanced settings' section of a report template.

In the tables that include the duration of a state the hours may not be combined into days (if the interval is longer than 24 hours). It means that instead of '5 days 12:34:56' there will be '132: 34: 56'. To disable days and leave only hours, choose the duration format 'hours:minutes:seconds' in the table properties of the report template. This option does not only affect the formatting in the cells, but also the row 'Total'. Moreover, the duration may be shown in in the format of 'hours (with two decimal places). For example, '3.45' instead of ' 3: 27' . This is done by means of activating the option 'hours (with two decimal places)'.

If grouping is used, then a table receives additional column 'Grouping' displaying time in the following way:

- Grouping by years shows corresponding years (for example, 2015);
- Grouping by months shows months' names (for example, August);
- Grouping by weeks shows a number of a week in a year (for example, week 10; note that the first week is considered to be the first *full* week in a year.)
- Grouping by day of the week shows the corresponding day (for example, Friday);
- Grouping by day of the month shows the corresponding day (from day 1 to day 31);
- Grouping by dates shows the corresponding date in the format chosen in the advanced settings of a report template;
- Grouping by shifts shows the corresponding shifts (for example, shift 1).

⚠ *Attention!*
To receive reliable data for time/duration, it is important to correctly indicate the *time zone* and *DST* options in User Settings.

Mileage

Mileage can appear in reports on trips, geofences, rides, speedings, digital sensors, etc., as well as in statistics and processed fuel level chart.

Mileage is calculated according to settings of mileage counter on the 'General' tab in unit properties. Besides, mileage can depend also on Trip Detector because the intervals of movement and parkings are detected by it.

Mileage can be ordinary or adjusted. The adjusted mileage may be useful to coordinate mileage detected by the program and mileage detected by vehicle itself. Correction coefficient is set in unit properties on the 'Advanced' tab.

In Statistics and in various tables, you can find many possibilities for mileage:

- Mileage in all messages: the full mileage without any filtration by trip detector. It is always the longest mileage because it includes also all adjustment of data.
- Mileage in trips: total mileage of all movement intervals found according to trip detector.
- Mileage (adjusted): mileage in trips multiplied by correction coefficient.
- Mileage in engine hours: mileage in intervals of engine hours.
- Urban mileage: distance traveled at speed which is considered as speed in populated areas.
- Suburban mileage: distance traveled at speed which is considered as speed outside populated areas. 'Urban speed limit' is a setting in unit properties which defines if unit is moving in urban area or outside it.
- Initial mileage: mileage sensor value at the beginning of the interval (trip, street visit, sensor operation, etc.).
- Final mileage: mileage sensor value at the end of the interval.

- Mileage counter: absolute mileage (mileage counter value at the moment of report generation).

In many tabular reports, mileage can be displayed. It can be calculated either by all messages or by messages in trips. Choice of the method of calculation is defined by the flag 'Mileage from trips only' in additional settings of the 'Report Template' dialog.

Mileage if less than 20 (miles or kilometers) is displayed with accuracy to hundredths (other decimal places are simply cut). Measurement units for speed and mileage (kilometers and kilometers per hour or miles and miles per hour) are selected in additional settings of the 'Report Template dialog'. There you can also set the option *'Mileage/fuel/counters with accuracy to two decimal places'* to see mileage always with hundredths.

Speed

Average and maximum speed values can be included in the same reports as mileage: trips, geofences, rides, speedings, digital sensors. Note that the **average speed** directly depends on mileage because it is calculated by dividing mileage by duration (for example, distance traveled with a sensor on divided by duration of on state. That is why a situation can happen when the average speed is zero and maximum speed is a positive number. It can happen (1) if state duration is zero (see explanation above); (2) if mileage is zero (unit was parked or the mileage counter is set incorrectly); (3) if the mileage is insignificant, for example, '0,01', and the result of division is smaller than one. Note also that mileage can be calculated either by all messages or by trips only (option in template's advanced settings), and this will obviously affect resulting values of average speed.

Maximum speed has nothing to do with mileage and any counters. To calculate maximum speed within an interval, all messages which get to this interval are analyzed and the largest speed value is selected and displayed in the corresponding cell.

Speed is given only in integer numbers.

Fuel in Reports

Many reports can provide information about fuel: fuel level (initial/final), the volume of filled/stolen/registered/consumed fuel, average consumption, etc.

In most cases to receive information about fuel you need the unit to have corresponding sensors installed. They should be configured on the tab 'Sensors' of 'Unit properties' dialog and the corresponding calculation methods should be chosen on the 'Fuel Consumption' tab.

Abbreviations used:

- FLS: fuel level sensor;
- ImpFCS: impulse fuel consumption sensor;
- AbsFCS: absolute fuel consumption sensor;
- InsFCS: instant fuel consumption sensor.

Without special fuel sensors, you can control fuel in the following ways:

- register fillings manually in the 'Monitoring' panel;
- use the mathematical calculation of fuel consumption that is based on the consumption rates from ignition, relative o absolute engine hours sensors multiplied by the values of engine efficiency sensors (if any). The latter can be used for taking into account the load, the movement in urban and suburban cycles and the work during different seasons.

The consumption by math does not require fuel sensors. The consumption rates and coefficients indicated in the properties of the ignition and engine efficiency sensors will be multiplied by time.

In a report template several methods of calculating fuel can be selected simultaneously. In this case a separate column will be generated for each method. Moreover, if there are several sensors of the same type, then a separate column will be generated for each. If you want a certain sensor to be used for fuel calculation, enter its name mask in the filter 'Sensor masks' of the parameters of the table. If in the report template you select columns that do not correspond to unit's properties, in the resulting report there will be zeros in those cells.

In statistics, there is no possibility to show information for each sensor separately. In the rows like 'Avg consumption

…', 'Consumed by …', 'Rates deviation …' etc. you can get only one value for each type of fuel sensor (FLS/ImpFCS/AbsFCS/InsFCS). That is why consumed fuel ('Consumed by …') in statistics is the sum of the sensors of this type, and average consumption ('Avg consumption …') is the arithmetic mean of those sensors. However, the calculation of deviation from rates ('Rates deviation …') depends on sensors' adjustments. If a unit has two sensors of the same type, the deviation from rates is calculated for each sensor separately but for the statistics (as it can be only one row) the sum of those deviations is shown. Thus, the formula is:

- *Rates deviation = (Consumed by FLS1 — Consumed by rates) + (Consumed by FLS2 — Consumed by rates)*

Fuel consumption detected by FLS as well as average consumption according to FLS can be calculated including fuel thefts or excluding them. This is adjusted in advanced settings of a report template — the checkbox *'Exclude thefts from fuel consumption'*. Depending on this option, you can get summarized information about fuel consumption or information about fuel consumed exactly by a vehicle.

By default the fuel level is given in integer numbers. The volume of the fuel consumed/registered/stolen as well as the average consumption is given correct to the nearest hundredth if their value is below 50 (if it is higher, then integer numbers are used). However, if you consider it necessary, you can see fuel always with accuracy to hundredths. For this, check the option 'Mileage/fuel/counters with accuracy to two decimal places' in the report template (the rest of numbers will be rounded off).

If the U.S. measurements are selected, the fuel is measured in gallons and the average consumption — in mpg (miles per gallon) unlike the European system where the average consumption is measures in l/100km (liters per 100 kilometers).

The fuel calculation algorithms process the messages considering filtration that is configured on the 'Fuel Consumption' tab (the option 'Filter fuel level sensors values').

Consumption Math

During the mathematical calculation the fuel consumption is computed separately for each pair of messages.

The following algorithm is used:

1. The status of each engine efficiency sensor in the current message is determined.
2. For the operating sensors the values indicated in the field *Consumed, l/h* of their properties are summed.
3. The values of the engine sensors are calculated.
4. The received values are summed according to the formula *k1 + (k2 - 1) + (k3 - 1) + … + (kn − 1)*. In that way the coefficient is formed. If the sum of the coefficients is less than 0 or invalid, the total coefficient will be 1.
5. To determine the current fuel consumption of the unit, the value from the point 2 is multiplied by the value of the point 4.
6. The value from the previous message till the current one is multiplied by the value from the point 5.
7. The consumption for each message pair for the indicated interval is summed and in that way the fuel consumption is determined by consumption math.

Fuel

All the sensor workflow can be divided into sequential steps (there are important options, terms in step subsections):

1. Data preparation
   - Option: Ignore the messages after the start of motion;
   - Term difference: 'Mileage-based calculation' VS 'Time-based calculation'.
2. Filtration
   - Option: Filter fuel level sensors values;
   - Option: Filtration level.
3. Fillings Detection
   - Option: Minimum fuel filling volume;
   - Option: Detect fuel filling only while stopped;
   - Option: Ignore filtration when calculating filling volume;
   - Special Case: How a filling is processed?
4. Thefts detection
   - Option: Minimum fuel theft volume;
   - Option: Idling;
   - Option: Detect fuel theft in motion;
   - Option: Ignore filtration when calculating theft volume.
5. Consumption calculation
   - Option: Replace invalid values with math consumption;
   - Option: Exclude thefts from fuel consumption;
   - Special Case: Filling/theft is sliced with one of interval frontiers.

Data preparation

⚠ Note: **Ellipsis (…)** substitutes **'Unit properties → Fuel consumption'** is option paths.

Among important options the next list should be mentioned:

- Option: Ignore the messages after the start of motion;
- Special Case: Mileage-based calculation VS Time-based calculation.

Ignore the messages after the start of motion

```
... → 'Fuel fillings/thefts detection' block → 'Ignore the messages after the start
of motion, sec'
```

This option allows messages being ignored after motion has started for a period of time in seconds. Messages which are frontier ones to ignored time period are joined by drawn line.

Here is whole algorithm more precisely:

1. all starts with start motion message, it is used to define the amount of messages being ignored;
2. this message is regarded as left-frontier message;
3. then we add seconds set in the option to this message timestamp to get end moment of ignored time period;
4. all FLS messages being within this time period are ignored while processing;
5. the first message which comes after ignored period (p.3), is called right-frontier message;
6. Both left- and right-frontier messages are joined by line being drawn (instead taking ignored messages into account while building graph).

All processed graphs have the option for such correction (except for the Regular graphs, where data is raw).

This is the graph with no ignoring:
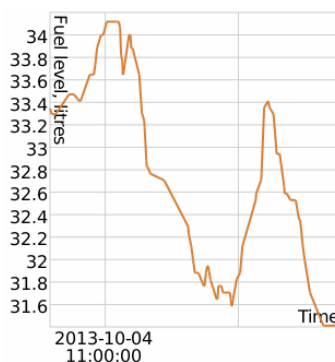
This graph is being ignore option 10 set:
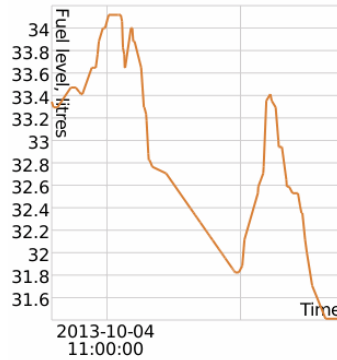
Mileage-based calculation VS Time-based calculation

```
... → 'Fuel fillings/thefts detection' block → 'Time-based calculation of fillings'
... → 'Fuel fillings/thefts detection' block → 'Time-based calculation of thefts'
... → 'Fuel level sensors' block → 'Time-based calculation of fuel consumption'
```

Convergence of data (i.e., when sum of interval results equals to whole interval result) is guaranteed when all mentioned options activated/deactivated:

1. time-based calculation of fillings;
2. time-based calculation of thefts;
3. time-based calculation of fuel consumption.

While 'Time-based calculation' (all three options) **switched on** the x-axis is time:

- fuel consumption/idling looks like slowly descending curve on graph;
- thefts/fillings — quick falling of fuel level on a small period of time (theft/filling processing time).

While 'Time-based calculation' **switched off** (data is calculated as mileage-based) the x-axis is mileage:

- fuel consumption in motion looks like slowly descending curve;
- idling – because mileage is not incremented, should be seen as vertical falling of fuel level;
- thefts/fillings on stops — because mileage is not incremented, should be seen as vertical rising of fuel level.

Filtration

⚠ Note: **Ellipsis (…)** substitutes **'Unit properties → Fuel consumption'** is option paths.

Two options are connected with filtering:

- Option: 'Filter fuel level sensors values';
- Option: 'Filtration level (0..255)'.

Filtration enabling and filtration level setting

```
... → 'Fuel level sensors' block → 'Filter fuel level sensors values';
... → 'Fuel level sensors' block → 'Filtration level (0..255)'.
```

To use filtration be sure to:

1. check 'Fuel level sensors' area ('Unit properties → Fuel consumption');
2. check 'Filter fuel level sensors values';
3. set non-zero value for 'Filtration level (0…255)'.

It is OK to use filtration when wrong messages appeared, i.e., with unreasonably bigger/smaller values. During filtering median smoothing is used.

⚠ *Attention!*

- If value 0 is set in 'Filtration level' option, a user must be aware of that filtration is not disabled this way, but its minimal level is used instead (three messages being filtered, because that is the minimum input required for median smoothing).
- Any number from 1 to 255 being set in 'Filtration level' is multiplied by 5. The result number is the amount of messages to be filtered.
- To disable filtration completely please uncheck 'Filter fuel level sensors values' option.

There is the chart filtration disabled:
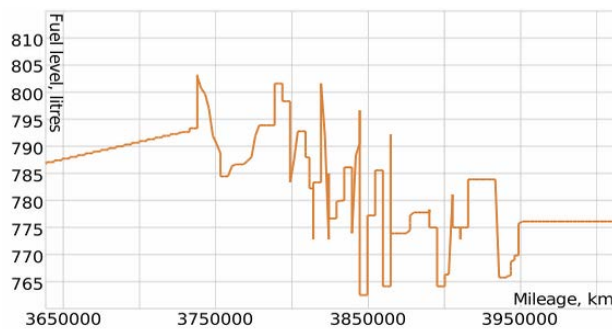
This chart is for enabled filtration 10:
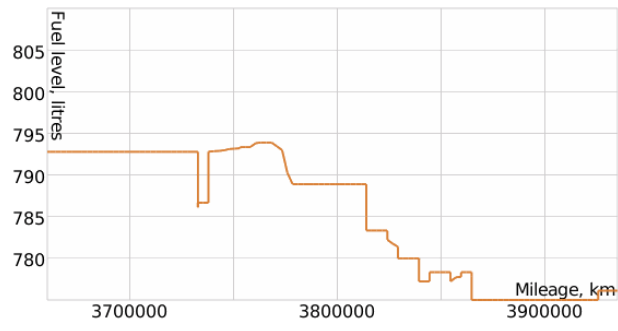
Fillings Detection

⚠ *Attention!*

In order to detect fillings the processed data is used (it is done on 'Data preparation' and 'Filtration' steps).

⚠ Note: **Ellipsis** (**…**) substitutes **'Unit properties → Fuel consumption'** is option paths.

Three options are attached to this detection:

- Option: Minimum fuel filling volume, liters;
- Option: Detect fuel filling only while stopped;
- Option: Ignore filtration when calculating filling volume;
- Special Case: How a filling is processed?

Minimum fuel filling volume

```
... → 'Fuel fillings/thefts detection' block → 'Minimum fuel filling volume, liters'
```

This option helps to quit false fillings, because in motion sensors may send false data rise.

Detect fuel filling only while stopped

```
... → 'Fuel fillings/thefts detection' block → 'Detect fuel filling only while stopped'
```

In normal conditions transport vehicles are fueled on stops. This option narrows its search to stops/parkings.

Ignore filtration when calculating filling volume

```
... → 'Fuel level sensors' block → 'Ignore filtration when calculating filling volume'
```

When filtration switched on then some fuel level deviations may occur at the beginning and end of a filling. To avoid it the system uses unfiltered data when filling volume calculated.

Special Case: How a filling is processed?

Filling time frontiers and its volume

The filling is processing.

Assume, that fuel volume in this message is *Vcurr*, previous message fuel volume — *Vprev*. If the difference *d* (=*Vcurr - Vprev*) for the current message is positive, then current message will be marked as **initial** filling message.

Time passes by. The filling is close to finish. When *d-value* for some message becomes negative (i.e., the current message fuel volume is less than in previous one), then it is called **final** filling message.

Filling **volume** equals to *Vfinal - Vinit* (difference in fuel volumes between final and initial filling messages).

Filling timestamp calculation algorithm

Now it's time to find the filling timestamp.

Iteratively for every message within filling interval (exclude the last one) the system seeks delta(=*Vnext - Vcurr*) for the next message which shows the fuel level growth between the current message and the next one.

Message timestamp which delta is the ultimately biggest among others is regarded as filling timestamp (in other words, the left message is chosen from the message pair which delta is the biggest one).

⚠ Worth highlighting, that a filling timestamp is calculated dynamically depend on the current unique case.

Thefts Detection

⚠ Note: Ellipsis (**…**) substitutes **'Unit properties → Fuel consumption'** is option paths.

The next options are crucial while detecting thefts:

- Minimum fuel theft volume, liters;
- Idling;
- Detect fuel theft in motion;
- Ignore filtration when calculating theft volume.

Minimum fuel theft volume

```
... → 'Fuel fillings/thefts detection' block → 'Minimum fuel theft volume, liters'
```

This option defines applicable fuel level falling minus fuel consumption for motion/idling to call such falling the theft and detect it.

Idling

```
... → 'Consumption math' block → 'Idling, liters per hour'
```

The option allows to detect thefts on stops/parkings. System finds difference between fuel volume spent according to sensors and mathematically calculated one. In case of non-zero difference which is equal to or more than value set in minimum fuel theft volume option then fuel theft detected.

Detect fuel theft in motion

```
... → 'Fuel fillings/thefts detection' block → 'Detect fuel theft in motion'
```

On default this option is unchecked. In case there is a necessity to control thefts in motion a user may use the option. But if sharp fuel level drop takes place then false theft may be detected.

Ignore filtration when calculating theft volume

```
... → 'Fuel level sensors' block → 'Ignore filtration when calculating theft volume'
```

Similar to fillings, filtration may deviate start and end fuel level values on thefts. To ignore such deviations the system uses unfiltered data while computing theft volume.

Special Case: How a fuel theft is detected?

Time frame of a theft and its volume

A theft is being performed.
Let us suppose that the fuel volume in the current message is *Vcurr*, the fuel volume in the previous message is *Vprev*. If the difference *d* for the current message (*d = Vcurr - Vprev*) is negative, the message will be considered

the **initial** message of the theft.

Time passes. When the value *d* is positive for some message (that is the fuel volume in the current message is higher than in the previous one), the message will be considered the **final** message of the theft.

The theft **volume** equals to *Vfinal - Vinit* (the difference of fuel levels between the final and the initial messages).

Theft timestamp calculation algorithm

Now the timestamp of the theft is being looked for.

The system seeks for a delta with the following message (*d = Vnext - Vcurr*) for every message within the theft interval. The delta shows the decrease in fuel level between the current and the next message.

The message timestamp that has the highest delta is considered to be the theft timestamp (in other words, the left message with the biggest delta is chosen from the pair of messages).

⚠ It is worth emphasizing that the timestamp of a fuel theft is calculated dynamically depending on the sensors' values in every particular situation.

Consumption calculation

⚠ *Attention!*

In order to calculate consumption the processed data is used (it is done on 'Data preparation' and 'Filtration' steps).

⚠ Note: **Ellipsis (…)** substitutes **'Unit properties → Fuel consumption'** is option paths.

Two options and special case are toughly connected with this step:

- Replace invalid values with math consumption;
- Reports → Report Template Properties → Options → Exclude thefts from fuel consumption;
- Special Case: filling/theft is sliced with one of interval frontiers.

Replace invalid values with math consumption

```
... → 'Fuel level sensors' block → 'Replace invalid values with math consumption'
```

In case of values falseness, they will be replaced by the values calculated mathematically. The mathematical calculation uses the data indicated in the properties of ignition, relative and absolute engine hours sensors (option ' Consumption, l/h') and the value of the engine efficiency sensor.

Algorithm: Let's say Vinit — initial volume for the interval (the way what interval is taken is defined in specified report template), Vfinal — final volume. Then difference is calculated between them with respect to fillings volume like Vinit – Vfinal + Vfill. In case of caluclated value is equal to or greater than zero the interval is marked as correct. But if the result value is negative then consumption is treated as falsy and math consumption takes place (with further whole interval falsy values replacing).

Exclude thefts from fuel consumption

```
Reports → Report Template Properties → Options → 'Exclude thefts from fuel
consumption'
```

That option defines whether a theft took part in consumption while computing different indices. Keeping this option switched on is valuable when ignoring deviations because of detected thefts. Switch it off when discharge is authorized, as an example, agriculture vehicles are being filled with refueller and the user is to get fuel turnover being spent during specified period of time.

Special Case: filling/theft is sliced with one of interval frontiers. What is the way filling/theft being detected?

Let's examine the case on a filling example. Assume we've sliced the filling with the interval initial frontier. As described in how a filling is processed section a filling timestamp is defined dynamically according to the unique case. Since we've sliced the filling with interval, the second interval message becomes the initial filling message and it informs that fuel level has grown compared to the previous value (the first message is the reference used to calculate the delta (*d=Vcurr - Vprev*) for the second message, it cannot be calculated for the first message because of the absence of its previous one).
The filling final message remains the same.
The filling volume declines compared to unsliced filling reference (because of the initial message shifts to the right).
The filling timestamp might hold the position/shift to the right, because it is all about the case whether the message, which timestamp is regarded as unsliced filling timestamp, is taking into account during calculation the time where the filling has occurred.

Geofences

Geofence, or geographical zone, is an area on the map that is important for user's tracking purposes and requires special attention. Geofences can be used to control units' activity in these areas or, on the contrary, outside them. You can choose an image for a geofence or add a description.

A geofence can have a shape of a line (for example, an avenue or any road), polygon (a city or park or plant), or circle with any radius.
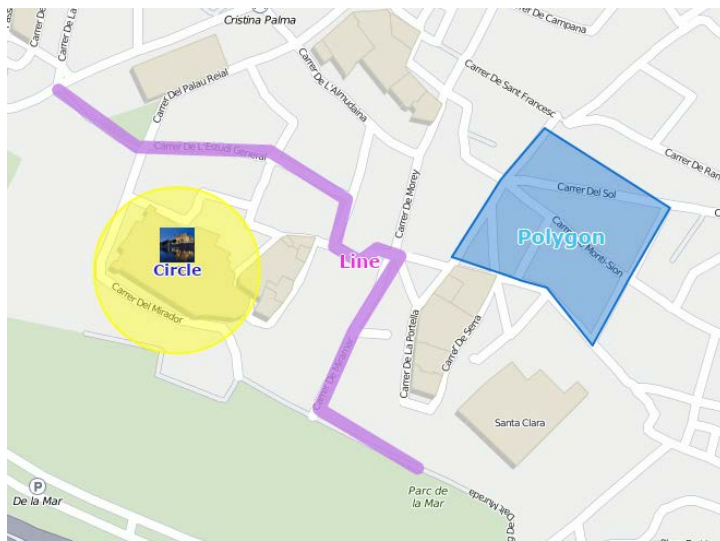
Geofences are widely used in Wialon. Along with the map's visual enrichment, they can be used in reports, notifications, and units' tooltips. Geofences can also be used as check points for route configuration. Geofence's tooltip may contain dynamically updated images and videos from external sources.

To open the Geofences panel, click the corresponding name in the top panel or choose the necessary item in the main menu customizer. Afterwards, choose a mode which allows you to work either with geofences or groups of geofences. Note that geofence creation is available in the 'Geofences' mode only, while the other options can be used in the 'Groups' mode as well.
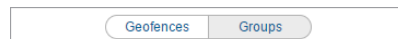
Creating a Geofence

Here are three steps to create a geofence.

1. Map Geofence

Start working with geofences by choosing the corresponding mode.

Press the **'New'** button, and help window will provide you with the instructions on geofences' creation. Choose a geofence type on the left: *line*, *polygon* or *circle*.

Then map a geofence. Here are the basic rules for mapping a geofence:

- Double-click on any place of the map to put the first point. Then add more points using the same method. Put the points as close or as far from each other as you want.
- To insert a point between two other points, double-click on a segment between them.
- To move a point to another place, click on it and holding the left mouse button drag to another place on the map. Then release the mouse button.
- To delete a point, just double-click on it. Note that points cannot be deleted if there are only two points — for lines, or three — for polygons.
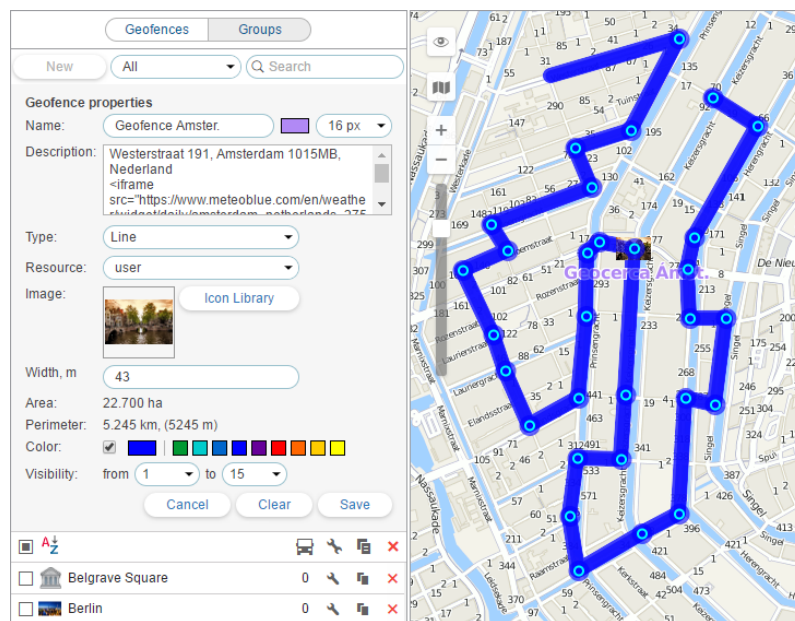
⊙ *Hint.*
A quick way to map a geofence is by using the Routing tool (create lines) or the Address tool (create circles).

2. Set Geofence Properties

Name
Geofence's name is used while tracking units as well as in reports and notifications. It is a required parameter. It can consist of one or more symbols. Besides, you can specify caption color and size. It has sense if in User Settings the option 'Display names of geofences on map' is enabled.

Description
This field is optional. Description is displayed in geofence's tooltip. It can be also added to geofence's name if the geofence is used as address source in reports. When you create a geofence, the description is filled in automatically with the address information taken from the first point you map. However, you can edit it or simply delete. Its length is

not limited. You can use *html* (including *iframe*) tags in descriptions in order to format text or get images from other sites. For example, you can embed video from web cameras, get photos from crossroads, load weather or currency exchange, etc.

Type

Geofence can be of the shape of the line, polygon, or circle. For line, you also can indicate its thickness, for circle — radius (in meters or feet, depending on resource settings).

Resource

This option is shown if the current user has access to more than one resource. The resource chosen while creating a geofence defines the measurement system used to calculate its area, length, radius, thickness, etc. (metric, U.S. or imperial system).

Image

You can attach any image to a geofence. An image can be chosen from the standard icons ('*Icon Library*' button) or loaded from your computer by pressing the corresponding area and choosing the file you need. Supported formats are PNG, JPG, GIF, and SVG. Moreover, you can use the ⊕Icon Library application (for top accounts only) which enables uploading individual icons for geofences. The icons uploaded to the system using this application will be available for you in the standard *Icon Library*. To facilitate the work with the library, the uploaded icons are placed in the same list, but separately from the standard ones (at the top). All loaded images are automatically resized by 64×64 pixels to display the geofences on the map and on the list. However, in the tooltip for a geofence you can see an enlarged image (up to 256x256 px). In the geofence's editing dialog you can delete the image used. To do so, point a cursor on it, and click the appeared delete button. Click OK to save changes, or Cancel to dismiss them.

Area & Perimeter

These fields are not editable, they are calculated automatically.

⊙ *Note.*
Area and perimeter values also depend on resource settings, and can be given in hectares and kilometers or square miles, square feet and miles (feet), respectively.

Color

This color will be used to render a geofence on the map and to display it in a unit's tooltip and in extended unit information as well as some other places where next to the geofence's name where a unit is located, is shown a square of the same color. The color is chosen using the palette or manually (by entering its RGB code). You can also choose if geofence's shape should be shown on the map. For this purpose the corresponding flag to the left of the color palette is used.

Visibility

Here you specify map zooms at which geofences will be displayed or not. For example, if a geofence is a city, it has sense to see it on remote scales, whereas if it is a building it is more logical to see it on more detailed scales. Different map types can have different graduation of map scales. However, all possible values fall into the range from 1 to 19, where 1 is the most detailed scale (small streets and houses are displayed) and 19 is an overview (the whole world).

3. Save Geofence

When finished, press 'Save'. In case of a mistake, press 'Clear' and try again. To close the create mode without saving results, press Cancel.

⊙ *Note.*
Geofences can be saved to a file and easily transferred from one resource to another.

Geofences Management

In the work area there is a list of all available geofences. To move to the necessary geofence on the map, click on its name in the list.

Put check marks in the left column of the table to choose the geofences you want to be displayed on the map. Deselect these boxes to remove geofences from the map. A check mark at the header of the list selects/deselects all the geofences if their visibility corresponds to the current map scale and the appropriate layer is enabled.

If you have ticked too many geofences or they are very big, it can slow down browser performance. In this case, the setting of rendering geofences on server may help.

A geofence can be presented on the map by its name (if the flag 'Display names of geofences on map' is enabled in User Settings), by the image or shape assigned (if that option is activated in geofence properties), as well as any combination of these three elements. The geofences that overlap each other can be replaced by one conditional item.
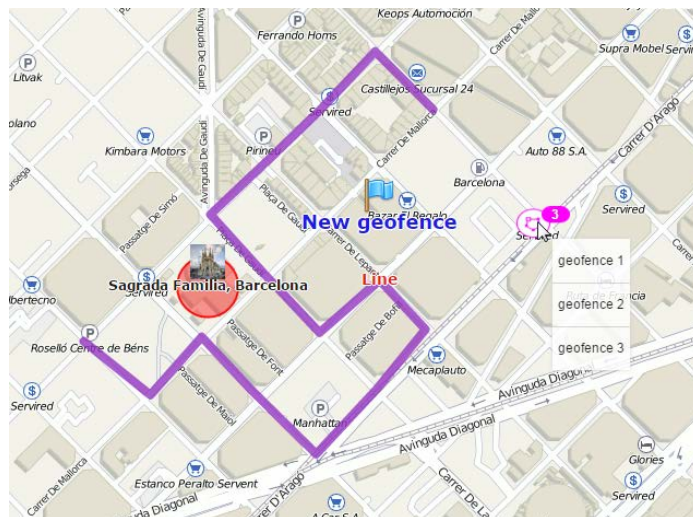
Placing a cursor over a geofence name (in the list) or its icon (on the map), you will get the following information about it in the popup tooltip: name, type, description (if specified), enlarged image, the name of the resource (if you have access to several), as well as the list of units located inside the geofence at the moment. Depending on geofence type, there will be also area, perimeter, length, and/or radius. The measuring units for these parameters depend on the measurement system chosen for a resource to which the geofence belongs. If a description contains links to other images, they will be shown as well. For instance, a tooltip of a geofence can look like this:
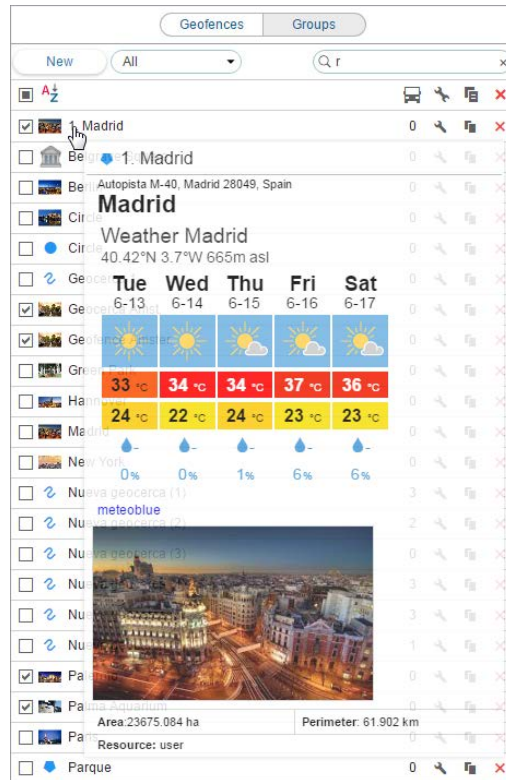
The following code has been used to add weather forecast to the tooltip:

```
 <iframe src="https://www.meteoblue.com/en/weather/widget/daily/city-of-london_united-
kingdom_2643741?
geoloc=fixed&days=4&tempunit=CELSIUS&windunit=KILOMETER_PER_HOUR&coloured=coloured&picto
frameborder="0" scrolling="NO" allowtransparency="true" sandbox="allow-same-origin
allow-scripts allow-popups" style="width: 216px;height: 245px"></iframe><div><!-- DO
NOT REMOVE THIS LINK --><a
href="https://www.meteoblue.com/en/weather/forecast/week/city-of-london_united-
kingdom_2643741?
utm_source=weather_widget&utm_medium=linkus&utm_content=daily&utm_campaign=Weather%2BWid
target="_blank">meteoblue</a></div>
```

To find or to sort geofences there is a filter and a fast search provided. The filter is a dropdown list with several predefined criteria:

By property:

- Polygons;
- Lines;
- Circles.

By resource:

- Here you can find a list of the resources available for the current user (if they are more than one). Click on any of them to display geofences belonging only to this particular resource.

To find a needed geofence quickly, you can use the dynamic filter above the list. Type the name of the geofence or some part of the name and observe the search results.

The following icons and buttons are used in the panel 'Geofences':

📋	Shows how many units are there inside the geofence at the moment. These units are listed in the tooltip (the data refreshes once in two minutes). If there are question signs (?) in this column, it means the option 'Presence in geofences' is disabled. If needed, activate it in User Settings.
🔧	The button to view or edit (depends on the access rights) geofence properties: size, shape, name, color, position, ⚠

🦡	etc. It is prohibited to edit the geofences that have more than 1000 points.
🗐	The button to copy a geofence. You can edit a geofence and save it under another name.
✖ ✖	The button to delete a geofence(s). To delete several geofences at once, check them in the first column of the table and press the delete button at the top of the list. If the button is dimmed, it means you don't have enough access rights to the resource which the geofence belongs to.

