ACKSYS
COMMUNICATIONS & SYSTEMS

HOW-TO

APNUS026
How to Get GNSS NMEA Data

Content

1. Glossary

GPS : Global Positioning System

GPS is the generic term used to describe the satellite-based timing and positioning system operated by

the United States Department of Defense (DoD), Galileo (European), GLONASS (Russian) and Beidou (Chinese).

NMEA: National Marine & Electronics Association

GNSS: Global Navigation Satellite System

SNMP: Simple Network Management Protocol

2. Introduction

By installing GPS devices as Acksys router on fleet vehicles or buses, fleet managers can track their trucks or buses' locations and statuses, as well as get important insights about their fleet's efficiency.

Fleet managers use GPS on a daily basis to keep track of their fleets and other assets. They can get information that helps them solve issues such as compliance, efficiency, and safety reason why Commercial fleets often use GPS to monitor their fleet vehicles.

3. Scenario details

Some models from the Acksys Router family (RailBox, AirWan, AirBox, etc..) have embedded an internal GPS module. This means that besides Cellular router conventional tasks (giving Internet connectivity to connected devices), they can also perform additional tasks with the GPS location.

First defined by the National Marine Electronics Association, NMEA is currently the most common data format supported by GNSS equipment. It allows connecting different types of hardware and software

4. Installation Overview and Prerequesites

Before we begin, let's overview the configuration that we are attempting to achieve and the prerequisites that make it possible in this How-To note :

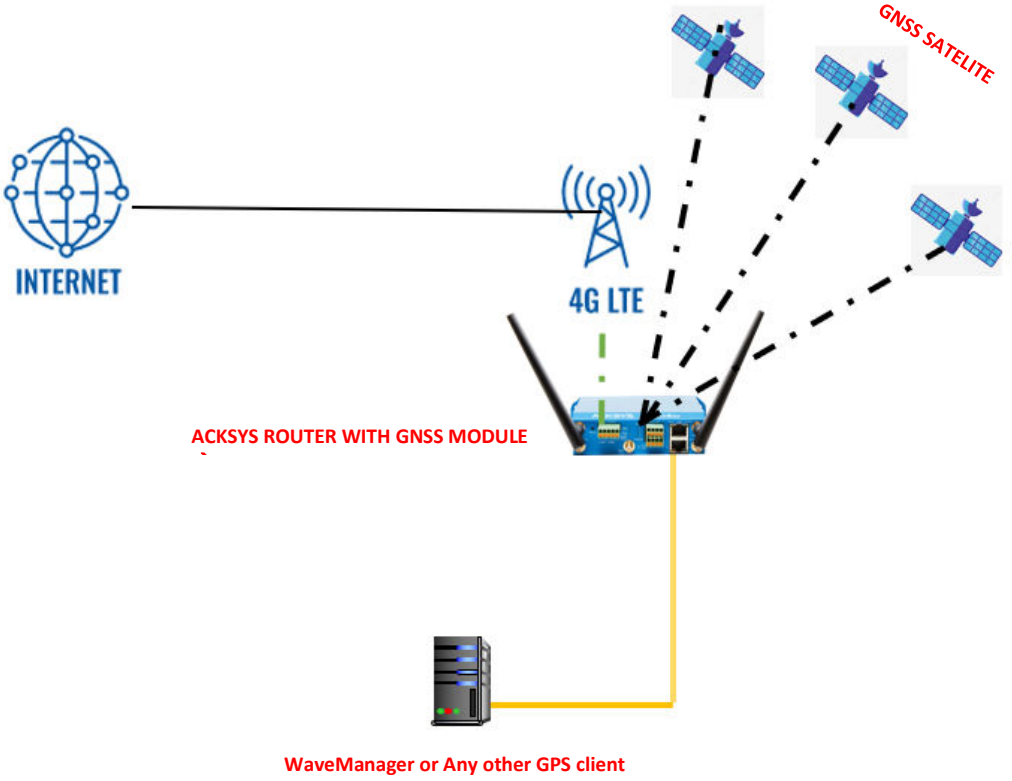
- GPS Server: One Cellular AirBox router or any type of Acksys Cellular Router
- Connect GPS antenna on the GPS connector
- A valid SIM card from an ISP
- A GPS NMEA frame Receiver Client : WaveManager or any type of GPS received Server
- Laptop to configure the router

5. GNSS System types

There are different type of GNSS system in the world and the GNSS component embedded with Acksys Cellular router automatically can track position of the four existing satellite systems, GPS (American), Galileo (European) GLONASS (Russian), Beidou (Chinese)
The purpose of GNSS system is to provide signals from space and transmit timing and positioning data to the GNSS receivers located on Earth. The receivers further use these data to determine your precise location.

6. GNSS Configuration architecture

In this How-To, we will explain in detail how to access directly the Acksys router's internal GPS NMEA data from an external GPS client.



