

Taller: Instalación y operación de estaciones GNSS permanentes. ¿Cómo incluirlas en SIRGAS-CON?

Etapas básicas de la configuración de los receptores

*Workshop “Installation and operation of permanent
GNSS stations. How to include them in SIRGAS-
CON?”*

Basic steps about receivers configuration



1. SIRGAS Technical guidelines
2. What do you need for receiver configuration
3. First step: communication with receiver
4. Network configuration (IP, gateway, netmask)
5. Receiver configuration and data file
6. Receiver, Antenna and Radome specifications
7. Security
8. How to save and send data- Session and data configuration
9. Data configuration
10. Receiver Configuration: Reference Station, Tracking and
11. Real time configuration

The objective is coordinate with the various agencies that operate GNSS tracking networks, which are involved in the collection and distribution of GNSS observational data and information, their configurations (instrumentation, monumetation, communications, etc), and data flow².



SIRGAS Technical guidelines – <https://sirgas.ipgh.org/en/resources/guidelines/>

- **Guidelines for the Coordination of the SIRGAS Continuously Operating Network (SIRGAS-CON)**
Responsibilities: Station Operators, data Centers and Analysis Centers
- **Guidelines for the installation, operation and registration of SIRGAS-CON stations**
~~Station Installation and Operation Guidelines~~
Requirements for data flow
Format and data Distribution
- **Guidelines for SIRGAS Analysis Centers**

What do you need for receiver configuration

- (1) IP number, Gateway, netmask
- (2) Security: Create a receiver account/password
- (3) IP number, account and password from the server of data center
- (4) How to organize data: Directory structure in data server
- (5) Antenna model, IGS name and antenna height
- (6) Station coordinates (opcional if not real time)

First step: communication with receiver

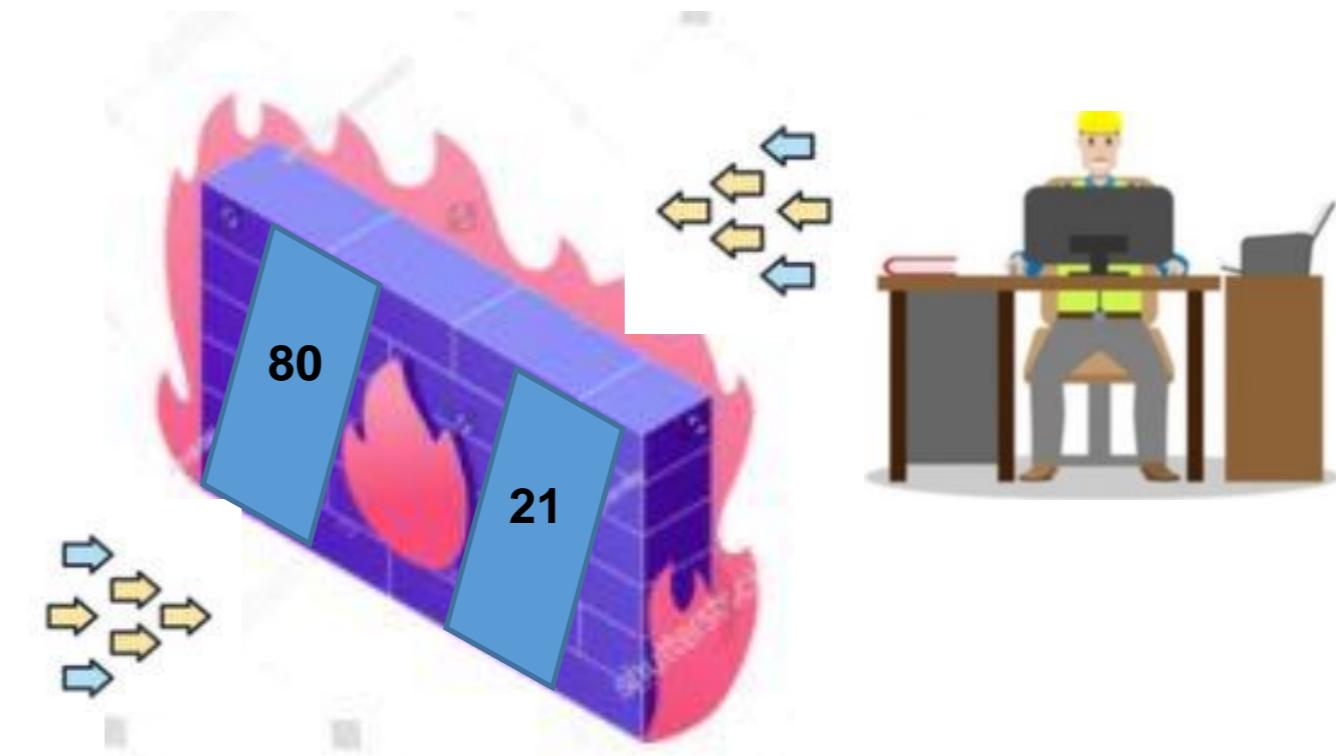
You need remote communication with receiver 24h / 7d