Groups of Geofences

Created geofences can be formed into groups. Groups are used to unite geofences on the basis of any criteria, and serve as intervals filtration parameters in several report templates. Moreover, groups of geofences are used in the notifications of the corresponding type. ⊕ A group may contain only geofences belonging to the same resource as the group itself.

To work with groups, choose the corresponding mode in the 'Geofences' panel.
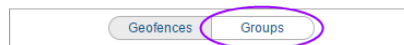
To create a new group of geofences, click the 'New' button. Enter a name and description, and choose geofences to be included in a group. Click OK.
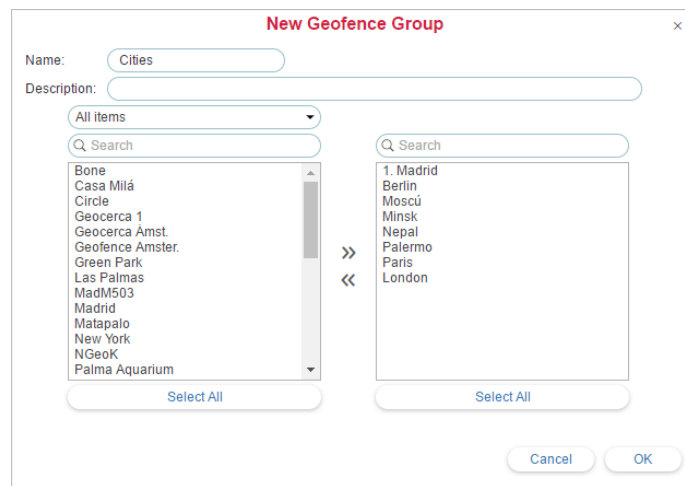
A list of created groups of geofences is displayed in the work area. Groups are arranged alphabetically. The same as for geofences, a filter or a dynamic search can be used for groups. Moreover, groups can be edited, copied, or deleted. Note that upon deleting a group you can not delete its contents.

Geofences not included in any group can be found in the 'Geofences outside groups'.

Series of standard actions are available for geofences in a group (unfold a group in order the corresponding buttons to appear).
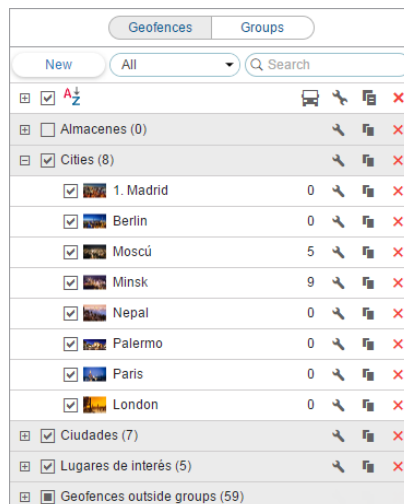
Usage

While Tracking Online

Geofences can be displayed on the map (the ones that have flags in the panel 'Geofences' are shown). That simplifies the visual perception of the map and enriches it. Different regions can be selected by different colors and you can estimate the units' presence in definite areas. If a geofence is displayed on the map, you can press <ctrl> and put the mouse cursor over it to see its tooltip (name, type, list of units inside, etc.). In case of the geofences that have images assigned, the tooltips appear as you just point them with the cursor.

In a unit's tooltip and in its additional information you can see its presence in geofences if the option 'Presence in geofences' is enabled in User Settings.

Besides, it's possible to get images from external sources in geofences' tooltips (webcam videos, photos, rates of exchange, etc.).
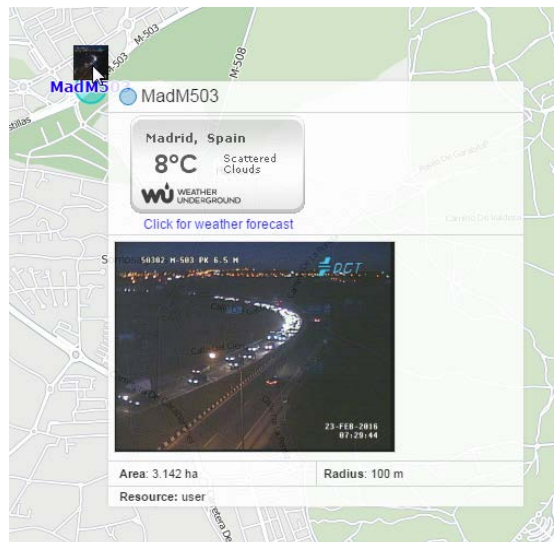
Besides, a column with geofences where units are located can be displayed in the 'Monitoring' panel instead of ordinary addresses.

⚠ Note that in order *Geofences* to be displayed on the map you should check if the corresponding layer is active.

In Notifications

You can be notified by e-mail, SMS, online or by other means when your unit leaves or enters a geofence. It is also possible to set speed limitations and sensor range for a unit during its presence in a geofence. Besides, entering a geofence or leaving it can be automatically accompanied by an action: send a message to the driver, block the engine, change users' access to this unit, and many others. See Notifications.

In Reports

Geofences can be used in reports as addresses (in the 'Location' column), if the 'Use geofences for addresses' flag is enabled in the 'Advanced settings' block of the reports' template.

Many tables are generated on the basis of geofences. Among them there are the following:

- Geofences: visits to geofences (all entries and exits to/from the selected geofence(s) are given together with visit duration, distance travelled within the geofence, average and maximum speed, etc.).

- Non-visited Geofences: geofences which were ignored (non-visited) during a period of time or on certain days.
- Rides and Unfinished Rides: rides from one geofence to another (convenient to control how a cargo is transported in several trips).

Geofences can be also used to filter intervals in reports.

When a report is generated, geofences can be rendered on the map.

In Routes

Geofences can be used as check points while configuring routes.

Routes

Wialon tracking system provides an opportunity to track a unit being on route and supposed to visit definite check points in predefined or arbitrary order, at definite time or without any strict schedule.

To understand how routes work, three notions are important: route, schedule, and round.

Route is a set of check points, each characterized by its location on map. The number of check points in a route is unlimited.

Schedule is a timetable which holds time of visit for each point. One route can have many schedules attached to it.

Round is a route, its schedule and assigned unit put together.

So, to configure a route, perform the following steps:

1. Create a route itself, i.e., mark check point on map.
2. Create one or more schedules for this route.
3. Assign rounds manually or adjust automatic creation of rounds.

⚠ Note that in order routes to be displayed on the map you should check if the corresponding layer icon in the main menu is active.

When everything is configured properly, you can analyze unit performance on route by various means:

1. In a specially designed online timeline.
2. In reports.
3. Get notifications about round progress.

To open the 'Routes' panel, choose a corresponding name in the top panel or click on the necessary item in the main menu customizer. Here you can configure routes and observe the progress of active rounds.
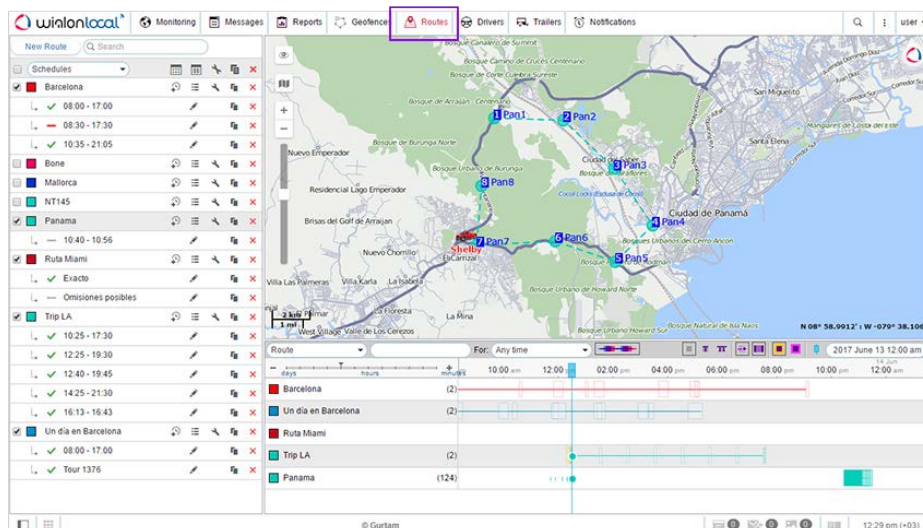
⚠ Routes take their measurement system from User Settings.

Creating a Route

To create a new route, press the *'New Route'* button*.*
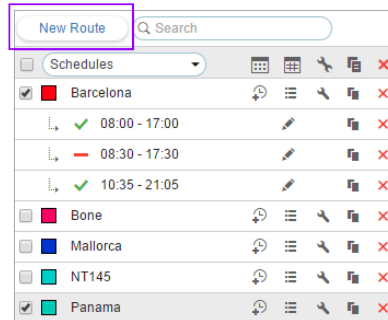
Input a name for route (at least four characters), give description (optional), and choose color which will be used to display the route on the map and in the timeline.

A route consists of check points that are supposed to be visited. Check points can be added by various means: directly from the map, from geofences, and from moving units.
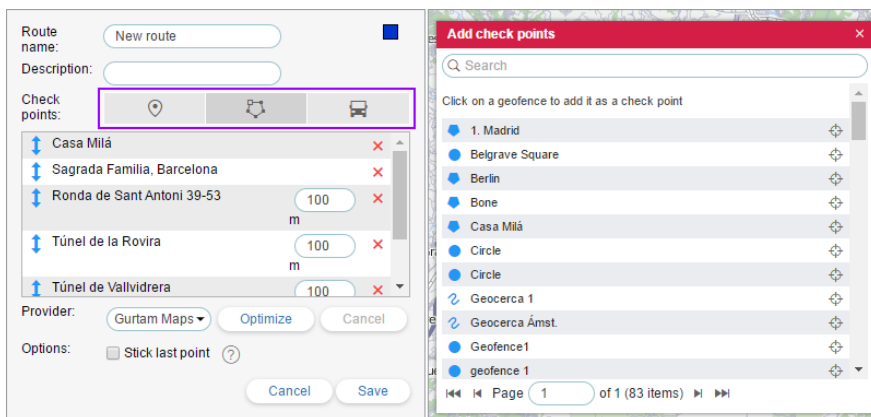
Adding Check Points

Click on the corresponding icon to add check points using one of the four methods:

1. **From map/address**.
    Either enter address or simply double-click on the map to indicate a place for a check point. The usage of the Address tool was described above. When necessary point is found, add it to the route by clicking *'Add as check point'*. Before adding, edit point name (the Address field) if necessary, because it will be impossible later.

2. **From geofences**.
    If you click on this icon, the list of geofences will be displayed. To the left of a geofence name, you can see its type (circle, line, polygon). Click on geofences to add them as check points. To quickly find a needed one, use the dynamic filter on the top. On the right there is a button to move to a geofence on the map, however, it will be visible only if this geofence is marked to be displayed on the map in the Geofences panel (the similar is with units). If you have more than 100 geofences, they will be divided into pages, and to view them all you will need to use navigation buttons on the bottom of the list.

3. **From units**.
    A check point may have no fixed coordinates, that is to be a moving unit. In this case, to visit this point will mean to approach within indicated radius. To add a unit as a check point, click on it in the list.

When points are added, you can edit their radius (except geofences) and place them in desired order, remove points or add more if necessary. To change points sequence order, just drag points up and down holding them at blue arrow-shaped icons. Radius for geofences is not specified because their shape and size are taken as they are. And check points cannot be renamed.

Remember that copies of geofences are created in the route, so route check points created from them lose connection with their predecessors completely when the route is created. You can then edit or delete those original geofences, and it will not affect the route in any way. Meanwhile, units as check points are different because their IDs are stored in the route. So, the connection with the unit is always maintained unless the unit is deleted.

When finished, press 'Save'. The route will appear on the list. To see it on the map, click on its name. It is strongly recommended to estimate the result visually and double check all points before proceeding because afterwards, when the route has schedules, it is impossible to edit it.

⚠ *Attention!*
When a route has schedules, it becomes impossible to edit its check points (add, delete, set sequence order). If you need to alter such a route, make a copy of it and make all necessary changes there. Then delete the original route. However, in this case you will have to configure schedules and rounds for this route again.

Optimization

Whichever method you choose to add check points to a route, you can afterwards apply the function of optimization to those points. The program will automatically detect the shortest way to visit all the points. The shortest route can be built considering existing roads, or avoiding highways, or by foot, etc. — these additional parameters depend on map provider selected. The default cartographical sources is Gurtam Maps. Though, Google Maps, Yandex Maps, Visicom, and HERE Maps can also be chosen from the dropdown list.

To apply optimization, press the *Optimize* button. See the route distance before and after optimization below. To restore the initial route, press *Cancel* near the button of optimization.
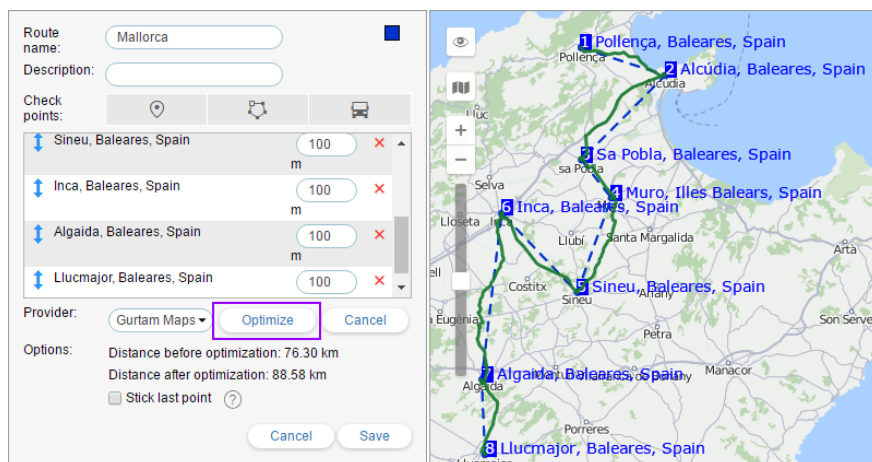
To build a route, you can also use specially designed app — 🌐Delivery Service, or such tool as 'Routing'.

Schedule

A schedule is a list of route check points with times of their intended visit. One route can have unlimited number of schedules. Different schedules can be applied in odd and even days, at weekends and weekdays, in different months, etc.

To create a schedule for a route, press the 'Add schedule' button ⏱ against this route and adjust required parameters.

General parameters

- *Automatically create rounds for this schedule*
  Rounds can be created automatically without any assistance of a dispatcher. When the time draws near the first point visit, the round is activated and the system starts to track it. ⚠ This option works only with *'Relative to day'* schedule type. Besides, one or more units should be selected on the 'Units' tab of the same dialog.

- *Expiration time (DD:HH:MM)*
  This is time after which the round (if not finished) will be finished forcibly and obtain the 'Aborted' status.

- *Schedule name*
  You can use automatically generated name for the schedule. It is composed of first point time and last point time or it can be 'Copy of ...' if the schedule is created using the copying method. However, you can give schedule any desired name if you put the checkbox before its name.

- *Remove finished rounds from the timeline*
  It is advisable to leave this option checked. Otherwise, finished rounds will remain on the timeline and soon will become too numerous and difficult to navigate through them.

Schedule type

- *Relative to activation*
  Scheduled time of point visit will refer to time from round beginning. Such schedule can be used at anytime.
- *Relative to day*

Scheduled time of point visit will refer to time of day. Such schedule can be used in different days (once in a day).

- *Absolute*
  Scheduled time of point visit includes also a date. Such schedule can be used only once.

Check points order

This parameter is extremely important for route control.

- *Strict*
  All check points are supposed to be visited in the sequence order they are places in the route. No skipping is allowed. It means, while we are waiting for the arrival to the Point #3, any visits to other check points are ignored if they happen. The route is considered as finished when unit (after visiting all points) enters the last check point.

- *Skipping possible*
  Check points are supposed to be visited in the default order, however, it is possible that unit would visit not all of them. If after the visit to the Point #2 the unit gets to the Point #4, then the Point #3 is considered as skipped (even if visited later). The round is estimated as finished when a unit enters the last check point, and it does not matter how many of other points it has visited.

- *Arbitrary*
  Check points can be visited in any order but only when all of them are visited, the routes finishes.

Schedule grid

Here you see the list of all check points of a route and their visiting time. For visiting time you can indicate only arrival or both arrival and departure. Besides, you can set deviation time to give a unit some degree of freedom to visit the point (for example, +/- 5 minutes).

- *Arrival time* to a check point. Time format is *hh:mm*.
- *Arrival variation* (hh:mm) corresponds to a time interval on which an arrival time is allowed to vary. For example, deviation time is 5 minutes, arrival time is 16:30, then a unit has to come to a check point between 16:25 and 16:35.
- *Departure time* from a check point.
- *Departure variation* corresponds to a time interval on which a departure time is allowed to vary.

The same variation time of arrival/departure can be set for all check points simultaneously. To do so, indicate common variation time in the corresponding field and click 'Apply'.

If a schedule contains an arrival time only, then a check point is considered to be visited upon arriving to it. If both arrival and departure time is indicated, then a check point becomes visited when both arrival and departure are detected.

Variation from arrival to the 1st check point is highly important, because a round is created (appears on the timeline) in advance. If the 1st check point arrival variation equals zero or has a small value, then it can be a situation when a visit is not detected. For example, a check point is visited before creation of a corresponding round. Therefore, it is recommended to set a larger arrival variation value for the 1st check point.

Time limitation

Time limitations can be applied to schedule to restrict its operation to certain time intervals, days of the week, days of the month or months. For example, you can select only event or odd days or only working hours of weekdays, etc. Note that this option does not work with *'Absolute'* schedule type.

Units

Choose unit(s) to be assigned to this schedule and thus create rounds. If rounds are created automatically, then units have to be indicated. If rounds are created manually, then a unit can be assigned upon a round creation. If several units are chosen, then the first that begins the round will be assigned to it. Required access right is 'Use unit in retranslators, jobs, and notifications'.

Switch to the tab 'Units'. Here you can see two lists. The units to be assigned are situated in the left one, the right one

contains already chosen units. The left list contains not all the units available to you, but those situated in the monitoring panel work list. In case the work list is empty (when dynamic work list is used or when units have been deleted from the work list manually), the units to which you possess enough rights will be displayed.

Round name

Here you can set name that will be applied to rounds created on the basis of this schedule do differentiate it from other rounds. Special tags can be used to form the name:

- %ROUTE% — route name;
- %SCHEDULE% — schedule name;
- %FIRSTPOINT% — first check point name;
- %LASTPOINT% — last check point name;
- %DATE% — date of round creation;
- %TIME% — time of round creation.
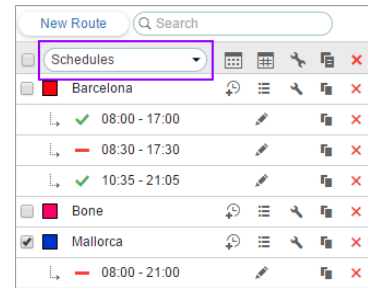
When you have configured the first schedule, others can be easily created by copying and shifting. Press the *Copy schedule* button against necessary schedule and alter some parameters. Enter shifting time (hh:mm) and press up or down icon (shift schedule upwards or backwards in time). Besides, you may want to change schedule name.

Rounds

Round is a route, its schedule and assigned unit put together. Unit performs a route (that is to say visits route's check points) according predefined schedule.

Rounds can be created manually or automatically.

Manual Round Creation

To create a round manually, press *Create manual round button* against a needed schedule.

At the top, you can see the name of chosen route and schedule. Underneath you can see two lists. The units to be assigned are situated in the left one, the right one contains already chosen units. The left list contains not all the units available to you, but those situated in the monitoring panel work list. In case the work list is empty (when dynamic work list is used or when units have been deleted from the work list manually), the units to which you possess enough rights will be displayed. Afterwards enter round name and description, decide upon points order, expiration time, and other parameters (see Schedule for details). New parameter here is *Activation time*.

This is date and time to start the control. Activation time is especially important for schedules of *Relative to activation* type. The round then will be tracked from this time on. Activation time can be omitted — in this case we consider that the route starts when unit enters the first check point (if points order is *Strict*) or any check point (in other points orders).

At the end, press *Create a round*.

Automatic Round Creation

Automatic creation of rounds is adjusted in schedule properties — set the option *Automatically create rounds for this schedule*.

Besides, automatic creation of rounds can be enabled straight from the Routes panel — using the corresponding switch button before each schedule name.

Another way to create a route automatically is to use the corresponding type notification. You can create a notification with trigger action to assign a new route after the previous one is finished.

Round List

To see the list of rounds created or planned for a certain schedule of a certain route, press the button ☰ .

Choose time period (Hour, Today, Yesterday, Week) or set your custom interval. For intervals like 'Today' or 'Yesterday', it is convenient to slightly extend the period by some more hours (+hh:mm) if the working shift ends after midnight.

You can observe either all rounds or rounds of a certain status: in progress, pending, finished, estimated. When all parameters have been set, press the Apply button to display rounds you need. Besides, in the header of the table, you can choose a route to show rounds for, or you can request a list of rounds for *all* tour routes.

In the table you see the round beginning time, name, state (finished, aborted, estimated, in progress, history), points order (arbitrary, strict, skipping possible), and unit(s) bound to this round. Finished and aborted (finished forcibly due to expiration) rounds can be deleted. It means they disappear from the timeline and get the status 'History'. Yet, all information about them is stored and can be reached through reports.

Route Control

There are several methods of tracking units on routes and you can choose what suits you better.

Online Control

Active rounds are displayed in the timeline which is situated in the right lower part of the screen. Here you see all rounds which are in the progress at the moment as well as all manually created rounds.

If there are many rounds, you can filter them according to adjusted parameters: by route name, by schedule, round, unit. A criterion is chosen in the dropdown list, and in the text field on the right you enter name mask of a route/schedule/round/unit. You can also specify a time interval to show rounds for. To apply adjusted filtration parameters, press <enter>.

Additionally, you can apply grouping to this list of rounds   . Then each row on the list will be dedicated to one route/schedule/round/unit. The name of such a row will contain the number of items it holds (in brackets).

Timeline scale is adjustable — it can display a period of time equal to a fortnight or just a minute. In some scales, point names can overlap and become partly hidden. That is why there are several possibilities in displaying captions for check point:

- do not show point names at all;
- show names for 'hot' check points i.e., points where units are located at the moment or points awaiting arrival at;
- show captions for all check points.

You can move the timeline right and left by simple dragging. Besides, it can move by itself in such a way to maintain the current moment in focus — press 'Lock current time' for this . While this button is pressed, the timeline cannot be moved manually.

On the timeline, a route is represented by a horizontal line of such colour that was assigned to it. Check points are represented as vertical sections on this line and they are situated in the places where the arrival to a check point is expected according to the schedule. A check point can be also displayed as a rectangle if not only arrival but departure time as well are indicated in the schedule. Besides, check points which contain only arrival time can be expanded to rectangles at the expense of deviation time (if specified). For this, apply the option 'Mark deviation time' .

Until a point is visited, it is displayed on the timeline as an empty rectangle; when visited, this rectangle obtains a filling of the colour assigned to the route. In addition, you can enable contours highlighting schedule violations:
- yellow — late visit (delay);
- pink — early visit (outrunning).
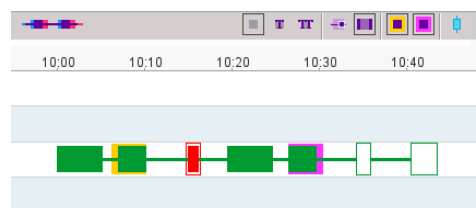
If a point has been visited in accordance to schedule, no contour will be applied. If a point has been skipped, it will obtain a red contour and a red filling regardless appointed route colour.

Apply 'In fact' option to see how a unit really visited the points — time of real visit will be shown above the planned line.

Notifications about Routes

While a unit is performing a round, you can receive notifications about how it is going. To do this, create a notification of the *Route control* type and adjust it properly depending on your needs. You can be notified when a round has started or finished, if a check point has been skipped, and in some other cases. These notifications can be sent by e-mail or SMS, shown online in a popup window, stored in unit history as events or violations, etc. See Notifications for

details.

Reports on Routes

All events connected with units' performance on routes are stored in the system automatically. This data can be used to generate the following types of reports:

- Rounds (for unit)
- Check Points
- Rounds (for route)

Routes Management

Routes in the panel are listed in the alphabetical order. To quickly find a definite route, use the dynamic filter situated above the list. Enter route name or its part and observe the results.

In the dropdown list above the list, you can choose how routes are displayed:

- *Routes*: the simplest list of routes without any sublevels.
- *Schedules*: routes and their schedules.
- *Check points*: routes and their check points.
- *Active units*: routes and units which are currently performing them.

The following icons are used in the panel:

⚒ — edit route i.e., change its name, description, color, and check points radius;

⊕ — add a new schedule for this route;

☰ — see the list of rounds for this route (finished, in progress, pending);

✎ — create a round for this manually;

⧉ — copy a route (i.e., create a new route on the basis of chosen one) or a schedule;

✕ — delete a route or a schedule;

✔ — automatic creation of rounds for this schedule is enabled (click to disable);

▬ — automatic creation of rounds for this schedule is disabled (click to enable);

▬ — automatic creation of rounds for this schedule is impossible because the schedule type is not 'Relative to day'.

To see a route on the map, enable the checkbox before its name. Click on route's name to center the map on this route. Note that check points' names are displayed on the map by default. Uncheck the corresponding box in user settings dialog in order the names not to be displayed.

Drivers

Wialon system provides a possibility to create and manage the list of drivers working for you. One click of a mouse can assign driver to a unit, i.e., attach to a vehicle. Then in the reports on this unit, a driver will be indicated. It is particularly useful when several drivers work with the same unit. There is also a possibility to detect drivers automatically with the help of iButton system. Moreover, created drivers can be formed into groups.

To start working with drivers, choose the 'Drivers' item in the top panel, or click the necessary item in the main menu customizer. Afterwards, choose the mode you would like to work with (drivers or groups).
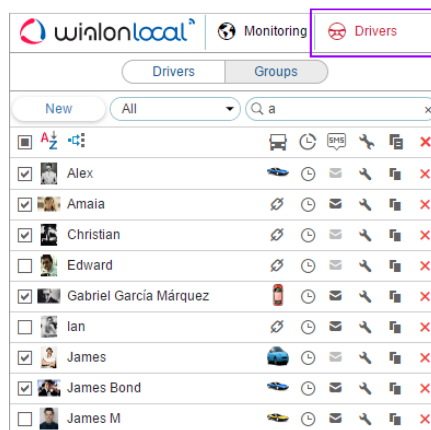
Creating a Driver

In the corresponding monitoring panel choose the appropriate mode ('Drivers'), click the 'New' button, and indicate required parameters.

Name

Give driver a name that will be visible during the tracking process and in reports.

Code

Enter unique driver code needed to identify the driver if an automatic method of binding will be used. Codes of different drivers should be different.

Description

Type any comments (optional). It is shown in driver's tooltip.

Phone number

Enter driver's phone number. It will be shown in driver's tooltip and can be used to send SMS messages to the driver and make calls. Note that units or drivers with the same phone numbers cannot exist in the system. If you attempt to create a driver with a phone number that is already reserved to another driver or unit, a special alert will be displayed, and this phone number will not be saved.

Mobile key

Password for mobile authorization.

Exclusive

If this flag is enabled, this driver can be the only one assigned to a unit. In case you bind this driver to a unit (in real time) which already has one or more assigned drivers, those drivers are reset automatically. This flag works only for drivers within a common resource.

Photo

To quickly identify a driver, you can attach their photo or any other image. To do this, press the *Browse* button and find and load an image from the disk. Supported formats are PNG, JPG, GIF, and SVG. In the driver's editing dialog you can delete an image used. To do so, point a cursor on it, and click the appeared delete button. Click OK to save changes, or Cancel to dismiss them.

Custom fields

Create driver's card adding any information as custom fields (information may include external links). They are shown in driver's tooltip and can be summoned in reports. Note that custom fields with the same name cannot coexist within one particular driver.

At the end click OK. The new driver appears in the list.
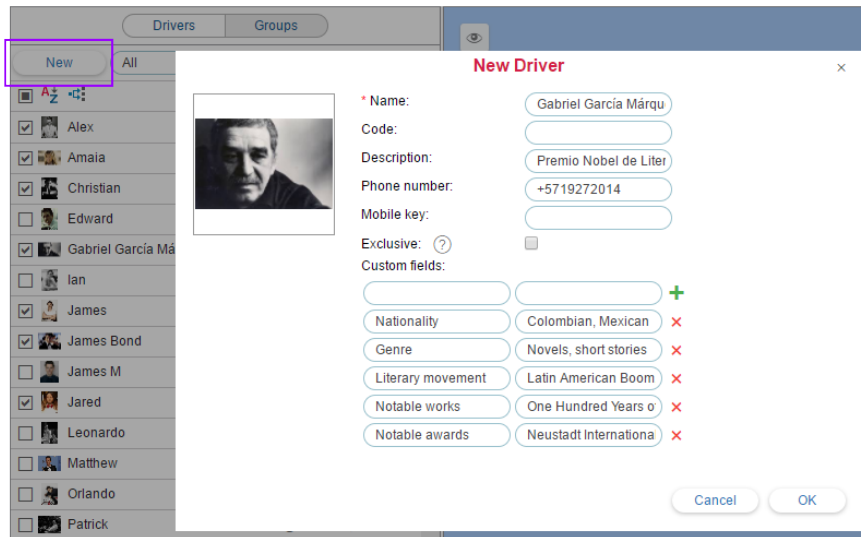
🔔 *Hint.*

Like any other resource contents, drivers can be imported and exported through files or directly from one resource to another. However, that is not true for driver groups.

Managing Driver List

Drivers are listed in the alphabetic order. To quickly find a certain driver, use the dynamic filter above the list. There are also filters to display drivers belonging to a certain resource or group or display drivers according to their status (loose/bound). Those filters are presented in the form of dropdown menus above the list.

To display a driver on the map, tick the checkbox on their left. As drivers do not have their own coordinates, they borrow their location from units to which they are assigned. Click on driver's name on the list to center the map on their position. An assigned driver is represented by a small icon at the bottom right corner of unit's icon. If a driver is not attached to any unit at the moment, their last known position is shown (with a bigger icon). If there is no data about driver's location (for example, if they have never been bound to any unit), such a driver is not shown on the map.

⚠ Note that in order drivers to be displayed on the map you should check if the corresponding layer is active.
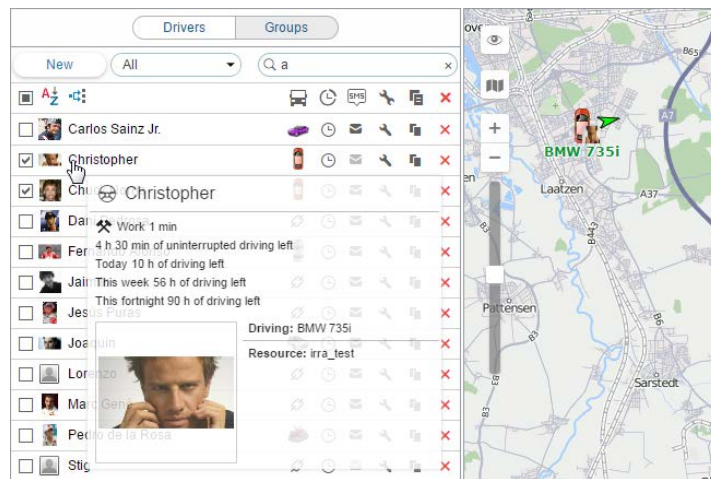
DDD files received from tachograph contain driver's activity information. Such files can be uploaded automatically (due to the corresponding settings of an equipment), or manually (using '⦿TachoManager' application). Received information on driver's activity helps to control whether a driver follows the AETR standards or not. Driver's activity is displayed in the tooltip of each driver, and contains the following data:

- current state (driving, work, availability, rest), and its duration;
- uninterrupted driving info (time left for driving/exceeded driving time/missed rest beginning, and also the necessary rest duration);
- driving info for the current shift (time left for driving/exceeded driving time/missed rest beginning, and also the necessary rest duration);
- week's driving info (time left for driving/exceeded driving time/missed rest beginning, and also the necessary rest duration);
- two-weeks driving info (time left for driving/exceeded driving time/missed rest beginning, and also the necessary rest duration).

⚠ If there is less than 1 hour left for driving in the current shift or less than 3 hours left for driving in the week or two weeks, the tooltip will contain a warning.

Moreover, the tooltip shows driver's name, phone number, enlarged photo, resource (if there are several), description, and custom fields (if any were set). Moreover a unit name can be shown in a tooltip is a driver is bound to it. You can call a phone number shown in the tooltip by ⦿Skype if you have '⦿Click to Call' plugin downloaded and enabled on your computer. To do so, click a necessary phone number in the tooltip.

If you have ⦿Skype on your computer, the phone number is highlighted, and you can make a call if clicking on it.

If a driver is bound to a unit, unit icon is displayed on the right of trailer's name. If you place the cursor over this icon,

the unit's tooltip is displayed (the same as in the Monitoring panel).

Several actions can be performed over drivers:

⊘ or ↺ — bind/unbind driver to/from a unit as well as delete incorrect bindings (disabled ⊘ if not enough access);

🕓 — register working shift or delete bindings;

✉ — send SMS to driver (the button is not displayed if the current user does not have enough rights; if the button is dimmed, it means there is no phone number in driver's properties);

🔧 or 👁 — edit or view driver's properties;

🗎 — create a new driver using this one as a basis;

✕ — delete driver (the button is dimmed if you have not enough rights).

Driver Assignment

Several drivers can be assigned to a single unit. To assign drivers to units, you need to have access flag 'Create, edit, and delete drivers' towards the resource where those drivers belong.

There are two ways to bind a driver to a unit: manual and automatic.

Manual Binding

The manual assignment can be performed in both modes ('Drivers', 'Groups') of the 'Drivers' panel. Use the corresponding switch button **'Bind / Unbind'** ⌀ 🔄 to attach or detach drivers to/from units. The button is disabled ⌀ if your access is not sufficient.

Click 'Bind to unit' button (⌀), choose a unit the driver to be bound to, and click OK.

⚠ Availability of units in this list depends on the work list in the Monitoring panel. If there are no units in the list, click 'Add all available' button 🔲 . If the list is still empty, then you have no access rights to these units.

