

Galaxy G1S/C（A5） Measuring System

User Manual

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Chapter 1 Brief Introduction

Read this chapter, and you will have a brief knowledge of South Company and Galaxy G1S/C (A5) measurement system.

§ 1.1 Introduction

Welcome to South Surveying&Mapping Instruments Co., Ltd, which is China's leading GPS RTK instrument production and sales enterprises, has been committed to spread the international advanced GPS mapping survey techniques and products to the users.

This manual takes Galaxy G1S/C measuring system for example, to explain how to install, set up and uses the RTK system as well as the use of the accessories. We recommend that you read these instructions carefully before using the instrument.

SOUTH Galaxy G1S/C, new generation integrated RTK system with smaller size and innovative design, leads the direction of new generation RTK with excellent performance, provides high-efficiency and intelligent surveying experience to customers. It isn't simply smaller, it does better in everywhere.

§ 1.2 Production functions

Control Survey: dual-band (dual-frequency) system static measurements can accurately complete the high-precision deformation observation, photo-control point measurement.

Highway Survey: quickly complete the encryption of the control points, road topographic mapping, cross-section measurement, profile measurement with EGStar.

CORS Application: provide more stable and convenient data link for field operations. It is seamlessly compatible with all types of domestic CORS applications.

Data acquisition measurement: perfect match South's various measurement software to do quick and easy data acquisition.

Stakeout shot: large-scale point, line, plane lofting.

Electric Power Measurement: power line measurement orientation, ranging, angle calculation.

Marine application: oceanographic research, dredging, piling, inserted row, making the marine operations more convenient and easy.

§ 1.3 Features

Innovative structure design: Galaxy G1S/C, with smaller size and innovative design, the weight is only 970g, built with magnesium alloy materials. And the top edge is design to decrease harm for receiver in case of fall down to ground.

Dual mode Bluetooth: SOUTH Galaxy G1S/C is equipped with Bluetooth 4.0 module, which is first to adopt this technology to support communication with smartphone, tablet PC etc, to make sure Bluetooth communication more stable.

NFC function: The internal NFC module can make the complicated Bluetooth communication more easy and simple.

Full constellation support: Equipped with most advanced GNSS boards, Galaxy G1S/C system can track most signal from all kinds of running satellite constellation, especially support B1,B2 and B3 signal from COMPASS, also get position result with only COMPASS signal.

Intelligent Platform

New generation of embedded Linux operating system platform improves RTK performance and work efficiency. Its operating efficiency is higher; a unique core processing mechanism which can respond to more than one command at one time; it starts faster and more responsive in real time. While the stability of system is much higher, it can be adapt to the job of longer uninterrupted power.

Internal Web UI management

Embedded Web UI management platform supports USB mode connection. Users can monitor the receiver status and configure it via the internal Web UI management platform.

Cloud service: The function enable realize online upgrade and register, remote diagnosis in real-time.

Upgraded network module

Standard 4G module is integrated which supports WCDMA/CDMA2000/TDD-LTE/FDD-LTE 4G network and downward compatible with 3G GPRS/EDGE. Also supports all kinds of network types to access CORS seamlessly.

Smart Voice Guide

The customizable iVoice technology is allowed to customize your local language. Multi-lingual and clear-tone messages enable users to understand the critical information and status of receiver such as network connection, solution status, working mode and more, which definitely helps to improve work efficiency by being acknowledged.

§1.4 Accessories &Components

Rover station standard configuration



Mainframe



antennas



X11 controller



Measuring tape



Mainframe charger



Mainframe batteries



Tribrach&connector



Bracket for controllers



Retractable pole



L7U50



L5930B

Base station standard configuration



Mainframe



Antennas



25w radio



Multiple communication cable



Battery charger



Batteries



Tribrach & connector



L7U50



Transmission antenna



Support pole



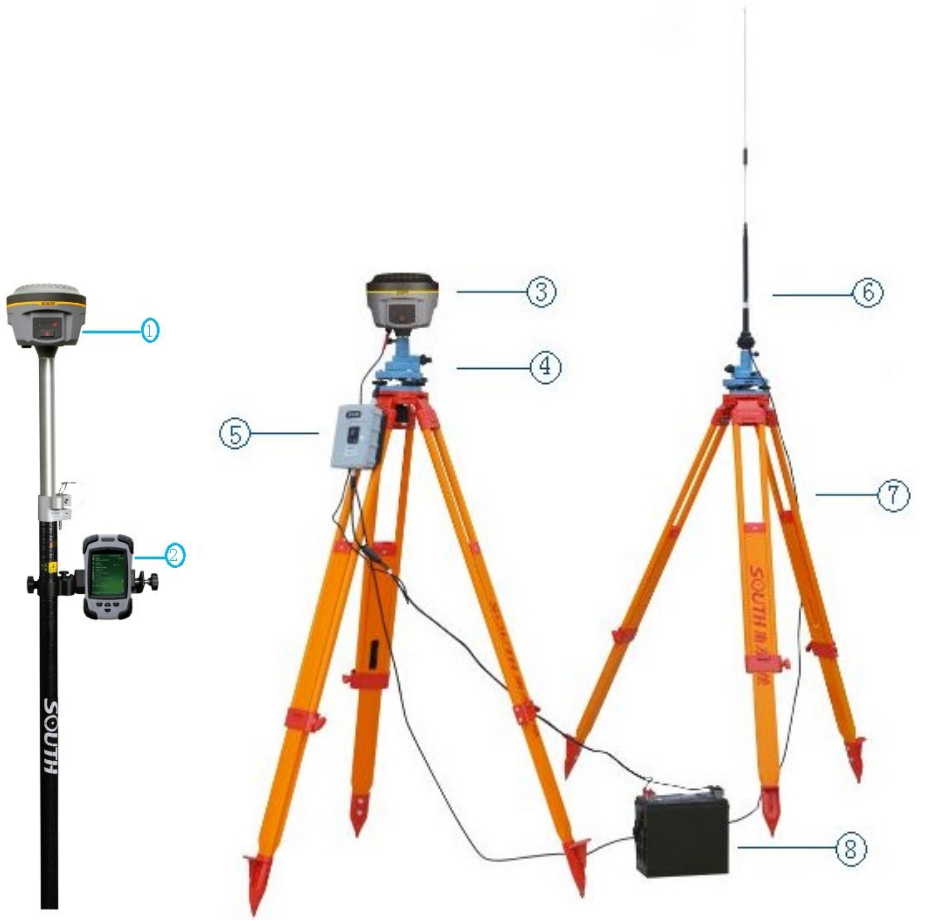
Frequency-change line



Measuring tape

Chapter 2 G1S/C Measuring System

Reading this chapter, you can grasp the components, installation and the function of Galaxy G1S/C measuring system.



① Rover ② Controller ③Base
④ Tribrach ⑤ Radio ⑥Radio Antenna
⑦ Tripod ⑧Battery

§2.1 Galaxy G1S/C Mainframe

§2.1.1 The mainframe appearance

The mainframe is a flat cylindrical, 112mm in height, 129mm in diameter, the height from the rubber seal ring to the bottom is 60mm. The front side is the buttons and indicator panel. The bottom of the instrument is radio and network interface, as well as the battery compartment and other interfaces; there is a string of bar code number, which is the mainframe machine number. Mainframe Serial number: for registration, and identify the mainframe and the corresponding connection with the handheld.

Front Panel



1. Bluetooth indicator **2**. Data link indicator **3**. Satellite indicator **4.**Power button

Back Panel



1.Battery housing

§2.1.2 Bottom interfaces



① Compartment snap-fit：for locking the battery compartment cover

② SN label

③ Screw hole: fix the mainframe to the tribrach or the pole

④ Beeper: broadcast voice messages

⑤ UHF/GPRS socket: connect UHF/GPRS antenna

⑥ 5-pin cable socket: connect power cable and RS232 port

⑦ 7-pin data cable socket: USB cable connector

5-pin interface: for connecting to the external Radio or external power;

7-pin serial port: used to connect to computer to transfer data, or get access to WebUI;

GPRS interface: Install the GPRS network antennas;

UHF interface: Install UHF radio antenna;

§2.1.3 Indicator panel

a) Galaxy G1S/C mainframe indicator still has two meanings:

The indicator for mode switching and working modes;

The indicator for mainframe self-check state;

b) In order to let you have a better understanding of the specific meaning of the indicator in the two states, we will describe in detail.

Galaxy G1S/C indication panel has been re-designed with 3 LED indicators, simply and clearly indicates the various status, as shown below:



①3 indicator lights ②Power key

The following are the meanings of some typical lights:

Indicator	Status	Meaning
	on	Normal voltage, built-in battery 7.4v

	blink	Low battery
Satellite 	blink	Number of satellite lock, cycle once every 5 seconds
Bluetooth 	off	Handheld disconnected
	on	Handheld connected
Signal/data 	blink	Static mode: flashing in accordance with the setting sampling interval when recording data
	on	Base or rover mode: built-in module receives strong signal
	blink	Base or rover mode: built-in module receives weak signal
	off	Base or rover mode: built-in module receives no signal

§2.1.4 Check working mode

Press the power button for once in the state of power-on, the instrument will prompt with voice message about current working mode (for example, “Rover, internal radio mode”).



§2.1.5 Mode selection

Rover

Press and hold the power button for about 5 seconds and pass over the state of power off (do not release the button even the instrument says power off), then G1S/C will say “start to set work mode”, at this moment, release power button, the working mode will be repeated from Rover to Static on control panel. When the Bluetooth indicator glows in red accompany with “Rover” voice message, press the power button to confirm.



Base

Press and hold the power button for about 5 seconds and pass over the state of power off (do not release the button even the instrument says power off), then G1S/C will say “start to set work mode”, at this moment, release power button, the working mode will be repeated from Rover to Static on control panel. When the Bluetooth indicator glows in red accompany with “Base” voice message, press the power button to confirm.



Static

Press and hold the power button for about 5 seconds and pass over the state of power off (do not release the button even the instrument says power off), then G1S/C will say “start to set work mode”, at this moment, release power button, the working mode will be repeated from Rover to Static on control panel. When the Bluetooth indicator glows in red accompany with “Static” voice message, press the power button to confirm.



After that, press the power button for once to make sure if the working mode is correctly setup.

Note: G1S/C only supports the working mode selected by control panel, without datalink configuration.

§2.1.6 Self-check

Self-check is an useful operation to simply check the main hardware components if the instrument is abnormal or not working properly.

Press and hold the power button for about 10 seconds and pass over the state of power off and mode selection (do not release the button even the instrument says power off and start to set work mode), then G1S/C will say “start to self-check”, at this moment, release power button, the instrument will perform self-check automatically for the modules one by one.

The sequence of modules checking is:

- OEM board checking
- Network module checking (GPRS module checking)
- UHF module checking
- Bluetooth module checking

If all the modules are normal during self-check, the instrument will get into the state of power-on.

§2.2 External Radio

§2.2.1 Radio features:

The radio GDL20 is a high-speed semi-manual wireless data transmission radio, whose air transfer rate can be up to 19200 bps and the RF transmitter power is larger, used in Southern RTK measurement system.

Radio GDL20 adopts GMSK modulation, 19200bps transfer rate, low bit error rate. RF frequency can cover 450-470MHz band. Data transmission mode of GDL20 is transparent mode, that is, the received data is sent to the RTK GPS system unchanged.

Radio GDL20 data interface is a standard RS-232 interface, which can be connected to any RS-232 terminal equipment for data exchange.

GDL20 digital radio research employs advanced radio frequency technology, digital signal processing technology and baseband processing technology, carefully selected high quality components to organize production, to ensure the long-term stable and reliable operation;

Have a forward error correction control, digital error correction function.

It has eight transmitting and receiving channels. Can be changed according to the actual use of the channel frequency, transmit power adjustable interval is 0.5MHz

Channel number	Frequency（450-470MHz）
Channel 1	463.125
Channel 2	464.125
Channel 3	465.125
Channel 4	466.125
Channel 5	463.625
Channel 6	464.625
Channel 7	465.625
Channel 8	466.625

§2.2.2 Radio appearance



① Control panel ②SN number

§2.2.3 Radio interface and panel

Mainframe Interface: 5-pin jack for connecting a GPS receiver and power supply



5-pin port

Antenna interface：For connecting the transmitter antenna



Antenna interface

Control Panel: control panel lights display the status of the radio, the key operation is simple and convenient, one-to-one interface can effectively prevent connection errors.



Control panel

① Channel indicator light.

② Power indicator light,

③ ON / OFF power key: This key controls the unit's power switch. The red light on the left

indicates the power status of the machine.

④ TX red light indicator: This indicator flashes once per second means that the radio is transmitting data with the transmitting interval in 1 second;

⑤ AMP PWR indicator: Indicates the level of radio power, light on indicates low-power, light off indicates high-power

⑥ CHANNEL button: By pressing this switch, you can switch channels 1-8.

Power switch (Shown in picture below): switch to adjust the radio power, AMP PWR lights on the panel indicate the radio power level, light on indicates low power, lights off high power.



Power switch

§2.2.4 Radio transmitting antenna

The UHF transmitting antenna is particularly suitable for field use, the receiving antenna is 450MHz Omni-directional antenna, light and durable.



Radio antenna

§2.2.5 Application Notice

The battery power is too low: When the flashing channel indicator appears on the control panel, which means the lack of battery power, replace the battery in time, otherwise there would be

data link unstable or unable to launch.

GDL20 radio power supply: voltage 12-15V (typical 13.8V) RF transmitter power 25W, current 7.0A.

Radio transmits power: radio transmits power based on the voltage of the power supply, check the voltage before use.

High and low power use: use low-power transmitter when low power can satisfy the operation as high-power transmitter will exponentially consume battery power, excessive use will reduce battery life. Install the radio station as high as possible.

Power corrugated coefficient: power ripple coefficient must be less than 40mV, the smaller the ripple factor is, the smaller will the beam spectrum be and the higher communication quality will be.

Power Connection: Power of positive and negative connected correctly.

Electromagnetic environment: Before using the radio, it is better to perform electromagnetic environment measurement, to avoid the communications blackout.

Radio match antenna: the basic parameters of the antenna selection are the band width, frequency, gain, directivity, impedance, VSWR and other indexes .Usually the effective bandwidth of the antenna is 3-5MHz,antenna selecting should be based on the frequency bands used by the to be selected channel. For the long-distance transmission, it is better to use a directional antenna and high-gain antenna, and pay attention to the impedance of the antenna and feeder to match with the Radio GDL20 antenna interface (50 ohms).

We recommend:

Recommend that you use plug-in battery which is more than 12/36Ah, the use of maintain a regulated current of 10A during the operation.

Recommend that you charge it in time, do not overuse the battery, otherwise it will reduce battery life.

Recommend that you replace the batteries after six months to a year, to ensure the radio distance.

§2.3 Mainframe accessories

§2.3.1 Instrument Case

The convenient RTK carrying case is customized for surveying workers; it has strong abrasive resistance and waterproofness. Meanwhile the unique backpack design reduces the heavy burden of field work.

The inner layer of the black soft bag is filled with anti-collision foam, the host and other accessories can be dispersed and embedded; Compact, durable, can effectively prevent the impact, easy to clean.





§2.3.2 Battery and charger

The standard configuration includes two batteries and charger:

The system indicator CHARGE turns red when the battery is being charged, the only indicator FULL turns green when charging is completed.

Li-ion battery and battery charger:



Charger& Adapter

§2.3.3 Differential antennas



GPRS antenna& UHF antenna

The differential antennas are as shown above; UHF differential antenna is needed in UHF built-in radio base station mode and UHF built-in radio rover station mode.

§2.3.4 Multi-function data line

Radio Y-data line: multi-purpose cable is a "Y"-shaped cable used to connect the base station mainframe (5-pin red jack), transmitting stations (black jack) and external battery (red and black

clip) for power supply and data transmission.



Power Cable

Mainframe multi-function data lines: the role of multi-purpose communications cable is to connect the receiver to the host computer, for the transmission of static data and Network port connection.



Data cable

§2.3.5 Other accessories

Other accessories include rover station centering rod, handheld bracket base point, connectors and measuring tape.

Note: The models and types of instrument accessories will vary with the instrument upgrade.

Chapter 3 Operations

Reading this chapter, you can grasp in detail how to use the G1S/C measurement to do system static, RTK operations.

GPS measurement operation scheme refers to the operating scheme used to determine the relative position between the stations with the help of GPS technology. Point coordinate precision obtained is not the same; its operating methods and observation time are also different, thus having different range of applications. GNSS receiver operating program is divided into two types: static measurement and RTK dynamic measurement (including the base station and rover station).

Test environment requirements:

(1) Observation stations (ie, the receiving antenna settlements) should stay away from high-power radio transmitters and high voltage transmission lines in order to avoid the magnetic field around the GPS satellite signal interference. Receiver antenna and its distance shall not be less than 200 m;

(2) Observation stations should not be near to the large area waters or objects which can strongly reflect (or absorb) electromagnetic wave to weaken the effects of multi-path;

(3) Observation stations should be located in places where the receiving device can be installed easily, and good vision available. Elevation angle of obstacles in view should generally be greater than 10° to 15°, in order to weaken the effects of troposphere refraction;

(4)Observation stations should be selected in a convenient place, and easy to use other means of measuring, joint measurement and expansion;

(5) For the long baseline GPS network, should also consider the vicinity good communication facilities (telephone and telegraph, post and telecommunications) and power supply, for power between the stations and equipments.

§3.1 Static operating

§3.1.1 Static Measurements Profile

Static measurements:

GPS positioning measurement by installed three (or more) GNSS receivers to perform simultaneous observation and determine the relative position between the stations.

Scope:

The establishment of a national geodetic control network (second or less);

The establishment of precision engineering control network, such as bridge measurement, tunnel measurements, etc;

The establishment of a variety of encryption control network, such as city measurements, Drawing Point measurement, road surveying, demarcation measurements.

For the GPS measurements of small and medium-sized cities, towns, as well as mapping, cadastral, land information, real estate, geophysical exploration, surveying, construction and other control measurement, should meet the accuracy requirements of the D, E grade GPS measurements.

§3.1.2 Operating procedures

Pre-measurement

Project approval

Program design

Construction design

Surveying and mapping data collection and arrangement

Instrument test, test

Reconnaissance, choice of site, buried stone

Measurement

Operating team stationed in

Satellite status Forecast

Observation planning

Dispatch of operation and field work observation

After the measurement

Data transmission, dump, backup,

Baseline Solution and quality control

Network adjustment (data processing, analysis) and quality control

Finishing results, technical summary

Project acceptance

§3.1.3 Field operation notes:

1)Static mode of Galaxy G1S/C receiver only to set in EGStar software or other software (Such as Field Genius or SurvCE), please refer to the EGStar manual for more information.

2)Set up a tripod on the control point, leveling and centering strictly on the measuring point.

3)Measure the instrument height three times, the difference of the results shall not be more than 3 mm, and average the results. The instrument height should be measured from the center of the control point to the mark line on the instrument.(Refer to §3.4)

4)Record instrument number, point name, instrument height, and start time.

5)Power on, confirm the static mode, the mainframe begins to search satellites and satellite lights begin to flash. Recording condition reached, the status light flashes in accordance with the set sampling interval, flashing once indicates the acquisition of an epoch.

6)After the test, the mainframe shut down, and then begins data transmission and data processing (data transmission sees Chapter IV, data processing, please read another manual GPS data processing software operation manual).

§3.1.4 GPS net design

1) GPS net generally constitutes a closed figure by independent observation edge, such as a triangle, polygon or annexed line, to increase the checking conditions, and improve the reliability of the network.

2) The points of the GPS network should coincide as close as possible with that of the original ground control network. Coincidence point generally should not be less than three (should perform leveling conjunction when not enough) and should be evenly distributed in the network in order to reliably determine the transformation parameters between the GPS and Ground Networks.

3) The points of the GPS network coinciding with the leveling points should be considered. Non-coincidence point should generally perform leveling conjunction method (or methods of equivalent accuracy), or set a certain density leveling conjunction point in the network, to provide information for the study of the geoid.

4) In order to facilitate the observation and perform leveling conjunction, GPS outlets should generally be located in unobscured and easy -to -reach places.

5) In order to facilitate the classical leveling conjunction or extension, emplace near the outlet a good view orientation point, to establish leveling conjunction direction. The distance between the point and the station should generally be greater than 300 meters.

6) According to the different purpose of GPS measurements, the independent observations edge of GPS network should be certain geometry. The basic forms of the graph are as follows: triangular network, ring network, stellate network.

§ 3.2 RTK operations (Radio mode)

Real-time dynamic measurements, referred to as RTK.

RTK technology is the real-time dynamic differential carrier phase positioning technology, combining global satellite navigation and positioning technology with data communication technology which includes base station and rover station. Base station transmits the data by radio or network to the rover station, which will perform differential analysis, thus providing real-time coordinates of the measurement point in the specified coordinate system.

Depending on the modes of transmission of the differential signal, RTK is divided into the radio mode and network mode.

This section first describes the radio mode, as shown below:



Base mode with External Radio

§3.2.1 Set up the Base Station

Base station shall be set up in the broad view, unobscured and higher places; avoid the vicinity of the high-voltage power transmission equipment and the transmitting and receiving antennas of radio communication equipment, the shade of trees, and the sides of waters, all of which will produce different degrees of impact on the GPS signal reception and emission of radio signals.

1) The receiver is set to the base station with external radio mode;

2) Set up tripods, the tripod on which to put the radio antenna should be placed at a higher point, the least distance between the two tripods should be 3metres.

3) fix the base and the base station receiver, (if set at a known point, a strict leveling should be done), power on the base station receiver.

4) Install the radio transmitting antenna, hang the radio on the tripod, place the storage battery at the bottom of the radio station.

5) Connect the radio, mainframe and battery with the multi-function cable, which is a "Y"-shaped cable used to connect the base station mainframe (5-pin red jack), transmitting radio (black jack) and external battery (red and black clip).Playing the role of power supply and data-transmission.

Important:

Please check the red dot on the five-pin port when you use the multifunction cable, aligning the red dot with the red mark on the mainframe will help it insert easily. Follow the same instruction when connecting to the radio.

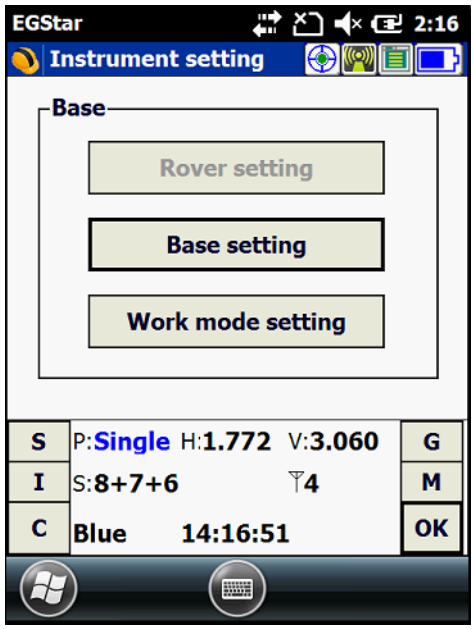
§3.2.2 Start the base station

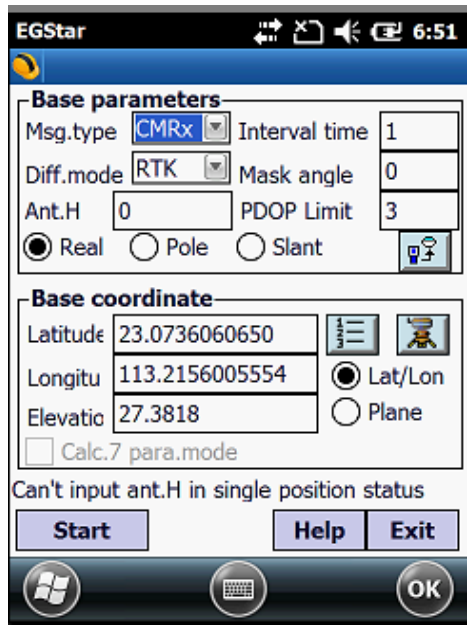
The first time you start the base station, you need to set the start parameters, set as follows:

1）Connect to the base station with EGStar in the handheld

2）Operation: Config → Instrument Config → Base Setting (the mainframe should be in base

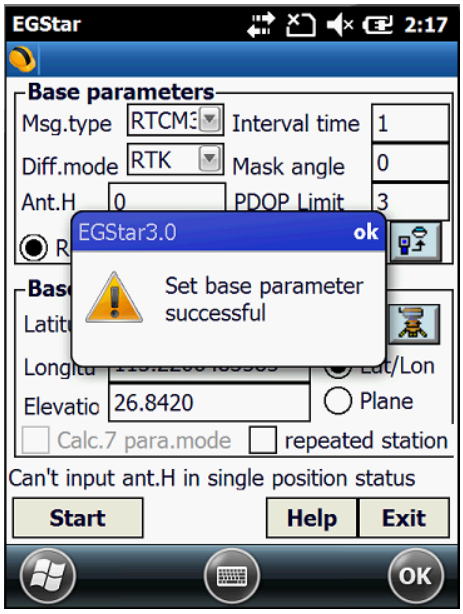
mode)

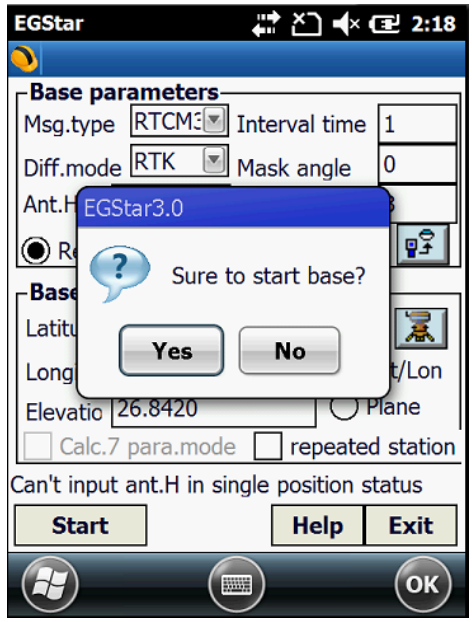


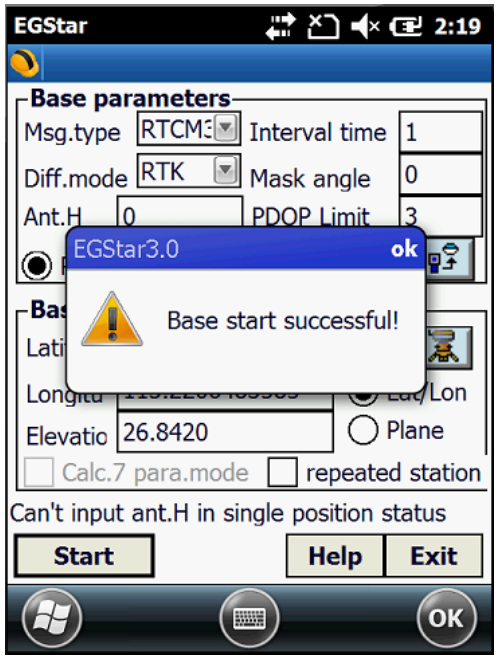


3）Set the base station parameters. Normally you only need to set difference mode（that is Diff.mode） in parameter settings while others using the default parameters. After setting click  , the Base station setting finish.