Receiver needs an address: **IP (static and public) Just to make life easier!**

Friendly Interface: **http://** (port 80)

Data flow: **ftp://** (port 21)

Real time data over internet: ntripserver, TCP/IP





Ethernet configuration of the receiver

Connect to receiver via serial (cable or Bluetooth), Ethernet or Wi-Fi

Front panel – Select “Ethernet”

DHCP option Disable

Include IP address,

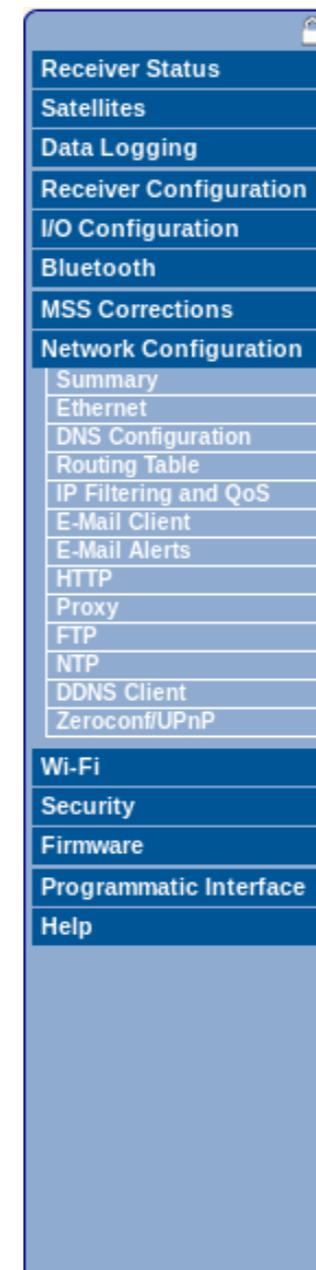
Include Gateway for the network that the receiver will be connected

Include Netmask for the network that the receiver will be connected

Turn off and on again



Ethernet configuration of the receiver



Ethernet Configuration

Stored settings

IP Setup:

IP Address:

Netmask:

Gateway:

Hostname:

MTU:

Force DNS Address:

DNS Address:

Sec DNS Addr:

DNS Domain:

DNS Proxy:

Hostname: Only alphanumeric and hyphen allowed. Required to start with letter and end with letter/number.

Current settings

IP Setup: Static IP

IP Address: 200.144.54.202

Netmask: 255.255.255.192

Gateway: 200.144.54.193

Hostname: Alloy



Receiver - Receivers should be configured so that:

- Multi-constellation tracking capabilities, at least GPS + GLONASS, and be able to register all the observables (codes and carriers) available.
If GPS only, it must be able to track at least the L1 and L2 carriers, and the PRN C/A and P codes;
- The observables should not be modified or smoothed ;
- must be configured to track satellites with a 0° elevation mask ;
- The observations must be send to SIRGAS at a sampling interval of 30 seconds in daily files;
 - ‘ This does not limit your recording being made at longer intervals, e.g. 15, 10, 5, 1 seconds, in hourly files;
 - Tracking occurs for all satellites regardless of health status since the US Department of Defense's criteria for designating an unhealthy satellite is not always applicable to ACS users;