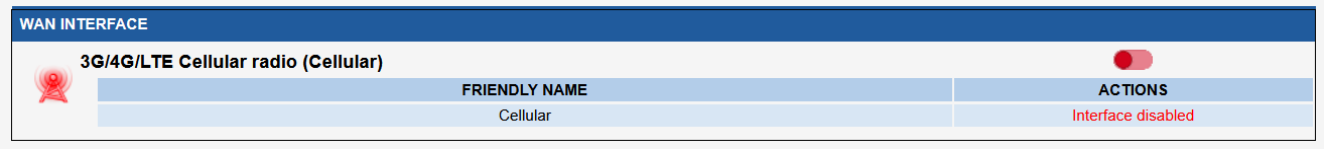
7. ACKSYS Router configuration

We may need the Acksys Cellular router to have a server prepared to the event of an external client receiver, so the GPS NMEA data is sent through it. For this configuration it will be enough to specify In this note, the WIFI interface will not be configured but we will use the default LAN setting and configure WAN Cellular interface.

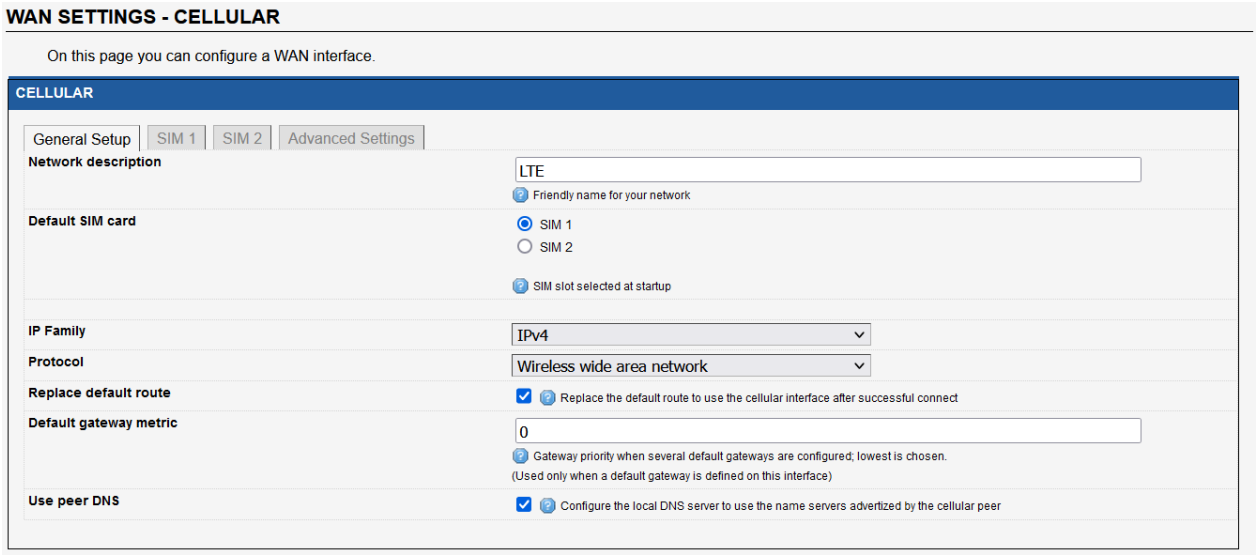
Configuring WAN Interface

If you have familiarized yourself with the configuration scheme and we can start configuring the router using instructions provided in this section:

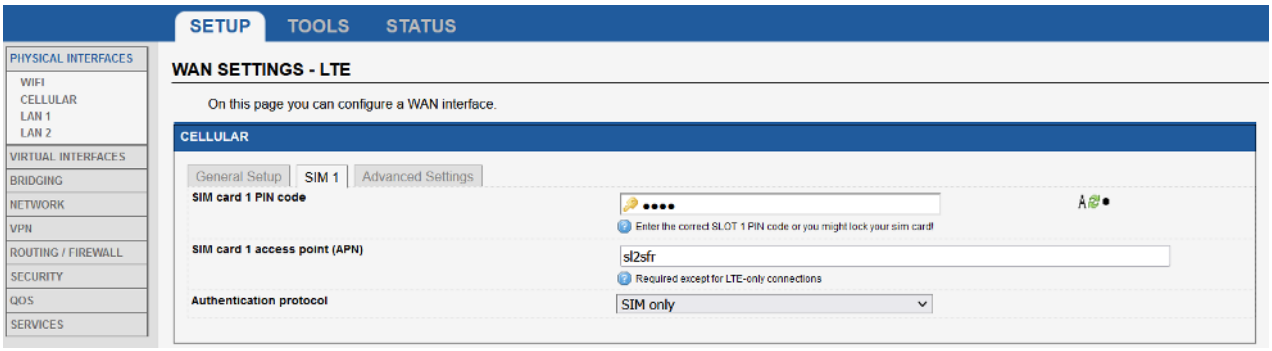
in GUI and go to Setup → Physical Interfaces → Enable the WAN Interface.