4）After setting the parameters, click "Start" (in general, the Base station are arbitrarily set up, Base coordinates do not need to be input)







Note: If you start the base station successfully the first time, you can directly open the Base station mainframe and it will operate automatically if you don't want to change the configuration.

5）The radio channel setting

Set the radio channel on control panel of the external radio.

- Set the radio channel, there are eight channels to choose from;
- Set the radio power, if the working distance is not far, and interference is low, you can choose the low power transmitting;
- If the radio is successfully transmitted, the TX indicator will flash at intervals;

§3.2.3 Set up rover station

After verifying the successful transmitting of the Base station, you can start the erection of the rover station. The steps are as follows:

1) Set the receiver to the rover station radio mode;

2) Open the rover station mainframe, fix it on the centering rod of the carbon fiber pole, and

screw on the UHF differential antenna;

3）Install the handheld bracket and the handheld；



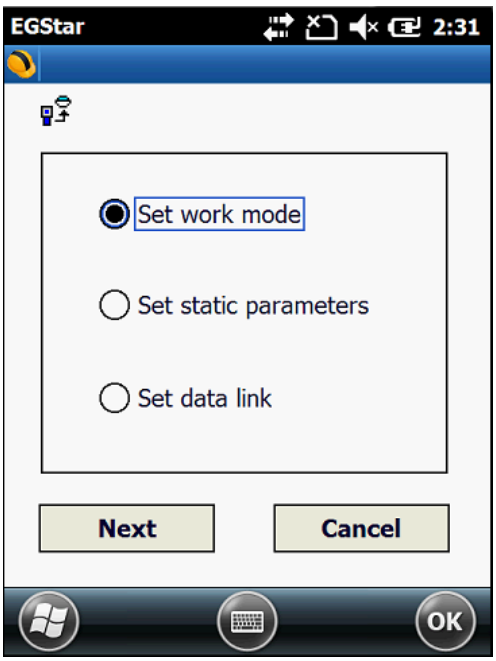
§3.2.4 Set rover station

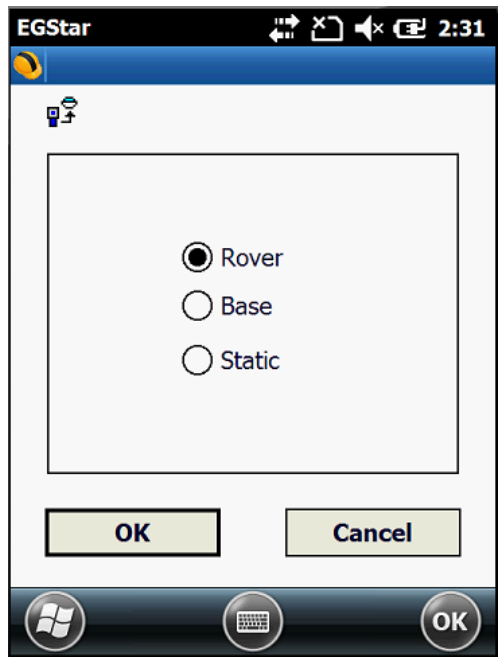
Set the rover station after installing the Rover station to achieve a fixed solution state, follow these steps:

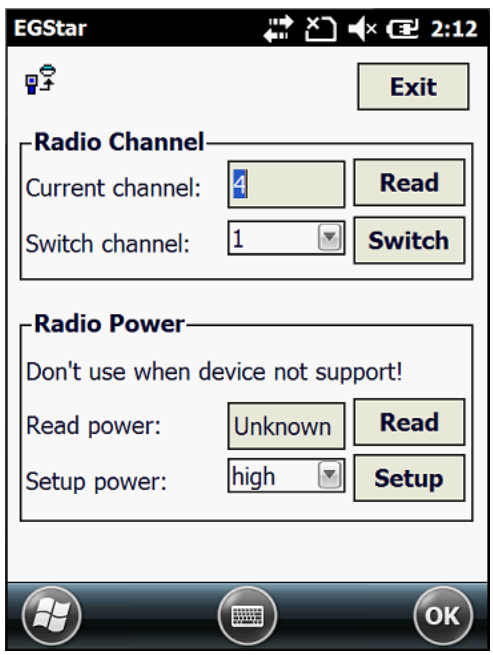
1）Connect the handheld and the EGStar

2）Rover station settings: Config → Instrument Config → work mode setting (switch the mainframe work mode into rover station mode and the data link to be internal radio mode)

3) Channel settings: Config → Radio Config → Radio channel setting, switch the radio channel to the same with the Base channel;







Setting finished, after the Rover station reaches the fixed solution, you can see the high-precision coordinates in the handheld. The follow-up new construction and conversion parameters please refer to the other manual <<EGStar 3.0 User Manual >>

§3.3 RTK operations（GPRS mode）

The main difference between RTK GPRS mode and Radio mode is the network transmission of differential data. Therefore the erection is similar to the radio mode, the setting of EGstar is much different, and the introduction is as follows:



§3.3.1 Base and Rover installation

RTK network mode and radio mode is different on the transmission mode, so the installation is in a similar way, except that:

1) When the Base station is switched to the Base GPRS mode, needn't to install external radio, you need to install the GPRS differential antenna;

2) When the Rover station is switched to the Rover GPRS mode, you need to install the GPRS

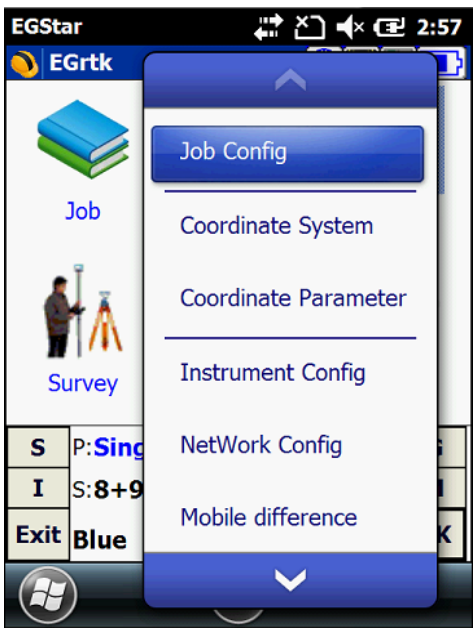
differential antenna.

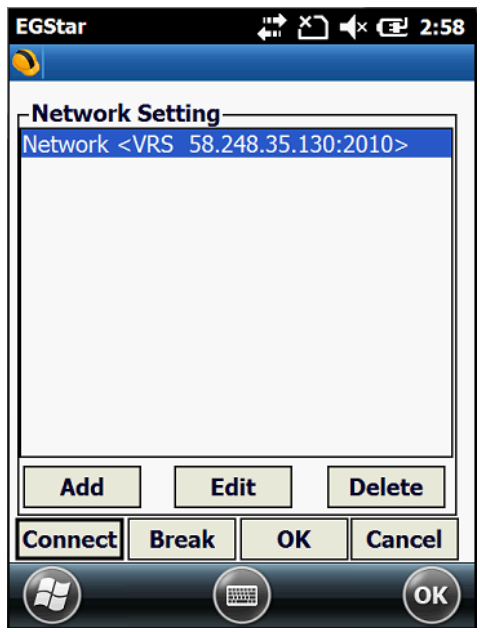
§3.3.2 Base and Rover settings

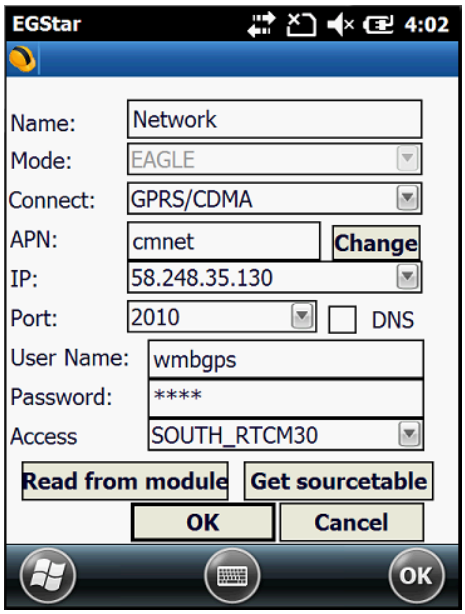
The setting of RTK GPRS Base station is the same with Rover station, you can first set Base station and then Rover and the steps are as follows:

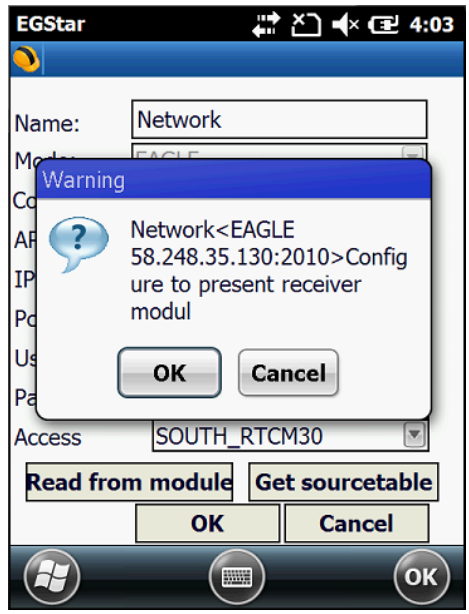
1) Setup: Config →GPRS Config

2) New network link should be added here, click “Add” to enter the setting interface.





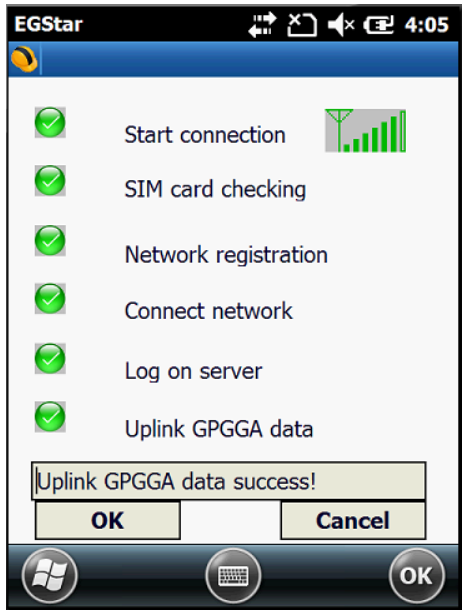




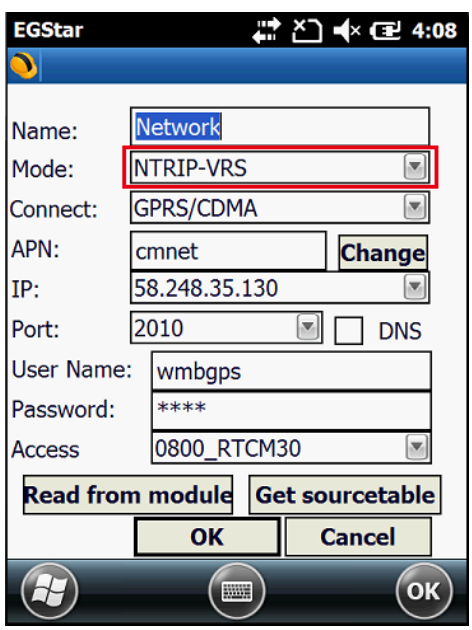
Note:"Read from module" is a function used to read the stored message in the system which is set by the receiver via GPRS link. Click "Read from module", the previous message will be filled in the "Access" field：

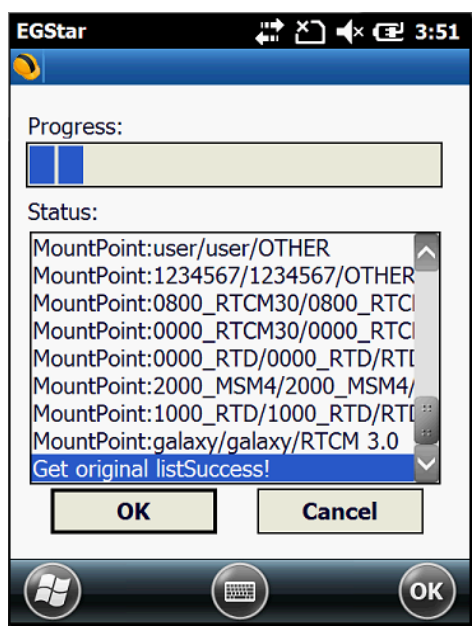
3) Enter the network configuration information in turn, select "Eagle" for the Base station, in "Access" please enter machine number or customize.

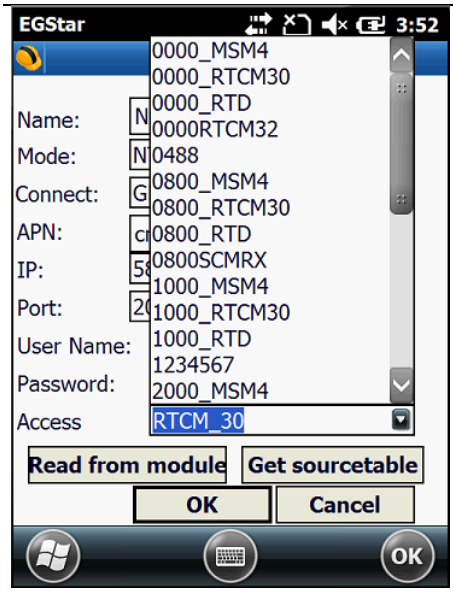
After setting, click "OK." and enter parameter configuration phase. And then click "OK" to return to the network configuration interface. Then click on "Connect" button to enter the EGStar initial interface, after connecting to network, click on "OK" and return to EGStar main interface.

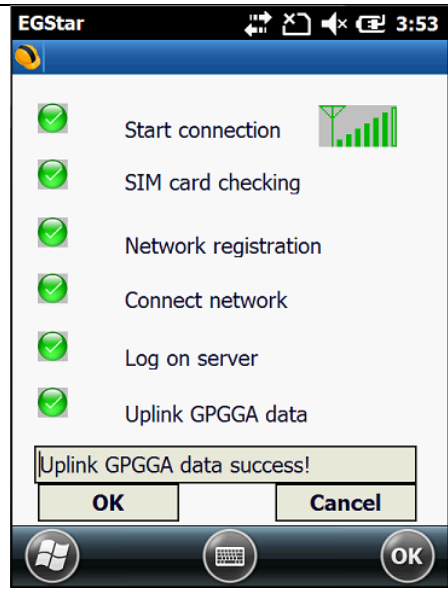


Note: The Rover station's connection with CORS is similar to Base GPRS mode, except the option of VRS-NTRIP, see the picture as below, input the IP and port for your local CORS network and the assigned username and password, hten click on "Get Sourcetable" to obtain mountpoints from server, and pick a correct one to access. Specific procedure please refer to <<EGStar3.0 user manual>>









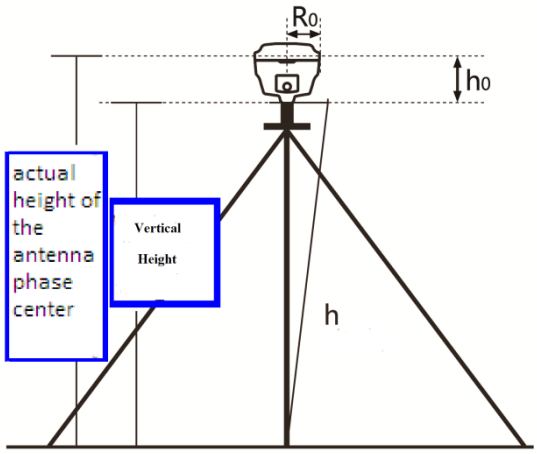
§3.4 The antenna height measuring

The antenna height is related to static operations and RTK operations, the following is the introduction separately.

Antenna height is actually the vertical height of the phase center to ground measurement point, measurement methods of antenna height in dynamic mode includes pole height, vertical height and slant height;

- **Pole height**: the height of the centering pole, which can be read from the pole scale;
- **Vertical Height**: the vertical height from the ground to the bottom of the main mainframe + antenna phase center to the bottom of the mainframe;
- **Slant height**: measure to the middle of the rubber ring, In the hand-held software, select the antenna height mode to the slant height, then input the value;

Static mode antenna height measurement: measure from the ground to the middle of the mainframe rubber ring; select the appropriate type of antenna in the post-processing software.


R0
h0
actual height of the antenna phase center
Vertical Height
h

Chapter 4 Connecting to PC

The 7 pins port has two connection mode, the first one the USB disk, another one is USB network interface. In USB disk mode, users can copy the static data inside the internal storage; In USB network interface, users can check and set the configuration of G1S/C via WebUI platform.

§4.1 USB mode setting

Press and hold the power button for about 15 seconds and pass over the foregoing states (power off, mode selection, self-check), G1S/C will get into USB mode setting with voice message saying “start to set USB mode”, at this moment, release power button, the instrument repeats “ USB disk” and “ USB network interface” for optional, choose the proper mode and press power button to confirm.

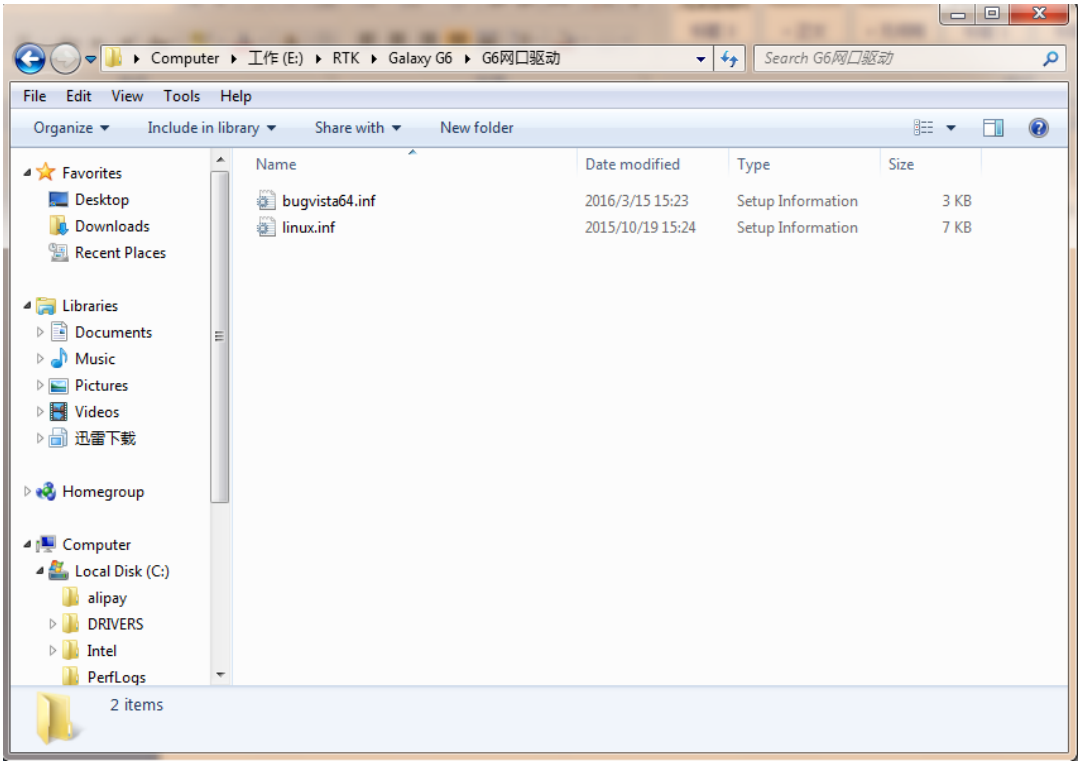
§4.2 Access to WebUI by USB connection

On this mode, the USB port (7-pin) of Galaxy G1S/C must work as an Ethernet port, then internal web UI shall be accessed via USB cable connection with computer.

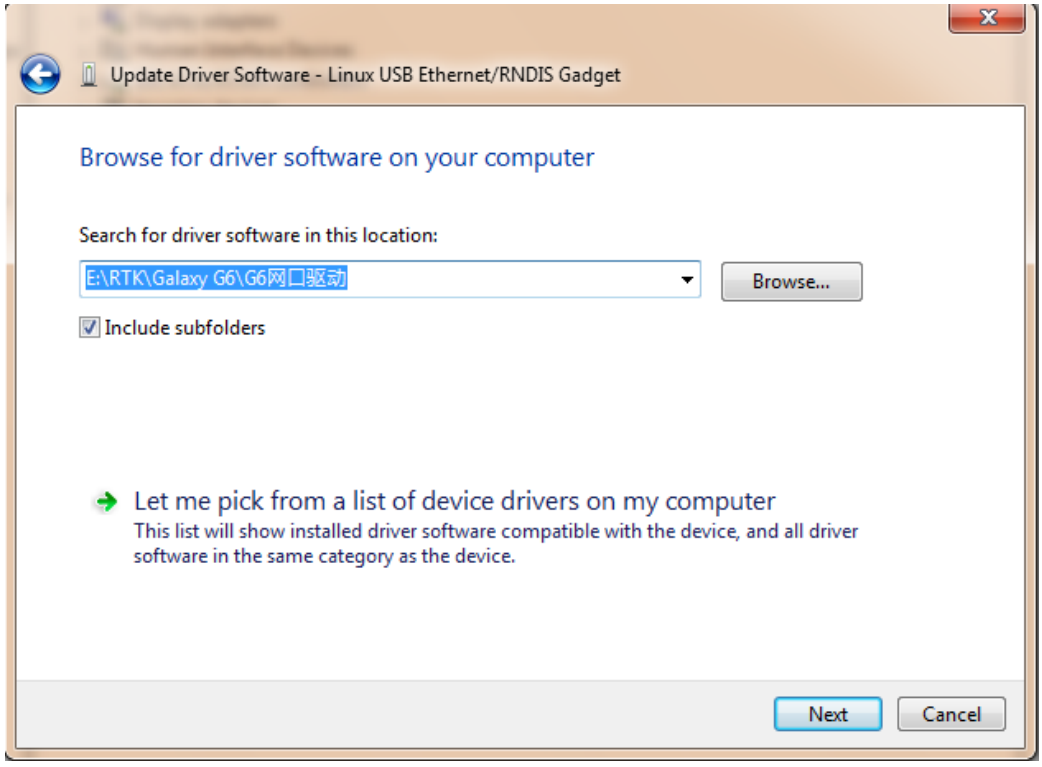
First of all, a corresponding driver is required to install to the computer, then this function could be activated.

