Altus NR2

User Manual

User Manual Revision 1.3
Applicable to version 1.2.1 of the Altus NR2 firmware

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1 Introduction

You made an excellent choice buying the Septentrio Altus Network Rover.

Don't drop the call!

Don't lose time with dropped calls. Your connection for differential correction reception is secure with the Altus NR2. It has been designed with a dual-antenna cell modem to optimize call retention.

Light

Despite its on-board smarts and wireless technologies, the Altus NR2 weighs only 760 grams with a diameter of only 167 mm.

Work all day

The batteries of the Altus NR2 are hot swappable so with two batteries in the device and two spare, you'll have more than enough power to see you through the working day and beyond. The charger and batteries are non proprietary so it is easy and inexpensive to keep spares.

Use your existing phone or tablet

The Altus NR2 can communicate with any device with a WiFi radio. Simply connect to the Altus NR2, open your browser and your Altus NR2 is configured within minutes.

Esri ready

The Altus NR2 has been designed specifically for ArcGIS Online users to add highly accurate positioning information to their databases using PinPoint-GIS Web and App: Septentrio's GIS framework. Alternatively, you may use the Altus NR2 with industry-leading survey software such as SurvCE, Field Genius or Digiterra.

Works in any network

The Altus NR2 works within all types of RTK networks. Its auto detect function is able to detect the correction type!

1.1 Altus NR2 Technical Characteristics

- 132 Channel GPS + GLONASS + SBAS receiver
- Integrated 3.5G Quad-Band GSM/GPRS/EDGE + HSPA Modem
- Integrated WiFi 802.11 b/g/n
- Integrated Bluetooth 2.1 + EDR/4.0
- Web Interface configuration
- Hot-Swap Li-Ion Batteries
- Onboard 8 GB Memory
- Onboard GIS collection thanks to PinPoint-GIS

With Septentrio's open architecture philosophy, you have the choice of using data collector software from MicroSurvey FIELDGenius or Carlson SurvCE.

1.1.1 GNSS Key Features

132 Channels with L1/L2/L2C GPS, GLONASS and SBAS.
RTK, SBAS, DGPS and Standalone positioning modes.

Navigation performance

	Horizontal	*Vertical*
Standalone	1.2 m	1.9 m
SBAS (WAAS, EGNOS, MSAS)	0.6 m	0.8 m
DGPS	0.4 m	0.9 m
RTK (Fixed)	0.6 cm + 0.5 ppm	1 cm + 1 ppm

The Altus NR2 can be mounted on a standard survey rod with a 5/8" thread.

1.2 User Notices

This section provides information regarding Warranty and Customer Service. Septentrio NV reserves the right for improvements and changes to this document, products and services without notice or obligation.

1.2.1 Warranty

Septentrio provides a two-year warranty for the Altus NR2 receiver, free from defects in materials and workmanship, from the date of sale on the invoice of the original buyer. A ninety-day warranty is provided for the cables and other accessories. Firmware upgrades are free for life. Software support is free for one year from date of purchase.

The warranty does not cover:

- Defects due to accidents, abuse, misuse, negligence, abnormal use or any other non-recommended use.
- Defects due to environmental conditions that do not conform to Altus NR2 specifications.
- Defects due to improper installation or operating procedures.
- Defects due to modifications, alterations, or changes not made in accordance with the Altus NR2 User Manual and other technical documentation or directly authorized by Septentrio NV.
- Normal wear and tear use.
- Shipping damage.
- Third party software included with the product, other than the warranty of the original manufacturer to the extent the manufacturer permits.

Please note that the warranty is void if the Altus NR2 has been tampered with or opened.

1.2.2 Support

For first-line support please contact your Septentrio dealer. For further information, please consult the Septentrio support website for documentation and firmware upgrades or the Septentrio Technical Support group:

http://www.septentrio.com

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1.2.3 CE Notice

Receivers of the Altus NR2 family carry the CE mark and as such are compliant with the 2004/108/EC-EMC Directive and amendments, 2006/95/EC-Low Voltage Directive, both amended by the CE marking directive 93/68/EC.

With regards to EMC, these devices are declared as class B, suitable for residential or business environment.

This device meets the EU requirements (1999/519/EC) and the International Commission on Non-Ionizing Radiation Protection (ICNIRP) on the limitation of exposure of the general public to electromagnetic fields by way of health protection. To comply with the RF exposure requirements, this equipment must be operated in a minimum of 20 cm separation distance to the user.

1.2.4 ROHS/WEEE Notice

Altus NR2 receivers comply with European Union (EU) Directive 2002/95/EC on the restriction of the use of certain hazardous substances in electrical and electronic equipment (RoHS Directive).

Altus NR2 receivers comply with the European Union (EU) Directive 2002/96/EC on waste electrical and electronic equipment (WEEE). The purpose of this Directive is the prevention of waste electrical and electronic equipment (WEEE), and in addition, the reuse, recycling and other forms of recovery of such wastes so as to reduce the disposal of waste. If purchased in the European Union, please return the receiver at the end of its life to the supplier from which it was purchased.

1.2.5 FCC Regulations

This device complies with part 15 of the FCC Rules. Operation is subject to the following two conditions: (1) This device may not cause harmful interference, and (2) this device must accept any interference received, including interference that may cause undesired operation.

Changes or modifications not expressly approved by the party responsible for compliance could void the user's authority to operate the equipment.

This equipment has been tested and found to comply with the limits for a Class B digital device, pursuant to part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference in a residential installation. This equipment generates, uses and can radiate radio frequency energy and, if not installed and used in accordance with the instructions, may cause harmful interference to radio communications. However, there is no guarantee that interference will not occur in a particular installation. If this equipment does cause harmful interference to radio or television reception, which can be determined by turning the equipment off and on, the user is encouraged to try to correct the interference by one or more of the following measures:

- Reorient or relocate the receiving antenna.
- Increase the separation between the equipment and receiver.
- Connect the equipment into an outlet on a circuit different from that to which the receiver is connected.
- Consult the dealer or an experienced radio/TV technician for help.

FCC RF Exposure Compliance

This equipment complies with radio frequency (RF) exposure limits adopted by the Federal Communications Commission for an uncontrolled environment. This equipment should be installed and operated with minimum distance 20 cm between the radiator and your body.

1.2.6 IC Regulations

RSS-Gen 7.1.3

This device complies with Industry Canada license-exempt RSS standard(s). Operation is subject to the following two conditions:

(1) this device may not cause interference, and

(2) this device must accept any interference, including interference that may cause undesired operation of the device.

Le présent appareil est conforme aux CNR d'Industrie Canada applicables aux appareils radio exempts de licence. L'exploitation est autorisée aux deux conditions suivantes:

(1) l'appareil ne doit pas produire de brouillage, et

(2) l'utilisateur de l'appareil doit accepter tout brouillage radioélectrique subi, même si le brouillage est susceptible d'en compromettre le fonctionnement.

IC RF Exposure Compliance (MPE)

This equipment complies with IC RSS-102 RF exposure limits set forth for an uncontrolled environment. This equipment should be installed and operated with minimum distance 20 cm between the radiator and your body.

Déclaration d'exposition aux radiations

Cet équipement est conforme aux limites d'exposition aux rayonnements IC établies pour un environnement non contrôlé. Cet équipement doit être installé et utilisé avec un minimum de 20 cm de distance entre la source de rayonnement et votre corps.

1.2.7 Safety information

Statement 1/WARNING: IMPORTANT SAFETY INSTRUCTIONS
This warning symbol means danger and indicates that you are in a situation that may result in body injury and physical damage. Before you work on any equipment, be aware of the hazards involved with electrical circuitry and familiarize yourself with standard practices for preventing accidents. Use the statement number provided at the beginning of each warning to locate its translation in the translated safety warnings that accompanied this device.

Statement 2/WARNING: The power supply provided by Septentrio should not be replaced by another.

Statement 3/WARNING: Ultimate disposal of this product should be handled according to all national laws and regulations.

Statement 4/WARNING: The equipment and all the accessories included with the product may only be used according to the specifications in the delivered release note, in the manual and in all other documents delivered with the receiver.

Statement 5/WARNING: Never place the equipment or its batteries in an environment where the specified maximum storage temperature can be exceeded.

Statement 6/WARNING: The outside of the instrument may be cleaned using a clean, lightly dampened cloth. Do not use any cleaning liquids containing alcohol, methylated spirit, ammonia etc.

2 Altus NR2 Overview

2.1 Shipping case contents

One Altus NR2 system includes the following items:

Item (Part Number)	Purpose
USB Cable (214100)	Configuration via USB
Four Li-Ion Batteries (215344)	Powering the Altus NR2
Battery Charger (215341)	4-bay Fenix ARE-C2+ smart battery charger
Cigarette-lighter charger cable (215474)	Use of battery charger in car
Wall Charger (EU:214870, UK:214871, AU:214872, US:214873)	Charging the batteries from a wall plug while they are inside the Altus NR2

The delivery contains two EU power cables: one for the battery charger and one for the wall charger. The power cables of the battery charger and wall charger are interchangeable.

When shipped outside of continental Europe, two power cables matching the requirements of the country of destination are added.

Figure 2-1: Standard items included with Altus NR2 delivery

2.2 Additional cables available

Item (Part Number)	Purpose
CBL_Altus_NR2_COM (214995)	DB9 Serial RS232 Male connector ideal for external radio communication
CBL_Altus_NR2_COM_PWR (214969)	DB9 Serial RS232 Female connector and open-ended power connector (supply range: 9-30 VDC)

2.3 Altus NR2 design

2.3.1 Front Panel

The Altus NR2 has an intuitive front panel with status LEDs and a central power button.

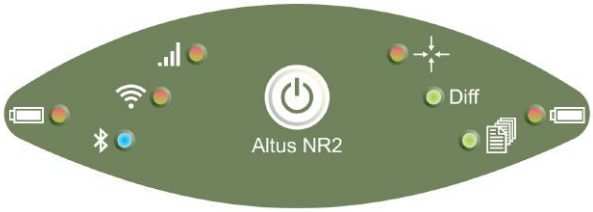


Figure 2-2: Altus NR2 Front Panel

The table below provides an overview of the LED indicators. A complete description of their behaviour can be found in Section A.2.

	Function	Indication
	Battery Power Level	Battery Power level (Green to Red) solidly lit = battery is in use, blinking = battery is not in use
	Bluetooth (not) paired	Bluetooth is off (not lit), connecting (blinking), Paired (blue)
	WiFi On/Off	WiFi On (Green) or Off (not lit)
	Cellular Modem Status	The cellular modem is not in use (not lit), connecting (orange), connected (green) or there is an error in the connection (red)
	Position Mode	RTK Fixed or static in base station mode (green), Standalone (red), SBAS, DGNSS or RTK float (orange) or no position can be calculated (not lit)
	Differential Corrections	Differential Corrections are being received (Green) or differential Corrections are not being received (not lit)
	Data Logging	Logging is disabled (not lit), active (green)

Power Button Functions

As well as turning the Altus NR2 off and on, the front-panel power button can also be used to toggle WiFi and internal logging as described in Table 2.3-2.

Altus NR2 power status	User Action	Effect
While the device is off	CLICK 	Switches on the Altus NR2
	HOLD  4 seconds	Resets the device to factory default
While the device is on	CLICK CLICK 	Toggles the Wi-Fi radio on and off 
	CLICK 	Toggles logging on and off  The LED only switches on if messages have been selected for logging
	HOLD  2 seconds	Powers off the device

Table 2.3-2: Altus NR2 power button functions

2.3.2 Location of Batteries and SIM card

- The Altus NR2 contains two battery bays. The positive contact for the batteries is that nearest to the front label.
- The SIM card slot is located under the left battery bay and has a watertight cover.
- Only a micro SIM card will fit into the slot.

Figure 2-3: SIM Card Slot

Closing the battery door

Figure 2-4: Closing the battery door

- Press firmly at the position indicated by the grey arrow to lock the battery door.
- The battery door is only latched after a firm click is heard.

2.3.3 Altus NR2 Connector

The Altus NR2 has one 9-Pin Lemo connection socket on its underside as shown in Figure 2-5. When connected to the wall charger, this will power the device and charge any batteries that are inside. Connecting the USB cable allows for communication with the Altus NR2 and transfer of logged data files.

Figure 2-5: Altus NR2 Port 1 Connection

3 Getting started with the Altus NR2

3.1 What you will need

An Activated Micro SIM Card

- In some countries a PIN and PUK code are required to use the SIM card. If so, make sure you have the codes at hand.
- To establish a data connection, an Access Point Name (APN), user name and password are needed. If you do not have this information, you need to request it from the telecom provider.

An active RTK (NTRIP or TCP/IP) service

- A subscription for a (NTRIP or TCP/IP) correction service or an Altus NR2 Base receiver for getting corrections (not applicable for Altus NR2 M or Altus Base models)

Charged Batteries

- Make sure you have two charged batteries.
- Empty batteries may take three to four hours to charge.

An Altus NR2 Wall Charger

- As an alternative you can power the Altus NR2 using the wall charger when configuring the Altus NR2.

A WiFi or USB connection to a phone, tablet or computer

- A WiFi enabled device can be used to configure the Altus NR2 using the Web Interface.
- Any device with a USB port can also be used to connect via the Web Interface and configure the Altus NR2.

An ArcGIS Online subscription for the PinPoint-GIS

- Using Septentrio's PinPoint-GIS Web you will be able to perform GIS data collection which synchronizes directly with ArcGIS Online.
- For subscriptions to ArcGIS Online please visit https://www.arcgis.com

3.2 Setting up the Altus NR2

3.2.1 Inserting a micro SIM card

Turn off the Altus NR2 to install or remove the SIM card. Damage to the SIM card may occur if installed or removed while the unit is powered.

1. Place the Altus NR2 on a flat surface with its battery compartments facing up as shown in Figure 2-3
2. Open the SIM card compartment via the battery compartment
3. Place the micro SIM card face down in the SIM card compartment and slide it gently towards the front panel of the Altus NR2 until a click sound is heard
4. Gently close the SIM card compartment

3.2.2 Inserting the batteries

1. Place the two batteries in their compartments with the positive ends pointing to the front panel of the Altus NR2
2. Close the two battery doors. The doors click audibly when latched.

3.2.3 Switching on the Altus NR2

Click the power button once to switch on the Altus NR2.

- It takes about **20 seconds** for the Altus NR2 to fully boot up
- It is advised to avoid pressing the power button during the start-up sequence
- The front-panel LEDs will follow a boot sequence on start up and will not indicate their correct status till the unit has fully booted

3.2.4 Switching WiFi on/off

The easiest way to configure the Altus NR2 is using the Web Interface over WiFi.

1. If the WiFi radio is already switched on, the WiFi LED will be lit (green)
2. If the WiFi LED is not lit, press the Power Button twice briefly. The WiFi LED will switch on, indicating it is now active.
3. If the WiFi LED is orange, the receiver is configured as a WiFi client and you will only be able to connect to the unit using the USB cable

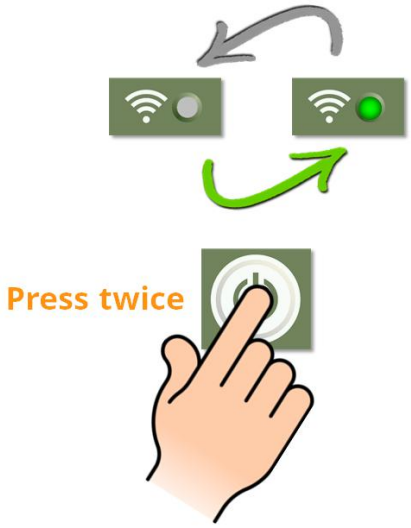


Figure 3-1: Press power button twice to toggle WiFi on and off

Turn off WiFi to save power

The WiFi modem consumes power when it is switched on. You can extend the duration of one battery charge by turning the WiFi off when it is not needed. Switch the WiFi modem off by pressing the power button twice or by using the on/off toggle button in the **Overview** tab of the Web Interface as shown in Figure 3-2.

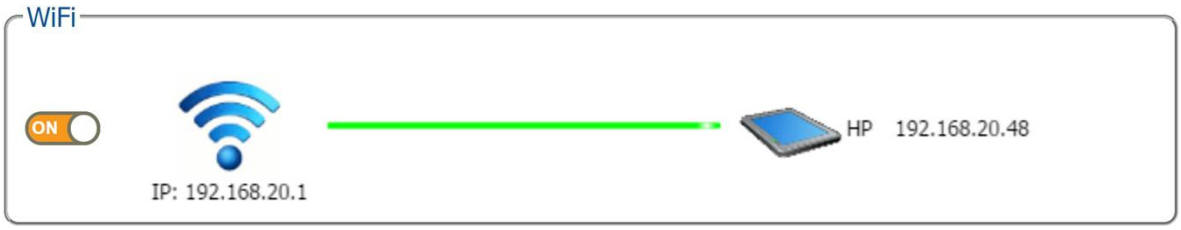


Figure 3-2: WiFi On/Off toggle button in the Overview tab of the Web Interface

3.3 Connecting to the Web Interface

The Altus NR2 can be fully configured and monitored using the Web Interface. Any WiFi device that supports a web browser can connect to the Altus NR2 via the Web Interface.

The Altus NR2 identifies itself as a wireless network or an access point by default. The procedure to connect to the Altus NR2 over WiFi is given in the steps below.

1. Wait till Altus NR2 has fully booted after switching on (about **20 seconds**).
2. Make sure that the front-panel WiFi LED is lit indicating WiFi is enabled. Section 3.2.4 describes how to turn on the WiFi.
3. On your device, find the wireless network named **Altus_NR2-*Serial Number*** where '*Serial Number*' is the 7-digit serial number of the Altus NR2. No password is set by default.
4. Open a browser and type the IP **192.168.20.1** or **altusnr2/** in the address bar. The browser will open the 'Overview' page of the Web Interface shown in Figure 3-3.

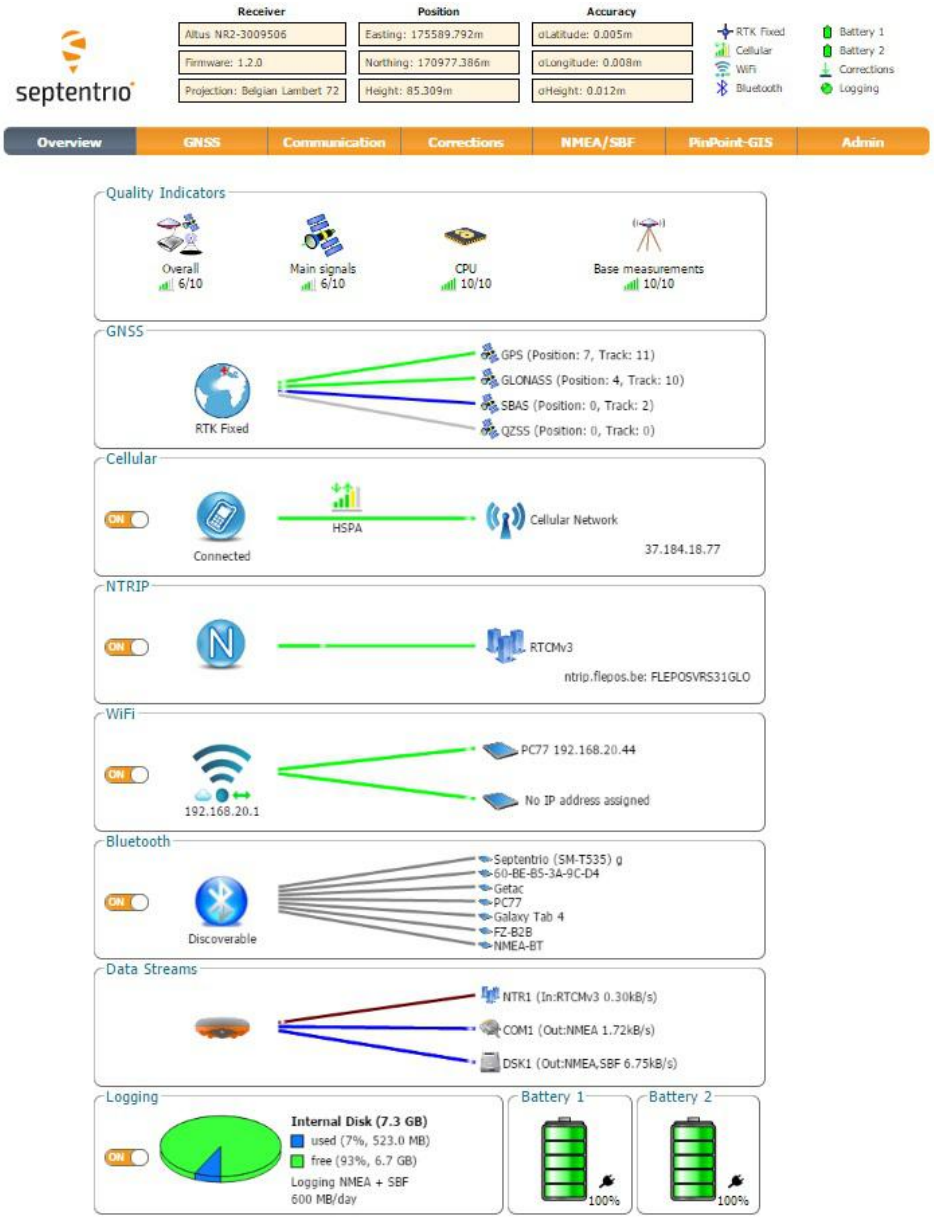


Figure 3-3: Web Interface Overview Tab

4 Configuring the Altus NR2 as a rover

4.1 Standard rover receiver settings

For the Altus NR2 to operate as a rover and accept differential correction data from a Base station, check that **Rover** is selected in the 'Mode' field of the 'Position Mode' window in the 'GNSS' menu as shown in Figure 4-1. This is the default operating mode of the Altus NR2.

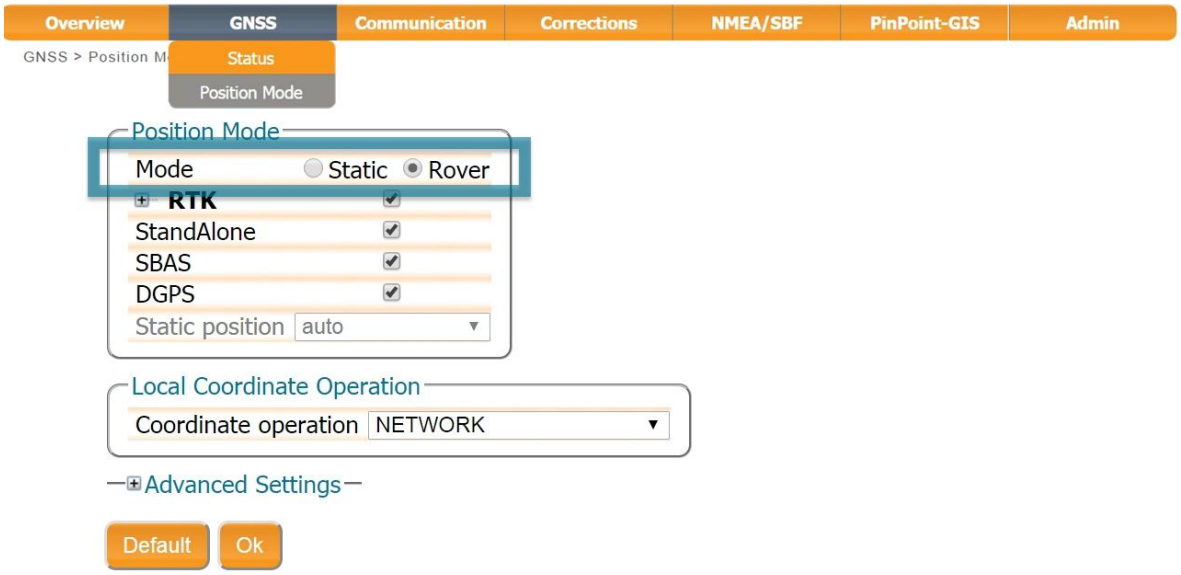


Figure 4-1: By default, the Altus NR2 is configured as a rover with all positioning modes enabled

The format of the differential corrections output by the Base station should be compatible with that acceptable by the rover. In the 'Corrections Input' window of the 'Corrections' menu, you can configure the Altus NR2 to only accept differential corrections of a particular format. The default 'auto' setting will accept correction data of any format.