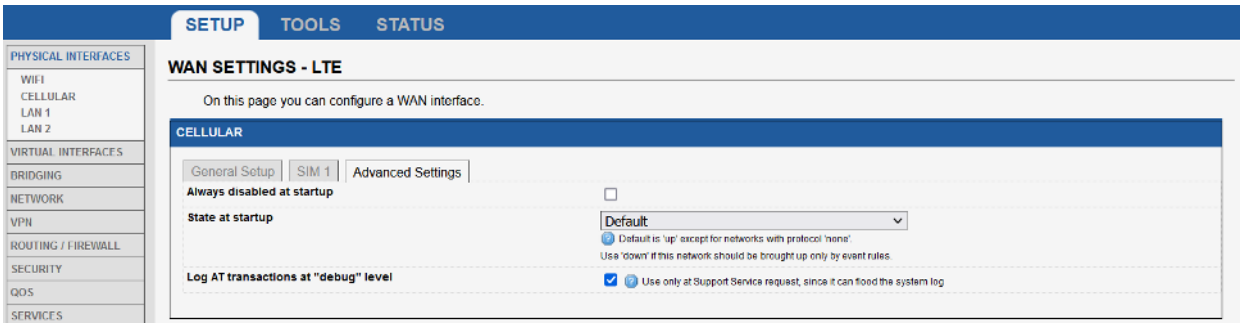
- Click the "Edit" button located to the right and configure WAN Interface.
  - General Setup
    - Select IPv6 in IP family
    - Check Replace default route
    - Set 0 as routing metric 0 for default gateway
    - Check Use peer DNS in case DNS is on the LAN to use the ISP DNS
    - Save



- Select the correct SIM slot (in case of dual SIM) and fill out APN with the connection information provided by the ISP (in this case sfr SIM card is used): sl2sfr



- Enable AT transactions logs for better understanding in troubleshoot in case of issue.
- Save and apply the config



- Save and apply the config

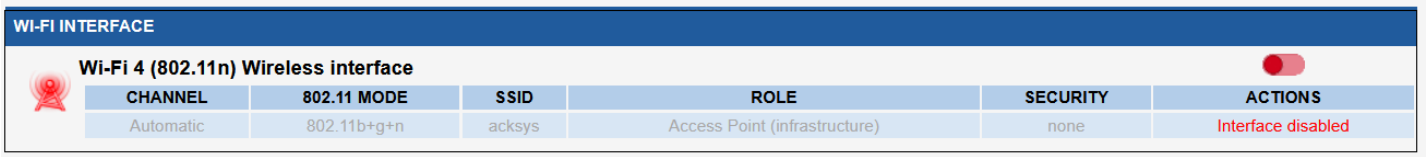
To check NMEA frame in CLI, we need to enable Cellular Log Level to Debug for more GNSS information in log.

Go in Tools Logs Setting→ Cellular → Log Setting

- Save and apply the config

Configuring WIFI Interface

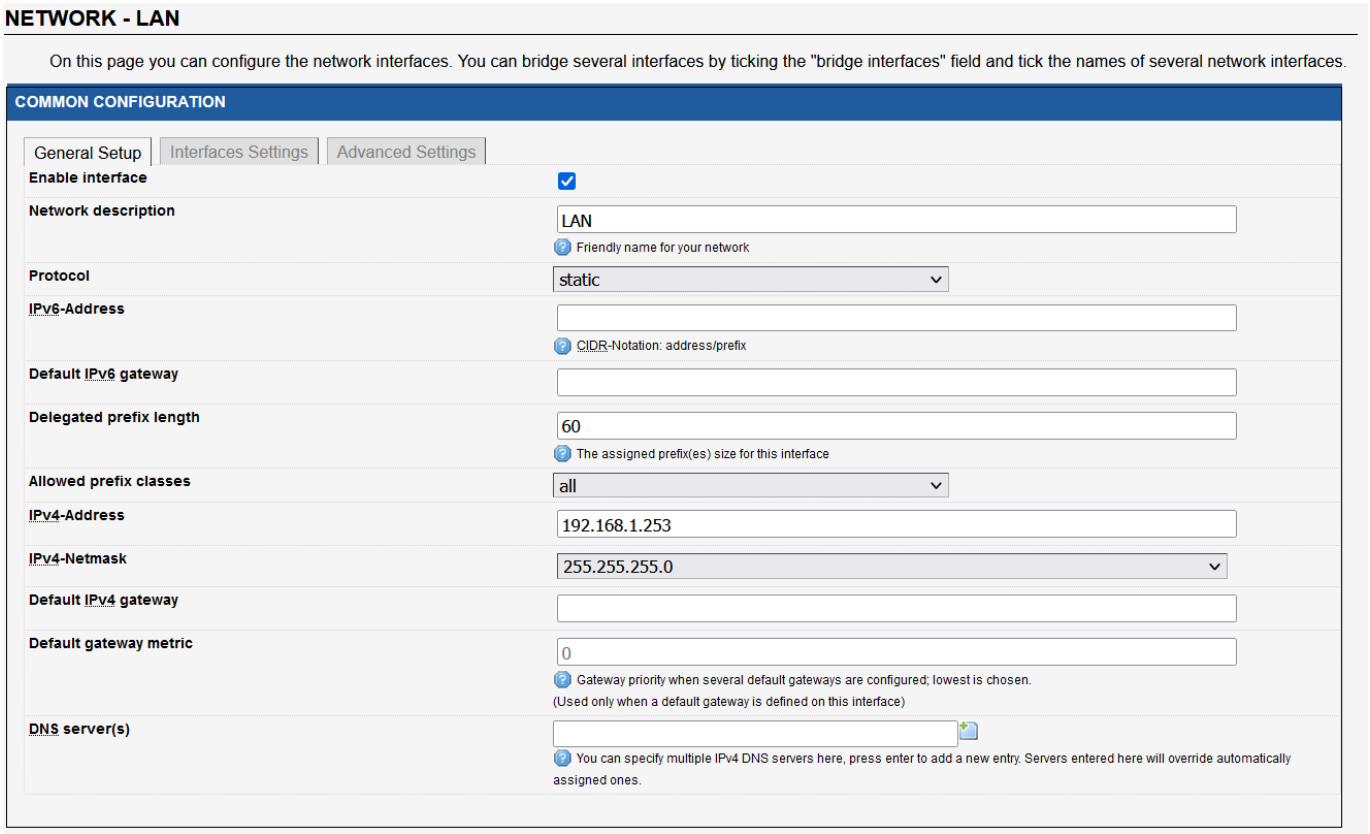
In this note, the WIFI interface will not be enabled or used.