Assign Driver − Amaia	✕
🔲	🔍 p ✕
○ 🚗 1967 Pontiac GTO	○ 🚙 Desesperado
○ 🚗 Dodge M4S Turbo Interceptor	○ 🚐 Ford Super De Luxe (sms)
○ 📱 KIA-952KLP	◉ 📘 Le Petit Prince
○ 📱 Lotus Esprit	○ 🚙 Pantera
○ 🚗 Paradoxa	○ 🚗 Picasso
○ 📱 Plymouth Fury	○ 🚗 Plymouth Hemi 'Cuda
○ 🚗 Plymouth 'Cuda	○ 📱 Pol1 (e)!
○ 📱 Pol1 (e)! copy	○ 📱 PolE1
○ 🚗 Pursuit Special (c)	○ 🚙 Volkswagen Transporter (c)
	Cancel OK
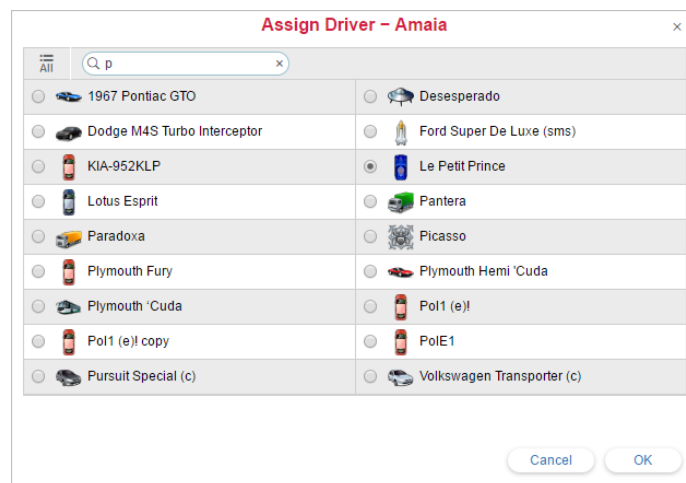
To unbind a driver from a unit, click an icon of a unit opposite to driver's name, and then use the corresponding button (🔄). Besides, you can unbind a driver by registering a working shift, or deleting bindings from history.

Automatic Binding

To detect a driver automatically the corresponding equipment has to be installed. In authorized personnel control system iButtons with 1-wire bus inside are widely used. When getting into the vehicle, the driver applies the electronic key to be identified by the system.

To use the automatic method of binding, some adjustments should be done in the system beforehand.

1. A special sensors of *Driver binding* type should be created in the properties of each unit intended for auto-binding. A parameter for this sensor can be avl_driver or some other depending on your equipment and its configuration. One or more driver sensors can be created on the basis of different parameters. If more than one driver binding sensor exist within a unit, the option *'Validate unbinding'* can be useful. If the option is activated, a driver bound to a unit automatically can be unbound from this unit only if zero value comes from the same parameter that was used to bind the driver. Otherwise, driver reset coming from any parameter will lead to the reset of all drivers bound to this unit.

⚠ *Note.*
A driver can be unbound from a unit by sending the corresponding notification (for example, upon switching off an engine).
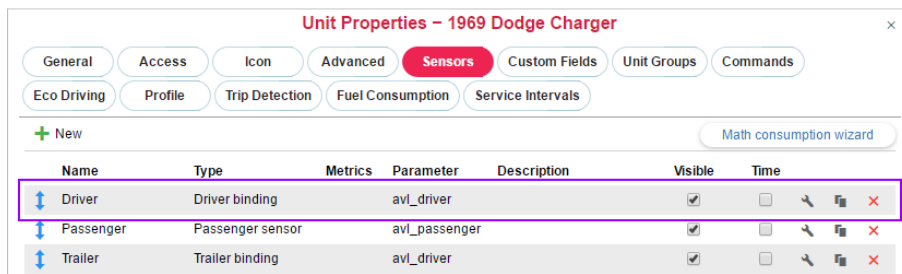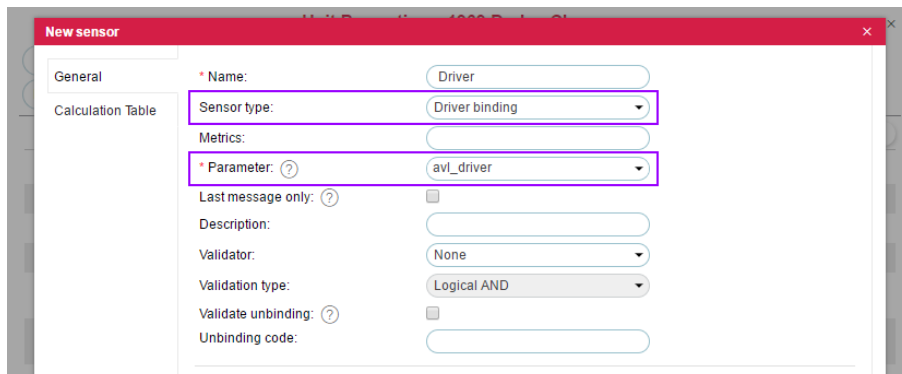
2. Create a list of units for any resource the drivers of which are intended to be bound automatically. In order to do so, click 'Auto-binding' icon ( ), and follow the steps listed below.

Upon clicking the 'Automatic binding' icon a list of available resources is opened. ⊕ Here you choose a resource the drivers of which will be used in automatic binding (with the units chosen in the next dialog). In order to understand which drivers belong to a particular resource, go back to the 'Drivers' panel, and apply a filter by resource (dropdown menu to the right of 'Create' button).

After choosing a resource, click 'Next'. If only one resource is available, then it will be chosen automatically.
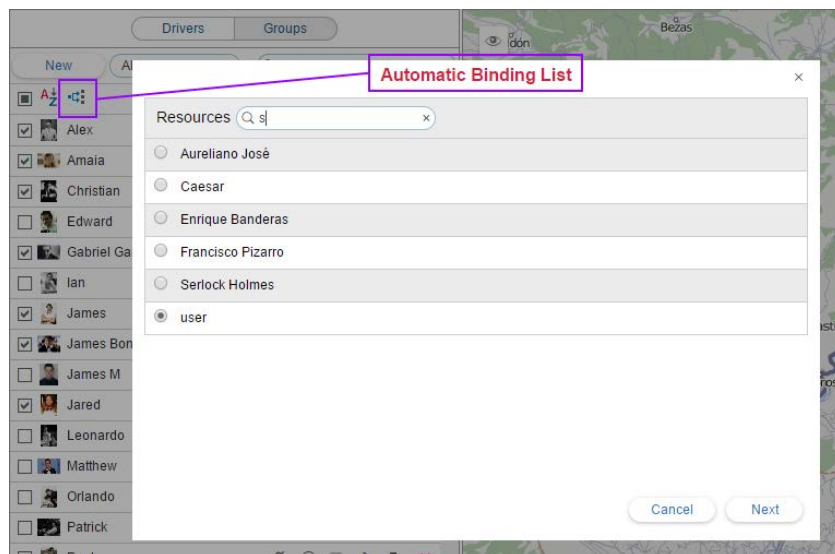
The next dialog contains a list of units to which the drivers from a chosen resource can be bound automatically. Depending on the access rights possessed, the list can be viewed or edited.
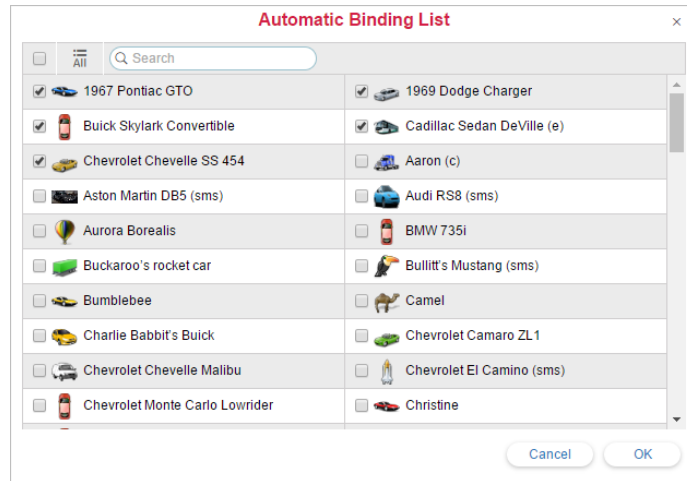
Thus, a driver will be automatically bound to a unit with the help of iButton in case that (1) this unit has a special sensor in its properties and (2) this unit is indicated in the list of auto-attachable units applied to the resource where the driver belongs.

Automatic binding of drivers is removed in the same way: summon 'Automatic binding' dialog, choose a resource, and uncheck flags of units for which the automatic binding will not be used.

Register Working Shift

This option can be used, for example, if you would like to register working shift post factum. Use the corresponding button (⏱) opposite to a trailer's name, choose the 'Register working shift' option, and click 'Next'. In the appeared dialog window choose a unit to which the trailer will be assigned in the indicated shift, click 'Next'. Now indicate time of shift beginning and end. Moreover, you can indicate either only beginning or only end time. For example, you have indicated shift beginning, and you would like its end to be registered automatically when a unit arrives to garage (as a geofence). To do so, create a notification of 'Geofence' type with method of action 'Reset trailer'. Anyway, registering a working shift you can use only past dates or current time (no future allowed).
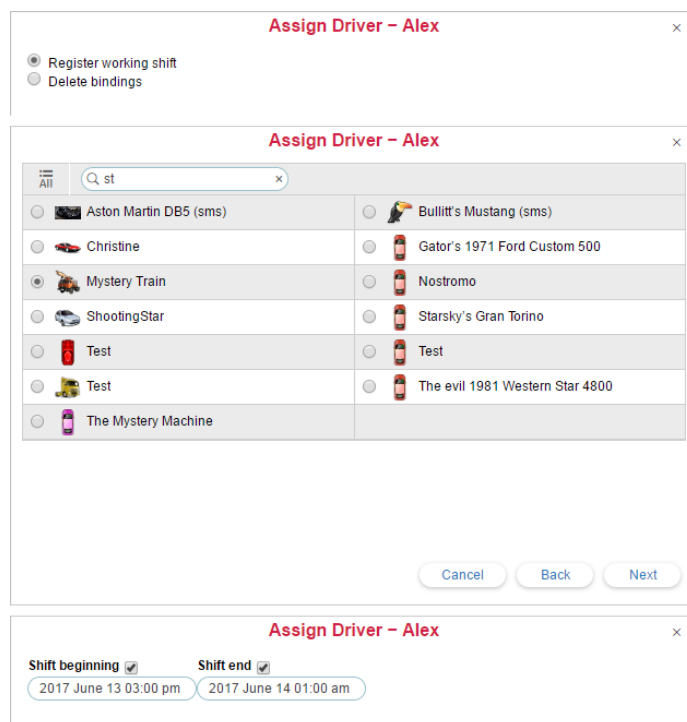
Delete Bindings

Incorrect registrations of drivers can affect reports and their informational efficiency. That is why sometimes you may need to delete such (un)bindings from the database. In the dialog, choose the last option — 'Delete bindings' — and press 'Next'. Specify time interval and press 'Show' to display all bindings and unbindings of the driver on the interval.

Check invalid messages and press OK to delete them.

Like with units, the last message from the driver (whether assign or reset) cannot be deleted.

Simultaneous Bindings

A driver can be bound simultaneously only to one unit. If somehow (for example, through registration of shifts) you are trying to bind a driver to another unit, later assignment cuts off the previous one.

However, several drivers can be assigned to one unit at once. It is reasonable with long-distance truck drivers and truckers.

If you want to avoid situation when a unit may have several drivers assigned to it, use the flag *'Exclusive'* in drivers' properties. If a driver with such a flag is bound to a unit, other previously assigned drivers are reset automatically. Note the following restrictions:

- For correct operation, all drivers must belong to one resource.
- It works only in real time, i.e., there are no such rules when registering drivers' working shifts.
- It does not work in reverse way, i.e., if a driver with 'Exclusive' flag is assigned to a unit at the moment and another driver without that flag is being assigned, both of those drivers will be bound.

Groups of Drivers

Created drivers can be formed into groups. Groups can unite drivers by any criteria. Driver groups are used in group reports. ⚠ Only drivers who belong to the same resource as the group itself can compose the group.

To start working with groups, choose the corresponding mode in the 'Drivers' panel.
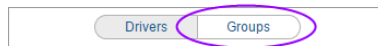
To create a new group of drivers, press the 'New' button. Enter its name and description. The drivers to form the group are chosen in the list at the left. The contents of the list can change according to the option chosen in the filter above. It can display all the drivers, a group of drivers (the names of the groups are shown in brackets) or the drivers outside groups. Move necessary drivers to the right list using double clicks or the 'Add' button. Press OK.
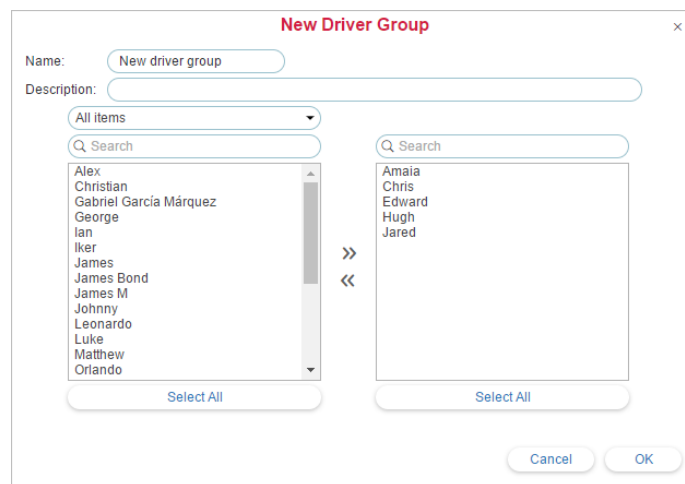
A list of created driver groups is displayed in the work area. Groups are arranged alphabetically. The same as for drivers, a filter or a dynamic search can be used for groups. Moreover, groups can be edited, copied, or deleted. Note that upon deleting a group you can not delete its contents.

Drivers not included in any group can be found in the 'Drivers outside groups'.

Series of standard actions are available for drivers in a group (unfold a group in order the corresponding buttons to appear).
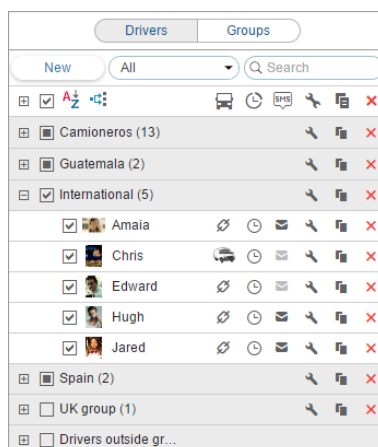
Usage of Drivers

While Tracking Online

The name of the driver is displayed (if available) in unit's tooltip and in extended unit information. To activate this option, check **Driver** in User Settings. The photo and phone number is also displayed if available.

Besides, it is possible to have a special column in the 'Monitoring' panel to display drivers. For this, it is required to activate **Show drivers column** in the Monitoring panel customizer.

⚠ *Attention!*
When a new driver is assigned, information about it in tooltip is refreshed within a minute (not instantly).

Drivers can be located **on the map**, which was described above.

In Notifications

Drivers appear in notifications. You can configure a notification to get informed when a driver is assigned to a unit or unbound from it. Using notifications, you can also unbind driver automatically, for example, when entering the depot.

In Reports

The drivers can be also mentioned in reports if the appropriate column is chosen in report template. This is available for the following tables: Trips, Engine hours, Rides, Unfinished rides, Fuel fillings, Fuel thefts, Speedings, and some others. To see drivers in a resulting report, choose the appropriate column in the report template.

Beginning	End	Duration	Mileage	Driver
2013-03-13 10:58:10	2013-09-04 06:41:21	174 days 19:43:11	0.00 km	John
2013-09-04 06:41:21	2013-09-04 08:17:38	1:36:17	14.38 km	John
2013-09-04 10:47:20	2013-09-04 11:11:54	0:24:34	0.54 km	John
2013-09-04 11:11:54	2013-09-04 11:29:27	0:17:33	0.47 km	John
2013-09-04 22:28:37	2013-09-04 22:37:00	0:08:23	0.45 km	John
2013-09-04 22:37:00	2013-09-04 22:56:05	0:19:05	7.39 km	John
2013-09-04 22:56:05	2013-09-04 23:20:30	0:24:25	27 km	John

In different kinds of reports, drivers can be used as a criteria of intervals filtration, meaning that you can get trips, parkings, etc. for certain driver (or without any) if you set his name mask in the report template.

Besides, if you have Other Reports module, you can generate a report totally dedicated to working shifts of a certain driver or even a group of drivers. More...

Trailers
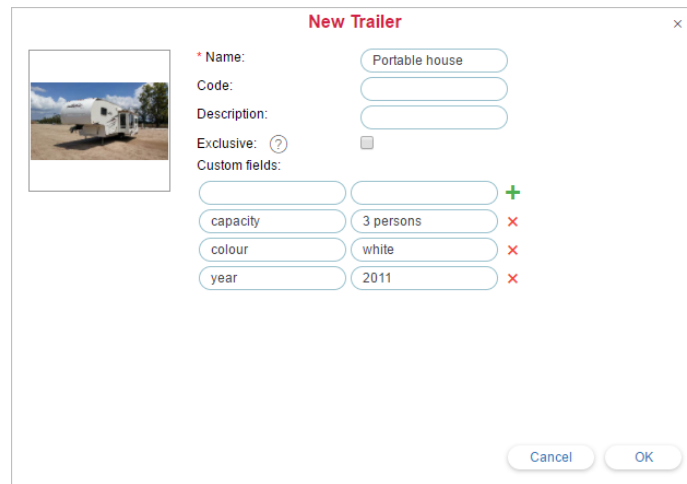
Trailers refer to any kind of mechanisms attached to or driven by the main vehicle ('unit') and not having their own trackers or controllers. They are very similar to drivers in functionality and implementation.

To open the 'Trailers' panel, choose a corresponding name in the top panel or click on the necessary item in the main menu customizer.
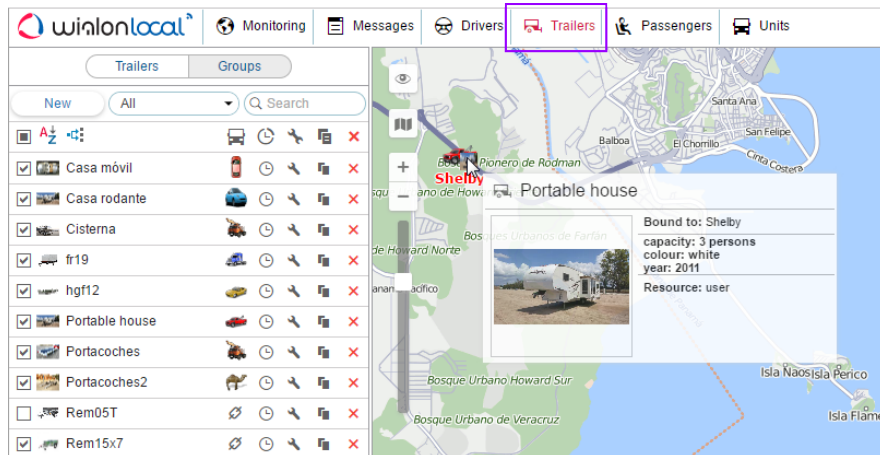
Creating a Trailer

Go to the Trailers panel and press the 'New' button. In the dialog, enter a name, identification code (for automatic binding), description and custom fields. This information is shown in trailer's tooltip, and used in reports. You can upload an image for the trailer which will be used to show the trailer in the list and on the map. It is recommended to upload square images in order their proportions not to be altered. Properties of trailers are the same as those of drivers.

⚠ *Hint.*

Like any other resource contents, trailers can be imported and exported through files or directly from one resource to another. However, it is not applicable to trailer groups.

Managing Trailer List

Trailers are listed in the alphabetical order. To quickly find a certain trailer, use the filter (choose filtration by property or by resource from dropdown list to the right of the 'New' button). Besides, the usage of a dynamic search is supported as well.

To display a trailer on the map, tick the checkbox on its left. As trailers do not have their own coordinates, they borrow their location from units to which they are bound. Click on trailer's name in the list to center the map on its position. A bound trailer is represented by a small icon at the bottom right corner of unit's icon. If a trailer is not attached to any unit at the moment, its last known position is shown (with a bigger icon). If there is no data about trailer's location (for example, if it has never been bound to any unit), such a trailer is not shown on the map.

⚠ Note that in order trailers to be displayed on the map you should check if the corresponding layer icon in the main menu is active.

If a trailer is bound to a unit, unit icon is displayed on the right of trailer's name. If you place the cursor over this icon, the unit's tooltip is displayed (the same as in the Monitoring panel).

Several actions can be performed over trailers:

Ø or ⤴ — bind/unbind trailer to/from a unit as well as delete incorrect bindings (disabled Ø if not enough access);

🕓 — register working interval, or delete bindings;

🔧 or 👁 — edit or view trailer's properties;

🗐 — create a new trailer using this one as a basis;

✕ — delete trailer (the button is dimmed if you have not enough rights).

Binding and Unbinding Trailers

Like with drivers, trailers can be bound to units either manually or automatically. To assign trailers to units, you need to have access flag 'Create, edit, and delete trailers' on the resource where those trailers belong. The conception of simultaneous bindings of trailers to units is the same as for drivers.

Manual Binding

Manual binding/unbinding can be performed in the 'Trailers' panel. A special switch button is located against each trailer — ⊘ or ⟳ correspondingly. If you do not have enough access rights, then the button is disabled ⊘ .

Click 'Bind to unit' button (⊘), choose a unit the trailer to be bound to, and click OK.

⚠ Availability of units in this list depends on the work list in the Monitoring panel. If there are no units in the list, click 'Add all available' button ⊞ . If the list is still empty, then you have no access rights to these units.
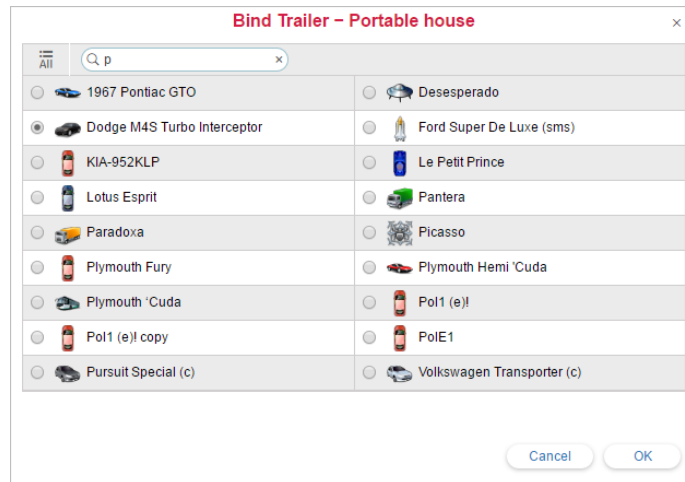
To unbind a trailer from a unit, click an icon of a unit opposite to trailer's name, and then use the corresponding button (⟳). Besides, you can unbind a trailer by registering a new working shift, or by deleting bindings from history.

Automatic Binding

Automatic method of binding trailers to units requires both special equipment (such as iButton system), and special adjustments in the system.

1. Create a special sensor of 'Trailer binding' type in the properties of each unit intended for auto-binding. A parameter for this sensor can be avl_driver or some other depending on your equipment and its configuration.
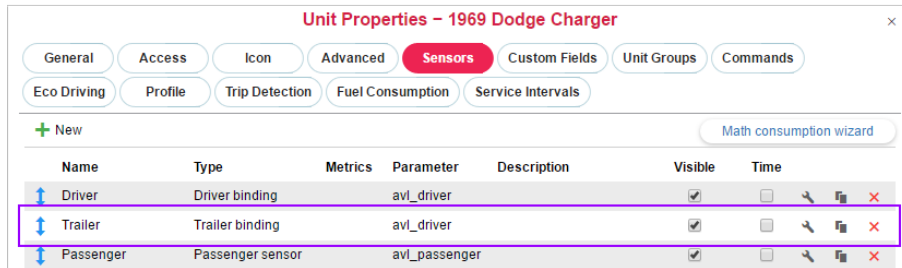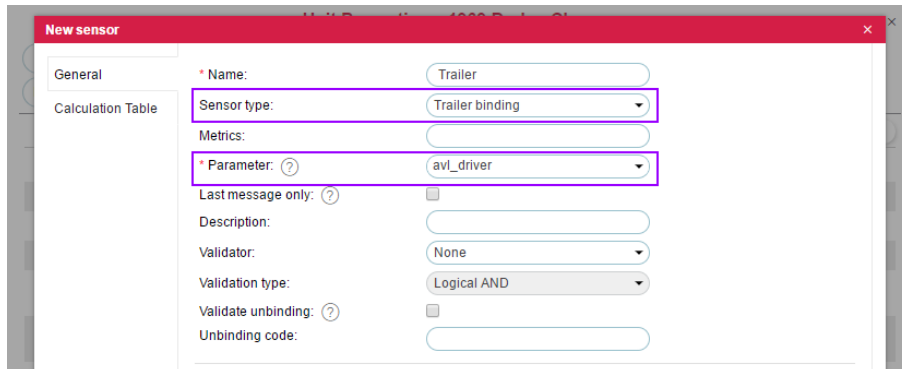
2. Create a list of units for any resource the trailers of which are intended to be bound automatically. In order to do so, click 'Auto-binding' icon ( ), and follow the steps listed below.

Upon clicking the 'Automatic binding' icon a list of available resources is opened. ⚠ Here you choose a resource the trailers of which will be used in automatic binding (with the units chosen in the next dialog). In order to understand which trailers belong to a particular resource, go back to the 'Trailers' panel, and apply a filter by resource (dropdown menu to the right of 'Create' button).

After choosing a resource, click 'Next'. If only one resource is available, then it will be chosen automatically.
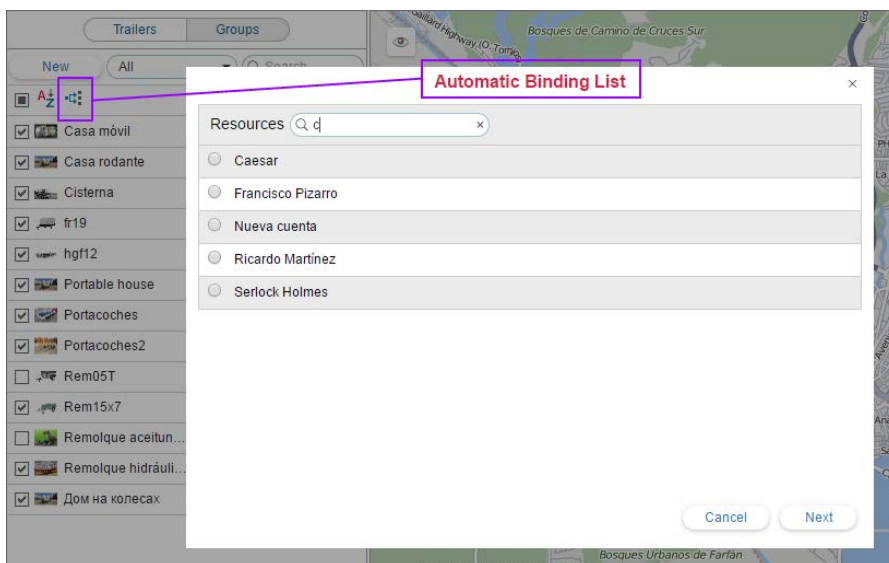
The next dialog contains a list of units to which the trailers from a chosen resource can be bound automatically. Depending on the access rights possessed, the list can be viewed or edited.
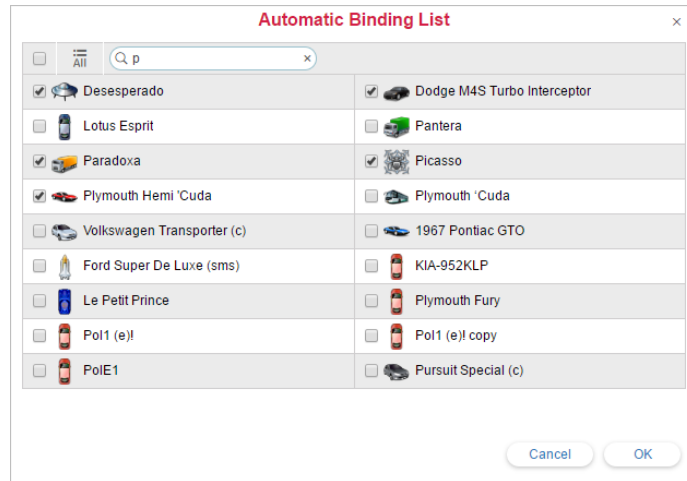
Thus, a trailer will be automatically bound to a unit with the help of iButton in case that this unit has a special sensor configured in its properties and that this unit is indicated in the list of auto-attachable units applied to the resource where the trailer belongs.

Automatic binding of trailers is removed in the same way: summon 'Automatic binding' dialog, choose a resource, and uncheck flags of units for which the automatic binding will not be used.

Register Working Shift

This option can be used, for example, if you would like to register working shift post factum. Use the corresponding button (⏲) opposite to a driver's name, choose the 'Register working shift' option, and click 'Next'. In the appeared dialog window choose a unit to which the driver will be assigned in the indicated shift, click 'Next'. Now indicate time of shift beginning and end. Moreover, you can indicate either only beginning or only end time. For example, you have indicated shift beginning, and you would like its end to be registered automatically when a unit arrives to garage (as a geofence). To do so, create a notification of 'Geofence' type with method of action 'Reset driver'. Anyway, registering a working shift you can use only past dates or current time (no future allowed).
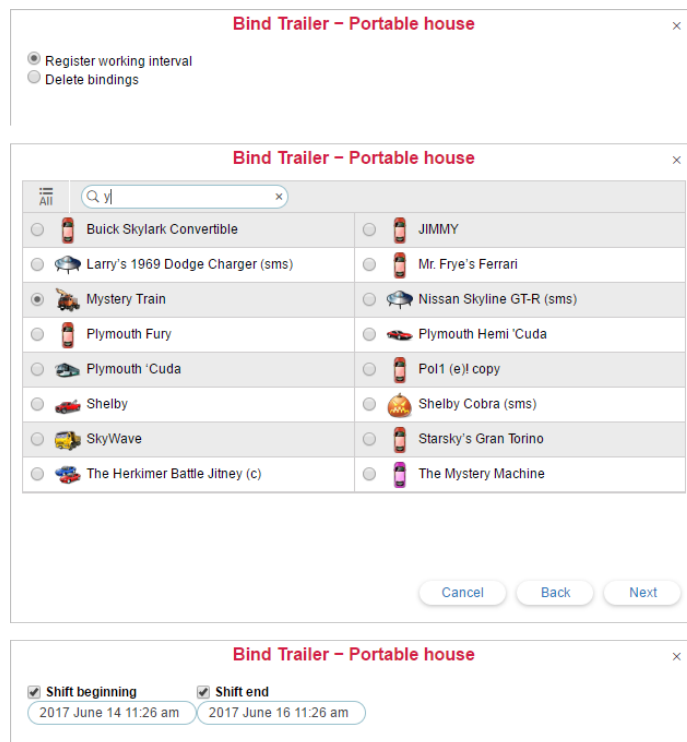
Delete Bindings

Incorrect registrations of trailers can affect reports and their informational efficiency. That is why sometimes you may need to delete such (un)bindings from the database. In the interval registering dialog choose the last option — 'Delete

bindings' — and press 'Next'. Specify time interval, and press 'Show' to display all bindings and unbindings of the trailer on the interval. Check invalid messages and press OK to delete them.

⚠ *Note.*

Like with units, the last message from the trailer (whether it is a binding or unbinding) cannot be deleted.

Groups of Trailers

Created trailers can be formed into groups. Trailer groups can unite drivers by any criteria, and they can be used to query reports for groups. ⚠ Only a trailer belonging to the same resource as the group itself can be added to the group.

To start working with groups, choose the corresponding mode in the 'Trailers' panel.

To create a new group of trailers, press the 'New' button. Enter its name and description. The trailers to form the group are chosen in the list at the left. The contents of the list can change according to the option chosen in the filter above. It can display all the trailers, a group of trailers (the names of the groups are shown in brackets) or the trailers outside groups. Move necessary trailers to the right list using double clicks or the 'Add' button. Press OK.
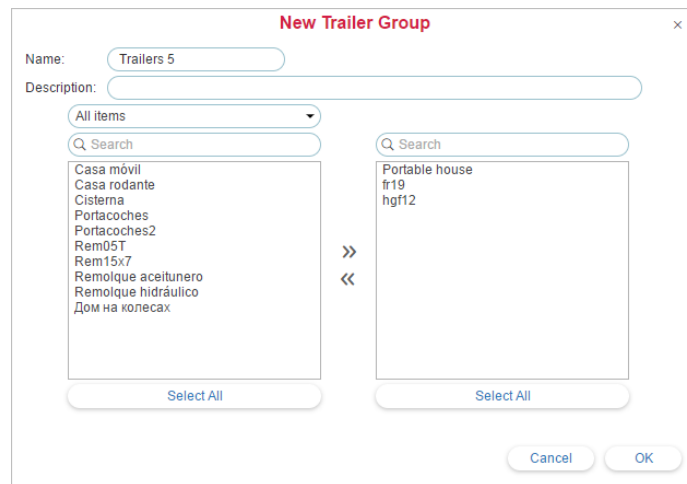
A list of created trailer groups is displayed in the work area. Groups are arranged alphabetically. The same as for trailers, a filter or a dynamic search can be used for groups. Moreover, groups can be edited, copied, or deleted. Note that upon deleting a group you can not delete its contents.

Trailers not included in any group can be found in the 'Trailers outside groups'.

Series of standard actions are available for trailers in a group (unfold a group in order the corresponding buttons to appear).
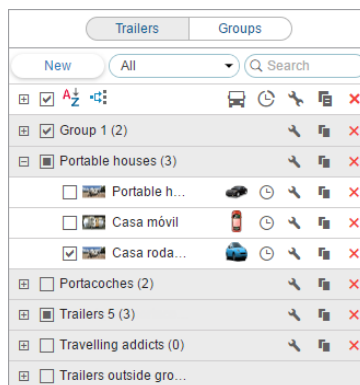
Usage of Trailers

Online tracking:

- Trailers can be displayed on the map if they are checked in the panel in the first column.

- Trailers can be displayed in unit's additional information if this option is selected in the 'User Settings' dialog.

- Trailers can be displayed in the 'Monitoring' panel as a column if this option is selected in the 'User Settings' dialog.

