Using a Siretta GNSS Modem to test the performance of a GPS Antenna

This Application Note is designed for customers who are looking to test their GPS antenna performance using a Siretta GNSS Modem.

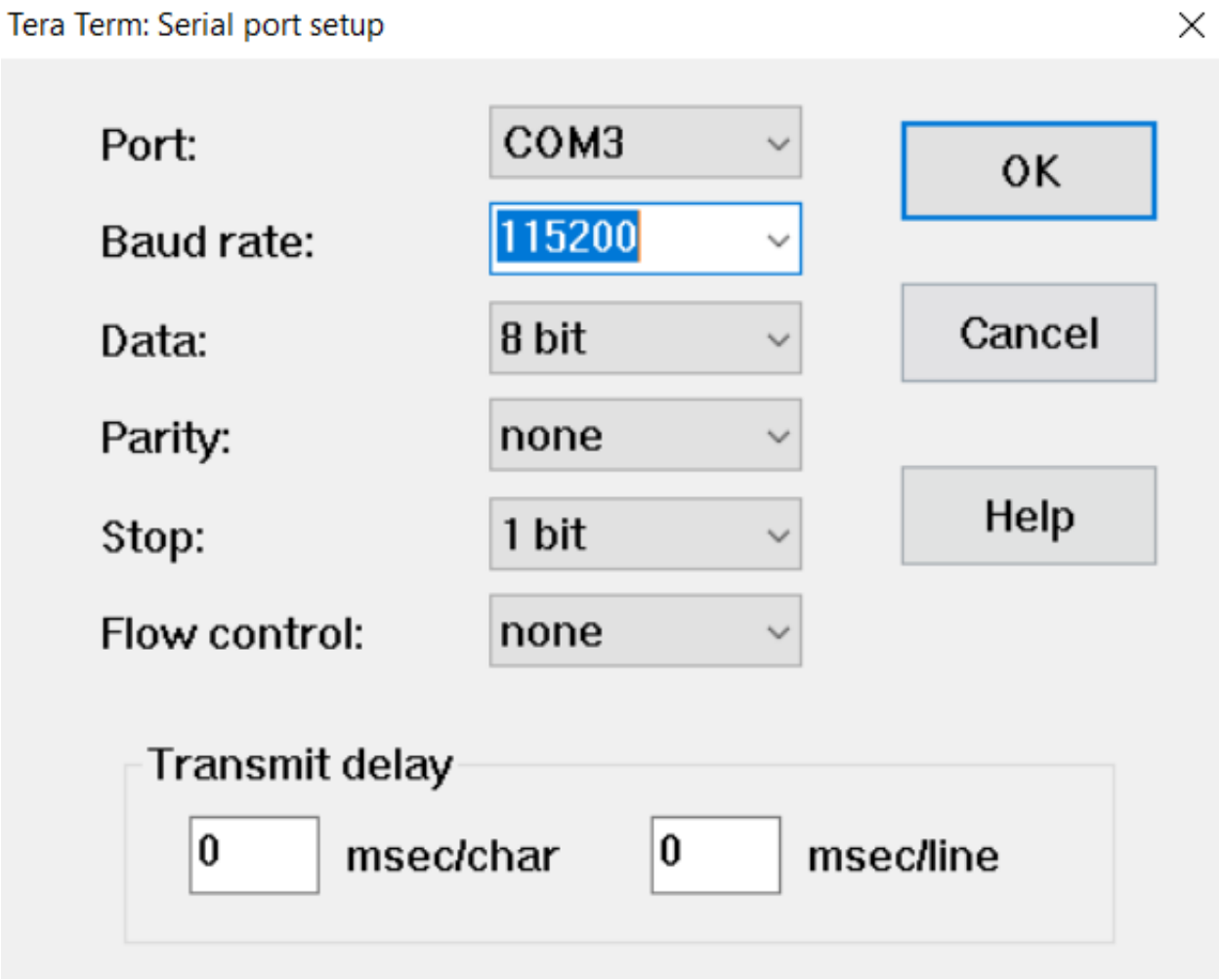
Requirements

- Siretta GNSS Modem such as ZETA-GEP-LTE4 (EU)
- PC with Tera Term Version 4.96 (Tera Term can be downloaded from the following link - Teraterm Link).
- PC with VisualGPSView (VisualGPSView is a free software application, it can be downloaded from the following Visual GPS Link for Windows 7 to Window 10)
- RS232 to USB cable (This cable is available with the ZETA starter kit - Siretta Part Number: 60793).
- GPS antenna to be tested (For this Guide the Mike 3A with SMA Male connector was used - Mike 3A)

Procedure for testing GPS antenna performance

1. Connect ZETA-GEP-LTE4 (EU) (or any other Siretta GNSS modem) Modem to the PC using USB to RS232 cable supplied by Siretta.
2. Power on the Modem refer to Basic Modem Functions and Enhanced Modem Functions application notes.
3. Open TeraTerm window on the PC connected to the modem
4. Select Serial and you should see "**Prolific-to-Serial com port**" as shown below.