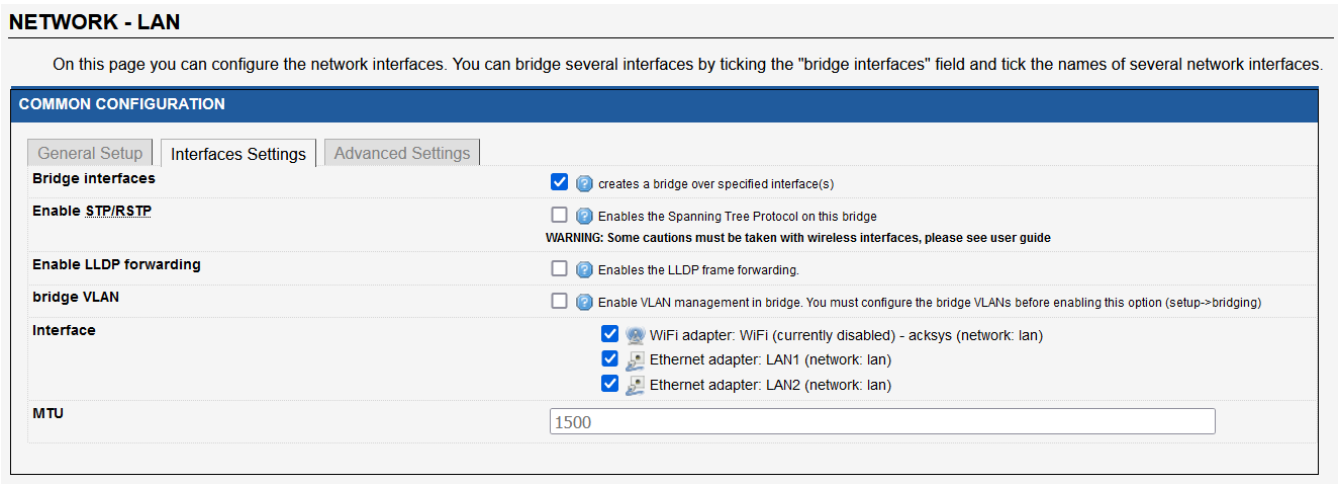


Configuring LAN Interface

In this note, we will use the default IP address of the router 192.168.1.253 in this section:

Go in GUI and go to Setup → Physical Interfaces → LAN setting Interface.

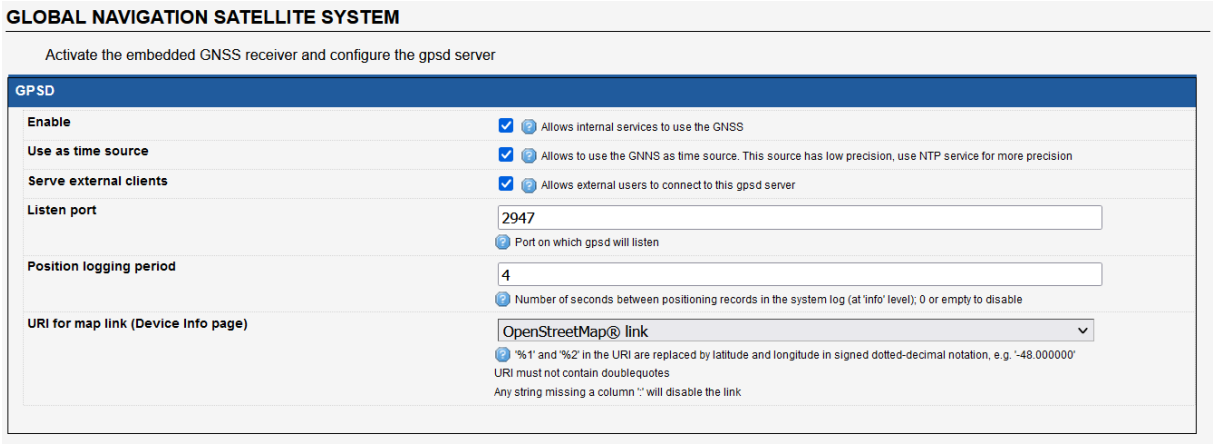




Configuring GNSS Agent

If you have familiarized yourself with the configuration scheme and have all of the device in order, we can start configuring the router using instructions provided in this section:

- Login to the router's WebUI and go to Setup → Services→GNSS Agent. Do this on the router:



Enable

Allow use of the location service.