In notifications:

- You can configure a notification to get informed when a trailer is bound to a unit or unbound from it.

- Using notifications, you can also unbind trailer automatically, for example, when entering the destination point.

In reports:

- Many tables (such as 'Trips', 'Geofences', 'Parkings' etc.) can have a column that displays a trailer if any was bound to the unit on certain interval.

- As a part of 'Advanced Reports' module, you can generate tables for individual trailers and trailer groups. Two tables are currently available — 'Bindings' and 'Custom fields'.

Passengers

Wialon system provides the means to control passengers doing regular trips by special transport (for example, school buses or corporate vehicles). RFID tags are commonly used for this purpose. Upon getting into and out a vehicle, passengers bring their tags against a reader. Received data is sent to Wialon Local where it can be further used for the monitoring purposes.

Algorithm of controlling a passenger

RFID tag sends identical information upon bringing it against a reader. Therefore, the algorithm should be used in order to establish a strict line between getting into and out a vehicle:

- The first operation of a RFID tag in 24 hours means a passenger gets into a vehicle. The second operation of the same tag in the same vehicle means a passenger gets out. If the second operation of the tag occurs in the same vehicle within 1 minute after getting into/out, then it is considered to be a false one. Such an operation is ignored by the system.
- If a passenger gets into a vehicle using RFID tag, and afterwards the same tag operates in the other vehicle, then the system recognizes it as getting out of the first vehicle and getting into the second one.
- If no RFID tag operation detected within 10 hours after a passenger gets into a vehicle using a RFID tag, then such a passenger is recognized by the system as the one left a vehicle.
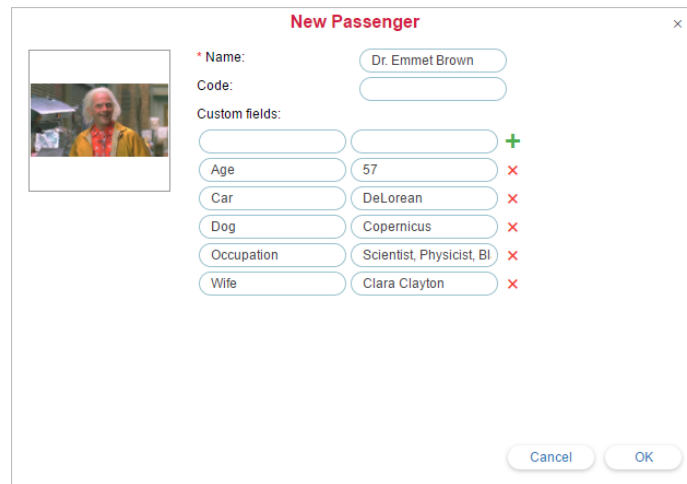
To implement control over a passenger, it is necessary to create passengers in the interface of the monitoring system and form automatic binding lists. Data received from a RFID tag provides a possibility to implement online monitoring, generate reports on passengers, and send corresponding notifications.
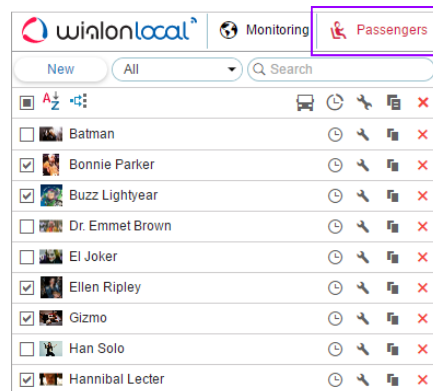
Creating a Passenger

To create passengers, it is necessary to possess the right 'Create, edit, and delete passengers' towards a resource.

To summon a passenger creation dialog, go to the 'Passengers' panel and click 'New'. Here enter a name, identification code (for automatic binding), and, if necessary, fill in custom fields. This kind of information is shown in passenger's tooltip and partially in reports. You can upload passenger's image in different formats: PNG, JPG, GIF, and SVG. An image is used to identify a passenger either in the list or on the map. It is recommended to upload square images in order their proportions not to be altered. Detailed description of parameters used upon passenger creation is provided in the section of driver creation.

Managing Passenger List

To view a passenger list, it is necessary to possess the right 'View passengers' towards a resource.

Passengers are listed in the alphabetical order. To quickly find a certain passenger, use the filter (choose filtration by property or by resource from dropdown list to the right of the 'New' button). Besides, the usage of a dynamic search is supported as well.
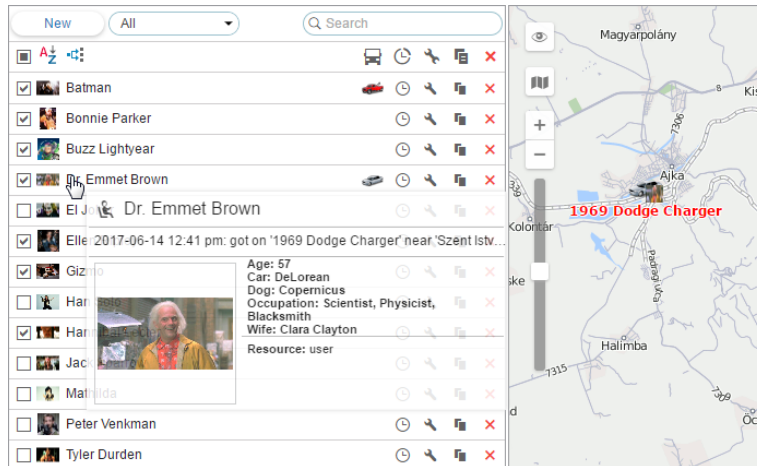
To display a passenger on the map, indicate its checkbox (the corresponding visible layer should be activated). Passengers do not possess their own coordinates, therefore they borrow their location from units to which they are bound. Click passenger's name in the list to center the map on its position. A bound passenger is represented by a small icon in the bottom right corner of unit's icon. If a passenger is not bound to any unit at the moment, its last known position is shown (with a bigger icon). If there is no data about passenger's location (for example, if it has never been bound to any unit), such a passenger is not shown on the map.

In the passenger's tooltip you can find its name, enlarged image, and custom fields (if any were set), as well as a name of a unit to which a passenger is currently bound.

Passenger's line may contain an icon of a unit to which a passenger is currently bound. In this case you can view unit's info by pointing an icon with a mouse.

The following actions can be performed over passengers:

⏲ — view or edit passenger's history (⬆ — getting into, ⬇ — getting out, ⏲⬇ — automatic unbinding);

🔧 or 👁 — edit or view passenger's properties;

⧉ — copy a passenger (create a new passenger using this one as a basis);

✕ — delete a passenger (the button is inactive if you have no enough rights).

Binding and Unbinding Passengers

🛈 *Attention*

To bind/unbind a passenger, it is necessary to possess the right 'Create, edit, and delete passengers' towards a resource.

Automatic binding is the only way for passengers to be bound to a unit. Automatic identification method requires utilization of the corresponding equipment. Dealing with passenger flow, RFID tags become commonly used. Getting into/out of a vehicle, a passenger brings a RFID tag against a reader.

Automatic binding/unbinding of passengers requires special adjustments to be done in the system as well:

1. Create the passenger type sensor for each unit intended for passengers binding. A parameter for this sensor can be 'avl_driver' or some other depending on your equipment and its configuration.
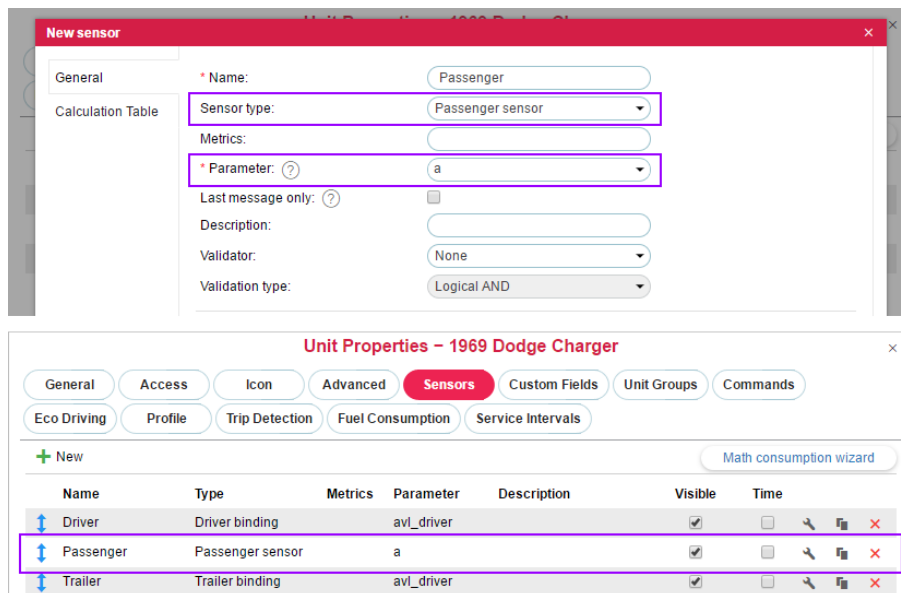
2. Create automatic binding list. To do so, click 'Auto-binding' icon (⊞) and follow the steps described below.

Upon clicking the 'Automatic binding' icon a list of available resources is opened. You should possess at least minimum rights towards a resource creator, otherwise it is impossible to work with resource contents.

🛈 Here you choose a resource the passengers of which will be used in automatic binding (with the units chosen in the next dialog). In order to understand which passengers belong to a particular resource, go back to the 'Passengers' panel, and apply a filter by resource (dropdown list to the right of 'Create' button).

After choosing a resource, click 'Next'. If only one resource is available, then it will be chosen automatically.
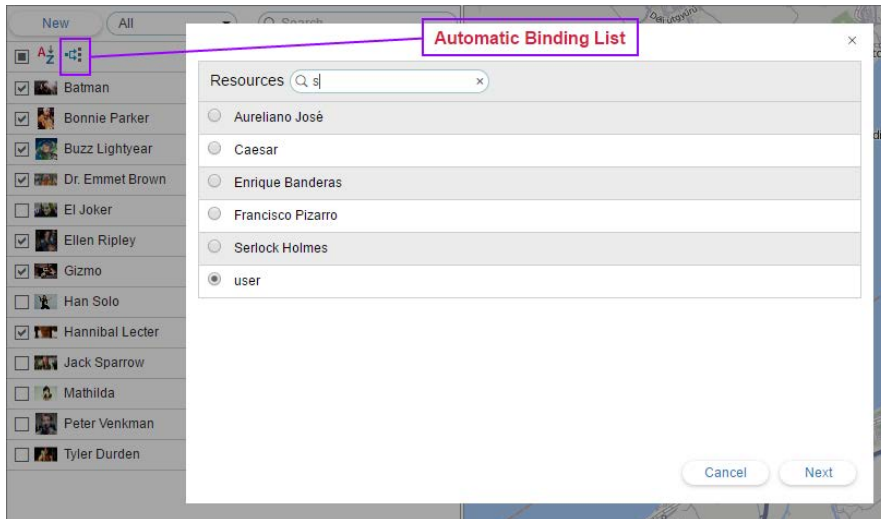
The next dialog contains a list of units to which passengers from a chosen resource can be bound automatically. Depending on the access rights possessed, the list can be viewed or edited.
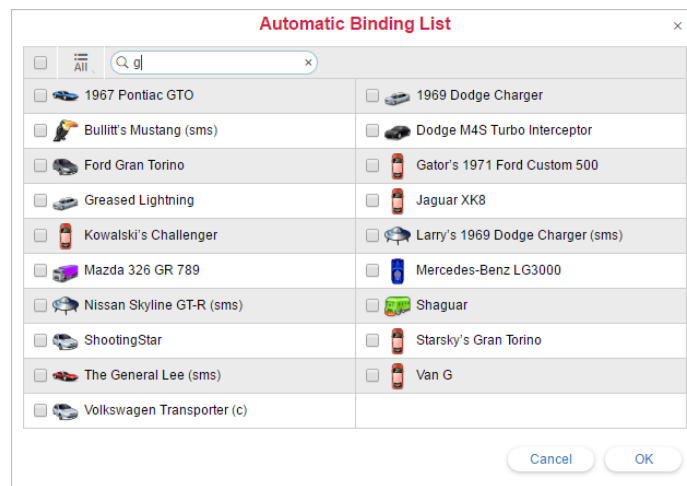
Thus, a passenger will be automatically bound to a unit with the help of a RFID tag in case this unit has a special sensor configured in its properties and this unit is indicated in the automatic binding list of a resource to which this passenger belongs.

Automatic binding of passengers is removed in the same way: summon 'Automatic binding' dialog, choose a resource, and uncheck flags of units for which the automatic binding will not be used any longer.

Usage of Passengers

Online tracking:

- Passengers can be displayed on the map if their flags are indicated.

In notifications:

- You can configure a 'Passenger activity' notification to get informed when a passenger gets into or out of a vehicle.

- You can configure a 'Passenger alarm' notification to get informed if a passenger doesn't leave a vehicle within an indicated time interval.

In reports:

- Such report as 'Trips' may include a column displaying a number of passengers carried by a unit within a trip.

- As a part of 'Advanced Reports' module, you can generate the 'Bindings' table showing time and location of getting into and out of a vehicle, name of a unit used by passengers, duration of a trip, etc.

Jobs

A job is a set of actions to be performed on a predefined schedule. A job can be command execution, sending reports by e-mail, changing access to units, etc.

To configure jobs, open the 'Jobs' panel choosing a corresponding name in the top panel or clicking on the necessary item in the main menu customizer. Here you can see the list of all jobs created, information on their state, and the button to create a new job.

In the list, jobs are sorted by name. Use the dynamic filter to save your time when looking for a certain job. Input job name or its part into the search box and observe the results. The other way to filter jobs can be used if you have access to more than one resource. Then, on the dropdown list, choose a resource to display only jobs belonging to it.

Direct a mouse pointer over a job to view details in the tooltip: job type, parameters, schedule, last execution time (whether successful or not), resource (if there is access to several), and other parameters depending on job configuration. In columns on the right, you can see job state (on/off), the number of executions already made, and the number of maximum executions allowed.

The system supports running test execution of a job. Test execution is a single execution of a created job regardless to its activation time and number of executions indicated. Test execution is implemented upon clicking the corresponding icon in the work list, and takes up to 1 minute. A result of a test execution is recorded in the log. Moreover, the information on job's test execution can be viewed in the corresponding report on user. Note than during a test execution of a job, the icon becomes inactive until it finishes.

In the panel, the following icons and buttons are used:

Job type	Different kinds of jobs are marked with special icons in the first column: — command execution; — sending report by e-mail; — sending information about fuel by e-mail or SMS; — access management; — job on engine hours counting; — job on mileage counting; — job on GPRS traffic counting.
⏻ / ⏻	Clicking on job state sign at the header of the table, you can enable/disable all jobs at once (if you have access rights on them). Enable ✔ or disable ▬ a certain job.
	Job's test execution column. Test execution can be run for a particular job only. To run it, click ▷ .
↻	The first (left) column shows how many successful executions there were; the second (right) column shows maximum executions allowed.
	Buttons to view and/or alter job properties (depending on your access).
	Create a new job on the basis of this one.
✕	Delete selected job.

⚠ *Note.*

If a job belongs to some resource to which you do not have access rights to 'Create, edit, and delete jobs', then some kind of actions towards this job, such as enable/disable, edit or delete will be unavailable.
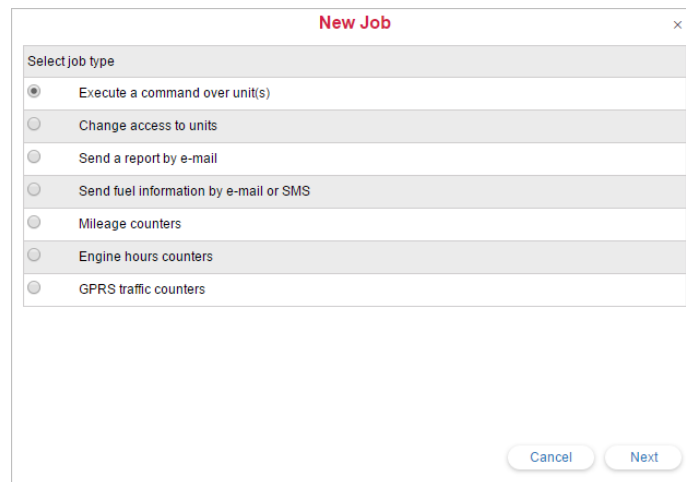
Configuring Jobs

⚠ To make manipulations with jobs, you should have at least one resource with the access right 'Create, edit, and delete jobs'.

To create a new job, press the **'New'** button. In the dialog choose job type:

- Execute a command over unit(s),
- Change access to units,
- Send a report by e-mail,
- Send fuel information by e-mail or SMS,
- Mileage counters,
- Engine hours counters,
- GPRS traffic counters.

Then follow instructions in the dialog. For any type, you have to select units to apply this job to and set the basic parameters like activation time and schedule. For each type of job, adjust also individual parameters described below.

Selecting Units for Jobs and Notifications

⚠ Access required: 'Use unit in jobs, notifications, routes, retranslators' (resource's creator where the job belongs is supposed to have this access to units to assign then this job).

Dialog of choosing units for a job or notification consists of the units currently displayed in the work list of the 'Monitoring' panel.

If you see no units, press the 'Display all' button ⊞ . If it does not help, it means there is not enough access to any of units.

You can switch between units and groups by clicking the switch-button ☰ / ☰ . If a unit group have been selected, then the action is applied to all the units the group contains on the moment of action implementation. The list of current units you can find in a group's tooltip.

Mark units/groups to apply a job/notification to. Put the flag in the header of the table to select all items.

Please note that if there are more than a hundred units on this page, their icons are not displayed.
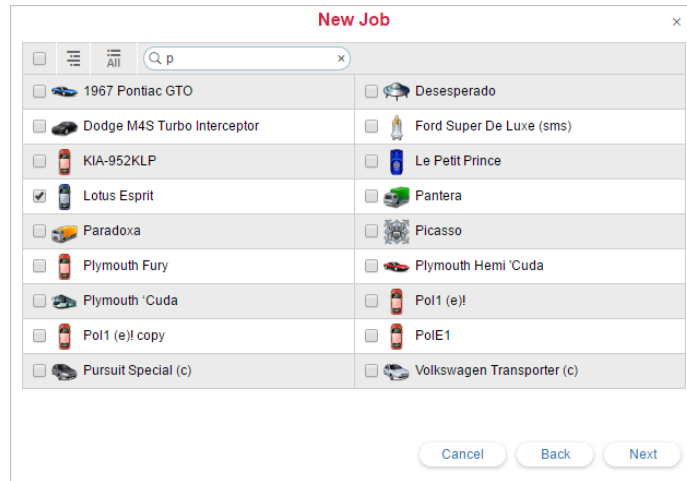
Upon editing a job/notification, units selecting dialog contains both units selected for a job/notification and units currently displayed in the work list. In order a unit to be listed in the dialog, it is necessary to possess the 'Use unit in jobs…' right towards this unit. If a job or notification that you are editing contains units to which you don't possess enough rights, you will be warned about it and in case you save the job/notification, those units will be lost.

Parameters for Jobs

These parameters are adjusted in the last page of the dialog:
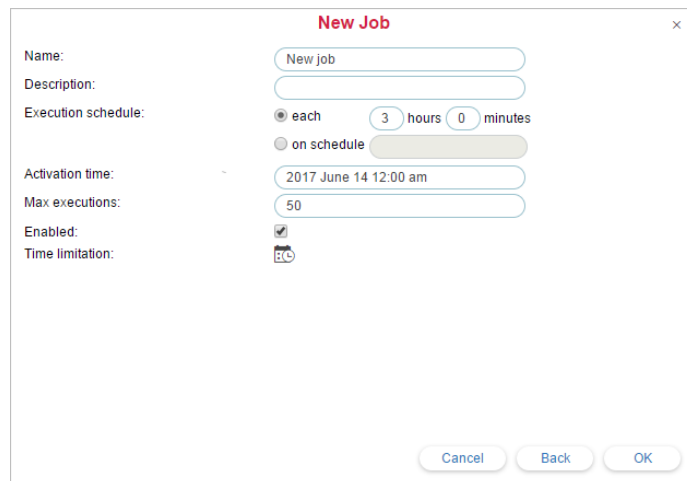
Name
It is used in the list of jobs or as mail topic if the job is to send some information by e-mail.

Description
Job description is optional. Is can appear in job's tooltip.

Execution schedule
Use one of two ways to set job's schedule:
(1) Periodic execution — each *N* hours and/or minutes.
(2) On schedule. Execution time is set in 24-hour format *hours:minutes* or just *hours*. If you need to indicate several points in time, separate them with spaces. Example:

```
8:00 22:00
```

In this case, the job will be executed at 8 AM and 10 PM daily (if other conditions concerning execution days are not set on the 'Time Limitation' tab).

Activation time
Date and time when the job will be activated.

Maximum executions

Enter the number of job executions after which the job will be automatically disabled. If you leave this field empty, the job will be executed endlessly until you delete it or disable manually.

Enabled

This check box indicated whether the job is on or off. When creating a job, enable this check box to activate the job just after creation. If this check box is not marked, the job will appear on the list anyway, and you can activate it later.

Time limitation

In the right part of the dialog one can define time limitations by days, months, time, etc. For instance, the job can be assigned to a unit just on weekdays and within working hours from 9 AM to 6 PM. Or you may want to reset traffic counter once a month on the first day of the month. To do this, select the day *1*.

Job name and schedule are required fields, other parameters are optional.

Execute a Command over a Unit

While creating a job of this type, choose a command to be executed from the given list. The list consists of all commands that are configured in selected units (if you have 'Execute commands' rights to these units).

Not all of selected units may be able to execute a chosen command, and it is seen from the indicator:

- ✓ a green sign means that all the selected units support this command;
- ⚠ a yellow triangle means that not all the selected units can perform it (see details in the tooltip). Restrictions can be placed due to access rights or device type used.
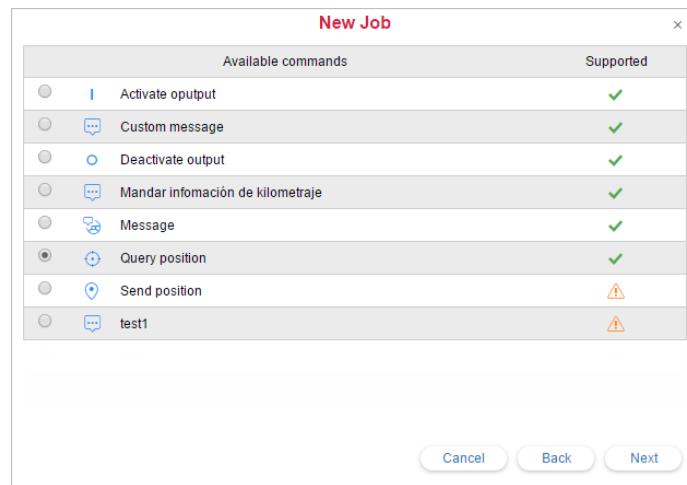
For some commands, you should set additional parameters like input/output number, online report interval, etc.
More about executing commands...

⚠ *Attention!*
When the time comes to execute a command as a job, all kinds of rights are checked beforehand. The user who is a creator of a resource where the job belongs should have the following access flags to unit: 'Execute commands' and the set of flags specified in properties of this command.

Change Access to Units

This job is aimed to change users' access rights automatically, for example, if you want to give someone demo access for several days or restrict access to working hours.

To configure this job, select users and assign them new access. On the list, there are only users to which you have access 'Manage user's access rights'.

Check necessary users on the left and indicate access flags on the right. You can set flags, remove flags, or leave them untouched.

⚠ *Attention!*
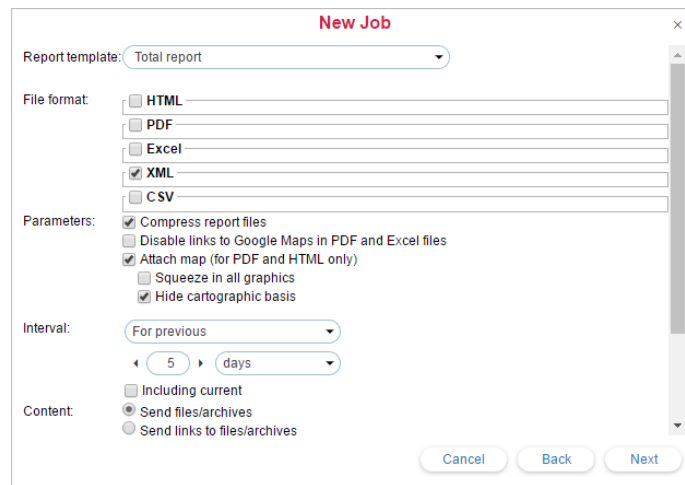
This type of job can be performed successfully only if at the moment of its execution necessary rights are OK. The user who is a creator of the resource where the job belongs should have unit ACL flag 'Manage access to this item'.

Send a Report by E-mail

This job can be used to automatically generate and send reports about units' activity to your e-mail(s).

Choose report template, file format(s) and parameters. Specify report interval: choose particular dates or specify any time interval for previous X minutes/days/weeks/months/years. Afterwards, for the 'Content' item specify whether you'd like to receive files/archives or the link on FTP server (Wialon or custom one) where the corresponding files/archives are stored. In the 'Recipients' section enter e-mail address(es) to send reports to.

To find out more on file formats or parameters description, see 'Export Report to Files'.

In the list of report templates, only those that belong to the same resource as the job are displayed. Depending on template type, you choose appropriate objects for report generation in the next page of the dialog — units, groups, users, drivers, routes, resources, or retranslators. To apply the job for those objects, you should have a special access to them — *'Query messages or reports'* (besides, units are taken here from the work list of the Monitoring panel).

Reports can be sent as a job using file compression. In this case a letter sent to e-mail contains ZIP archive. Archive's name consists of a report template name and a date (yyyy-mm-dd). Upon receiving such a letter, extract files to a folder and open them with applications dealing with corresponding formats. Here are some rules of files zipping:

- **Compulsory zipping**: for the files in HTML, CSV, and XML formats, as well as for the files with total size exceeding 20 MB.
- **Zipping upon flag activation**: for the files in PDF or XLSX format.
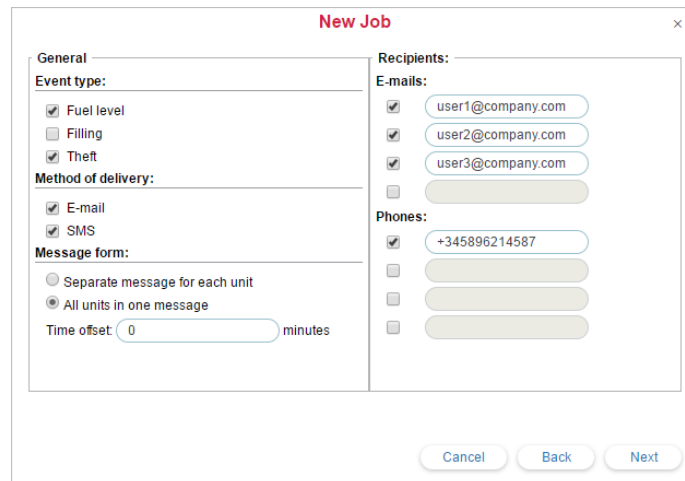
⚠ *Note.*
If in your company the workday sometimes finished after midnight (because some vehicles may arrive late at night), then you can adjust the parameters for the daily report in the following way. Select report interval 'for previous 24 hours' and set job activation time at 4 AM. Then the report will be automatically generated every day at 4 AM. It will contain data for the last day, and the trips finished after midnight will not be divided into two parts.

Send Information about Fuel

You can get information about fuel (fillings, thefts, fuel level) by e-mail or SMS according to predefined schedule. This information is given in *liters* only.

To detect fuel fillings and thefts, the appropriate unit settings are used (see Unit Properties => Fuel Consumption).

Additional parameters to configure this report are:

- Event type: filling, theft, fuel level (all three can be chosen). Fuel level means fuel level at the beginning and at the end of the interval (the interval is set later).

- Method of delivery: by e-mail and/or SMS. On the right, enter your e-mail(s) and phone number(s) in the international format. When all slots to enter e-mails and phones are filled, additional slots appear automatically. Note that if the flag 'Can send SMS' is not chosen in user properties, then the corresponding delivery method becomes unavailable.

- Message form: one unit in one message or all units in one message.

- Time offset (in minutes): a parameter which allows you to analyze messages from the black box. In this case, time offset value is subtracted from interval beginning.

⚠ *Note.*

Upon sending fuel information, the system uses the following data collection algorithm:

- 1st job's execution — data for the interval from an indicated activation time (minus time offset) to the job execution time;
- Subsequent executions — data for the interval from the previous job execution (minus time offset) to the current job execution.

Information on fuel fillings and thefts is sent only in case such events have been detected. Information on fuel level is sent anyway. In case there is no data to detect fuel level, an addressee receives the text 'Fuel level unknown'.

SMS Format

```
Unit Name
x a/b/c
```

where

444

- *Unit Name* is unit name as set in unit properties (to save traffic it is recommended to use no other letters but Latin);
- x — sensor number;
- a — fuel level;
- b — fuel filling;
- c — fuel theft.

For example, SMS message

```
Iveco_1501
1 66/-/-
2 100/-/10
```

means that according to the first sensor the unit Iveco_1501 has 66 lt of fuel, and no fillings and thefts were detected; according to the second sensor (fuel in the second tank, for example) fuel level is 100 lt, no fillings were found, and 10 lt theft was detected.

Dashes may mean one of the following:

1. The corresponding flag is not ticked in job parameters. For example, it is not chosen to send fuel level.
2. There are no valid data (it may happen with fuel level).
3. Required events were not detected (it may happen with fillings and thefts).

⚠ *Note.*
Whether fuel volume will be sent in liters or gallons, depends on resource settings (where the job belongs) and not on units' settings.

Jobs on Counters

Counters of three types are used in Wialon tracking system: counters of GPRS traffic, mileage, and engine hours. They can be set up in unit properties.

Jobs about counters allow you to automate accounting of mileage, engine hours, and GPRS traffic.

Mileage Counters

This kind of job can help you to fulfill control over mileage counter automatically, according to schedule. With this job you can store mileage counter value in unit history, reset mileage counter, set a new value for it, save its value as parameter in data message.

To set a new value or to reset the counter, choose the option **'Set new value for mileage counter'** and input the desired value below. The counter will obtain this value each time when the job is executed. Depending on resource settings, different measurement systems can be used.

Set the flag **'Store counter value as parameter of unit data message'** to save the counter value as parameter in data message. Later on it can be used to get initial and final mileage for trips. It is recommended to store the counter while the unit is parked, for example, once a day at night time.

The option **'Store counter value in unit event history'** can be used to store current mileage counter value. It is especially recommended if according to the job properties, the counter has to be reset or altered.

Engine Hours Counters

This is analogue of the previous type of job but it is applied to engine hours sensors.

If you store engine hours sensor as parameter in data message, you can use this parameter to create engine hours sensor on its basis.

⚠ *Attention!*
This types of job can be performed successfully only if at the moment of its execution all necessary rights are OK. The user who is a creator of the resource where the job belongs should have unit ACL flag 'Edit counters'.

Counters' values (traffic, mileage, engine hours) are stored in unit history as registered events, which is needed for creating reports — Events or Chronology. When counter values are stored as parameters, it means new data messages are added to unit database. Those messages bear data message type, and mileage and engine hours are displayed there in meters or feet (depending on unit's properties) and seconds correspondingly.

GPRS Traffic Counters

This job is aimed to:

1. Automate traffic counter reset;
2. Store GPRS traffic counter value in unit's history.

For example, you can assign to reset the traffic counter once a month and register each reset with the current value in unit history.
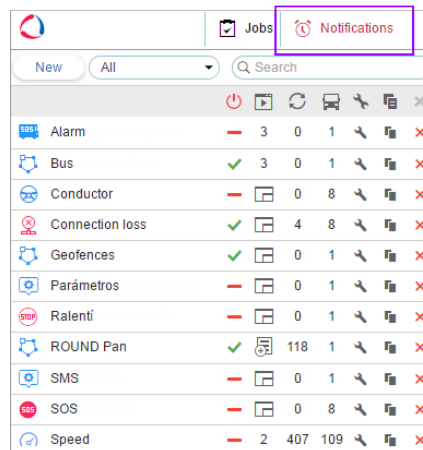
Indicate the status of the option **'Store counter value in unit history'**. If the option is activated, each reset is registered in the system, and then you can generate a report on events or report on traffic to see traffic consumption. If the option is not activated, resets are not registered anywhere.

The option **'Reset GPRS traffic counter'** is to set the counter to 0 each time when the job is performed.

Notifications

You can be notified about any unit activity that you consider significant. It can be speeding, location, sensors values, etc. A notification can be delivered by e-mail or SMS, shown online in a popup window or replied by some other means.

To create, edit and view notifications, open the Notifications panel, choosing a corresponding name in the top panel or clicking on the necessary item in the main menu customizer.

How to Create a Notification
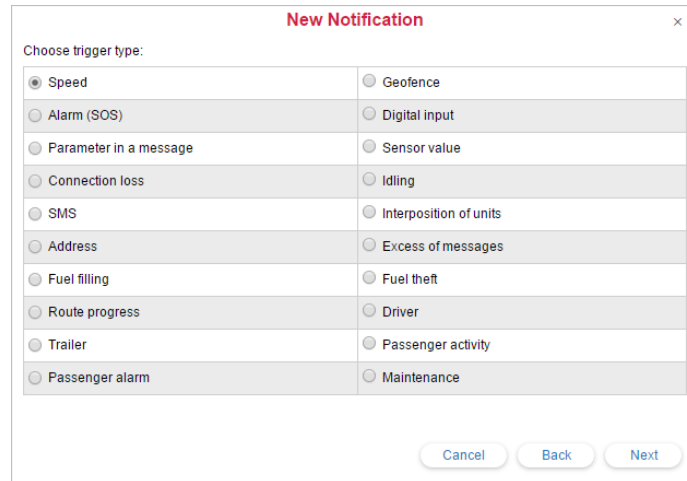
1. Click the **'New'** button.
2. Choose unit(s) to create a notification for, and click 'Next'. Units are selected in the same way as in jobs. More...
3. Select what you would like to control: geofence, speed, alarms, sensor values, message parameter, etc. Click 'Next'. More...
4. Adjust control parameters needed for the notification type selected in the previous window: select geofences, indicate speed limits, etc. Click 'Next'. More...
5. Input your text for the notification using special tags listed in the table below. They will be substituted with real values when notification triggers. More...
6. Indicate how the notification should be delivered: sent by e-mail or SMS, popup online, registered in unit history, etc. More...
7. Key in a name for the notification and adjust the schedule for its performance. More...
8. Click OK. The created notification will appear on the list in the left part of the window.