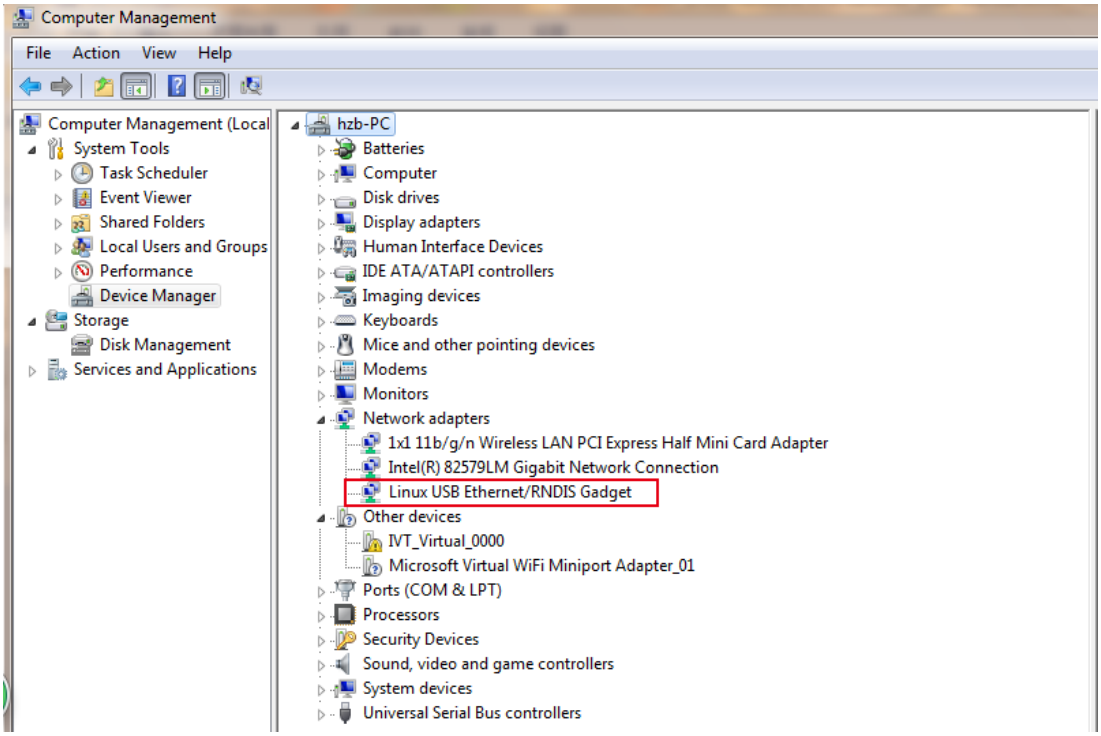
Due to different operating system is installed on computer, the drivers should be applied to a suitable one. The file bugvista64.inf is applied to 64bit operating system, and linux.inf is for 32bit operating system.

Make sure that the USB port (7-pin) is switched into USB network port (please refer to section 3.5, USB mode setting).



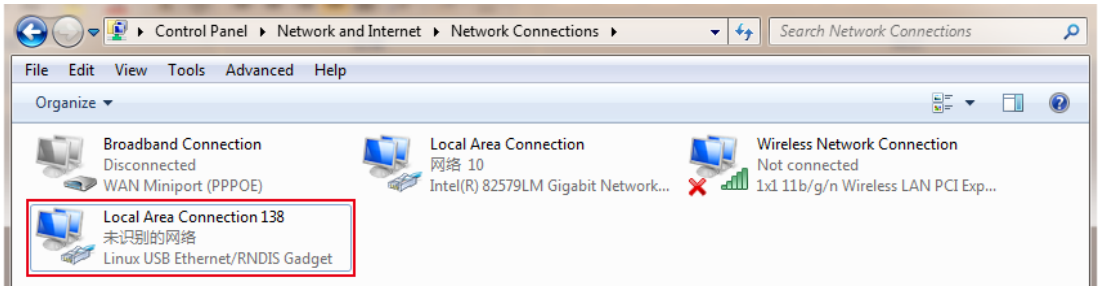
Choose the folder which contains the drivers





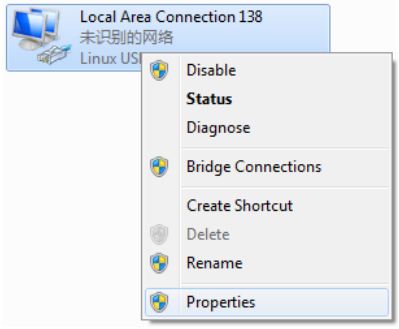
NOTE: *The driver can be downloaded from official website automatically or please contact with us for more supports.*

If the driver has been successfully installed, the USB port of G1S/C will be recognized as **Linux USB Ethernet/RNDIS Gadget**, and a local area connection will generate in **Network Connections** on the computer. For example, Local Area Connection 138 generates after connecting G1S/C receiver to computer via USB Ethernet port.

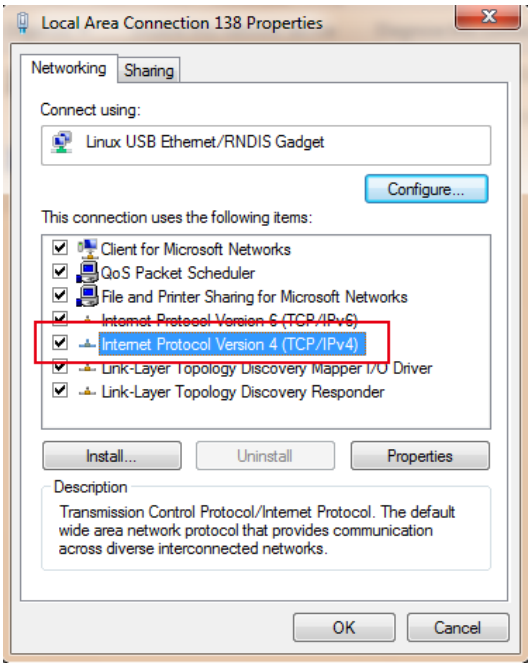


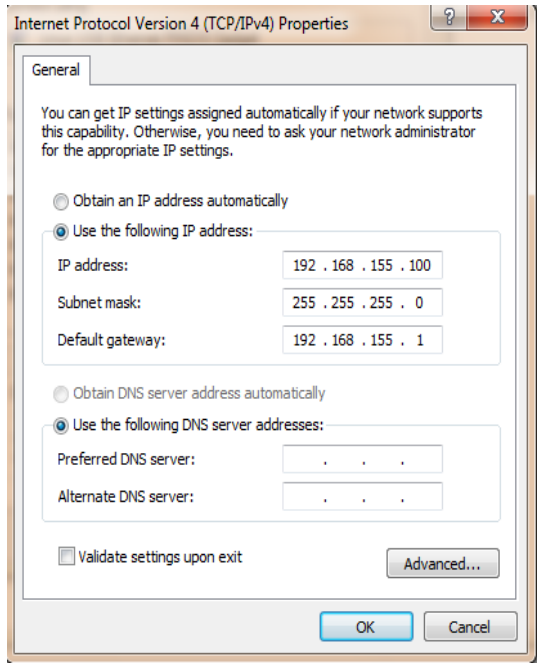
However, sometimes the computer cannot detect the receiver by USB Ethernet port because there is something wrong with acquiring IP automatically, therefore, we need to do something to avoid such problem, that is to set a fixed LAN IP for the connection:

Right click on the local area connection which newly generates, choose properties to call out the local area connection properties window.

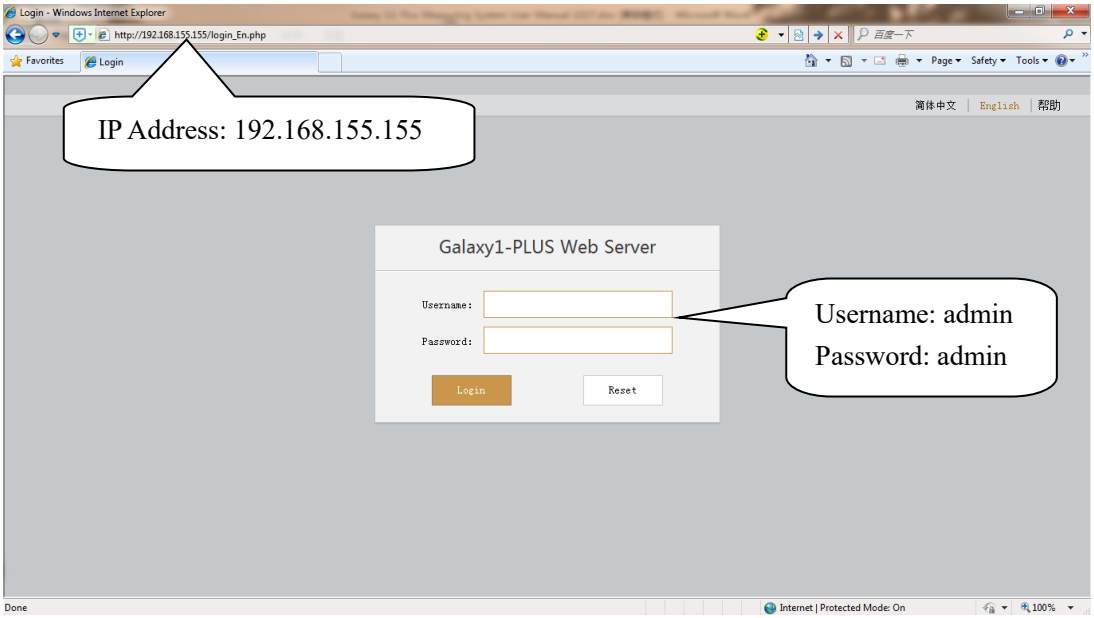


Then double click on Internet Protocol Version 4 (TCP/IPv4) option or click on properties button to call out Internet Protocol Version 4 (TCP/IPv4) properties window, set the fixed LAN IP address as shown in following, then click OK button and confirm the settings, return to the IE browser and use the IP address 192.168.155.155 to access the internal web UI.



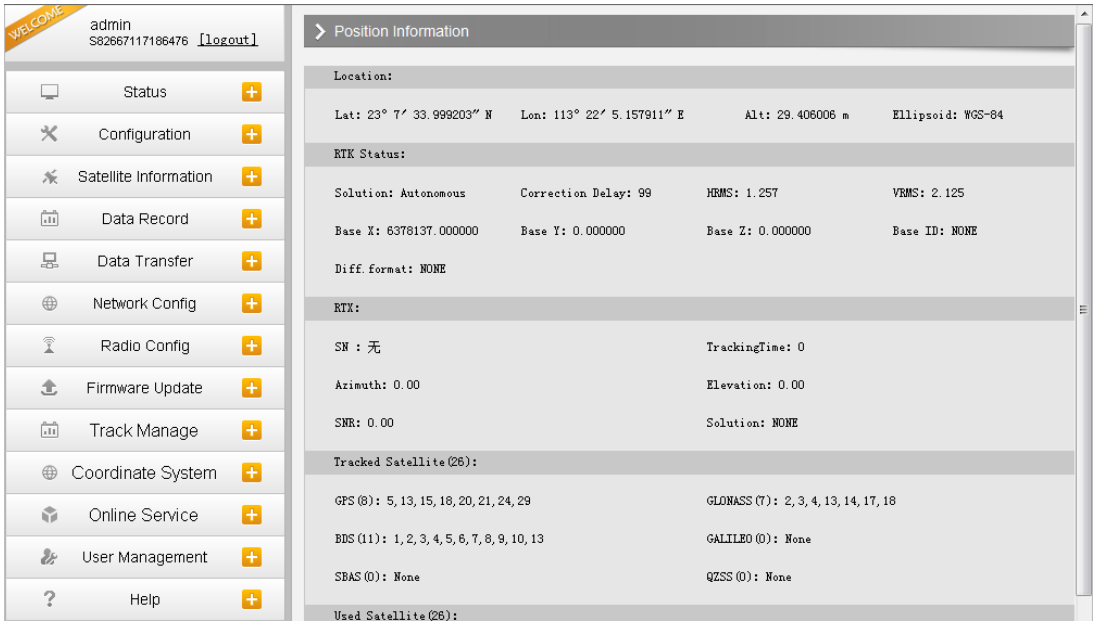


Run IE broswer on computer and input the default IP (**192.168.155.155**) into address bar, after a while, the system login interface is refreshed, then apply **"admin"** for username and password to login.



§4.3 Web UI main interface

After login the Web UI management of G1S/C by USB connection, the main interface appears with displaying configuration items and positioning. As shown at following figures.



In the Web UI home page, the configuration items are listed at left side. And the positioning informaiton including coordinates information and satellites are diplayed at right side.

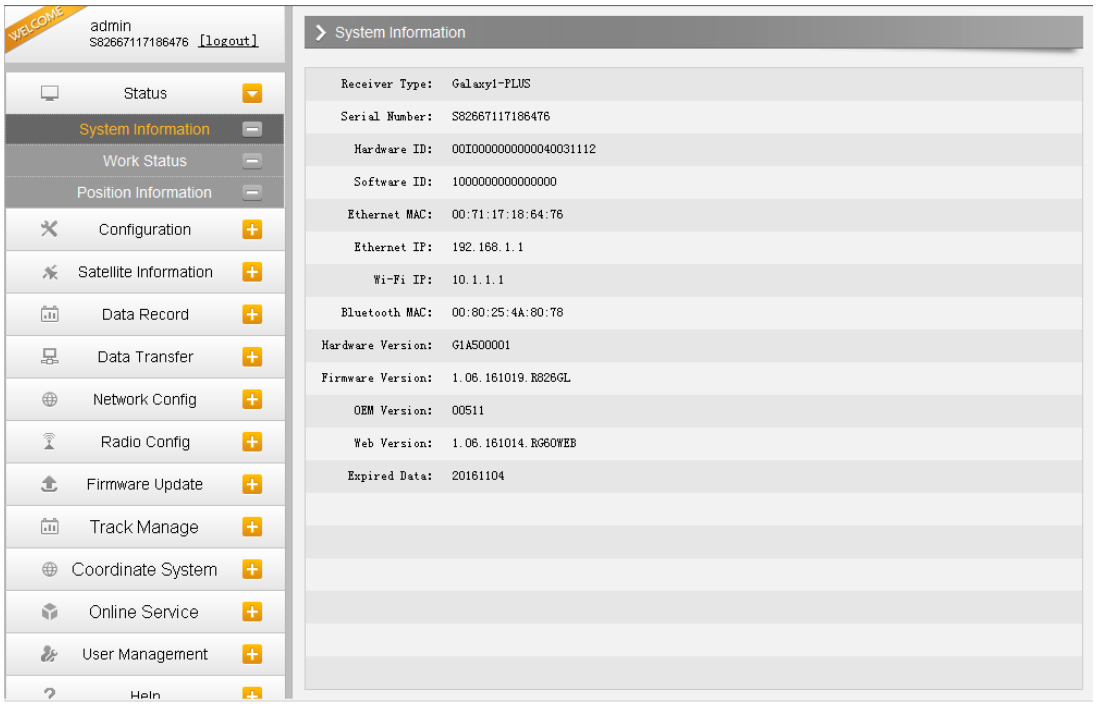
Ref	Component	Description
	**Status**	Positioning information, satellite tracking and the others will be displayed in this page
	**Configuration**	It contains registration for receiver, base configuration, antenna configuration, satellite configuration, receiver configuration and system configuration.
	**Satellite Information**	Display and control the satellites are used or not
	**Data Record**	Configure the parameters for static mode and raw data download
	**Data Transfer**	Contains NTRIP configuration, TCP/IP configuration and data transferring with PC
	**Network Config**	Contains network parameters configuration, configuration and the other functions
	**Radio Config**	Configure the parameters and frequency for radio modem
	**Firmware Update**	It is used to upgrade the firmware for receiver and each modem
	**Track Manage**	Record track file while doing measurement
	**Coordinate System**	Setup a local coordinate system for Galaxy G1S/C
	**Online Service**	Upload data onto a server in real-time
	**User Management**	Add and manage the Web UI users
	**Help**	Offers solutions

§4.3.1 Status

System Information, Work Status and Position Information are listed under Status menu.

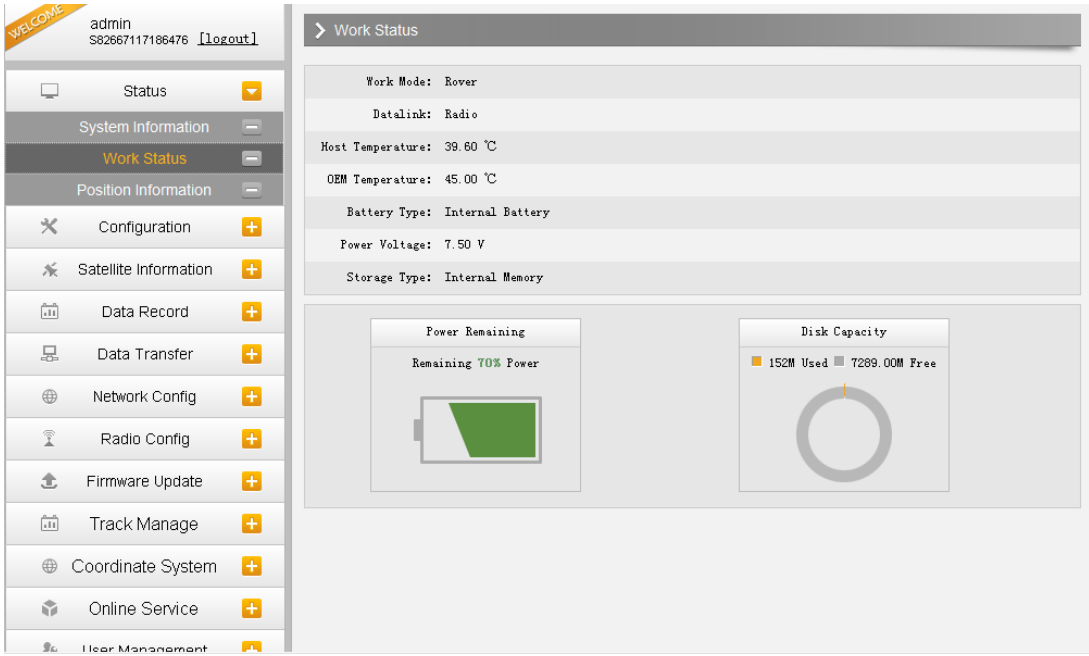
System Information

In this page, all the information of G1S/C is diplayed such as serial number, hardware ID, MAC address, firmware version and so on.



Work Status

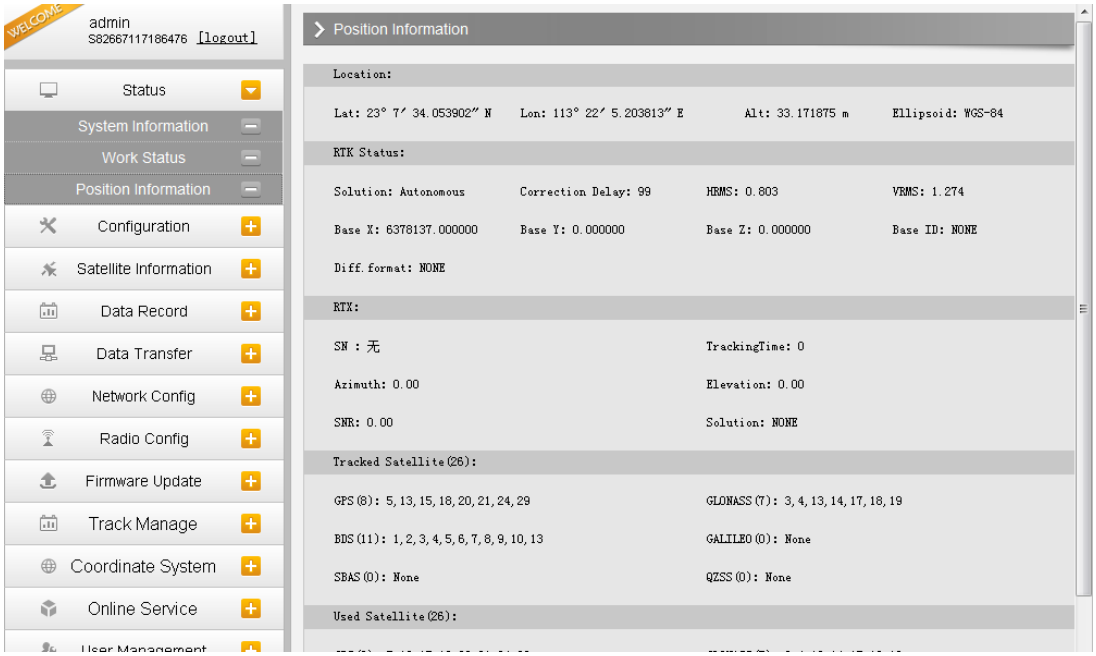
The physical state of G1S/C such as working mode, datalink, host temperature, remaining power and the free memory is obtained from this page



Position Information

In this page, users can be clear at a glance on current position information and satellite

information

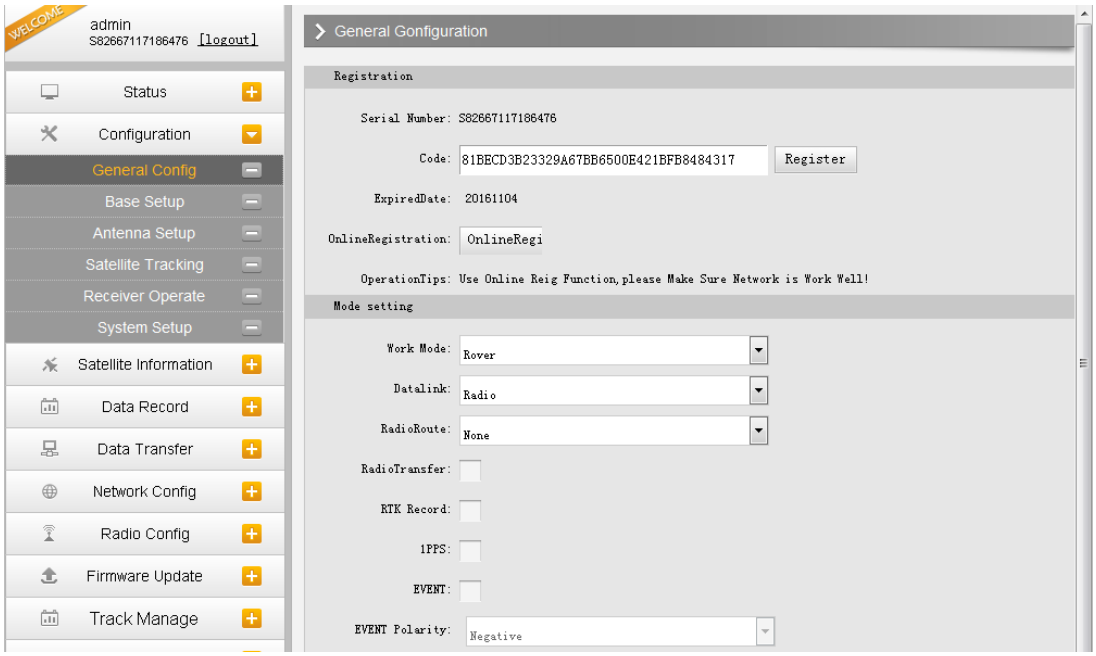


§4.3.2 Configuration

General Config, Base Setup, Antenna Setup, Satellite Tracking, Receiver Operate and Default Language are contained under Configuration menu. Users are able to configure all kinds of parameters for Galaxy G1S/C under Configuration menu, and all the settings are immediate effect after saving.

General Config

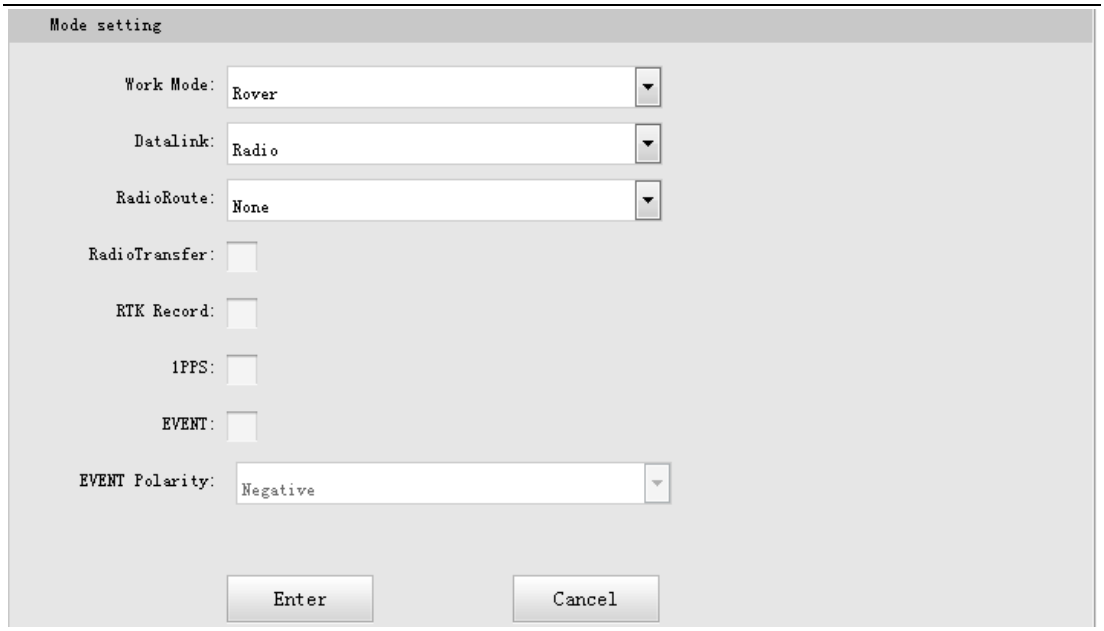
The registration for receiver working mode setting can be completed in this general configuration page.



If the code of G1S/C has expired or is going to be run out, please provide the serial number of your G1S/C for us to apply for another available code, then input the code into the blank or register the receiver online.



Galaxy G1S/C allows users to setup the working mode and datalink from this Web UI



Work Mode: There are Rover, Base and Static contained in this dropdown list

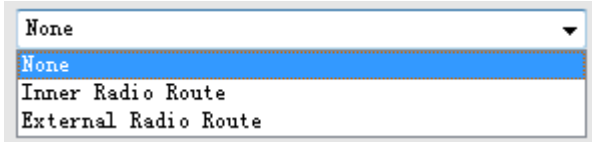
Datalink: Pull down the list, there will be all kinds of options for datalink, such as radio, Network, External, Bluetooth and CSD.

