



Installation and connection of Galileosky v4.0 tracking devices

User Manual

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Necessary Tools, Devices, Materials

For operation, you will need:

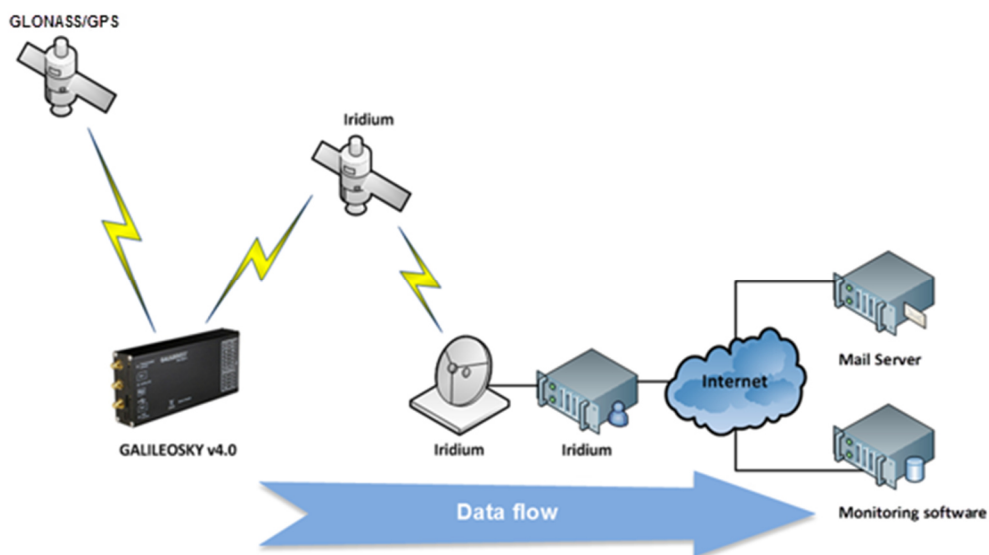
1. Electrical tools.
2. Set of connecting wires.
3. Satellite monitoring Galileosky v4.0 tracking device (hereinafter - tracking device)
4. Windows-based computer with the installed software of configuring Galileosky tracking devices – "Configurator" (hereinafter – Configurator). It is recommended to install the latest version of the program from the site <https://galileosky.com/podderzhka/programmyi.html>

General Information

Galileosky v4.0 tracking device in addition to the traditional GSM module is equipped with Iridium satellite module. Thanks to this, the tracking device can transmit information about the location and condition of the vehicle, even where there is no cellular connection.

Picture 1 shows a diagram illustrating the process of transmitting data from Galileosky tracking device through Iridium satellite channel (hereinafter – Iridium channel). In the current Iridium channel configuration:

- data transmission is carried out in one-way direction from the tracking device to the monitoring server or e-mail of the user; the final destination is defined by the user of the Iridium channel;
- voice communication and sending of commands via Iridium channel aren't supported.



Pic. 1
The scheme of communication organization via Iridium channel

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(version 4 dated from June 25, 2018)

Galileosky v4.0 Tracking Device Connection

Preparation of tracking device connector, SIM-cards inserting, installation, connection and setting of the tracking device for data transmission via GSM channels are performed according to the recommendations of the manual "Installation and connection of Galileosky tracking devices". The current user's manual can be downloaded from our site <https://galileosky.com/podderzhka/dokumentacziya.html>

Connection of Iridium Satellite Antenna

Together with the tracking device there is an antenna for Iridium satellite communication module (hereinafter – Iridium antenna). Antennas are made by various manufacturers and may differ in appearance (Pic. 2).



Pic. 2

Iridium antennas

Connection of GSM antenna, GLONASS/GPS antenna, Iridium antenna is carried out to the corresponding connectors, as shown in Picture 3.



Pic. 3

Antennas connection

The order of antennas location in the vehicle and connection to the tracking device is the following:

- place GSM-antenna in the cabin as close to the windscreen as possible or on the vehicle roof, as shown in the Picture 4;
- place GLONASS/GPS-antenna in the cabin as close to the windscreen as possible or on the vehicle roof, as shown in the Picture 4;
- place Iridium antenna in the cabin as close to the windscreen as possible or on the vehicle roof, as shown in the Picture 4;

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- pull along GSM-antenna, GLONASS/GPS-antenna and Iridium antenna wires to the installation place of the tracking device and connect them to the corresponding connectors of the device, as shown in the Picture 3.