All of the steps of creating notification are described in detail below.

⚠ *Attention!*
To create a notification, the access flag 'Use unit in jobs, notifications, routes, retranslators' is required. However, sometimes it is not enough — if a notification concerns an action, you need to have rights to perform those actions, and only then the notification will trigger.

Notification Type

Speed

Define the minimum and/or maximum speed values. If a unit goes out of this range, the notification will trigger. In addition, you can activate *sensor value control* — in this case, the notification will trigger only if both conditions are met.
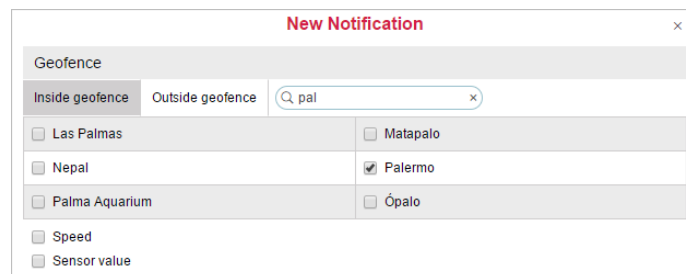
Geofence

In case of this choice, in the following window you select geofences or groups of geofences to control and control type: control entries to or exits from geofences. Those geofences should be created in advance and belong to the same resource with the notification.

In addition, you can adjust speed limitations and/or sensor value range inside (outside) chosen geofences. Then the notification will trigger when all conditions are met.
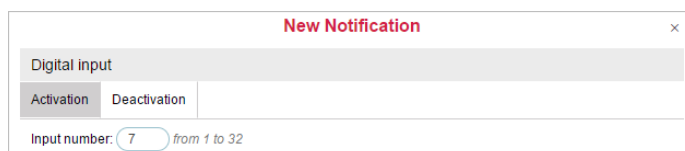
Alarm (SOS)

For this type of notification, no specific settings are needed.

Digital input

Specify the number of digital input and select control type: trigger on input activation or deactivation.
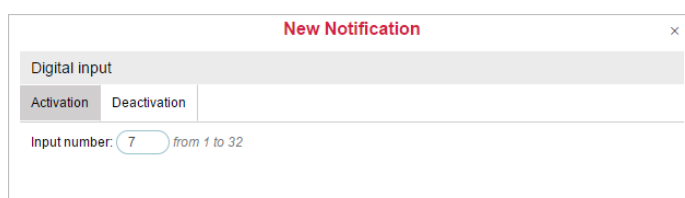
Parameter in a message

Four control types are provided: value range, text mask, parameter availability, and parameter lack. Only real parameters, i.e., sent by device itself can be considered whereas virtual parameters such as speed, altitude, sats (satellites) etc. cannot be controlled by this type of notification.

To control *Value range*, specify parameter name, define minimum and maximum values for it, and select whether to trigger in the specified range or out of it. If you need to get notifications for all parameters except 0, set 0 as min and as max value and choose trigger type 'Out of specified range'.

To control *text*, enter parameter name and *Text mask* using wildcard symbols (? and *).

For *Parameter availability* and *Parameter lack*, it is enough to indicate parameter name. These two last mentioned options can be interpreted as parameter appearance and disappearance if on the last page of the dialog you set the option 'Generate notification only when state changed'. ⊖ For *in* and *out* parameters it is possible only to control parameter availability/lack.
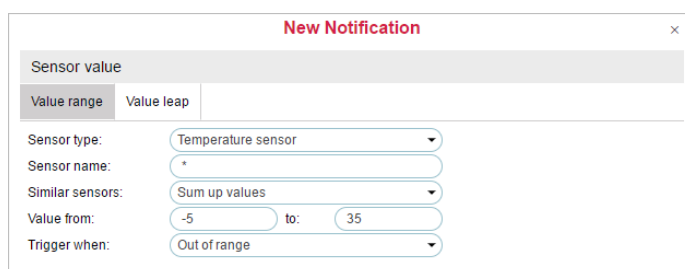
Sensor value

With this notification type, you can control either sensor getting some undesirable value (*Value range*) or abrupt significant change in sensor value (*Value leap*). To specify sensors to be controlled by the notification, choose sensor type on the dropdown list or set the name mask using wildcard symbols (* and ?). You can as well do both. If there will be found two or more sensors meeting these conditions (same type or name mask or both), their values can be summed or regarded separately — select the corresponding option. Then enter minimum and maximum values and select control type: trigger in the specified range or out of it.
If you control value leap, then enter delta. Notification triggers when delta is exceeded. Note that an indicated delta is compared to the module of values' delta.

Connection loss

Choose control type:

1. No data. It can be a simple connection loss when no messages are received from the unit during a period of time.

2. No coordinates. There are also cases when all sensors are active and their values are known, but it is impossible to locate the unit. It is especially true if someone has covered GPS receiver.

Indicate loss time: how long (in minutes) the connection/coordinates loss should continue before a notification triggers.

The notification can also trigger when the connection is restored if the checkbox 'Also notify when connection restored' is activated.

Idling

For this type of control, indicate speed and time. Speed should be more than 0 in order to exclude possible equipment errors. Indicate also time allowed for staying. If this time exceeded, this will be considered as an idle, and the notification will trigger. ⚠ Note that maximum allowed time of idling corresponds to 98 hours and 59 minutes.

In addition, you can activate *sensor value control* — in this case the notification will trigger only if both conditions are met. It is convenient to control idles with engine on, for example.

SMS

You can receive a notification when a certain SMS message comes. To define, which SMS messages you are interested in, enter a mask for message text. This feature can be useful, for example, when a device sends SMS of a certain content in case of malfunction.

Interposition of units

This type of notification allows you to control approaching of units to each other and moving away from each other. Select control type (approaching or moving away) and specify radius in meters — if this distance between units is insufficient or exceeded, then the notification will trigger. Choose units which position will be estimated regarding the units that were chosen for the notification itself. In addition, you can narrow trigger case adjusting speed limitations or sensor value range (like in geofence control). ⚠ Note that units interposition is checked by the system using their latest messages only.

Address

This type of notification is similar to geofence control. You can control entrance/exit or being *in* or *out of* a particular place. Enter some address parameters (e.g., city, street, and house) and then select the most appropriate option from found addresses. Additionally, adjust the radius of controllable area.

Excess of messages

With this notification, you can be warned if a unit exceeds the limit of messages you have set. Either usual data messages or only SMS messages can be under control of this type of notification. Indicate the limit of messages and set the reset interval. The example below assumes that the notification will trigger if unit sends 3 or more SMS messages in an hour's time.

Fuel filling

This notification type allows you to control fuel fillings, and provides with an information on the amount of fuel filled. Upon notification creating you can indicate sensor masks in order to use this particular sensors for fuel filling detection. Besides, checking the corresponding flag you can control location of filling in relation to the chosen geofences (inside/outside geofence). These geofences should be created in advance, and belong to the same resource as the notification itself. Moreover, there is an 'Ignore recalculated data' option. Enabling this option allows receiving notifications for a new (current) fillings. If the option is disabled, then upon receiving a historic message (from the black box, or after importing messages, etc.) the number of events will be recalculated, and you will receive messages on the old (not current) fillings.

⚠ Note that notification triggers for every fuel level sensor individually.

Fuel theft

This notification type allows you to control fuel thefts, and provides with an information on the amount of fuel stollen. Upon notification creating you can indicate sensor masks in order to use this particular sensors for fuel theft detection. Besides, checking the corresponding flag you can control location of filling in relation to the chosen geofences (inside/outside geofence). These geofences should be created in advance, and belong to the same resource as the notification itself. Moreover, there is an 'Ignore recalculated data' option. Enabling this option allows receiving notifications for a new (current) thefts. If the option is disabled, then upon receiving a historic message (from the black

box, or after importing messages, etc.) the number of events will be recalculated, and you will receive messages on the old (not current) thefts.

⚠ Note that notification triggers for every fuel level sensor individually.

Route progress

For this type of notification, select statuses to control: round start, round finish, arrival to check point, check point skip, departure from check point, etc. Additionally, you can specify name masks for routes, schedule and/or round.

Driver

Choose control type: driver assignment or driver reset. To control both activities, two notifications of different types will be required. Using this notification you can control all drivers (*) or just some of them — input driver's name (or code) mask.

Trailer

Choose control type: trailer assignment or reset. Settings to adjust are the same as for previous type.

Passenger Activity

To receive notifications on passenger's activity, choose control type: check in/out. Moreover, indicate passenger's code in the corresponding field. To control all the passenger, leave just the asterisk sign (*) in the field.

Passenger Alarm

Indicate a timeout upon the expiry of which you'll receive an alarm message if any passenger of a chosen resource stays in a vehicle. Timeout is started to count upon passenger binding.

Maintenance

First, you choose trigger type: notify when service term approaches or notify when service term is expired. Then indicate the interval before or after the term for the notification to trigger. This interval can be in days, kilometers, engine hours, or together. You can control either all intervals existing in the 'Service Intervals' tab in unit properties or just several intervals. To specify target intervals, enter a name mask using wildcard symbols like asterisk (*) and question sign (?). Then indicate how much mileage, or time, or how many engine hours should be left or expired to make the notification trigger.

⚠ Notification about maintenance triggers only once — when a critical point is met (mileage, engine hours or time) about any maintenance interval. Then information about service work done should be delivered through event registrar or through unit properties dialog. Only after that, the notification starts working again.

Notifications' triggering peculiarities:
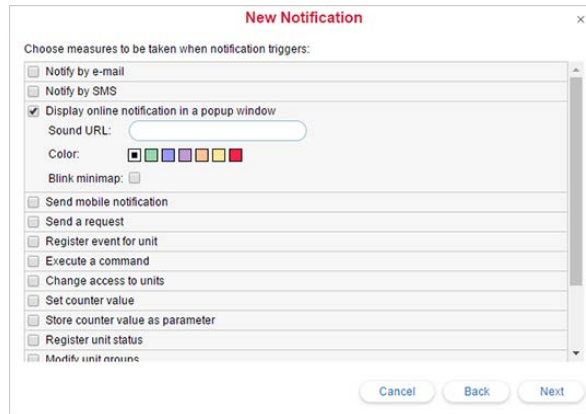
- If upon creation of notification a unit with an already exceeded maintenance interval is chosen, then the notification for such a unit will not trigger.
- If no position messages have been sent to a unit, then the notification for such a unit will not trigger.

⚠ *Note.*

As each notification belongs to some resource, it takes its measurement units from this resource. If the american or imperial measurement system is set for the resource, then speed is shown in miles per hour (mph), radius in feet (ft), and mileage in miles (mi). Otherwise (in case of metric system), it will be kilometers per hour, meters and kilometers, correspondingly.
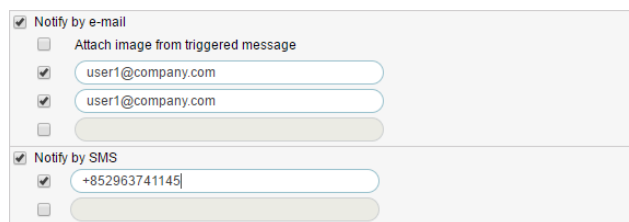
Notification Action

Notification action is the way system will react when a notification triggers.

Notify by e-mail

You can indicate one or more e-mail addresses to send a notification to. When all slots to enter addresses are filled, additional slots appear automatically. Besides, you can check the option 'Attach image from triggered message' if your the device used takes pictures.
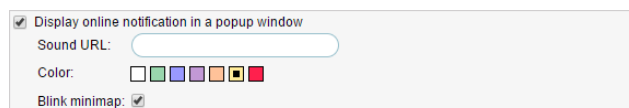
Notify by SMS

Key in one or more telephone numbers in the international format, for example, +375293293294. When all slots to enter phones are filled, additional slots appear automatically.

⚠ Note that if the flag 'Can send SMS' is not chosen in user properties, then the corresponding notification delivery method becomes unavailable.

Display online notification in a popup window

A notification can be displayed in a popup window. It can be silent or accompanied by a specific sound. If no URL is given for the sound, the standard tune will be used. Otherwise, enter sound URL to use a custom tune. Recommended file size is up to 0.5 MB.

There is a possibility to inform on a notification triggering by blinking a minimap. To enable this option, indicate the 'Blink minimap' flag in this section.

⚠ *Attention!*

Different browsers can have restrictions regarding formats of audio files:

	MP3	WAV	Ogg	AAC
Internet Explorer 9+	+			+
Google Chrome 11+	+	+	+	
Mozilla Firefox 12+		+	+	
Safari 5+	+	+		+
Opera 10+		+	+	

To highlight a notification, you can set an individual color to it. This color will be applied to the background of the triggered notification so that you could easily notice it.

Send mobile notification

In this case upon notification triggering mobile notification is sent to a user/users of an application. Choose the necessary application in the left field. Then the system checks the possession of the necessary rights towards users: 'View detailed item properties', 'Act as given user'. Current user as well as creator of a resource to which a notification belongs are checked for the possession of these rights. Afterwards on the basis of this check a list of users is formed in the right field. Here you can indicate a user/multiple users (choosing the corresponding flags) or all the users (holding <ctrl> and checking any user's flag) to whom a notification will be sent. Note that mobile notifications service availability depends on the chosen service package.

⚠ Note that in order to receive mobile notifications, a user of Wialon Mobile Client should authorize in the application and enable the 'Notifications' option.

Send a request

You can transfer a notice on the triggered notification to external systems. Choosing this measure it is necessary to indicate server address as well as HTTP request method ('POST' or 'GET').

Register event for unit

In this case notification text is stored in unit history. Then a report on these events can be generated.

Register as violation

Upon checking this option the notification will be registered not only as event but also as violation, and one more report type will be available to you. For further information, see reports on Events and Violations.

Execute a command

For this action, choose a command to be executed over unit(s). The list consists of all commands configured in the properties of selected units. So, different commands on the list may be supported by different units. Support status is seen with special indicators:
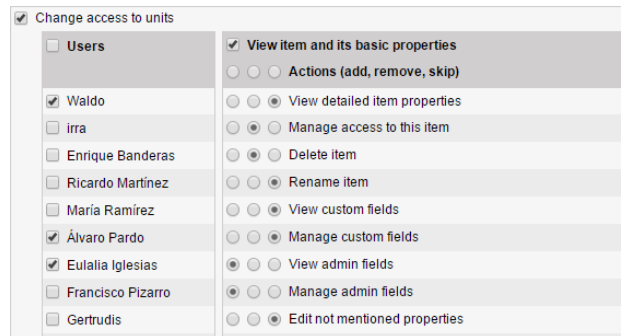
- ✔ command is supported by all selected units;
- ⚠ not all of selected units support given command (see details in the tooltip).

For some commands, you should set additional parameters like input/output number, online report interval, etc. More about executing commands...

Change access to units

Choose users whose access rights will be modified when trigger conditions occur. Specify access that will be applied to those users after the notification triggers. This feature can be used, for instance, in the following situation.

Set counter value

Counter values can be changed (or zeroed) when notification triggers. Select one or more counters (mileage counter, engine hours counter, traffic counter) and set new values for them.

Store counter value as parameter
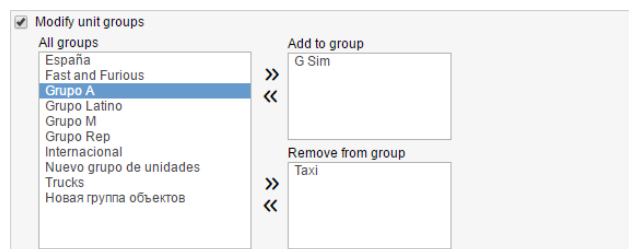
Current values of mileage or engine hours counters can be stored as parameters in unit data messages (*odometer* or *engine_hours* correspondingly). These parameters can be used to create sensors on their basis (for example, engine hours sensor) and to get initial/final mileage in reports. For more precise calculations, it is recommended to store counters while the unit is parked, for example, once a day at night time.

Register unit status

A new status can be set for unit when a notification triggers. For instance, when unit enters a geofence, *private* state can automatically switch to *business*.

Modify unit groups

You can change the contents of unit groups when a notification triggers — add triggered unit to a group or remove it from a group. On the left, there is a list of all available unit groups. Move necessary groups to the right to *'Add to group'* or *'Remove from group'* sections.

Send a report by e-mail

Select report template, object, file format(s), and report parameters. Note that choosing an object, sometimes it is convenient to use the *'Triggered unit'* option — in this case a report is generated for the same unit that the notification triggers for. Afterwards, for the 'Content' item specify whether you'd like to receive files/archives or the link on FTP server (Wialon or custom one) where the corresponding files/archives are stored. Indicate report interval: choose particular dates or specify any time interval for previous X minutes/days/weeks/months/years. Enter e-mail address(es) to which report to be sent upon notification triggering.

To find out more on file formats or parameters description, see 'Export Report to Files'.

For report generating, it is necessary to possess the 'View messages and reports' right.

Create a round

Creating a new round for unit can be chosen as an action undertaken after the notification triggers. For example, when one round is finished, a new round can be assigned, or when unit leaves its garage (as a geofence), a round is automatically created for it.

Reset driver

This feature can be used, for example, to reset driver automatically when the unit returns to the depot. This action can be completed successfully only if you have enough rights for the resource where the driver under question belongs — 'Create, edit, delete drivers'. Note that driver resetting can take place only within the resource to which a notification belongs.

Reset trailer

Similar to the previous one but concerns trailers. This action can be completed successfully only if you have enough rights for the resource where the trailer under question belongs — 'Create, edit, delete trailers'. Moreover, the same as for driver resetting, trailers should belong to the same resource in order the action to be executed correctly.

Notification Text

Text can be set for such actions as notify by SMS or e-mail, register an event in unit history, or display popup window online.

The text of a notification can be written in any language, contain any characters, words and phrases, and be of any size. Large messages are acceptable for e-mail notifications. Of course, for SMS notifications it is better to form more compact messages.

To be more informative, a notification should contain special parameters (tags) which are substituted with real values in an incoming notification.

Example.
The text *«'%UNIT%' violated speed limitations. At '%POS_TIME%' it moved %SPEED% near '%LOCATION%'»* can be transformed to *«'Rover-119' violated speed limitations. At '2000-01-01 12:01:37' it moved 136 km/h near 'KU 8, Thurnau, DE'»*.

Measurement units (kilometers or miles) used to decipher parameters depend on resource settings where the notification belongs. Date and time format are taken from the creator of this resource.

Below is the list of parameters applicable to most types of notifications:

%UNIT%	Unit name
%CURR_TIME%	Current date and time
%LOCATION%	Unit location at the moment when notification triggered
%LAST_LOCATION%	Last known unit location (may be useful if there is no position in the triggered message)
%ZONE_MIN%	The smallest of geofences holding unit at the moment of notification
%ZONES_ALL%	All geofences holding unit at the moment of notification
%SPEED%	Speed registered at the moment when notification triggered (is not applicable to fuel fillings/thefts)
%POS_TIME%	Date and time of the latest message with position
%MSG_TIME%	Date and time of the message triggered
%DRIVER%	Driver's name (can be displayed only if the driver belongs to the same resource as notification)
%TRAILER%	Trailer's name (can be displayed only if the trailer belongs to the same resource as notification)
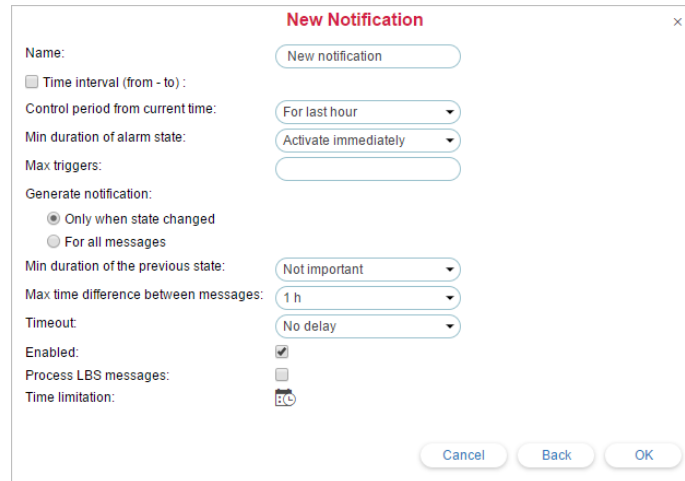
%ALL_SENSORS%	All sensors and their values (not applicable to fuel fillings/thefts; does not show sensors with textual parameters)
%ENGINE_HOURS%	Engine hours at the moment of notification
%MILEAGE%	Mileage at the moment of notification
%LAT%	Latitude at the moment of notification (e.g., N 55° 45.7530')
%LON%	Longitude at the moment of notification (e.g., E 37° 35.2068')
%LATD%	Latitude without formatting
%LOND%	Longitude without formatting
%GOOGLE_LINK%	Link to Google Maps with the position at the moment of notification (e.g., http://maps.google.com/?q=55.762550N,37.586780E)
%CUSTOM_FIELD(*)%	Unit custom fields. If you leave the asterisk sign in the brackets, all accessible custom fields (both regular and administrative) will be shown with their values (in the format 'key: value'). However, you can get the value of a certain field if you specify its complete name in the brackets. In this case, the resulting notification text will contain the value of the specified field (only the value but not its name).

There are also parameters which make sense only with certain types of notifications:

%ZONE%	Triggered geofence name (used in notifications of geofence control)
%SENSOR_NAME%	Triggered sensor name (used in various notifications)
%SENSOR_VALUE%	Triggered sensor value
%SERVICE_NAME%	Service interval name (used in notifications about maintenance)
%SERVICE_TERM%	Service interval state — left/expired value (used in notifications about maintenance)
%TRIGGERED_SENSORS%	All triggered sensors and their values (used in notifications about maintenance)
%LOSE_RESTORE%	Connection loss/Connection restored (used in notifications about connection loss)
%PARAM_NAME%	Parameter name (used in parameter control)
%PARAM_VALUE%	Parameter value (used in parameter control)
%SMS_TEXT%	Text from SMS message (used in SMS control)
%DRIVER_ID%	Driver's code (used in notifications about drivers)
%DRIVER_NAME%	Driver's name (used in notifications about drivers)
%TRAILER_ID%	Trailer's code (used in notifications about trailers)
%TRAILER_NAME%	Trailer's name (used in notifications about trailers)
%OTHER_UNIT%	Name of another unit (used in notifications about interposition of units)
%ROUTE_NAME%	Route name (used in notifications of route control)
%ROUTE_STATUS%	Round execution status (used in notifications of route control)
%ROUTE_POINT%	Check point name (used in notifications of route control)
%ROUTE_SCHEDULE%	Schedule name (used in notifications of route control)
%ROUND_NAME%	Round name (used in notifications of route control)
%COUNTRY%	Country
%REGION%	Region (state, etc.)
%CITY%	City (town, etc.)
%STREET%	Street
%HOUSE%	House

Note that a parameter must be marked by percent sign from both sides. Otherwise, it will be considered as plain text and will not be converted to real values.

Notification Parameters

Here you set general parameters for a notification as well as define the specific character of its operation. The set of parameters can vary depending on notification type.

- **Name**

  Key in any mane. It will be displayed on the list of notifications and in the notification itself.

- **Time interval (from – to)**

  Time interval is a notification validity period. It is unlimited by default (the Time interval box is not checked). Though, if it is necessary any notification validity period could be set accurate to the minutes (check the box and indicate an interval needed). Upon the expiration of the indicated time period, a notification will be automatically switched off (or permanently deleted if units mentioned in this notification do not exist anymore).

- **Control period from current time**

  This is a period of between the time when the notification triggered and the current server time. If this interval is exceeded, the message is not taken into account.

- **Min duration of alarm state**

  This parameter is aimed to exclude cases of accidental trigger that can be caused by equipment errors and inaccuracy. For example, a tracker can show that a unit left a geofence but returned 10 seconds later. In this field you can define how much time the alarm state have to continue in order to be registered. Choose an interval from 10 seconds up to 1 day. ⚠ Minimum duration value is applicable directly to the main triggering condition (notification type) and does not influence the additional ones (speed, sensor value, etc.).

- **Max triggers**

  Maximum number of notifications to be delivered. The notification is disabled automatically upon reaching this value.

- **Generate notification: (1) Only when state changed, (2) For all messages**

  In the first case, the notification will trigger when unit state changes, that is if at the moment when the notification was activated a unit is already in an alarm state, the notification will not trigger. In the second case, the notification will trigger as soon as an alarm state is detected. If the second option is selected, the following parameters are not needed.

- **Min duration of the previous state**

  This parameter is needed to exclude excessive triggers. For example, the unit can return to the normal

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state for a very short time and then returns back to the alarm state. In order that the notification in such a case would not trigger twice, this parameter is used. Choose an interval from 10 seconds up to 1 day.

- **Max time difference between messages**

  Maximum time between the latest message and the previous one to form a notification. If the interval between the current message and the previous one exceeds this value, the notification does not trigger.

- **Timeout**

  Delay from the moment when message was received and before it will be checked. This delay is especially recommended if a unit has a black box that usually requires time to unload all messages stored in the period of communication loss (for instance, while it was abroad).

- **Enabled**

  If activated, the notification after creation/editing will be active. If not, it will be disabled.

- **Process LBS messages**

  Activate this flag in order the system to consider location received via LBS detection.

- **Time limitation**

  It is possible to set limitations depending on time, day or month. For example, the control can be performed only on weekdays and within working hours. Get more details...

Notifications Management

On the list of notifications, you can get the following information:

⏻ Notification state: ✔ — enabled, ▬ — disabled.	
↻ How many times a notification has already triggered.	
🚌 How many units are under control of this notification (see the list of these units in the tooltip).	

Control type	Action(s)
🕑 speed 🏴 geofences 🆘 alarm (SOS) 📟 digital input activation/deactivation 📊 sensor value 💬 parameter in a message 👤 connection loss 🛑 idling 💬 SMS ⊕ interposition of units 📍 address visit 📈 excess of messages ⛽ fuel filling ⛽ fuel theft 🚗 route progress 🕶 driver control 🚚 trailer control ✳ maintenance (service intervals)	✉ e-mail 💬 SMS 🖥 online popup window 📱 mobile notifications sending ↔ POST/GET request sending 🏳 event registration ⊙ violation registration ▶ command execution 👤 modify users access level 🔢 manipulate counters 🖥 register unit status 🚚 modify unit groups 📊 send a report by e-mail 📋 create new round 👤 reset driver 🚚 reset trailer 2, 3, etc. — if there are several notification actions chosen, a digital indicator shows the quantity of such actions.

Hover the mouse cursor over a notification to see detailed information in the tooltip: control type, parameters, actions, life time, max triggers, text, and resource (if available).

The following actions can be executed over notifications:

✔ ▬ enable/disable notification,

⏻ enable/disable all notifications at once,

🔧 edit a notification settings,

🗐 create a new notification using this one as the basis,

✗ delete a notification.

If you have just view access to the resource where a notification is located, you cannot edit or delete it, and some buttons look different:

✔ ▬ you cannot change notification state,

👁 view notification properties (editing not available),

✗ impossible to delete the notification.

Using the dynamic filter, you can save your time when looking for a certain notification on the list. Enter notification name or its part into the search box above the list and estimate the results.

The other way to filter notifications can be used if you have access to more than one resource. Then, on the dropdown

list, choose resource name to display only the notifications that belong to this resource. Note that if you have just view rights to a resource, you cannot edit or delete these notifications.
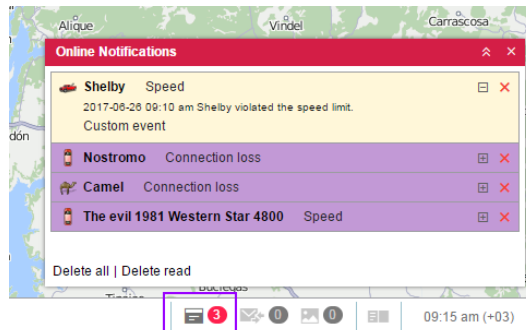
Online Notification

Online notifications can be received only by users logged in to the system on the moment of notification triggering. Moreover, received online notifications are not stored in the system after logging out.

Online notifications will popup in a separate window and can be accompanied by a special sound (see User Settings). If special parameters are not specified in notification properties, the standard audio signal is used. However, you can assign your own sounds, for each notification individually.

As more notifications come, they are stored in the same window.

Received notifications are displayed in the online notifications window. A button-indicator of the number of newly received (unread) notifications is situated in the right part of the bottom panel. You can hide/show online notifications clicking this button. Moreover, a number of unread online notifications is shown on the browser tab.

Newly received notifications are added to the list on the top. An online notification's caption is taken from notification's name provided during its creation and highlighted in blue. To expand or collapse a particular notification, use the switch button '**+/–**' or click on the header of the notification in a place with no text.

Records in this window can have different background (if this was set in action parameters). Colorful backgrounds can be applied to highlight most important messages or visually separate notifications of various types from each other. Background becomes lighter after the notification has been read.

If clicking on a notification, the map is centered on the place where the event happened. If clicking on unit's name, the map is centered on the latest unit position. At that, the unit is added to the work list of the Monitoring panel with the flag 'Show on map'.

To delete a notification, click on a red cross against it. It is possible also to delete all notifications or delete all read notifications (*Delete all* or *Delete read*). The window is closed automatically when you delete all notifications. If the online notifications' window is closed by clicking on the grey cross in the upper right corner, then the window ceases to appear automatically upon receiving new notifications until the 'Automatically display popup events' flag is activated.

The notification window can be hidden or shown, resized or dragged over the screen. To resize the window, click on its right or bottom edge and drag in the necessary direction. To hide the window, click on the 'Online Notifications' icon on the bottom of the screen (or use the standard little cross in the upper right-hand corner of the window).

⚠ *Note*.
Any user who has any access to a resource will get all online notifications created in this resource.

⚠ *Note*.
Online notifications can also be viewed in minimaps.

⚠ *Note*.
The system supports receiving browser push notifications. Their main advantage is that you can see a notification working on any tab of your browser, or even if a browser is minimized. You can enable browser push notifications in the dialog window which appears upon receiving the first online notification.
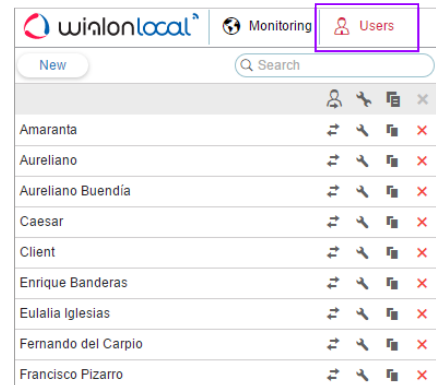
Users

User is a system object defined by its specific name (login) and password. Users can login to Wialon and control their units with the help of different tools and features. Different users can have different access to units and different set of allowed activities. They can create their own geofences, report templates, etc. non-visible to other users.

Working with Users

To work with users, open the 'Users' panel, choosing a corresponding name in the top panel or clicking on the necessary item in the main menu customizer.

On the panel, there is a button to create new users, and a list of available users. For your convenience, the users are arranged by name. If there are many users, use the dynamic filter above the list to easily find them. Use buttons against each user to perform an action over a user:

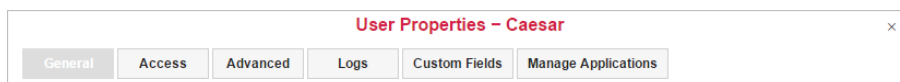⇄ — The button to login as this user. It is disabled if you do not have enough access privileges. More...

🔧 or 👁 — Edit or view user's properties (depending on your access). User properties dialog can contain up to five tabs that were described above:

- General,
- Access,
- Advanced,
- Logs,
- Custom fields,
- Manage applications.

▯ — Create a copy of this user.

✕ — Delete user from the system. If the button is dimmed, it means you have not enough rights to delete it.

Application of Users

If you have access to several users, it affects system in whole. You can create objects under a selected user or within their account. As a rule, the information that a certain object (driver, geofence, unit, etc.) belongs to a certain resource or account is displayed in object's tooltip or properties dialog. Besides, in all panels containing filters, there is an additional filter by user/account (in the form of a dropdown list).

Actions of users in the system are logged. For instance, you can view user's (operator's) chat with driver, learn which commands were sent to units by this user, what alterations this user made to some object properties, what objects created, etc. This functionality is available mainly through reports.

In advanced reports on users you can create the most detailed tables on users' logins and logouts as well as get charts of their activity by hours and days.

Users' access to units can be changed automatically:

- with the help of the the appropriate job (for instance, you can allow access only during the working shift);
- with the help of the notification with the appropriate action (for instance, deny access when a route is complete).

Individual settings can be transferred from one user to others. More...

Units

Unit is a vehicle, equipment, person, pet or any other moving or stationary object that can be monitored via GPS tracking system.

The 'Units' panel provides the possibility to create (including creation from WLP), view, edit, copy, and delete units, export/import their properties and send SMS messages to them.

To work with units, open the 'Units' panel by clicking the corresponding name in the top panel or choosing the corresponding item in the main menu customizer. Afterwards, choose a mode which allows you to work either with units or groups of units. Note that unit creation is available in the 'Units' mode only, while other options can be used in the 'Groups' mode as well.
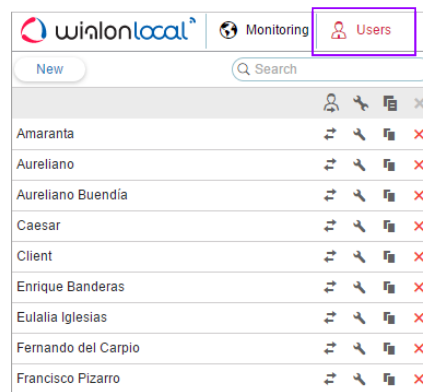
Managing Units

To create a unit, click 'Create', fill in general properties, and click OK. The created unit appears in the work area. It also appears automatically in the work list of the ' Monitoring' panel (in the group view mode) of the account it has been created in.