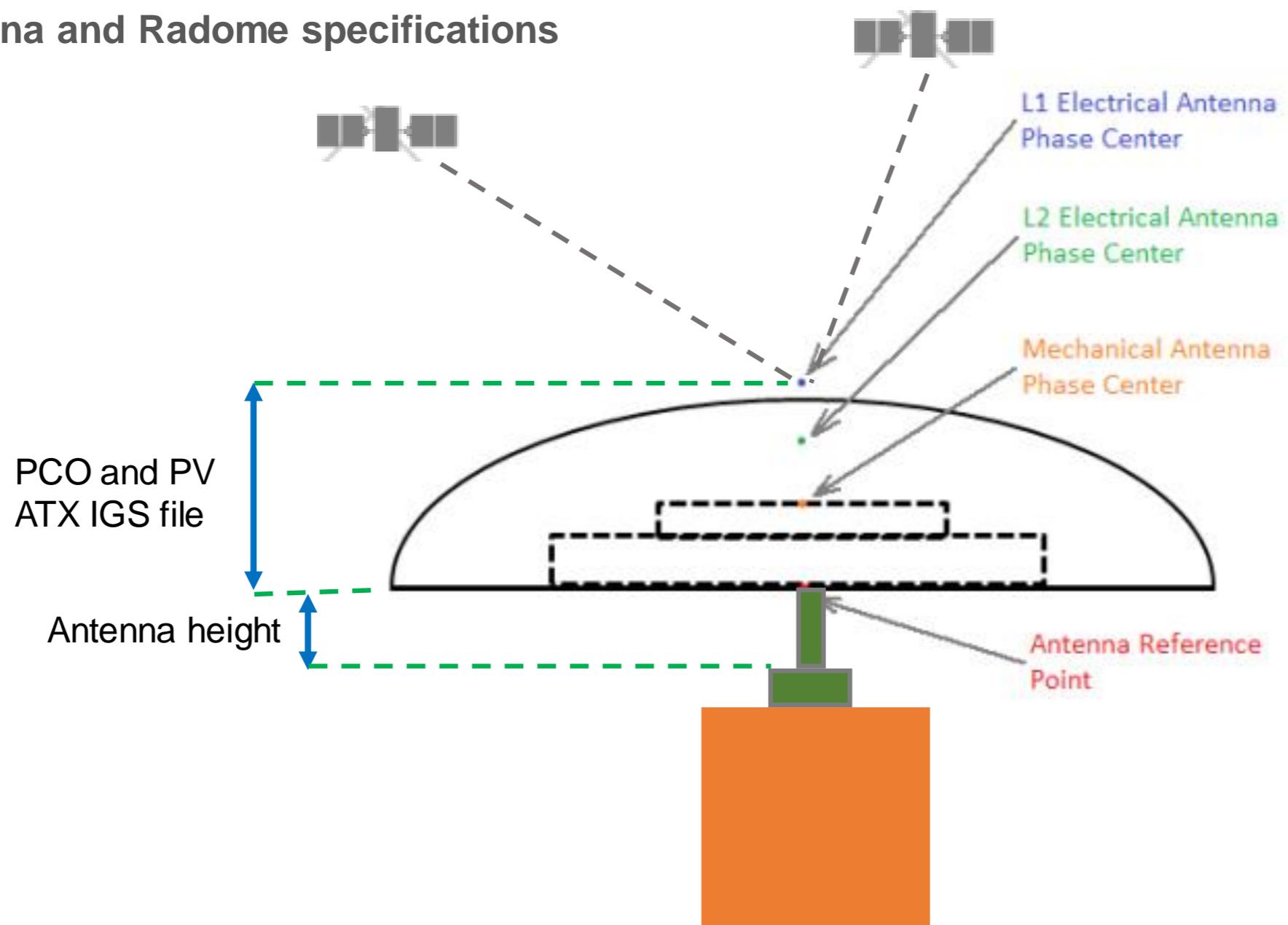
Receiver firmware must be updated periodically according to the manufacturer's provisions