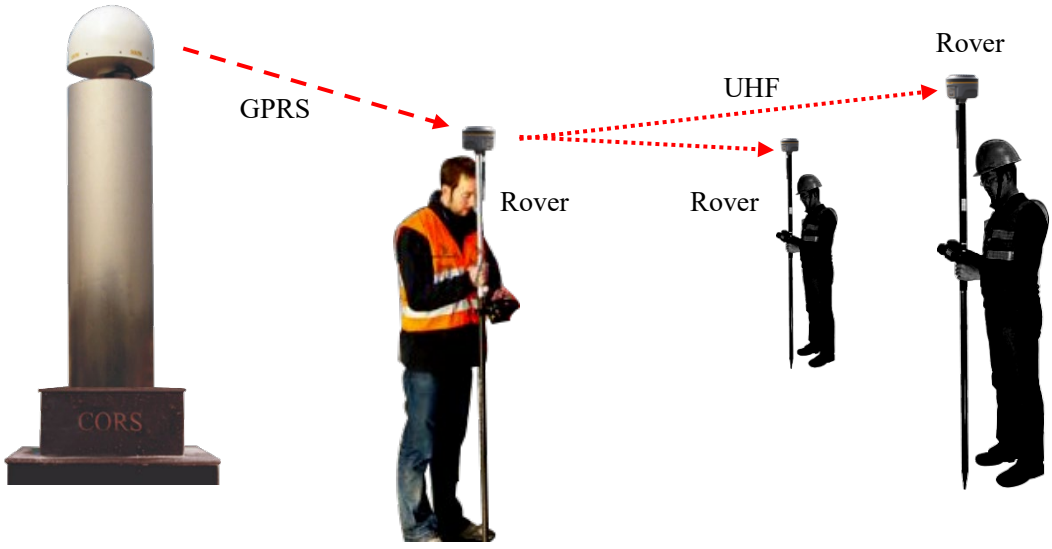


Radio Route: This feature is used to transfer the correction which from the reference station to the other rover by radio, the rovers will have the same reference coordindates. This is in the case of working in some places where there is poor signals from reference station or there is only a SIM card for a few rovers.

It is able to use internal radio or connect an external radio to transfer the correction.

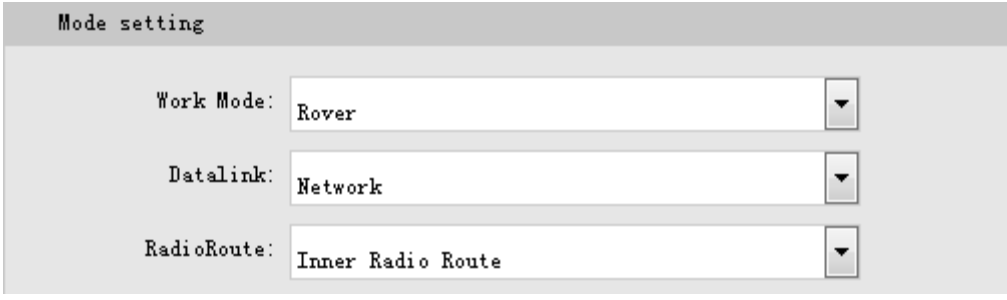
This feature is only available on Rover mode.



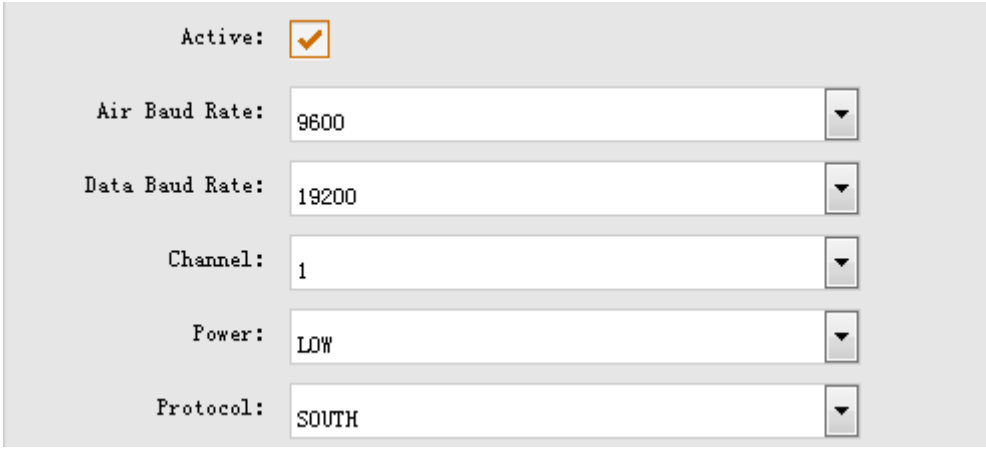


Operation:

1, choose “Inner Radio Route” and click “Enter” button to confirm the settings.

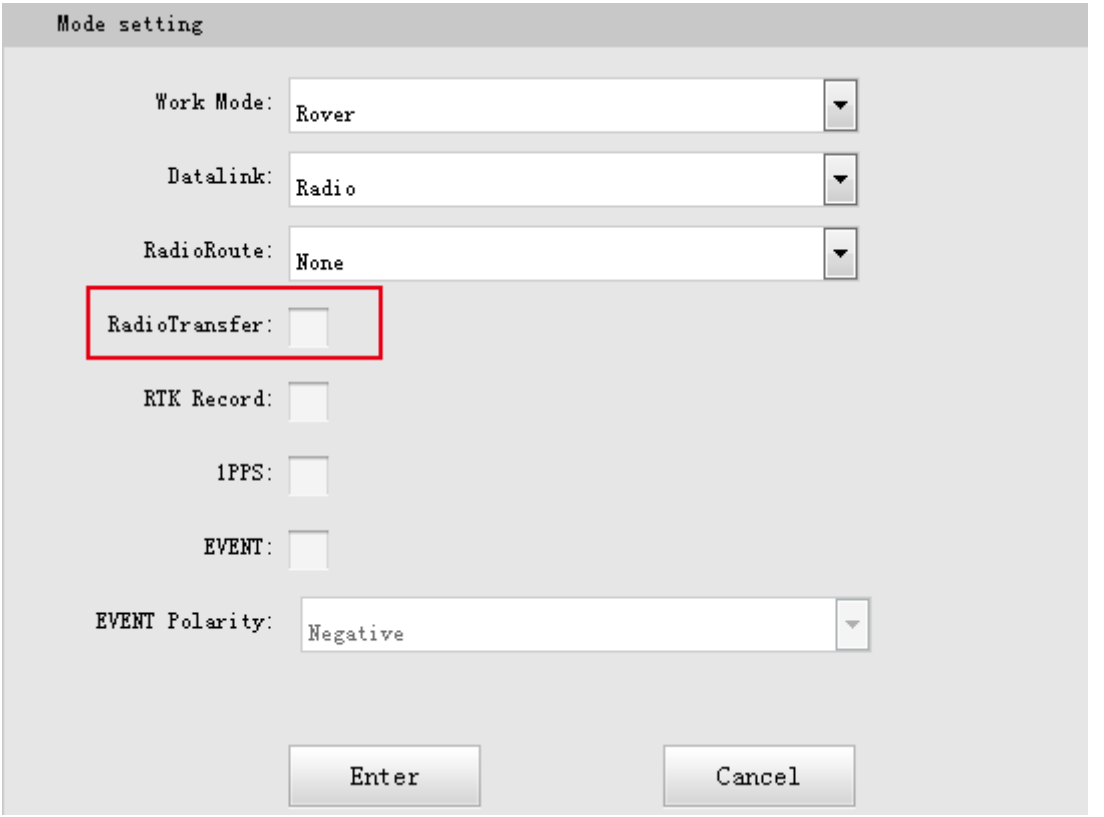


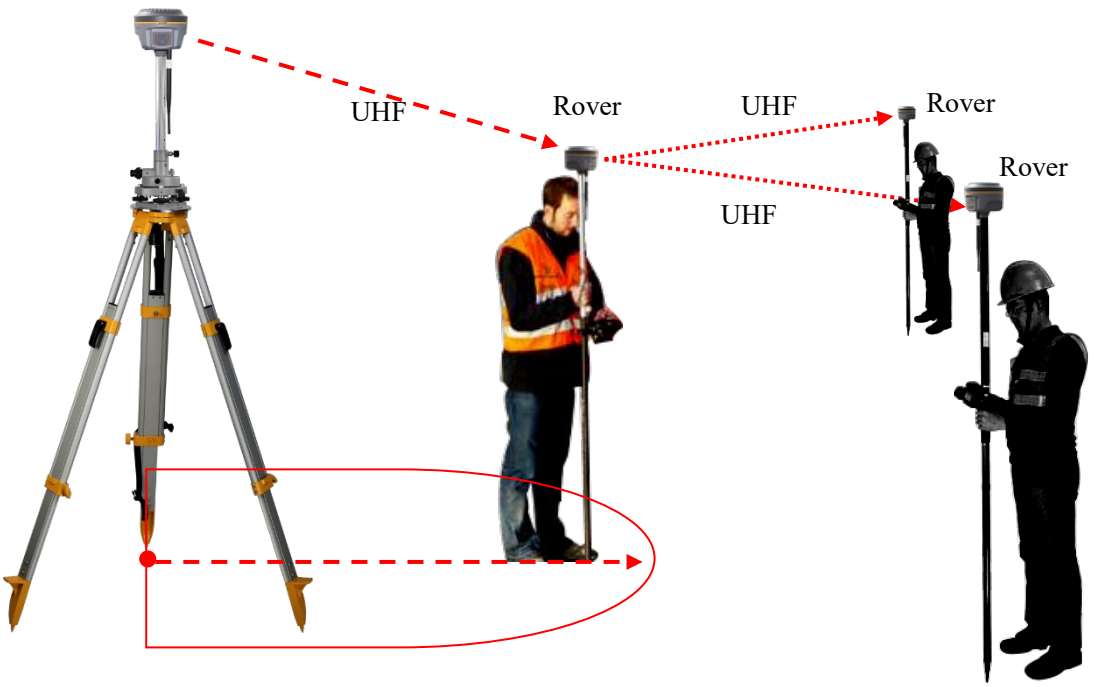
2, go to “Radio Config” page, check the channel, communication protocol and the frequency point of each channel.



3, configure the datalink of the other rovers into internal UHF mode, then make sure the channel, protocol and frequency point are same as “Route” rover.

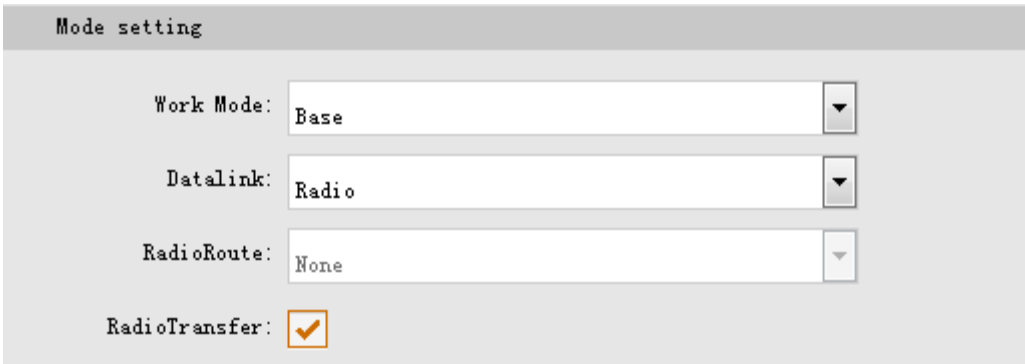
RadioTransfer: This is the function that G1S/C is able to transfer the correction from Base station to the other rovers with the internal UHF, definitely, G1S/C can work as a radio repeater.



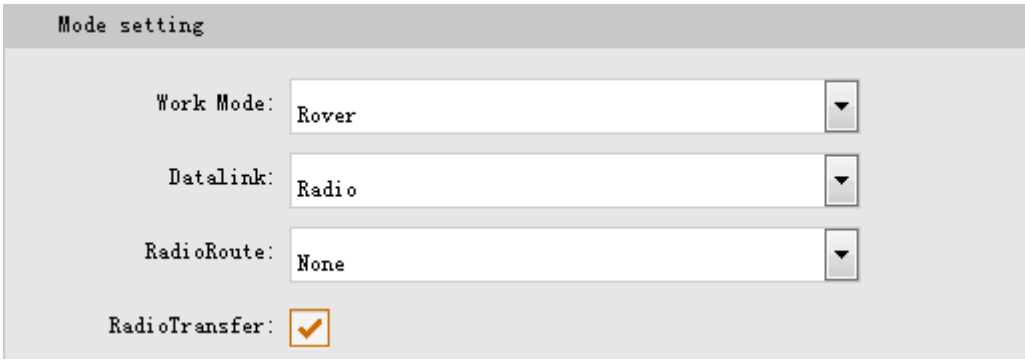


Operation:

1, check the box of "RadioTransfer" on "General Config" dialog for Base station.



2, open the same function for Rover in critical status (when the Rover is close to working distance of Base internal UHF).



3, configure the datalink of the other rovers into internal UHF mode, then make sure the channel, protocol and frequency point are same as "Repeater" rover.

Note: please take in mind that the "Repeater" rover should keep away from Base station to avoid signal interference.

RTK Record: This is used to enable raw data recording in base mode or rover mode for post-processing

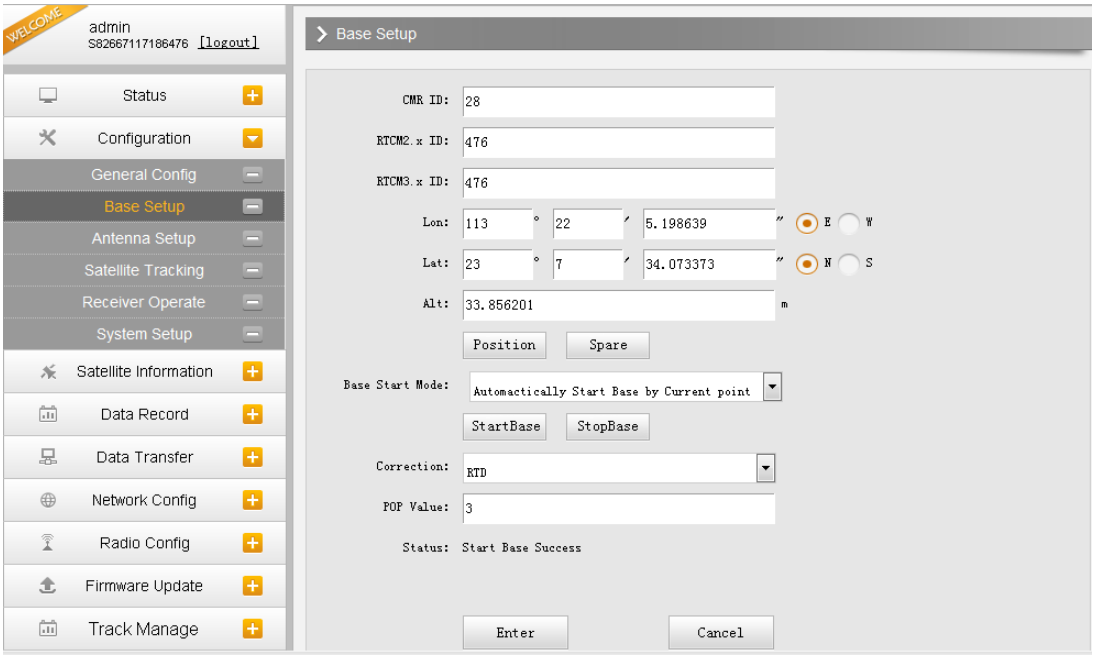
1 PPS: This option is for the 1 pulse per second output

EVENT: This option is for the EVENT marker input

EVENT Polarity: EVENT input method.

Base Setup

When G1S/C works as a base, the basic configuration for base can be setup in this page. Users can input the correct coordinates or capture a current position for the base. Also users can define what kind of correction format is transmitted.



CMR ID/RTCM2.X ID/RTCM3.X ID: Users can specify the ID for transmitting correction.

Position: Click this button to capture the coordinates for current position

Spare: This is used to the repeat station

Base Start Mode: Here contains 3 methods to start the Base, manually start base, automatically start base by fixed point, automatically start base by current point.

Correction: Here contains the global general used correction formats including RTD,RTCM23, RTCM30, RTCM32, CMR and SCMRx

POP Value: This value is setup for the PDOP limitation.

Status: Here will display the status for base in real-time.

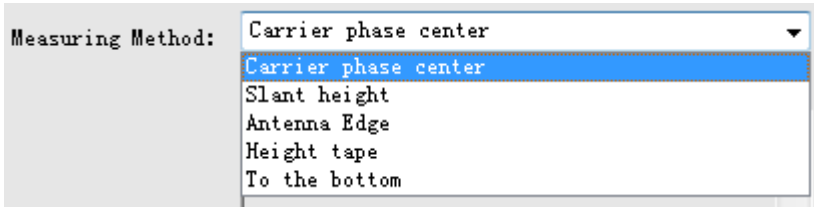
Antenna Setup

The antenna parameters are configured in this page including the antenna height, measuring method.



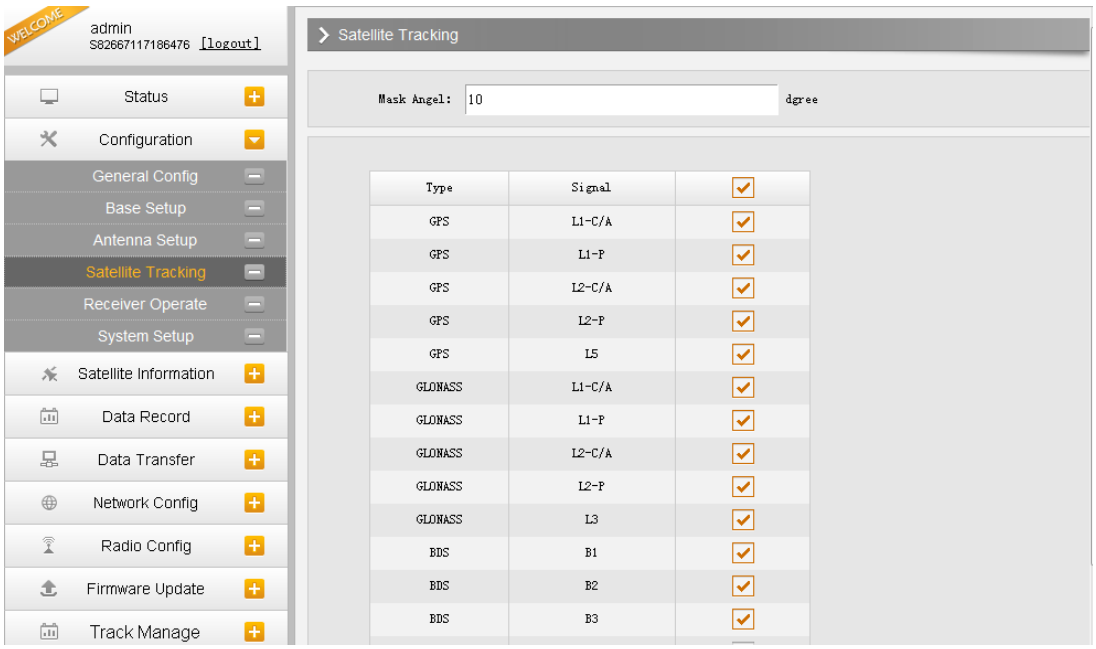
Antenna Height: This is the value for height of antenna while surveying.

Measuring Method: Here provides several methods for measuring the antenna height such as carrier phase center, slant height, antenna edge, height plate and to the bottom.



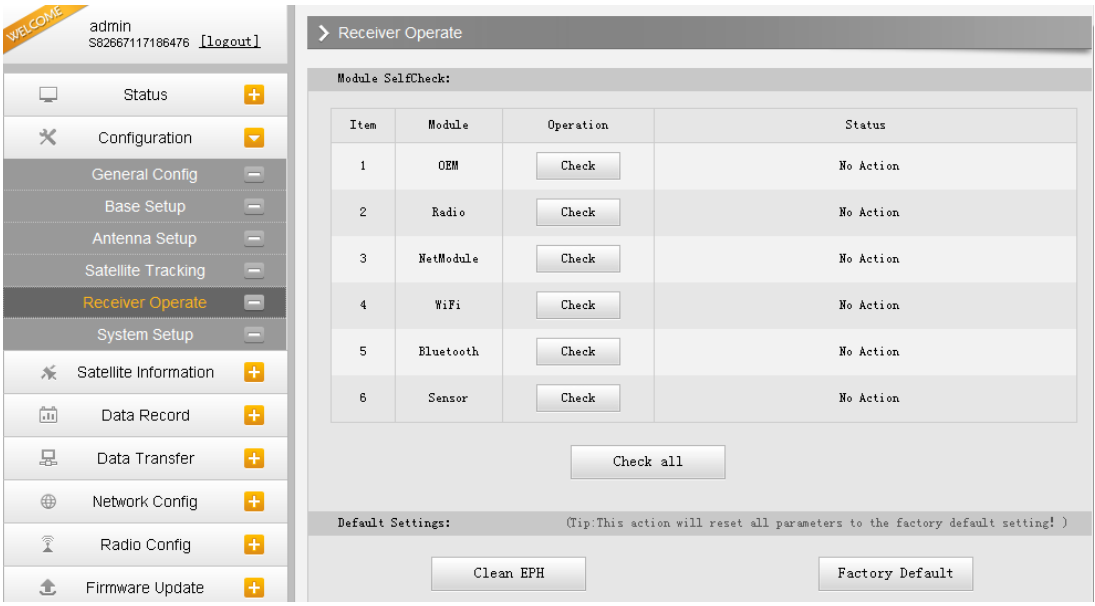
Satellite Tracking

In this page, users can define the mask angle for satellite tracking, and check on the box of corresponding band from the constellation that to use this band or not



Receiver Operate

The page provides all kinds of operations to control the receiver such as self-check operation, clean epochs, factory reset, reboot and power off.



Self-check: Users can also do the self-check from this configuration page, click on the Check all button to check all the modems or click on the check button corresponding to the modem to check one by one.

Clean EPH: Click this button to clear the remaining epochs to let recever track the satellites better.

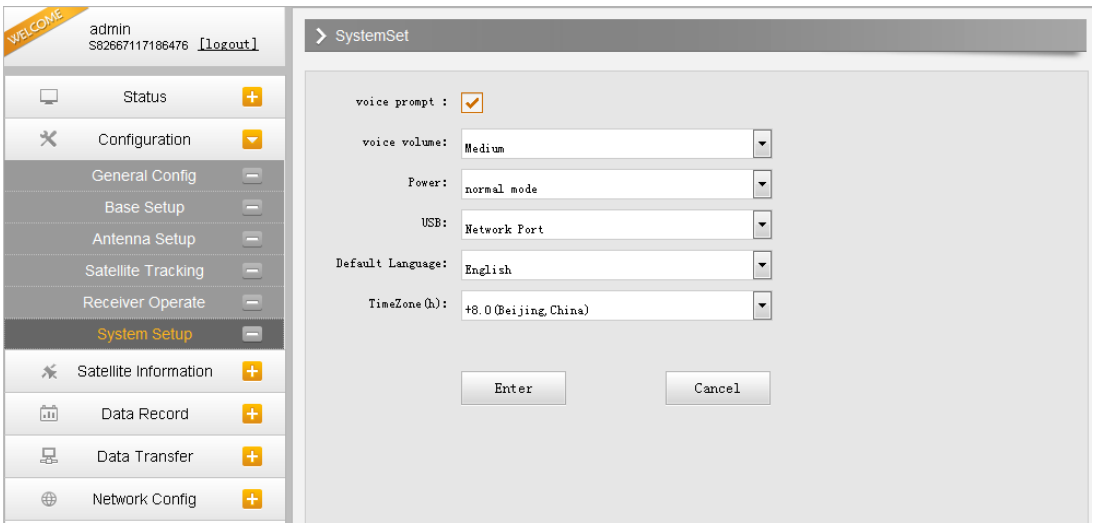
Factory Default: Click this button to bring the receiver back to factory default setting.

Reboot: Click this button to restart the receiver.

Power Off: Click this button to power off the receiver.

System Setup

This page is used to control Voice prompt, volume of voice, power saving, USB mode and the default language for receiver.



Voice Prompt: Check on this box to turn on the voice guide for G1S/C, uncheck it to turn off the voice guid.

V**oice Volume:** Define the voice volume for G1S/C's speaker.

Power: Configure the receiver to use the power saving mode or not.

USB: This is used to configure G1S/C what kind of USB mode output from 7-pin port when connect the receiver with computer via USB cable. USB and network port for optional.

Default Language: Configure the default language for Galaxy G1S/C which associates with voice guid.

Note: This is not the language setup for web UI, the Web UI only supports Chinese and English.