Units are listed in the alphabetic order. Each unit has an icon. To facilitate unit search, use dynamic filter. Such information as unit type, unique ID, and phone number(s) can be found in unit's tooltip. To do so, place a cursor on the unit. In order to view unit's tooltip it is necessary to possess the 'Edit connectivity settings' right towards a unit.
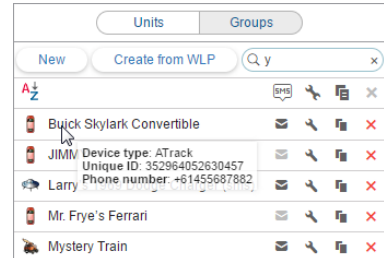
The following icons are used to perform standard actions over units:

✉ — Send SMS to unit's SIM card. It can be a command or other message. SMS icons are not displayed if this feature is not activated for the current user. If the icon is inactive, then there is no phone number indicated in unit properties or a current user has no enough rights towards a unit. If two phone numbers are given in unit properties, choose one of them when the dialog of SMS sending opens. More about sending SMS messages...

🔧 — View or edit unit properties. To get the most efficient results both in reports and in online monitoring, unit should be set up correctly, in accordance with device type used, available sensors, and tracking tasks. Unit is configured in unit properties dialog that was described above. Depending on your access level, the dialog can contain up to 13 tabs which detailed description can be found in the following topics:

- General,
- Access to Unit,
- Icon,
- Advanced,
- Sensors,
- Custom Fields,
- Unit Groups,
- Commands,
- Eco Driving,
- Profile,
- Trip Detection,
- Fuel Consumption,
- Service Intervals.

📋 — Create a copy of this unit.

✕ — Delete a unit from the system completely. If the icon is inactive, then you don't possess enough rights to perform such an action. Note that routes assigned to a unit are deleted together with it.
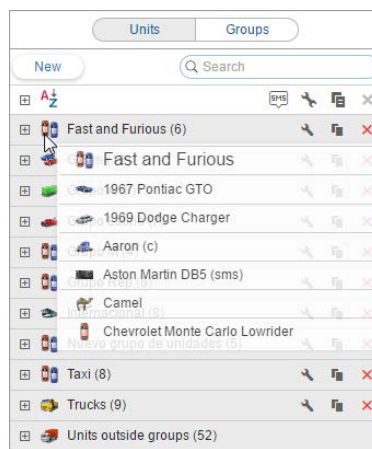
Unit Groups

Created units can be formed into groups. Groups are used to unite units on the basis of any criteria.

To work with unit groups, choose the corresponding mode in the 'Units' panel.

To create a group, click 'Create', fill in general properties, choose units forming a group, and click OK. The group will appear automatically in the work list of the 'Monitoring' panel (in the group view mode) of the account it has been created in.

A list of unit groups created is displayed in the work area. Groups are listed in the alphabetic order. To the right of each group name you can see a number of units in it. To see names of units forming a group, place a cursor on the necessary group (names are shown in a tooltip). To facilitate a search of the necessary unit group, use dynamic search above the list.

The following icons are used to perform standard actions over units:

⚒ or ☞ — Edit or view unit group properties — depends on your access (change name, add more units, remove units, manage access, etc.). The dialog of unit group properties can contain up to 4 tabs which were described above:

- General,
- Access,
- Icon,
- Custom fields.

▣ — Create a new group using this one as a basis (copy).

✕ — Delete the group from the system. Deleting a group does not mean deleting the units included. If the icon is inactive, then you don't possess enough access rights to perform such an action.

Working with unit groups, consider some specific features of access rights:

- A group can be used to give a user access to several units at once.
- With groups, access to a unit can be widened but not narrowed.
- The creator of the group must have rights to units in this group. Otherwise, it would not be possible to transfer the rights properly.
- To add/remove unit to/from a group, you are required to have the rights 'Edit ACL propagated items' on this group.

Application of Unit Groups

Unit groups are widely used in the user interface of Wialon:

1. Online tracking of unit groups:
    - display/remove from the map a group of units with one mouse click;
    - send commands to a group of units at once;
    - observe a certain parameter (sensor value, movement state, etc.) for a group of units in one window.
      More...
2. Advanced reports:
    - all tabular reports can be generated for a unit group;
    - draw tacks of all grouped units on the map.
      More...
3. Configuring jobs, notifications, and routes:
    - When configuring jobs, notifications or routes, they can be applied to a group of units at once, which accelerates the process.
      More...

Unit groups also have some specific functions in the management system, which were described above.

At that, unit groups are easy to handle. Deleting groups does not mean physical removal of units belonged to this group. That is why you can easily create, manipulate and delete groups. Besides, the dynamic formation of groups is supported — see Notification Action. It means, if some preset conditions are met, a unit can be added to a group automatically or removed from it.

Tools

To find a necessary tool, open **Tools** dropdown menu, choosing a corresponding name in the top panel or clicking on the necessary item in the main menu customizer.

With a help of such features as *Track Player, Distance, Area, Address, Routing, Hittest, Nearest units, and LBS Detector* you can measure the length of polyline or just a distance between two points, measure an area of any piece of the map, find out the address of some place, get to know the shortest way to a certain destination point, analyze movement tracks, etc.
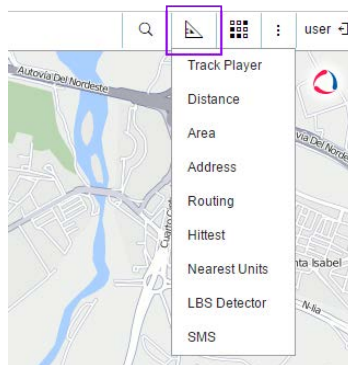
To get more accurate measurements, observe the following rules:

- To add a point, double-click on any place on the map;
- To insert a point, double-click on the segment between two points;
- To delete a point, double-click it;
- To change position of a point, click on it and holding the left mouse button drag to another place on the map.

To quickly access a tool, use shortcuts. Any tool can be minimized or closed with two corresponding buttons located in the upper right-hand corner of the window of each tool. Besides, these windows can be dragged over the screen. Their custom position is stored (for each tool individually), and next time they will be opened in the place they were closed the previous time.

Measurement system applied to tools which require online calculations (such as Distance, Area, Address, Routing, Nearest units) is taken from the settings of current user (see User Settings. Measurements for tools associated with track processing (such as Track Player, Hittest) are borrowed from units' properties.

Find detailed information about each tool:

- Track Player
- Distance
- Area
- Address
- Routing
- Hittest
- Nearest Units
- LBS Detector
- SMS
- Search on Map

Track Player

This tool allows viewing how unit was moving and how its various parameters were changing with time. The tool can be applied to tracks only. There are four ways to get a track on the map:

1. In the 'Tracks' panel, request tracks of units' movements for any period of time.
2. In the 'Messages' panel, while viewing messages for the indicated period, the track is mapped automatically.
3. In the 'Reports' panel, while generating a report the track is mapped if the corresponding option ('Trip routes' or 'All messages on map') is activated in report template.
4. Tracks can be built directly from the 'Monitoring' panel with the 'Quick Track' button.

The most recently built track (in any panel) becomes selected in the Track Player automatically. However, you can switch tracks manually choosing them in the dropdown list. A track name coincides with unit's name, and the panel where the track was built is specified in brackets (Tracks, Reports, Messages).
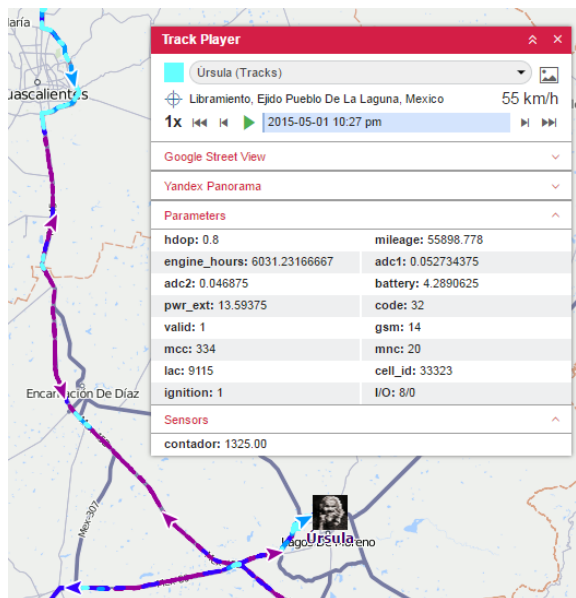
Player Settings

Adjust appropriate **playback speed** using the speed slider bar. It can vary from real time speed (1x) to acceleration by 1000 times (1000x). Regardless selected value, messages with zero speed and no movement will be played at maximum velocity. If you change playback speed while playing a track, new value will be applied after you press 'Pause' and then 'Play' again.

⚠ *Note.*
Playback speed is a rather conventional thing. Playback performance depends on type of browser used, computer processing power, number of messages in the track, and time intervals between messages. It is likely that the track will be played more slowly than you expect because, in any case, all messages will be played even if it takes more time.

The **map** can be moved manually or automatically. This setting is adjusted with the switch button ⊕. If it is disabled, the map cam be moved only manually. If it is active, the map is moved automatically in the following cases:

- along with the unit, while playing a track;
- when locating initial and final position in the track with special buttons;
- when moving along the track point-by-point manually;

when navigating the track by clicking on different places of the timeline;

- when choosing a new track in the dropdown list (the map is moved to the first point of the track).

If the device used is able to send **pictures**, they can be displayed, too. This option can be disabled though — use the switch button ⁀ .

Playback

To start playing the track, press the 'Play' button ▶ . At this, it transforms to the 'Pause' button, which can be used to stop playback. If after a pause playback is started again, it continues from the place it has been stopped the previous time. There is a similar button in the Tracks panel, against each track on the list. When the playback is completed the unit stays in the point of its last location, and the button changes from 'Pause' to 'Play'. If you click this button once again a time scale will be set to zero, and a track will be played from the very beginning.

As messages are being played, the selected unit is moving over the map. It can be represented by its icon or movement state signs. It is also convenient to use rotating icons — see Unit Presentation on Map. A unit being played is easily distinguished from the real unit by the color of its name — purple for playable units, red for real units. While playback is performed, the real unit temporarily disappears from the map.

While playing, address and speed of each point are displayed above the timeline. Below the timeline, you can track also changing values of parameters and sensors (visible sensors only). Expand two below sections to see their full contents. There can be a great number of parameters and sensors and you may want to single out those you want to track during playback. Double-click on necessary items to move them to the main section of the player (right below the timeline). Then you can collapse sections with all parameters and sensors.

As a track is played, all data in these sections is refreshed dynamically according to message being played at the moment. If there are images in messages, they popup in corresponding places, too.

Track playback can be invoked from any message. Navigate throughout the track by clicking on any place of the timeline or track itself. Besides, you can use the buttons:

⏮ — go to first point (accompanied by the marker ⚑ on the map),
⏭ — go to last point (accompanied by the marker ⚑ on the map),
▸ — move to next point of the track,
◂ — move to previous point of the track.

Tracks can be also played in a special app — ◉Track player. This application allows playing tracks of several units at once.

Distance

Choose **Tools => Distance** to measure the distance between two objects. To indicate the initial point, double-click on any place of the map. Then sequentially add new points. At any moment, you can move the map or zoom it using any of ways described above.

Near each point, the distance from the previous point is indicated. The total sum of all segments is known from the popup window in the corner. To know the sum, the mouse pointer must be placed over the last point of the polyline. Unlike other points that are red, it is white with blue border. If the cursor points some other place, the total sum will also include the distance to the current cursor position. At the same time, in brackets two numbers are given: the sum of all segments drawn + the distance to the cursor (if the cursor is over the last drawn point, this distance is 0m).

When the line is on the map, move the cursor along the line to get the distance from the starting point to the current cursor position. Cursor position is marked by a white point (if put the cursor over, it becomes plus-shaped), and a black font is used to display distance value.

To clean the map and start new measurements, use the **'Reset'** button.

![wialonlocal logo]

Area

Choose **Tools => Area** on the menu. To draw a polygon, follow the same directions as for polyline creation. The perimeter and total area are indicated in the instrument's window.
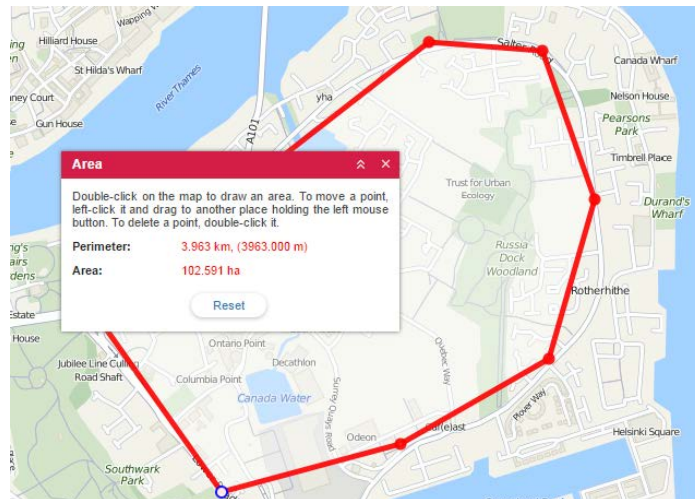
Note that for users with metric system of measurement the area value is given in hectares, for users with U.S./imperial — in square miles and square feet.

Use the **'Reset'** button to clean the map and draw a new area.

Address

The address tool is designed to:

- find a place (city, house, etc.) on map;
- detect the address of a place.

Choose **Tools**   **Address** on the menu to make use of the tool.

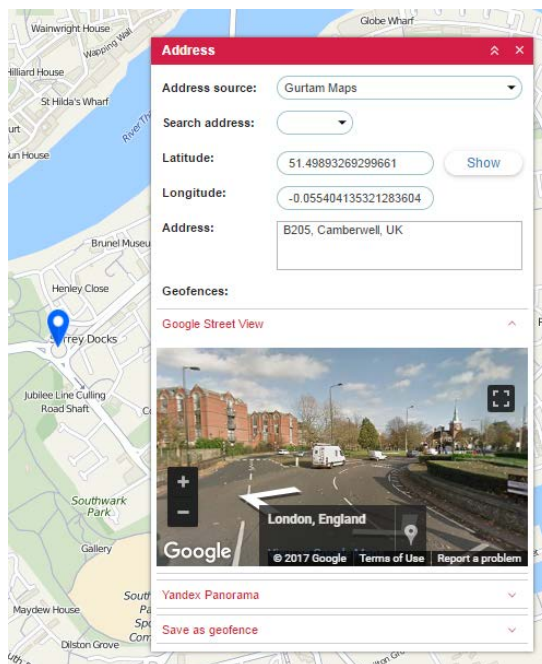The default provider for address information is Gurtam Maps. Though you can choose another source (depending on maps activated and their support): Google, Yandex, Visicom, Luxena, what3words, etc. (see Map Source).

In User Settings, you can indicate *City*. Then this city/town will be selected automatically when you open the Address tool.

Search by Address

Start entering address details into the 'Search address' field and choose the appropriate matching from the appeared address list. If nothing is found try to rephrase your request. A found place is indicated on the map with the blue marker.

The 'Address' instrument's window displays such information as coordinates and address (if available). If the found place gets into any geofences, their list is given below. On the left of a geofence name there is a square box with color assigned to this geofence.

If you have moved the map or scaled it, you can reset changes pushing the **'Show'** button.

Address Detection

To know address of a point on the map, just double-click on it. See the address and coordinates in the instrument's window. If it gets into any geofences, they will be listed below.

It is possible also to detect address by coordinates. Input latitude and longitude in grades and fractions (they should be separated by a dot) and push the **'Show'** button. The map will be centered at this point.

Save as Geofence

The found place can be saved as a circle-shaped geofence. To do so, there is the 'Save as geofence' section at the bottom of the 'Address' window. Unfold the section by clicking on it. Here the following parameters are indicated: resource (can be chosen from the dropdown list), geofence name, and radius.

To save the geofence, click the corresponding button. The saved geofence becomes available for viewing and editing on the 'Geofences' tab.

Routing

This tool helps to quickly make routes from one point to another visiting any number of intermediate points. You can define the sequence of points yourself or the program will optimize it for you. You can indicate key points double-clicking on the map or entering needed addresses. Resulting route can be either saved as a geofence with or without control points, or a route, and can be used for routes control or geofences control later on.

Choose **Tools   Routing** to make use of this feature. Set points and click 'Calculate'.

Selecting Provider

Gurtam Maps is a default cartographical service for making a route. Besides, depending on the maps available at your service, other map providers can also be used: Google, Yandex, HERE, etc. However in this case the order of points should be chosen manually (or previously determined using Gurtam Maps). Some providers offer additional options. For example, if Google is selected, the route can be mapped regarding the way you travel: by car (default option), or walking, or avoiding highways (tick the appropriate check box). Yandex adds possibility to take into account traffic jams.

Placing Points

There are two basic ways to set key points for route:

1. *With the mouse*.
   Just make several double-clicks on the map to mark key points. If the option *'Use detected addresses as names for points'* is enabled in the 'Points' panel, then address information is set as point name. If no address information is available, the point is added anyway but with empty name.
2. *With the address tool*.
   In the 'Address' panel indicate addresses to be visited (city, street, house). The usage of the Address tool was described in details in the previous section. The found points can be added to the route automatically (if the flag **'Auto save of points'** is enabled), or manually (with the **'Add point'** button if this flag is disabled).

⚠ *Note*.
If you are going to use this route for Route Control, it is recommended to enter departing point as the first point of the route.

When all points are set, it is possible already to draw the route (the **'Calculate'** button). However, before doing that, you can edit key points, especially if you are going to save this route as geofence or as a route.

The list of points is displayed in the 'Points' panel. Here you can edit point name, its radius, and delete unnecessary point.
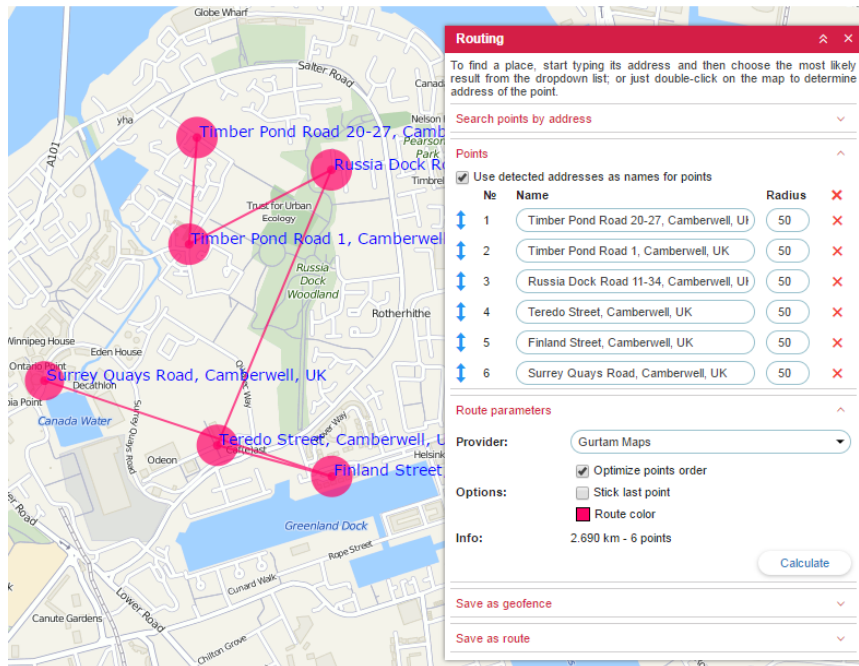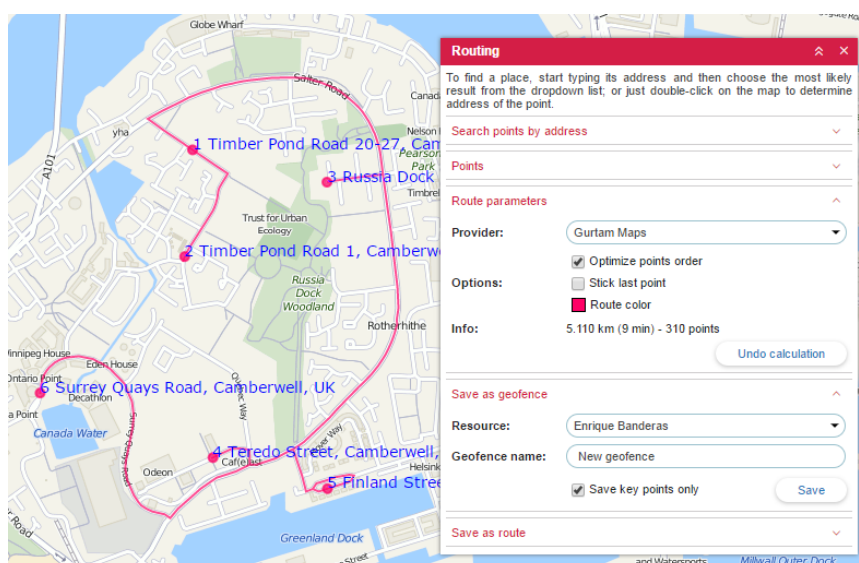
Route Calculation

Upon building a route with Gurtam Maps, different sequence of route points may be used:

- Default option is that the points follow in the order you put them.
- To build the shortest way of passing route points, enable the **'Optimize points order'** flag. In this case the 1st route point is fixed, and a route is laid without snapping to roads. The last point can be fixed either (for example, if a unit leaves the depot and after a while comes back), therefore regardless to the sequence of route passing, the last point indicated is the last route point as well. For this, enable the flag **'Stick last point'**.

At the end, click the **'Calculate'** button and estimate the result. If you need to change some parameters (for example, add more points), click **'Undo calculation'**. If you want to build a new route, remove all points using the corresponding button special button (on the 'points' tab of the instrument).

In addition, you can choose line color as well as view information about a route — its length, approximate route duration, and number of points.

If the calculation is made using routing, then the route will be built considering the existing roads. Gurtam Maps is supported as default routing provider for this instrument.

Saving as Geofence or Route

After the calculation and visualization has been done, the result can be saved either as a line-shaped geofence or as a route. Geofence saving section is automatically opened after calculation by default. Here you should enter geofence name, choose a corresponding resource, and click 'Save' button. There are two variants for saving in this section:

- If 'Save key points only' flag is activated, then geofence corresponds to a line going straight through the key points;
- If the flag is not activated, then geofence corresponds to the full line of a route (can contain any number of points).

The newly created geofence will appear on the 'Geofences' panel where it can be edited and used for different purposes.

As it was mentioned before, the result can also be saved as a route. To do so, it is necessary to unfold the corresponding section, indicate a name for the route, and click 'Save'. The created route appears in the 'Routes' panel where it could be edited or used.

To build a route, you can also make use of a specially designed app — Delivery Service.

Hittest

This tool is applied to tracks only. There three ways to get a track on the map:

1. Open the 'Tracks' panel and request tracks of unit movement for the indicated period.

2. In the 'Messages' panel, while viewing messages for the indicated period, the track is mapped automatically.

3. In the 'Report's panel, while generating a report the track is mapped if the corresponding option ('Trip routes' or 'All messages on map') is selected in report template.

4. Tracks can be built directly from the monitoring panel with the 'Quick Track Building' button.

Choose a track in the dropdown list. Hover the cursor over track to get accurate information about any point in a tooltip. This point will be highlighted with the pulsating circle. Double-click at any place of the track (or even on the map), and the nearest to your click message will be found and indicated by the marker. The map will be centered on this point.

Two modes are available here: single-point and multipoint. Depending on your choice, you can get information about one or more points at once. The information is displayed in the popup window when placing the cursor over a marker. The information is: date and time, location, speed, altitude, coordinates, satellites, sensors values (visible sensors only). It is duplicated in the table at the top of the screen.
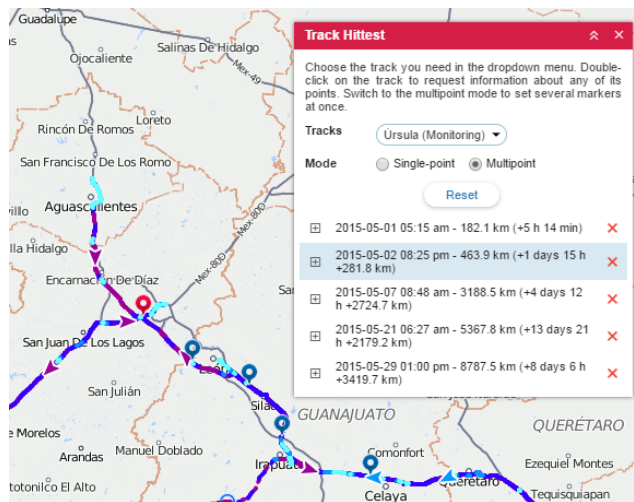
If the multipoint mode is selected, you can mark several point of the track. The active (selected) point is then blue and others are red. In the table, the active point is also highlighted by blue color. To navigate from one point to another, click on a corresponding marker on the map or corresponding row in the table. Besides, if the multipoint mode is selected, the displacement from the starting point (in time and distance) is calculated, and in brackets you can find the displacement from the previously put point.

Nearest Units

This tool is designed to help you to find units which are the nearest to a certain place according to their last message.

Choose **Instruments**   **Nearest Units** on the menu. In a special window set the parameters of your request and observe search results.

Request

There are two ways to indicate a place:

1. Double-click on the map in this place.
2. Enter address in the 'Search' field and then choose the most likely variant below.

In the selected place, a red marker appears, and at the bottom the list of nearest units is displayed.

If in User Settings the parameter *'City'* is set, then the city/town is already specified when you open the tool.

⚠ *Note.*
Only Gurtam Maps can be used for address detection.

Additional Parameters

Several additional parameters can be applied to the search:

Number of units to show
5, 10 or 20 units can be shown (choose the number from the dropdown list).

Consider routing
When choosing this option, the distance from the indicated place to a unit is calculated not directly but taking into account existing roads. Moreover, enabling this option you can not only receive the distance between the indicated point and a unit, but also time which is necessary for covering this distance.

Routing provider
By default, it is Gurtam Maps. However, in can be Google, Yandex, Visicom, and HERE as well.

Geofence
Any geofence can be selected as district limitation. The filter by geofence is applied to found results only. This feature is designed to exclude from search results the units which are far away from the indicated place.

Data for last
Units which have not been sending messages for a long time can make difficulties for locating nearest units. Then it is handy to narrow the search interval: for last 5 or 30 minutes, 1, 6, 12 or 24 hours, or set *'Anytime'* (no limitations). If unit last message does not get into the specified interval, this unit will not be considered.

Search Results

Search results are presented at the bottom of the window as a list of units. There you can see the following information:

- unit name (click to focus the map on unit),
- driver's phone number (if any driver with indicated phone number is bound to unit),
- distance to the indicated place (if routing is applied, the first number stands for a distance considering routing and the number in brackets stands for the time necessary to cover this distance, if available),
- sensor state indicator (adjusted on the Advanced tab of unit properties),
- buttons to send commands to unit (including messages to driver).
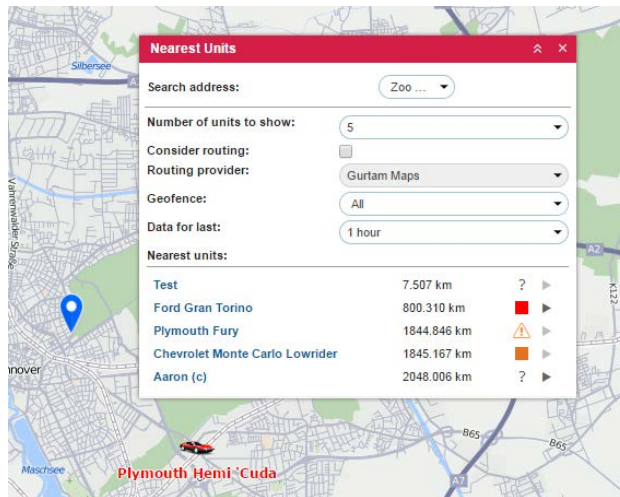
If you are not satisfied with search results, please, check your work list because the search of nearest units is performed on the basis of units displayed on that list.

LBS Detector

LBS Detector is a tool which helps to detect unit's location on the map using mobile network.
⚠ Note that this instrument enables to determine a location of the nearest base station only. So, the knowledge of the base station location implies the unit is nearby.

Choose the corresponding item in the instruments menu to open the 'LBS Detector'. The further actions are listed below.

Working with LBS Detector

Choose a necessary unit in the dropdown list. Its contents depend on the work list of the Monitoring panel and access to those units ('Query reports or messages'). Besides, the list contains only the units with corresponding parameters.
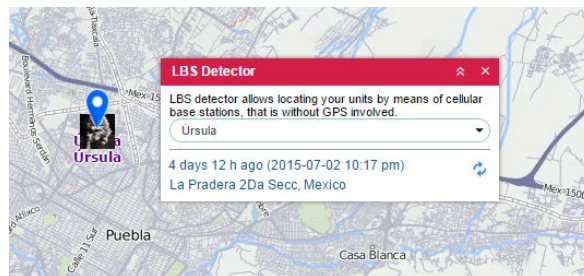
After the unit is chosen, a search starts automatically. Then the map is centered on the found location identified with the blue marker. Also, unit's name can be enabled/disabled below the marker by pressing the corresponding button in the bottom panel. Moreover, LBS Detector's window shows such information as time of defining the latest location and its address. To the right of this data there is a 'Refresh' button pressing which the location information will be updated.

SMS

SMS messages can be sent to drivers, units, and to any phone number. SMS dialog is accessible in 'Monitoring', 'Units', and 'Drivers' panels as well as in the 'Tools' dropdown menu. The buttons are not shown if the current user does not have enough rights to send SMS messages. Besides, to send SMS to a unit, the user is required to have the right 'Edit connectivity settings' to this unit.
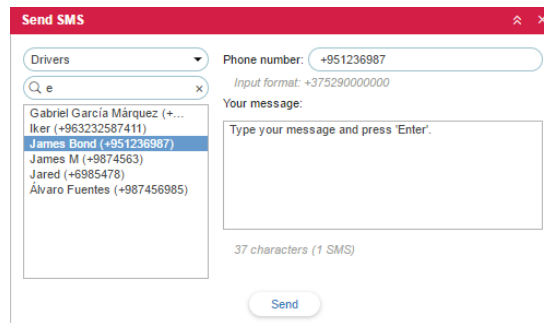

In the dropdown list *Drivers/Units* select addressee. Below you will see the list of objects of the selected type, but only objects that have a phone number in their properties. This phone number is displayed in brackets after object's name. If a unit has two phone numbers, such unit is displayed on the list twice — with each number. To quickly find a needed object on the list, use the dynamic filter.

On the right of the dialog, the phone number of the selected item is displayed. It is taken from the object's properties. However, you can input any other number in international format.

As you type your message, below you can see the number of symbols used and the number of SMS messages that will be needed to send your message. Remember that letters of the Latin alphabet are optimal.

After you have typed the text, press 'Send'. After that, in the dialog as well as in the log there will be a record about how successful the operation has been.

A driver can send SMS to a dispatcher from his phone. This phone number must be indicated in driver's properties. Drivers' messages appear in the log and popup in a special window (the same as for drivers' messages sent from a device in the form of a command). Besides, if there are unread messages, the number of them is shown in red circle next to the chat icon in the bottom panel. To reply to an SMS, click on the *SMS* button against the message.
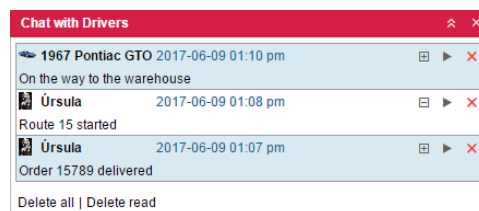

SMS chat of a dispatcher with a driver can be shown in a special table called SMS.

Correspondence with driver can be also fulfilled with the help of a specially developed app — ⊙Chatterbox.

Search on Map

In the top panel to the left of the user name there is the 'Search on Map' tool (search icon). This tool is used to dynamically search the necessary item by its name. The search is made among units, geofences, unit groups, drivers, trailers, passengers, and routes. Moreover, if the names of the above mentioned items do not contain indicated symbols, then addresses corresponding to the entered filter are shown.
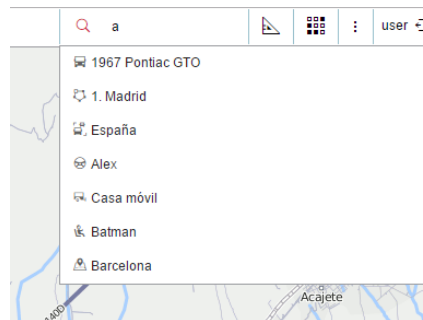
Search Process

Click the corresponding icon in order to use 'Search on Map' tool. In the appeared field enter a search filter (type in symbols of a desired item's name). Moreover, searching a unit you can enter its unique ID, as well as registration plate or VIN number indicated on 'Profile' tab of a unit properties dialog. Upon entering the first symbol the list of the items corresponding to the filter appears below. Items in the list are displayed using their names, and icons specifying their type. If lots of items correspond to the indicated filter, then the list will contain single result for each item's type.

### Switching to the Item on the Map

Click on the necessary item in a search list in order it to be shown on the map. The alternative way to do this is to use up and down arrow keys and <enter> on the keyboard. The map is centered on the chosen item. Moreover, the map is scaled in such a way that the chosen item gets into the vision field. After you choose the item in the list, the search tool will be folded up.

Apps

Along with the basic features of Wialon, you can get access to additional applications. Those applications can be highly customized reports, specialized tools, or just a calculator.

Applications are implemented and added by the administrator of your tracking service. More...

To open the 'Apps' menu, choose a corresponding icon in the top panel or click the necessary item in the main menu customizer. The appeared menu contains the list of available applications arranged in alphabetic order.
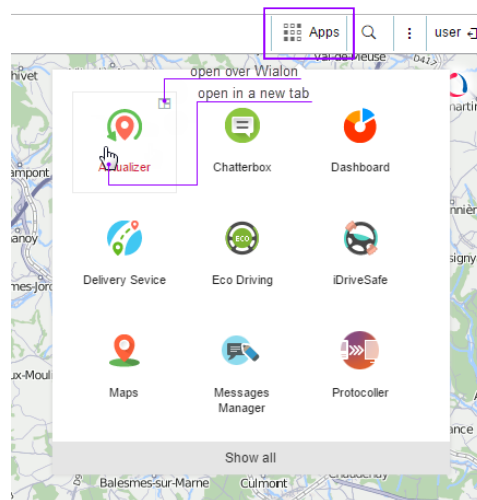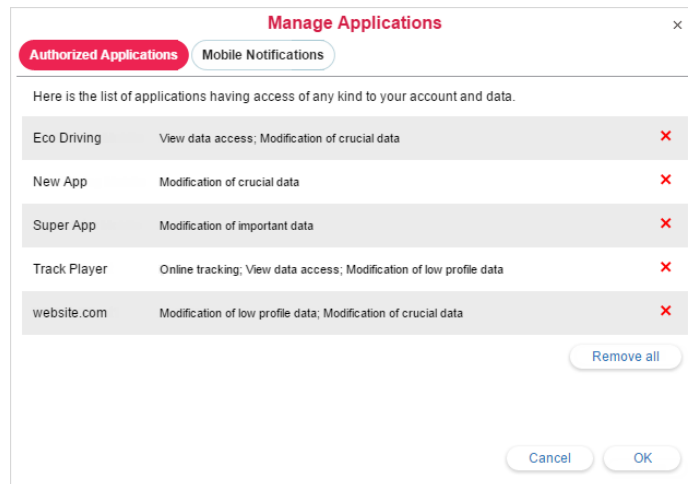

Click the logo (or name) of an application to open it in a new tab of your browser. An application can also be opened in a separate window over Wialon by clicking the following icon — ▣ (appears upon pointing a cursor over an application). Windows with applications can be dragged over the screen, resized, and closed down.