5. Open setup tab on the Tera Term then select serial port, you will be presented with the screenshot below.



6. Enter the following parameters:

- Bits per second: 115200
- Data bits: 8
- Parity: None
- Stop bits: 1
- Flow control: none

7. Click OK, the Tera Term window will open where you can type AT command.

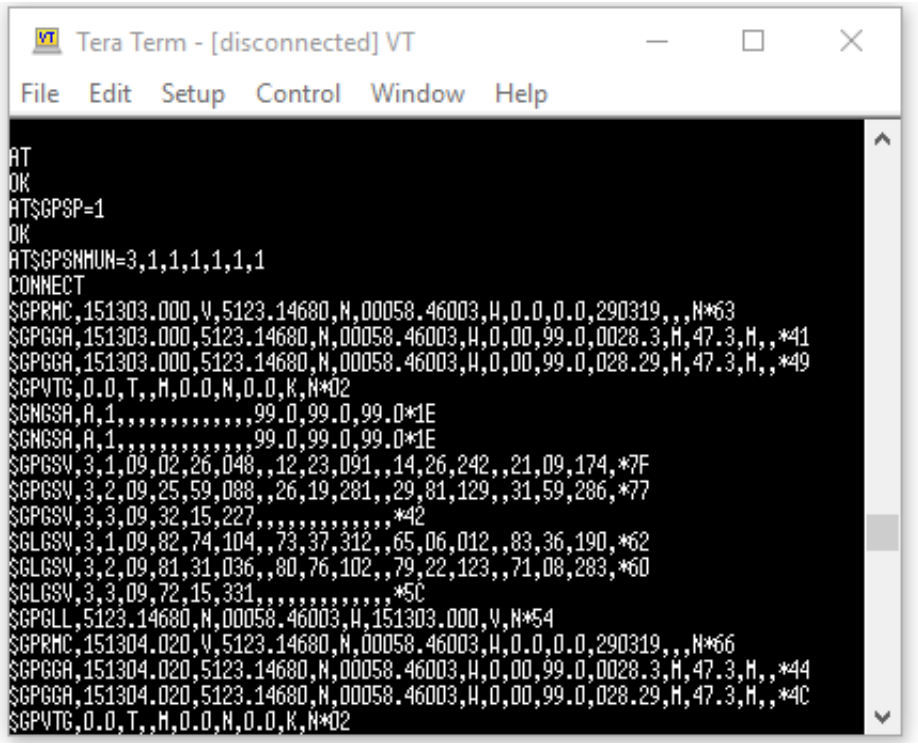
8. Send the commands shown below:

//Check Modem is responding to AT commands
AT (You will receive OK)

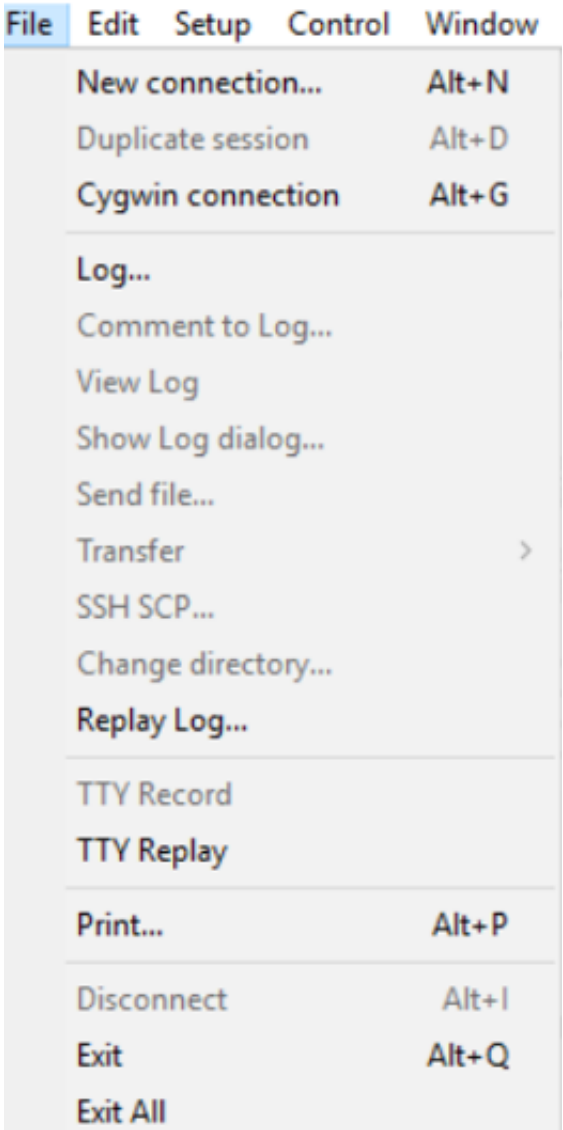
//Turn on GNSS engine inside the modem
AT$GPSP=1 (You will receive OK)