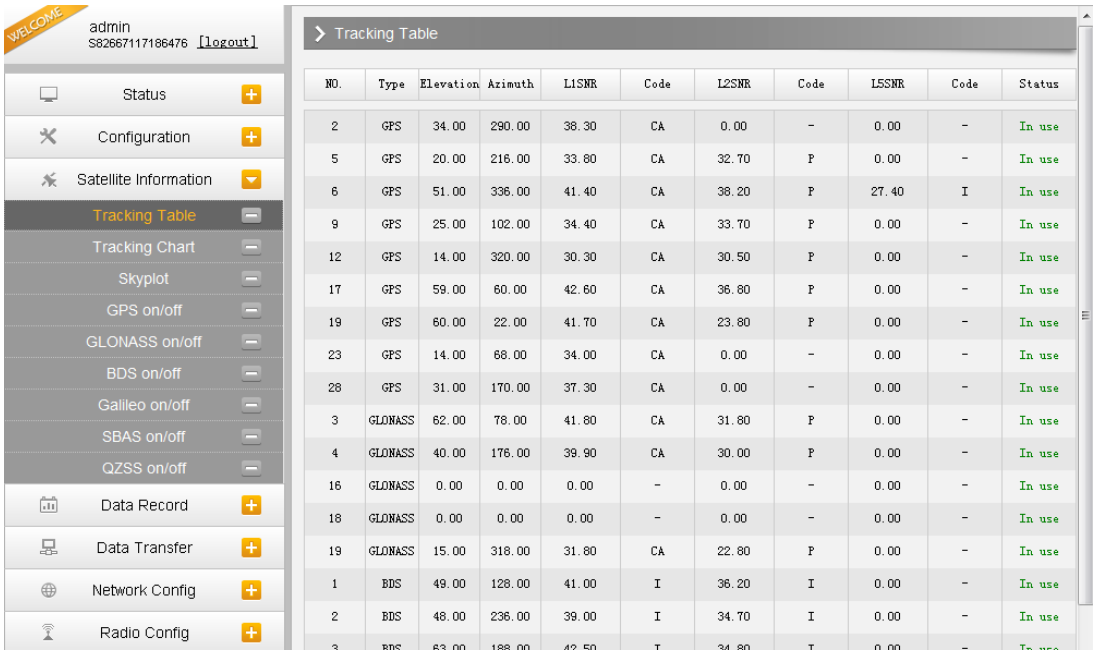
TimeZone(h): Use this to setup the corresponding time zone for your country or area.

§4.3.3 Satellite Information

The "Satellite Information" provides all kinds of tables, graph and the skyplot to view the information of tracking satellites. And it is allowed to configure to use which satellite in constellation on/off page by checking on the corresponding box.

Tacking Table

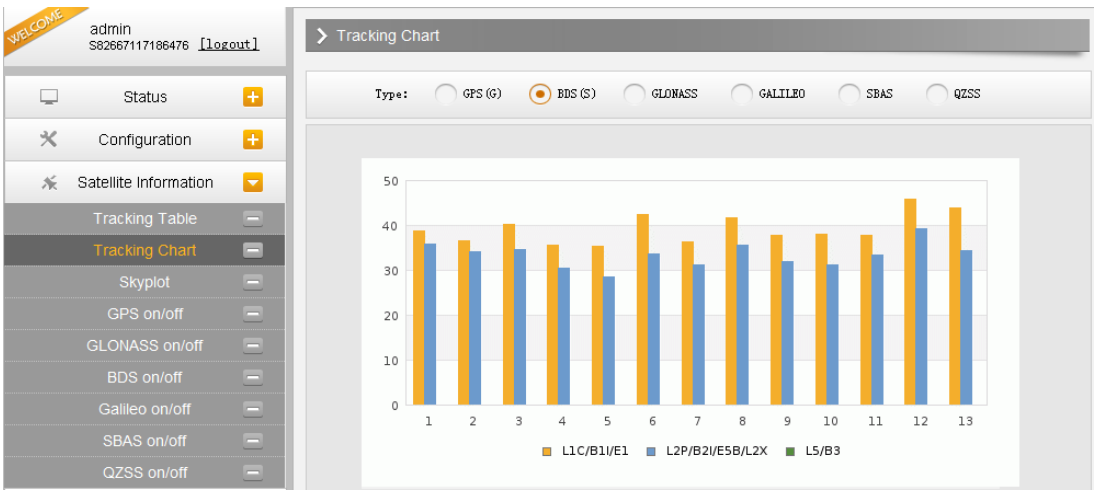
Here is the table to list all current used satellites and the other information for these satellites.



NO.	Type	Elevation	Azimuth	L1SNR	Code	L2SNR	Code	L5SNR	Code	Status
2	GPS	34.00	290.00	38.30	CA	0.00	-	0.00	-	In use
5	GPS	20.00	216.00	33.80	CA	32.70	P	0.00	-	In use
6	GPS	51.00	336.00	41.40	CA	38.20	P	27.40	I	In use
9	GPS	25.00	102.00	34.40	CA	33.70	P	0.00	-	In use
12	GPS	14.00	320.00	30.30	CA	30.50	P	0.00	-	In use
17	GPS	59.00	60.00	42.60	CA	36.80	P	0.00	-	In use
19	GPS	60.00	22.00	41.70	CA	23.80	P	0.00	-	In use
23	GPS	14.00	68.00	34.00	CA	0.00	-	0.00	-	In use
28	GPS	31.00	170.00	37.30	CA	0.00	-	0.00	-	In use
3	GLONASS	62.00	78.00	41.80	CA	31.80	P	0.00	-	In use
4	GLONASS	40.00	176.00	39.90	CA	30.00	P	0.00	-	In use
16	GLONASS	0.00	0.00	0.00	-	0.00	-	0.00	-	In use
18	GLONASS	0.00	0.00	0.00	-	0.00	-	0.00	-	In use
19	GLONASS	15.00	318.00	31.80	CA	22.80	P	0.00	-	In use
1	BDS	49.00	128.00	41.00	I	36.20	I	0.00	-	In use
2	BDS	48.00	236.00	39.00	I	34.70	I	0.00	-	In use

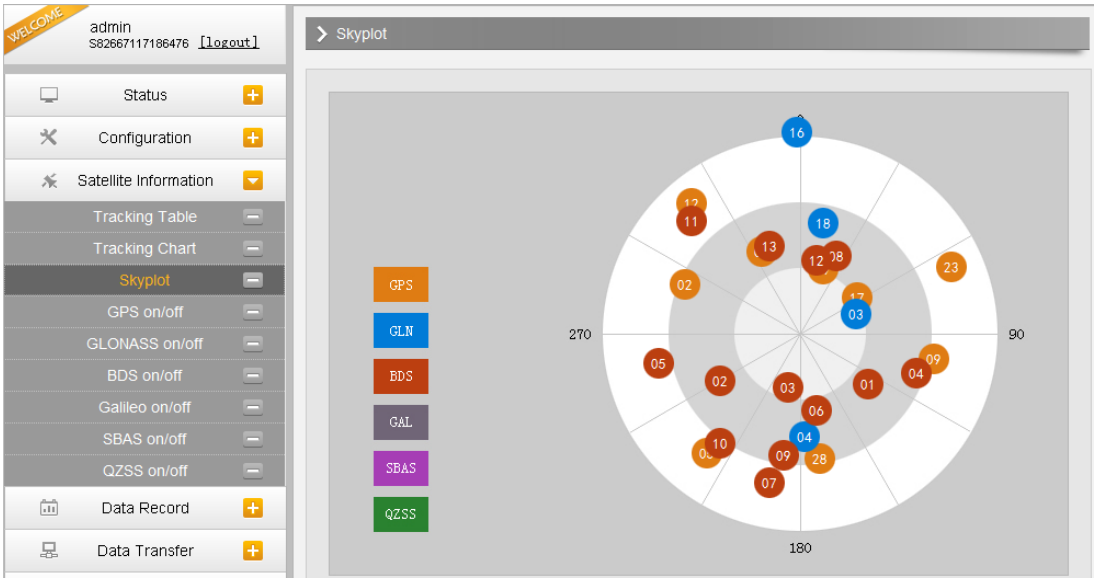
Tracking Chart

In this page, the histogram will indicate the signals from those used satellites, and allow to check each constellation separately.



Skyplot

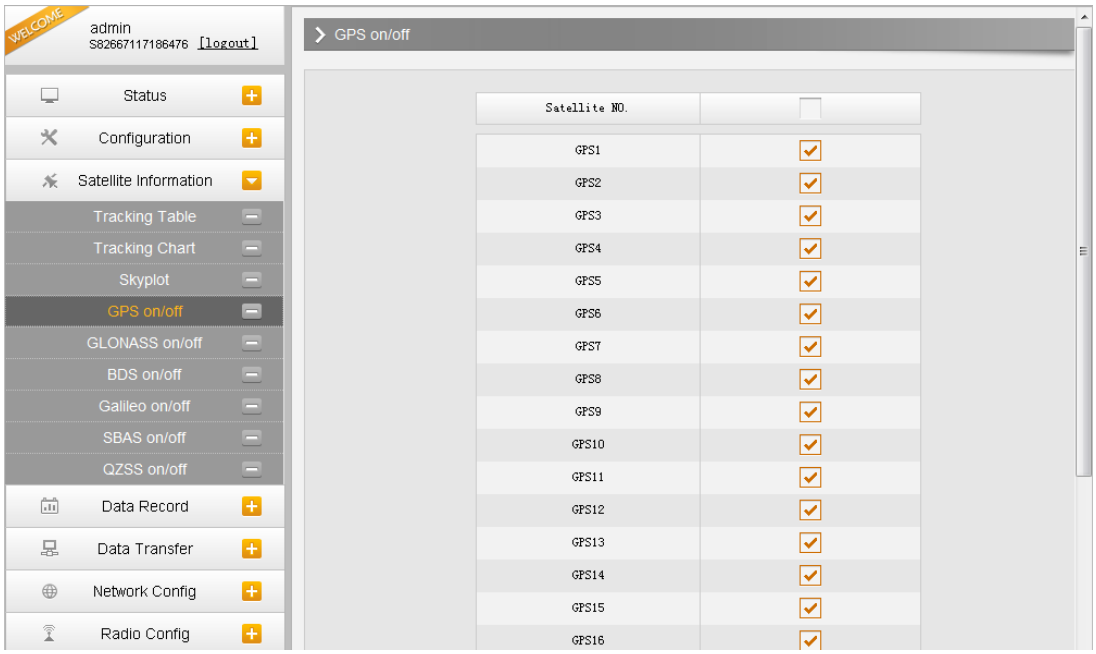
In this page, all the tracking satellires are shown on the skypolt, this let users intuitively view and know where the current position of satellite is.



GPS on/off

For all the running GNSS constellations or the augmentation system, G1S/C allows to configure to use which satellite or not.

In gnss on/off page, all the running satellites are listed, and unselect the box corresponding to the satellite to not use it.

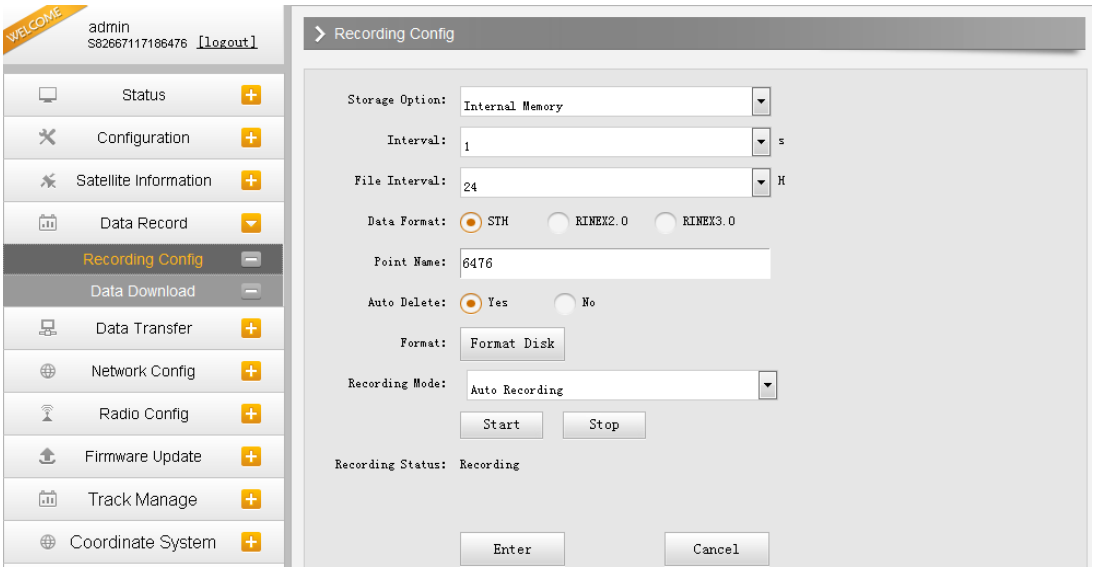


§4.3.4 Data Record

The “Data Record” performance is mainly used to configure all the parameters for receiver in static mode. Much more operations can be done on Galaxy G1S/C such as storage path, interval, data format and data files download.

Recording Config

The page provides more practical operations for raw data storage.



Storage Option: Here are the options to be selected for where the raw data will be stored, internal memory or external memory.

Interval: This is the sampling interval for data storage, 50Hz(0.02s) sampling interval now is available for G1S/C.

File Interval: This is used to defined the data storage time for the static file.

Data Format: Here are 3 options to selected for G1S/C to store what kind of format data, STH, Rinex2.0 and Rinex3.0.

Point Name: A point name is required, the last 4 digits of SN is default setting for the point name.

Auto Delete: This is used to configured G1S/C to delete the previous data files automatically if the memory is full.

Format: Click this button to format the internal memory for G1S/C.

Recording Mode: Here are 2 options to configure G1S/C to record raw data automatically or not if it achieves the sampling conditions.

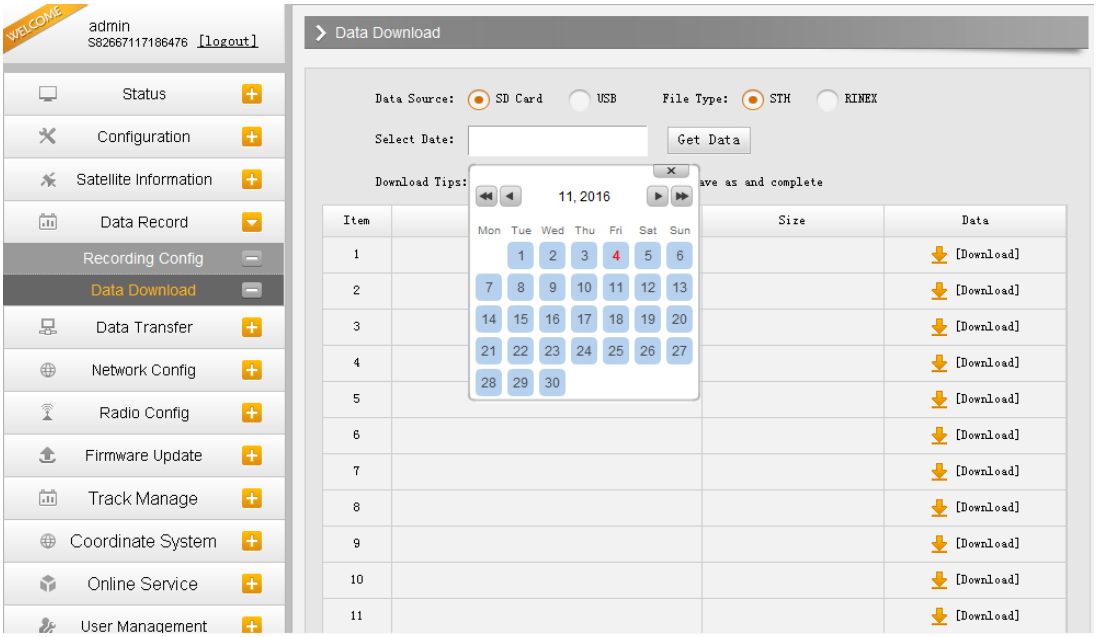
Start/Stop: Click these buttons to start recording or strop recording the raw data.

Recording Status: Here shows the status of static data storage.

Data Download

This page provides the data files to download

Choose the storage where the static data recorded, and file type, then click on the blank of "Select Date" to choose what date the data was recorded and click "Get Data" button, all the files recorded in the date you choose will show in the table, tap download button to download the data files.

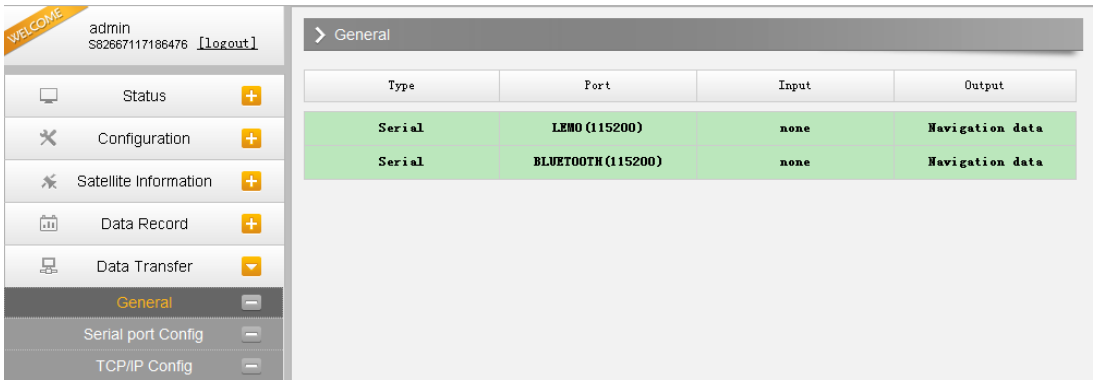


§4.3.5 Data Transfer

This performance contains General, Serial Port Config, TCP/IP Config, NTRIP Config and Data Flow Config. The "Data Transfer" allows to configure the output mode for raw observation data and differential data, as well as to the NTRIP performance configuration.

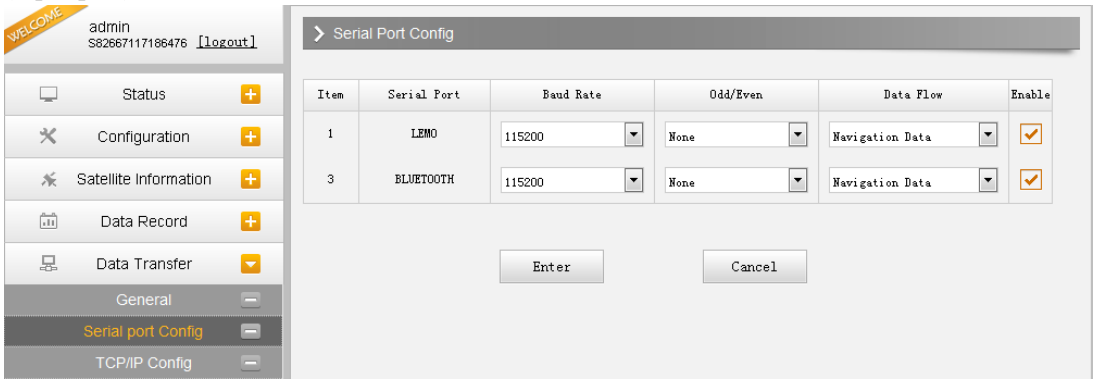
General

This page shows the service condition and the output contents of the ports, if the port item display in green, that means the port is being used, and the port is not used while the item display in red.



Serial port Config

This page is allowed to configure the baud rate, odd-even check and the data flow for serial port (5-pin port) and Bluetooth.



CAUTION: do not change the default value in this page for each item, if you want to change the settings, please contact with SOUTH technician for further support.

In the dropdown list of data flow, there shows 4 items for selection.

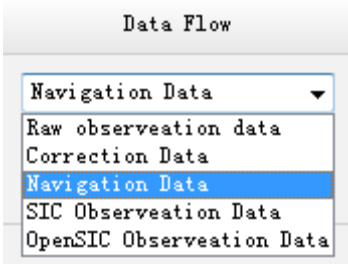
Raw observation data: This is the raw observation data straight from OEM board.

Correction Data: This is the correction data straight from OEM board.

Navigation Data: This is the navigation data output from receiver such as NMEA-0183, GSV, AVR, RMC and so on. It is configured in Data Flow Config page.

SIC Observation Data: This is the user-defined format observation data from SOUTH.

OpenSIC Observation Data: This is the open version of SOUTH user-defined format observation data for secondary development.

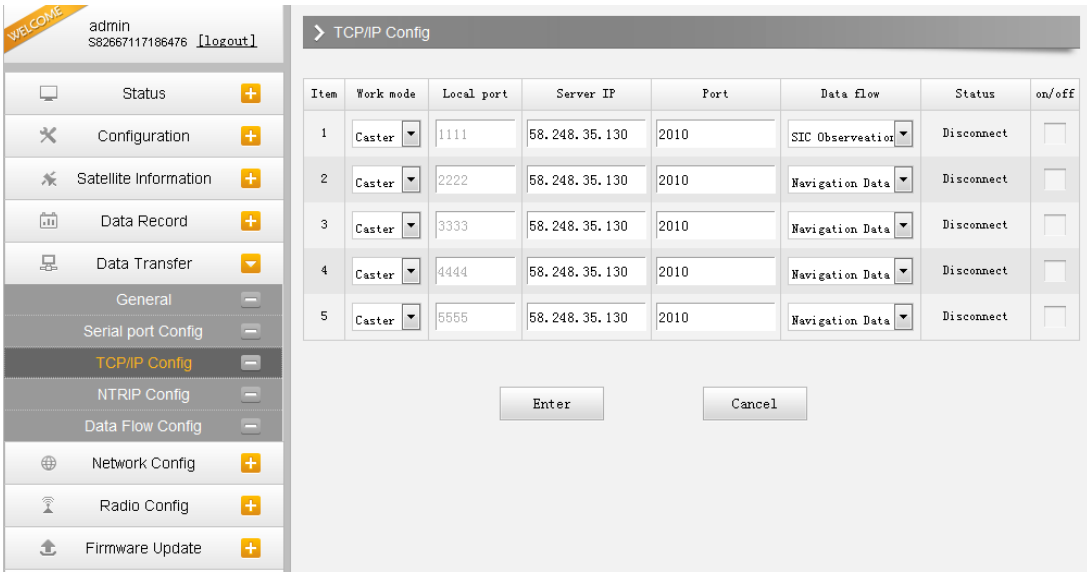


TCP/IP Config

This is used to configured the raw data or navigation data to be uploaded or transferred to a server. And there are Caster and Server working mode for this performance.

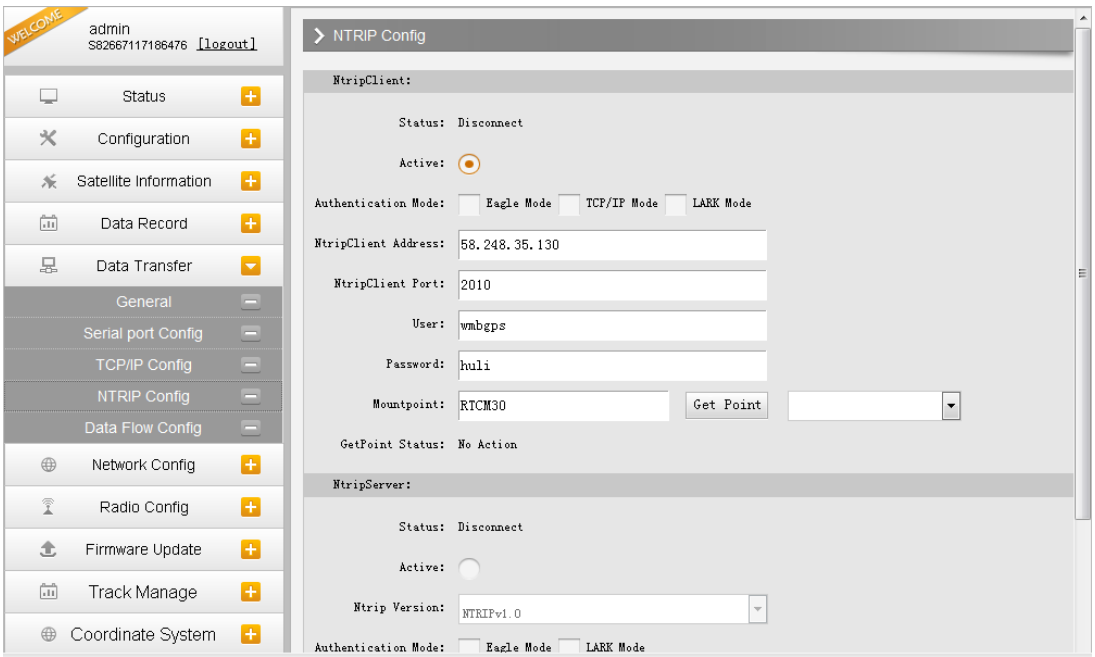
Caster: If this working mode is selected, G1S/C will be a client to upload the data to a specify server if it connects to the internet by GPRS connection with SIM card inserted. Input the specified IP and port for server, and the data format what is uploaded. Then users are able to see the uploaded data on server.

Server: Galaxy G1S/C will upload the data onto internet if server is selected, then users are able to obtain its dynamic data by accessing to G1S/C through the IP from receiver.



