GLONASSSoft BLE Identification system

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Parameters for registration in Wialon:

1. Identifier: IMEI 1111222233334444 (SAMPLE)
2. IP address of the server: 193.193.165.165
3. Port: 21336 (UMKa300), 21510 (UMKa301), 21946(UMKa302); 21787(UMKa 310)

BLE Identification system

The document describes the main operating principles of the identification system based on BLE technology in terminals UMKa302 and UMKa310.B

1. Theory

There is a beacon on the basis of BLE identification that intermittently transmits the unalterable data packet. There exist several standards for the data transmitted by beacons that are competing with each other: iBeacon, Eddystone and AltBeacon.

The most widespread, simple and suitable for the tasks turned out to be the iBeacon standard.

iBeacon transmits the set of announcements with the interval from a fraction of second to some seconds which along with the heading contains a useful load

UUID - a unique identifier from the groups of beacons on 128 bytes. In order to get a unique UUID one should use special generators. For example,

Major - unsigned number on 16 bytes that allows to classify the beacons with the same UUID together

Minor - unsigned number on 16 bytes that allows to classify the beacons with the same UUID and Major

Measured Power - signed integer on 8 bytes - the indication value of the level of the received signal (RSSI) that is 1 meter calibrated from the receiver and that is used for proximity sensing of the beacon to the receiver. It is measured in dBm.

Terminals UMKa302(verson 2.10.1) and UMKa310B(version 0.27.0) are able to emulate one iBeacon. Also the terminals have four independent, flexibly set up monitoring channels of iBeacon identificator

Before the setting of identification functions it is necessary to turn on Bluetooth BLE «BLEMODE 2» or combined configuration mode and BLE «BLEMODE 3»

The setting of the Beacon is performed with the command of «BLEIDBEACON [EN[,UUID[,MAJOR[,MINOR[,ONEPWR]]]]]» where

EN - mode of beacon operation
EN=0 - beacon is turned off
EN=1 - beacon is turned on
UUID - UUID of D595A152-A7E9-4A1F-A65D-CCA4C719D2DF type
MAJOR - Major ranging from 0 up to 65535;
MINOR - Minor ranging from 0 up to 65535;
ONEPWR - measured power of the beacon on 1 meter distance

The setting of monitoring channel is performed with the command of «BLEIDLISTENn[MODE[,MAXDIST[,DEFEN[,EVENTEN[,UUID[,MAJOR[,MINOR]]]]]]]» type where

n - monitoring channel from 0 to 3
MODE - mode of monitoring channel operation
MODE=0 - monitoring channel is turned off
MODE=1 - the reception of identificators with exact concurrency of UUID, Major and Minor
MODE=2 - the reception of identificators with exact concurrency of UUID and Major, there can be any Minor
MODE=3 - the reception of identificators with exact concurrency of UUID. There can be any Major and Minor
MODE=4 - the reception of all identificators with any UUID, Major and Minor
MAXDIST - the maximum distance of identificators' reception. The properly set up identificator beyond the circle with the MAXDIST radius will definitely not be «heard». Everything that is nearby is likely to be perceived. The maximum value is limited by 100 meters.

DEFEN - to transmit the value natively or not if there are no suitable identificators nearby

DEFEN=0 - when there are no suitable identificators, nothing is transmitted onto the server

DEFEN=1 - when there are no suitable identificators, the «0» is transmitted onto the server

EVENTEN = the recording of the point in Black Box with each value alteration in the channel

EVENTEN=0 - the recording of the point in Black Box is not performed by alteration

EVENTEN=1 - the recording of the point in Black Box for any alteration in the operation of the channel

UUID - UUID of D595A152-A7E9-4A1F-A65D-CCA4C719D2DF type

MAJOR - Major ranging from 0 to 65535

MINOR - Minor ranging from 0 to 65535

Notice! The distance to identificator is calculated according to the level of its signal. Each identificator transmits the reference level of signal measured on 1 meter distance. This method of distance calculation is extremely rough. Moreover, various factors affect it, e.g. obstacles, interferences, mutual position of beacon and receiver, precision of detection and setting of reference power, etc. It should be taken into account during the setting and usage of the identification system based on BLE identificators.

For each monitoring channel one parameter for 4 bytes is transmitted onto the server. The value transmitted onto the server consisits of Major and Minor values of accepted identificator. In general the conversion formula is ID = Major * 65536 + Minor. The names of parameters are given in the chart.