//Turn on NMEA data stream
AT$GPSNMUN=3,1,1,1,1,1,1 (You will receive CONNECT)

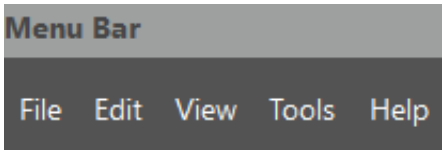
After this command the NMEA GPS data strings will appear as shown below.



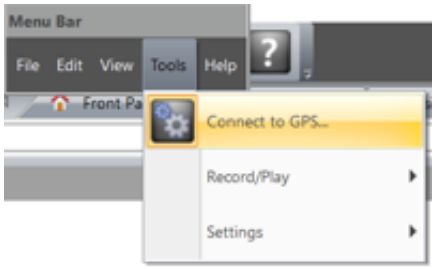
9. Click file tab on the Tera Term window, select disconnect as seen below.



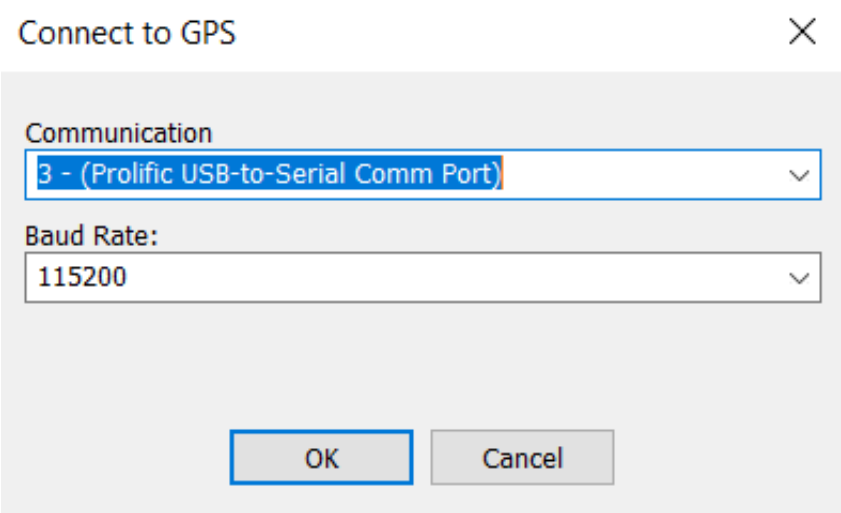
10. Once disconnected from the Tera Term, Open Visual GPS View on the same PC connected with the modem and you will find Menu Bar as seen below.



11. Navigate to the tool then select “Connect to GPS“ option as shown below.



12. Pop up screen below will appear, select com port 3 and enter the baud rate of 115200 then click OK.



The setting now is complete.