Pic. 4

Antennas location



Setting the Tracking device for Data Transmission via Iridium Channel

In a usual operating mode of the tracking device Iridium module is deactivated. When the tracking device determines that there is no communication via GSM-channel, it starts counting the time interval to enable Iridium module. Along with this, the tracking device tries to reestablish communication via GSM channel. If the connection still fails, Iridium module is automatically activated and within 10 minutes the tracking device tries to send monitoring data via Iridium channel.

After successful data sending, the tracking device waits for a predetermined time interval. If GSM coverage is still missing, the tracking device sends the packet through Iridium channel again.

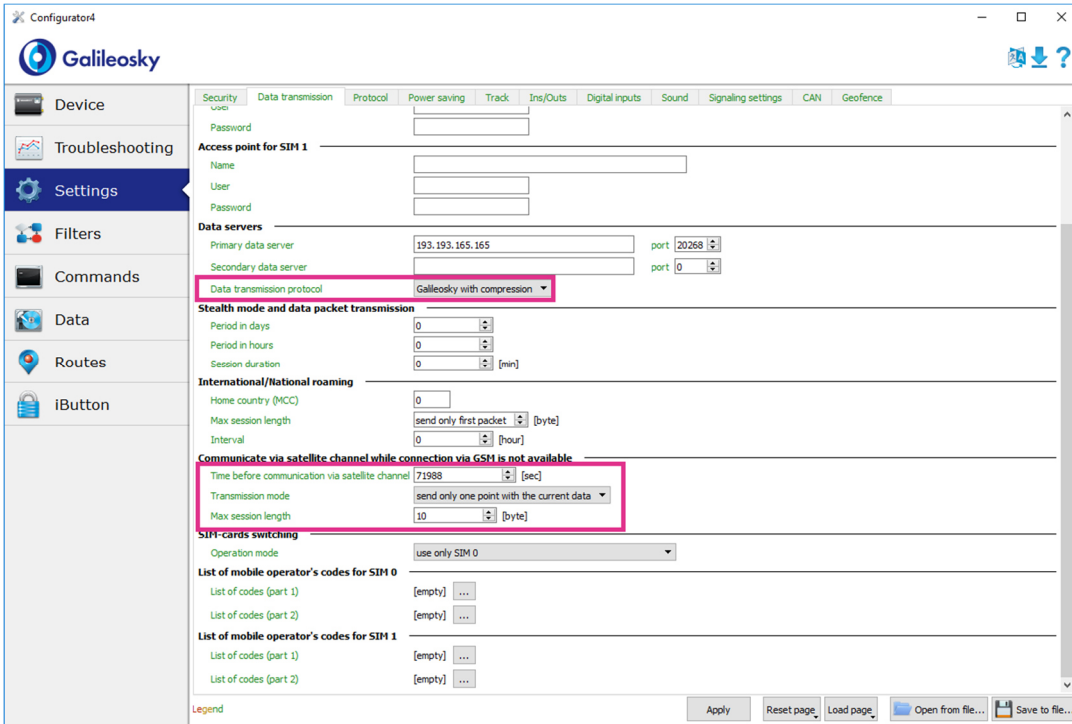
The time interval to enable Iridium module and data transmission via Iridium channel is set in the Configurator or with the help of *Sputnik* command (see Table 1). The order of setting in the Configurator is the following:

1. start Configurator and connect the tracking device to a computer;
2. go to the "Settings" tab -> "Data transmission";
3. set "Data transmission protocol", if "Galileosky with compression" is selected, tick "Minimal data set" of Sputnik packet as shown in section "Setting of protocol for data transmission via Iridium channel";
4. set the value of the time interval in seconds in the field "Time before communication via satellite channel" (Pic. 5). If the value is equal to 0, the satellite module is not used;
5. set "Transmission mode";
6. set "Maximum session length", if "Send archive" is selected;
7. click "Apply" button.

