Connection to the synchronization unit

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The external synchronization unit allows to synchronize the time (the beginning of each second) across multiple devices (up to 7) with an accuracy less than a microsecond, so all the connected units can enable transmitters at the same time. This entirely eliminates mutual interference of the neighboring sectors, when one transmitting unit with its power signal interferes to the neighbor unit to receive weak signal of its customers.

The synchronization unit can be used only for "**H08**" hardware platform**, Omx** and **Mmx** models.

In order to connect to the synchronization unit TDMA firmware version must be installed on InfiNet Wireless R5000 devices.

> ⚠️ **NOTE**
>
> You can download TDMA firmware version via https://ftp.infinet.ru/pub/Firmware/beta/TDMA/.

Firmware

Firmware Version:	H08S11-TDMAv2.0.57
Build Date:	Aug 11 2016 14:46:46
Serial Number:	51867
Part Number:	R5000-TEST_LAB
Platform:	Processor: PPC460EX 1000 MHz
Uptime:	01:18:35
Last Reboot Reason:	firmware upgrade

Download Certificate for upgrade over SSL

Figure - TDMA firmware version

In order to enable the synchronization mode:

via Web interface:

- Go to the section "Basic Settings" -> "Link Settings" -> "rf5.0"
- Check the box "*Use AUX-ODU-SYNC*"
- Click "**Apply**" button.

via CLI:

- Go to the section "Command Line"
- In the field "*Command*" enter the following command

```
tsync enable
```

- Click "**Execute**" button.

> **⊘ CAUTION**
>
> The device coordinates are transmitted via the standard NMEA sequences in ASCII code. The false definition of control characters to enter to the boot monitor service mode can occur during synchronization signal receiving since the synchronization unit is connected to the console port of the base station on a non-standard rate.
>
> In order to avoid this, in case the device with:
>
> 1) **MINT** firmware:
>
> - Upgrade the device boot monitor via command
>
> ```
> _upgrade -q
> ```
>
> > **⚠ NOTE**
> >
> > "*_upgrade -q*" command is available starting with firmware version "*MINTv1.90.17*". It is recommended to install the firmware version not lower than "*MINTv1.90.25*" before the boot monitor upgrade. The command can be executed via a web interface in the section "Command Line".
>
> - Connect the synchronization unit to the device console port.
> - Upgrade to **TDMA** firmware version.
> - Reboot the device.
>
> 2) **TDMA** firmware:
>
> - Make sure you have the latest firmware version and then connect the synchronization unit.
> - Otherwise, update the firmware to the latest version and after reboot connect the synchronization unit.
>
> 3) Just upgraded from **MINT** to **TDMA** firmware:
>
> - Reboot the device and only after that connect the synchronization unit to the device console port.

In the section "Device Status" -> "Link Statistics" the information about synchronization status and the number of visible satellites is displayed.

Sync(0us)   Sat:4   H08S11-TDMAv2.0.57

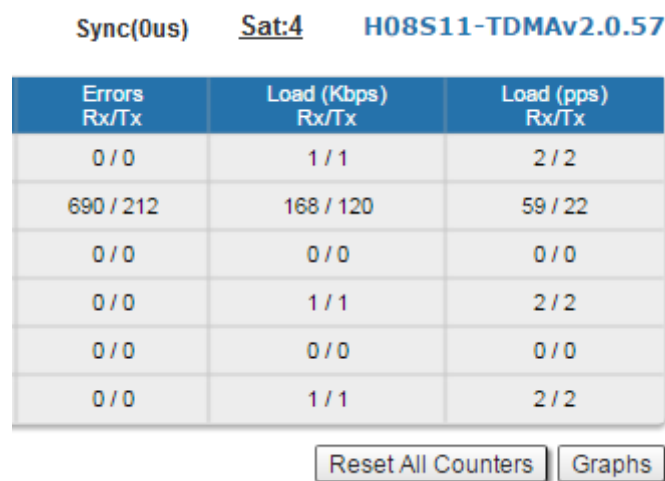| Errors Rx/Tx	Load (Kbps) Rx/Tx	Load (pps) Rx/Tx
0 / 0	1 / 1	2 / 2
690 / 212	168 / 120	59 / 22
0 / 0	0 / 0	0 / 0
0 / 0	1 / 1	2 / 2
0 / 0	0 / 0	0 / 0
0 / 0	1 / 1	2 / 2

Reset All Counters   Graphs

Figure - Sync status with the number of visible satellites

The synchronization mode information can be obtained in the "Command Line" section via command:

```
tsync
```

Time offset histogram is displayed below.