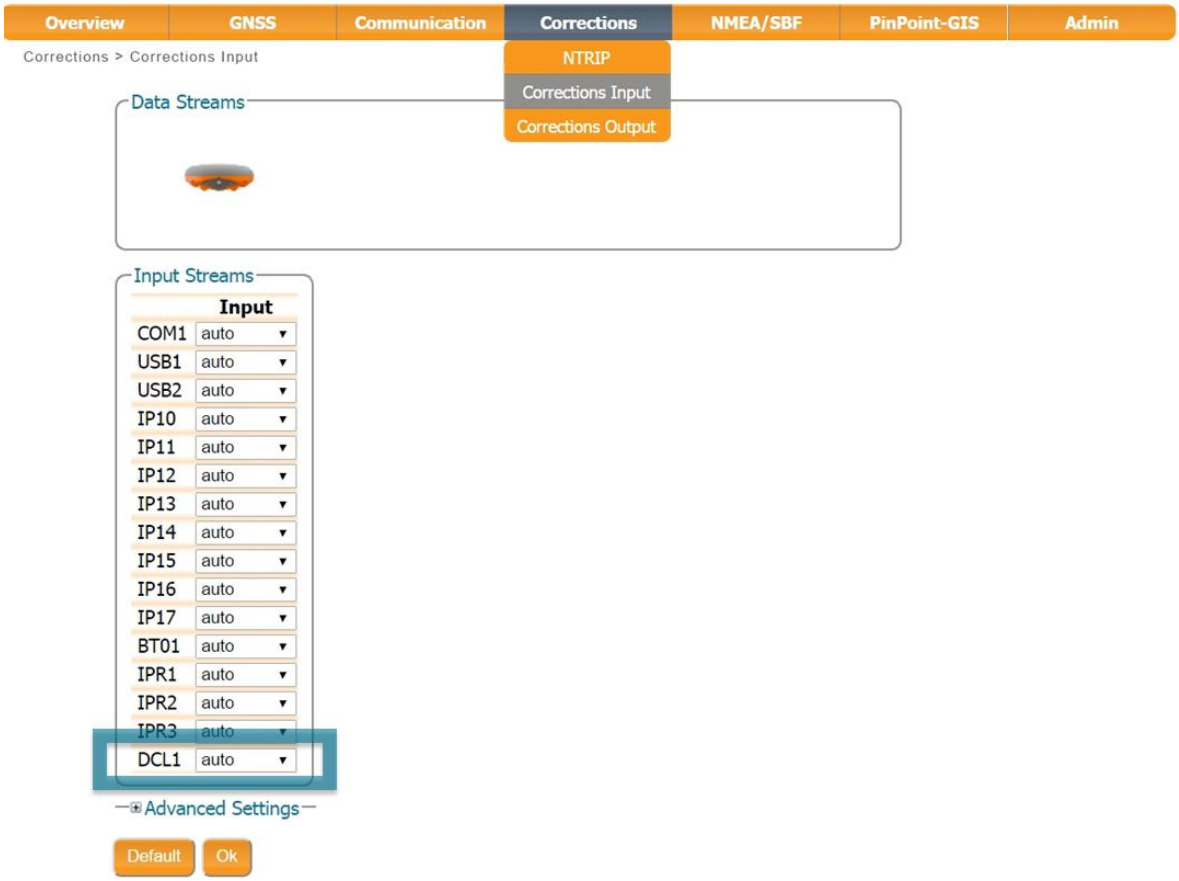


Figure 4-2: With the default 'auto' setting, Altus NR2 will accept any format of incoming differential corrections.

4.2 Configuring the connection to a Base station

4.2.1 Connecting via Mobile Internet

1. Click the **Communications/Cellular** tab on the Web Interface to show the status of the Cell Modem.
2. Enter a Cellular PIN and Access Point Name (APN) in this window. You may also need to enter a Username and Password.
3. Make sure the 'on' buttons of both Power and Connect are selected.
4. Click 'Ok'

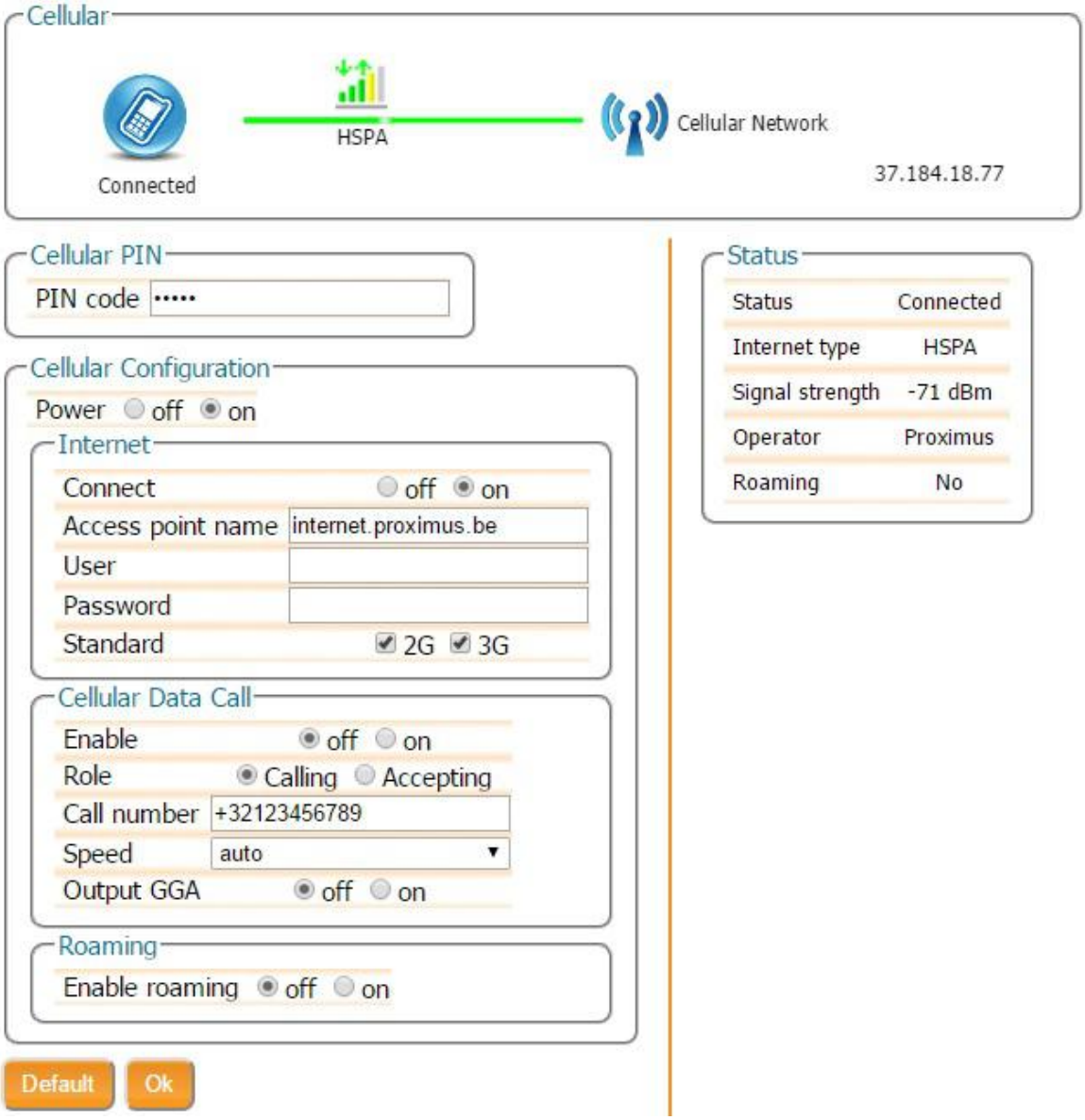


Figure 4-3: Connecting the Altus NR2 to the internet using the cellular modem

If the connection has been established successfully, the Status will follow the sequence:

Initializing → Connecting → Connected

The connection line in the Cellular field will become green and indicate the connection type (e.g. HSPA) and Status field on the right hand side of the window will be filled with details of the connection as shown in Figure 4-3.

The cellular modem of the Altus NR2 should be configured on the Cellular/Modem tab of the web interface or using the 'setCellularParameters' command in Expert Console. No other method for configuring the cellular modem is supported.

4.2.2 Connection to an NTRIP Caster

Step 1: Configure the NTRIP Client settings

1. Make sure you have a cellular connection as described in the previous section.
2. Select the **Corrections/NTRIP** tab on the Altus NR2's Web Interface.

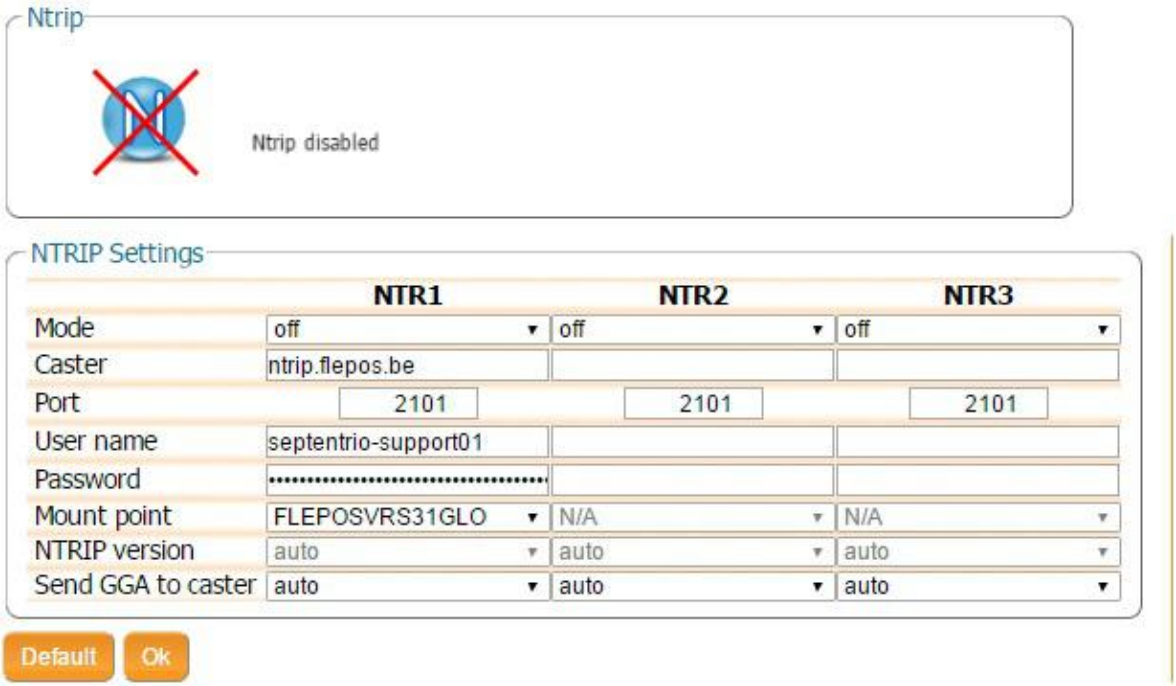


Figure 4-4: NTRIP tab of the Web Interface

You have the possibility to enter up to three different NTRIP configurations. This is useful for switching easily between connections when working on multiple locations with different NTRIP Casters.

3. Select 'Client' in the Mode drop down box.
4. Enter the Caster server name or IP address and the Port of your CORS.
5. Enter the User Name and Password of your account. The NTRIP password will automatically be encrypted and not shown for security.
6. Once the NTRIP Mode, Caster, and Port are entered, the Mount Point drop-down box will be populated.

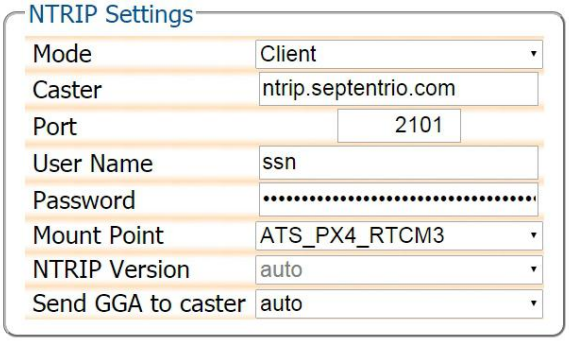


Figure 4-5: NTRIP Settings

7. Select a Mount Point in the drop down box.
8. Click OK
9. The Altus NR2 will automatically initialize and connect.

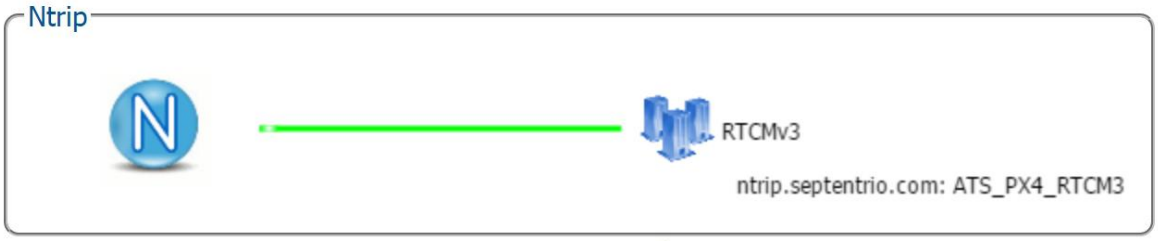


Figure 4-6: Receiving differential corrections via NTRIP

If the Mode Field is set to 'Client', the Altus NR2 will auto-connect to the NTRIP Caster each time it is powered.

If the Mode Field is set to 'Off', no corrections will be received and the Altus NR2 will not auto-connect to the caster when switched on.

The Altus NR2 can also be configured as an NTRIP Server. In this case the receiver would work as a Base station passing corrections to an NTRIP Caster. Note that the NTRIP version is only relevant when the NTRIP has been configured as a Server (in Client mode the Altus NR2 automatically detects the version protocol of the NTRIP Caster).

Step 2: Configure data output

Section 4.3.2 details the settings needed to configure data output.

Step 3: Configure any additional settings

Section 4.4 details some additional settings that you may need.

4.2.3 Connecting via Data Call

The setup described in this section is represented schematically in Figure 5-3. Differential corrections from the Base station to the rover are transferred over a GSM cellular modem call without the need for an Internet connection (also known a Circuit Switch Data connection or CSD). In the example shown, the rover receiver calls the Base station receiver on the number **0474 90 86 52**.

Step 1: Check the receiver is in Rover mode

Section 4.1 shows how you can check that the Altus NR2 is set to work as a rover.

Step 2: Configure the connection to the Base station

From the 'Communication' menu select 'Cellular', where you can configure the cellular modem of the rover receiver to make a data call to the Base station receiver. The essential settings are shown highlighted in Figure 4-7 with other settings being optional.

After clicking on the 'Ok' button, the rover receiver will automatically call the Base station receiver on the number in the 'Call number' field. If the connection is broken or the Base station fails to answer, the rover will continually try to call the Base station.

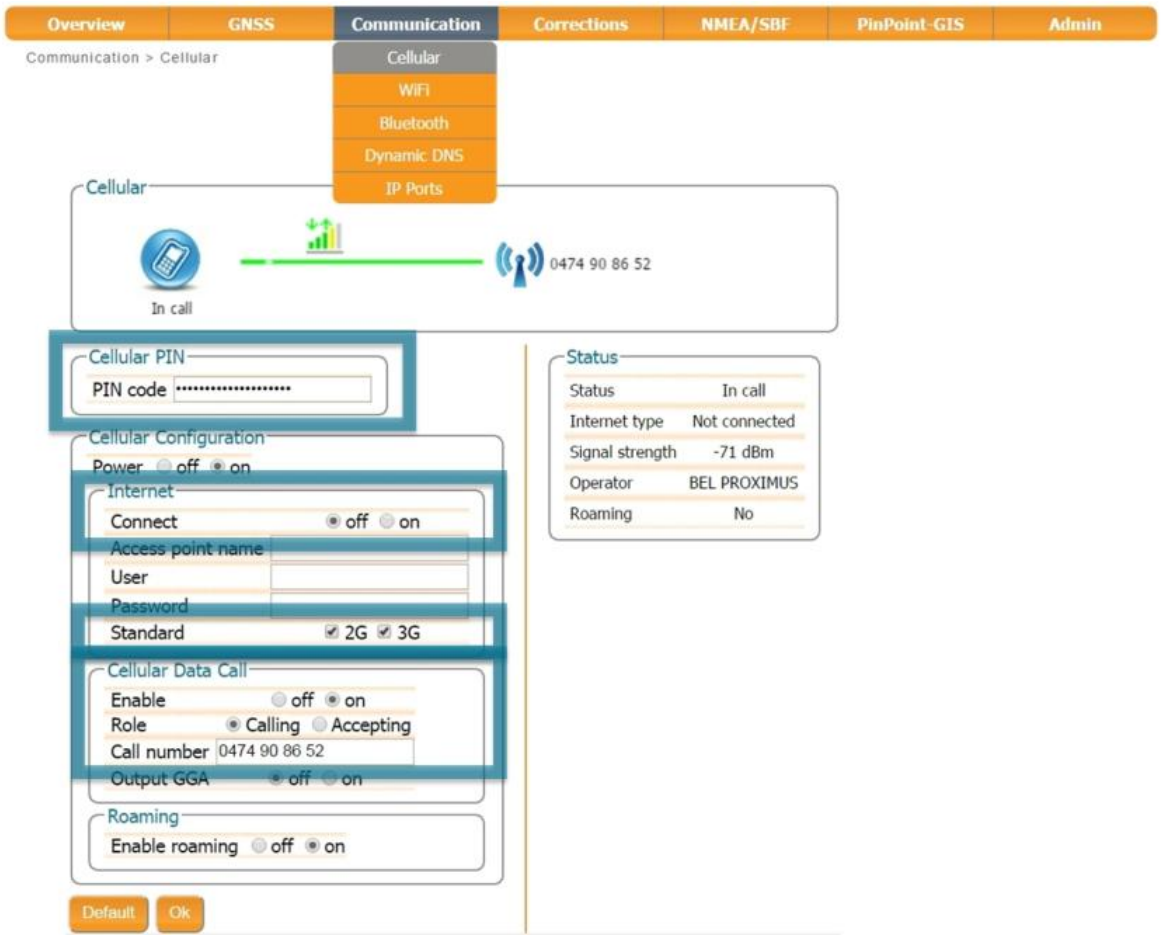


Figure 4-7: Configuring the Base station receiver to receive a data call from the rover receiver

Note that the Data Call feature only works when using batteries and will not work when the Altus NR2 is connected to an external power supply.

Step 3: Configure data output

Section 4.3.2 details the settings needed to output data

Step 4: Configure any additional settings

Section 4.4 details some additional settings that you may need

4.2.4 Connecting via an IP address using Mobile Internet

You can configure the Rover receiver to accept differential corrections from an IP address. In this case, the Base station receiver, be it a Reference Network or another Altus NR2, is sending corrections over IP. This section describes the Rover settings for the Altus NR2. Please review Section 5.2.2 for the configuration of the Altus NR2 as a Base using an IP address.

The setup described in this section is represented schematically in Figure 4-8.

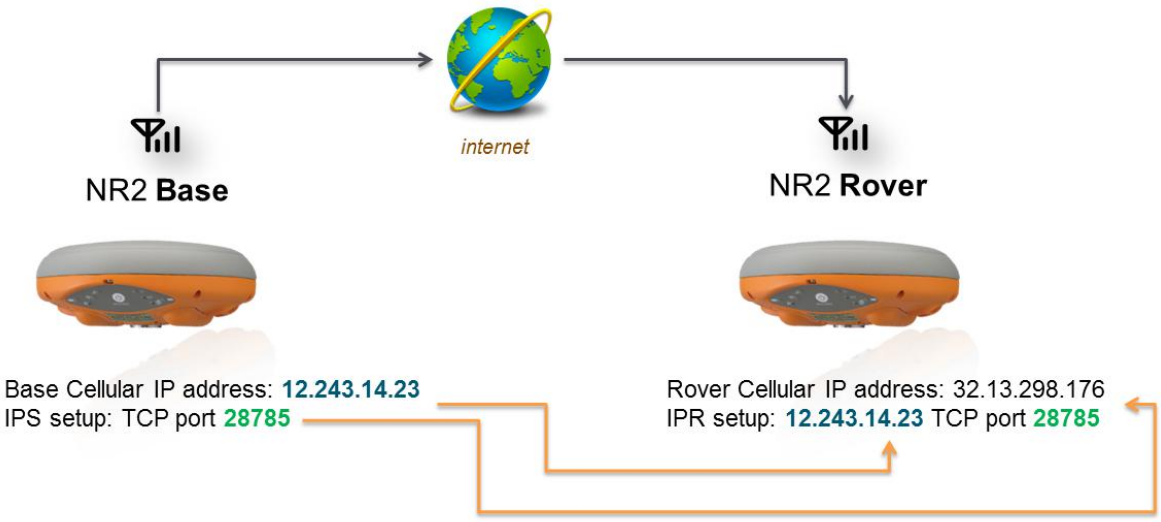


Figure 4-8: Base-Rover configuration using GSM

Step 1: Configure your cellular connection

Make sure that the Cell modem of the Altus NR2 is connected to the internet as described in Section 4.2.1.

Step 2: Configure the IPR connection

Setup an IPR (Receive) connection so the unit can accept the differential corrections via the Cellular internet connection. On the 'Communication/IP Settings' menu, configure and IPR connection with the IP address either from the Reference Station or from the Altus NR2 (the IP address assigned by the GSM or Cellular internet connection - See Figure 5-7) and select the port number configured for the Base station as shown in Figure 4-9.

Alternatively you can also use the Dynamic DNS feature (See Section 6.4) of the Altus NR2 in which case you can use a dedicated URL instead of an IP address (e.g. nr2-123.dyndns.org). In this case it is recommended to configure the Dynamic DNS service in the Altus NR2 Base station allowing the Rover receiver to use a URL instead of an IP address in the IPR connection settings described above.

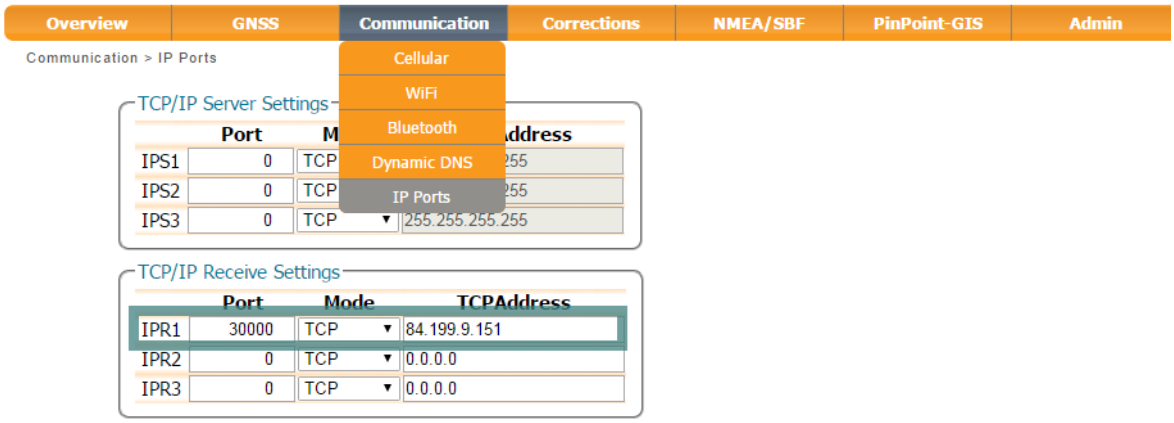


Figure 4-9: Enter the TCP/IP address and port number of the connection

Step 3: Configure the input of differential corrections

On the 'Corrections Input' tab, you can select the communication port and the RTCM stream expected as input as shown in Figure 4-10. The default setting is 'auto' which will detect automatically the format of the incoming differential correction stream. You can specify explicitly the format using the drop-down list.

Figure 4-10: Configure the rover receiver to listen for differential correction output from the Base station

Step 4: Monitor the incoming stream

In the Rover unit, the widget in the 'Corrections/Corrections input' menu should show the IPR connection accepting corrections. Similarly, the Base station widget will show data output from the receiver. If no connection is visible please verify the configuration making sure that the IP address/port of the Base are properly used in the Rover configuration. If you continue having problems, please contact your mobile network provider.

4.2.5 Connecting via WiFi

The setup described in this section is represented schematically in Figure 4-11.

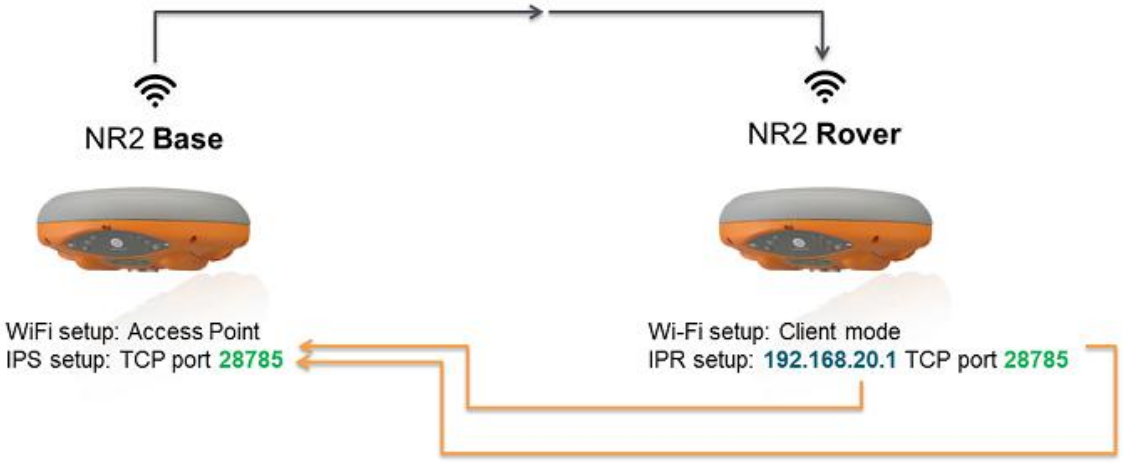


Figure 4-11: Base-Rover configuration using WiFi

Step 1: Check the receiver is in Rover mode

Section 4.1 shows how you can check that the Altus NR2 is set to work as a rover.

Step 2: Configure Rover input of differential corrections

Configure the rover WiFi connection as Client over USB

If the base station receiver has been configured as a WiFi Access Point then the rover should be configured as a client. In client mode however, the rover can make only one WiFi connection which in this case, will be with the base station. For this reason, the rover should be configured using the USB connection.

The steps below describe how to connect via USB to the Altus NR2 and configure it in WiFi client mode.

- Plug the USB cable of the Rover unit and connect to the web interface using **192.168.3.1**
- On the 'Communication/WiFi' tab, select 'Client' in the Mode parameter as shown in Figure 4-12.

