Special functions of Galileosky tracking devices: GPRS-traffic cost optimization, operation in roaming, Stealth mode

User Manual

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Contents

Necessary Tools, Devices, Materials ..................................................... 3
General Information ........................................................................ 4
Operation in Roaming ...................................................................... 5
Recommendations on GPRS Traffic Optimization ............................ 10
Stealth Mode and Packet Transmission ........................................... 15
Appendix №1 .................................................................................. 17
Necessary Tools, Devices, Materials

To set special functions you should have Windows-based computer with the installed program of configuration of Galileosky tracking devices – "Configurator". It is recommended to install the latest version of the program from the site https://galileosky.com/podderzhka/programmyi.html
Special functions of Galileosky tracking devices: GPRS-traffic cost optimization, operation in roaming, Stealth mode
(version 4 dated from May 7, 2018)

**General Information**

The Galileosky tracking device (hereinafter - the tracking device, device), besides performance of the main functions - determination of location of a mobile object, record and transfer of number of vehicle parameters, discrete and analog inputs state of the tracking device and digital interfaces to the monitoring server, possesses additional features.

Settings of the tracking device allow:

1. to lower financial expenses for data transmission in roaming;
2. to lower financial expenses for data transmission in the native region;
3. to reduce vehicle accumulator load and (or) to prolong operating time from the internal accumulator.
Operation in Roaming

The tracking device allows setting special parameters of data transmission in the international and national roaming.

Setting of the tracking device can be performed in two various ways:

1. in Configurator service program;
2. by means of commands.

ATTENTION! Device’s settings by default do not have any restrictions on operating in roaming. If necessary, you can set some restrictions on data transmission while the tracking device is in roaming (not in the home area) by performing the necessary settings.

ATTENTION! Depending on the device version, roaming settings can be completed either in Configurator software (“Settings” -> “Data transmission”), or by means of an additional algorithm designed on the Easy Logic tab. You can find out which way can be used for your tracking device in Appendix 1 of the present User Manual. Further, settings by means of “Settings” tab are described.

To configure the device settings in Configurator service program, you need to follow these steps:

1. Launch Configurator and go to the “Settings” tab -> “Data transmission” of the Configurator
2. In the section “Mobile country code (MCC)” set the necessary parameters:
   - when setting this parameter, specify a country code (the international roaming, for example for Russia – 250) or a code of the country and a code of the operator (national roaming). List of country codes can be viewed at [http://www.itu.int/dms_pub/itu-t/opb/sp/T-SP-E.212A-2010-PDF-E.pdf](http://www.itu.int/dms_pub/itu-t/opb/sp/T-SP-E.212A-2010-PDF-E.pdf).
   - “Maximum volume of session” – set the quantity of transmitted data in bytes or “Send the one first packet” value. Each cellular operator has minimum tariffing interval in roaming. It is recommended to set maximum data volume equal to half of this interval (the second half is left for maintenance TCP/IP traffic which volume depends on connection quality).
   - “Connection interval” - specify frequency of GPRS session installation for data transmission.

According to Picture 1, the tracking device has the following operation mode:
Special functions of Galileosky tracking devices: GPRS-traffic cost optimization, operation in roaming, Stealth mode
(version 4 dated from May 7, 2018)

If receiving a country code which is different from 250, and in case, when the list of codes is not provided, the tracking device activates the mode of operation in roaming and establishes communication via GPRS only every 3 hours, besides the size of transmitted data in 1 session should be not more than 5000 bytes.

3. If necessary, additionally set the codes of cellular operators in the section “List of mobile operator’s codes for SIM 0” (“List of mobile operator’s codes for SIM 1”) (Pic. 2).

4. Click “Apply” button.

The settings, presented in Picture 2, represent the following operation mode:

If there is a list of mobile operator’s codes, the tracking device checks if the received codes is equal to the operator’s codes from the list. If the received code is different from the codes in the list, then GPRS-session is not allowed.

In case, the received code is similar to one from the list (26001 or 26002), the tracking device checks, if the country code is equal to the home country code, set in the Configurator service program (250). If the country code is different from 250, the tracking device activated the operation mode of roaming and establishes GPRS connection every 3 hours, meanwhile the size of transmitted data should be less than 5000 bytes.