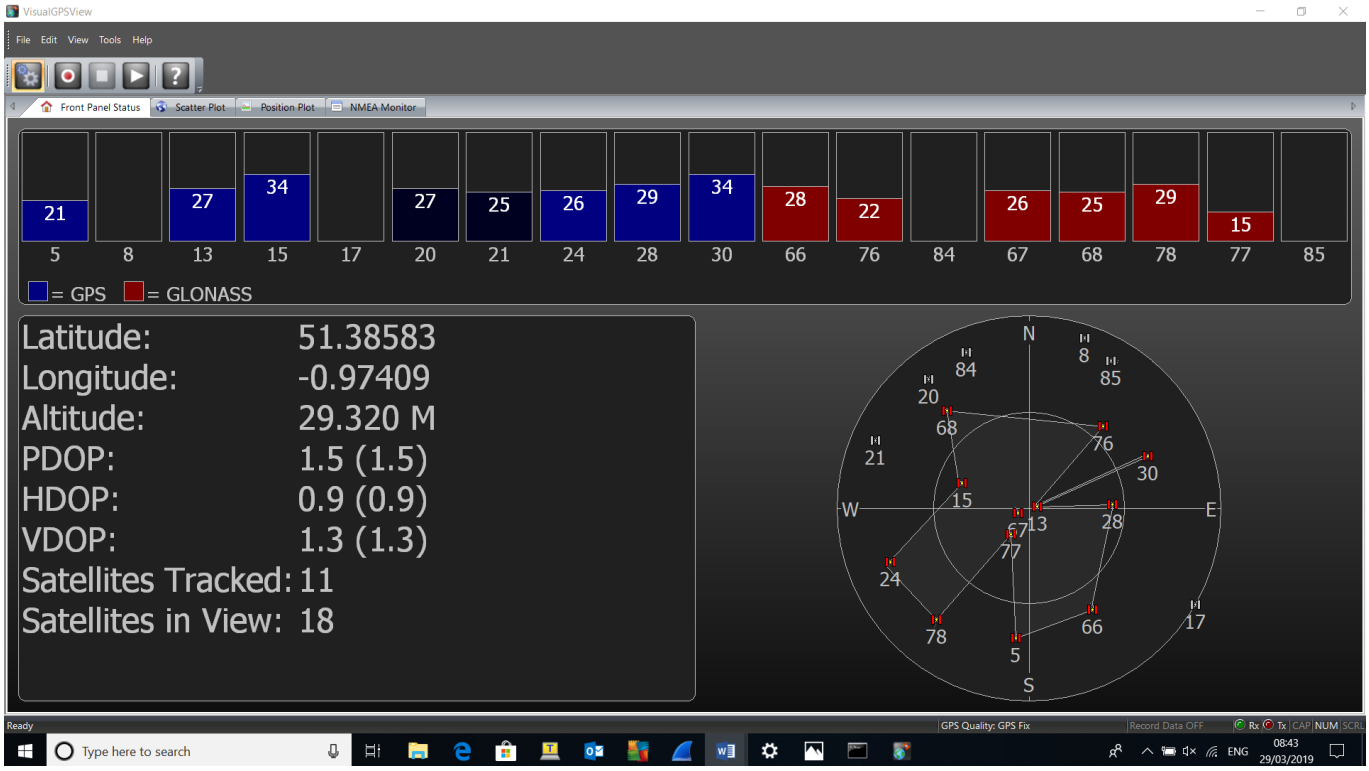
13. Connect the GPS antenna (for this guide Mike 3A) to be tested to the modem GPS connector then click “Front Panel Status” from the VisualGPSView where you will be presented with results shown below.

NOTE:

- GPS reception is affected by line of sight to the satellite
- You should adjust the GPS antenna position to find best reception which will ideally be outside or close to a window
- If comparing antennas, you should therefore always place the antennas under test in exactly the same location every time to ensure a fair comparison