Manage Applications

Authorized applications

This tab contains the list of applications having any access to your account and data. To the left there is an application name, to the right you can see access rights possessed by an application towards your data or account. To block an access for the application it is necessary to delete the corresponding application from the list.
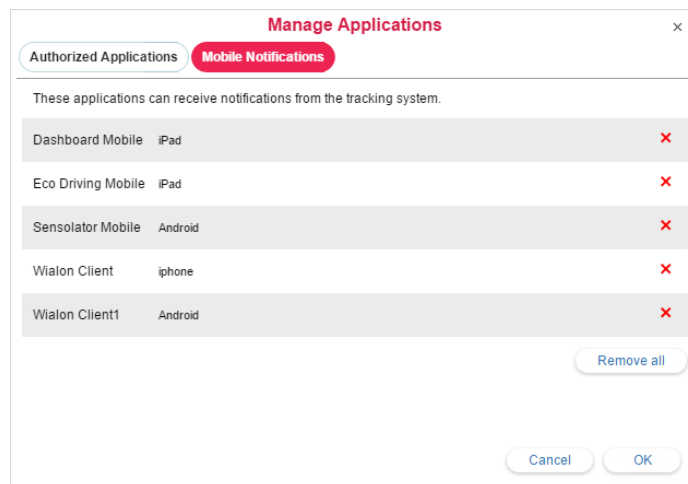

Mobile Notifications

This tab contains the list of applications which are allowed to send notifications to your mobile devices. To the left there is an application name, to the right you can see a device type. To block mobile notifications sending it is necessary to delete the corresponding application from the list.

Wialon on Mobile

You can track your units not only from a full-sized desktop computer but also from a smartphone, tablet, and other mobile devices. The interface is adapted for such cases. Moreover, a special mobile application for Android and iOS is available as well as two previously developed web applications.

- **Wialon Mobile Client**
  - Settings
  - Units
  - Map
  - Tracking
  - Notifications
  - Commands
- **Wialon Mobile v2**

Wialon Mobile Client

Wialon Mobile Client is an application providing you with the basic Wialon Local capabilities on your mobile devices. Wialon Mobile Client is available for both Android (smartphone) and iOS (smartphones, tablet computer) platforms.

The set of Wialon Mobile Client functionality amounts to the following: tracking of unit location and moving state (trip, stopping, parking), controlling ignition state (on/off), monitoring data actuality (time passed from the last message received) and latest events (trip, parking, fuel filling/theft), as well as sending several commands.

Further information:

- Settings
- Units
- Map
- Tracking
- Notifications
- Commands

Settings

To work with Wialon Mobile Client's settings, go to side menu (tap 'hamburger' in the app bar's top left corner or swipe the screen to the right), and choose 'Settings'. Here you can indicate settings for a map, notifications, etc.

Map

Map layer — choose a map to work with (Gurtam Maps, OpenStreetMap, Google Roadmap, Google Satellite, Google Terrain, Google Hybrid, Mapbox Streets, Mapbox Satellite, Mapbox Satellite Streets);

Unit icons — enable/disable displaying of units' icons on map;
Unit names — enable/disable displaying of units' names on map;
Group units — enable/disable displaying of a grouping icon for an accumulation of units on map;
Geofences — enable/disable displaying of geofences on map;
Zoom buttons — enable/disable displaying of scaling buttons on map.

Notifications

Enable/disable receiving of mobile notifications and choose a notifications ringtone. Note that to receive mobile notifications, it is necessary to configure their sending in Wialon. In other words, it is necessary to create a new notification in the corresponding panel of the monitoring system and choose 'Send mobile notification' as a way of notification action.

Other

Geofences as addresses — enable/disable the substitution of address information by unit's presence in geofences.

Active screen — here you can adjust a period of time during which your screen to be active. The following variants are available:

- While charging — the screen is active upon device charging;
- Always — the screen is always active;
- Disabled — the option is not used (screen activity interval corresponds to the one chosen in device settings).
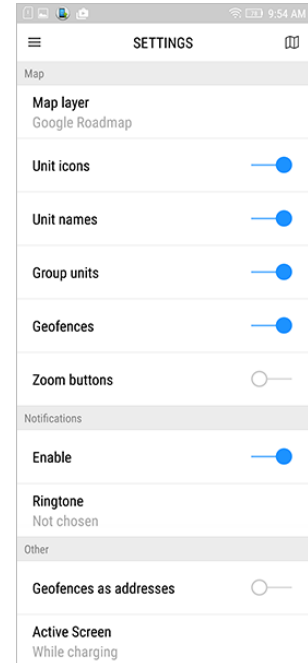
Units

First start of the application brings us to the 'Units' mode, or simply work list. In the work list you can monitor units' parameters, or you can switch either to the 'Map' or 'Tracking' mode from here.
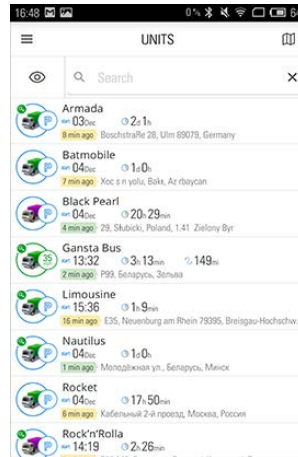
The work list contains dynamically updated unit information. This information includes current moving state, data actuality, state beginning time, duration, and address. Note that address information can be substituted by unit's presence in geofences. To do so, activate 'Geofences as addresses' flag in 'Other' section of Wialon Mobile Client's settings.

Further let's explore the possible variants of graphic information presentation:

Current state

Wialon Mobile Client uses the 'GPS speed' method to detect movement regardless to the one chosen on the 'Trip Detection' tab. A proper functioning of this method requires receiving of location information and speed. Therefore, to detect movement states, the minimum moving speed value should be higher than 0. Moreover, the other settings used for movement states detection are also taken into account in the application.

 Trip

 Stop

 Parking

 Current state unknown (check trip detection properties)

 Last known state is no longer relevant as it was detected more than a week ago

 No data from unit

Ignition state

 Ignition is on (green circle with key). Ignition off — key not shown

⚠ *Attention!*
Unit's current state as well as ignition state are available only if you have 'Query messages or reports' right.

Data actuality

   last message was received no more than 5 minutes ago

   last message was received no more than an hour ago

   last message was received no more than 24 hours ago

   last message was received more than a day ago

On the first launch of Wialon Mobile Client the work list contains all the units available in the Monitoring panel of Wialon. However, it is more convenient if the work list contains the units you are currently interested in. To form the work list, it is necessary to move to the 'Choose units' menu by clicking the 'Eye' icon to the left of the dynamic search (for iOS — to the right of the dynamic search).
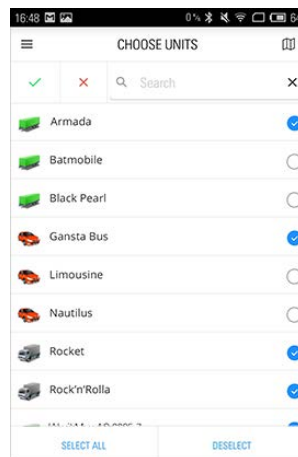
Units indicated by a flag in this menu are added to the work list. You can either choose all the necessary units one by one (tap it), or choose all the units at once (corresponding button in the end of the list). Use dynamic search to find a particular unit.

To get back to the work list after units choosing, it is necessary to save or dismiss indicated changes. In the interface of Android use the green check mark icon (save changes) or red cross icon (dismiss changes) to the left of the dynamic filter. Using iOS device, tap 'Save' or 'Cancel' buttons situated on both sides of the menu name.

Map

Map mode can be activated by choosing the corresponding item in the main menu, or by tapping the map's icon situated in all the available modes to the right of their names. Units from the work list are displayed on the map. By default the map is centered in such a way that all the units get into vision field. Note that geofences created in Wialon can be shown on the map of mobile client (enable the corresponding option in the 'Settings' mode of Wialon Mobile Client).

Interacting with Map

Zooming

Map zooming is made by special controls appeared in the bottom right corner of the map. These controls can be enabled/disabled in the 'Settings' mode (choose in the main menu).

Moreover, map zooming can be made using special gestures on the screen:

- Double tap — zoom in.
- Two fingers tap — zoom out.
- Two fingers stretch/pinch — zoom in and zoom out, correspondingly.
- Double tap without releasing on the second tap, and then slide the finger down — to zoom in, or up — to zoom out.

Tilt gestures

You can tilt the map by placing two fingers on it and moving them up (increasing tilt angle) or down (decreasing tilt angle).

Map rotation

To rotate the map, place two fingers on it and apply a rotate motion. After the map has been rotated, a compass icon appears in the top right corner. Tap it in order the map to return to default position (North in the top of the screen).
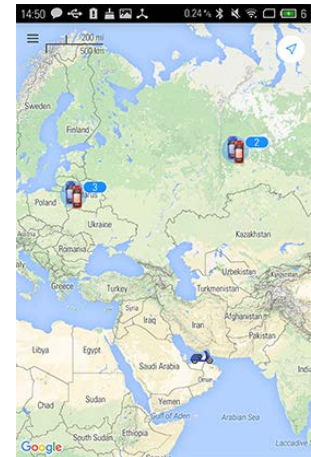
Finding Device Location

Finding your own location is an additional feature of the application's map mode (can be used only if Gurtam Maps cartographic service is chosen). Tap the 'Arrow' control in the top right corner in order your current location to be shown on the map by a marker (the control receives active state). Upon moving the map and loosing location marker from the vision field, the 'Arrow' button changes for the 'Target' one, by tapping which the map will be centered on your location once again.

From the 'Map' mode you can move to the main menu (corresponding button in the upper left corner), or to the 'Track' mode (tap unit icon on the map).

Tracking

There are several ways of switching to the 'Tracking' mode. One of them (switching from the 'Map' mode) has been described in the previous section. The other way is to move from the work list ('Units' mode). To do so, tap the line of the necessary unit in the work list.

'Tracking' mode provides you with a possibility to monitor both unit's location on the map, and parameters received from a unit. Note that unit's location can be shown as address (by default) or as unit's presence in geofences ('Geofences as addresses' flag in 'Other' section of Wialon Mobile Client's settings)
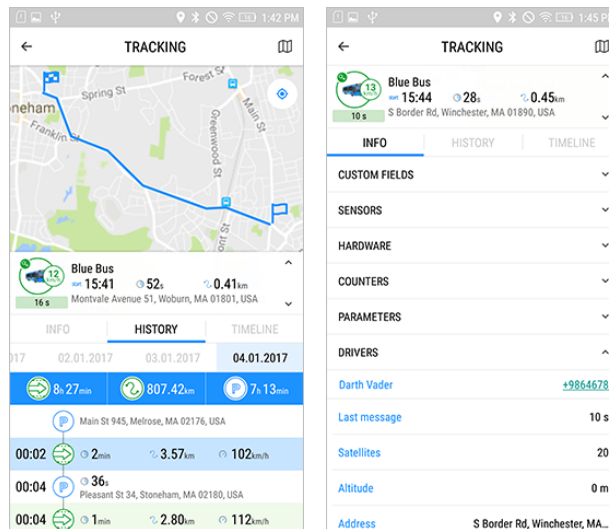
History

You can view unit's events on the 'History' tab. All the events are presented here chronologically.

Types of events and provided information:

Trip
Event's start time, duration, covered distance, unit's average speed

Parking
Event's start time, duration, location address

Fuel filling
Event's time, amount of fuel filled, location address

Fuel theft
Event's time, amount of theft, location address

Choose any event in the history to display it on the map. In order the map to be centered on a unit of monitoring, tap its icon.

⚠ Note that some values of event parameters (time intervals, amounts of fuel, unit's location) may differ from the values of the same parameters in the reports of the monitoring system. It occurs due to the implementation of different calculation systems in main Wialon and in Wialon Mobile Client. For example, upon detecting fuel fillings/thefts, mobile client uses time of a last message received before a fuel level changing, while main Wialon uses time of the first

message from the interval with the biggest difference of fuel levels. Moreover, movement state in Wialon Mobile Client is determined only by GPS speed, while other methods can be used in main Wialon.

⚠ Note that in Wialon Mobile Client the correctness of data received on any event depends on parameters indicated on the trip detector tab.

Info

The 'Info' tab displays an extended unit's information: location address, attached drivers (with phone numbers) and trailers, equipment data, values of custom fields, sensors, counters, and parameters.

Timeline

On the 'Timeline' tab you can visually identify events' duration, find out their number, and get full details on events (tap events bar). You can work with the following event types: trips, fuel fillings, fuel thefts. Moreover, both sensor state changing (ignition sensor, custom digital sensor) and sensor values increasing (mileage sensor, relative odometer, counter) are considered to be event types as well.

You can view up to 4 event types on the timeline. Trips, fillings, and thefts are chosen by default (names are displayed in the bottom of the screen). To choose other types, summon the corresponding menu by tapping any event type in the bottom of the screen.
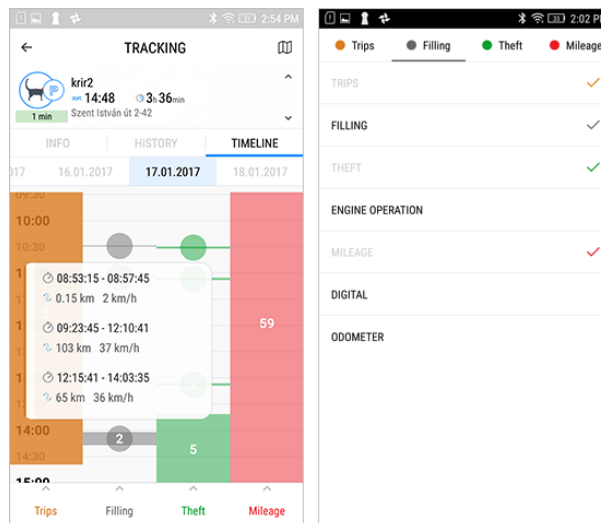

Working with Events

Stripes of different colors shown on the timeline are called event bars. The size of an event bar depends on duration and number of events in it. There can be either single or multiple events in a bar. A multiple events' bar always shows a number of events it contains. To view an extended info on events, tap a corresponding bar. The extended info features a list of events and their details. Here you can choose events to be shown on the map.

Chosen events are both shown on the map and placed in the event basket above it ( ). The basket indicates number of chosen events. To view details of events in the basket, tap 'Basket' icon. To center and scale the map on any event in the basket, tap this event.
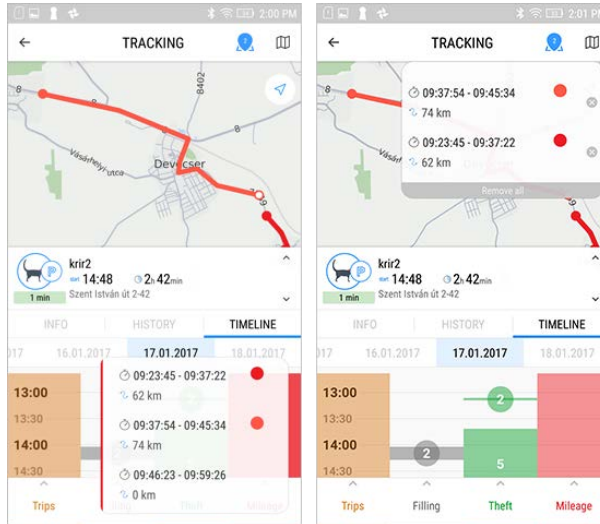
Locator

The application supports a locator functionality. Locator is used to generate links and share current units' location. Locator can be available either from the work list ('Units' mode) or from the 'Tracking' mode. To generate a link, use left swipe in the line of a corresponding unit, and tap the 'Target'. In the appeared menu, choose locator's link validity period (from 1 hour to week). Then choose a necessary action: send a location link by any messenger on your smartphone, copy it, open in a browser, etc. Viewing is performed on locator's map which becomes available upon clicking on the provided link.
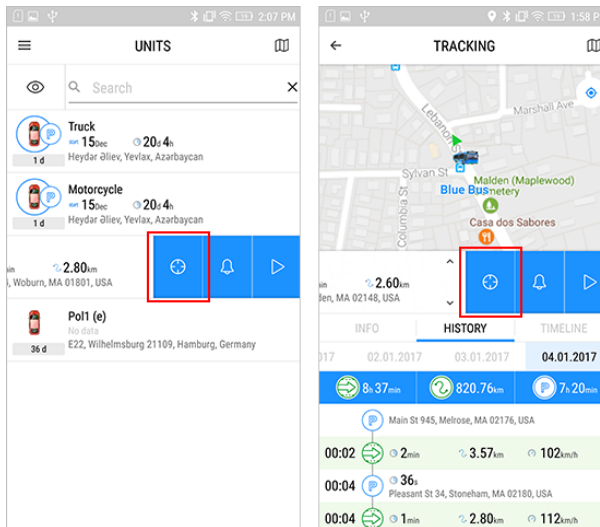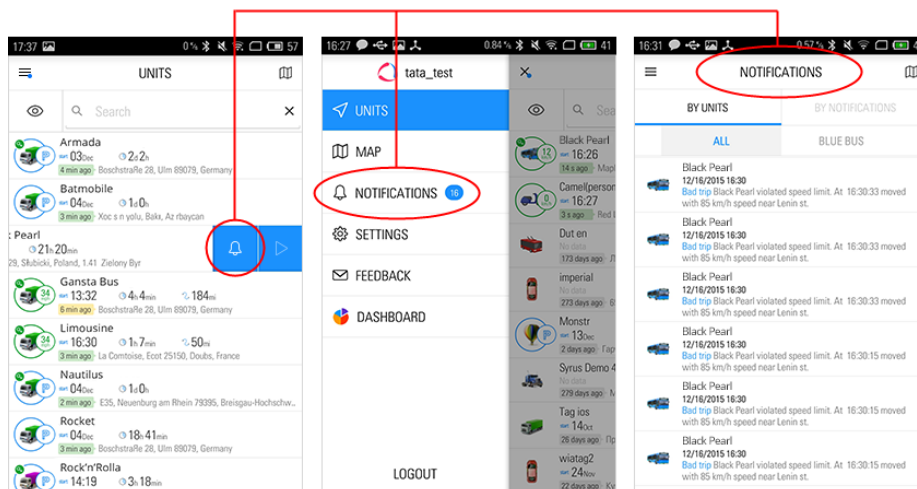
Notifications

To receive mobile notifications, it is necessary to configure their sending in Wialon. In other words, it is necessary to create a new notification in the corresponding panel of the monitoring system and choose 'Send mobile notification' as a way of notification action. Notification receiving should also be activated in the 'Settings' mode of Wialon Mobile Client.

⚠ Moreover, to send mobile notifications it is necessary to activate such services as 'Mobile notifications' and 'Wialon Mobile Client'.

Received notifications are automatically saved in the system, and afterwards can be viewed in the corresponding mode. Note that notifications are stored in the system within 30 days. Besides, the number of notifications per one user is limited to 2000 items.

≡ Blue marker on the icon of switching to the main menu signals about receiving a notification. The number of received notifications is displayed to the right of the corresponding menu item. After switching to the 'Notifications' mode the marker disappears.

Switching to the 'Notifications' mode is done via the same called menu item. Moreover, it is possible to be done through the work list or through the 'Tracking' mode. To do so, swipe to the left in the line of a unit for which a notification have triggered and tap the 'Bell'.

'Notifications' mode features a list of all the mobile notifications received. Tap any notification in the list to view unit's location on the map during notification triggering.


499
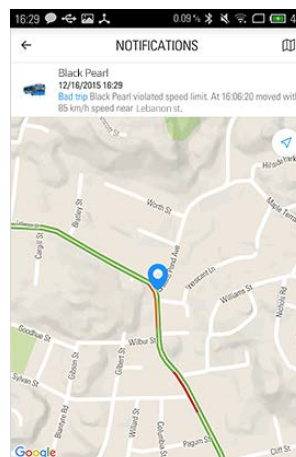
Commands

The following commands are supported in Wialon Mobile Client:

- Query position;
- Block engine;
- Unblock engine;
- Activate output;
- Deactivate output;
- Set data transfer interval (how often unit sends data to the server);
- Send custom message (sending of a non-standard command to a unit);
- Send message to driver;
- Upload configuration (not supported for iOS);
- Upload firmware;
- Query snapshot;
- Query snapshot from specified camera;
- Query DDD file.

Switching to the command sending menu can be done either from the work list ('Units' mode) or from the 'Tracking' mode. To do so, swipe to the left in the line of the corresponding unit, tap triangle, and choose the necessary command.
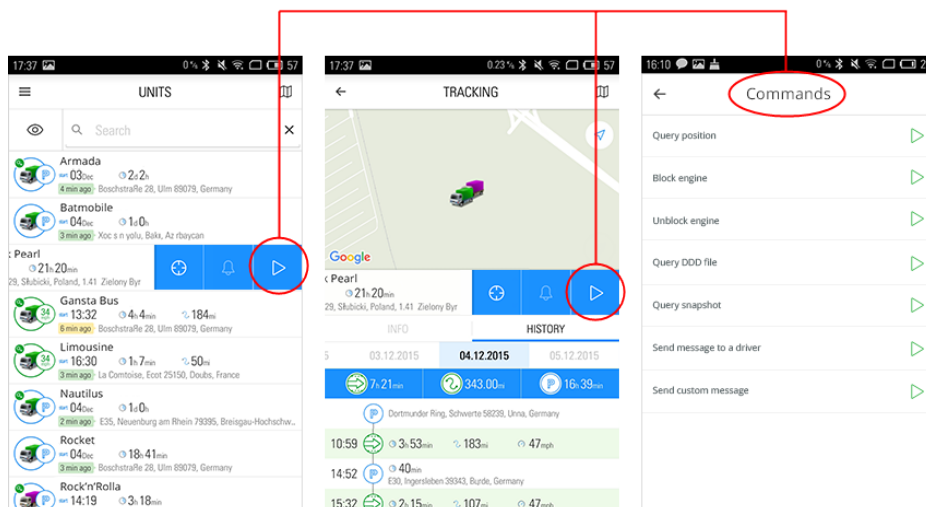
Here you can view detailed information on commands.

Wialon Mobile v2

Wialon Mobile v2 is a specially developed program which gives access to lite version of Wialon from different mobile devices such as Android, iPod, iPhone.
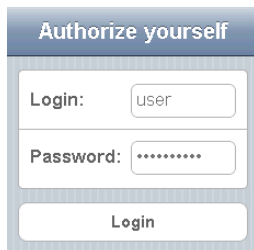
Requirements for mobile operating system:

- iOS;
- Android 1.6+;

Only native browsers can be used, and cookies should be activated in the browser.

Wialon Mobile basic features are:

- displaying unit current position on map;
- unit movements for latest 5 messages;
- dynamic filter of units by name;
- information about unit state, connection, driver, sensor values, etc.;
- tracking of moving units;
- geolocation.

Login

To access Wialon Mobile v2, enter its address in browser, e.g., http://m.wialon.com. On the login page input your user name and password, the same as you use to login to the system from an ordinary computer.

⚠ Enable cookies in your mobile browser. It is required for correct operation of the program.

If you have logged in successfully, the main menu becomes available.

Navigation

The following options are accessible through the main menu:

- **Units**: show the list of available units with short information on them;

- **Map**: show units on the map (to be 'seen', unit has to have a special flag enabled in its properties – *Show on map*);

- **Settings**: custom configuration of the program (map, icons, etc.);

- **Logout**: logout from the program.

Units and Commands

Upon the first login, no units are displayed in the list until you apply a filter. However, the next time you log in your previous work list will be displayed.

To add or remove units from the work list, use a filter at the top. As you type, the work list is updated dynamically to fit your query (see dynamic filter). To display all units, type *.

Units in the list are displayed by their names and icons. Additional information on each unit is available as well: last message's time and speed. Tap a unit

in the list in order its properties to be displayed.

Moreover, there are two buttons to the right of each unit in the work list. One of them enables/disables a unit displaying on the map, tapping the other button you can send commands (if the button is active). These are the states of the buttons:

⊙ — a unit is displayed on the map

◎ — a unit is not displayed on the map;

▶ — commands are available;

▶ — no available commands.

If you would to send a command to a unit, tap the corresponding button. Afterwards, a menu of available commands is opened. Choose the necessary one and tap it to send. Note that commands' creation is available in the interface of monitoring system only.

Unit Properties

Unit properties are divided into two tabs:

Information — information on current state of unit:

- *General* — last messages time, device type, phone number, unique ID (phone number and UID are available only if the current user has *manage* access to this unit);
- *Position* — location (if available), speed of movement, altitude, satellites locked, course (direction of movement, if available);
- *Counters* — mileage, engine hours, GPRS traffic.
- *Sensors* — sensors and their values.
- *Parameters* — state of inputs/outputs and other parameters available in the last message.
- *Custom fields* — unit custom fields from its properties.

Settings — unit display on the map:

- *Show on map* — if activated, unit will be seen on the map (the option is stored only for the current user);
- *Watch on map* — if activate, each time new message from this unit comes, the map automatically moves to its latest location (the option is stored only for the current user).

To return to the work list, press *Back*. All altered properties are saved automatically.
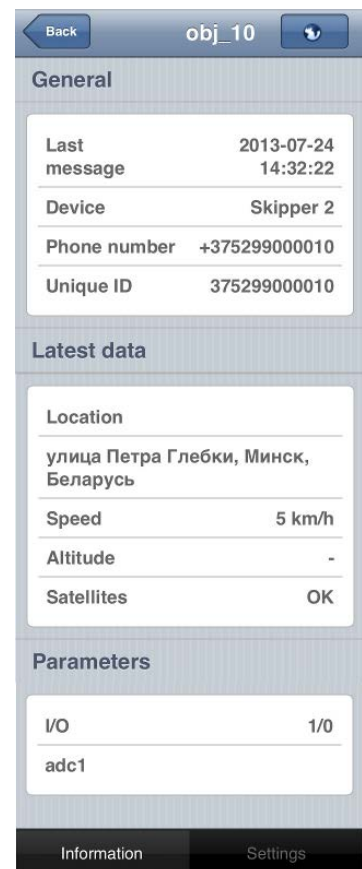
Settings

Program settings are also divided into two tabs:

General settings:

- *Language* — choose English or Russian as interface language.

Unit settings:

- *Show icons* — enable or disable displaying units' icons in the work list. By default, the option is activated. However, you may want to disable it in order to increase program performance. Smooth scrolling of the work list depends on mobile device properties, Internet connection quality, and other factors.

Map settings:

- *Show unit names* — unit can be displayed on the map either as just an icon or together with its name.

- *Use geolocation* — enable/disable geolocation function.

- *Address provider* — default address provider is Gurtam Maps, however, Google Maps can be activated, too. If no address information is available, then coordinated are shown.

Unit's tooltip:

- *Parameters* — display values of raw parameters taken from the last message in unit's tooltip that appears when you click on unit's icon on the map.
- *Sensors* — display values of sensors in unit's tooltip.

To return to the work list, press Back. All altered properties are saved automatically and affect only the current user.

Map

The Map mode is designed to locate current position of units and track them. On the map, there can be displayed only those units which have the *Show on map* flag enabled in their properties.

On the map, a unit is represented with its icon and with name (if the last is chosen in settings (the option *Show unit names*). Besides, it can have a tail (red line) that shows its movements for last 5 messages (if these movements were detected within the current session).

If you click on a unit displayed on the map, in the tooltip you can see the detailed information about this unit.
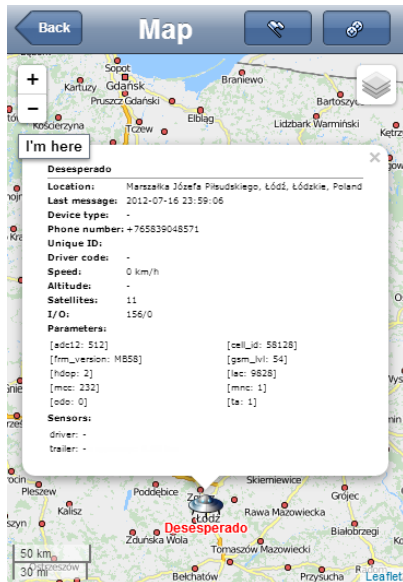
If you move to the map from the main menu, the map is scaled in the way to let you see all selected units. If you move to the map from unit properties, the map is centered on this unit.

However, map zoom can be altered, and the map itself can be moved. The scale can be changed with the help of plus/minus buttons in the top left corner as well as with the help of scroll button. To move the map, just drag it to the desired direction. In Apple devices, the map can be also zoomed using multitouch function. Current scale is displayed at the bottom.

You can choose from several kinds of maps:

- Gurtam Maps,
- Google Maps (if keys provided).

Tracks

A track of unit's movement can be built for any period of time. In the Map mode, press the *Tracks* button on the top panel and adjust required track parameters.

Choose a unit in the dropdown list. Only units with the flag *Show on map* are displayed on this list. Press the *Units* button above to go to the work list and set those flags if necessary.

Set time interval (from — to) and other track parameters:

- *Trips* — apply trip detector while building the track;

- *Annotations* — show annotations at the points where messages were received (time and speed is given in the annotation);

- *Color* — track can be of different colors depending on speed or sensor values or be just one-colored.

More about track parameters...

After adjusting all parameters, press the *Execute* button below. Your track will be shown on the map.

None that any number of tracks can be drawn on the map, either for different units or for one unit at different time periods. To remove all those tracks from the map, press *Clear*.

Click on any point of the track to get detailed information for this point: message time, speed of movement, address (or coordinates), satellites count.

If you click on unit icon, you will be offered two options: *Remove track* and *Information*. The first one is designed to remove all tracks drawn on the map for this unit. The second is to see a standard tooltip with detailed information on the unit.

Geolocation

Wialon Mobile v2 supports geolocation function. Geolocation is the identification of
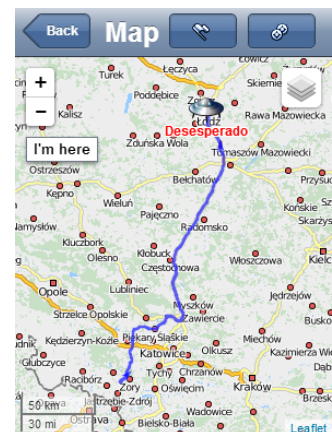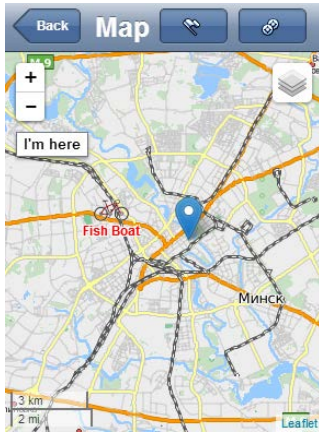
the real-world geographic location of an object, such as mobile phone or an Internet-connected computer terminal known from the Internet Protocol (IP) address, MAC address, hardware embedded article/production number, embedded software number, or other information.

Geolocation is activated in settings. Note that you may need to additionally check browser settings.

When you switch to the map mode, the program essays to locate you. Your supposed position will be indicated on the map with a special marker. In addition, the button *I`m here* will appear on the screen. Click on this button at any time to move the map to your current location. Click on this marker to see available address information.

In case geolocation is not successful, an error is displayed and the corresponding marker and button are not shown.

⚠ *Note*.
Google Maps are activated separately and can be missing in your package. At that, Gurtam Maps are always available.

Logistics

Logistics is a multifunctional program created to implement control over all the working stages of a courier delivery service.

Logistics consists of two applications: web and mobile one. The web application is intended to be used by an operator. The web part is developed to manage working processes such as orders' creation and distribution between units, routes planning and optimization, as well as monitoring and coordination of orders' delivery. The mobile application is intended to be used by couriers. It is available on both smartphones and tablets (Android, iOS). The mobile part is developed to inform a courier on job details: orders attached, their sequence, and optimized delivery routes. Moreover, using the mobile application a courier notifies an operator on a progress of orders delivery (confirmation/rejection), leaves comments regarding it, attaches photos, and uses chat to communicate with an operator.
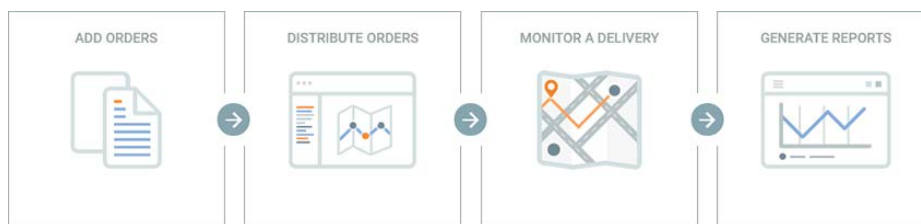
For Logistics to work in Wialon Local you need the following:

Screen package for Debian
It is installed using the command '*apt-get install screen*'.

Separate DNS
Create a separate DNS and route it to the external IP of the server. Indicate this DNS with the type 'Logistics' in the site settings in the administration system.

The configuration of Logistics in CMS is done like that of other apps. In the 'URL' field you need to indicate the created DNS.

Access rights
To work with orders, it is necessary to possess the rights 'View orders' and 'Create, edit, and delete orders' towards a resource and 'Use unit in jobs, notifications, routes, retranslators' towards units.

Required services
In order the application to work correctly, the 'Orders' service has to be activated in the user's billing plan or account.