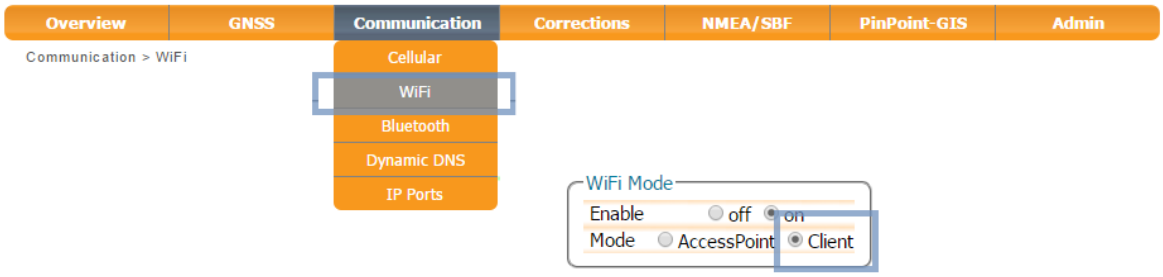


Figure 4-12: Click on 'Enable WiFi Client'

- Next, click on the 'Configure Networks' button in the 'WiFi Client Status' panel as shown in Figure 4-13. This will display a list of reachable WiFi networks.

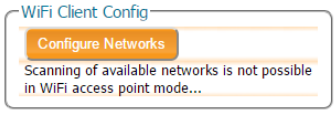


Figure 4-13: Click on 'Configure'

- From the list of networks, select to connect to the base station receiver by clicking 'Add' as shown in Figure 4-14.

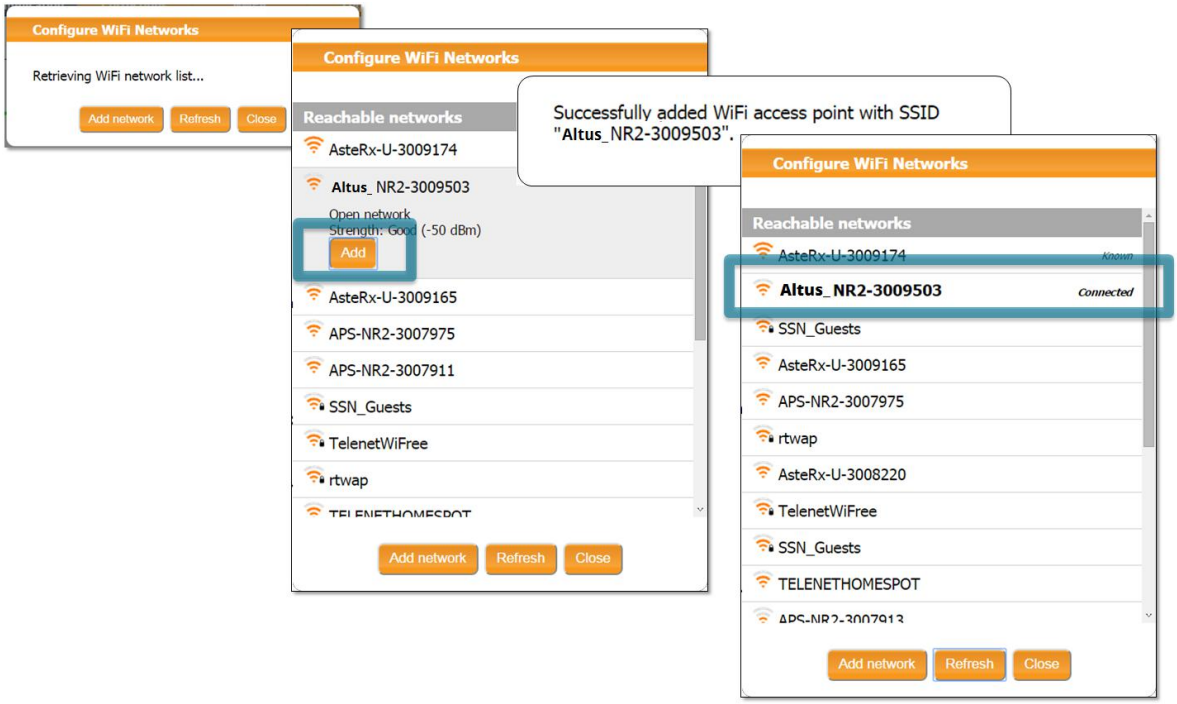


Figure 4-14: Select the base station device from the list of reachable networks

- Close the screen and click the 'OK' button to apply the settings.

Configure the input of differential corrections

On the 'Corrections Input' tab, you can select the format of corrections that will be accepted. The default setting is 'auto', as shown in Figure 4-15, which detects the format automatically however, a specific format can be explicitly selected using the drop-down list.

Figure 4-15: The IPR1 connection will be used for input of differential correction input.

Configure the IPR connection

Setup an IPR (Receive) connection for reception of differential corrections. On the 'Communication/IP Settings' menu, configure and IPR connection with the same port number configured for the Base station and the IP address **192.168.20.1** as shown in Figure 4-16.

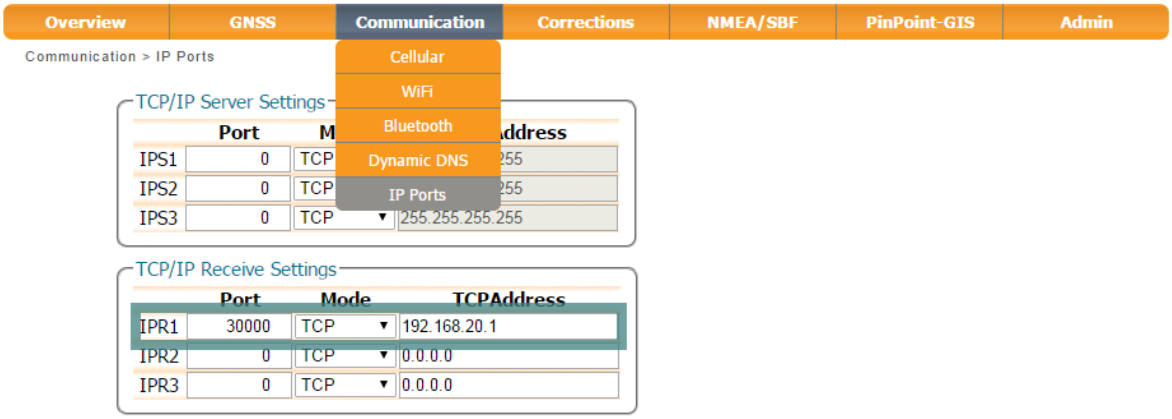


Figure 4-16: Configure the rover receiver to listen for the diff corr ouptut from the Base station

Step 3: Configure any additional settings

Section 4.4 details some additional settings that you may need.

Step 4: Verifying the configuration

If both the Base station and rover receivers have been configured correctly, the rover 'Overview' tab should show the WiFi connection to the base station and the top panel positioning mode icon should indicate RTK fixed as shown in Figure 4-17.

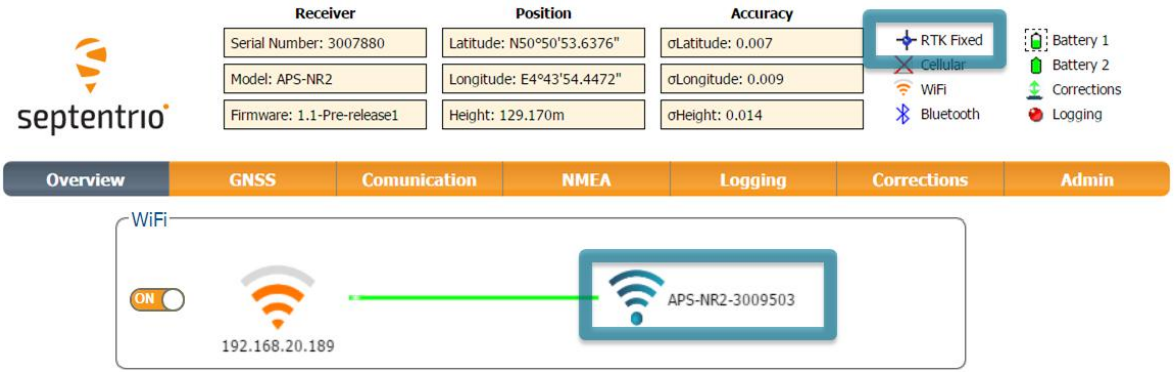


Figure 4-17: If the configuration is correct, the WiFi panel should show a connection to the Base station and the top-panel icon indicate RTK fixed

4.3 Configuring data output over Bluetooth

4.3.1 Connect Bluetooth

A Bluetooth connection is the most straightforward way to output data from the Altus NR2 to an application running on a tablet, phone or computer.

1. Select the **Communications/Bluetooth** tab on the Altus NR2's Web Interface.
2. The Bluetooth tab shows the Device name and Pairing code you need to connect to your device consuming the data produced by the Altus NR2
3. Using your preferred device, select the Bluetooth application and find the Bluetooth device name of your Altus NR2 and execute the pairing sequence. By default the Bluetooth Device name is Altus_NR2-<Serial Number>.
4. The Bluetooth name of the device you connected to appears on the right hand side of the Bluetooth icon in the Bluetooth tab.
5. Using your preferred GIS or Survey application on the device make sure you connect to the Bluetooth port created by the Bluetooth manager of your device.

Unless there are specific reasons to make the Altus NR2 undiscoverable, it is advised to leave the Discoverable option switched on.

The device name and pairing code may be changed for user preference. Also, the Bluetooth module may be powered on/off and set to discoverable from this tab.

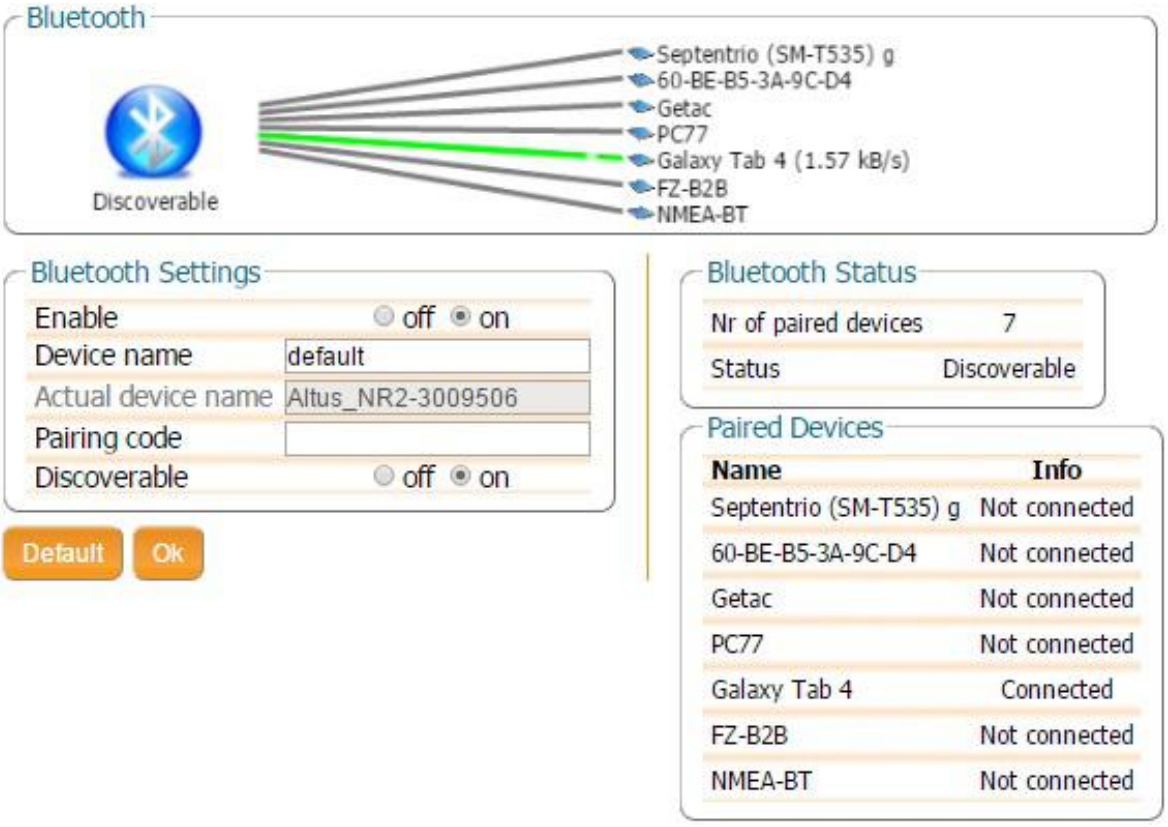


Figure 4-18: Configuring the Bluetooth connection to an external device

4.3.2 Configuring output of SBF and NMEA data

The Altus NR2 can be configured to output SBF or NMEA data in the 'NMEA/SBF Output' window.

- Select either NMEA or SBF
- Click on the icon to start the output configuration wizard
- When the configuration is complete, click on 'Ok' to apply the settings

In the example shown in Figure 4-19, the Altus NR2 has been configured out output the NMEA GGA and ZDA messages every 1 second over the serial COM connection (COM1). Data can also be output over USB (USB1 or USB2), Ethernet (IPS1, IPS2 or IPS3), Bluetooth (BT01) or DataCall (DCL1).

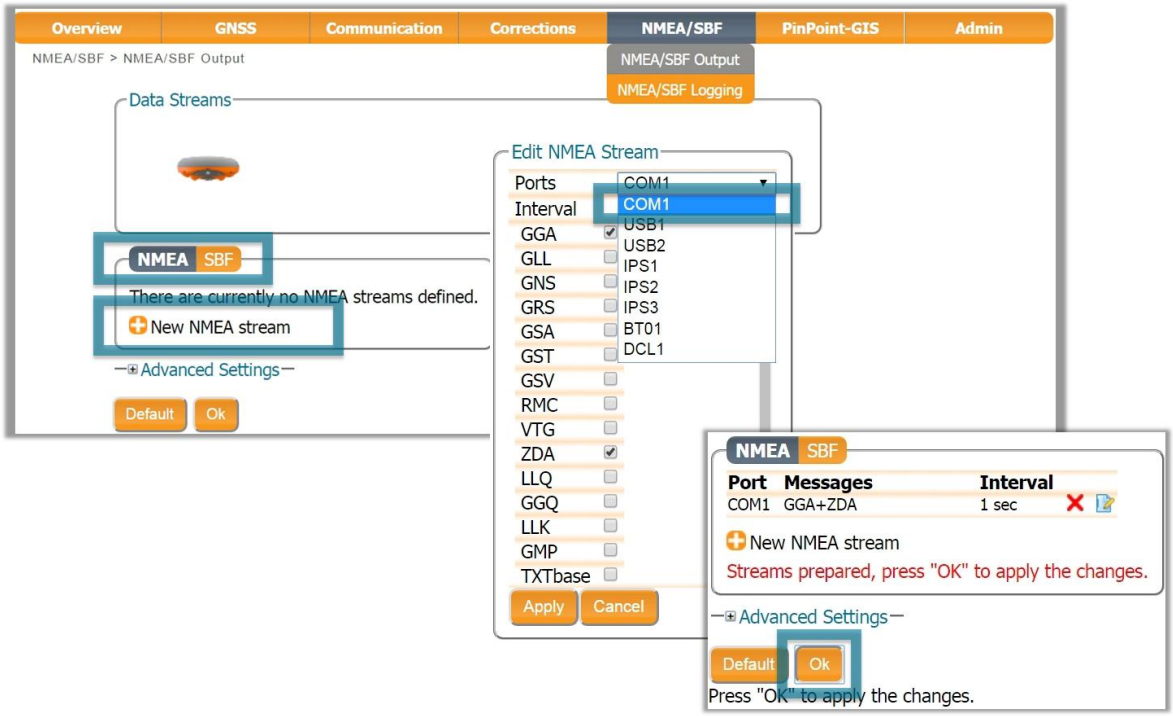


Figure 4-19: example showing output of NMEA GGA and ZDA over the serial COM connection

4.4 Additional rover settings

4.4.1 Setting the antenna height

The antenna height is the offset between the height of the measured position and the Antenna Reference Point which is usually the length of the survey pole.

1. Click on the **GNSS/Status** tab and enter the antenna height
2. Click 'Apply' when finished. In the example shown in Figure 4-20, an offset of 2.0 metres was used.

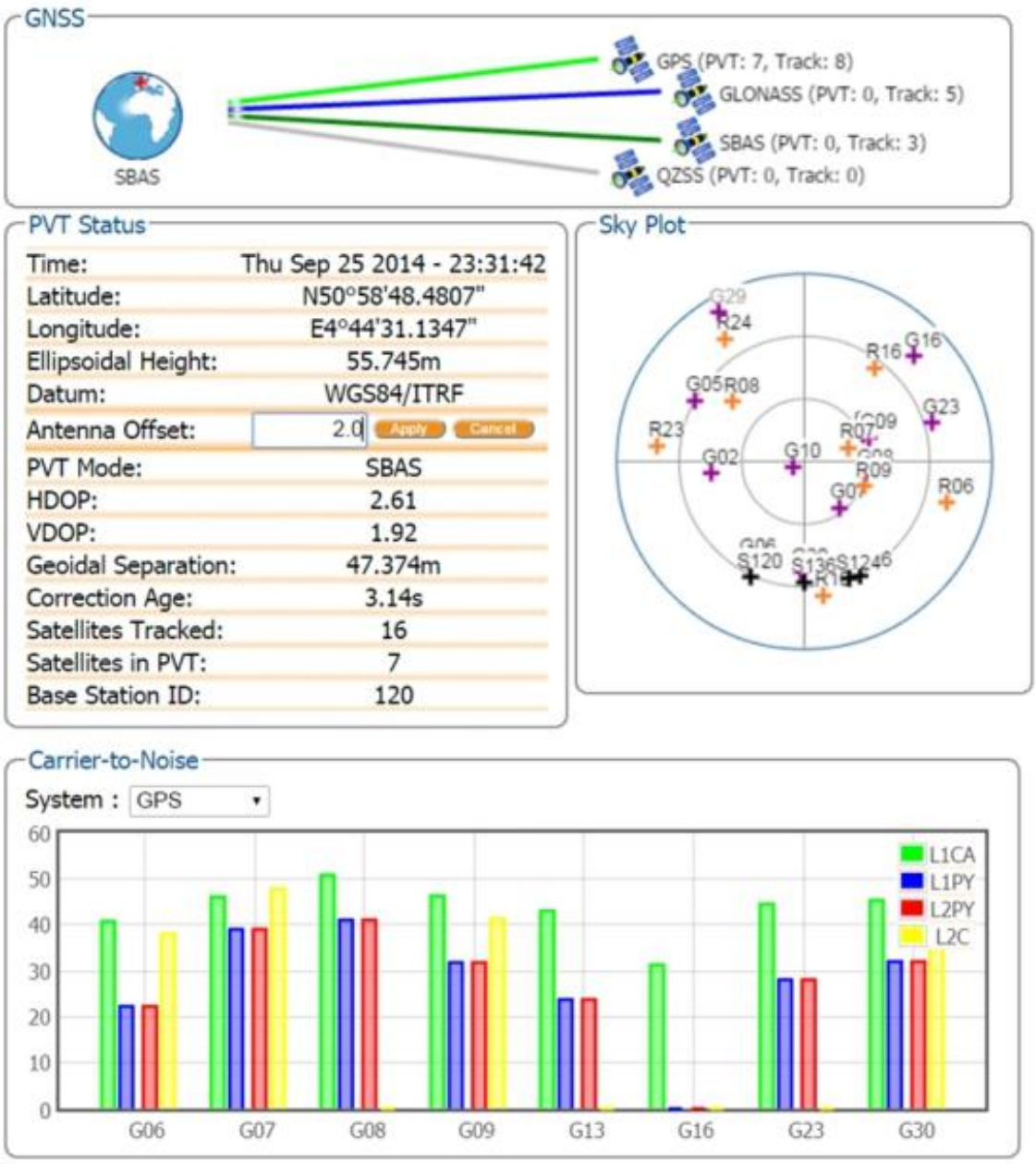


Figure 4-20: GNSS Tab: setting Antenna Offset

The Altus NR2 automatically compensates for the Antenna Phase Centre offset using the approved calibration of the product in order to provide the most accurate position out of the box.

5 Configuring Altus NR2 as a Base station

Before starting ...

The Altus NR2 can be set up as a Base station receiver. Thanks to its point-to-point connectivity features, the Altus NR2 Base station makes a great companion to any Altus NR2 Rover unit. Two Altus NR2 units (Base station and rover) can be connected point-to-point, without any intermediate device, for the for the transfer of differential corrections.

RTK Differential corrections can be output over any of the following communication channels:

- Data Call (also referred to as CSD, Circuit Switched Data)
- Mobile internet
- WiFi
- Serial COM1 port (e.g. to an external UHF radio)
- Bluetooth

Note that the Data Call feature only works when using batteries and will not work when the Altus NR2 is connected to an external power supply. A summary of the pros and cons of the first three connection methods can be found in Appendix C

5.1 Setting the base station position

A rover receiver in RTK mode calculates a position relative to the Base station receiver. For this reason, it is always recommended to use a properly surveyed position for the Base station receiver.

Set the Base station position as static

To work as a base station, the position of the Altus NR2 should be static. The 'Static' position mode should be selected in the 'GNSS' tab as shown in Figure 5-1.

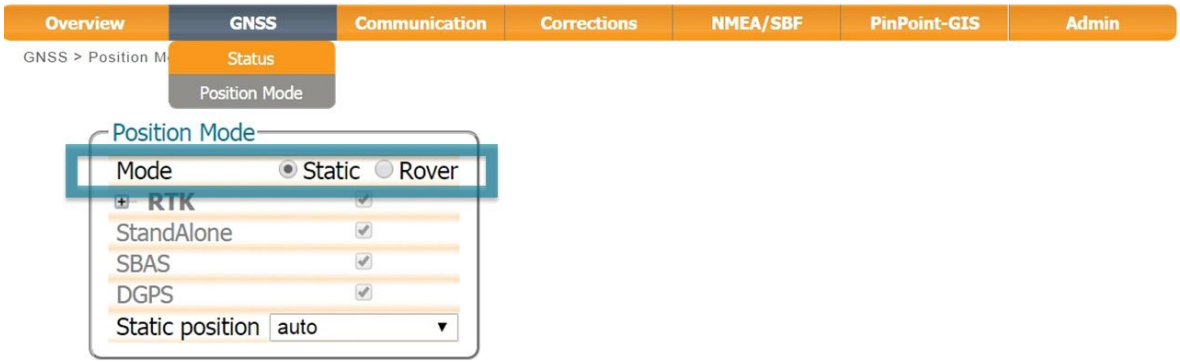


Figure 5-1: Setting the Altus NR2 base station position to static

Set the correct position

The next step is to set the antenna position of the Altus NR2. The default setting of 'auto' can be used for demonstration or for relative positioning however, for most other purposes, a properly surveyed position is advisable. In the example shown in Figure 5-2, the position stored under 'Geodetic1' is used. The stored positions can be entered via the 'Advanced Settings' link on the same page. Pre-set positions can be entered in either Geodetic or Cartesian coordinates as shown.

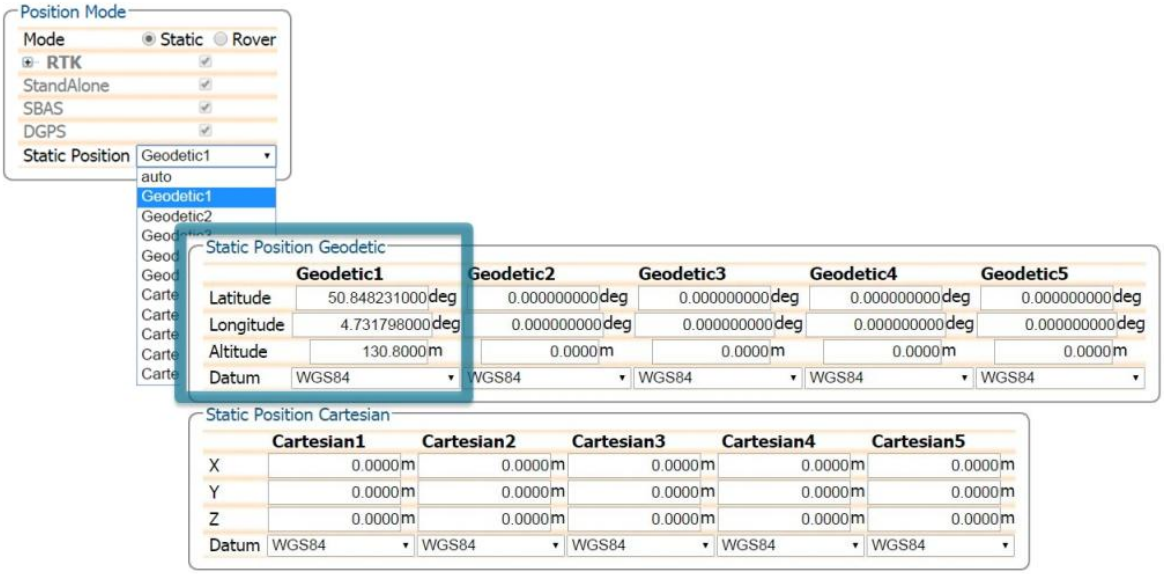


Figure 5-2: Setting the static position to the pre-set 'Geodetic1' position

5.2 Connecting the Base station receiver to the rover

5.2.1 Connecting via Data Call

The setup described in this section is represented schematically in Figure 5-3. differential corrections from the Base station to the rover are transferred over a GSM cellular modem call. In this example, the rover receiver calls the Base station receiver on the number 0474 90 86 52. With the 'Role' set to 'Accepting', any call the receiver will automatically accept any incoming call.