Protocol		Description
IPS	Combine	
BleId0	driver_code8	Identification BLE. Channel 0
BleId1	driver_code9	Identification BLE. Channel 1
BleId2	driver_code10	Identification BLE. Channel 2
BleId3	driver_code11	Identification BLE. Channel 3

Notice! The terminal reacts to the shift of identificator outside the outlined radius or its delayed disconnection that can take place for up to 1,5 minutes.

2.Practice
Search of the nearest active identificators

Enter the command «BleIdListen0 4,100». Listen in the channel 0 without checking UUID. Maximum distance to identificator is 100 meters.
Perform reload
Turn the loggs on
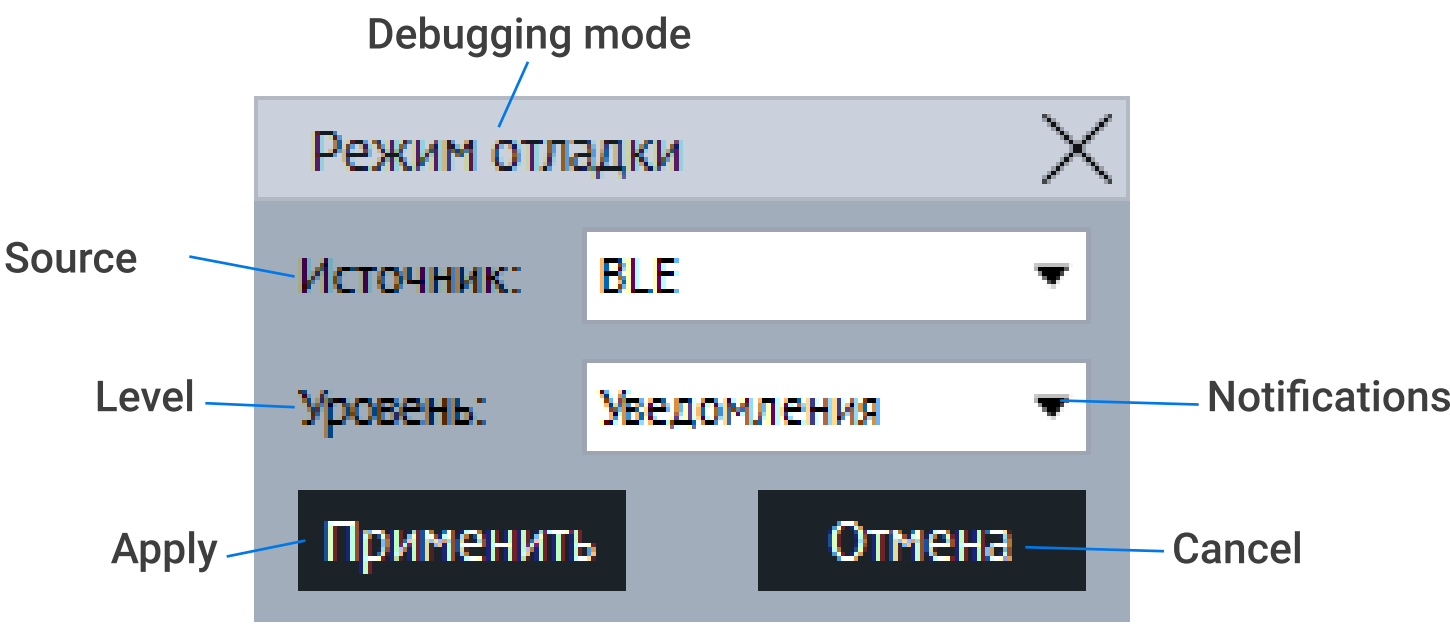
After some time (up to 1 minute) the following sentences will start to appear:
< N10:23:35 BLE: BLEID[0] iBeacon FDA50693-A4E2-4FB1-AFCF C6EB07647825,10011,10011 detected at 0.208m
< N10:23:35 BLE: BLEID[0] iBeacon D595A152-A7E9-4A1F-A65D CCA4C719D2DF,0,1 detected at 0.078m
< N10:23:35 BLE: BLEID[0] iBeacon E2C56DB5-DFFB-48D2-B060-D0F5A71096E0,0,0 detected at 0.004m
< N10:23:35 BLE: BLEID[0] iBeacon FDA50693-A4E2-4FB1-AFCF-C6EB07647825,10,7 detected at 0.026m

The terminal detects 3 identificators and one terminal UMKa310 that is set up onto identificator mode beforehand at the distance of up to 1 meter. Their UUID, Major and Minor are known.

Setting up drivers' identification

Suppose that there is a neccessity to set up drivers' identification in Wialon system based on BLE identificators and the terminals UMKa302 and UMKa310. for a large motor vehicle convoy which has several divisions. Originally it is neede to compile a unique UUID for all drivers of the motor vehicle convoy given. The external resource https://www.uuidgenerator.net/ is used for this purpose.