Correct work of the application
For the data to be correctly passed from the web application to the mobile one, it is necessary to create drivers, warehouses, and orders in the same resource. To do so, create a driver in the monitoring system and in the web application's settings on 'General' tab choose a resource of the driver created.
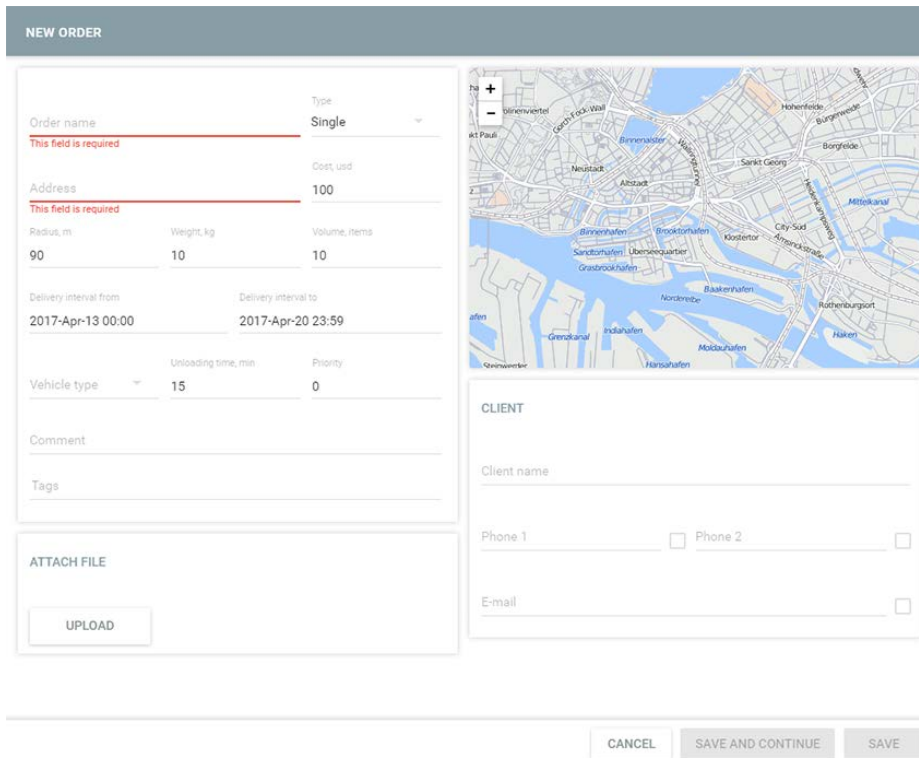
Maps
For route creation, which is an important part of the work of the application, Gurtam Maps are required.

Measurement system
The measurement system depends on the user's settings.

Orders

To create an order, choose 'New Order' in 'Planning' section (left panel). New order menu consists of 4 blocks: order's parameters, map, contact details, files attaching.

An order may contain the following parameters:

- **Order name** — an arbitrary name used for order registration in the system (obligatory field).
- **Type** — 2 types of orders (single and permanent) are supported in the system. A single type order is intended for a single use. Its delivery interval contains both date and time. Orders of such a type are moved to history after execution. A permanent type order is intended for a multiple use. Delivery interval of such an order contains no particular date, but time (hours:minutes). Permanent orders are not moved to history after execution.
- **Address** — a customer's location address (delivery destination point). Note that before entering this field, it is recommended to choose an address provider ('Settings' section). Upon entering the first symbols of an address, a dropdown list containing the possible variants appears. Choose the necessary one from the list or type an address manually (obligatory field).

The indicated address is shown on the map by a marker. If necessary, a delivery destination address can be adjusted by dragging the marker to the corresponding point on the map. Moreover, a necessary destination address can be added directly from the map. To do so, click a corresponding destination point on the map.

- **Cost** — total cost of goods in the order. The units of measurement for the cost values are indicated in the corresponding block of the general settings.
- **Radius, m** — the maximum distance on which a unit should come close to an indicated delivery destination point and stop there in order a point to become visited (upon delivery point visiting a courier must confirm or reject an order by setting the corresponding status in the mobile app).
- **Weight, kg** — an overall weight of goods in the order. This value can be taken into account upon

distributing orders among units.

- **Volume** — a conventional value (for example, items). Can also be taken into account upon distributing orders among units. Units of measurement for the volume values are indicated in the corresponding block of the general settings.
- **Delivery interval (from – to)** — date and time interval for an order to be delivered. Pick dates in the calendar. Indicate initial and final dates of an interval. If an interval consists of a single day, then indicate it as both initial and final date of an interval. To summon a calendar, click one of the fields of a delivery interval. After indicating dates, click OK. Time of a delivery is edited manually.The dropdown list contains only the vehicle types indicated for units in the monitoring system ('Profile' tab of unit properties dialog).
- **Unloading time, min** — an approximate duration for unloading goods.
- **Priority** — a numeric value (from 1 to 99) showing the importance of an order upon distribution if a route validation is used. The orders with higher importance are distributed first. The higher numeric value indicated, the higher the importance of an order is. The priority is taken into account only for orders with overlapping delivery intervals.
- **Comment** — an arbitrary comment regarding a delivery.
- **Tags** — key words (any) on the basis of which orders can be sorted (planning section). To add a tag, click the field, enter a key word, and use <enter> on your keyboard. To delete a tag, use <backspace> or delete button.

A separate block (bottom-right) is devoted to contact details such as client name, phone number, and e-mail. A phone number and an e-mail indicated by a flag are used to inform a client on a courier's arrival. Contact details are available to an operator on the stages of planning and delivery. Also, contact details are displayed for a courier in the mobile application. ые данные также отображаются и для курьера в мобильной версии приложения.

A file (for example, a bill or consignment document) can be attached to an order. The file attached can be viewed by a courier in the mobile application. The file attachment block is situated below order parameters. To attach a file, click the corresponding button.

Click 'Save' upon the form's completion. Saved order is moved to the 'Planning' section.

Import Orders

Along with the manual creation of orders, the possibility of importing orders is supported as well. Import is performed using either CSV files in UTF-8 coding or XLSX files. These types of file may contain several orders simultaneously. For an optimal system performance the amount of orders in a file should not exceed 100.

Importing Dialog

To import orders, choose 'Planning' section in the left panel and click 'Import Orders' item below. Afterwards, the importing dialog appears in the right panel. This dialog provides the possibility to attach a file containing orders and create a template which can be used for this file as a header in the table of orders. For an imported file to be correctly recognized by the system, its template should possess the same sequence of parameters as an attached file. Though template creation and usage is a helpful feature, it is considered to be optional on this stage. After attaching a file, click 'Import'.

Note that the proper file import requires each order to contain both address /coordinates and delivery interval (from – to) information.

Table of Orders

All the orders a file contains are placed in the table of orders. A file may also contain names for orders' columns. In this case the names appear in the first line of the table. To avoid errors, it is necessary to hide this line (indicate the corresponding flag in the bottom of the table).

If a proper template hasn't been created in the importing dialog, then it is necessary to indicate a name for each column in the header of the table (choose from dropdown lists). Sequence of names indicated in the header can be saved as a template for the further usage in the importing dialog. To do so, click the corresponding button in the bottom of the table (left corner).

If the sequence of columns, their number or names in the imported file differ from the parameters set in the header, then it is necessary to edit the header of the table correspondingly.

Table Editing

To edit any field of the table, click it and make necessary changes. These changes can be saved or canceled using either a keyboard (<enter>, <esc>) or the corresponding buttons in the bottom of the table (right corner). Moreover, changes are saved automatically upon switching to another field.

A multiple editing feature is also supported in the table of orders. To use multiple editing, indicate flags in the lines where similar information should be provided. Afterwards, edit any field of the table. As a result, identical changes are applied to the corresponding fields of the chosen lines.

If a mistake is made upon editing the table, move a step back by clicking 'Undo' in the bottom of the table (left corner). Up to 5 steps are saved in the system.

Buttons in the bottom of the table (from left to right):

- **Add template** — to save a current header of the table as a template.
- **Undo** — to move a step back in case of editing mistakes (up to 5 steps).
- **Cancel** — to cancel orders' import.
- **Save** — to save imported orders (saved orders are moved to the 'Planning' section).

The date and time format and the separator for the imported files are indicated in the 'Settings' section. In order import to be implemented correctly, the date and time format should be the same in the imported file, the application settings and the user settings in the monitoring system. The separator used in the file and in the application's

settings should coincide as well.

Integration

Logistics Services is a service intended to automate the processes of import supported in Logistics program. This service provides you with a possibility for importing multiple orders or routes from both CSV and XLSX files or via JSON.

Moreover, the service provides you with a possibility to integrate Logistics program with either third-party services or ERP systems via special API for importing orders and routes.

To use Logistics Services, view its documentation first.

Planning

Delivery planning includes several steps: choosing orders (step 1), choosing transport (step 2), and routes building (step 3). The steps on delivery planning are performed using such interface elements as table (top part of the working area), map (bottom right part), and information block (bottom left part).

Some peculiarities of a delivery planning:

- Working with permanent orders (step 1), you should choose a delivery date (calendar in the bottom right corner of the table).
- Routes building is implemented on the basis of the algorithm set on the corresponding tab of the settings. The parameters of the algorithm can be changed directly from 'Planning' section (on any planning step). To do so, click the 'Gear' button in the bottom right corner of the table, indicate necessary parameters, and apply or cancel implemented changes.

Table

Main actions on delivery planning are performed in the table. Depending on a current planning step a table may contain created orders, available units (transport), and built routes. A planning step is shown in the bottom left corner of the table. Moving to the next step is possible only upon completing a previous one. On every step (until a route is saved) there is a possibility to go back to a previous one and make corrections. A number of columns in the table is configured individually (click the icon in the top right corner of the table).

The table supports a number of additional actions with an order (step 1):

- Edit — change order parameters.
- Copy — create new order with identical parameters (by default 'Today' is used as delivery interval).
- Delete — delete order from the system.

These actions become available upon pointing the cursor on a necessary order (buttons in the end of a line).

Map

Information presented in the table is visualized on the map (click an element's line in order the map to be centered on the chosen element; indicate a flag in order the map to be scaled and centered in such a way that all the elements with indicated flags to be seen on it). Information on a particular element can be viewed directly from the map. To do so, summon a tooltip by clicking a necessary element. Moreover, the map can be used as a means of choosing orders. To choose elements on the map, use <ctrl> + click combination. To select several elements, hold <shift> and point out the area with the necessary elements on the map.

Information Block

The information presented in this block can be divided into 3 categories: information on the chosen element, general information on orders, and general information on routes.

The information on a chosen element (order, unit) is shown upon clicking an element's line in the table and includes its detailed description. Order description is an information indicated upon order creation; unit description is an information indicated on 'Profile' tab of a unit properties dialog in the monitoring system. In the bottom of the information block there are buttons for editing or deleting an order chosen in the table.

General information is shown upon checking an element's flag. On the 1st step of planning this piece of information includes such parameters as total weight, volume, cost, and number of orders; on the 2d step this piece of information is also accompanied by unit's data (total carrying and effective capacities). In the bottom of the information block there is a button for deleting all the orders indicated in the table by flags.
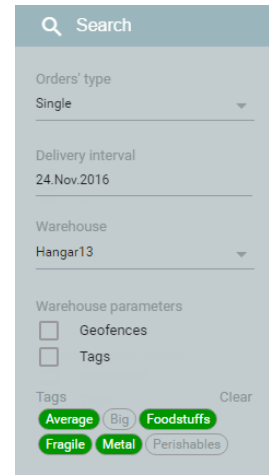
General information on routes is shown on the step of routes building. The information on orders and units engaged in a route is added by data on route's distribution and validity parameters.

Filters and Dynamic Search

The elements shown in the table are determined by the filters applied. The filters are used to quickly find the necessary elements. They are situated in the left panel. Filtration is made by the following parameters: order type, delivery interval, warehouse, and warehouse parameters — for orders (1st step), as well as warehouse parameters and vehicle type — for units (2d step). By default, a warehouse used as a filter is the one indicated on the corresponding settings tab as the initial warehouse, default delivery interval is 'Today', and default vehicle type filter is 'Any'. Delivery interval is chosen in the calendar. Its usage is described in the section of orders creation. Note that a warehouse's

filter value can be changed on the first planning step only.

Besides, the necessary elements can be found using the dynamic search. The search field is situated above 'Orders' type' filter. The search is performed by all the fields of the table.

Sorting by Tags

The orders filtered by delivery interval and warehouse can be sorted by tags added upon orders' creation. To do so, choose necessary key words in the tags cloud (below the filters). Moreover, orders can be sorted by warehouse tags. In this case a table presents a list of orders, tags of which match the tags of a chosen warehouse. To sort by warehouse tags, it is necessary to enable the corresponding flag ('Tags') in 'Warehouse parameters' filter.

Routes Building (3d step)

After choosing orders (step 1) and units for their delivery (step 2), click 'Distribute'. On the basis of the algorithm used, a route is formed. For the optimal route building the algorithm considers such parameters as delivery interval, weight, and volume of goods in the order (if the corresponding settings are indicated), as well as warehouse working hours and unloading time (indicated on the 'Warehouses' tab of the settings). Moreover, upon a route building the algorithm considers requirements on the minimization of distance and time for a delivery.

To view the sequence of delivery points to be passed, expand a route (click its line). Note that a formed route is considered to be preliminary. In other words, the sequence of delivery points of a formed route can be reestablished either automatically or manually.

To do it automatically, click 'Refresh' icon in the end of the line.

To reestablish delivery points manually, drag and drop them in the needed sequence. Note that if several routes are formed, you can drag points from one route into the other. The points dragged become fixed and their position stays constant even upon further automatic reestablishment.

Note that upon a route building you can receive a situation when some of the route's points can't be visited in the indicated delivery interval. Such a point is marked in the estimated arrival column by a special marker (the marker is also duplicated beside the route name). In case such a situation emerges, delivery points can be reestablished either automatically or manually. If a delivery point is impossible to visit, it should be deleted from this route (click 'Trash' icon in the end of the line).

The built delivery route is displayed on the map. Route visualization color schemes can be set on 'General' tab of the 'Settings' section.

To save a built and optimized route, click 'Floppy disk' icon in the end of the line. To save all the built routes, click 'Save' in the bottom right corner of the table. Saved routes are moved to the corresponding section.

Routes

This section is intended for the monitoring of routes delivery. Routes are displayed in the table according to their filter state (active/planning/fulfilled) chosen in the navigation panel. Moreover, particular routes can be found using dynamic search (navigation panel). A search is implemented on the basis of current table data.

The active routes are:

- Current day routes having any of its points visited.
- The routes till the 1st delivery point of which remains the time indicated in 'Advance time' field of 'General' tab in 'Settings' section.

The planning routes are inactive routes of a current day or routes of the following day.

Information on the fulfilled routes is displayed for 24 hours, afterwards it is automatically moved to history. Besides, if it is necessary to send information on fulfilled routes to history without waiting 24 hours, you can do it manually (choose a corresponding route in the table and click 'Trash' button in the information block).

On the basis of the data on fulfilled routes stored in history, you can generate reports in the corresponding section.

Working with Routes

'Routes' section consists of the same interface elements described earlier: the table, the map, the information block, and the filter.

Active routes are shown in the table by default. Upon clicking the route's line, a route's fulfillment icon becomes active, a corresponding route is displayed on the map, and the map is centered and scaled in such a way that all delivery points get into vision field. Moreover, current data on the chosen route is shown in the information block.

Upon clicking the arrow (in front of the route) the list of delivery points (orders) in this route is expanded and the route is displayed on the map (route's fulfillment icon becomes active). The map is not centered and scaled. The expanded route shows all the orders arranged in the sequence of their delivery (orders = delivery points). The table contains visual elements used to determine a route's fulfillment state.

Route's point state:

The line of the point towards which a unit moves is highlighted in green and marked correspondingly.

Note that 2 types of values are shown in such columns as 'Arrival time' and 'Mileage'. These are estimated and actual values. Estimated values are the approximate values calculated by the system. Upon a delivery point visiting estimated values are changed for actual ones. Actual values are shown in the table by a slightly brighter color.

To delete a route using the table, place a cursor over a route's line and click the appeared 'Trash' icon.

Information Block Usage

The same as in 'Planning' section, the logic of the information block can be divided into two components: showing general information and showing information on a particular route.

If no routes are chosen in the table, then information block shows general data on routes presented in the table (total number of routes and total number of orders in them).

Current data on a particular route is shown in the information block upon clicking the line of a corresponding route in the table. This data includes name of a unit assigned for the route implementation, number of orders in the route, estimated and actual route duration, estimated and actual mileage, driver name, etc. From here a fast transition to the 'Chat' section is available. In order to communicate with a driver, click a driver name.

Information on a chosen route can be exported in both XLSX and PDF formats, or printed. Moreover, a chosen route can be moved to history before its execution. The corresponding buttons are situated in the bottom of the information block.

Information block supports the possibility of working with route's delivery points (orders). Delivery point's data includes its address, estimated and actual arrival time, estimated and actual mileage. Some order values (name, cost, radius) can be edited. To do so, click 'Edit' button in the bottom of the information block. Note that using the information block an operator can set delivery points' statuses (corresponding buttons in the bottom of the information block).

Displaying a Route on the Map

A route chosen in the table is shown on the map. The system provides the possibility for visual comparison of planning and fulfilling routes. Therefore, a fulfilling route can be displayed on top of a planning one. A planning route is displayed by a wide transparent line, while a fulfilling one — by a thick non-transparent line. To enable the displaying of fulfilling routes, click the corresponding icon in the top right corner of the map. A fulfilling route is shown on the map until its complete fulfillment or until the end of a delivery interval. Route visualization color schemes can be set on 'General' tab of the 'Settings' section.

Upon choosing a route in the table, the map is centered and scaled in such a way that all delivery points of a route get into vision field. To center the map on a particular delivery point, click it in the table. A route fulfillment state can be recognized by the markers used on the map:

warehouse visited

warehouse not visited

delivery point (order) visited

delivery point (order) not visited

delivery point (order) visited (with delay/with advance/in time) and rejected

delivery point missed

Working with the map you can view information on elements (route points, units) by summoning their tooltips. To do so, click the necessary element on the map.

Attached Files

Upon setting an order's status (in Logistics Mobile), a courier has a possibility to supply a comment with an electronic signature or a file. An electronic signature is transferred to the web-version as a photo and shown along with other attached files by 'Paper clip' icon in the table, information block, and order's tooltip on the map.

To see a list of files attached, click the 'Paper clip' icon. The list contains names of files and download buttons. To preview a file, click its name; to download it, click the corresponding button.

Reports

This section provides a possibility of generating various reports regarding routes. Reports can be used for the complex analysis of a courier's work.

Prior to a report generating it is necessary to set its configuration and adjust the table view.

Report configuration consists of the following parameters: report type (unit/driver, as well as unit group/driver group), order type (all, visited, visited late, fulfilled, rejected, visited without status, non-visited), unit, and report interval. Configuration parameters can be chosen from the dropdown lists in the left panel of the application.

Report interval can be either set using a 'Quick interval' (yesterday, today, week, month, last 7 days, last 30 days) or chosen in the calendar. Working with the calendar, it is necessary to pick initial and final dates of an interval. If an interval consists of a single day, then indicate it as both initial and final date of an interval. After indicating report's interval, click OK.

Set the table by choosing parameters to be shown in a report (double click, drag and drop, or click '—>'). It can be table data (in reports on units/drivers or groups of units/drivers) or statistics (in reports on units). To summon the settings dialog, in the left panel click the corresponding icon to the right of the report type field. To apply the chosen settings, click OK.

To receive a report on the basis of chosen configuration and indicated settings, click 'Execute'. A report is shown in the working area.

A report can be printed as well as exported in XLSX or PDF formats. To do so, use the corresponding buttons in the top right corner of the working area.

Chat

This section is designed to communicate with drivers. Moreover, the chat supports viewing photos received from the mobile application.

Settings

This section is designed to work with general settings as well as settings of warehouses and planning. To open 'Settings' section, summon a user menu (click a user name) and choose the corresponding item. Afterwards, choose a tab to work with.

General

On the 'General' tab you can find parameters used upon orders creation, their distribution, and routes displaying. Values indicated here are used on the corresponding stages as default ones.

Resource chosen here is the one where orders will be created. Delivery interval (from – to), weight and unloading time are taken into account upon delivery planning. Advance time corresponds to the time on which a delivery can be advanced (a route becomes active when the indicated time value remains before the visit of its first delivery point). Such value as radius is taken into account upon delivery point visiting. By choosing address provider you define a source of address information to be used either upon manual order creation or warehouse creation. Route color, depending on a chosen option, can either be taken from unit properties (corresponds to a track color) or be random.

The 'Import orders' block serves for setting parameters (date format, separator) used in imported files. Besides, here you can indicate a notification method used for orders' import. 'Units of measurement' block serves for indicating corresponding units for the cost and effective capacity values.

Warehouses

To create a warehouse, click 'Add warehouse' button. Afterwards, a corresponding form appears. Obligatory fields of the form are warehouse's name and address (note that before entering this field, it is recommended to choose an address provider on 'General' tab of 'Settings' section). Upon completion of the address field, a warehouse is shown on the map. Additional fields of the form are telephone number, warehouse working hours, unloading time, comment, and tags.

Special attention should be paid to the tags. Tags are custom key words intended for sorting orders on the stage of delivery planning (1st step). There are two types of tags utilized in the system: order tags and warehouse ones. Warehouse tags show that orders with such tags are attached to a particular warehouse. On the stage of choosing orders (1st step), sorting by warehouse tags can be applied by enabling the corresponding flag ('Tags') in 'Warehouse parameters' filter. Upon enabling this flag, a table presents a list of orders, tags of which match the tags of a warehouse used.

To add a tag, click the field, enter a key word, and use <enter> on your keyboard. To delete a tag, use <backspace> or delete button.

Geofences Attached to the Warehouse

The geofences created in the monitoring system can be attached to warehouses. This attachment is used in the delivery planning section. If a warehouse (with attached geofences) is chosen as a filter, then on the 1st step of a delivery planning, a table contains orders situated within the limits of geofences attached.

Units Attached to the Warehouse

Units created in the monitoring system can be attached to warehouses. This attachment is used in the delivery planning section. If a warehouse (with attached units) is chosen as a filter, then on the 2d step of a delivery planning, a table contains units attached to a chosen warehouse.

Deleting/Editing Warehouse

To delete or edit a warehouse, click the icon in the end of the field (3 dots) and choose the necessary action.

Planning

On this tab you should indicate a set of parameters to be used as default algorithm upon building a route in 'Planning' section.

Distribution Optimization

First of all indicate if you are going to utilize routing in the route building algorithm. The usage of routing allows calculating estimated arrival time considering road speed limits. Besides, upon routing usage the system provides the possibility to increase an estimated arrival calculation's accuracy by means of implementing speed coefficients for both inside and outside a city. Let's use an example. A supposed route is laid both through a city and outside it. You know for sure that at specified delivery interval there is the highest city traffic that results in decreasing an average speed in half. Moreover, you have an information that there is a road work on your route outside the city that will also lead to decreasing an average speed by one third. These issues may result in considerable differences between estimated and actual arrival times. To avoid such an inaccuracy, the coefficients are used. You need to decrease average speed coefficients inside and outside a city by half and third, correspondingly. Therefore, time for overcoming the obstacles will be considered in the route building algorithm.

If no routing is chosen to be used in the route building algorithm, then the system provides the possibility to indicate a vehicle's average speed.

Moreover, choose warehouses to be used upon route building. Three types of warehouses can be utilized for this purpose: initial, intermediate, and final.

Initial warehouse is the one a courier starts a route from.

Intermediate warehouse is the one to be visited by a courier in case of applying the corresponding action.

Final warehouse is the one at which a courier should finish a route.

Route Validity Parameters

Choose the parameters a route should correspond to (mileage, duration, number of orders, idling), and a unit fulfilling a route should correspond to (carrying and effective capacities). If a route cannot be built without exceeding any of the indicated parameters, then the route building algorithm is added by an action chosen in the next block.

Note that values of such parameters as carrying and effective capacity are indicated on 'Profile' tab of a unit properties dialog in the interface of the monitoring system.

Actions

Choose an action to be used by the program in case of a failure to build a route according to the route validity parameters indicated.. The following variants are available:

- Use valid route — in this case a distribution of orders on units is made in such a way that route validity parameters are not exceeded. For example, 5 is indicated as a number of orders in the route validity parameters block, but you would like to distribute 10 orders on 1 unit. As a result, a route is formed. It contains 5 orders (delivery points) chosen by their priority. The rest orders are not distributed at all.
- Visit intermediate warehouse — in this case the indicated parameter value can be exceeded only by adding a visit to an intermediate warehouse. Let's use the above mentioned example. A distribution results in the following route: 5 orders (delivery points), intermediate warehouse, 5 orders (delivery points). Orders are chosen by their priority.
- Create separate routes — in this case the indicated parameter value can be exceeded only by creating a separate route. Let's use the same example. As a result we receive 2 routes with 5 orders (delivery points) each. Orders are chosen by their priority.

Notifications

This tab provides the means of setting automatic notifications. These can be either notifications used to inform a customer on a courier's arrival or push notifications used to inform couriers on key stages of working with orders.

Client Notifications

A courier's arrival message can be sent automatically on a mobile number and/or e-mail provided upon order creation and indicated by a flag. If orders are imported, then notification method should be indicated on 'General' tab of the settings section in 'Import orders' block. Compose a notification and set a time of its receiving in 'Notification template' block. Here it is necessary to indicate advance time (in what time before an estimated arrival a customer should be informed), SMS text, as well as e-mail subject and text. Each text field contains a set of standard parameters (click on the field) which can be used in the message: order name, estimated arrival time, order cost, and order comment. You can enter a text and use parameters (click necessary ones) which subsequently will be transformed into real values. Special attention should be paid to such parameter as locator. Use this parameter if you would like a notification to contain a link on a courier's current location.

Courier Push Notifications

In this block you can set automatic sending of push notifications for couriers. Push notifications are used to provide couriers with the following information: route creation or deletion, contact details changing, attaching or deleting files, order parameters changing, delivery point missing, exceeding delivery or unloading time, as well as deviation from a route, and lack of order confirmation. Note that to receive push notifications, one should activate the corresponding option in the settings of Logistics Mobile.

Here you should indicate notification sending criteria, and compose notification text. Aside from the text itself, a notification may contain standard parameters (a list of parameters appears upon clicking the notification text field) which are transformed into real values upon notification sending. The list of parameters varies depending on the chosen notification sending criteria. Moreover, the notifications on time exceeding and deviation from a route should be indicated with numeric values. By default each notification has a special text template containing all the relevant parameters. This template can be taken as a basis for your notification.

Operator Notifications

Notifications set to be received by a courier can be shown to an operator as well. Such notifications are displayed in pop-up dialogs in the top right corner of any section an operator works with. Pop-up dialogs last for 5 seconds in order not to use too much screen space. To make a detailed analysis of notifications received, click the incoming notifications indicator situated in the top right corner of the left panel.

Here you can enable/disable notifications displaying and enable/disable notifications sound.

Mobile Application

To work with Logistics Mobile, create a driver in the monitoring system and assign him to a unit. In a driver properties dialog it is necessary to enter a phone number and a mobile key. Indicated values are used as login (phone number) and password (mobile key) for the application authorization. ⊕ In the 'Server address' line the DNS of Local should be introduced, not the separate DNS of the application Logistics. Note that blocking user-creator of a resource to which a driver belongs leads to restricting access to this driver as well.

Settings

Map — choose a map source (OpenStreetMap, Google Roadmap, Google Satellite, Google Hybrid, Gurtam Maps).

Photo quality — choose image quality to be used upon photo sending. The following variants are available:

- Original — an original image without quality loss;
- High — an original image is compressed to 3 megapixels (not more than 600 Kb);
- Medium — an original image is compressed to 2 megapixels (not more than 300 Kb);
- Low — an original image is compressed to 1 megapixel (not more than 100 kb).

Tracker — enable/disable a tracker. To use a tracker function in your application, choose 'WiaTag' as device type and indicate unique ID (arbitrary value) in a unit properties dialog (monitoring system). Afterwards, a tracker's switch appears in your mobile application settings.

Notifications — enable/disable receiving of push notifications on relevant events regarding orders, routes, and delivery process; choose an appropriate notification signal.

Admin password — set and enable/disable a password to be used upon working with mobile application settings.
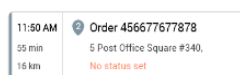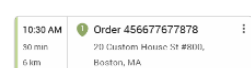
Help — link to a user manual.
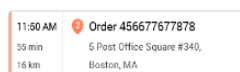
Working with Logistics Mobile
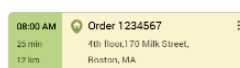
The current point is a warehouse visit
The point of delivery which follows the current one. Green color indicates that a courier is moving up the schedule
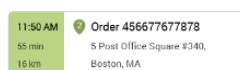
The point of delivery which follows the current one. Red color indicates that a courier is moving behind the schedule at the moment
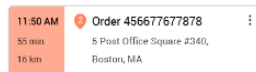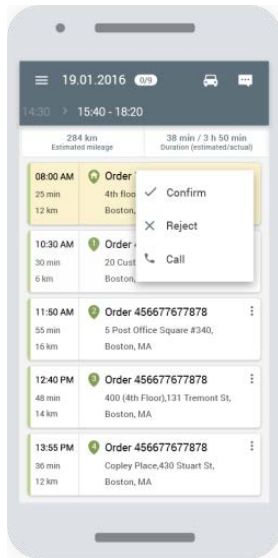
The point of delivery has been visited; the status is not set (status setting is required)
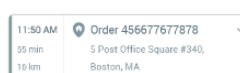
A visited and confirmed delivery point

The current delivery point towards which a unit is moving

 The current delivery point towards which a unit is moving with delay

 For setting an order status it is necessary to click this icon (3 points in the top right corner of the order) and choose the corresponding status (confirm/reject) in the appeared menu. Moreover, this menu can be used to contact a client ('call' button).

Upon setting an order's status, a courier has a possibility to enter a comment (optional upon confirmation; obligatory upon rejection), identify oneself with an electronic signature, or attach a file. These steps provide an operator with a possibility to monitor delivery processes and undertake any action on the basis of relevant information.

An order chosen from the list is shown on the map by a marker. The map is centered and scaled on the chosen order. On the map screen you can move between orders by swiping (left-right) the order's block in the top of the screen.

To quickly move on the map to your own location, tap the button in the bottom right corner. This button has several states: arrow — tracking unit's location, route's points — showing all the route's delivery points on the map. To activate unit location tracking, tap the arrow. Afterwards, the map stays constantly centered on your location. Upon moving the map from unit's location manually, 'Arrow' button changes for 'Target' one, by tapping which the map is centered on your location once again. To escape tracking mode, tap the button (route points) once more.
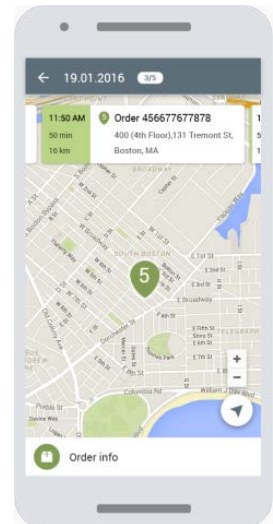
If it is necessary to build a route to a delivery point, you can use an external application. To do so, tap and hold a point towards which you would like to build a route.

From the map screen you can move to viewing detailed order's information. To do so, choose a necessary order in the top of the screen and tap 'Order info' button in the bottom. The appeared menu serves for viewing order's information, setting order's statuses (confirm/reject), and calling a client (call).

The mobile application is provided with a tracker mode. This mode can be used to determine a courier's location if no vehicle or personal tracker is available. After activating this mode, location data is collected and sent to the server constantly (in iOS version data is collected and sent upon movement detection). To enable the tracker mode, move to the menu and activate the corresponding switch.

Logistics Mobile application is also available on tablet. A tablet version has some peculiarities. The first one is that

tablet's screen size allows viewing detailed order info without hiding the list of orders. The second is that special buttons (situated below the detailed info menu) are used for setting statuses and calling a client.
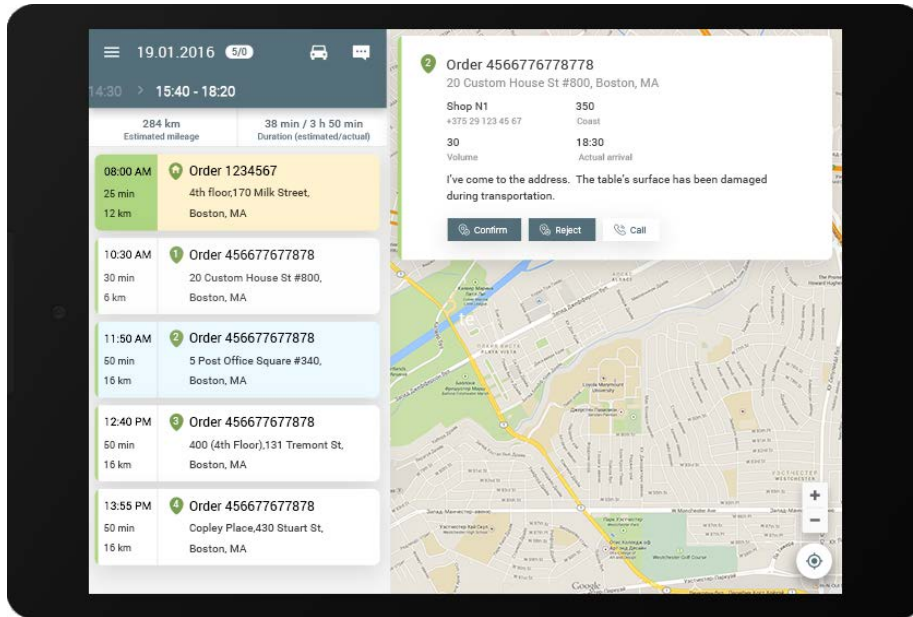
ActiveX

Documentation available at http://sdk.wialon.com/wiki/en/local/activex/activex.

SDK

SDK is a software development kit that allows you to integrate Wialon with other systems, as well as create additional applications and sites for Wialon Local platform. It provides an API (application programming interface) as a source code based specification intended to be used as an interface by software components to communicate with each other. All documentation available at http://sdk.wialon.com

Two areas of SDK development are available at the moment:

- **Remote API** gives access to data through low-level HTTP (hypertext transfer protocol) requests. Using it, you can develop your own web services, mobile device applications, etc. on Wialon basis.

- **JavaScript API** gives you access to Wialon Local functions from your web application using JavaScript. IT considerable decreases time of creation a web application because basic procedures have been already implemented.