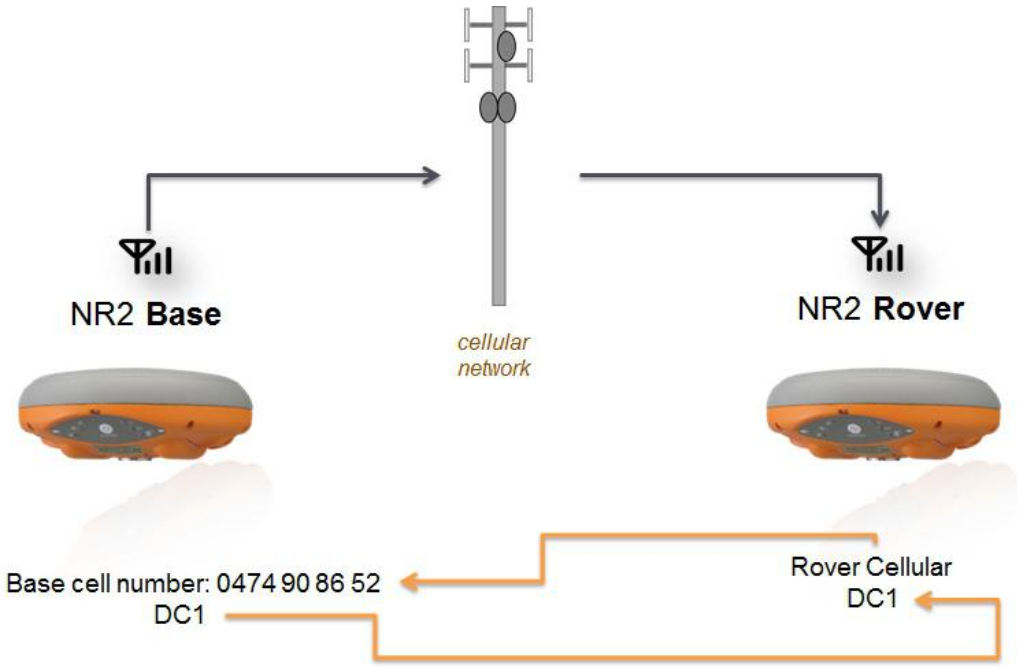


Figure 5-3: Overview of the Base-Rover configuration for differential correction transfer over Data Call

Step 1: Setting the Altus NR2 base station position

Set the Altus NR2 base station position as described in Section 5.1

Step 2: Configure the connection to the rover

From the 'Communication' menu select 'Cellular', where you can configure the cellular modem of the Base station receiver for the reception of a data call. The essential settings are highlighted in Figure 5-4 with other settings being optional.

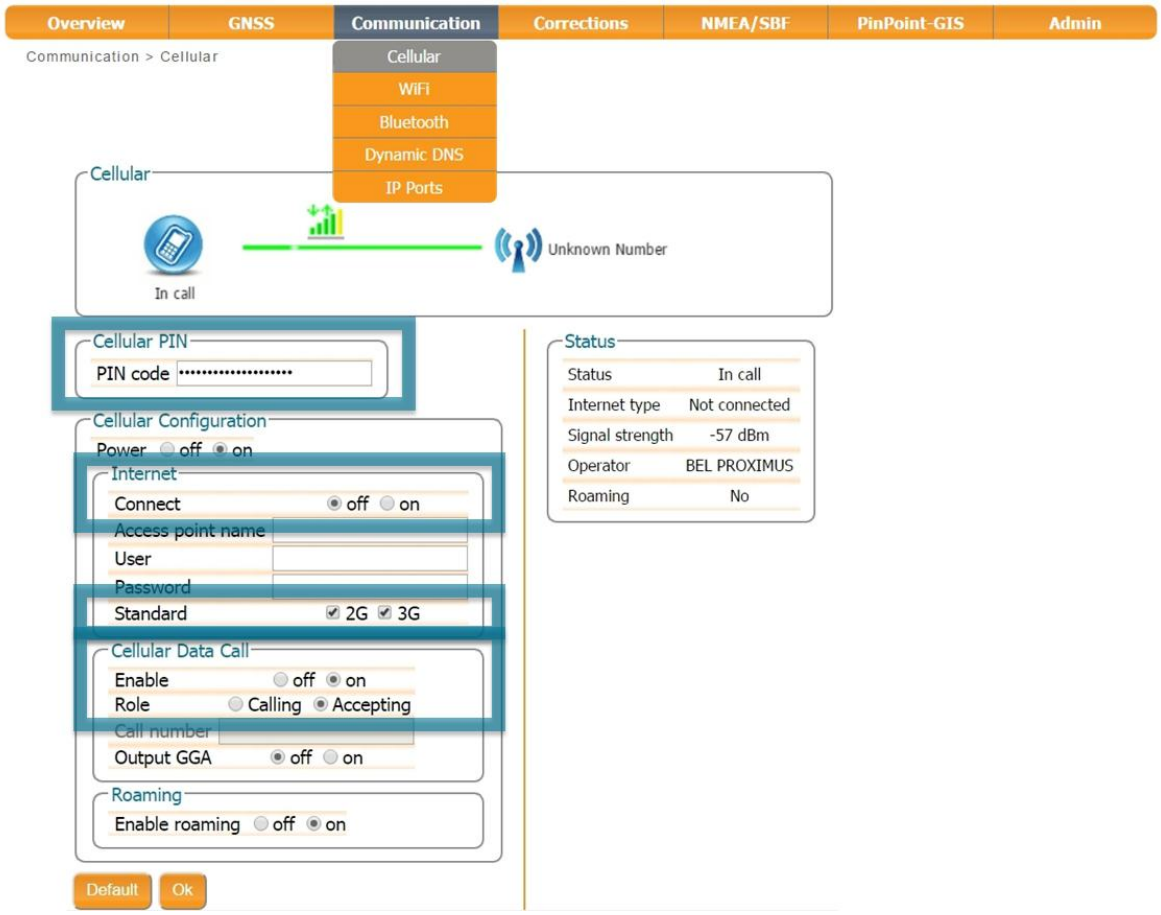


Figure 5-4: Configuring the Base station receiver to receive a data call from the rover receiver

Step 3: Configure output of differential corrections

On the 'Corrections Output' window, you can select the type, number and rate of differential corrections that you want to send to the rover receiver. The particular messages necessary for RTK and DGNSS are selected by default. Selecting **DC1** as the Connection Port will as shown in Figure 5-5, the receiver will send out correction data to any rover receiver that connects on a data call.

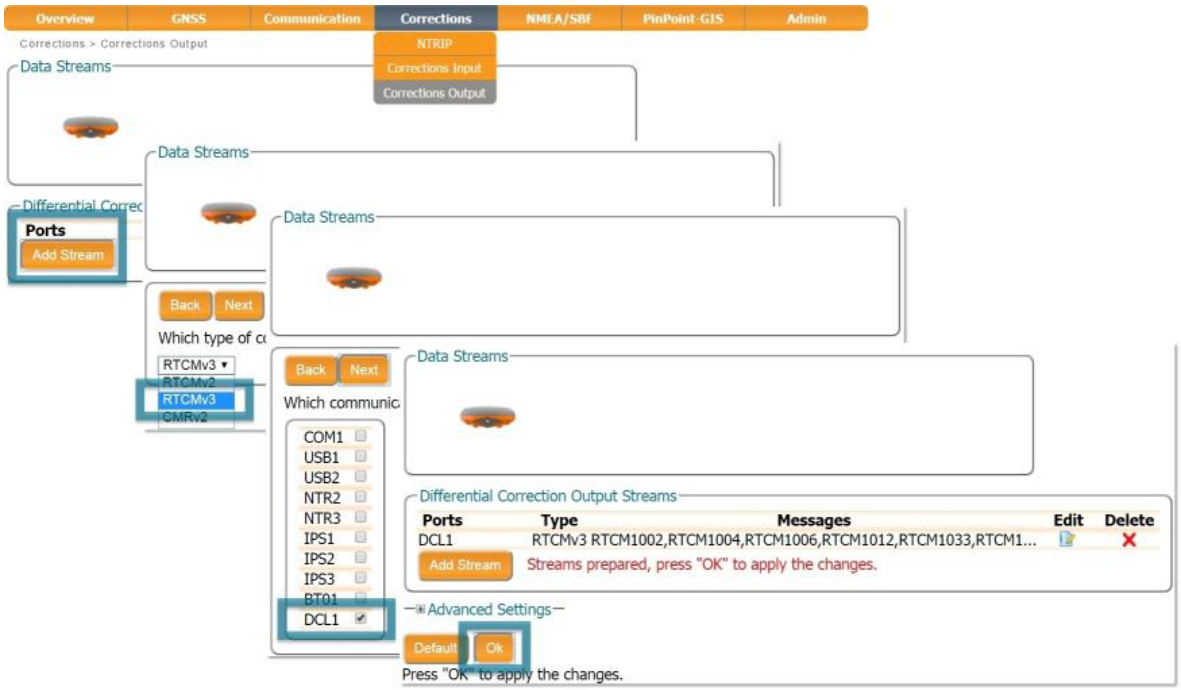


Figure 5-5: Output of RTCMv3 differential corrections over the DC1 connection of the base station receiver

5.2.2 Connecting via Mobile Internet

The setup described in this section is represented schematically in Figure 5-6. The Base station must be configured as a server (IPS) in order to accept incoming connections on a specified IP port. The Rover is configured to request an IPR connection to the specified IP address and port of the Base receiver in order to receive corrections.

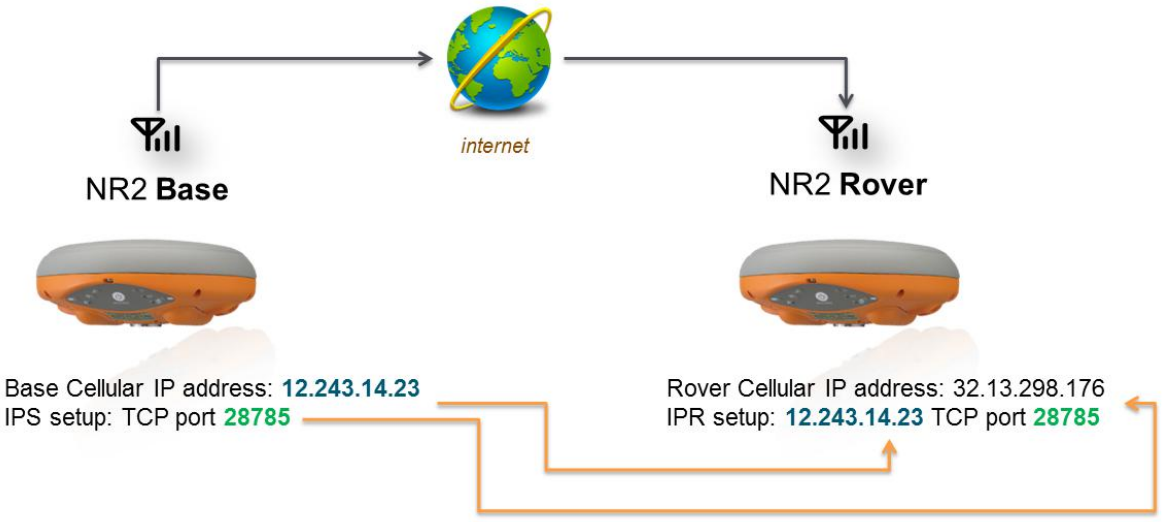


Figure 5-6: Overview of the Base-Rover configuration for differential correction transfer using Data Call

Step 1: Setting the Altus NR2 base station position

Set the Altus NR2 base station position as described in Section 5.1

Step 2: Configure output of differential corrections

Configure your cellular connection

- Make sure that the cell modem of the Altus NR2 is connected. Section 4.2.1 details how this can be done.
- When the cellular modem is connected this will be indicated by an active green cellular connection line in the 'Communication/Cellular' window as shown in Figure 5-7. Take note of the IP address[1] indicated as it will be needed for the rover configuration in the next step.

[1] It is important to remember that with most mobile network providers, the assigned IP address of the cellular modem in the Altus NR2 will be changed every time that a new connection is made. As such the Rover units will need to be aware of the new IP address (some mobile network providers allow you to use Fixed IP addresses).

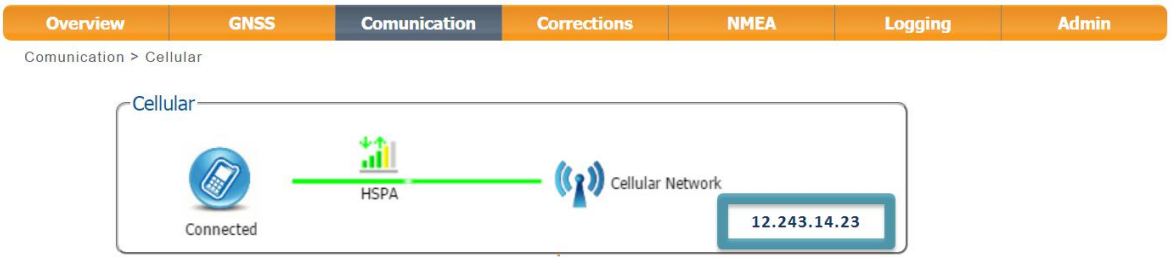


Figure 5-7: Cellular connection active with assigned IP address indicated

Optionally configure a Dynamic DNS service

It is important to note that the assigned IP address of the Base station receiver will change every time the Cellular connection is established unless your Network provider has provided you with a Fixed IP address on your SIM card. If you do not have a Fixed IP address then it is recommended to use the Dynamic DNS service from the Altus NR2 which will allow the Rover receiver to use a fixed and unique URL for connecting to the Base receiver (e.g. nr2-123.dyndns.org). In this case the Dynamic DNS configuration should be done on the Base station receiver. Please see Section 6.4 for configuring a Dynamic DNS service.

Configure the IPS connection

Setup an IPS connection so you the unit can stream out corrections. Go to the 'Communication/IP Settings' menu and set an IPS port for the corrections output as shown in Figure 5-8. It is recommended to use higher range ports (e.g. 28785) to avoid conflicts with other applications. For RTCM corrections, TCP Mode should be sufficient.

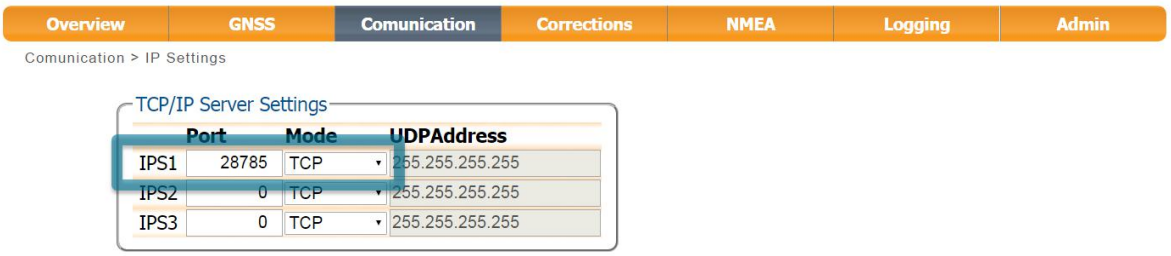


Figure 5-8: Select an IPS ports on which to output differential corrections.

Configure the correction stream

On the 'Corrections Output' tab, you can select the type and number of differential corrections that you want to send to the rover receiver. Make sure that you use the same IPS connection you configured in the previous step. The sequence of steps are shown in Figure 5-9. The messages necessary for RTK and DGNSS are selected by default[2].

[2]Note that if you do not have permissions for RTK Base corrections, you will only be allowed to output RTCM2 DGPS messages

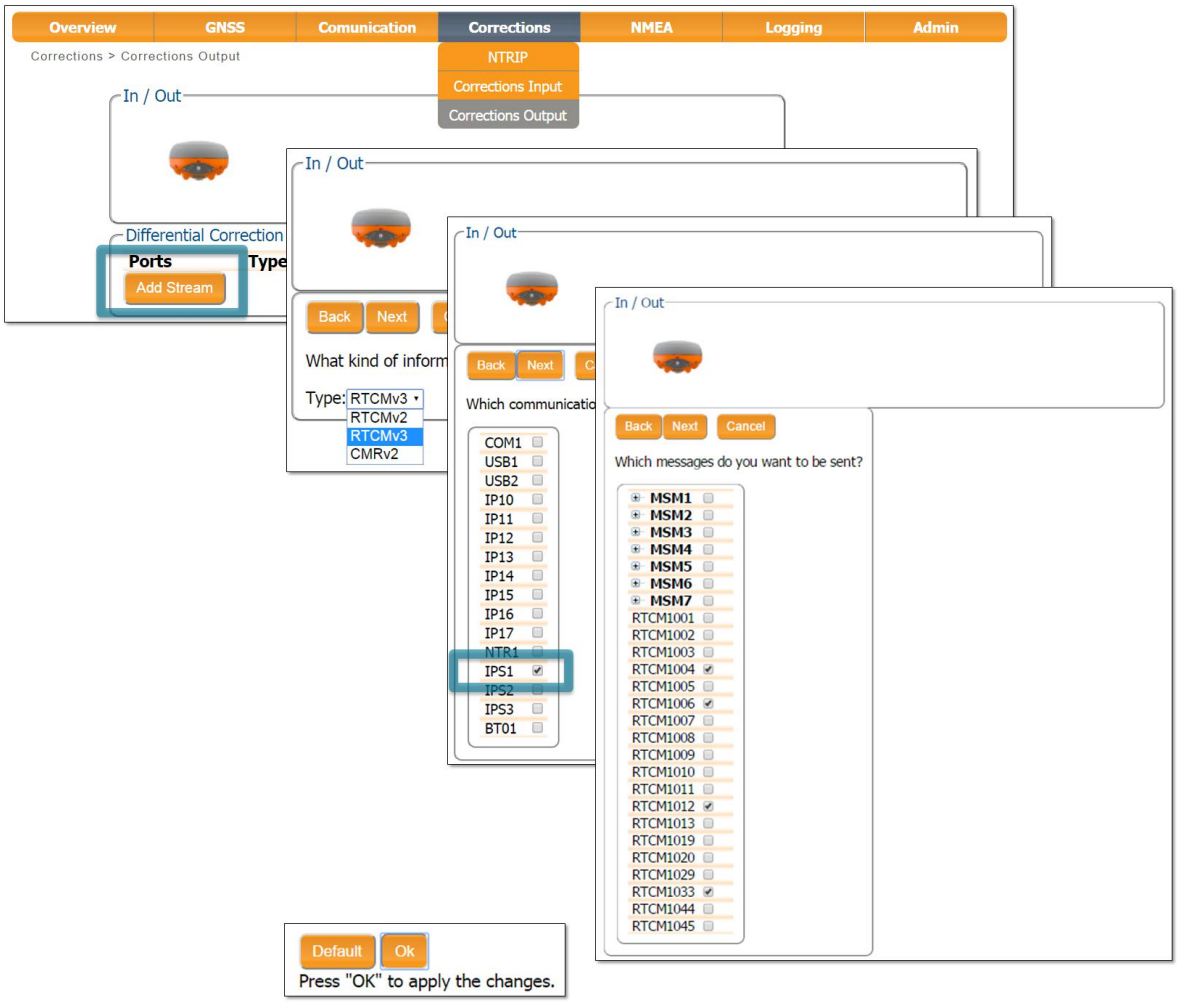


Figure 5-9: Output RTCMv3 diff corr on the configured TCP/IP server port of the Base station receiver

5.2.3 Connecting via WiFi

A WiFi Rover-Base setup is ideal for smaller sites where a cellular connection is not feasible. While in principle a connection can extend to 180 metres, in practise this is highly dependent on the environment. One advantage a WiFi setup has over a cellular setup is that, after the configuration has been saved to boot, the connection will automatically re-establish every time the base and rover are powered up. Whereas in the case of a cellular connection, the IP address will change with each new connection.

The setup described in this section is represented schematically in Figure 5-10. The Base station is configured as a WiFi access point while the rover is configured as a client.

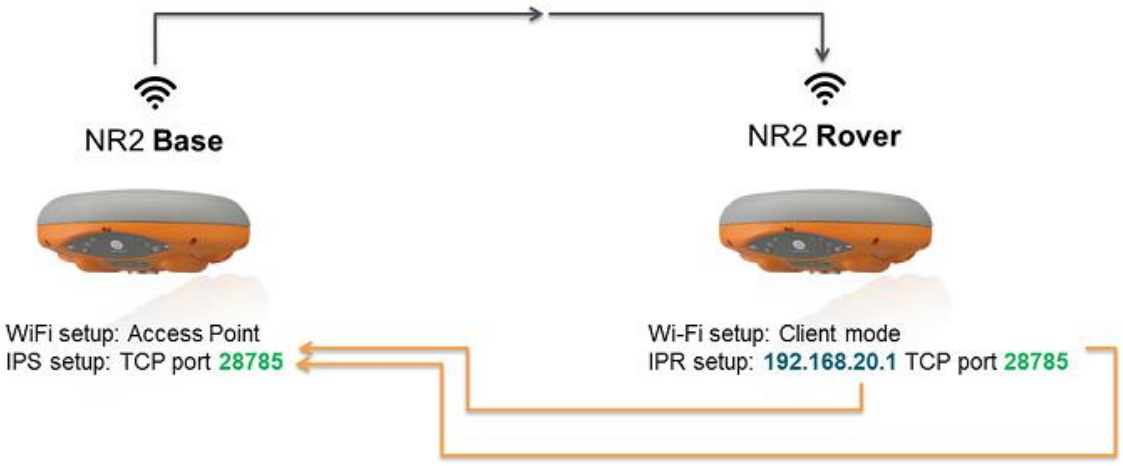


Figure 5-10: Base-Rover configuration using WiFi

Step 1: Setting the Altus NR2 base station position

Set the Altus NR2 base station position as described in Section 5.1

Step 2: Configure the Base station output of differential corrections

Configure your WiFi connection as an Access point

If you can connect to the receiver over WiFi using the web interface then it is already configured in Access Point mode and you can go directly to '*Configure the IPS connection*' in the next section.

Configuring the base station receiver as an Access Point will allow rover receivers to connect to it. The Access Point setting is the default configuration however, if your receiver has been configured as a Client you can reconfigure it over USB. To do this, connect the NR2 to your PC using the USB cable connected to the 'Port 1' socket indicated in Figure 2-5. You can now open an internet browser and connect to web interface using the IP address **192.168.3.1** as shown in Figure 5-11

Figure 5-11: Connecting over USB to the web interface using the URL 192.168.3.1

In the 'Communication/WiFi' window 'AccessPoint' can then be selected as the WiFi mode as indicated in Figure 5-12.

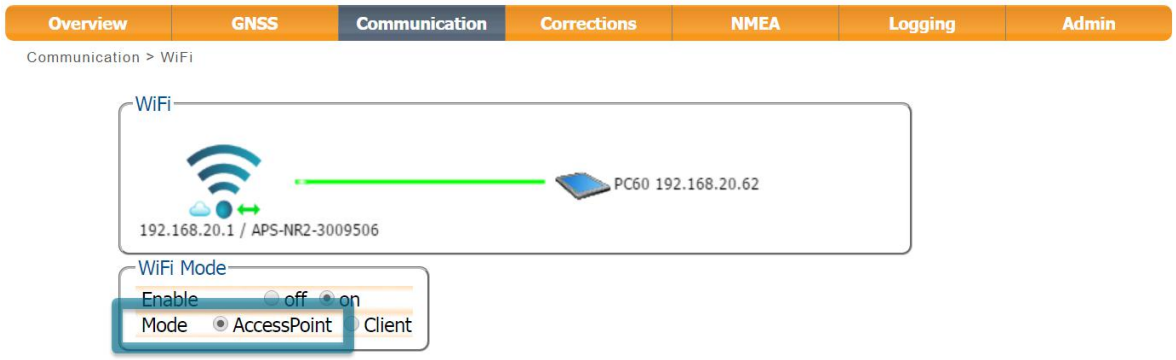


Figure 5-12: Select 'AccessPoint' in the WiFi Mode field

Configure the IPS connection

Setup an IPS (Send) connection over which differential corrections can be sent. On the 'Communication/IP Settings' menu select an IPS port as shown in Figure 5-13. It is recommended to use higher range ports (e.g. 28785) to avoid conflicts with other applications. For RTCM corrections, TCP Mode should be sufficient.

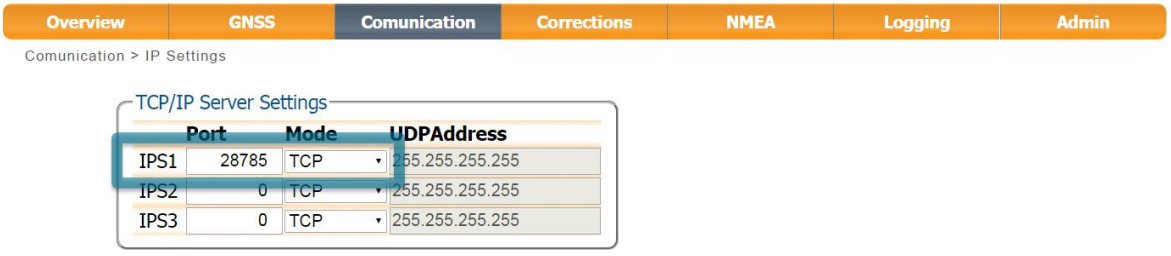


Figure 5-13: Select an IPS ports on which to output differential corrections.

Configure the correction stream

On the 'Corrections Output' tab, you can select the format and individual differential correction messages that you want to send to the rover receiver. Make sure to select the same IPS connection you configured in the previous step. The sequence of steps are shown in Figure 5-14. The messages necessary for RTK and DGNSS are selected by default[3].