Suppose the generator gives the value fda50693-a4e2-4fb1-afcf-c6eb07647825.

Next it is neccessary to attach the code for each division. It is Major.

In our example the codes of devisions have values 10 and 10011

In each devision the drivers are assigned the codes that are unique within this division. It is Minor

In our example the drivers' codes have values 7 and 10011

These values need to be inscribed into identificators. The identificators have their methods of setting up depending on manifacturer

Into identificator 1 inscribe the following identifiers
UUID: fda50693-a4e2-4fb1-afcf-c6eb07647825, Major: 10011, Minor: 10011

Into identificator 2 inscribe the following identifiers
UUID: fda50693-a4e2-4fb1-afcf-c6eb07647825, Major: 10, Minor: 7

Setting up the terminal. Drivers' identification takes place on level zero of monitoring identificators

Next it should be determined whether the drivers from different divisions are capable to control one object. If so, opt for monitoring mode MODE=3 with concurrency check according to UUID. If not, MODE=2 with concurrency check of UUID and Major should be chosen. For simplicity of demonstration next use the mode MODE=3 with concurrency check according to UUID only.

Then the distance of identificators' detection should be calculated. As everthing is very subjective and depends on many factors, let determine the radius of operation outside the border 5 meters. MAXDIST=5.

Also for monitoring the end of driver's work turn the option of value transmission natively if there are no suitable identificators in the operation radius. DEFEN=1

Also turn episode generation on with any alteration in the state or channel value. EVENTEN=1

Set UUID. UUID= fda50693-a4e2-4fb1-afcf-c6eb07647825.

If monitoring mode MODE=2 is used with concurrency check of UUID and Major, it is neccessary to also set up Major. It is not mandatory in this case.

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Final command for setting up the terminal:
«BleIdListen0 3,5,1,1,fda50693-a4e2-4fb1-afcf-c6eb07647825»

After the setting reload the terminal

When identificators and terminals are set up it is neccessary to define unique identifiers of each driver according to the formula ID = Major * 65536 + Minor.

For the first driver ID = 10011 * 65536 + 10011 = 656090907

For the second driver ID = 10 * 65536 + 7 = 655367

Inscribe the drivers into the system

Name	Имя: *	Пользователь1 — **User1**
Code	Код:	656090907
Description	Описание:	
Phone number	Телефонный номер:	
Mobile key	Мобильный ключ:	
Eliminating	Исключающий: ?	☑
Derived field	Произвольные поля:	

	Имя: *	Пользователь2 — **User2**
	Код:	655367
	Описание:	
	Телефонный номер:	
	Мобильный ключ:	
	Исключающий: ?	☐
	Произвольные поля:	

Next open «List of automatic attachment» v ⊷ button and choose objects on which drivers can be appointed.

Then it is necessary to create the sensor of «Driver's appointment» in characteristics of objects and point the parameter of the chosen monitoring channel.

Name	Имя: *	Водитель — **Driver**
Type of sensor	Тип датчика:	Привязка водителя — **Driver's appointment**
Unit of measure	Единица измерения:	
Parameter	Параметр: * ?	driver_code8
Last message	Последнее сообщение: ?	☐
Description	Описание:	
Validator	Валидатор:	Нет — **No**
Type of validation	Тип валидации:	Логическое И — **Logical I**
Validate the end of operation	Валидировать снятие: ?	☐
Code of the end of operation	Код снятия:	0