In general, device operation algorithm in roaming is the following:

1. The tracking device at the place of current position registers in cellular network and receives current country code and mobile operator code;
2. The tracking device checks if the parameter “List of mobile operator’s codes for SIM 0” is set, if so, it compares the received operator code with the list:
   2.1. In case the received operator’s code is not included in the list, the tracking device registers in the GSM-network, but GPRS-connection is never established;
   2.2. In case the received code is similar to one from the list (or this parameter is not set), the tracking device checks, if the country code is equal to the “Home country (MCC)”, set in the Configurator service program (250). If they are not similar, the tracking device activates the operation mode of roaming and establishes GPRS connection in accordance with the set parameters of “Interval” and “Max session length”.

Pic. 2
Setting lists of codes
Special functions of Galileosky tracking devices: GPRS-traffic cost optimization, operation in roaming, Stealth mode
(version 4 dated from May 7, 2018)

ATTENTION! Being in roaming the tracking device constantly supports registration in GSM-network but initializes GPRS-session only according to the schedule, thus it is always possible to make a call to the tracking device or send SMS with a command and decrease GPRS-traffic expenses.

ATTENTION! If the tracking device operates in the mode of roaming, pay attention to the settings “Settings” -> “Track” parameter “Order to send data from archive to server”. In case this parameter is set as “in chronological order”, then we recommend setting transmission of coordinates and sensors’ data in the first packet, as while attempting to establish GPRS-connection, when having data which are not sent yet, the tracking device tries to send the previous data, but not current one. Whereas the first packet can be sent anyway, thus during data transmission to the server the tracking device sends one point with current coordinates of the vehicle and the older, not transmitted part of the archive. In case the archive is stored at the SD-card, it is absolutely necessary to do, as the data from SD-card are sent in chronological order.

With the help of the following commands it is possible to configure roaming parameters remotely.

Command format
Roaming MCC_MNC,Size,Interval

Parameters
MCC_MNC – a mobile code of the country where the data can be transmitted without any limitations (the list of codes is given in http://www.itu.int/dms_pub/itu-t/opb/sp/T-SP-E.212A-2010-PDF-E.pdf), for example, the Russian Federation code is 250 or it may be a combination of mobile country and mobile operator codes. Zero means that there are no special roaming settings;
Size – maximum number of bytes which can be transmitted during one connection session in roaming. When the value is equal to 0, only the first packet is transmitted;
Interval – connections interval in hours.

Explanation
Settings of data transmission in roaming.

Example
Request: Roaming 25099,10000,24
Reply: ROAMING:Home=25099,MaxBytes=10000,Interval=24;
Special functions of Galileosky tracking devices: GPRS-traffic cost optimization, operation in roaming, Stealth mode
(version 4 dated from May 7, 2018)

Command format
OPS0 n1,n2,n3, n4,n5,n6,n7,n8,n9,n10,n11,n12,n13,n14,n15

<table>
<thead>
<tr>
<th>Parameters</th>
<th>n1-n15 – preferred GSM-networks</th>
</tr>
</thead>
<tbody>
<tr>
<td>Explanation</td>
<td>A list of preferred GSM-networks for a SIM-card (SIM0). The network is defined by a mobile country code and a mobile operator code (the list of codes is given in <a href="http://www.itu.int/dms_pub/itu-t/opb/sp/T-SP-E.212A-2010-PDF-E.pdf">http://www.itu.int/dms_pub/itu-t/opb/sp/T-SP-E.212A-2010-PDF-E.pdf</a>, for example, the Russian Federation code is 250.</td>
</tr>
</tbody>
</table>

Example
Request: OPS0 25001,25099
Reply: OPS0:25001,25099,,,,,,,,,,,;

Command format
OPS02 n16,n17,n18,n19,n20,n21,n22,n23,n24,n25,n26,n27,n28,n29,n30

<table>
<thead>
<tr>
<th>Parameters</th>
<th>n16-n30 – preferred GSM-networks</th>
</tr>
</thead>
<tbody>
<tr>
<td>Explanation</td>
<td>Additional list of preferred GSM-networks for a SIM-card (SIM0).</td>
</tr>
</tbody>
</table>