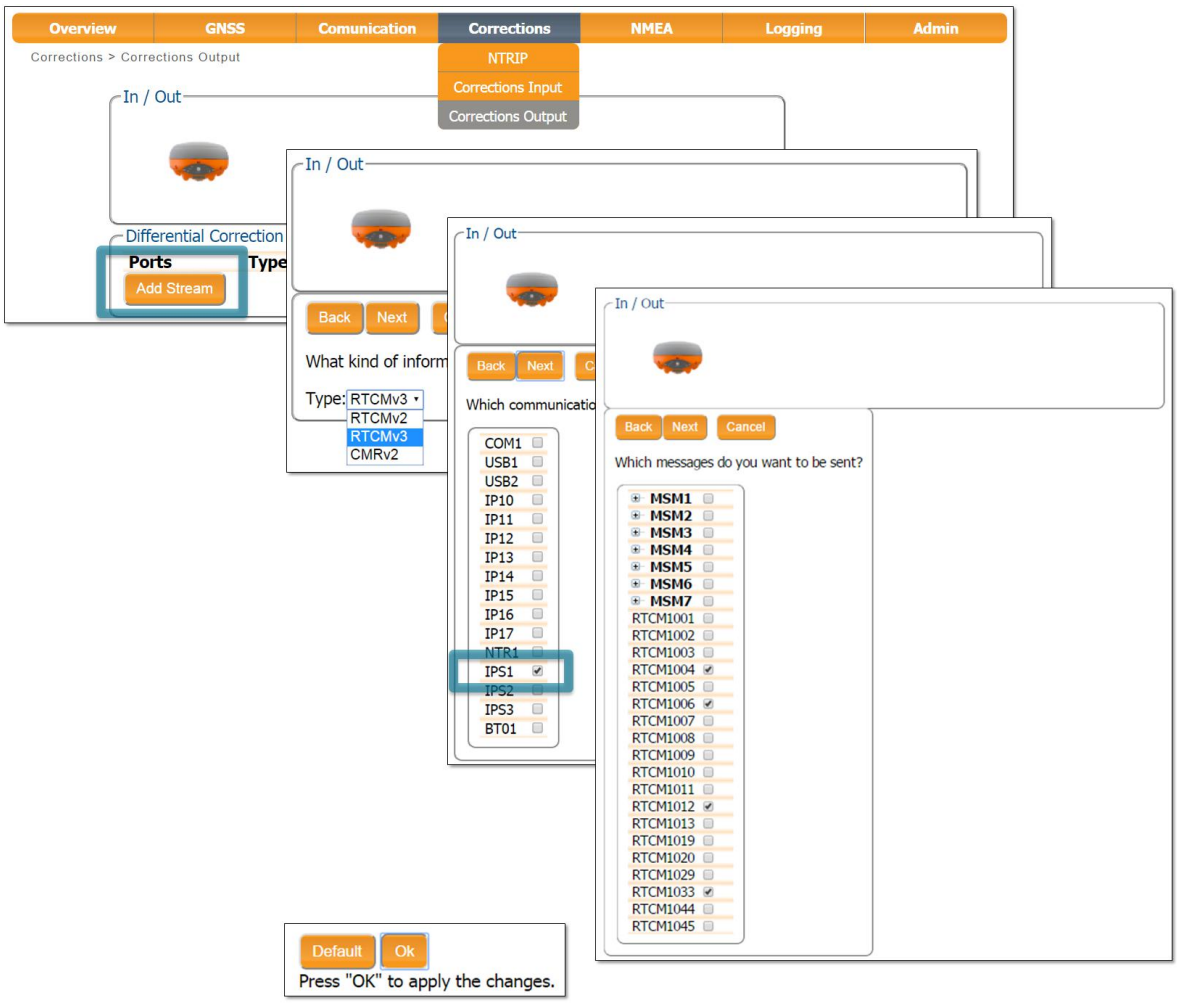


Figure 5-14: Output RTCMv3 diff corr on the configured TCP/IP server port of the base station receiver

[3]Note that if you do not have permissions for RTK Base corrections, you will only be allowed to output RTCM2 DGNSS messages

6 Other receiver operations

6.1 Logging SBF and NMEA data

Data can be logged on the internal 8 GB disk of the Altus NR2 in either SBF (Septentrio Binary Format) and/or NMEA messages (National Marine Electronics Association). Section 6.2 details how to download data logged on the receiver.

6.1.1 Basic logging configurations

Logging of SBF and/or NMEA data can be configured in the 'NMEA/SBF Logging' window as shown in Figure 6-1. To set up a logging session you should:

1. Select '**on**', in the Enable Logging field
2. Select either the 'NMEA' or 'SBF' data format
3. Click the icon to start the logging configuration wizard. In the example shown in Figure 6-1, the SBF blocks necessary for Rinex generation have been selected for logging at 1 Hz.
4. In the 'SBF Logging Parameters' field, you can select the naming convention. The 'IGS' options name files according to IGS convention but files can also be freely named using either the 'FileName' or 'Incremental' options
5. Click 'Ok' to apply the settings

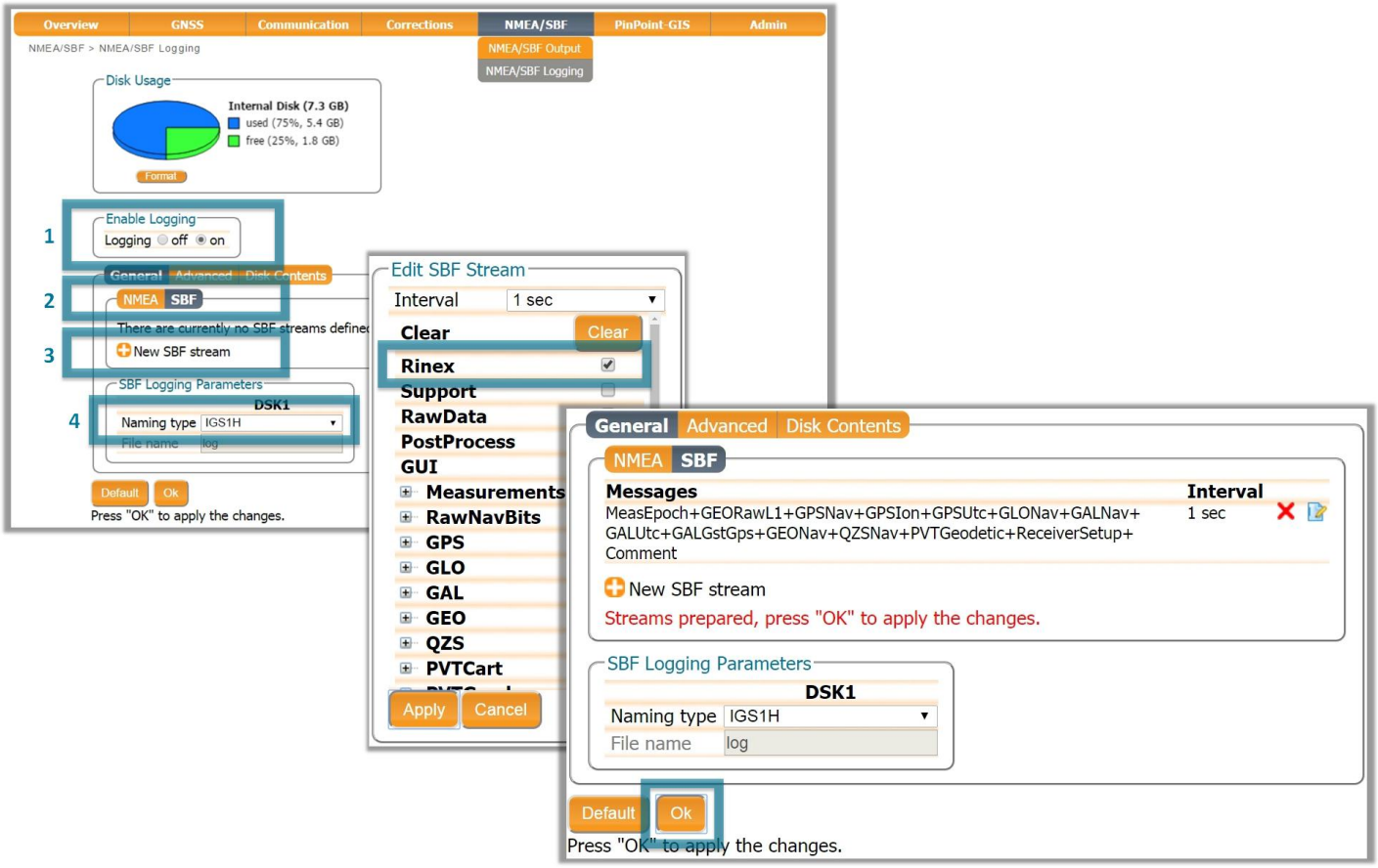


Figure 6-1: logging the SBF blocks necessary for RINEX conversion

6.1.2 Advanced Settings for Logging

The 'Advanced' tab offers several additional logging options. For Base station use, the 'Marker and Station Parameters' fields can be filled in. You can also specify what you want to happen when the internal disk becomes full. The default option is 'StopLogging' with 'DeleteOldest' as alternative.

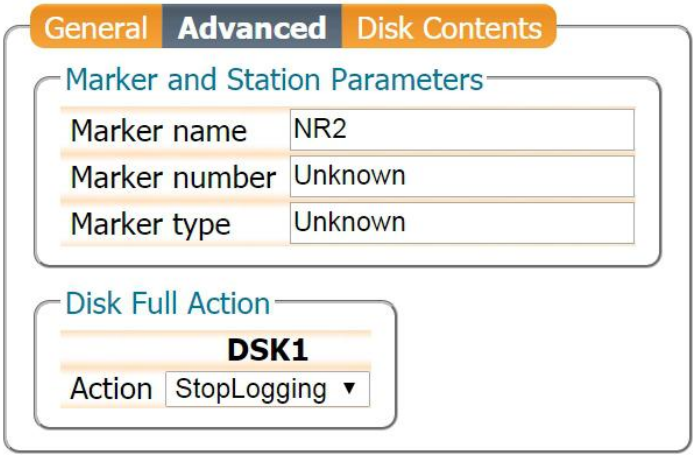


Figure 6-2: Web Interface Logging - Advanced Settings

6.2 Downloading logged data from the receiver

As described in Section 6.1, the collected data can be stored on the internal disk.

The data can be retrieved over WiFi using the Web Interface or over USB using the data cable.

6.2.1 Using the Web Interface

1. Click on the **Logging** tab
2. All the recorded files are shown in the File Explorer
3. Click the ⬇ in the Download column to download the file to the browser's download directory
4. Obsolete files can be deleted by clicking the ✖ next to the file

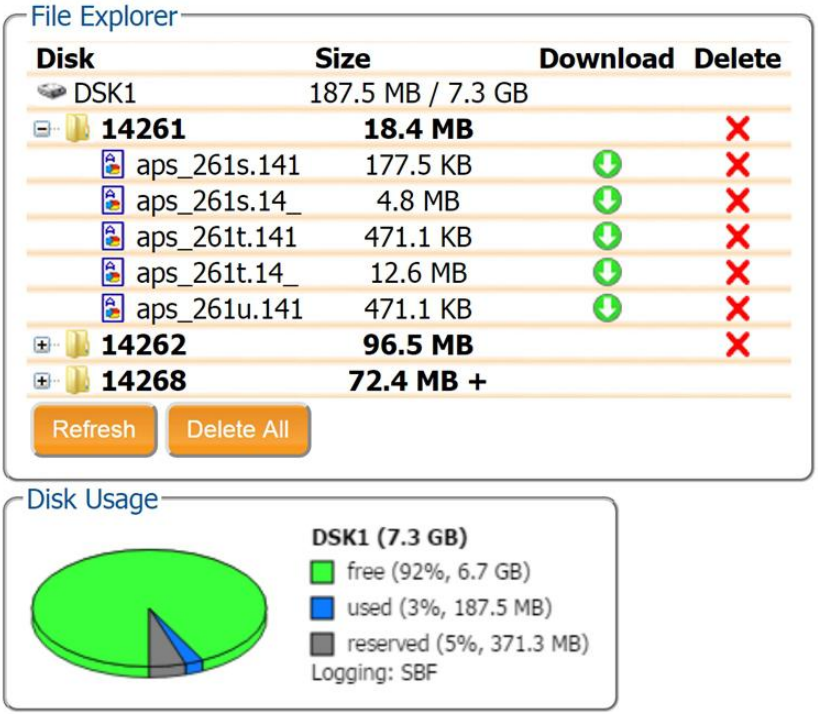


Figure 6-3: Downloading logged files

6.2.2 Using the USB connection

Connecting the USB data cable for the first time

The USB drivers for the Altus NR2 can be installed by following the steps below:

- Make sure the computer is connected to the internet
- Connect the Altus NR2 to a USB port of your computer using the USB cable
- A new drive called 'Septentrio Drivers' will appear in the File Explorer after a few seconds. Pop-ups may appear indicating that drivers are being installed but these should be ignored.
- In the folder 'driver', you will find an executable driver file. Right click on this file and select 'Run as administrator' as shown in Figure 6-4.

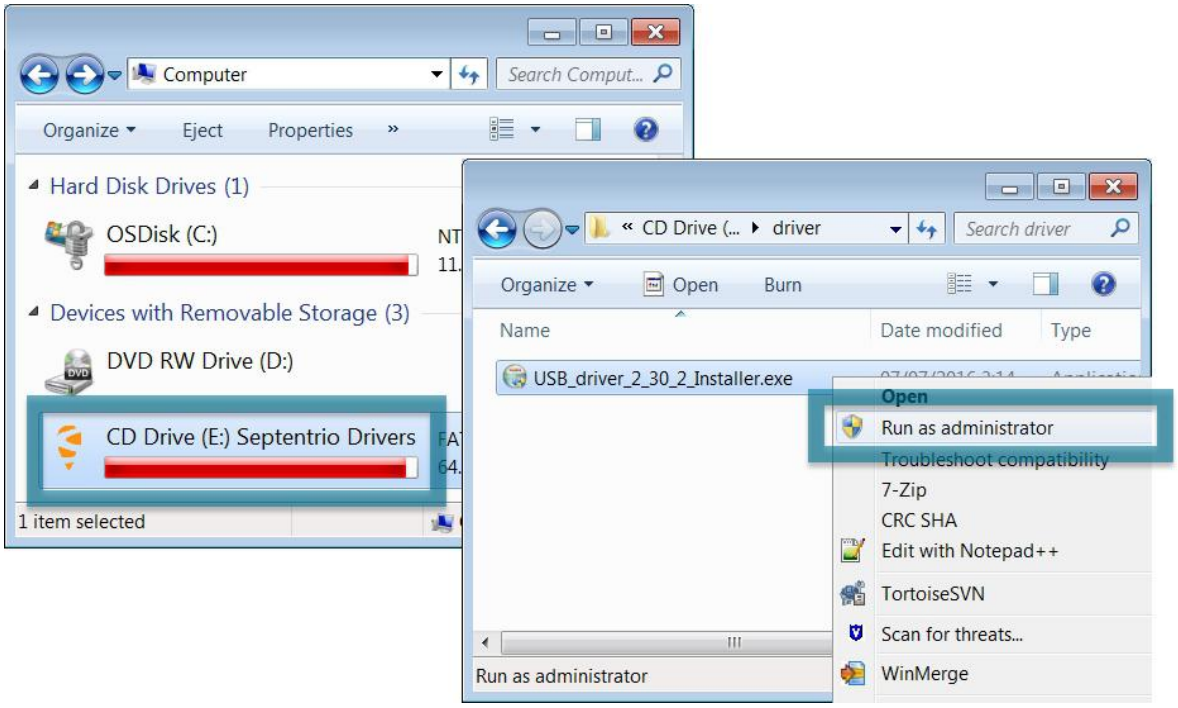


Figure 6-4: Run the executable driver installation file in the folder 'driver'

- For the final stage of the driver installation, you will be prompted to disconnect then reconnect the USB cable from your pc as shown in Figure 6-5.

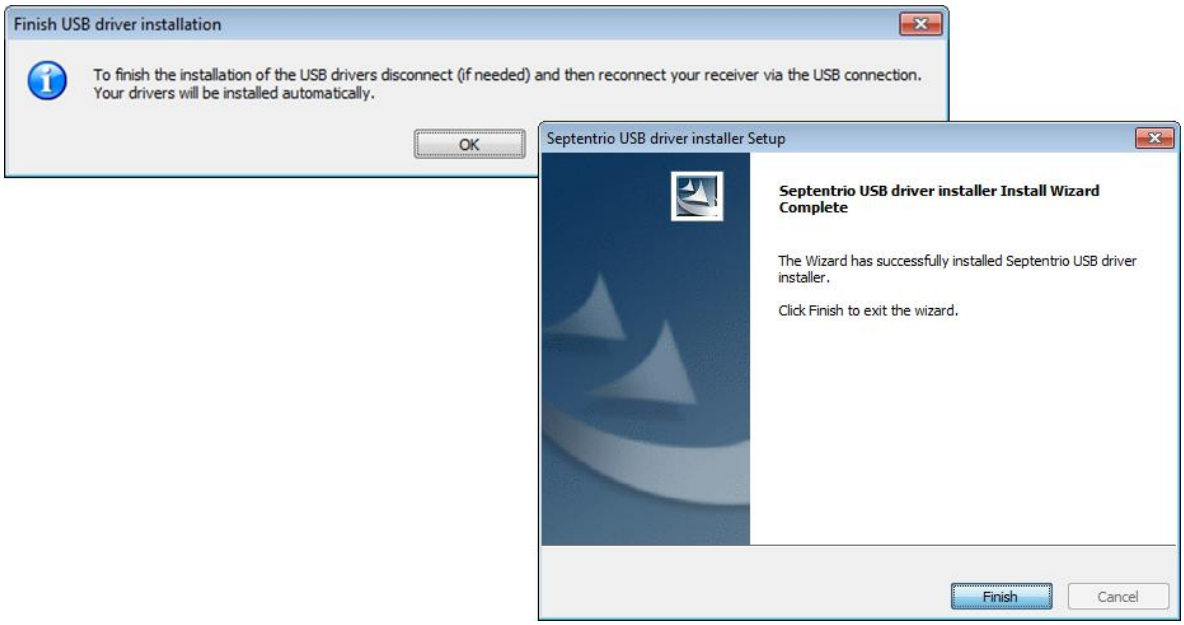


Figure 6-5: Disconnect then reconnect the USB cable to finalise the driver installation

Retrieving data via the USB connection

Connecting the USB cable while logging will stop logging

If the Altus NR2 has not been connected to the computer being used before then first execute the steps described in the Section 6.2.2.

If the Altus NR2 has already been connected to the computer and the drivers installed, you can follow the steps below to retrieve logged data files:

1. Open the Windows File Explorer
2. Connect the Altus NR2 to a USB port of your computer using the USB communication cable
3. On a Windows computer the Altus NR2 will appear as an extra drive in the file explorer after a few seconds
4. The Altus NR2 appears as a drive named 'Altus_NR2-xxxxxxx DSK1' where 'xxxxxxx' is the 7-digit serial number of the receiver
5. The data files can be retrieved from the 'SSN\SSRC9' folder

Connecting via ‘Ethernet over USB’

The web Interface of the Altus NR2 can be accessed over an ‘Ethernet over USB’ connection. If the Altus NR2 has not been connected to the computer being used before then first execute the steps described in the Section 6.2.2.

If the Altus NR2 has already been connected to the computer used the following steps apply:

- Connect the Altus NR2 to your computer using the USB cable.
- Open your web browser and use the IP address: **192.168.3.1**

6.3 Configurations

A configuration is a collections of all settings and values that determine the behaviour of the receiver. The table below gives an overview of the Altus NR2's configurations.

Configuration	Persists after power cycle	Writable	Description
RxDefault	Yes	No	The factory default configuration
Current	No	Yes	Settings that are actually being used
Boot	Yes	Yes	The receiver configuration on start up
User1, User 2	Yes	Yes	Two configurations can be stored for later use

With the Web Interface, you can perform the following operations on configurations:

Copy	The Copy operation allows the user to copy any of the five configurations into another configuration
Download	The Download operation allows the user to export a selected configuration to a text file
Upload	The Upload operation allows the user to import a selected configuration from a text file

6.3.1 Saving the configuration

After each change made to the configuration of the Altus NR2, the pop-up shown in Figure 6-6 will appear. Clicking on 'Save' will cause the new configuration to be applied the next time the receiver is powered. Configurations can also be saved as text files and uploaded to other receivers. See Section 6.3.2 for more information on managing configurations.

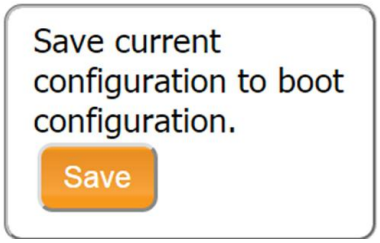


Figure 6-6: The 'save to Boot' pop-up

If you have consistently pressed 'Save' when the pop up appears on the screen, all settings will be persistent and will be applied again when the device powered on.

If you are not sure that all the setting have been stored, you can follow the steps below:

1. Click on the **Admin/Configurations** tab
2. Select 'Current' in the Source drop down box as shown in Figure 6-7.

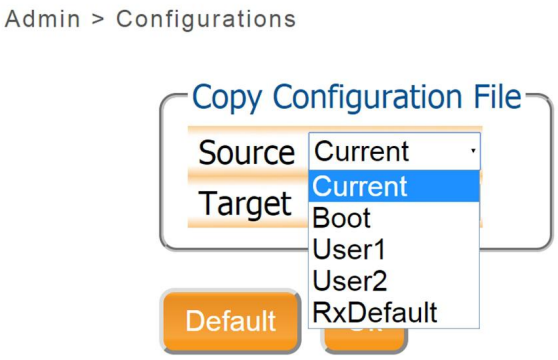


Figure 6-7: Select 'Current' as Source

3. Select 'Boot' in the Target drop down box as shown in Figure 6-8

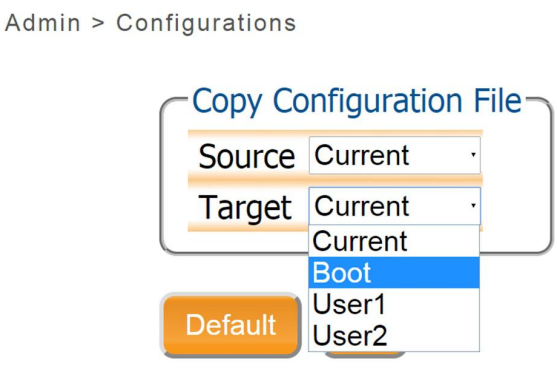


Figure 6-8: Select 'Boot' as Target

4. Click the ‘OK’ button shown in Figure 6-9

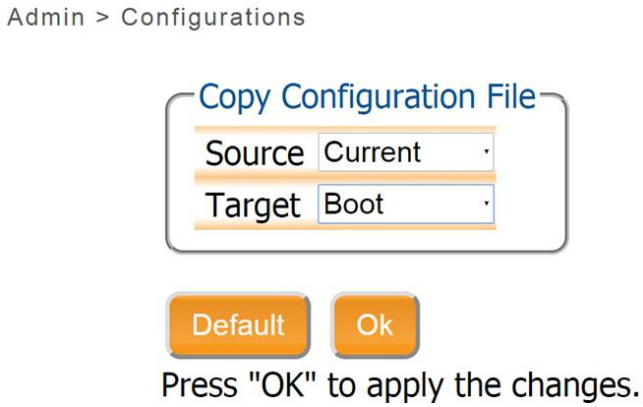


Figure 6-9: Click on ‘OK’ to execute the copy

6.3.2 Managing Configurations

The Altus NR2's configurations can be managed from the Admin tab.

1. Click the **Admin** tab.
2. Select **Configurations**. The Configurations tab will resemble Figure 6-10.

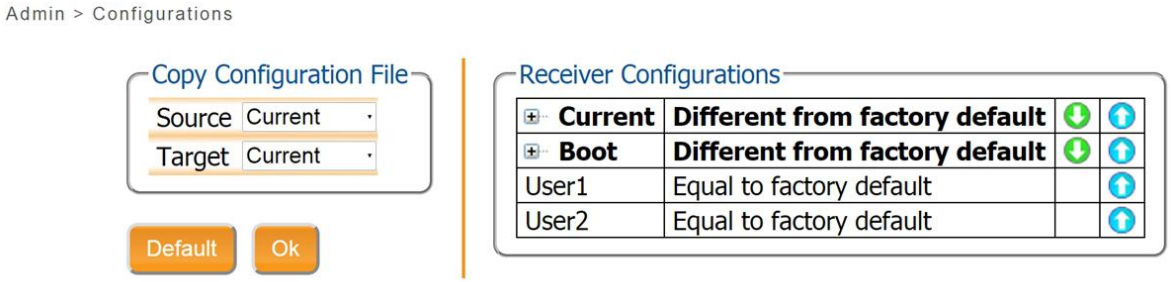


Figure 6-10: Web Interface Admin-Configurations

Copy Configuration File

1. Select the configuration to be copied in the Source drop down box.
2. Select where the Source configuration is to be copied into using the Target drop down box.
3. Click OK

Download Configuration

1. Click the next to the configuration to be downloaded.
2. The download is started immediately.
3. The configuration can be found in the browser's download folder.

Upload Configuration

1. Click the next to the configuration to be uploaded.
2. A window pops up for the user to select a file.
3. After a file has been selected the upload is started immediately.

If the uploaded file contains invalid commands, the complete file is ignored and the configuration remains unchanged.

6.4 How to configure Dynamic DNS

Dynamic DNS allows remote contact with the Altus NR2 using a hostname.

When devices are connected to the internet, they are assigned an IP address by an internet service provider (ISP). If the IP address is *dynamic* then it may change over time resulting in a loss of connection. Dynamic DNS (DynDNS or DDNS) is a service that addresses this problem by linking a user-defined hostname for the device to whichever IP address is currently assigned to it.