Example of the operation of a set up system

Manual appointment and history - User2
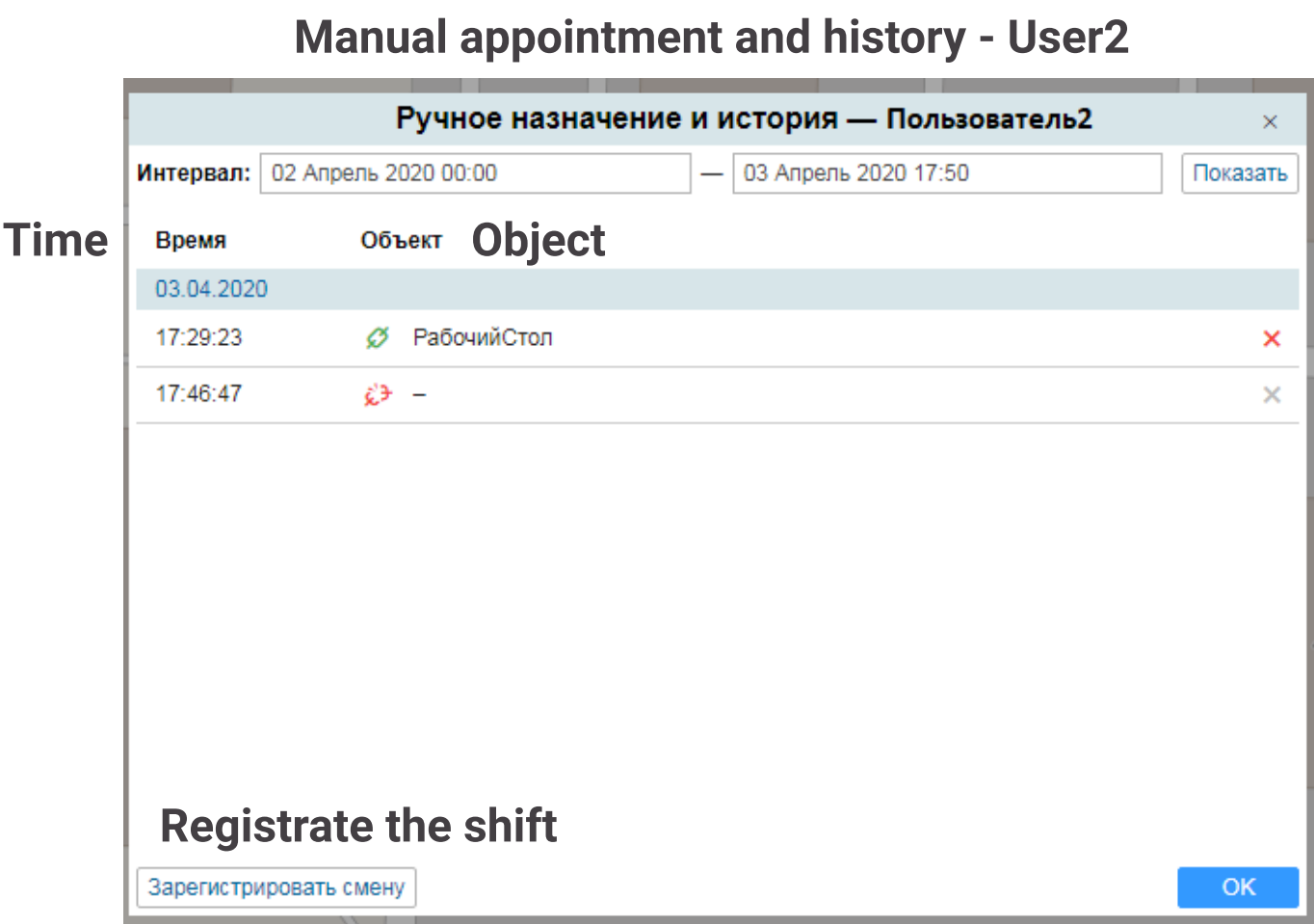
Control over trailers

In functional terms the monitoring of trailers is mostly identical to the drivers' monitoring. In order the trailers do not intercross with the drivers it is sensible to use own UUID. It is possible to set up identification of trailer on any free monitoring channel. It is also reasonable to set up a big identification radius (e.g. 20 meters). However, it must be customized.

Using the terminal as identificator

In functional terms the monitoring of trailers is mostly identical to the drivers' monitoring. In order the trailers do not intercross with the drivers it is sensible to use own UUID. It is possible to set up identification of trailer on any free monitoring channel. It is also reasonable to set up a big identification radius (e.g. 20 meters). However, it must be customized.

Setting up mutual BLE identification of terminals

For mutual identification of nearby positioning terminals UMKa302 and UMKa310.B it is recommended to simultaneously turn beacon mode on and set up monitoring channel on each terminal.

Beacon is turned on with the command «BleIdBeacon 1». The values UUID, Major and Minor are native.

Use any free monitoring channel, e.g. channel 3. The monitoring mode MODE=3 is without Major and Minor check. Parameters MAXDIST, DEFEN and EVENTEN are kept if needed. UUID is kept with native value D595A152-A7E9-4A1F-A65D-CCA4C719D2DF. The example for detection of terminals-identifictors within the radius of 50 meters with episode formation is «BleIdListen3 3,50,0,1»

Control of digital input with BLE identificators

The algorythm of control over digital input with BLE identificators can be implemented with the help of MyLogic script. Script has access to the values that are received on any monitoring channel.

Due to the script either the most basic algorythms can be implemented, e.g. the output start if identificator is near the terminal, or more sophisticated as white lists of identificators that unlock the output with an opportunity of remote download of this list (up to 64 units) or the switch off detention if identificator is outside activity zone.