Example
Request: OPS02 25001,25099
Reply: OPS02:25001,25099,,,,,,,,,,,;

Command format
OPS1 n1,n2,n3, n4,n5,n6,n7,n8,n9,n10,n11,n12,n13,n14,n15

<table>
<thead>
<tr>
<th>Parameters</th>
<th>n1-n15 – preferred GSM-networks</th>
</tr>
</thead>
<tbody>
<tr>
<td>Explanation</td>
<td>A list of preferred GSM-networks for a SIM-card (SIM1) or a SIM-microchip.</td>
</tr>
</tbody>
</table>

Example
Request: OPS1 25001,25099
Reply: OPS1:25001,25099,,,,,,,,,,,;
Special functions of Galileosky tracking devices: GPRS-traffic cost optimization, operation in roaming, Stealth mode
(version 4 dated from May 7, 2018)

Command format

OPS12 n16,n17,n18,n19,n20,n21,n22,n23,n24,n25,n26,n27,n28,n29,n30

Parameters

n16-n30 – preferred GSM-networks

Explanation

Additional list of preferred GSM-networks for a SIM-card (SIM1) or a SIM-microchip.

Example

Request: OPS12 25001,25099
Reply: OPS12:25001,25099,,,,,,,,,,,,,,;
Recommendations on GPRS Traffic Optimization

GPRS-traffic expenses decrease at online monitoring may be reached by following these pieces of advice:

1. Turn off the transmission of not used information;
2. Increase the period of point recording into the device memory;
3. Set parameters of angle drawing;
4. Set coordinates filtering at a stop;
5. Use the protocol Galileosky with compression.

**ATTENTION!** Settings 2 and 3 should be carried out carefully, as they influence the quality of track.

**Turning off the transmission of not used information.**

To reduce the size of transmitted data, turn off transmission of some information if it is not important, for example, temperature, acceleration, analog and digital inputs values which have no connected sensors and so on.

1. In Configurator service program go to “Settings” tab -> “Protocol”.
2. Clean ticks from unnecessary parameters in the column “Main packet” (Pic. 3)
Special functions of Galileosky tracking devices: GPRS-traffic cost optimization, operation in roaming, Stealth mode
(version 4 dated from May 7, 2018)

3. Click “Apply” button.

The same operations can be performed using MainPack and MainPackBit commands.

Command format
MainPack bbbbbbbbbbbbb

Parameters
bbbbb bbbb bbbb bbbb – tag set from 1 to 128.
If b is replaced by 1, the tag is on.
If b is replaced by 0 the tag is off.
Tag numeration order is given in section Galileosky protocol data.

Explanation
Main packet configuring.

Example
Request: MainPack 11111111111111111111110000
Reply: MainPack= 000000000000000000000011111111111111111111110000
This means that tags 1, 2, 3, 4 are off and tags 5-26 inclusive are on. All the following tags are off.

Command format
MainPackBit index,value

Parameters
index – tag number, which is on or off for transmission to the server
value – 1 if this tag should be transmitted to the server
  0 if this tag should not be transmitted to the server
Tag numeration order is given in section Galileosky protocol data.

Explanation
Main packet configuring.

Example
Initially the second tag is off:
HeadPack=1100b
Switch on this tag.
Request: HeadPackBit 2,1
Reply: HeadPack=1100b

Increasing the period of point recording into the device memory.

To increase the period of points recording into the memory and, thus, reduce the amount of points that are recorded within a certain period of time, you need to carry out the following actions:

1. In Configurator service program select the “Settings” tab-> “Track”.
Special functions of Galileosky tracking devices: GPRS-traffic cost optimization, operation in roaming, Stealth mode
(version 4 dated from May 7, 2018)

2. Set the necessary parameters for “Period of points recording” (Pic. 4);

3. Click “Apply” button.

The same operations can be performed using *WrPeriod* command.