Step 1: Open a Dynamic DNS account

To make use of this feature on the Altus NR2, you should first create an account with a Dynamic DNS provider to register a hostname for your receiver. The Altus NR2 supports the following two services:

- Dyn DNS: http://dyn.com/
- No IP: http://www.noip.com/

Having opened account, you can then create a host service for which you will need to specify a URL or hostname for the receiver (e.g. mynr2.dyndns.org).

Step 2: Configure the Dynamic DNS settings of the receiver

In the 'Dynamic DNS' window of the 'Communication' menu, the hostname of the receiver and other Dynmamic DNS settings can be entered.

In the example shown in Figure 6-11, the hostname *mynr2.dyndns.org* has been registered with dyndns.org. The *Bind* option, selected in this case, tells the Dynamic DNS provider to automatically update IP addresses assigned over either a WiFi or cellular connection.

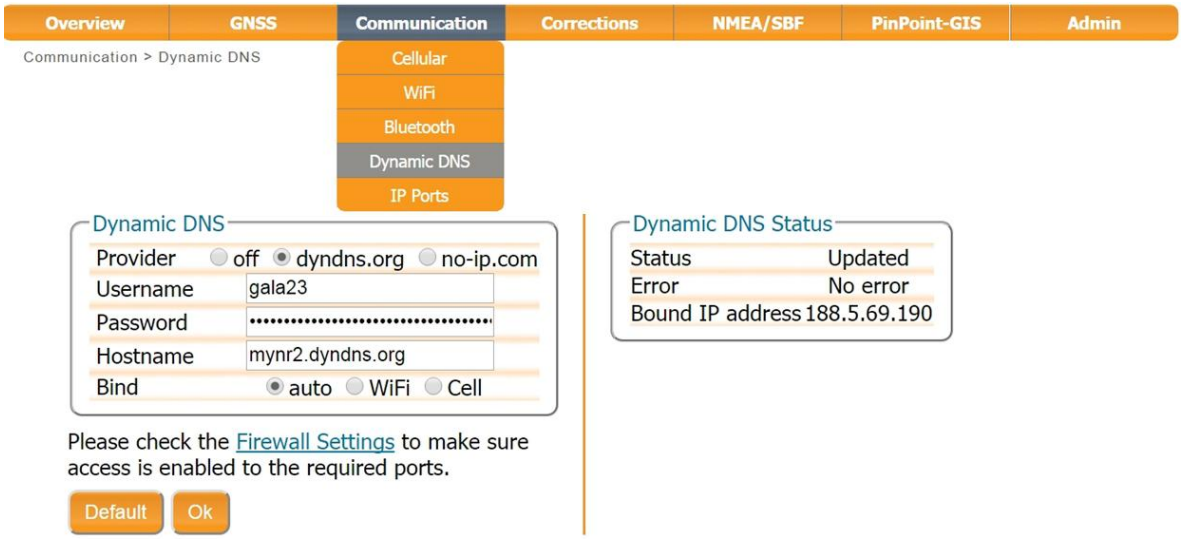


Figure 6-11: Configuring Dynamic DNS

6.5 Resetting the Altus NR2

When the Altus NR2 is not operating as expected, a simple reset may resolve matters. The receiver can be reset as described below:

1. Click The **Admin** tab
2. Select the Reset Option

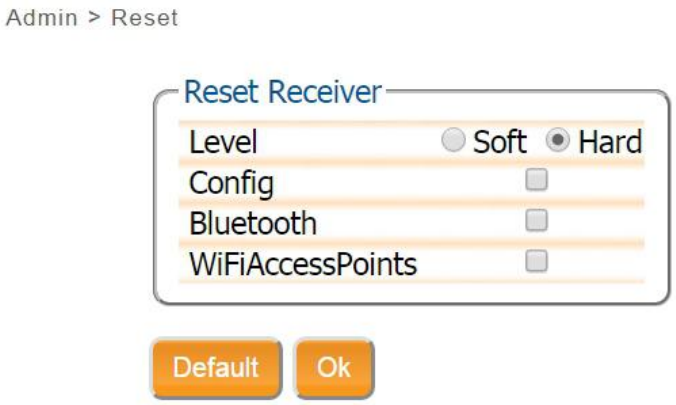


Figure 6-12: Admin - Reset

3. Select the desired reset level using Tables 6.5-1 and 6.5-2
4. Click OK
5. The Altus NR2 restarts

Level	Description
Soft	This is a reset of the receiver's firmware. The receiver will restart operating in the same configuration as before the command was issued, unless the 'Config' option has been ticked.
Hard	This is similar to a power off/on sequence. After hardware reset, the receiver will copy the Boot configuration into the Current configuration..
Upgrade	Set the receiver into upgrade mode. After a few seconds, the receiver is ready to accept an upgrade file (SUF format) from any of its connections.

Table 6.5-1: Altus NR2 Reset Levels

Erase	Description
Config	The RxDefault configuration is copied into the receiver's Boot and Current configurations. The User1 and User2 configurations remain unchanged.
Bluetooth	All information about previously paired devices is cleared.

Table 6.5-2: Altus NR2 Reset- Memory Erase Options

6.6 Upgrading the firmware

Firmware upgrades for the Altus NR2 are freely available for the lifetime of the receiver and can be downloaded from the Septentrio website. The procedure for upgrading firmware is detailed below:

1. Read the Release Notes carefully before performing an upgrade An upgrade may consist of one or several .suf files and there may be a specific sequence to be followed depending on the firmware version to upgrade to.
2. Click The **Admin** tab.
3. Select the **Upgrade** Option.
4. Store the .suf files required for the upgrade in a folder on your computer.
5. Click the Browse button and navigate to the folder where you stored the .suf files. Select the (first) .suf file to be loaded into the Altus NR2. After selecting the .suf file its name will appear next to the Browse button.
6. Click the Start upgrade button.
7. After processing the upgrade file the Altus NR2 will reset.
8. The upgrade process possibly disconnects the WiFi connection. If so, re-establish the connection as described in Section 3.3.
9. Repeat steps 5 to 8 until all the necessary .suf files have been uploaded.

Figure 6-13: Web Interface Admin-Upgrade

6.7 How to manage access to the Altus NR2

You can manage the access that users have to the Altus NR2 in the **User Administration** window of the **Admin** menu. By default, all communication interfaces are assigned User-level access except the DataCall port as shown in Figure 6-14. 'User' level allows full control of the receiver while 'Viewer' level only allows viewing graphics and configurations.

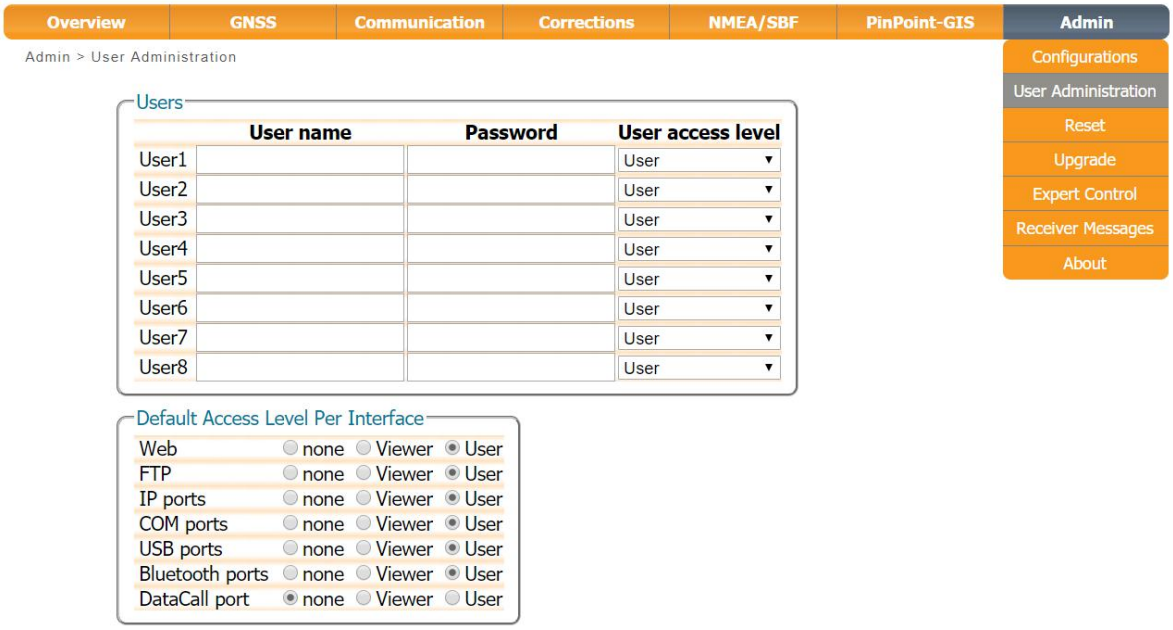


Figure 6-14: The default access levels of the Altus NR2

In the example shown in Figure 6-15:

Web Interface: Anonymous users (without password) can connect to the receiver via the web interface as Viewers. They can browse the various windows but cannot change any of the settings. Only George, who has User access, can change receiver settings via the web interface.

FTP: Anonymous users have full access over FTP so can download and delete logged data files.

IP, COM, USB, Bluetooth and DataCall ports: Only George has User access to these ports so can change receiver settings over these connections. Mildred has only viewer access so can only send commands to show the configuration. Anonymous users can neither change or view the receiver configuration over these connections.

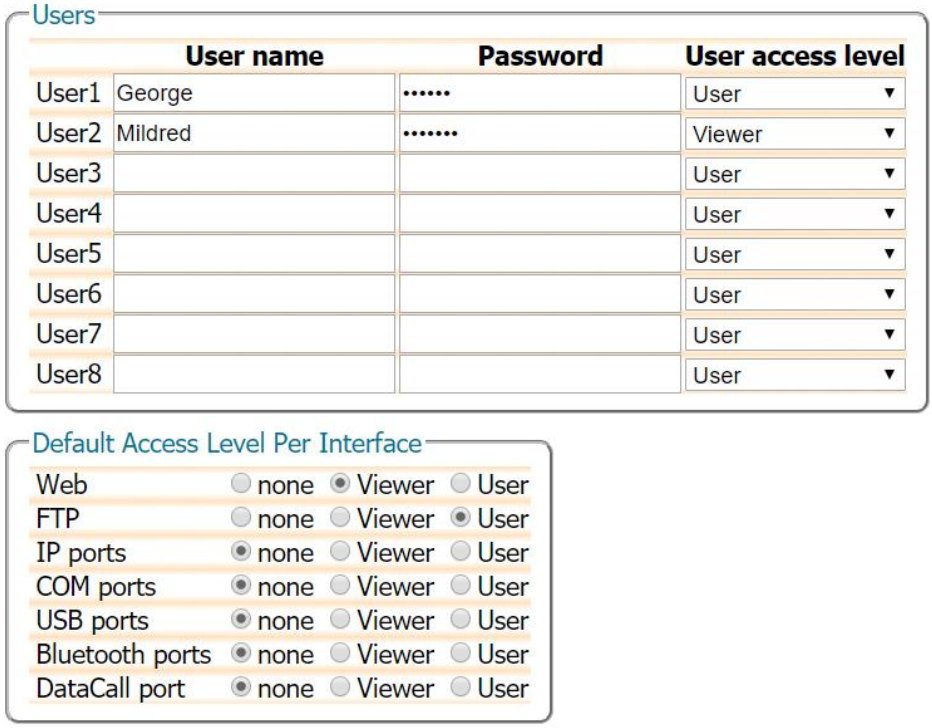


Figure 6-15: Defining user access levels

After defining the Users/Viewers and their access levels, they can then login on the web interface by clicking on **Log in** on the upper-right corner as shown in Figure 6-16.

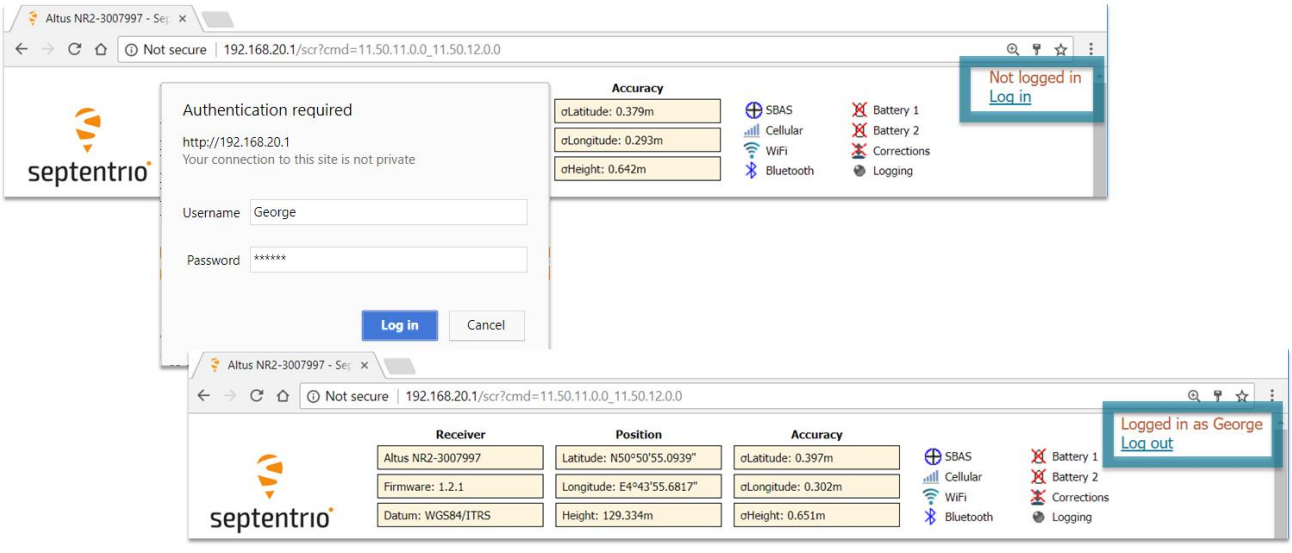


Figure 6-16: Logging in to the Altus NR2 web interface

Users/Viewers can logout by clicking on **Log out** on the upper-right corner and leaving the 'User Name' and 'Password' fields of the pop-up empty as shown Figure 6-17.

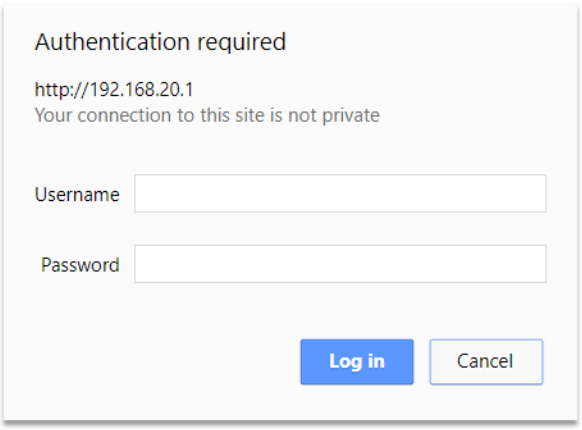


Figure 6-17: Logging out

6.8 Using the Expert Console

Commands can be sent to the Altus NR2 via the Admin/Expert Console menu.

- The drop-down box showing 'Mainboard (Altus NR2)' in Figure 6-18 allows selecting which of the Altus NR2's sub-systems to direct the command. The sub systems of the Altus NR2 are the Mainboard (Altus NR2), GNSS Receiver and the Cell modem. The command responses will be shown the window below the label 'Expert Console'.
- Clicking the up and down arrows of your keyboard will allow you to scroll through previously entered commands
- Specific messages may be viewed via the Message Inspector
- The command set of the Altus NR2 is described in the 'Command Line Interface Reference Guide.pdf'

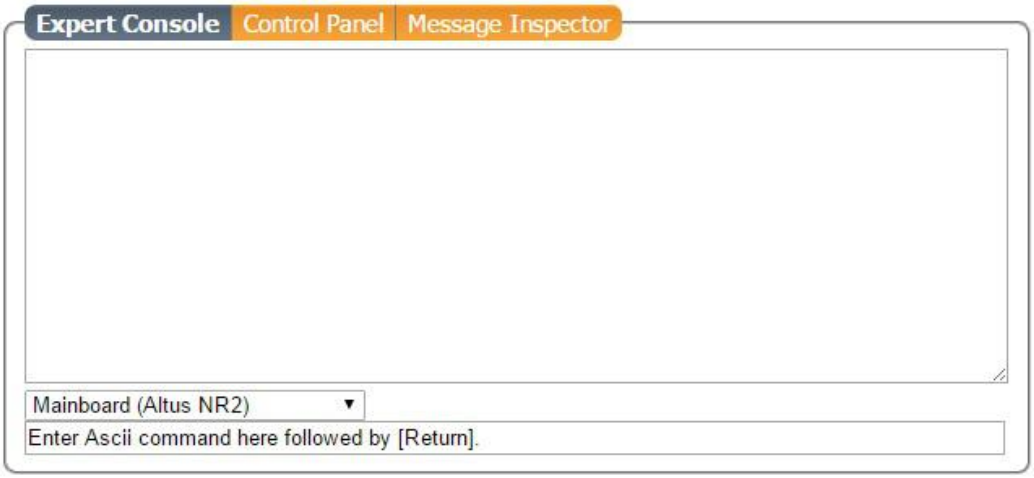


Figure 6-18: Web Interface Admin-Expert Console

6.9 The 'About' menu

The Altus NR2's hardware and software components can be seen in the About menu in the Receiver Identification field. A Diagnostic Report can also be generated on this page.

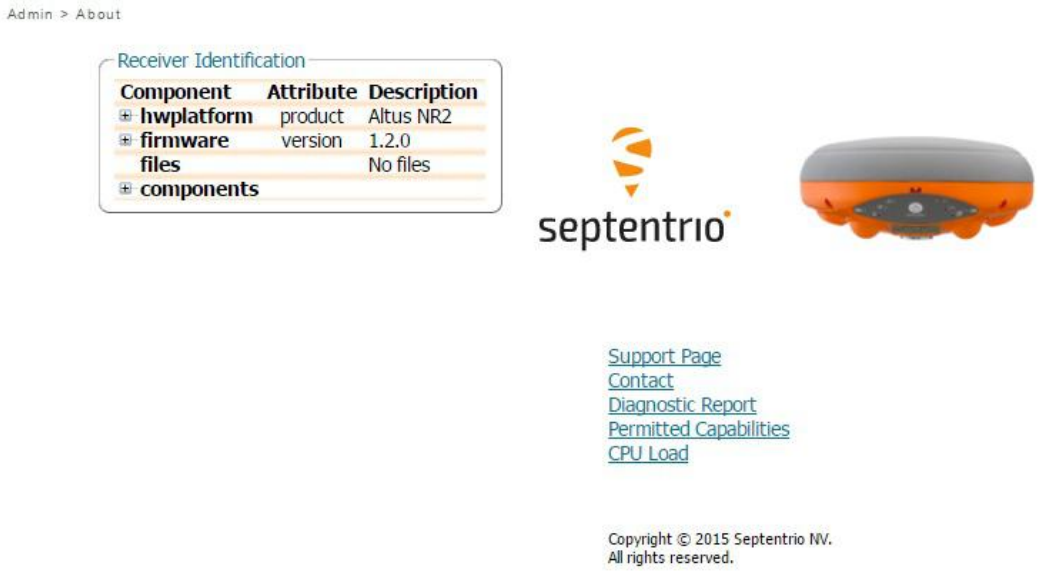


Figure 6-19: Web Interface Admin-About

7 GIS Collection with PinPoint-GIS or other applications

7.1 Introduction

Key Features

- Access to your ArcGIS Online maps on the field
- Straightforward GIS data collection
- Reliability and scalable accuracy guaranteed
- Any platform, any where
- Cloud Inside
- Full ArcGIS compatibility

PinPoint-GIS is a powerful utility software suite enabling straightforward GIS data collection of accurate and reliable GNSS positioning from your Septentrio receiver. It provides seamless integration of this data directly into Esri ArcGIS Online and other GIS database workflows.

PinPoint-GIS exists as the web interface tool: **PinPoint-GIS Web** and as an Adroid app: **PinPoint-GIS App**.

PinPoint-GIS Web

PinPoint-GIS Web is an extension of Septentrio's web interface with a direct link to ArcGIS Online. It offers a unique solution with the power to run GIS collection inside Septentrio GNSS receivers. No extra applications are needed, simply use your preferred web browser for full GIS workflow - from accurate data collection in the field directly to the ArcGIS Online Cloud.

PinPoint-GIS App

Septentrio understands that mobility and flexibility are important for your GIS projects. This Android app provides any Android GIS application running on your mobile device with cm-level positioning accuracy. The app also allows easy monitoring and control of the receiver.

Collector for ArcGIS

ArcGIS Online users familiar with Collector for ArcGIS can also use the latest version of Collector which supports high accuracy collection using the Altus NR2 (See Section 7.6)

The PinPoint-GIS App can work alongside any other Android app to provide an interface between the receiver and the mobile device. Table 7.1-1 summarises the differences between the Web and App versions of PinPoint-GIS when working in conjunction with Esri's well-know ArcGIS Online tools.

Feature	Collector for ArcGIS	PinPoint-GIS Web	PinPoint-GIS App
Usage	*Ideal for Esri users who are familiar with ArcGIS Online and with Collector. Its new version allows high accuracy collection straight into ArcGIS Online.*	*Ideal for users wanting an all in one solution for accessing ArcGIS Online maps and for monitoring the GNSS receiver. This is a cross-platform solution working from your own web browser.*	*A mobile app from Septentrio which allows monitoring your accuracy, connecting to an NTRIP caster for getting corrections and allows location overriding on Android devices for multiple 3rd party Android applications.*
Connection	Collector connects to the Altus NR2 using Bluetooth	Connection to the receiver is done via Wi-Fi	Connection can be done via Wi-Fi, Bluetooth and even via the GSM modem of the receiver
GNSS Accuracy	✓	✓	Location overriding gives accuracy to other Android apps
Height collection	✓	✓	via location overriding
Accuracy Error collection	✓	✓	via location overriding
Local coordinates	✓	limited	--
Attachments	✓	✓	--
Offline collection	✓	--	--
GNSS attribute Auto-filling	✓	✓	--
Platform Support	Android, Windows10, (iOS requires an extra dongle for the Altus NR2)	Any platform (works via your web browser)	Android

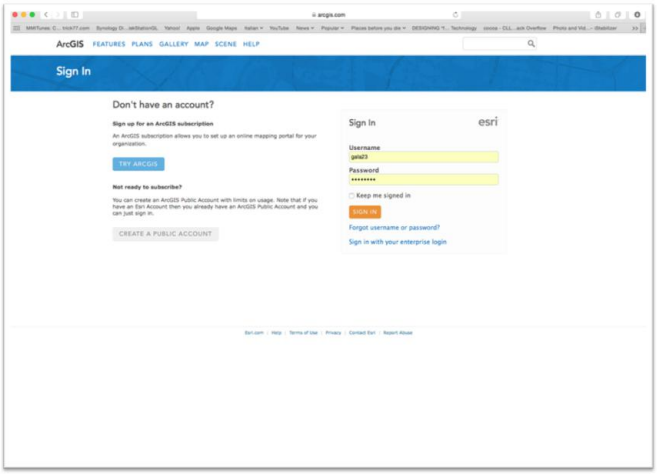
Table 7.1-1: Differences between PinPoint-GIS web and PinPoint-GIS App when using Esri's ArcGIS Online

The following sections provide an introduction to using PointPoint-GIS Web and PinPoint-GIS App. An additional section provides details on the newer version of Collector for ArcGIS with the Altus NR2. A glossary of the terms that are used in these sections can be found in Appendix E.

7.2 Creating a map

To be able to use PinPoint-GIS Web or Collector for ArcGIS you will need an ArcGIS Online account. ArcGIS accounts are either public (free) or commercial (payable). Public accounts allow you to create your own maps using feature layers which are publicly available on the internet. They are useful for demonstrating PinPoint-GIS functionality and for simple collections. More information on public accounts can be found at: www.esri.com/software/arcgis/arcgisonline/features/public-account.

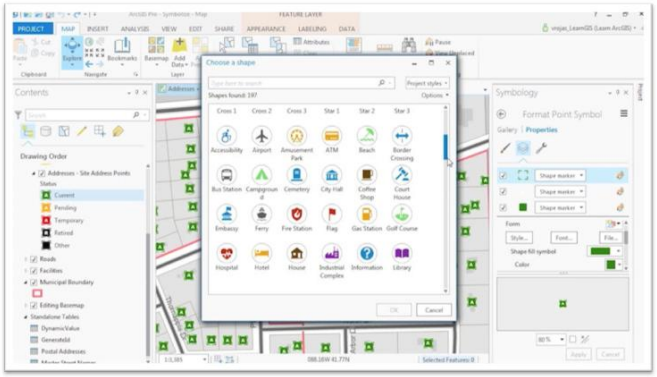
For more complex tasks, such as collecting your own specifically defined data (attributes), it is recommended to buy an ArcGIS Online license.



1-Create an Esri ArcGIS Online account

- Open an ArcGIS account online at: www.arcgis.com/home
  - You can create a Public account (free for non-commercial use)
  - If you need to create/define your own collection feature layer you will need a payable account from Esri (a trial version is available)

ℹ A feature layer is used when data collection and editing is required. A feature layer can be customized for your own GIS attributes in a geolocation.