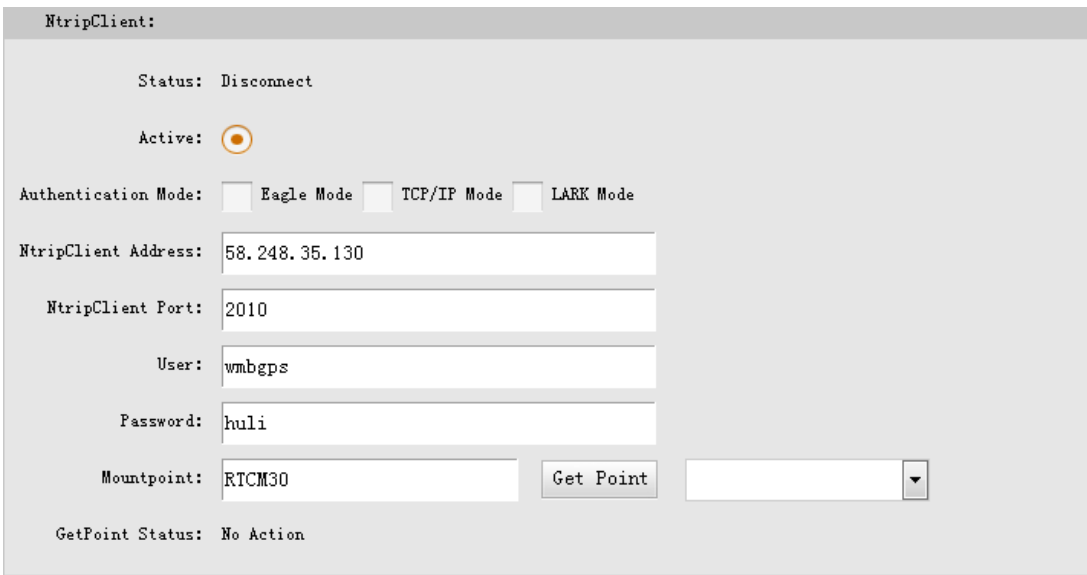
NTRIP Config

This is used to configure the NTRIP performance while receiver is going to connect to internet. Galaxy G1S/C supports complete NTRIP performance including NTRIP Client, NTRIP Server and NTRIP Caster.



NtripClient

This is the general used function for rover set in GPRS mode. At the field of NtripClient, the specify IP address, access port of reference station, as well as the assigned username and password shall be input for the NTRIP connection.



Status: This field will display the status of NTRIP connection, connect or disconnect.

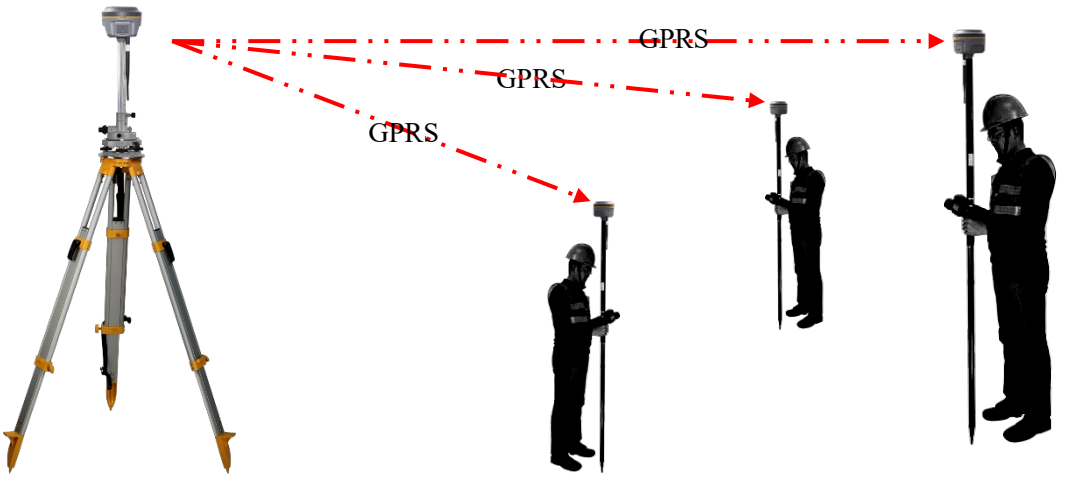
Active: Check on this circle to activate this function.

Authentication Mode: This includes Eagle Mode, TCP/IP Mode and LARK Mode.

① Eagle Mode is SOUTH standard mode, usually, this mode is used on the case of both Base and Rover are using GPRS mode.

② TCP/IP Mode is for private network use.

③ LARK Mode, which is a new technology on GPRS use, it is similar to GSM dial. This mode no longer rely on a CORS server that the corrections are transmitted by GPRS network. Besides, it is different from the feature of Caster.



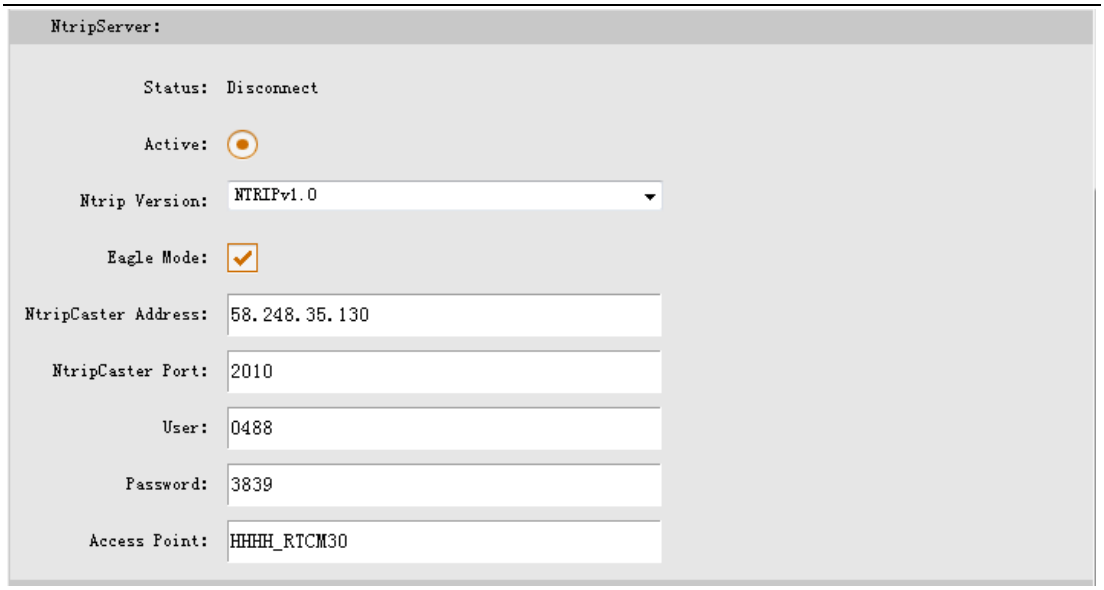
The other fields are the standard configuration for NTRIP connection, IP, port, username and password, after this information is input into the corresponding field, click on Get Point button to download the source table from server, then choose a proper mountpoint to access.

NtripServer

This configuration is used in Base+GPRS mode that Base station will transfer its correction onto the server as long as it connects to internet, then Rover can download the base's correction from server for use. Or use the LARK mode.

Ntrip Version: This field provides NTRIPv1.0 and NTRIPv2.0 for optional.

Access Point: This field is allowed to user-defined the correction format which base will transfer to the server, such as HHHH_RTCM30

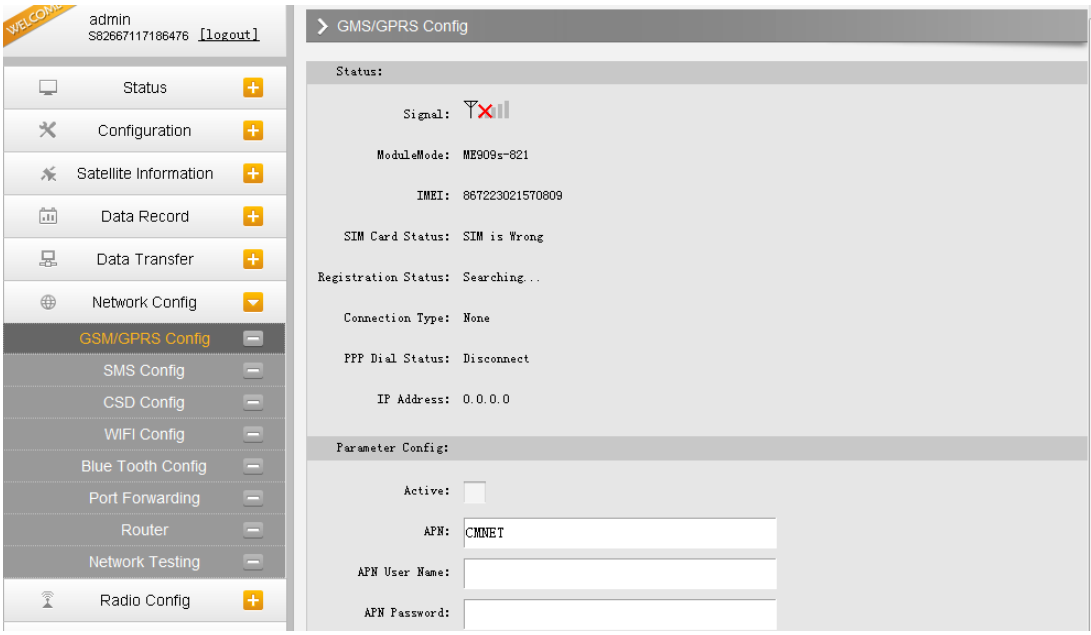


Operation on LARK

a) Setup the Base station on a known position or an unknown position.

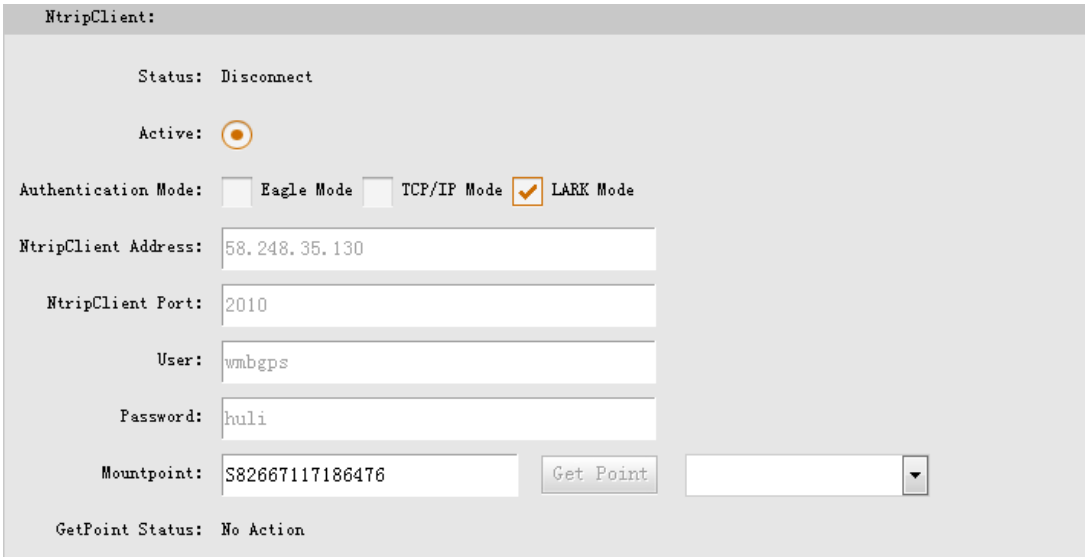
b) Insert SIM cards into both Base and Rover receiver

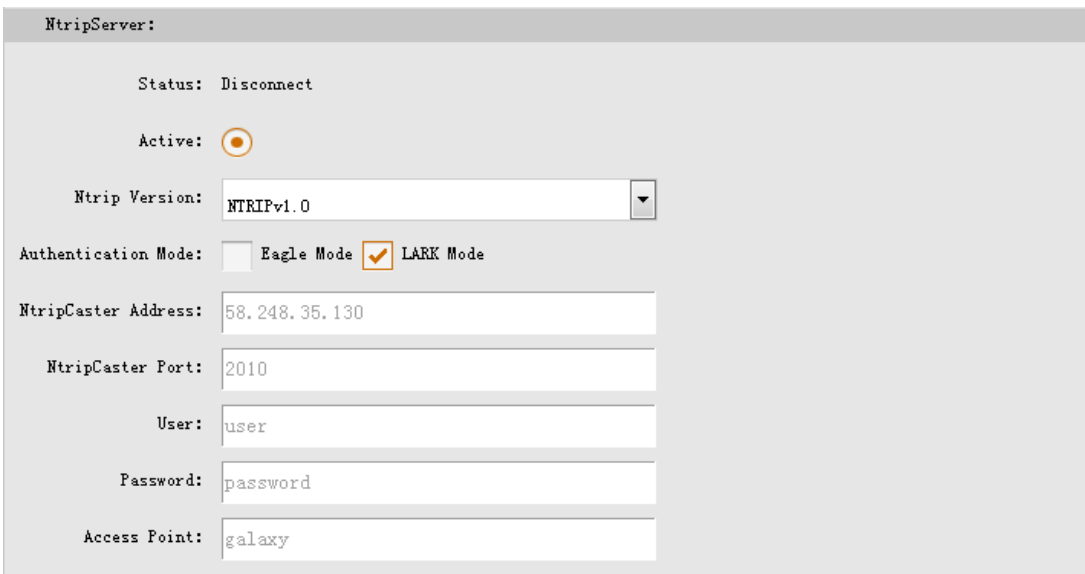
c) Input the correct APN and the assigned username and password on Network Config page, then make sure both of them have connected to internet.



d) Check the box of LARK for both Base and Rover, then we can notice that after checking LARK for Base, all the fields turn into grey and unable to input anything, and there is only Mountpoint field available for Rover.

e) The key step is that input the **Serial Number** of Base into Mountpoint field, then click "Enter" button to confirm all the settings.



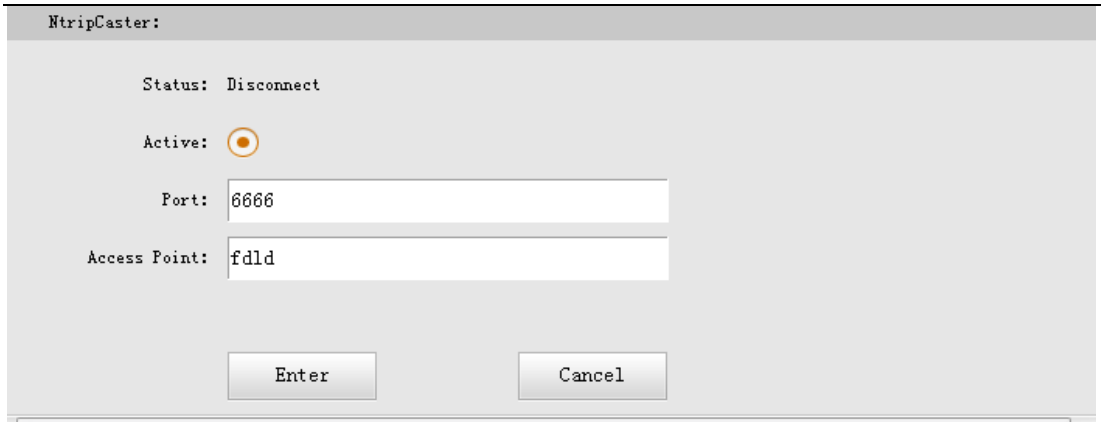


NtripCaster

This feature is finally realized on Galaxy G1S/C, the receiver is equivalent to a CORS system that it generates and broadcasts the user-defined correction for rover if G1S/C connects a static IP address.

Port: This is the specify port for the access.

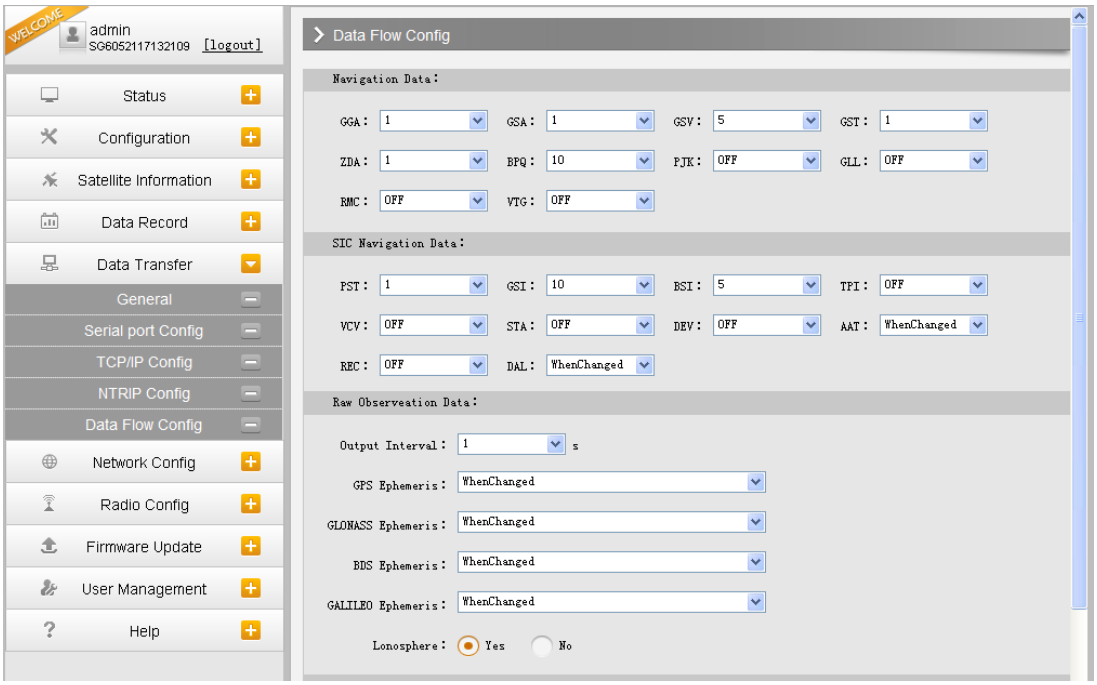
Access Point: This is mountpoint which can be user-defined.



Data Flow Config

In this page, users can optionally to configure the content and the update rate of data flow that to output or not to output what kind of data format.

Click on the dropdown list for each data format to define the update rate



§4.3.6 Network Config

The “Network Config” is able to configure the ways and the contents for internet access of G1S/C. GSM/GPRS Config, CSD Config, Bluetooth Config, Port Forwarding, Router and Network Testing are under the list of Network Config.

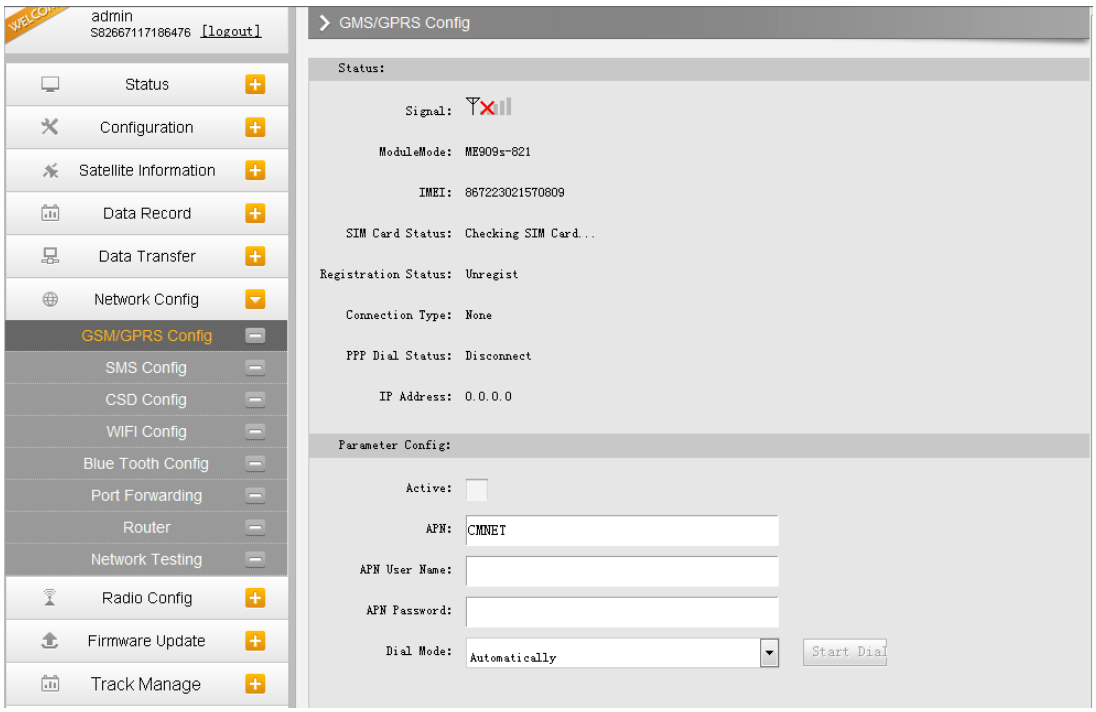
GSM/GPRS Config

In this page, all the information of receiver under GPRS mode will be displayed including the

hardware information and dialing status.

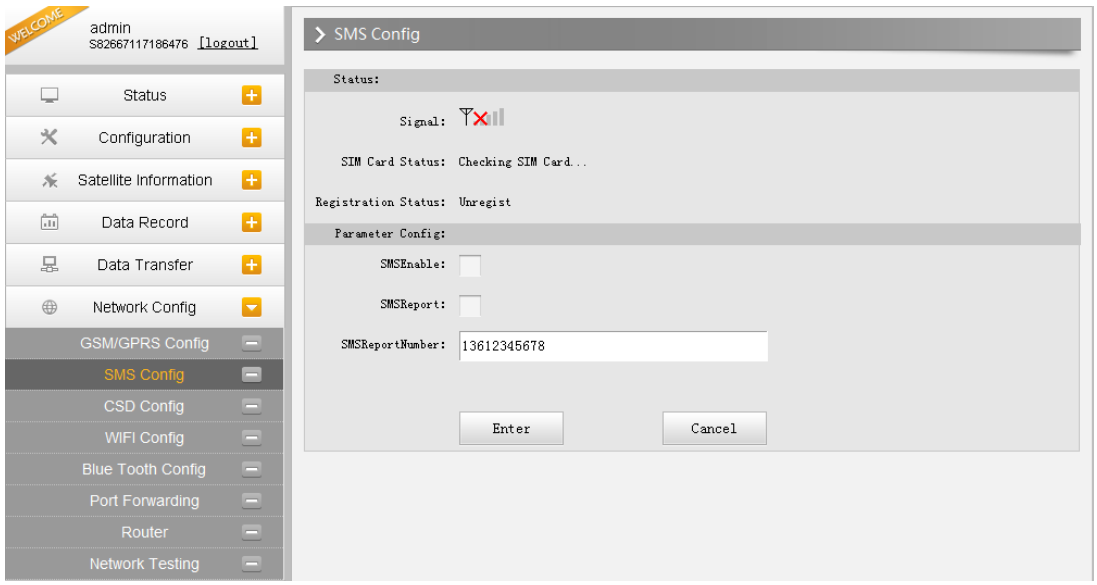
Status: The dialing status and hardware information are displayed in this field that users can intuitively to view the signal of network, module model and the IMEI number of the module.

Parameter Config: The parameters of SIM card are input in this field including APN, assigned username and password, dial mode.



MSM Config

On this configuration dialog, input a phone number into the blank, G1S/C will send text message onto the phone which number is written.



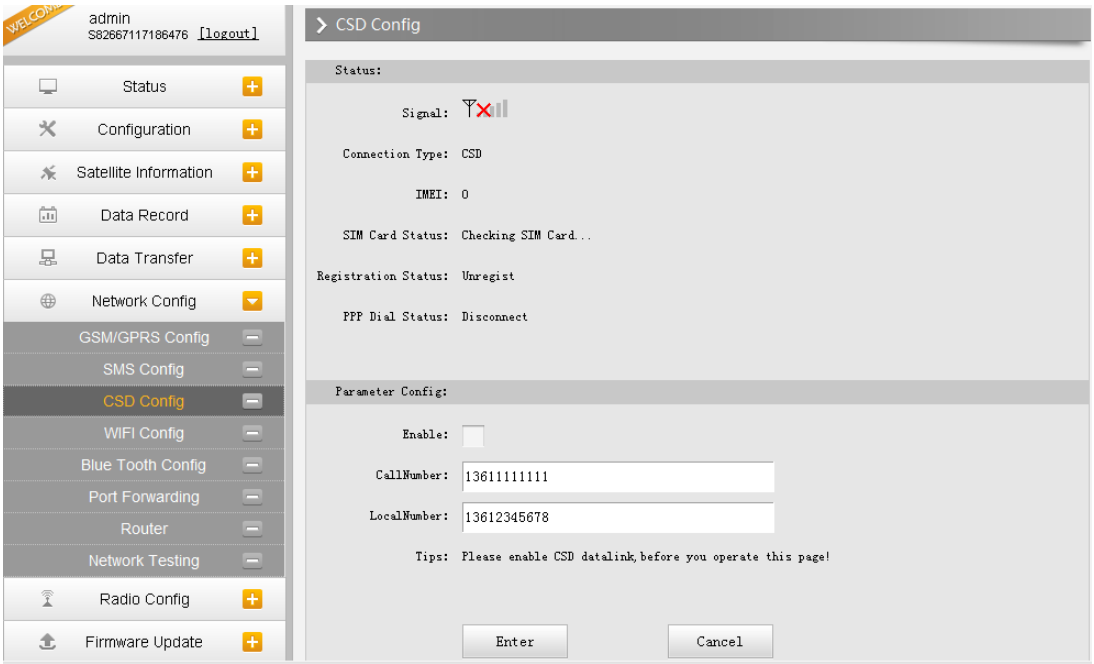
CSD Config

CSD is the meaning of direct dial between Base and Rover with SIM card inserted (the CSD function should be activated on local SIM card), this function is mainly used in the area where there is very poor internet signal coverage.

Status: This field displays the dialing status when CSD is used on G1S/C.