**Command format**

*WrPeriod* x,y

<table>
<thead>
<tr>
<th>Parameters</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>x</td>
<td>Period of packet recording in memory in motion, [sec.];</td>
</tr>
<tr>
<td>y</td>
<td>Period of packet recording in memory when the vehicle stops, [sec.].</td>
</tr>
</tbody>
</table>

**Explanation**

Period of packets recording when the vehicle is moving or when it stops.

**Example**

Request: *WrPeriod* 60,180  
Reply: WRPERIOD move=60 parking=180

**ATTENTION!** Server monitoring software has the parameter of the admissible period of inactivity of the tracking device and when exceeding the specified value, terminates the connection with the tracker. Find out the value of this indicator from the developers of the server software. This parameter should be considered when setting points recording period, otherwise, the traffic will increase because of overhead costs of connection restoration.

Let’s consider the example: points recording period at a stop is 1200 seconds (20 minutes), period of termination of connection by the server at inactivity of the tracking device is 180 seconds (3 minutes). The tracking device defined that the vehicle stopped and turned on the timer for record of the following point in 20 minutes, in 3 minutes the server terminated the connection since it didn’t receive data from the device. The tracking device immediately tries to restore the connection and reconnects to the server. This happens 6 times and only after 20 minutes the tracking device will send the next point. As a result, traffic expenses will considerably outweigh the savings from increasing points recording interval.

**Setting parameters of angle drawing**

To change settings of track drawing parameters and, thus, reduce the number of points, that are recorded on the vehicle motion, you need to carry out the following actions:

1. In the Configurator select the “Settings” tab -> “Track”.
2. Set higher values for parameters “Min. angle” and “Distance” (Pic. 5).
3. Click “Apply” button.

The same operations can be performed using Turning command.

## Command format

Turning \( V,A,D,S,dS \)

### Parameters

- \( V \) – minimum speed that enables drawing of the track at turnings, \([\text{km/h}]\);
- \( A \) – minimum turn angle for the tracking device to record a track point, \([\text{º}]\);
- \( D \) – the distance above which the next packet will be saved to the tracking device memory, \([\text{m}]\);
- \( S \) – the speed above which for \( dS \)-multiple value track point will be recorded, \([\text{km/h}]\);
- \( dS \) – speeding interval, \([\text{km/h}]\).

### Explanation

Configures track detail representation.

### Example

Request: Turning 3,10,300,60,20

Reply: TURNING: Speed=3, Angle=10, Distance=300, SpeedEx=60, SpeedDelta=20

## Setting coordinates filtering at a stop.

While at a stop, the tracking device records points with the interval, which is set in the field “During stop”.

The tracking device can determine the stop according to several elements:

- accelerometer data;
- external supply voltage;
- ignition sensor indications.

Period setting of point recording is carried out in accordance with the user manual “Setting Track by means of the Tracking Device”, which can be found in our site [www.galileosky.com](http://www.galileosky.com) on the tab “Support -> User Manuals -> General Information -> Setting of track by means of the tracking device” ([https://galileosky.com/podderzhka/dokumentacziya.html](https://galileosky.com/podderzhka/dokumentacziya.html)).

## Using Galileosky protocol with compression.

Galileosky tracking devices support data transmission protocol with compression.
Special functions of Galileosky tracking devices: GPRS-traffic cost optimization, operation in roaming, Stealth mode
(version 4 dated from May 7, 2018)

If the tracking device periodically is out of GSM network or GPRS network, it stores the data and then, when the connection is available, it sends the archive.

If such cases happen repeatedly, it is recommended to use Galileosky protocol with compression. When transmitting the archive, it would allow to reduce GPRS traffic.

To set the tracking device to operate with Galileosky protocol with compression, you need to carry out the following actions:

1. In Configurator service program go to tab “Settings” -> “Data transmission”
2. Select “Galileosky with compression” for the parameter “Data transmission protocol”
   (Pic. 6)

   ![Protocol settings](image)

   Similar settings can be performed by means of command `Protocol`.