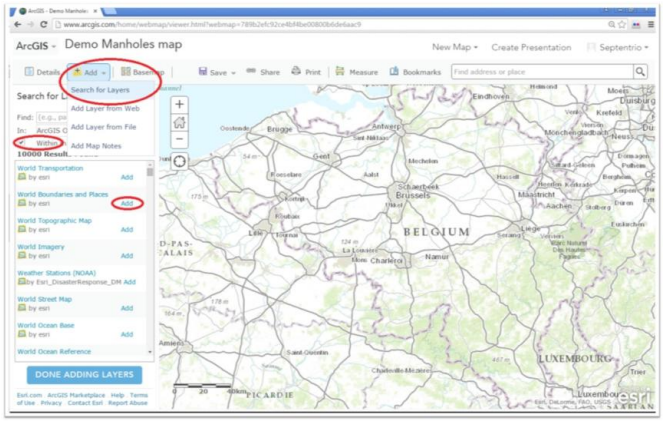


2-Create your own map

- Create your own map either using ArcGIS Online or using ArcGIS PRO (desktop SW)
  - Some tutorials can be found at: `https://learn.arcgis.com/en/projects/get-started-with-arcgis-online/lessons/create-a-map/`
- If you want to collect data then you will require to create a feature layer (with a feature service attached to it).
  - Feature services can be created using ArcGIS Online and ArcGIS PRO. See: `http://doc.arcgis.com/en/collector/android/create-maps/prepare-data-desktop.htm`

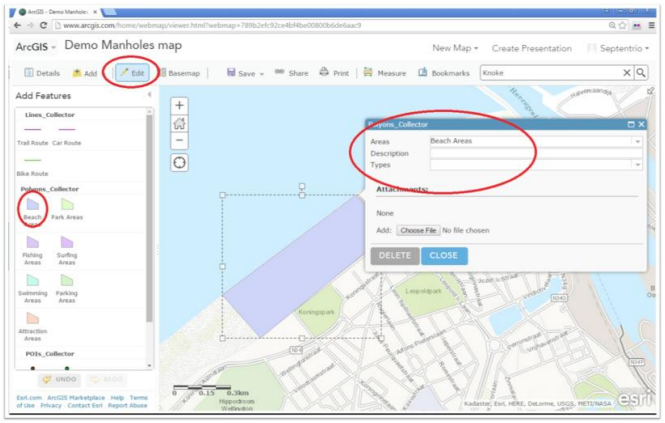
ℹ You can also use some freely available feature services as templates

3-Prepare your map



- You can add different layers to your map
- Layers can be either collectable or non-collectable (e.g. a traffic layer is not collectable while a manhole inspection layer will have some collection possibilities)
- Add Layers by clicking on 'Add' then selecting 'Search for Layers'.
  - Note that you can search for both publicly available layers (defined in the area of the map) and for layers around the world (deselect the 'Within map area' option)
- Having found your preferred layer click on 'Add'
- You can add as many layers as you want

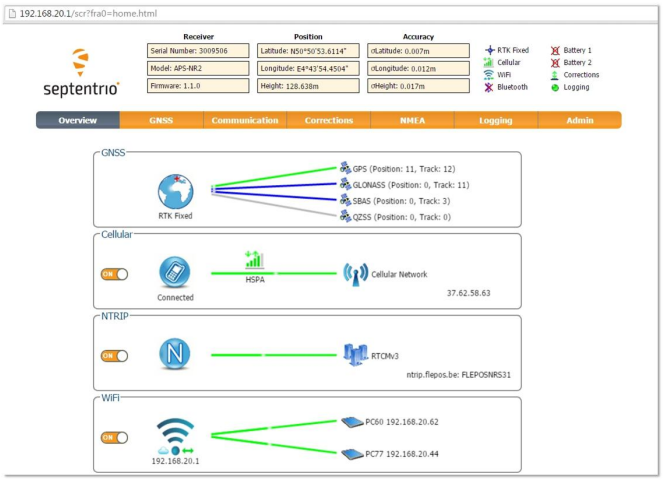
4-Add a collectable layer

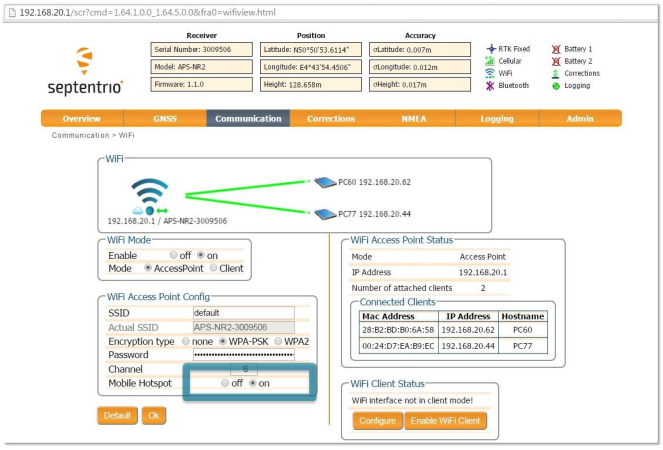


- You can create your own layers and your own Layers Service however, a good example of a collection layer would be: Layers_Coastal_Collector
- Search for this layer in ArcGIS Online
- This layer contains lines, polygons and point collections which can be illustrative for demonstrations
- You can check that your feature is collectable by going to the Editing features panel (click on the Edit button)
- For testing select a Feature Layer and the Feature Type (in the 'Add Features' panel) and click on the map to add the feature (if added for the feature can aslo be removed)
- Save your map with your preferred name

7.3 Connecting to the internet

To be able to use PinPoint-GIS Web, your browser should be connected to the internet. This section details how this can be done by enabling the Mobile Hotspot funtionality of the Altus NR2.





Connect to the Internet using the internal Cellular/GSM on the Altus NR2

- Ensure that your Altus NR2 is switched on and that the WiFi LED in the receiver is on (double click the front-panel power button to toggle the WiFi)
- Connect your mobile device (tablet, phone or PC) to the Altus NR2 using the WiFi connection
- If connected via WiFi you can open the web browser on your mobile device and open the web interface of the Altus NR2 (using the URL: **http://192.168.20.1**).

- Make sure the GSM of the Altus NR2 is on and connected to the internet. You can configure the cellular modem on the Communication/ cellular tab on the web interface. If you want a high accuracy position then use the NTRIP settings tab to configure RTK (see Altus NR2 user manual)
- When connected via WiFi to the Altus NR2 your mobile device will lose its own Internet connection. The Altus NR2 allows you to share its Internet connection by using the Mobile Hotspot functionality.
  - This is enabled on the WiFi tab in the Altus NR2 web interface. Next to 'Mobile Hotspot': select 'on' then click 'OK')

It is recommended to save the configuration to boot (so that the Altus NR2 starts its connection automatically at boot time)

If you want to use the Internet in your mobile device then use a Bluetooth connection to the Altus NR2 and use the NTRIP connection in the PinPoint-GIS app

7.4 Using PinPoint-GIS Web

PinPoint-GIS Web allows you to either acess your ArcGIS Online maps or to perform data collection which is synchronized directly with Esri ArcGIS Online (it is a cross-platform alternative to using Collector for ArcGIS. See Section 7.6 for further details on how to use Collector for ArcGIS.). It works on any platform with a web browser and makes the bridge between GIS and accurate data collection.

The following steps will guide you through the main functionalities of PinPoint-GIS Web.

The PinPoint-GIS view is located in the PinPoint-GIS menu of the web interface as shown in Figure 7-2. Within this view you have full access to your ArcGIS Online user maps. The system allows you to select your ArcGIS Online user maps, change the background of your user map using the multiple Basemaps available from Esri, Display or hide the different layers and filters of your map, and will allow you to have configurability for Portal for ArcGIS in the case your data is located in an specific secured ArcGIS Server.

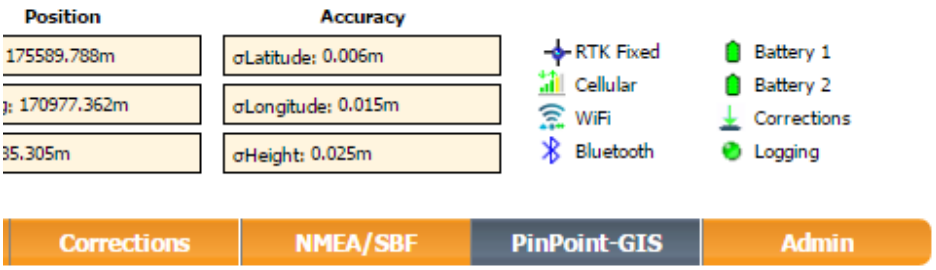


Figure 7-2: PinPoint-GIS Web menu

Navigation within the PinPoint-GIS Web view is straightforward and allows you to visualize all the main GIS and GNSS information in a single view. The view can easily be maximized using the maximize/minimize button in the right corner of the map . This is handy when working in the field with tablet screens.

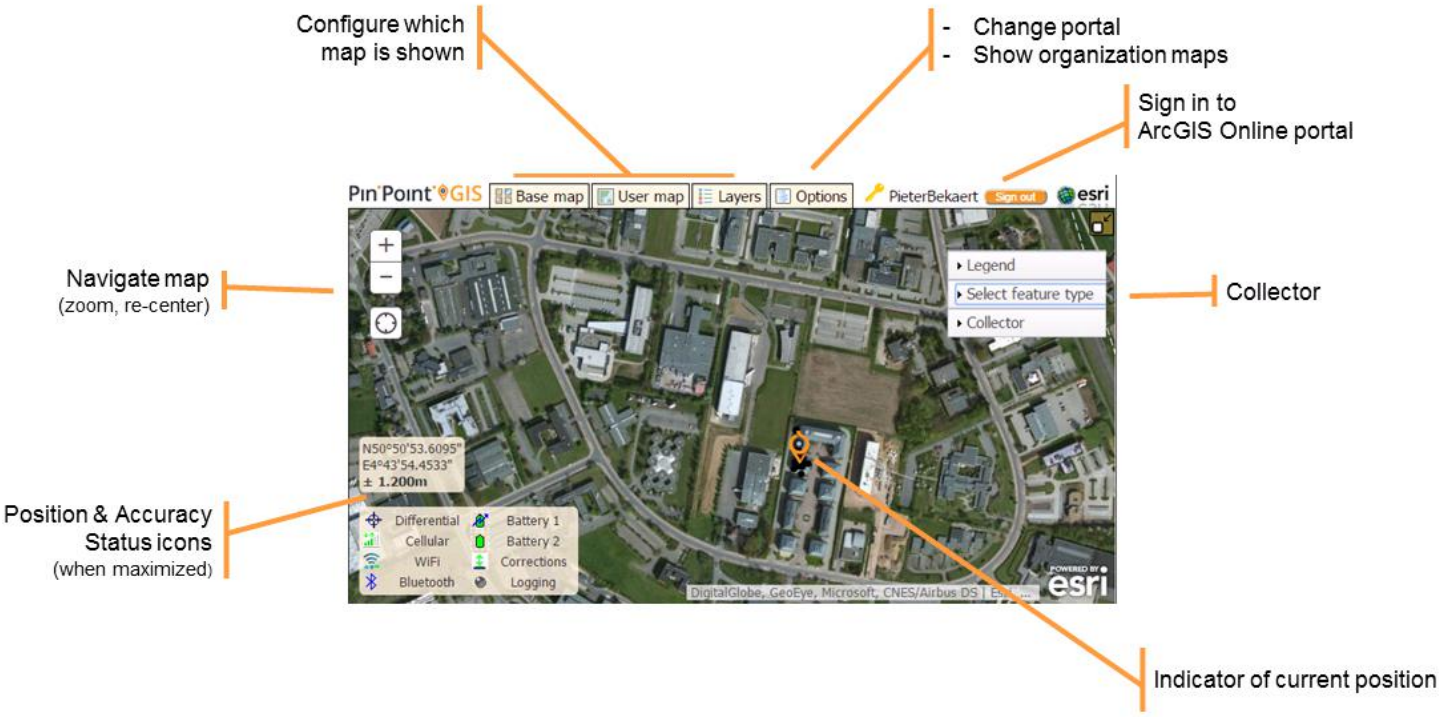
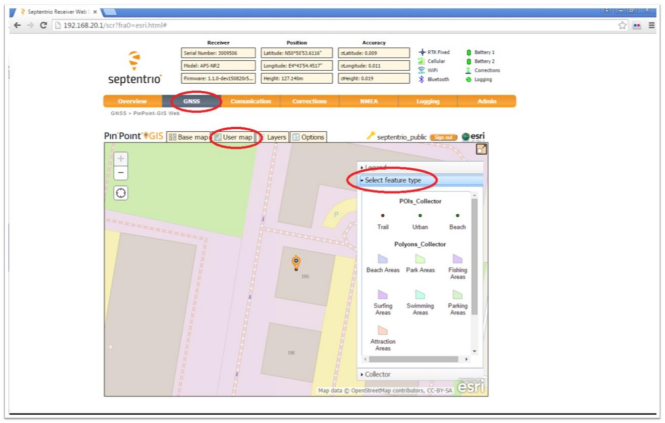


Figure 7-3: Functions within PinPoint-GIS Web



Access your maps from the Altus NR2

- Connect to your Altus NR2 receiver
- Go to the GNSS/PinPoint-GIS Web tab where you should see a basic map
  - Your browser should be connected to the internet (See Section 7.3).
- Sign-in to ArcGIS online using the 'Sign in' button and enter your own user/password
- Clicking on 'User maps' will show the maps stored in your account.
- Select your map of choice. The Altus NR2 position will be shown and you can now start data collection with accurate positioning.

- You can use the ArcGIS Online toolsets to perform analytics, administration, reports, web apps and much more benefiting of the precise and accurate collected data from the Altus NR2: http://www.arcgis.com/features/features.html
- While position passed to ArcGIS Online is accurate enough you will need to make sure your Esri layer is prepared in the correct Datum as output from the GNSS receiver.
- Please contact Esri for any questions on getting an ArcGIS Online account: www.arcgis.com

7.4.1 Optional: Auto filling of GNSS attributes[1]

One of the great advantages of ArcGIS Online is the power to automatically fill GNSS attributes when performing a collection. This allows you to store in your Geo data base information such as precise height, accuracy error and quality information which is relevant for many GIS accurate jobs. The auto-filling is very simply handled by using a specific naming convention in the attributes of your Feature class.

All the following Septentrio SBF blocks are supported for auto filling within the GIS collection:

Positioning and solution	PVTCartesian, PVTGeodetic, PosCart, PosLocal, PosProjected, RTCMDatum
Position accuracy error	PosCovGeodetic, PosCovCartesian, RAIMStatistics, VelCovCartesian, VelCovGeodetic, DOP
Status information	BatteryStatus*, BluetoothStatus*, CellularStatus, WiFiClientStatus, ReceiverSetup, ReceiverStatus, IPStatus, DiffCorrIn*, MeasEpoch*, WiFiAPStatus

*Note that currently there is no support for sub-block information within some SBF blocks (only the common flags of the block are auto filled)

Table 7.4-2: SBF blocks supported by the Auto filling of GNSS data

The auto filling is done by simply creating a GIS attribute which corresponds to the SBF block and field name: <message name>_<field name> e.g. DOP_VDOP.

More information about all the fields of SBF blocks can be found at the Reference guide of the Altus NR2. It is also possible within the web interface to check the Message inspector located in the Expert Console menu so that you can visualize the fields which could be filled.

Here are some example of attributes and how would they be defined in the ArcGIS Online Feature class.

Field wanted	Attribute name to be added in your GIS database
Height	PVTGeodetic_Height
Horizontal Accuracy	PVTGeodetic_HAccuracy
Differential Corrections received	DiffCorrIn_Mode

When creating the attributes in ArcGIS Online it is important to consider the field type of the information you want to auto fill. The following table explains how the type conversions are done between the GNSS receiver and your GIS database.

[1] Note that the auto-fill functionality is not available with free Esri ArcGIS public accounts.

Esri type	SBF field type	Attribute value
String	Any	String representation of SBF field value enums get their **symbolic representation**
Floating point	Numeric	Field value
Floating point	Not numeric	No attribute value filled in
Integer	Numeric	Field value
Integer	Not numeric	No attribute value filled in
Other	Any	No attribute value filled in

Table 7.4-4: Type conversion for auto filled GNSS attributes

To be able to add extra attributes to a GIS database you will need to use either ArcGIS Online or ArcGIS PRO Desktop SW. The steps below explain how to prepare a map for auto filling of GNSS data using ArcGIS Online. Note that you need to have an Esri account which allows editing of the Feature class. In ArcGIS Online, open a User map which includes the Feature Class you want to use for the auto-filled GNSS data and follow steps below:

Public accounts do not allow new attributes in the layer to be defined. Extra attributes are useful for demonstrating how PinPoint-GIS automatically pushes not only position data but also any other metadata which might be important (e.g. accuracy, height, Positioning Mode, etc.). If you need this functionality you will need a payable Esri account.

1. Select the in the Details menu the Feature class you want to edit
2. Click on the table view icon which will allow you to visualize all the fields of the Feature class
3. Click on the Table Options menu and select the option Add a field

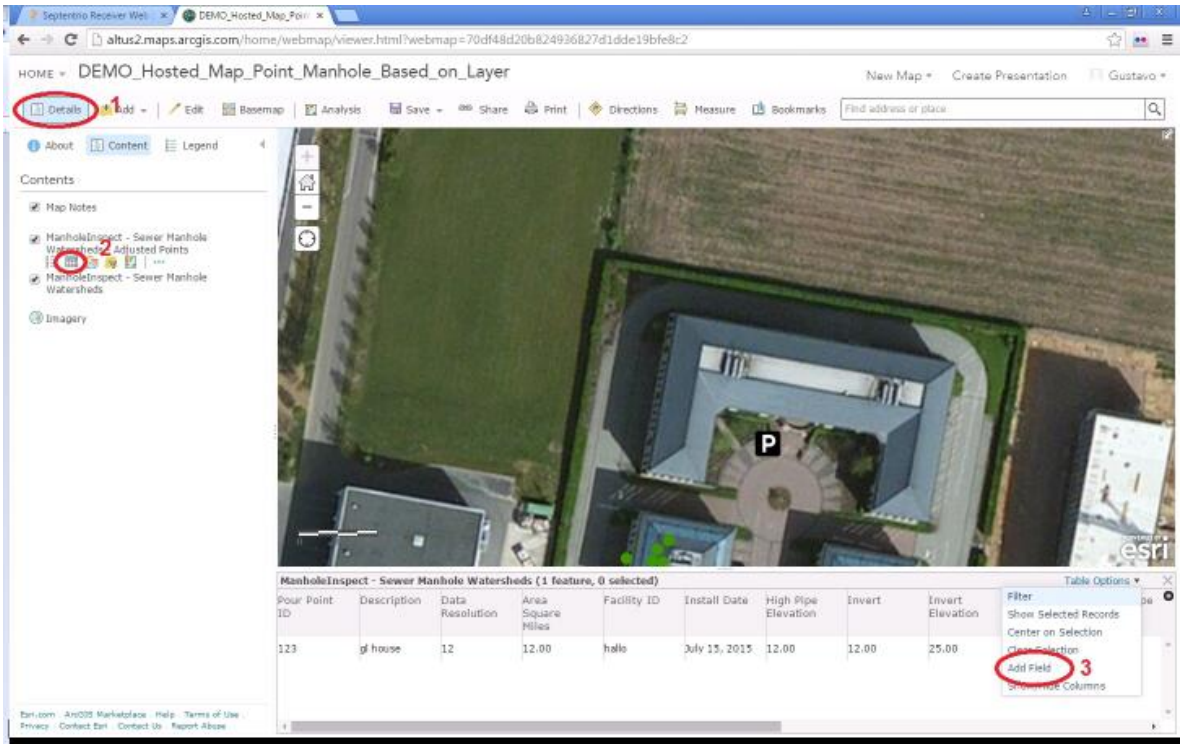


Figure 7-4: Adding a GNSS attribute in a feature class

4. Finally make sure you add the field following the naming convention described above and the Type which corresponds best for the auto filled GNSS value.

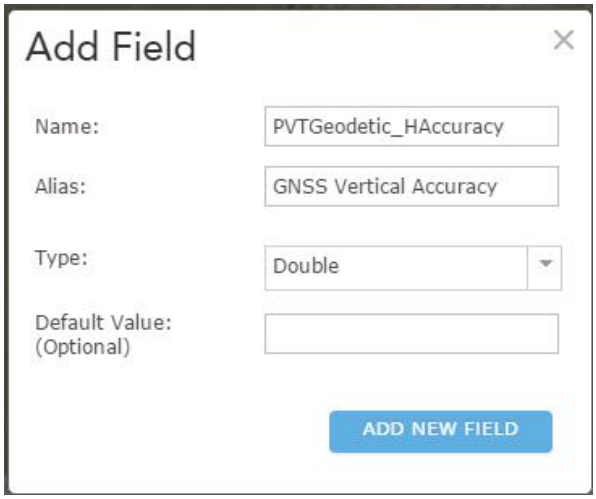


Figure 7-5: Adding a field using the SBF naming convention

5. Once you have added the field, please make sure you save your map.
6. Once saved, when you add a collection in ArcGIS Online you will see the form field automatically filled by the Altus NR2

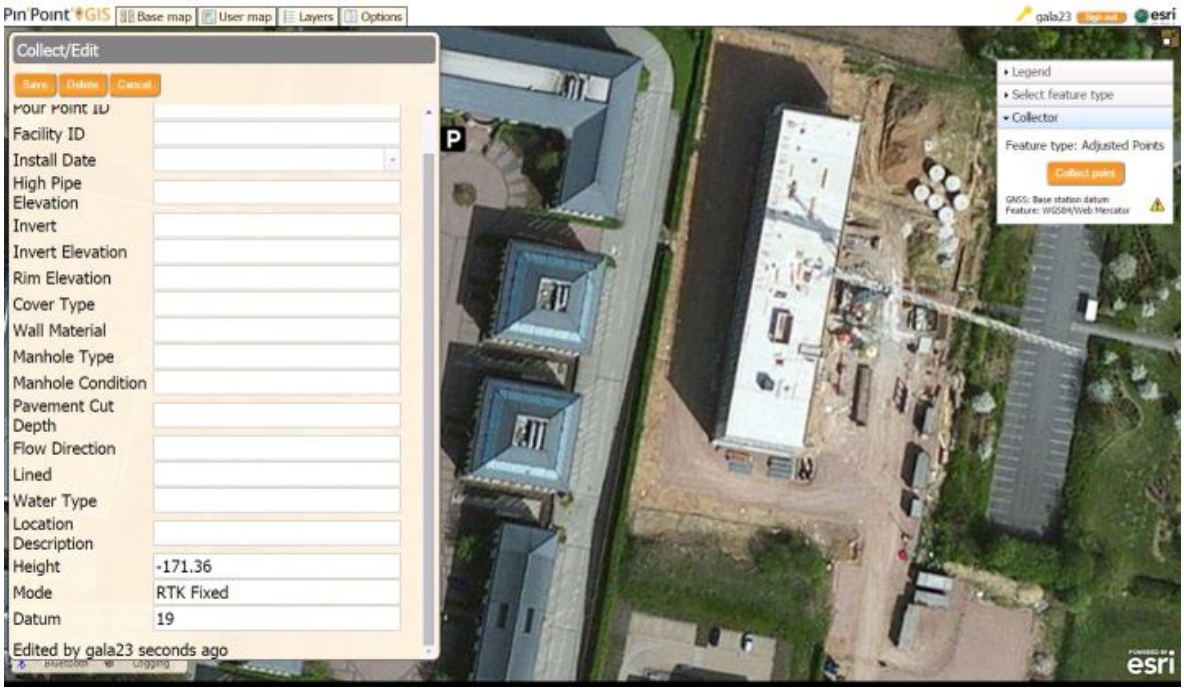


Figure 7-6: Auto-filled values in PinPoint-GIS Web

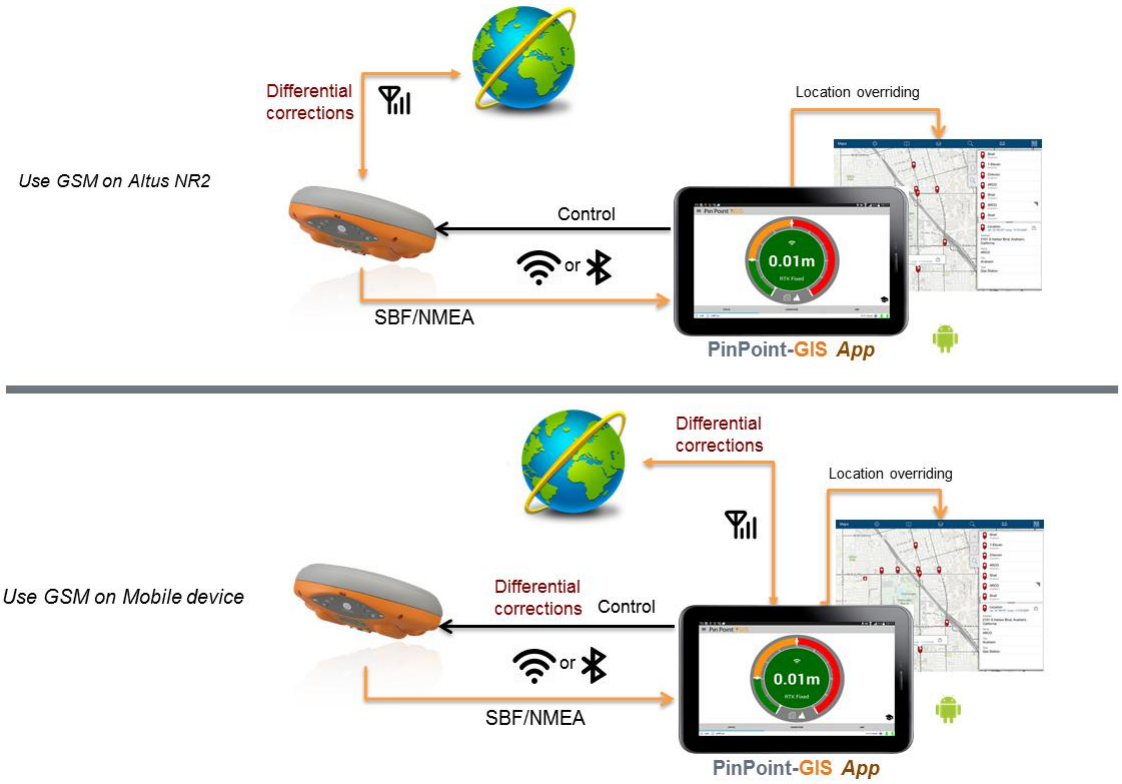
Note that even if not the whole accuracy is shown in the form auto filled values, PinPoint-GIS Web will still push the whole accuracy to the GIS Database once the user clicks the Save button.