Figure 1 shows the GPS results with the GPS antenna connected

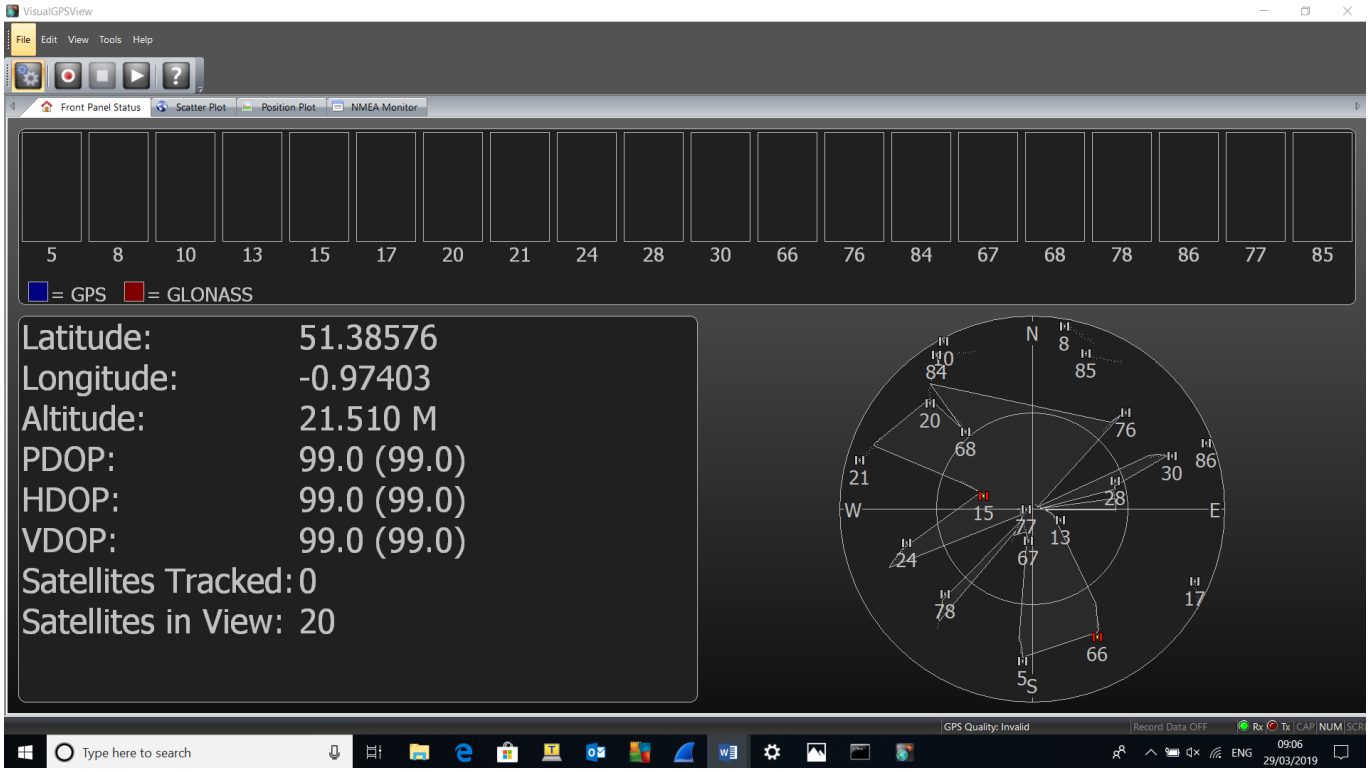
Figure 1



Disconnect the GPS antenna (for this guide Mike 3A) from the modem GPS connector then click “Front Panel Status” from the VisualGPSView where you will be presented with below results which show poor performance.

Figure 2 shows the results with no GPS antenna connected

Figure 2



14. Results from VisualGPSview can be analysed by observing the GPS Quality entry as displayed below the satelite locations chart:

- GPS Quality: Invalid means that Poor GPS antenna performance or GPS antenna is not connected to the Modem or GPS antenna is faulty (see figure 2 above)
- GPS Quality: GPS Fix means that Good GPS antenna Performance (GPS fix is the locational information that the GPS system provides for a specific point see figure 1)

NOTE:

- DOP (Dilution Of Precision) (range 0.9 to 99 is an indicator of how accurate the GPS signal results are
- A low DOP value means an accurate GPS signal result (see Figure 1), whereas a high value of DOP means an inaccurate GPS result (see figure 2)
- If two antennas give the good GPS results, the antenna with a lower DOP value is more accurate than an antenna with a higher DOP value

Definition of terms used in VisualGPSview

GPS - Global Positioning System.
GLONASS - GLObal NAvigation Satellite System.
LATITUDE - is a geographic coordinate that specifies the north to south position of a point on the Earth's surface.
LONGITUDE - is a geographic coordinate that specifies the east to west position of a point on the Earth's surface
DOP- Dilution of Precision or GDOP Geometric Dilution of Precision is a term used in GPS and geomatics engineering to specify the error propagation as a mathematical effect of navigation satellite topology on positional measurement precision.
PDOP - Position (3D) dilution of precision
HDOP - Horizontal dilution of precision.
VDOP - Vertical dilution of precision
Satellites Tracked - Satellites Tracked by receiver
Satellites in View – Total satellite in View
GPS Quality – GPS Fix (Good antenna performance) / Invalid (Poor antenna performance/ antenna not connected / Faulty antenna).

Scatter Plot - The scatter plot shows individual position samples referenced to several type of reference types, next sample, average or user defined
Signal Quality/SNR Window - Monitor satellite signal to noise ratios and see them graphically on the screen. The signal quality window will grow or shrink to accommodate number of satellites in view

More information about modems can be found from https://www.siretta.com/products/industrial-modems/

More information about GPS and GNSS antennas can be found from https://www.siretta.com/products/antennas/antenna-selector/

Any queries please contact support@siretta.com