**Command format**

`Protocol n`

**Parameters**

`n` – version of data transmission protocol:

- 0 – Galileosky protocol;
- 3 – EGTS;
- 4 – Galileosky protocol with compression

**Explanation**

Choice of monitoring data transmission to the server.

**Example**

Request: Protocol 0
Reply: PROTOCOL:0;
Stealth Mode and Packet Transmission

If continuous online monitoring isn’t a paramount need, it is possible to adjust packet data transmission.

In this case the tracking device will periodically contact, send data from a black box and disconnect from the server. The economy is reached due to reduction of overhead transmission costs of one information packet. It means that when sending data from the archive the size of a packet can reach 1000 bytes, and at online monitoring one point (weighs some tens of bytes) is usually sent. At the same time the operation time of the tracking device from the accumulator increases, as in periods of disconnection from the server, the tracking device disables the GSM module.

**ATTENTION!** Depending on the device version, Stealth mode can be set either in Configurator software (“Settings” -> “Data transmission”), or by means of an additional algorithm designed on the Easy Logic tab. You can find out which way can be used for your tracking device in Appendix 1 of the present User Manual. Further, settings by means of “Settings” tab are described.

To set the parameters in the Configurator you need to carry out the following actions:

1. Select the “Settings” tab -> “Data transmission”.
2. Set the necessary parameters in the section “Stealth mode and data packet transmission” (Pic. 7).

**ATTENTION!** Parameter “Connection period in hours” is set relating to Greenwich time (for example, the values given in the picture mean that the tracking device will contact every other day at 1 p.m. with the duration of the communication session – 5 minutes).

The same operations can be performed using Stels command:
Special functions of Galileosky tracking devices: GPRS-traffic cost optimization, operation in roaming, Stealth mode
(version 4 dated from May 7, 2018)

Command format
Stels pday,phours,minutesGSMOn

Parameters
pday – tracking device contact is enabled once on p days since the beginning of the month, in other words on days, multiple to pday;
phours – tracking device contact is enabled once at p hours since midnight GMT, in other words at hours, multiple to phours.
minGSMon – GSM-unit is enabled for minGSMon minutes since the beginning of the hour.

Explanation
Setting the Stealth mode.

Example
Request: Stels 2,13,5
Reply: STELS:pday=2,phours=13,minutesGSMOn=5

Parameters of Stealth mode setting:
- To enable connection once a day phours must be greater than 11, i.e. the connection once in 11 hours can be enabled at 11 o’clock and at 22 o’clock. If it is set to contact once in 12 hours, the contact will be enabled at 12 o’clock and the next must be at 24 o’clock, but this is the next day, therefore the connection will not be realized;
- Contact at 0 o’clock GMT cannot be enabled whatever the settings are;
- Remote commands will work only when the radio silence mode is disabled, i.e. GSM-unit is on;
- Do not set the connection time less than five minutes; otherwise, the tracking device will not have enough time to connect to the server and to tell its location.

Setting of special functions of the Galileosky tracking device: GPRS-traffic cost optimization, operation in roaming, Stealth mode 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.
Appendix №1

<table>
<thead>
<tr>
<th>Device version/Functionality</th>
<th>Galileosky 2.X</th>
<th>Galileosky 4.0</th>
<th>Galileosky 5.X</th>
<th>Galileosky Base Block</th>
<th>Galileosky 7</th>
</tr>
</thead>
<tbody>
<tr>
<td>Operation in roaming</td>
<td>Settings tab</td>
<td>Settings tab</td>
<td>Settings tab</td>
<td>Easy Logic algorithm</td>
<td>Easy Logic algorithm</td>
</tr>
<tr>
<td>Stealth mode</td>
<td>Settings tab</td>
<td>Settings tab</td>
<td>Settings tab</td>
<td>Easy Logic algorithm</td>
<td>Easy Logic algorithm</td>
</tr>
<tr>
<td>GPRS-traffic cost optimization</td>
<td>Settings tab</td>
<td>Settings tab</td>
<td>Settings tab</td>
<td>Settings tab</td>
<td>Settings tab</td>
</tr>
</tbody>
</table>

Table 1. Parameters of setting special functions depending on the device version