7.5 Using the PinPoint-GIS App

The PinPoint-GIS App allows you to use any GIS application you want in your mobile device. This is achieved by overwriting the internal GPS position of your mobile device by the accurate and reliable position of the Altus or Septentrio GNSS receivers.

PinPoint-GIS App offers the following features:

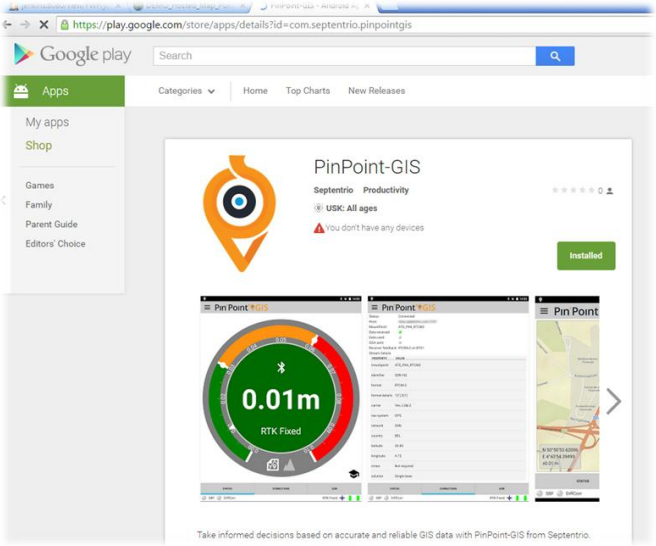
- Connection manager
- NTRIP Client (allowing multiple connections)
- GeoPod usb support so you can connect the Altus GeoPod product directly to your mobile device
- Accuracy widget with level alarms for easy monitoring of the accuracy
- Location overriding so that you can use any other Android application while using the high precision information from the Altus receivers
- Basic GNSS control: WiFi, GSM



With the PinPoint-GIS App, you can choose to use either the internal cellular connection of the Altus NR2, or the connection of your mobile device. The diagrams above show schematically the connection options. The PinPoint-GIS App is an application which can be used along with any other Android applications. The application is designed to provide accurate positioning to any other Android application running on your mobile device. Note that many Android applications could also be used in conjunction PinPoint-GIS App for maximum flexibility.

The application is freely available in the Android Play store and can be used with the Altus NR2, Altus GeoPod or the Altus APS3G receiver.

The following steps will guide you through using PinPoint-GIS App with the Altus NR2 receiver.



1-Install the PinPoint-GIS App

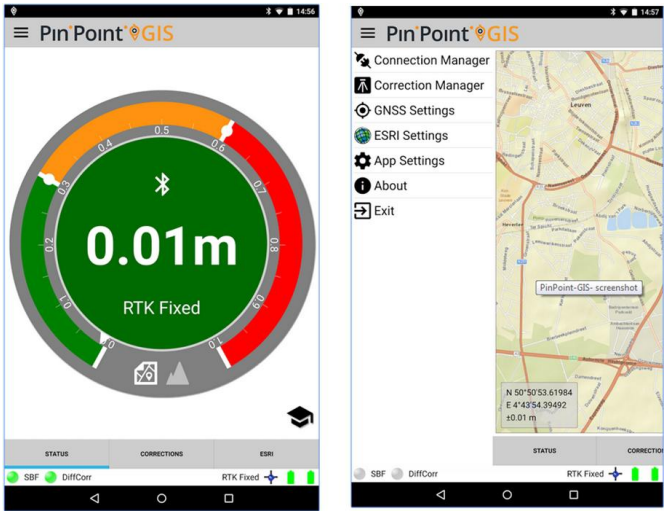
- The app can be installed in your mobile Android device from the Google play store.

PinPoint-GIS App location overriging will only work when you enable Mockup Locations on your mobile device. To do this go to, Settings→ More→ Developer options, in your mobile device and make sure that the 'Allow mock locations' option is enabled. Opening the app will also guide you through these settings when Mockup Locations is disabled.

2-Connect to the Internet using the internal Cellular/GSM on the Altus NR2

- Section 7.3 describes how this can be done

3-Open the app and connect

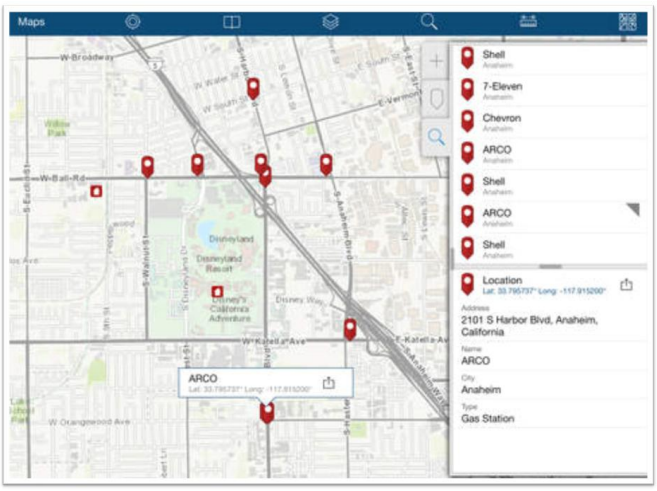


- Click on the PinPoint-GIS App icon
- The PinPoint-GIS App will try to make an automatic connection to the Altus NR2. If you have the WiFi connection enabled then it will automatically connect to the receiver. If you want to connect via Bluetooth then you can create a new connection by going to the Connection manager in the app.

The first time you perform a Bluetooth connection it will require a pairing to the Altus NR2 (which can also be done from the connection manager)

4-Override the GPS location

- Your mobile device has also an internal GPS receiver therefore you need to override the GPS location by using the external Altus NR2 accurate position.
- In the App Settings menu of the app you can find the Location Overriding option.
- Note that when you override the internal GPS position, other applications running on your device will now also use the Altus NR2 position.



5-Use your own preferred application

- Keep PinPoint-GIS running in the background (by clicking the home key in your Android device) and open the Android GIS application of your preference
- Open the Android application of your preference.
- The Altus NR2 current location will be used on your own app (if location overriding is enabled then the GPS accuracy will be the one from the Altus NR2)

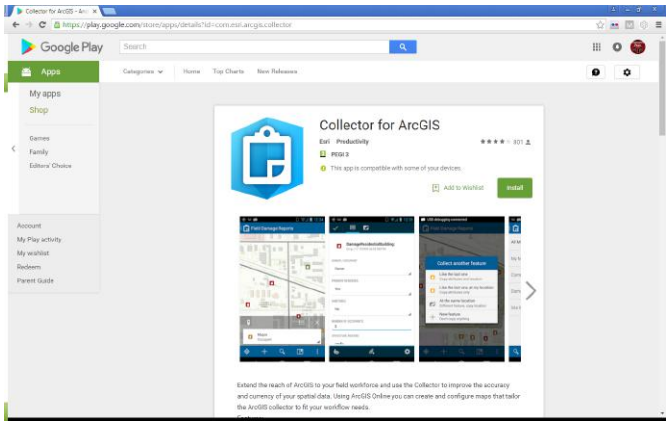
7.6 Using Esri Collector with the Altus NR2

Collector for ArcGIS is an application which allows GIS data collection into ArcGIS Online. The latest version of Collector for ArcGIS offers compatibility with the Altus NR2 receiver. This allows customers working within the Esri environment to perform high-accuracy data collection straight into the ArcGIS Online cloud.

This section describes the general steps needed for using the Altus NR2 with Collector for ArcGIS. Please contact Esri for any questions or for getting an ArcGIS Online account: www.arcgis.com

A Bluetooth connection is needed when using Collector for ArcGIS. In this case it is recommended to connect to the Altus NR2 web interface via WiFi for configuring and monitoring the Altus NR2 receiver.

The following steps will guide you through using Collector for ArcGIS (Android) with the Altus NR2 receiver.



1-Install the Esri Collector App

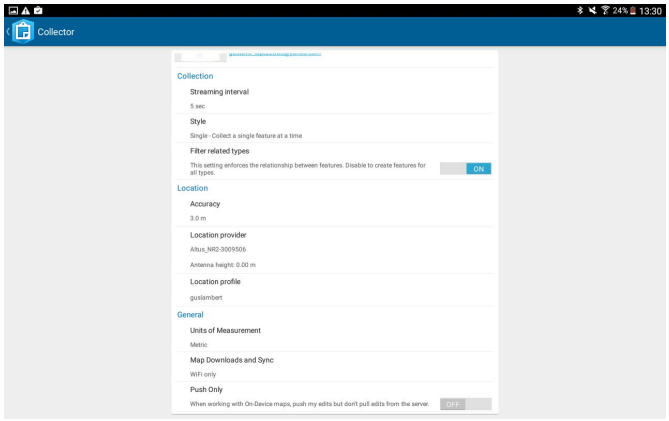
- The app can be installed on your mobile Android device from the Google play store.

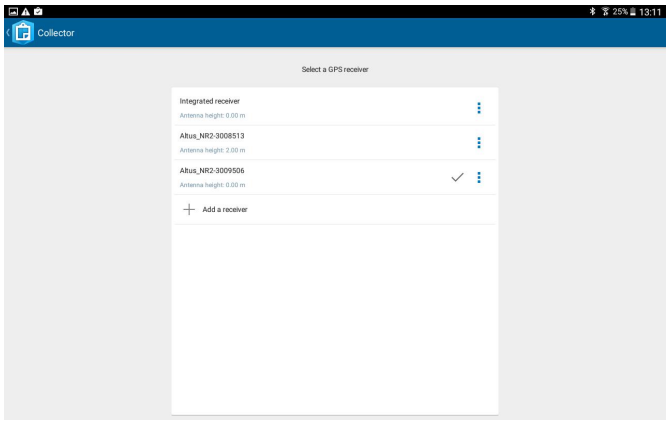
ℹ High Accuracy collection with the Altus NR2 is only supported with Collector version 10.4 and above.

ℹ More information about Collector for ArcGIS from Esri can be found at www.esri.com/products/collector-for-arcgis

2-Connect to the Internet using the internal Cellular/GSM on the Altus NR2

- Section 7.3 describes how this can be done





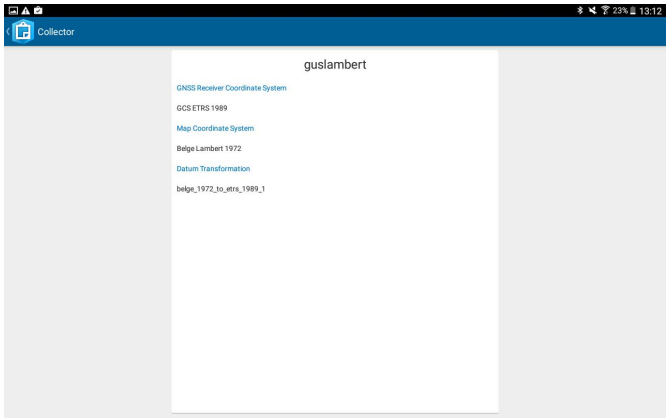
3-Open the Collector app and connect

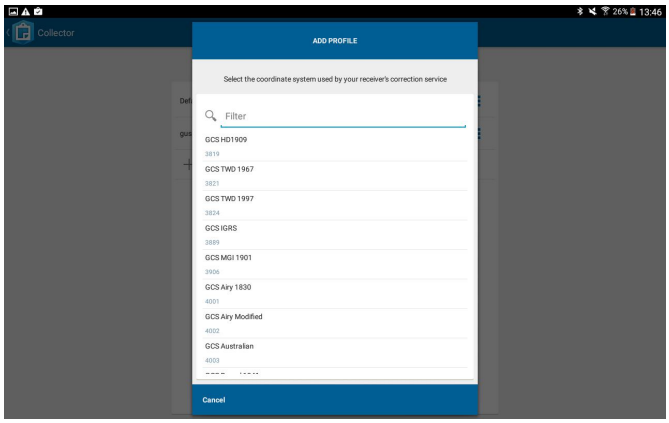
- Make sure the Altus NR2 is Bluetooth paired with your mobile device

ℹ The first time you perform a Bluetooth connection it will require a pairing to the Altus NR2 (which can be done from the connection manager)

- Click on the Collector for ArcGIS App icon
- In the Settings panel from Collector open the Location Provider and tap to choose the receiver you want to use. If the Altus NR2 receiver is not yet in the list, tap on the + icon and select the desired receiver from the list of devices.
- If you are mounting the receiver or antenna on a pole, specify the height of the pole along with any distances from the bottom of the receiver to the phase center of the antenna.
- Tap Add to add the receiver to the location provider list and switch to using the Altus NR2.

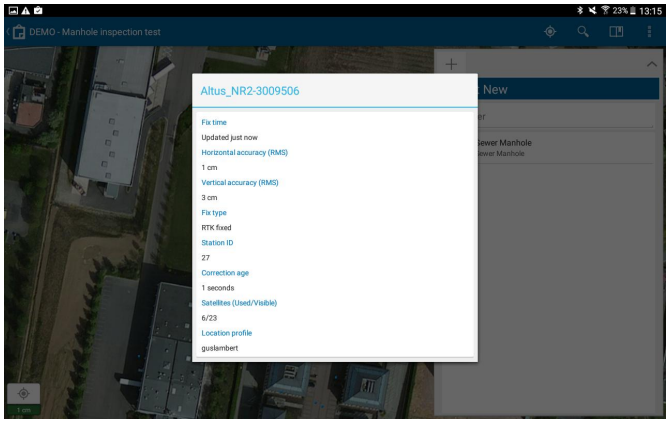
ℹ Differential Corrections can be received either using the Altus NR2 Cellular modem or by using the PinPoint-GIS App. If the PinPoint-GIS App is used then it is recommended to use a WiFi connection for the PinPoint-GIS App connection (so that Bluetooth port can be used for the Collector app)





4-Create a Correction Profile

- From Correction Profile in the Settings panel, tap on the + icon.
- Browse for the Geographic Coordinate System (GCS) of the receiver's differential correction service. Alternatively, type in the Geographic coordinate system name or ID to search for the GCS of receiver's correction service. Tap to select the desired GCS.
- Browse for the Geographic or Projected cordinate system of the map's coordinate system. Alternatively, type in the Geographic coordinate system name or ID to search for the GCS of receiver's correction service. Tap to select the desired GCS. Tap to select the desired coordinate system used by the map.
- Note: There are GCS and PCS with the same name; make sure you select the correct tab before selecting the coordinate system.
- If a datum transformation between the receiver's correction service and the map coordinate system, you will be prompted to specify the expected area for data collection.
- Choose a datum transformation from a list of available transformations. The list of transformations is sorted, with the most relevant datum transformation listed at the top of the list.
- Give the creation profile a name and save it.
- Once created, you will see it added to the profile list. Tap to use this correction profile during data collection.



5-Start using collector

- Once connected collector you will be able to perform GIS collection with Collector.

Using Esri's ArcGIS Online Software will give you access to multiple tools for analytics, administration, reports, web apps and much more:
www.arcgis.com/features/features.html

A Status icons and front-panel LEDs

A.1 Status Icons on the Web Interface

The icons on the right hand side of the top banner quickly show the user the status of the Altus NR2.

Position mode	The Altus NR2 will function in modes of increasing accuracy, depending on the configuration.					
	Standalone	SBAS	Differential	Float	Fixed	Base
Cellular Status	Off			On, showing signal quality		
Wi-Fi	Off			On		
Bluetooth	Off			On		
Battery	No battery	Empty	Charging	In use		
Corrections	No Corrections received			Corrections being received		
Logging	Off	Logging		Disk full or not mounted		

Table A.1-1: Web Interface Status Icons

A.2 Front Panel LEDs

BATTERY			NO BATTERY
	BLINKING		NOT IN USE
	ALWAYS LIT		IN USE
			LESS THAN 5% REMAINING
			LESS THAN 20% REMAINING
			OK
BLUETOOTH			OFF
		BLINKING	RADIO ON/DISCOVERABLE
			CONNECTED
WIFI			OFF
			ON as Access-Point
			ON in Client mode
MODEM			OFF
			CONNECTING
			CONNECTED
POSITION			NO POSITION CALCULATED
			RTK FIXED POSITION
		BLINKING SLOWLY	STATIC IN BASE STATION MODE
			SBAS, DGNSS or RTK FLOAT
			STANDALONE
Diff			RECEIVING CORRECTIONS
		BLINKING SLOWLY	OUTPUTTING CORRECTIONS IN BASE STATION MODE
CORRECTIONS			NOT RECEIVING
LOGGING			DISABLED
			LOGGING
		BLINKING SLOWLY	LOGGING DISK > 80% FULL
		BLINKING FAST	LOGGING DISK FULL OR NOT MOUNTED

Figure A-1: Front-panel LED behaviour

B Batteries

Two high-quality 18650A 3.7 V Li-Ion batteries are supplied with the Altus NR2. Additional batteries may also be purchased.

When purchasing batteries from another manufacturer please note that:

- The battery specification must state that the batteries contain a protection circuit
- The cell inside the battery should be supplied by a well known brand (Panasonic, LG, Samsung ...)

B.1 Charging

To prevent premature ageing of the batteries it is good practice to:

- Charge the batteries completely before re-inserting them into the Altus NR2
- Use the batteries until they have completely discharged

It is advised to charge the batteries using the supplied external battery charger however, the batteries can also be charged while they are still inside the Altus NR2 using the AC adapter or the USB adapter.

B.1.1 Using the external battery charger

The batteries of the Altus NR2 can best be charged using the external battery charger. For a totally drained battery of 3400 mAh, a charging time of 3 to 4 hours can be expected.

Battery chargers from other manufacturers may be used however, please note that:

- Low quality battery chargers may not fully charge the batteries
- Flexible chargers that can charge batteries of different types (e.g. Li-Ion and NiMH) are typically not optimal for charging the batteries

B.1.2 Using the AC adapter

The batteries of the Altus NR2 can be charged inside the device while it is connected to an external power supply. If the Altus NR2 is switched off during charging then there is no visual indication of the charging: all front-panel LEDs will remain off.

- Insert the lemo plug into the Altus NR2 by aligning the red dot on the connector with the centre of the unit as shown in Figure B-1
- Push the lemo connector firmly into the socket until the locking mechanism clicks into place.

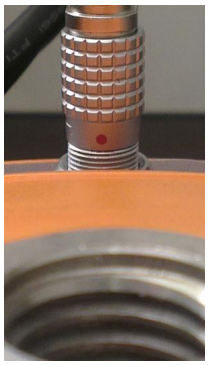


Figure B-1: The red dot on the lemo plug should align with the centre of the Altus NR2

B.1.3 Using the USB adapter

Although the Altus NR2 can be charged using the USB communication cable, it is not advised. Depending on the design of the USB charger used, connecting the charger may stop logging to the internal disk. It is recommended to use the AC adapter for charging the batteries inside the unit.

B.2 Hot Swapping the batteries and charging

When both batteries are below 5% then the Altus NR2 will make use of both batteries. The user may replace either battery without interrupting operation.

Both the Web Interface and front panel LEDs give information about the battery status.

BATTERY		NO BATTERY	Insert a charged battery
	BLINKING	LESS THAN 5% REMAINING IN USE	Replace the battery!
	BLINKING	LESS THAN 20% REMAINING IN USE	
	BLINKING	OK IN USE	No action needed, but battery can be replaced.

Table B.2-1: Battery not in use

 BATTERY	SOLIDLY LIT	LESS THAN 5% REMAINING IN USE	Do not open the battery cover!
	SOLIDY LIT	LESS THAN 20% REMAINING IN USE	
	SOLIDLY LIT	OK IN USE	

Table B.2-2: Battery in use

C Point-to-Point connections

Two Altus NR2 units configured as a Base station and rover, can be connected to each other in order to transfer differential corrections over the connections listed in the Table below.

Connection	Cost	Range and availability	Number of rovers	Additional information
Data call	set by provider	Limited to GSM network availability	1	The initial connection can be slow (∼ 30s), GSM availability is however usually better than mobile internet. In some countries, CDMA is more prevalent that GSM. **NB:** Accepting or initiating a data call will cause a peak in the current drawn from the batteries. For this reason, a data call connection requires both batteries to be present with at least a total charge (for both batteries) of about 40%. Note that the Data Call feature cannot be used when the Altus NR2 is connected to an external power supply without batteries on the unit.
Mobile internet	set by provider	Limited to 3G availability	8	It is Advisable to use register with a Dynamic DNS service[1] or use a fixed IP address[2]
WiFi	Free	up to ∼180 m (depending on environment)	4	The Base station unit should be setup as an Access Point and rover receivers as WiFi Clients

[1] Section 6.4 describes how to make use of Dynamic DNS
[2] Note that some service providers do not support use of a fixed IP

D Connecting to the web Interface in Client WiFi mode

Using your iOS mobile device as a personal hotspot can be useful for sharing the internet connection of your mobile device to the Altus NR2. In this case you need to configure the receiver in WiFi client mode and the web interface needs to be accessed in a different way (you will not be able to connect using **192.168.20.1**).

The following steps describe the way the Altus NR2 can be configured for using the mobile connection of your mobile device and the way to connect to the web Interface.

- Make sure your mobile device has been configured with personal hotspot (a user and a password will be displayed to the user)
- Configure the Altus NR2 in WiFi Client mode so that it can connect to your mobile device (using the credentials from the mobile device)
- Access the web interface via your mobile device:
  - **iOS devices**: You can easily access the web interface by using **http://altusnr2.local** or **http://altusnr2-*xxxxxxx*.local** in your web browser. Where 'xxxxxxx' is the 7-digit serial number of the receiver.
  - **Android and Windows devices**: To access web interface you need to know the IP address assigned to the receiver by your mobile device. Most Android devices allow you to see the assigned IP address within the network settings. Alternatively, you can connect to the receiver using USB in order to find the IP address assigned to the receiver (displayed in the WiFi graphical widget).

E Glossary of ArcGIS and PinPoint-GIS terms

GIS

- A geographic information system (GIS) describes any information system that can integrate, store, edit, analyse, share, and display geographic information. GIS applications allow users to analyse spatial information, edit data in maps and present the results of these operations

ArcGIS Online

- Web system which allows custom map creation
- PinPoint-GIS Web runs on top of ArcGIS Online accounts

ArcGIS PRO/ArcGIS Desktop

- The desktop SW applications which allow you to create, edit and analyze maps/feature classes, etc.
- Esri's ArcGIS Desktop will be replaced by ArcGIS PRO which has better connectivity to ArcGIS Online

User maps

- A map created by the user using different layers (may or may not be shared with an organization)
- User maps can be created using ArcGIS Online, ArcGIS PRO or Desktop

Layer

- Extra geographical data shown visually on top of a basic map

Feature class

- The definition of a feature which specifies all the attributes of your object
- Creation of new feature classes can only be done using ArcGIS Pro or Desktop

Feature (data)

- The actual object which can have geographic location and other properties and which are defined in the feature class
- Using PinPoint-GIS Web collection, a Feature in the ArcGIS Online database will be created

Feature layer

- Layer that references a set of features that are shown on a map
- The user can add feature layers to his map using ArcGIS Online
- Feature layers are created using ArcGIS Online or ArcGIS PRO/Desktop. Note that if custom fields are needed then users require a payable version of ArcGIS Online

Feature service

- Mechanism to make feature classes/layers available for others either in your server or in ArcGIS Online

Portal for ArcGIS

- Portal for ArcGIS helps you organize and share information throughout your organization in a more secure way using your own server
- PinPoint-GIS Web also allows users to connect to their own ArcGIS portal

F List of Typical GNSS Related Acronyms

APME	A Posteriori Multipath Estimation
ARP	Antenna Reference Point
ASCII	American Standard Code for Information Interchange
CMR	Compact Measurement Record
CPU	Central Processing Unit
CR	Carriage Return
CTS	Clear to Send
DGPS	Differential Global Positioning System
DOP	Dilution of Precision
EGNOS	European Geostationary Navigation Overlay System
ESTB	EGNOS System Test Bed
FPGA	Field Programmable Gate Array
GLONASS	Global Orbiting Navigation Satellite System (Russian satellite system)
GNSS	Global Navigation Satellite System
GPRS	General Packet Radio Service
GPS	Global Positioning System
GPX	GPS exchange
GSM	Global System for Mobile communications
GUI	Graphical User Interface
HERL	Horizontal External Reliability Level
HPL	Horizontal Protection Level
IGS	International GNSS Service
LAMBDA	Least-squares AMBiguity Decorrelation Adjustment
LED	Light Emitting Diode
MDB	Minimal Detectable Bias
MOPS	Minimum Operational Performance Standards
MSAS	Multi-functional Satellite Augmentation System
MT	Message Type
NGS	National Geodetic Survey
NMEA	National Marine Electronics Association
OEM	Original Equipment Manufacturer
OTF	On the Fly
PPS	Pulse Per Second
PVT	Position Velocity Time
RAIM	Receiver Autonomous Integrity Monitoring
RINEX	Receiver Independent Exchange Format
ROM	Read Only Memory
RTCA	Radio Technical Commission for Aeronautics
RTCM	Radio Technical Commission for Maritime Services
RTK	Real Time Kinematic
SBAS	Satellite Based Augmentation System
SD	Secure Digital
SDHC	Secure Digital High Capacity
SIM	Subscriber Identity Module
UHF	Ultra high frequency
VRS	Virtual Reference Station
WAAS	Wide Area Augmentation System