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Pic. 5

Setting Iridium channel usage



The format and description of *Sputnik* command are shown in Table 1 of this manual.

Command format

Sputnik t,m,b

Parameters

t – a period of establishing communication with the help of satellite modem, [sec.]. At the value equal to 0, the satellite modem is not used;

m – data transmission mode. 0 – one point with current data, 1 – data saved in internal memory;

b – maximum number of bytes, transmitted per one communication session.

Explanation

Sets parameters of satellite modem operating.

Example

Request: Sputnik 1200,1,1000

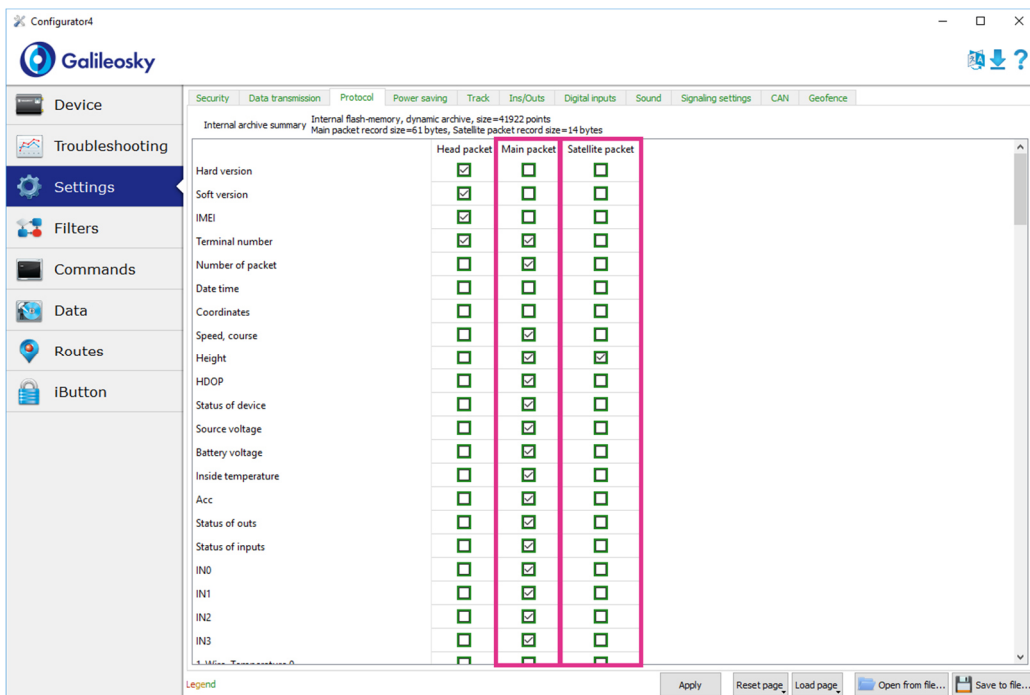
Reply: SPUTNIK: Timeout=1200,Mode=1,MaxBytes=1000

Setting Protocol for Data Transmission via Iridium Channel

Galileosky v.4 can transmit only one point with current coordinates or recorded archive via Iridium channel in the limits of set Maximum session length.

Packets tags for data transmission are defined by setting of the main packet for firmware up to 228 or by settings of Sputnik packet for firmware 229 or higher.

Setting of the main packet or Sputnik packet is carried out on tab "Protocol" in Configurator (Pic.6).