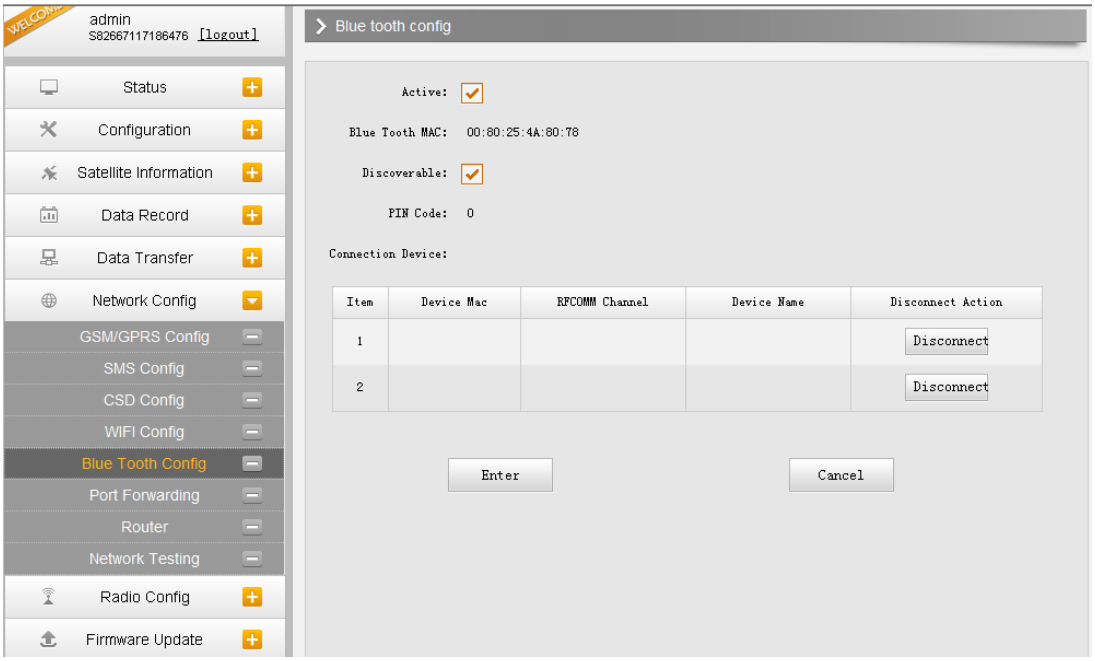
Parameter Config: To enable the CSD function with checking the box of Enable option in this field, then input the phone number for Rover and Base in CallNumber and LocalNumber.

Tips: please choose CSD as datalink for receiver in General Config.



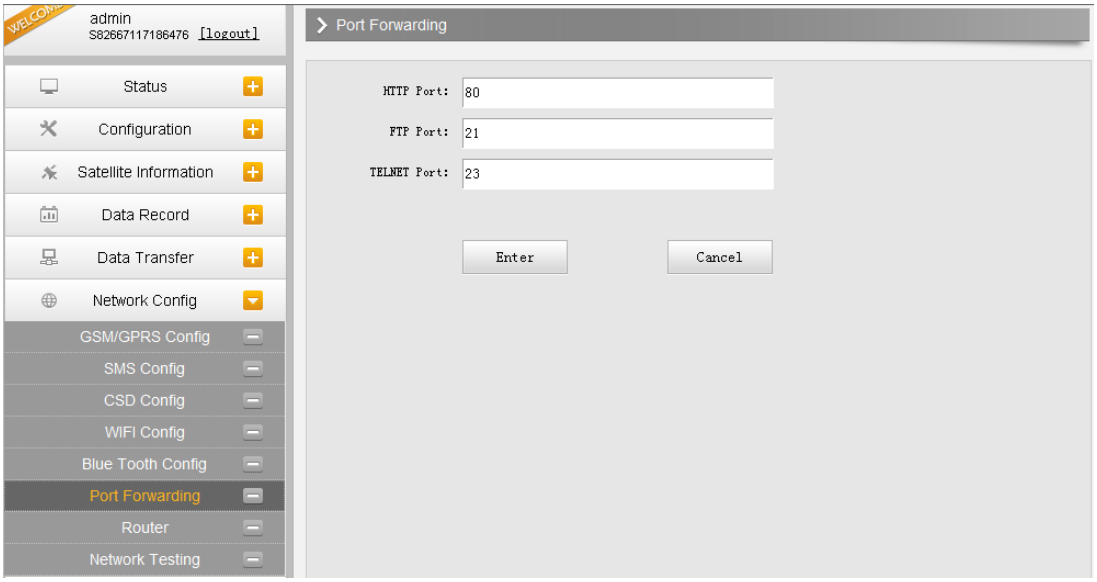
Bluetooth Config

In this page, users can view the information and connection status of Bluetooth, such the MAC of Bluetooth, discoverable or not, the PIN code, and the connection devices in following table.



Port Forwarding

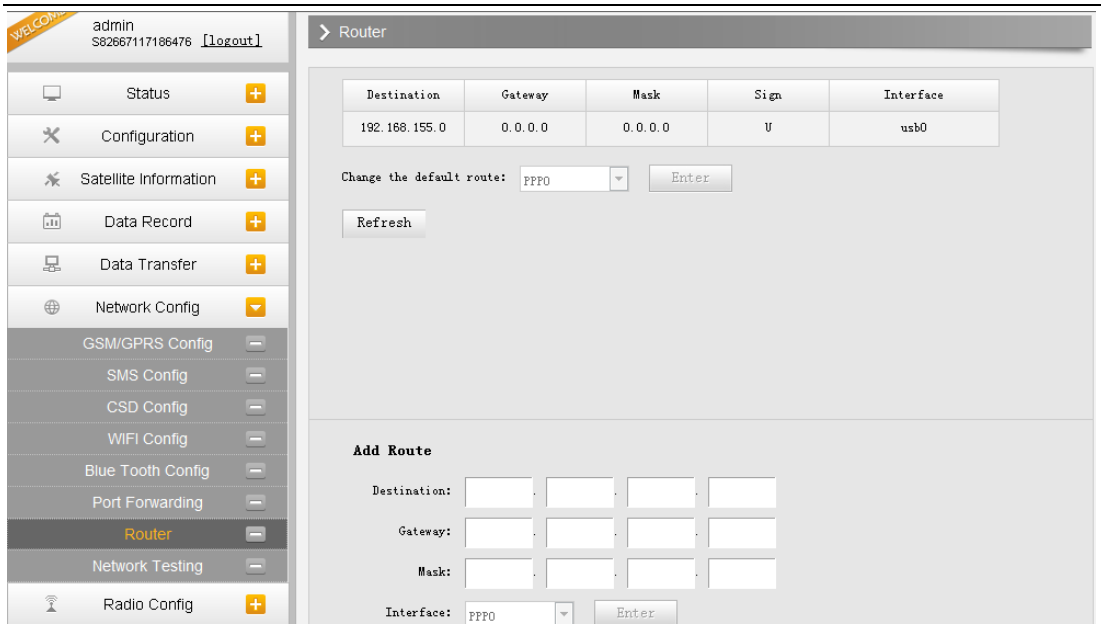
This page is mainly used to view and configure the internet transmission port for G1S/C, customize and debug receiver.



NOTE: Usually we will keep the default setting in this page, if you would like to modify it, please contact with SOUTH technician for more supports.

Router

This is mainly used to view and configure the parameters for router, only under the condition of customize and debug receiver.



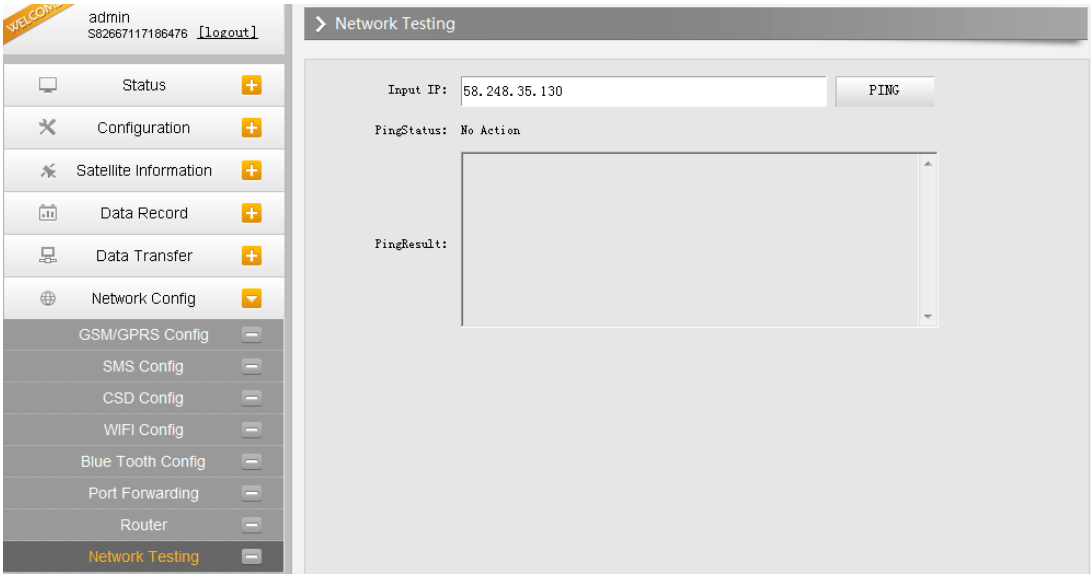
NOTE: Usually we will keep the default setting in this page, if you would like to modify it, please contact with SOUTH technician for more supports.

Network Testing

This function is mainly used to test network status for G1S/C after logging on the internet.

How to do:

Input the IP address which G1S/C already connected, then click PING button, the testing information will be displayed in the following window.

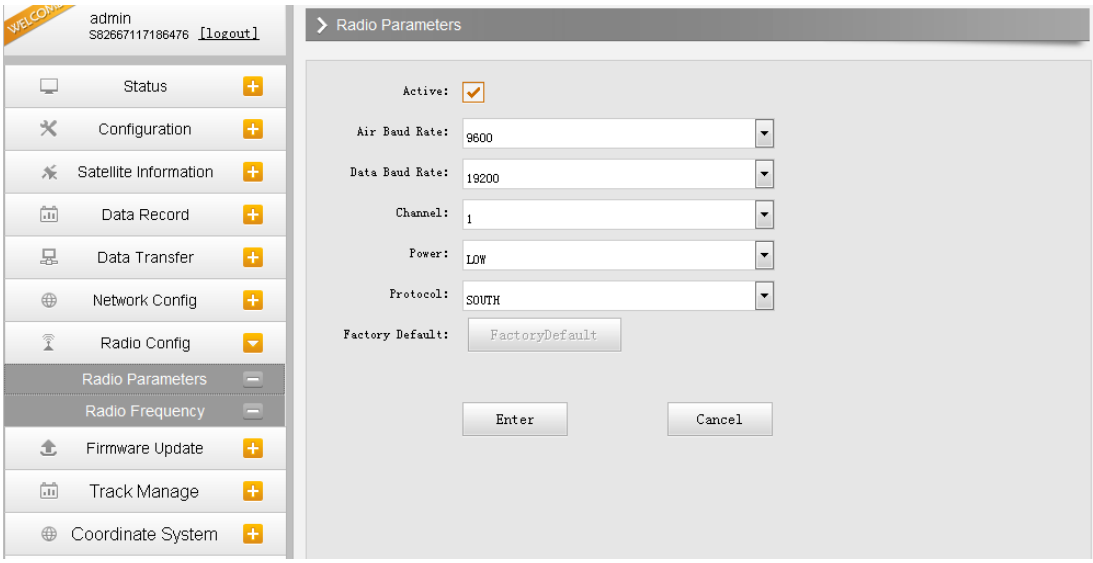


§4.3.7 Radio Config

As the name implies, the parameters of radio can be done in "Radio Config", it is divided into Radio Parameter and Radio Frequency.

Radio Parameter

This page is mainly used to configure the parameters for internal radio module of Galaxy G1S/C.



Air Baud Rate: This represents the data transmission rate in the air of internal radio, the higher value, the bigger of data size transmitted per second, usually keep the default setting.

Data Baud Rate: This represents the rate of data transmission port of internal radio, this rate should be the same in both Base and Rover. In general, the data baud rate of SOUTH radio module has been unified to be 19200, keep it as default.

Channel: This is the communication channels for internal UHF, the value of the channel must be the same both in Base and Rover.

Power: This appears only in Base mode, the radio transmitting power is allowed to define in High, Middle or Low power.

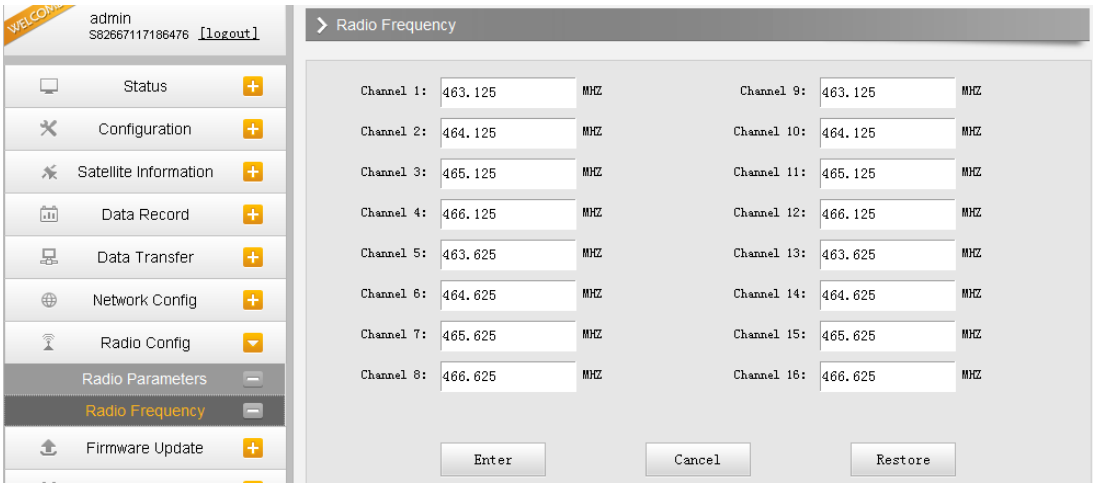
Protocol: This is radio communication protocol for data transmission, SOUTH and TRIMTALK are optional in this page and SOUTH is the default setting, if it is changed, Base and Rover must use the same protocol for communication.

Factory Default: Click this button to restore the factory default for internal UHF module.

Radio Frequency

For Galaxy G1S/C, the powerful internal radio module supports much more radio channels apply to the legal frequency in different countries or areas.

There are 16 radio channels listed in this page after clicking on radio frequency. Users are able to change the frequency freely in the channel spacing, click Restore button to bring the frequency of each channel back to default setting.

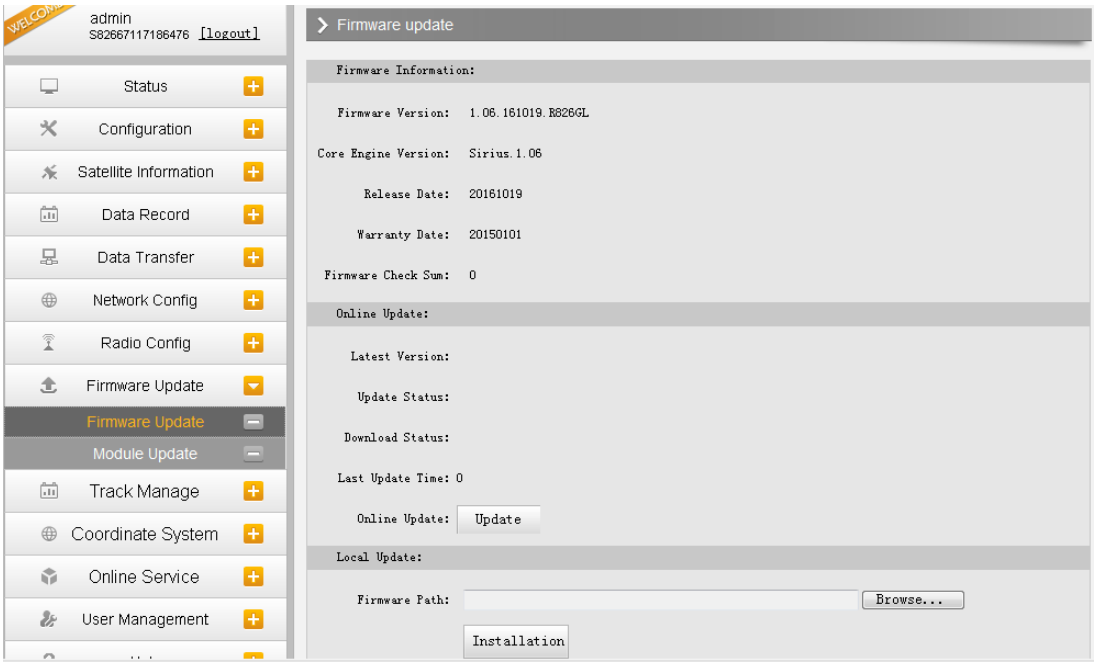


§4.3.8 Firmware Update

Update the latest firmware for receiver or for corresponding modems can be done in “Firmware Update”.

Firmware Update

This page displays all the information of the firmware which current installed on G1S/C, and allows to update the latest version firmware for receiver. To get latest version firmware please contact with SOUTH technician.

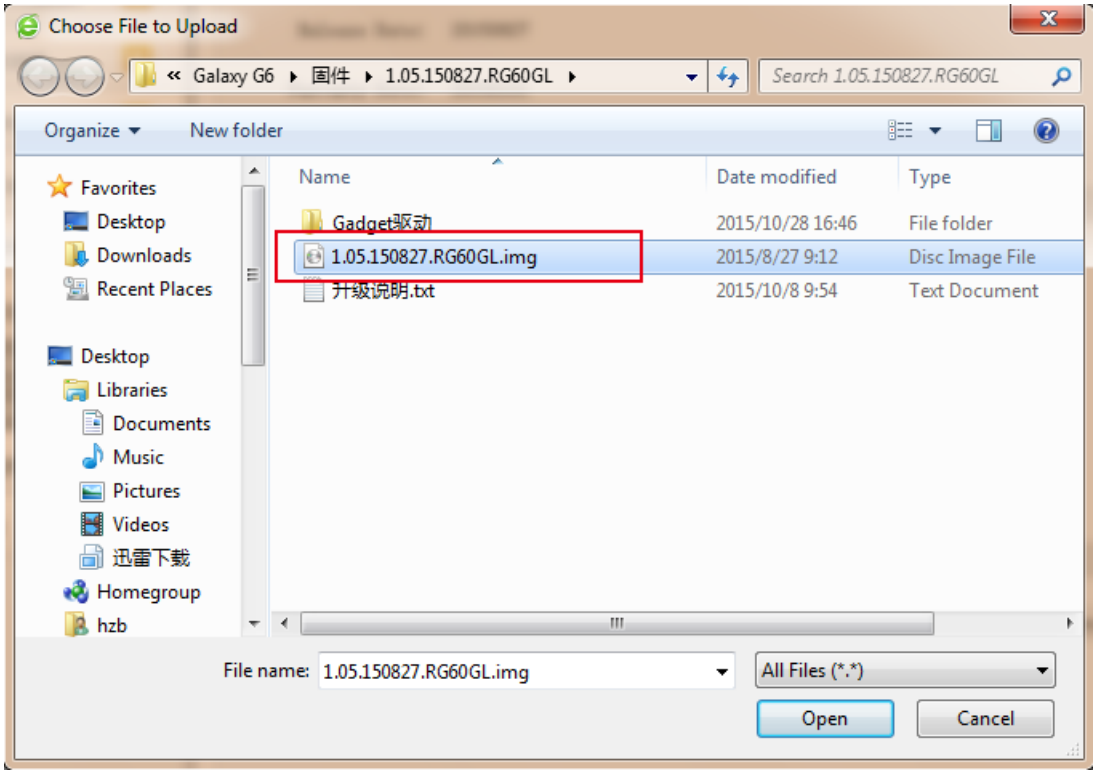


Online Update: Galaxy G1S/C supports to update the firmware online anytime if there is something update or optimized.

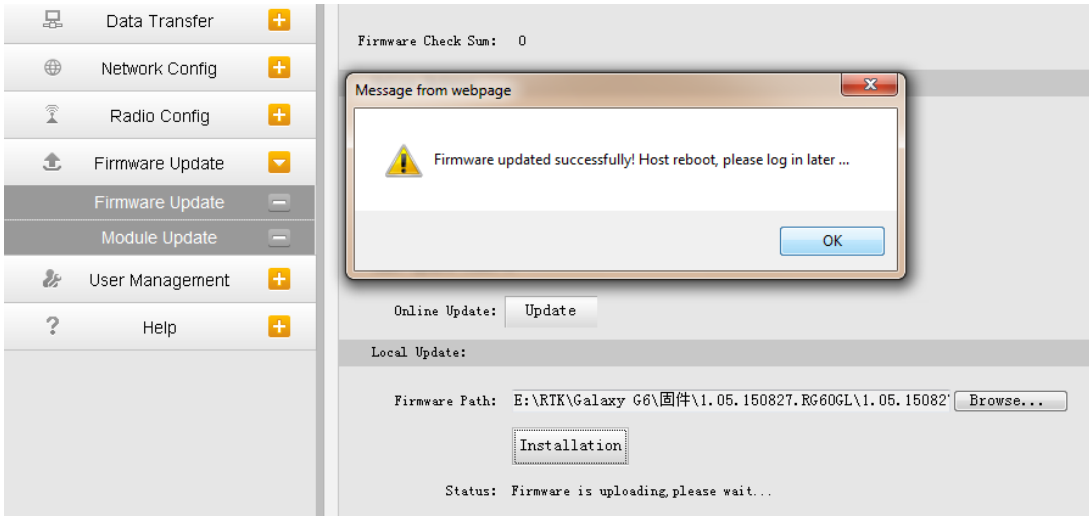
Local Update: Update the latest firmware by using a firmware file.

How to upgrade the firmware with Local Update

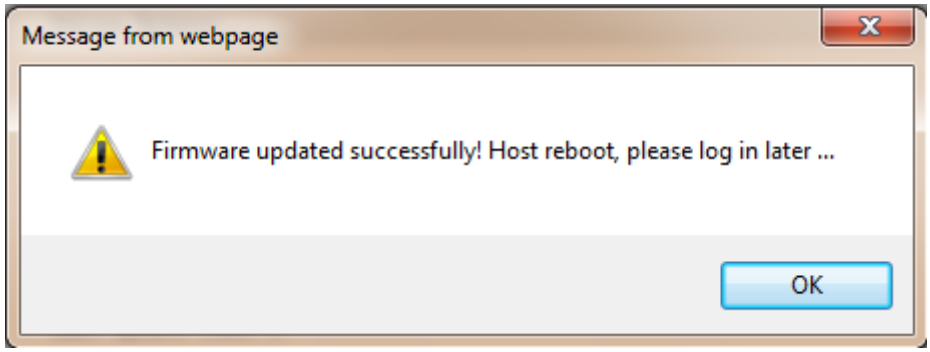
a) Click on “Browse” button to load firmware file (Please take in mind that the firmware is ended with .img as the extension name).



b) And then click “Installation” button to start upgrading.



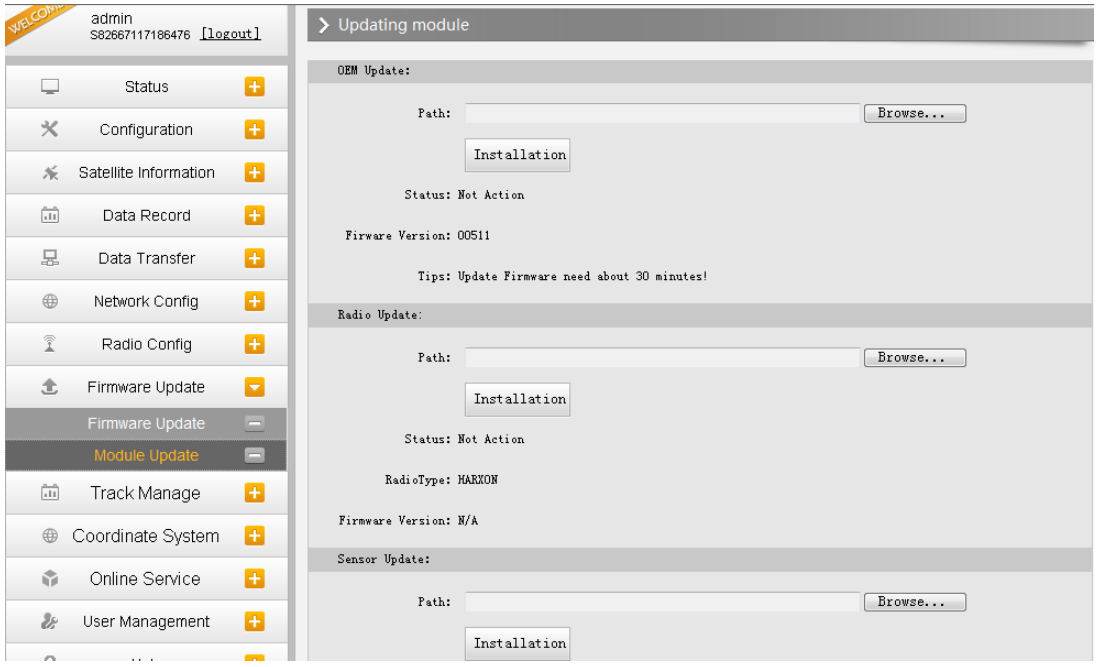
c) After the firmware is completed upgrading, a dialog will appear saying “Firmware updated successfully! Host reboot, please log in later…”, then the receiver will restart automatically.