Serve external clients

Allow devices outside of the product to query its position using the gpsd protocol. If disabled, the position can still be queried with SNMP, displayed on the Status→Device Information page, or logged to an external log server.

Listen port

Change TCP server port for external clients :2947

Position logging period

Periodically add an entry in the system log indicating current position:4

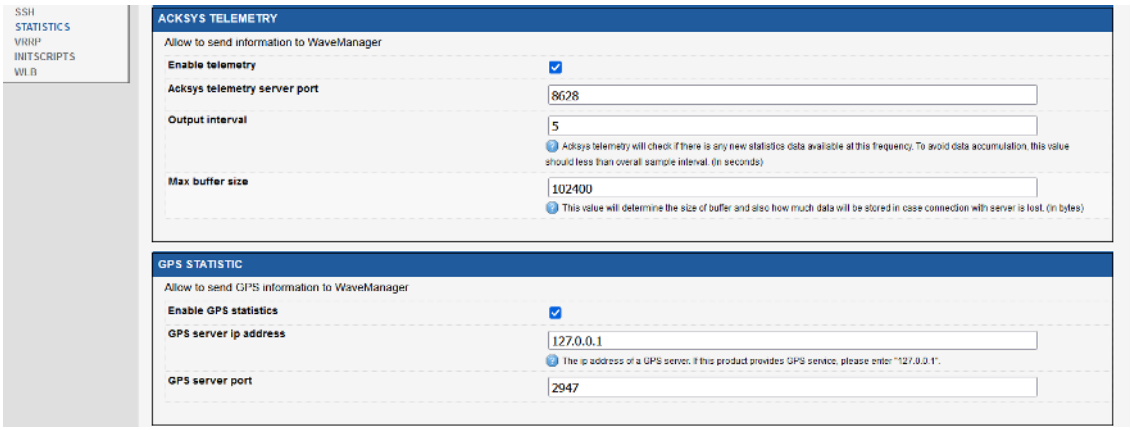
URI for map link

The current position that appears on the Status→Device Information page is embedded in a web link, allowing for example to display a map using external services. Here you can choose among renown public services, or set up a link to your preferred web server. To disable the link entirely, choose **custom** and enter a dash or a hash mark (anything but a column). If the string **%1** appears in the link, it will be replaced with the latitude, and **%2** will be replaced with the longitude.

It is also possible to retrieve NMEA Data in local or on a remote GNSS Client as receiver if you want to read NMEA DATA on another device.

Login to the router's WebUI and go to Setup → Services → Statistic. Do this on the router:

- Enable GPS statistic
- GPS server IP address :127.0.0.1
- GPS server port: 2947
- Save and apply

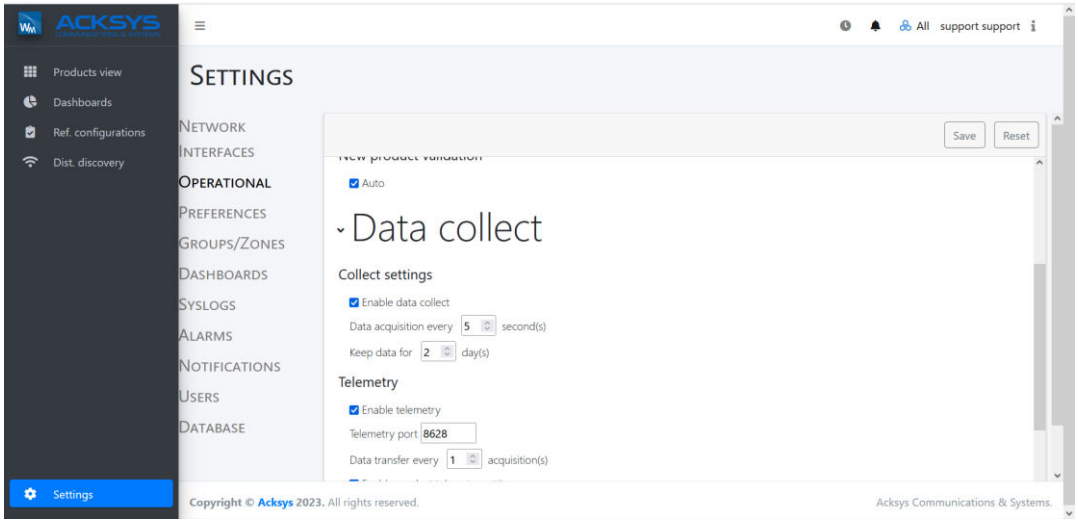


NOTE:

GPS Server IP address 127.0.0.1 because the Acksys cellular router provides GPS service and the Telelemetry service is used in order to send logs to WaveManager Server in this note.