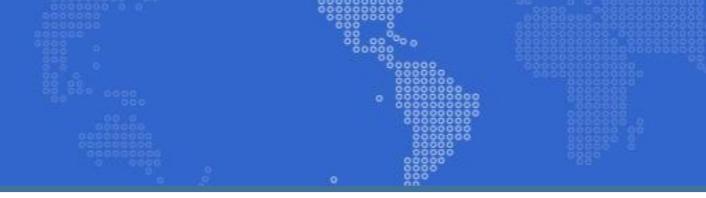


Data files

- Store the observed tracking data in its native format and also make it available in ASCII > **RINEX format (Version 2 -GPS+GLONASS or Version 3 multi-constellation)**
- The RINEX files must cover daily GNSS **observation sessions, between 00h00m00s and 23h59m30s, according to GNSS time.**
- GNSS station must provide RINEX mixed format observation files (**RINEX M**)
- The stored data should be retrievable immediately after the hour, either hourly or at the end of the day (24h00 GNSS time)
- All file names and associated dates should be recorded with respect to GNSS time and must follow the nomenclature established by IGS;
- Data Centers should store data, following the same structure as the directories managed by the IGS.
Data > Year > day of the year > o22 (ex: GNSS/2022/200/o22/)
- Data files should be compressed using the Hatanaka format, and subsequently the Gzip compression

Receiver, Antenna and Radome specifications





Receiver, Antenna and Radome specifications

On the precise GNSS processing must consider the corrections and variations to the ARP – Antenna reference point from satellites and receivers: <https://files.igs.org/pub/station/general/igs14.atx>

Must be included in https://files.igs.org/pub/station/general/rcvr_ant.tab

Provides the receiver and antenna models available in ATX file

Provides important physical features of antennas: <https://files.igs.org/pub/station/general/antenna.gra>

- (1) the position of the antenna reference point (ARP) to which the phase center correction values in the corresponding IGS antenna phase center model;
- (2) the definition of the north reference point (NRP), i.e. the element of the antenna that has to be oriented toward the true north direction.
- (3) antenna dimensions (in meters)



Receiver, Antenna and Radome specifications

Official IGS receiver and antenna names (rcvr ant.tab)

TRIMBLE Receivers IGS Codes—20 columns XXXXXXXXXXXXXX		Description
TRIMBLE NETR9		L1/L2+L2C/L5 GLONASS L1/L2 with 2 Maxwell-6 ASIC , eth + SBAS, 440 channel
TRIMBLE Antennae IGS Codes—15 columns XXXXXXXXXXXX DOME		Description
TRM59800.00		Dorne Margolin with chokerings , Model 59800.00 L1/L2/L5/G1/G2/G3/E1/E2/E5ab/E6/BeiDou , GPS, GLONASS, Galileo & BeiDou