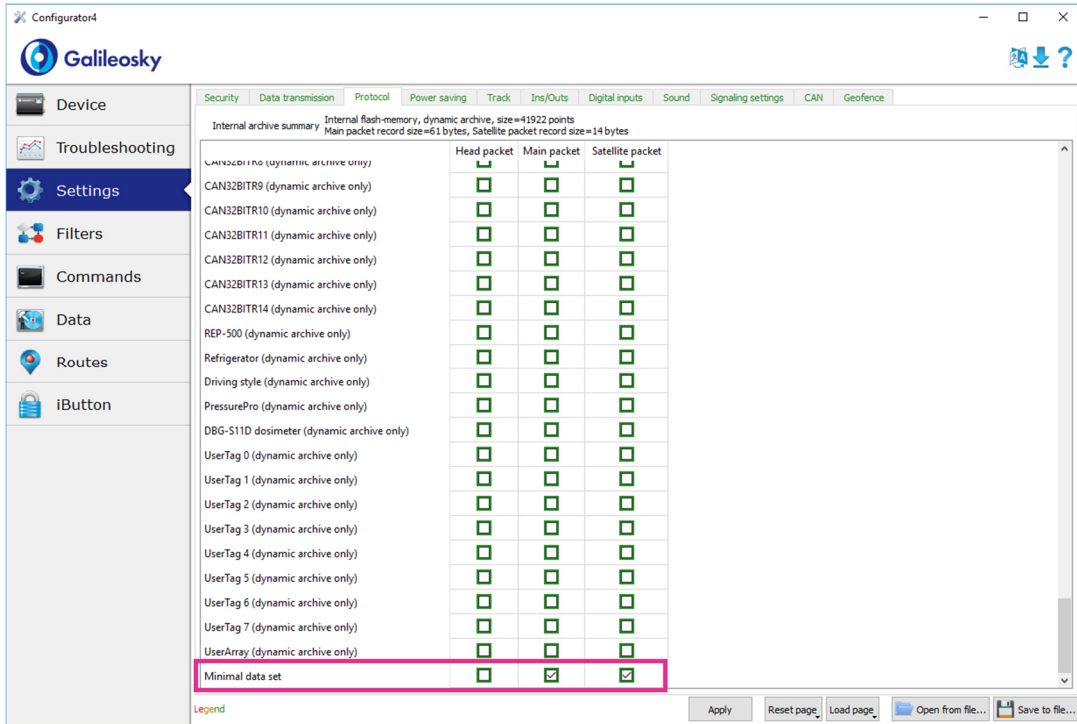
Pic. 6

Setting packet for data transmission via Iridium channel

If "Galileosky with compression" protocol is selected:

1. Go to "Protocol" tab in Configurator and tick "Minimal data set" in "Main packet". It will help to decrease volume of data of the most frequently used tags (Pic.7);

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Pic. 7

Setting the main packet

“Minimal data set” includes:

- date and time;
- coordinates validity (0-valid; 1-invalid);
- longitude;
- latitude;
- alarm (0-no alarm, 1-alarm);
- user tag data.

Size of “Minimal data set” tag consists of 10 bytes and information included into this tag can replace “Date and time”, “Coordinates”, “Status of device” tags and “User tag 0” with general size 22 bytes, other ticked tags don’t change size.

Date and time in “minimal data set” are transmitted in seconds, starting from 00:00:00 of the 1st of January. Year is not transmitted, it is set in accordance with the current year of the server. Due to decrease of data size used for coordinates record and transmission, error of transmitted coordinates increases up to 10 meters.

2. Click “Apply” button.

Setting Monitoring Software

To receive data via Iridium channel, monitoring software should be developed in accordance with Galileosky protocol. You can download it from our site www.galileosky.com (Support – User Manuals – Galileosky protocol description).

Wialon monitoring software is developed for receiving and parsing data via Iridium channel, including data with compression. To activate receiving data with compression in Wialon, transmitted through Iridium channel, set object settings (pic.8).

The image shows a web-based configuration interface for a tracking device. It features a tabbed menu at the top with 'General', 'Access', 'Icon', and 'Advanced'. Below this is a sub-menu with 'Profile', 'Trip Detection', 'Fuel Consumption', and 'Service'. The 'General' tab is active, showing fields for '* Name:' (Iridium) and '* Device type:' (GALILEOSKY v 5.0). A red box highlights the device type dropdown menu. Below this is a 'Device configuration' section with several checkboxes: 'Hide camera info', 'Skip messages with 2000 year:', 'Advanced iButton processing:', 'Registration ibutton as hex:', 'Private key:', 'Tahograph authorization key:', and 'Data compression activated:'. The 'Data compression activated:' checkbox is checked and highlighted with a red box.