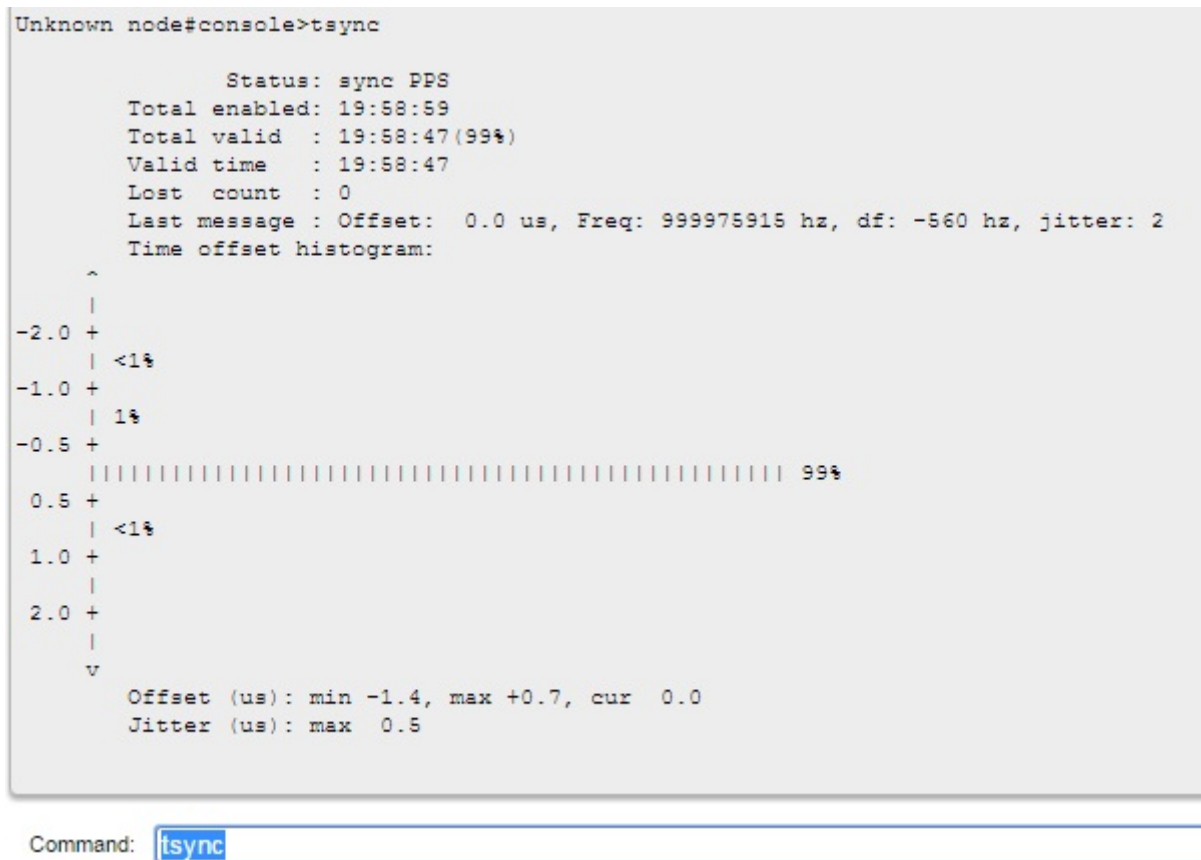The limiting values of the time offset and jitter are in the bottom of the histogram.

```
Unknown node#console>tsync

              Status: sync PPS
       Total enabled: 19:58:59
       Total valid  : 19:58:47(99%)
       Valid time   : 19:58:47
       Lost  count  : 0
       Last message : Offset:  0.0 us, Freq: 999975915 hz, df: -560 hz, jitter: 2
       Time offset histogram:
      ^
      |
-2.0 +
      | <1%
-1.0 +
      | 1%
-0.5 +
      |||||||||||||||||||||||||||||||||||||||||||||||||||||| 99%
 0.5 +
      | <1%
 1.0 +
      |
 2.0 +
      |
      v
       Offset (us): min -1.4, max +0.7, cur  0.0
       Jitter (us): max  0.5

Command:  tsync
```

Figure - Time offset histogramm

Parameter	Description
Status	Current device status
Total enabled	Total time during which the synchronizaion unit was enabled
Total valid	Total time during which the timing accuracy was better than 10 microseconds
Valid time	Time during which the timing accuracy was better than 10 microseconds
Last message	Last message from synchronization software

Table - Synchronization mode information

Additionally in order to determine the device coordinates GNSS position can be enabled:

via Web interface:

- Go to the section "Basic Settings" -> "System Settings"
- Check the box "*Use GNSS Position*"
- Click "**Apply**" button.