Configuring WaveManager to access GNSS POSITION via Telemetry

In this note, we will also use WaveManager Server to receive GNSS position therefore we will enable Telemetry service. To enable Telemetry service on WaveManager in Setting→ Data Collect → Operational→ enable Data Collect →Save



8. STATUS

If you've followed all the steps presented above, your configuration should be finished and let have an overview on status of the Cellular and GNSS.

WAN Router Wireless: Status

In GUI and go to **Status → Cellular**

CELLULAR STATUS

Warning: scanning will break established connections which use that radio.

Cellular interfaces

RADIO	MODEM INFORMATIONS	ATTACHED	OPERATOR MCC/MNC	BASE STATION LAC/CID	ACCESS TECHNOLOGY	INFRASTRUCTURE BAND CHANNELS	RSSI	BER	SCAN
Cellular	Password accepted **IMSI:** 208101188844640 **IMEI:** 866758042299632 **model:** EC25 rev A6.3 EMEA **band:** LTEFDD: B1/B3/B5/B7/B8/B20 LTETDD: B38/B40/B41 WCDMA: B1/B5/B8 GSM: B3/B8	home	F SFR 208/10	46506 / 159942403	gsm FDD LTE	LTE LTE BAND 3 ARFCN: 1501	-67	0	Scan

WAN Router: Network Status

To verify the connection, click in Status>Network as shown in the screenshot below where the WAN interface receive Internet IP address.

In GUI and go to **Status → Network**

LTE

IP CONFIGURATION
IPv4 Stack
IPv4: 100.104.156.203 Netmask: 29 MTU: 1500
IPv6 Stack
IPv6: fe80::8143:169f:14e2:308a Netmask: 64 Scope: link
DHCP info: Lease time: 7200s
DNS server: 172.20.2.39 172.20.2.10

GRAPH	PHYSICAL INTERFACE	MAC ADDRESS	TX COUNT (IN BYTES)	RX COUNT (IN BYTES)	INTERFACE MODE	MTU
	Cellular	00:00:00:00:00:00	23039	44147	Operator (home): F SFR SIM: Password accepted	1500

WAN Router: Network Testing

GNSS Agent can show position only if the WAN router get internet therefore we do network connectivity test with ping on google DNS works with success as shown the screenshot below:

```
root@GPS-Agent:~# ping 8.8.8.8
PING 8.8.8.8 (8.8.8.8): 56 data bytes
64 bytes from 8.8.8.8: seq=0 ttl=115 time=55.917 ms
64 bytes from 8.8.8.8: seq=1 ttl=115 time=656.157 ms
64 bytes from 8.8.8.8: seq=2 ttl=115 time=474.894 ms
64 bytes from 8.8.8.8: seq=3 ttl=115 time=378.489 ms
64 bytes from 8.8.8.8: seq=4 ttl=115 time=311.806 ms
64 bytes from 8.8.8.8: seq=5 ttl=115 time=285.724 ms
64 bytes from 8.8.8.8: seq=6 ttl=115 time=72.721 ms
64 bytes from 8.8.8.8: seq=7 ttl=115 time=484.698 ms
64 bytes from 8.8.8.8: seq=8 ttl=115 time=300.996 ms
64 bytes from 8.8.8.8: seq=9 ttl=115 time=110.102 ms
64 bytes from 8.8.8.8: seq=10 ttl=115 time=311.840 ms
64 bytes from 8.8.8.8: seq=11 ttl=115 time=258.432 ms
64 bytes from 8.8.8.8: seq=12 ttl=115 time=364.148 ms

--- 8.8.8.8 ping statistics ---
13 packets transmitted, 13 packets received, 0% packet loss
round-trip min/avg/max = 55.917/312.763/656.157 ms
```