SPECIAL REMIND: Galaxy G1S/C doesn't support to update the firmware with the help of INstar program any more, in the future, update the firmware for Galaxy G1S/C shall be done through the Web UI.

Module Update

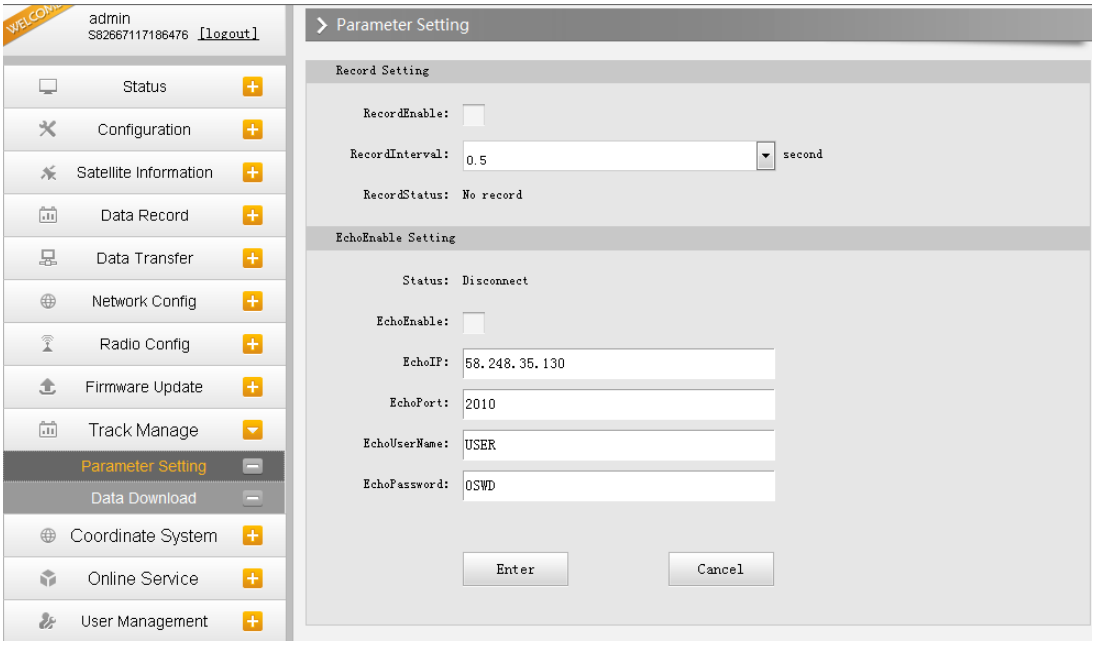
This page is used to update the firmware for corresponding modem such as OEM board, radio module and sensor.



§4.3.9 Track Manage

Galaxy G1S/C now supports to record the track while doing measurement, and upload the data onto the server.

Parameter Setting



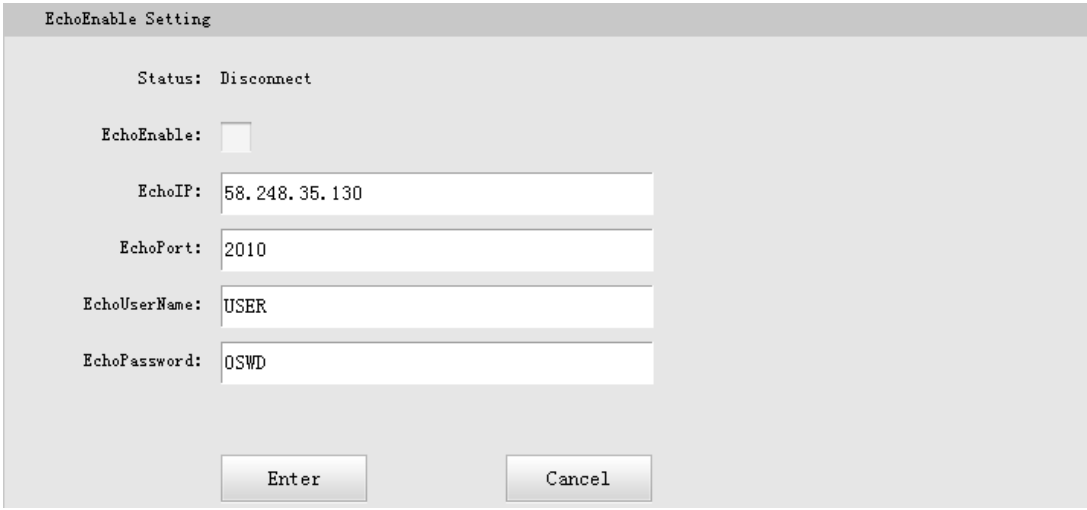
Record Setting

Check on the box of "RecordEnable" to activate track recording function, and choose a proper recording interval in dropdown list of "RecordInterval".



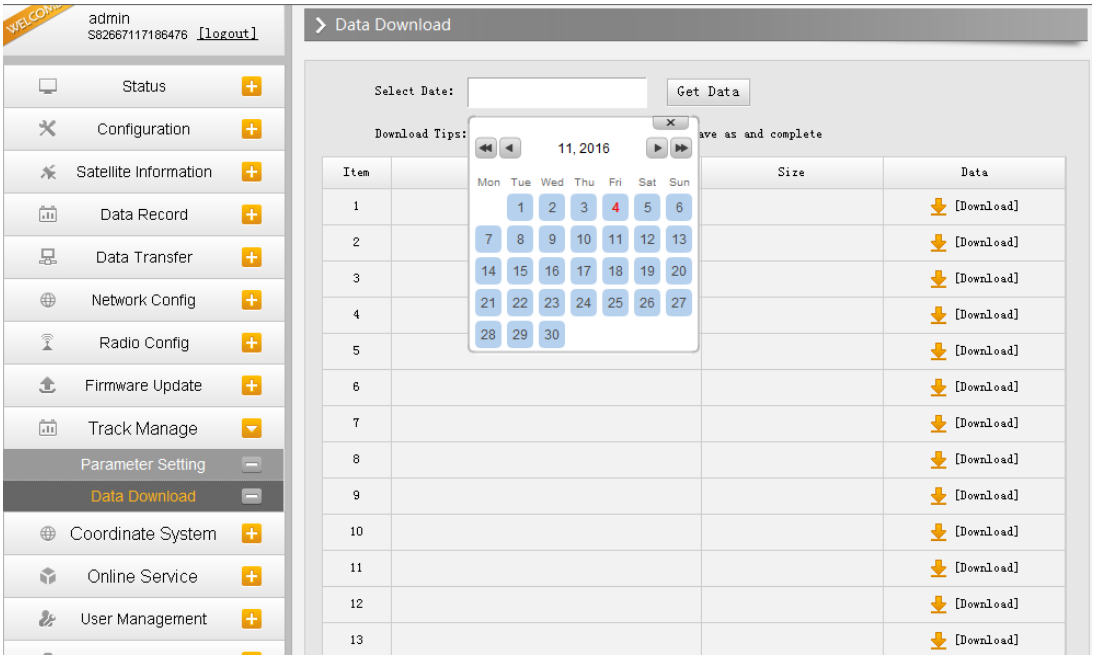
EchoEnable Setting

This configuration dialog is used to upload the recording data to a server in real-time.



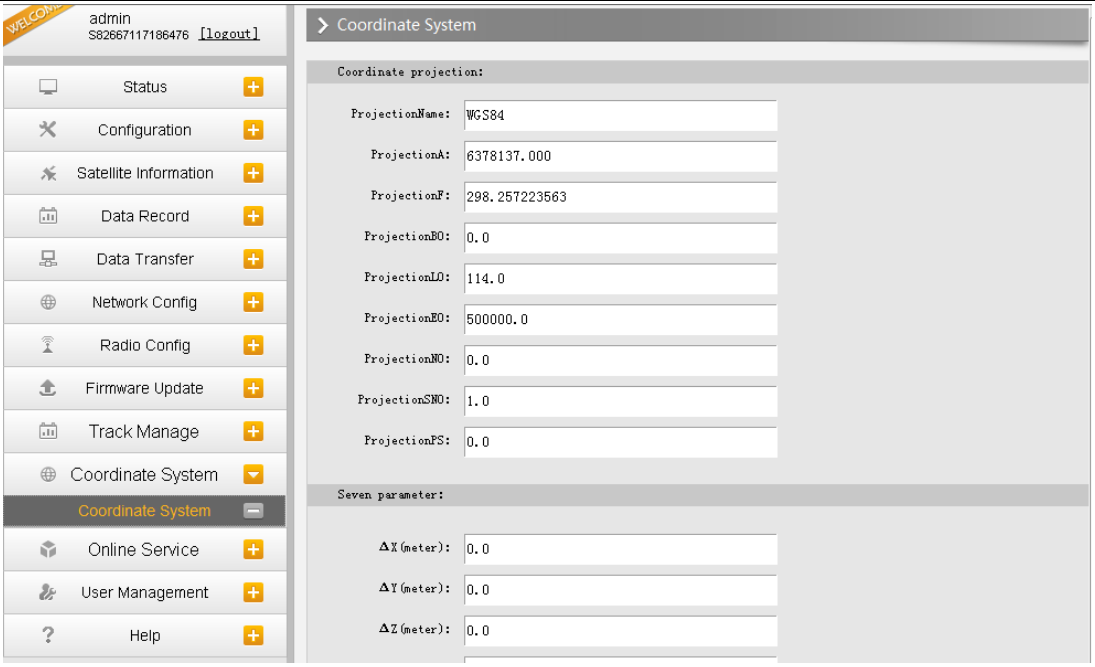
Data Download

On this page, users can download the track data file from receiver. Choose the recording date and click “Get Data” to load all the data files recorded at that day, then choose the files and click download button.



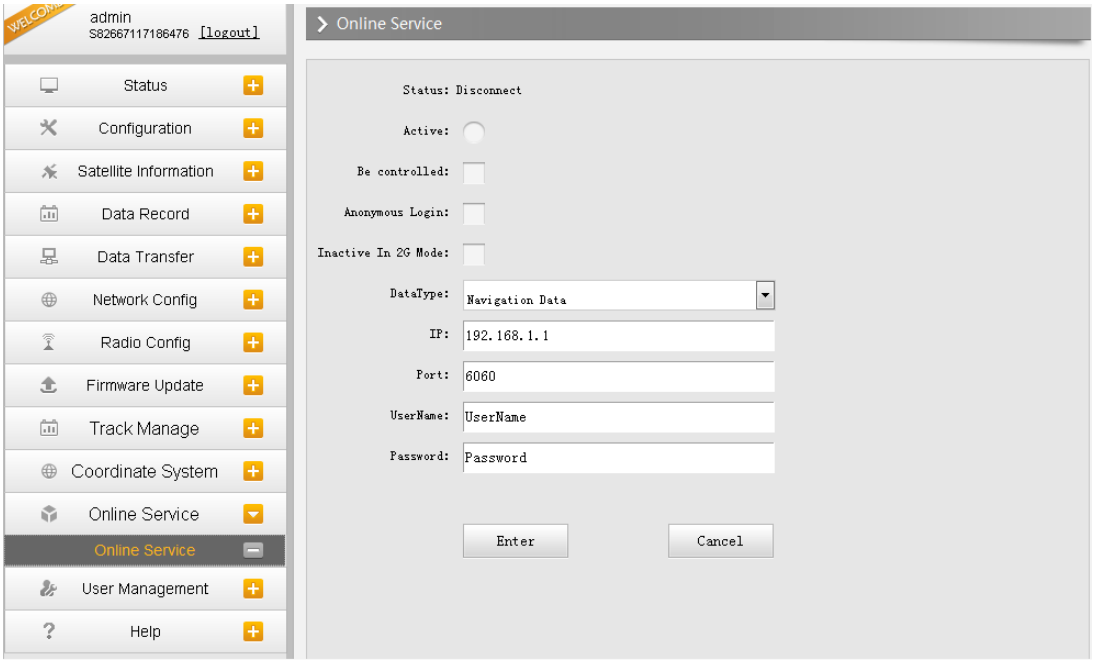
§4.3.10 Coordinate System(reserve)

G1S/C allows users to setup the local coordinate system on internal web UI management. The instrument would output the local coordinates according to this coordinate system.



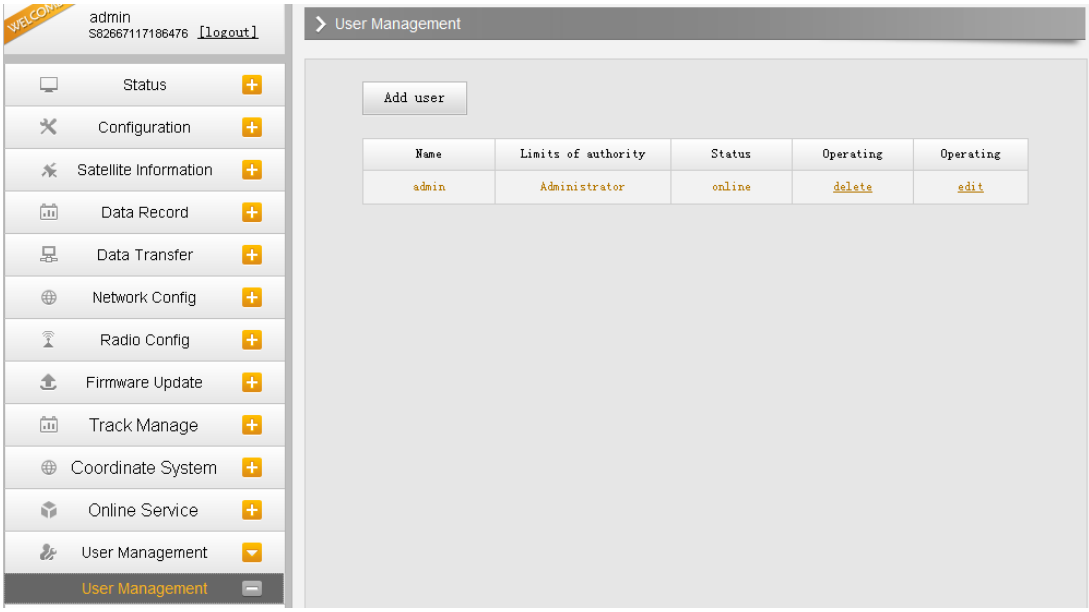
§4.3.11 Online Service(reserve)

This function is to upload the data onto a server real-time, including Navigation data, raw observation data, correction data, SIC observation data and open SIC observation data.



§4.3.12 User Management

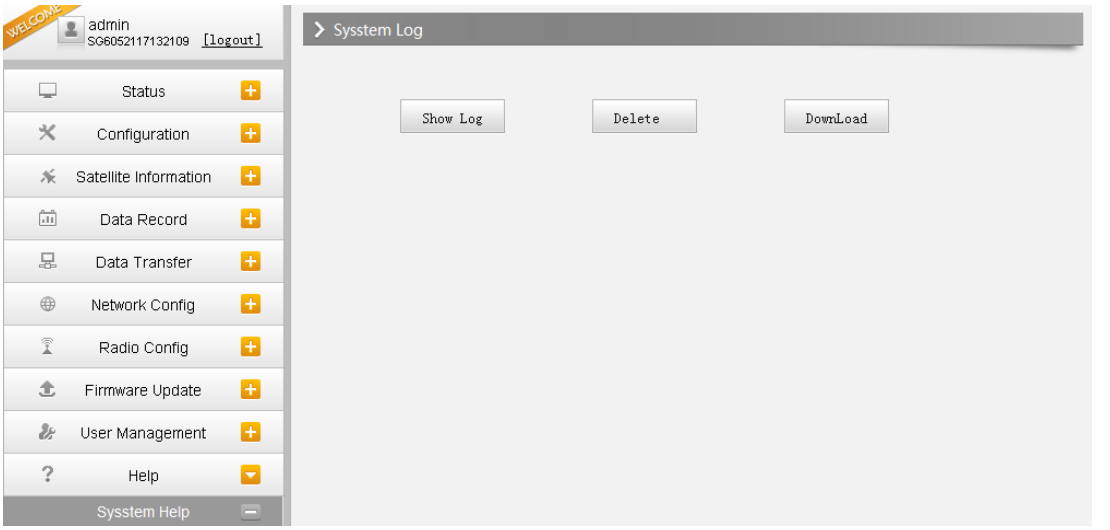
This page is used to manage the authority of login Web UI for users, including the username, password and add users.



§4.3.13 Help

In this page, users can get help and check the log book of receiver (the log book can help to backtrack the working status of receiver).

NOTE: Only the administrator can modify any parameters for receiver and manage users, and the ordinary users only have the right to view the relative parameters.


admin
SG6052117132109 [logout]
Status
Configuration
Satellite Information
Data Record
Data Transfer
Network Config
Radio Config
Firmware Update
User Management
Help
Sysstem Help
Sysstem Log
Show Log
Delete
DownLoad

Appendix A Galaxy G1S/C main technical specifications

Signals Tracked Simultaneously	
Channels	220/440 Channels
BDS	B1, B2, B3
GPS	L1C/A, L1C, L2C, L2E, L5
GLONASS	L1C/A, L1P, L2C/A, L2P, L3
SBAS	L1C/A, L5 (Just for the satellites supporting L5)
GALILEO	GIOVE-A, GIOVE-B, E1, E5A, E5B
	QZSS, WAAS, MSAS, EGNOS, GAGAN, SBAS
GNSS Features	
Positioning output rate	1Hz~50Hz
Initialization time	< 10s
Initialization reliability	>99.99%
Positioning Precision	
Code Differential GNSS Positioning	Horizontal: ± 0.25 m + 1 ppm
	Vertical: ±0.50 m + 1 ppm
SBAS positioning accuracy	typically<5m 3DRMS
Static GNSS Surveying	Horizontal: ±2.5 mm + 0.5 ppm
	Vertical: ±5 mm + 0.5 ppm
Real-Time Kinematic Surveying	Horizontal: ±8 mm + 1 ppm
(Baseline<30km)	Vertical: ±15 mm + 1 ppm
Network RTK	Horizontal: ±8 mm + 0.5 ppm
	Vertical: ±15 mm + 0.5 ppm
RTK initialization time	2~8s
Physical	
Dimension	12.9cm(Diameter)×11.2cm(Height)
Weight	970g
Material	Magnesium aluminum alloy shell
Environmental	
Operating	-45℃~+60℃
Storage	-55℃~+85℃
Humidity	100% Non-condensing
Waterproof/Dustproof	IP67 standard, protected from long time immersion to depth of 1m
	IP67 standard, fully protected against blowing dust
Shock and Vibration	Withstand 3 meters pole drop onto the cement ground naturally
	Withstand 40G 10 milliseconds sawtooth wave impact test

Electrical	
Power Consumption	2W
Power Supply	9-25V DC, overvoltage protection
Battery	Rechargeable, removable Lithium-ion battery
Battery Life	Single battery: 16h (static mode)
	10h (internal UHF base mode)
	12h (rover mode)
Communications	
I/O Port	5PIN LEMO external power port + RS232
	7PIN LEMO +external USB(OTG)+Ethernet
	1 UHF/GPRS antenna interface
	SIM card slot
Wireless Modem	Integrated internal radio receiver and transmitter, 1W/2W/3W optional
	External radio transmitter 5W/25W
Frequency Range	410-470MHz
Communication Protocol	TrimTalk450s, TrimMark3, PCC EOT, SOUTH
Cellular Mobile Network	WCDMA3.5G network communication module, downward compatible with GPRS/EDGE
	customized CDMA2000/EVDO 3G and TDD-LTE/FDD-LTE 4G module
Double Module Bluetooth	BLE Bluetooth 4.0 standard, support for smart device connection
	Bluetooth 2.1 + EDR standard
NFC Communication	Realizing close range (shorter than 10cm) automatic pair between Galaxy G1S/C and controller (controller equipped NFC wireless communication module needed)
External Devices	Optional external GPRS/EDGE dual-mode communication module, switchable; allow to connect external WLAN card
Data Storage/Transmission	
Storage	8GB SSD internal storage
	Automatic cycle storage (The earliest data files will be removed while the memory is not enough)
	Support external USB storage
	The customizable sample internal is up to 50Hz
Data Transmission	Plug and play mode of USB data transmission
	Support FTP/HTTP data download
Data Format	Differential data format: CMR+, sCMRx, RTCM 2.1, RTCM 2.3, RTCM 3.0, RTCM 3.1, RTCM 3.2
	GPS output data format: NMEA 0183, PJK plane coordinates, Binary

	code, Trimble GSOF
	Network model support: VRS, FKP, MAC, fully support NTRIP protocol
User Interaction	
Operaing system	Linux
Buttons	One-button operation, visual operation, convenient and efficient
Indicators	Convenient to view and understand mode settings and status
Webserver	Allows to control and monitor the receiver in webserver freely to configure receiver
Voice guide	Status and operation voice guide, support to customize local language, Chinese/English/Korean/Spanish/Portuguese/Russian/Turkish supported
Open platform	The OpenSIC observation data format and interative interface support secondary development

Table 4-1 specifications

Appendix B GDL-20 radio technical specifications

General specifications	
Frequency bands	450-470MHz
Channel interval	0.5MHz
Channel transfer rate	19200bps
Channel number	8
Frequency Stability	±2.0ppm
Modulation mode	GMSK
Antenna impedance	50Ω
Ambient temperature	-25°C～60°C
Humidity	10-90% relative humidity, non-condensing
Receiver Specifications	
Receiver sensitivity	≤0.25μV(12dB SINAD)
Adjacent Channel Selectivity	≥65dB
Modulation signal frequency deviation	≤±5.1KHz
Intermodulation Rejection Ratio	≥65dB
Audio distortion	≤3%
Transmitter indicators	
RF output power	10W/25W Switchable
Adjacent Channel Rejection Ratio	≥65dB
Spurious frequency components	≤4μW
Residual FM	≤-35dB
Remaining AM	≤2%
Carrier frequency modulation mode	TWO PIN
RS-232 interface	

rate	19200bps can be set
Data stream	1 start bit, 8 data bits, no parity (parity bit can be set), 1 stop bit
power	DC power supply
voltage	12-15V, the typical of 13.8V, the voltage of the power supply will affect the size of the RF power of the transmitter
Power consumption	
Receiver standby current	≤100mA
The machine operating current of the transmitter	8A
voltage	13.8V
power	15W/25W

Table 4-2

Appendix C Technical Terms

Ambiguity: unknown quantity is the integer number of cycles of the carrier phase measured from the satellite to the receiver.

Baseline: The connection line of the two measurement points, on which to receive GPS signals and collect observation data simultaneously.

Broadcast ephemeris: message released by the satellite demodulator satellite orbit parameters.

SNR (Signal-to-noise ratio): an endpoint signal power to noise power ratio.

Cycle skipping: interfere loop skips a few cycles from a balanced point, and stabilize in the new equilibrium point, this make the phase integer number of cycles to generate an error.

Carrier: As the carrier, Frequency, amplitude or phase modulation of the modulated wave by a known reference value.

C / A code: GPS coarse / acquisition code, modulate the pseudo-random binary code for the 1023 bit duplex, the bit rate of which is 023MHz, and code repetition period of 1ms.

Difference measurement: GPS measurements employ cross-satellite cross-receiver and cross-epoch.

Difference Positioning: the method of determining the relative coordinates between two or more receiver by tracking the same GPS signal.

Geometric dilution of precision: Describe the contribution of satellite geometry errors factor in dynamic positioning

Eccentricity: $e = \sqrt{\frac{a^2 - b^2}{b^2}}$ where a, b of the semi-major axis and semi-minor axis.

Ellipsoid: mathematical graphics formed when an ellipse moves around the minor axis of rotation in Geodetic Survey.

Ephemeris: the position of celestial bodies over time parameters.

Flattening: $f = \frac{1}{a}(a - b) = 1 - \sqrt{(1 - e^2)}$

a is the semi-major axis, b is the semi-minor axis, e is the eccentricity.

Geoid: similar to the mean sea level and extends to the mainland special planes. Geoid everywhere perpendicular to the direction of gravity.

Ionosphere delay: delay of radio waves through the ionosphere (non-uniform dispersion medium)

L-band: The radio frequency range of 390-1550MHz.

Multipath error: the positioning error caused by the interference between two or

more radio signal propagation path.

Observing session: the use of two or more receivers at the same time to collect GPS data period.

Pseudo Range: GPS receiver in the time required to copy the code aligned with the received GPS code offset and multiplied by the speed of light to calculate the distance. This time offset is the difference between the signal reception time (time series of the receiver) and the signal emission time (satellite time series).

Receiver channel: GPS receiver RF mixer and IF channel, can receive and track satellites two carrier signals.

Satellite configuration: the configuration status of the satellite with respect to a specific user or a group of users within a specific time.

Static position: do not consider the point of measurement of the movement of the receiver.

FCC Statement

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.

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 is in compliance with the essential requirements and other relevant provisions of Directive 1999/5/EC.

Use the GNSS RECEIVER in the environment with the temperature between -45°C and 60°C.

CAUTION: RISK OF EXPLOSION IF BATTERY IS REPLACED BY AN INCORRECT TYPE. DISPOSE OF USED BATTERIES ACCORDING TO THE INSTRUCTIONS.

The device complies with RF specifications when the device used at 0cm from the user's body

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