General	Access	Icon	Advanced
Profile	Trip Detection	Fuel Consumption	Service
* Name:	Iridium from		
* Device type:	GALILEOSKY v 5.0		

Device configuration	
Hide camera info:	<input type="checkbox"/>
Skip messages with 2000 year:	<input type="checkbox"/>
Advanced iButton processing:	<input type="checkbox"/>
Registration ibutton as hex:	<input type="checkbox"/>
Private key:	<input type="checkbox"/>
Tahograph authorization key:	<input type="checkbox"/>
Data compression activated:	<input checked="" type="checkbox"/>

Pic. 8

Activating data with compression receiving, transmitted through Iridium channel in the monitoring server

Diagnostics of Iridium Channel Quality

When using Galileosky v4.0 tracking device, it is necessary to consider the demands of the Iridium channel to quality of the established connection. High-rise buildings, atmospheric conditions, other subjects and the circumstances interfering establishment of direct visibility between the antenna and the satellite can influence quality of connection.

You must also take into consideration the circumstance, that Iridium satellites are constantly moving relative to the Earth surface, and it can take up to 10 minutes to establish the direct line of sight between the antenna and the satellite.

The quality of the connection can be estimated in Configurator. The order of evaluation is the following:

1. disconnect GSM antenna;
2. launch Configurator and connect the tracking device to a computer;
3. go to the "Settings" tab -> "Data transmission", set the value of 30 seconds in the field "Time before contact";
4. go to the "Troubleshooting" tab and tick the field "Time" and "Satellite modem"; remove all the rest ticks;
5. click "Start" button and wait for 10 minutes;
6. after completion of troubleshooting, configure "Time before communication via satellite channel" again and connect GSM antenna;

In the process of troubleshooting you will see messages of the following type:

```
Sputnik. Power on
06:07:20
Sputnik. Net found
Sputnik. > ATE0
Sputnik. < ATE0
Sputnik. > OK
Sputnik. < AT+CULK?
Sputnik. > +CULK:0
Sputnik. > OK
Sputnik. < AT+CSQ
06:07:30
Sputnik. > +CSQ:5
Sputnik. > OK
Sputnik. < AT+SBDWB=29
Sputnik. > READY
Sputnik. > 0
Sputnik. < AT+SBDI
Sputnik. > OK
06:07:40
GSM. Success turn on.
```

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Sputnik. > SBDI: 1, 17, 0, 0, 0, 0

Sputnik. Message send

*Sputnik. < AT*F*

Sputnik. > OK

Sputnik. Power off

The *CSQ* parameter shows the quality of the connection established with the satellite. *CSQ* can take values from 0 (there is no connection) to 5 (the maximum quality of connection).

SBDWB parameter informs about the packet size for sending via Iridium channel.

Sputnik. Message send message informs about the successful sending of the packet via Iridium channel.

Control of Expenses for Data Transmission via Iridium Channel

To be able to use Iridium satellite channel, the user should make a contract with Iridium partner (hereinafter - service provider). The service provider can specify the description and comparative information on provided tariffs.

When using Iridium channel, the question of control of expenses is one of priority. The algorithm of operation of Galileosky tracking device allows to minimize and to control these expenses:

- Iridium channel is used after the set interval of time by inaccessibility of the main communication channel;
- there is an opportunity to deactivate Iridium channel;
- there is an opportunity to set sending data with compression;
- when communication session via Iridium channel is established, the tracking device transmits only one last recorded point of the main packet or recorded archive in the limits of set "Maximum session volume" size.

Thus, the user of the tracking device has an opportunity to calculate and to set the volume of a point of the main packet, which is transmitted via the Iridium channel in advance.

Setting of the Galileosky tracking device for data transmission via Iridium satellite channel is completed, the tracking device is ready for use.

RSA "Galileosky", LLC produces satellite monitoring equipment for GPS and GLONASS real time vehicles monitoring. The tracking devices determine the mobile object location recording the time and route as points with geographical coordinates and send the data to the server to be further processed and sent to the traffic controller panel.

In addition, a number of other vehicle parameters are recorded: the state of analog and discrete inputs of the tracking device and the state of digital interfaces.

The tracking devices can be used in any vehicle.