9. GNSS DATA COLLECT

WAN Router: CLI GNSS

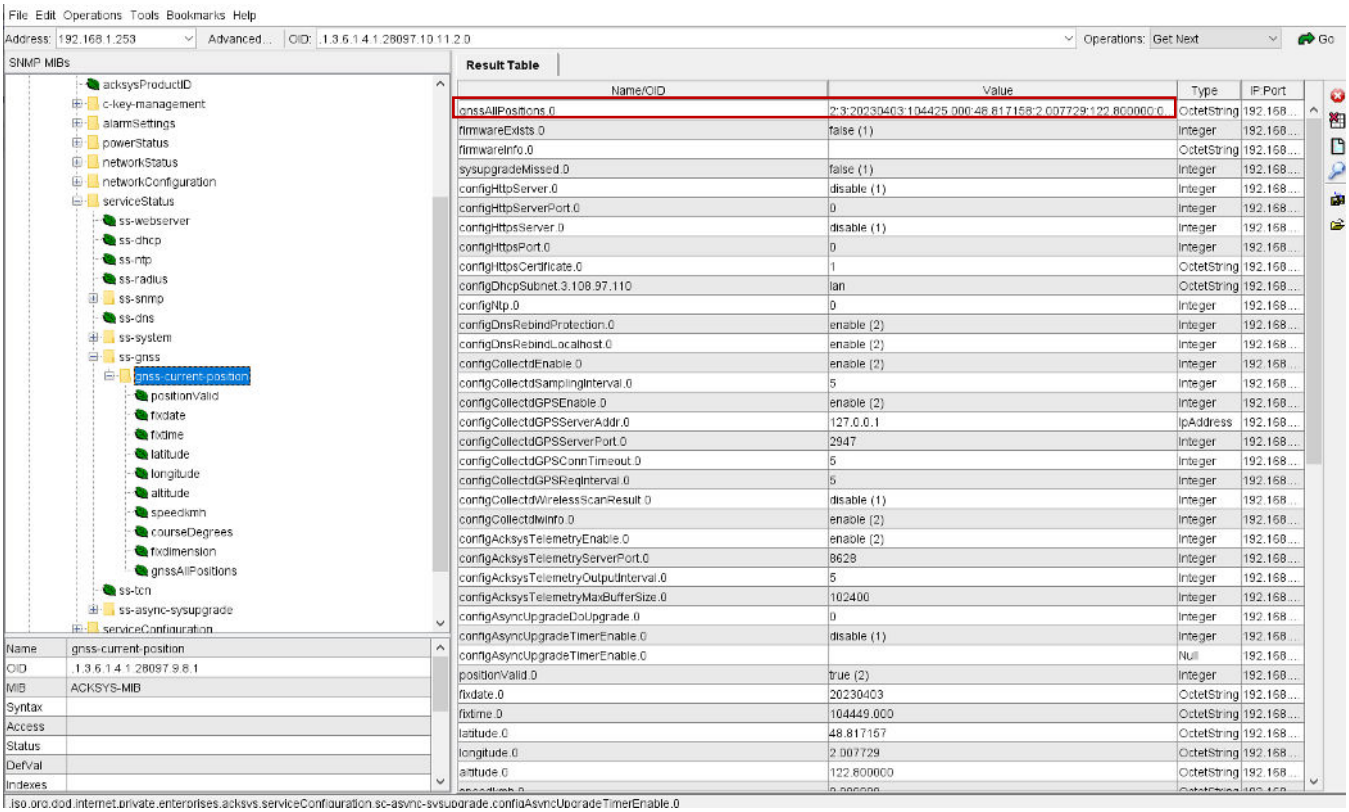
To verify the NMEA data, we can enable SSH service in Tools→ Service→ enable SSH with the command logfile after enable GNSS log level to Debug.

Once you have configured the router, if you connect in CLI on the AirBox router IP, we will get the NMEA data in real time, 1 data per 4 second according to my configuration as shown in the screenshot below:

```
root@Acksys:~# logread -f | grep "2:3"
Fri Mar 31 14:40:20 2023 user.info : 2:3:20230331:144020.000:48.799547:2.351979:101.700000:0.000000:3.100000
Fri Mar 31 14:40:24 2023 user.info : 2:3:20230331:144024.000:48.799547:2.351979:101.600000:0.000000:3.100000
Fri Mar 31 14:40:28 2023 user.info : 2:3:20230331:144028.000:48.799547:2.351980:101.600000:0.000000:3.100000
Fri Mar 31 14:40:32 2023 user.info : 2:3:20230331:144032.000:48.799547:2.351980:101.600000:0.000000:3.100000
Fri Mar 31 14:40:36 2023 user.info : 2:3:20230331:144036.000:48.799542:2.352016:101.200000:0.000000:309.700000
Fri Mar 31 14:40:40 2023 user.info : 2:3:20230331:144040.000:48.799598:2.351893:101.100000:0.000000:309.700000
Fri Mar 31 14:40:44 2023 user.info : 2:3:20230331:144044.000:48.799594:2.351930:102.400000:0.000000:309.700000
Fri Mar 31 14:40:48 2023 user.info : 2:3:20230331:144048.000:48.799588:2.351942:102.000000:0.000000:309.700000
Fri Mar 31 14:40:52 2023 user.info : 2:3:20230331:144052.000:48.799563:2.352001:100.900000:0.000000:309.700000
Fri Mar 31 14:40:56 2023 user.info : 2:3:20230331:144056.000:48.799571:2.351981:101.300000:0.000000:309.700000
Fri Mar 31 14:41:00 2023 user.info : 2:3:20230331:144100.000:48.799571:2.351982:101.300000:0.000000:309.700000
Fri Mar 31 14:41:04 2023 user.info : 2:3:20230331:144102.000:48.799571:2.351981:101.300000:0.000000:309.700000
```

Configuring MIB Browser to access GNSS NMEA Data via SNMP

Positioning information can also be read directly via SNMP on any MIB Browser and on any remote Management system by using OIDS from Acksys MIB from the gnss-current-position table as shown in the screenshot below.