Title

Figure - Use GNSS Position

via CLI:

- Go to the section "Command Line"
- In the field "*Command*" enter the command

```
gps start
```
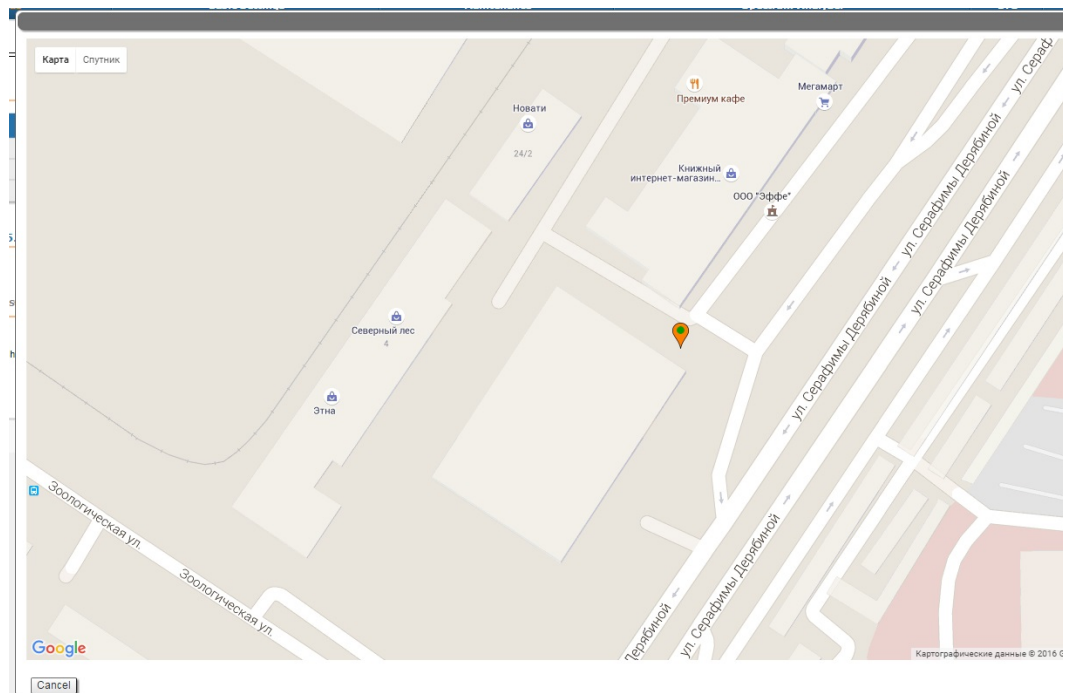
Click "**Open map**" to view the device location.

Figure - Device location

The map is updated in real time that allows to monitor the movement of the device mounted on the mobile object.

More detailed GNSS statistic can be obtained via command
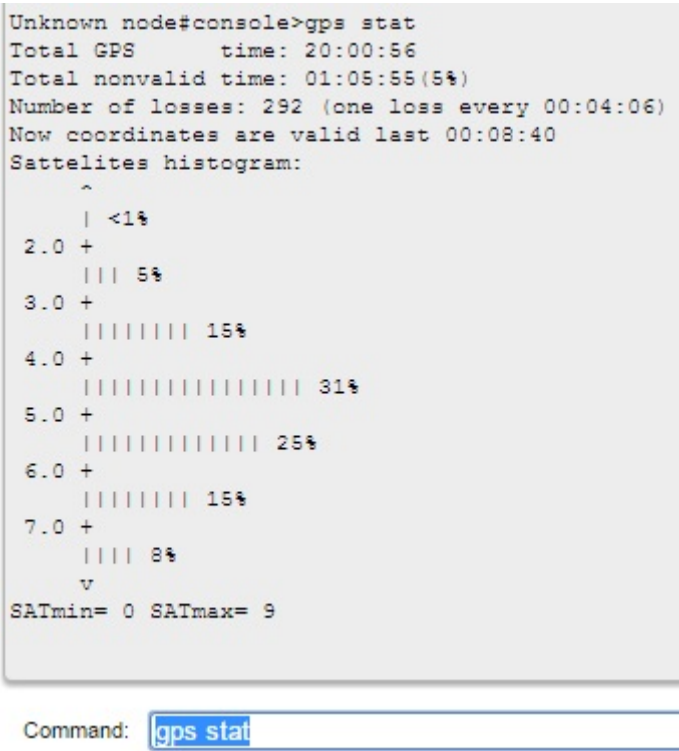
```
gps stat
```

Title

```
Unknown node#console>gps stat
Total GPS      time: 20:00:56
Total nonvalid time: 01:05:55(5%)
Number of losses: 292 (one loss every 00:04:06)
Now coordinates are valid last 00:08:40
Sattelites histogram:
        ^
        | <1%
  2.0 +
        ||| 5%
  3.0 +
        ||||||||| 15%
  4.0 +
        ||||||||||||||||| 31%
  5.0 +
        |||||||||||||| 25%
  6.0 +
        ||||||||| 15%
  7.0 +
        |||| 8%
        v
SATmin= 0 SATmax= 9
```

Command: gps stat

Figure - GNSS statistic

Параметр	Описание
Total GPS time	Total time of GPS operation
Total nonvalid time	Total time during which the information about coordinates was unavailable
Number of losses	Quantity of cases when the information about coordinates had become unavailable
Now coordinates are valid last …	Time of GPS operation since last coordinates discovering
Sattelites histogram	Histogram of visible satellites quantity
SATmin	Minimum of visible satellites (since the last time you cleared the statistic)
SATmax	Maximum of visible satellites (since the last time you cleared the statistic)

Table - GNSS statistic description