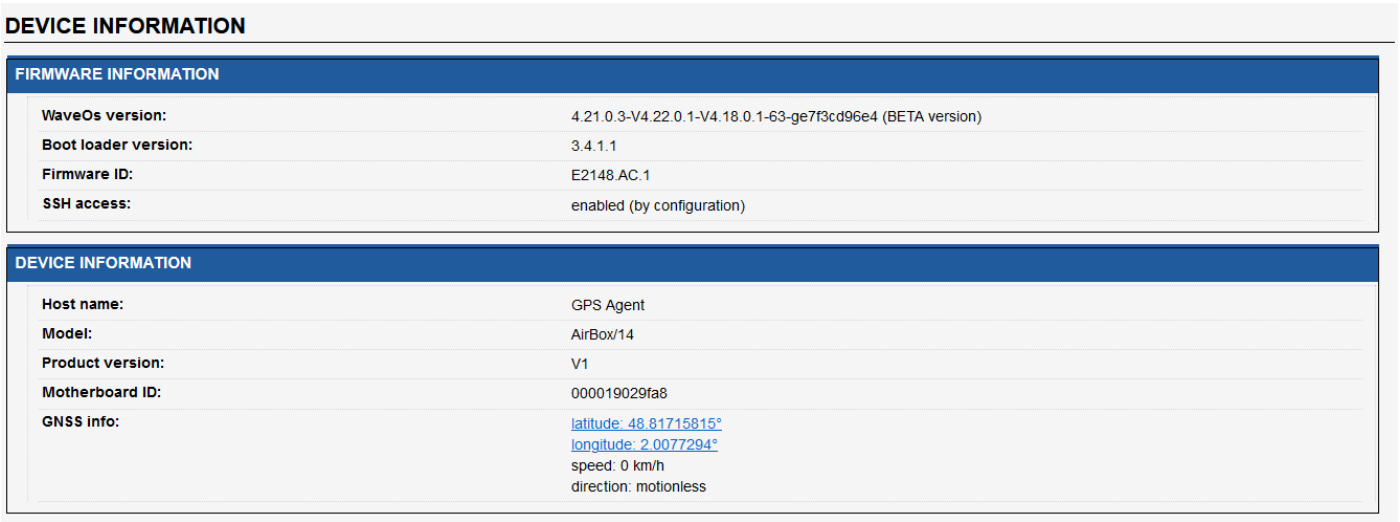
The string displayed in the system log and the string obtained through the 'gnssAllPositions' SNMP OID have the same format. It consists in a series of column-separated values in the following order:

Valid flag	**1 if position is undefined, 2 if the following data is valid**
Dimension	2 if only latitude/longitude are known, 3 if elevation (altitude) is also valid, 0 or 1 if position unknown
Date	Last fix date. YYMMDD (year, month, day) or empty if invalid
Time	Last fix time. If time is available: HHMMSS.ddd (hour, minute, second, dot, milliseconds). If time is unavailable: ssssssssss (integer number of seconds since 1/1/1970) as known to the product. Always greater than 1000000.
Latitude	±DD.dddddd degrees from equator, 6 decimal places, a minus sign means south of equator
Longitude	±DD.dddddd degrees from Greenwich, 6 decimal places, a minus sign means west of Greenwich
Altitude	HHH.hhhhhh Height above mean see level, in meters

Speed	kkk.vvvvvv Horizontal displacement speed in kilometers per hour, 6 decimal places
Direction	DDD.dddddd degrees from true north, 6 decimal places, DDD ranges from 0 to 359

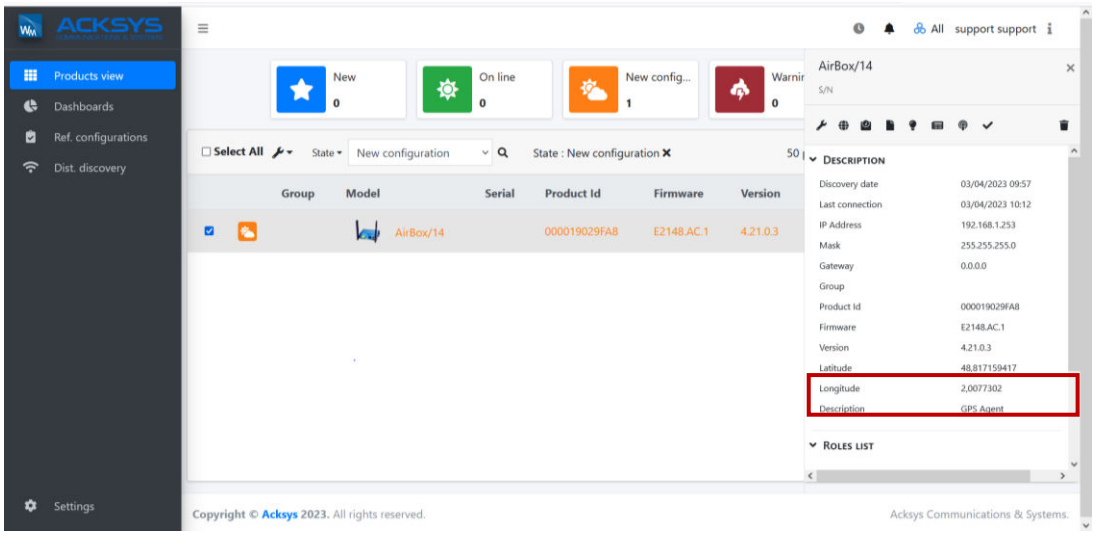
WAN Router: GNSS Status

You can retrieve the current position Via GUI in on “Device Information” page as shown in the screenshot below Status



WaveManager: GNSS Status

We can retrieve the current position Via WaveManager on “Device Information” page (Latitude and Longitude) as shown in the screenshot below where.



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