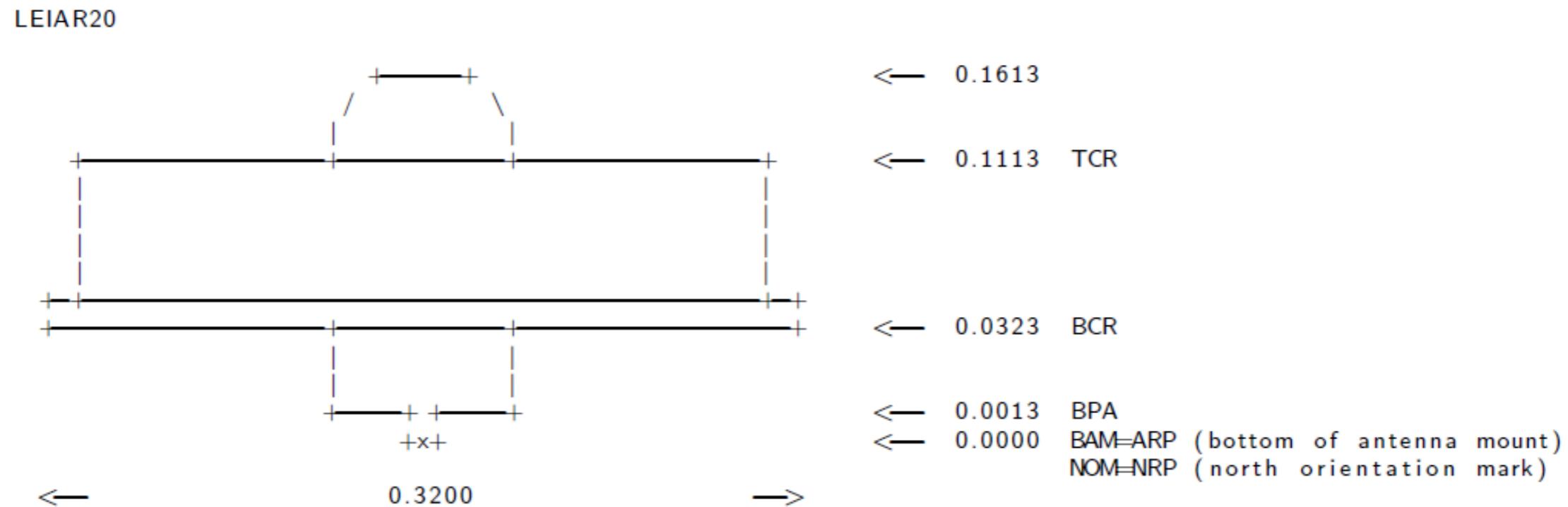


Receiver, Antenna and Radome specifications

Schematic antenna graphics defining the Antenna Reference Point (antenna.gra)

NRP: North Orientation Mark

ARP: Antenna Reference Point



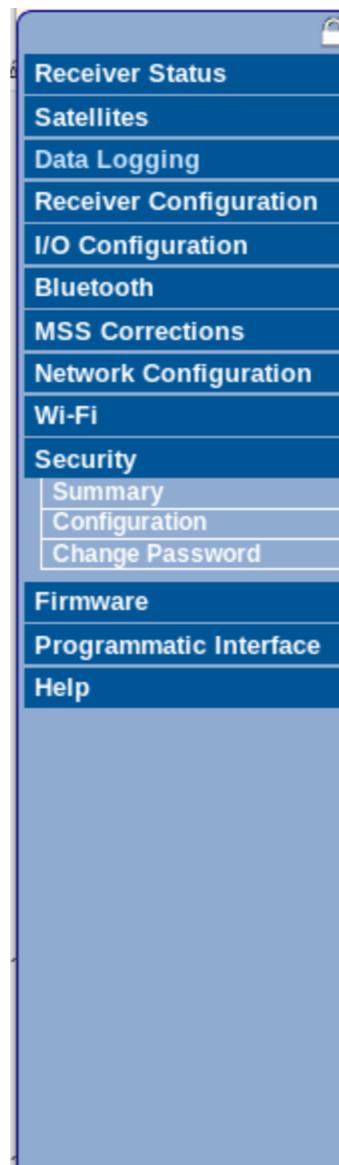
Basic Steps for receiver configuration Security

Create an User

Permissions : Receiver Config / File

Download / File Delete /Edit User /

NTripCaster)



Security Configuration

Security: Enabled with Anonymous Access

Anonymous User:

File Download
 File Delete

Limit NTRIP Caster Connections: Disabled

Login IP Address Range (non-admin): Any IP

OK

Delete?	User Name	Receiver Config	File Download	File Delete	Edit User	NTripCaster	
	admin	<input checked="" type="checkbox"/>					
<input type="checkbox"/>	rbmc	<input checked="" type="checkbox"/>					

Add User

A Medium or Strong password is required. Increasing length, using uncommon words, and mixing upper/lower case, numbers, and symbols.

User Name:

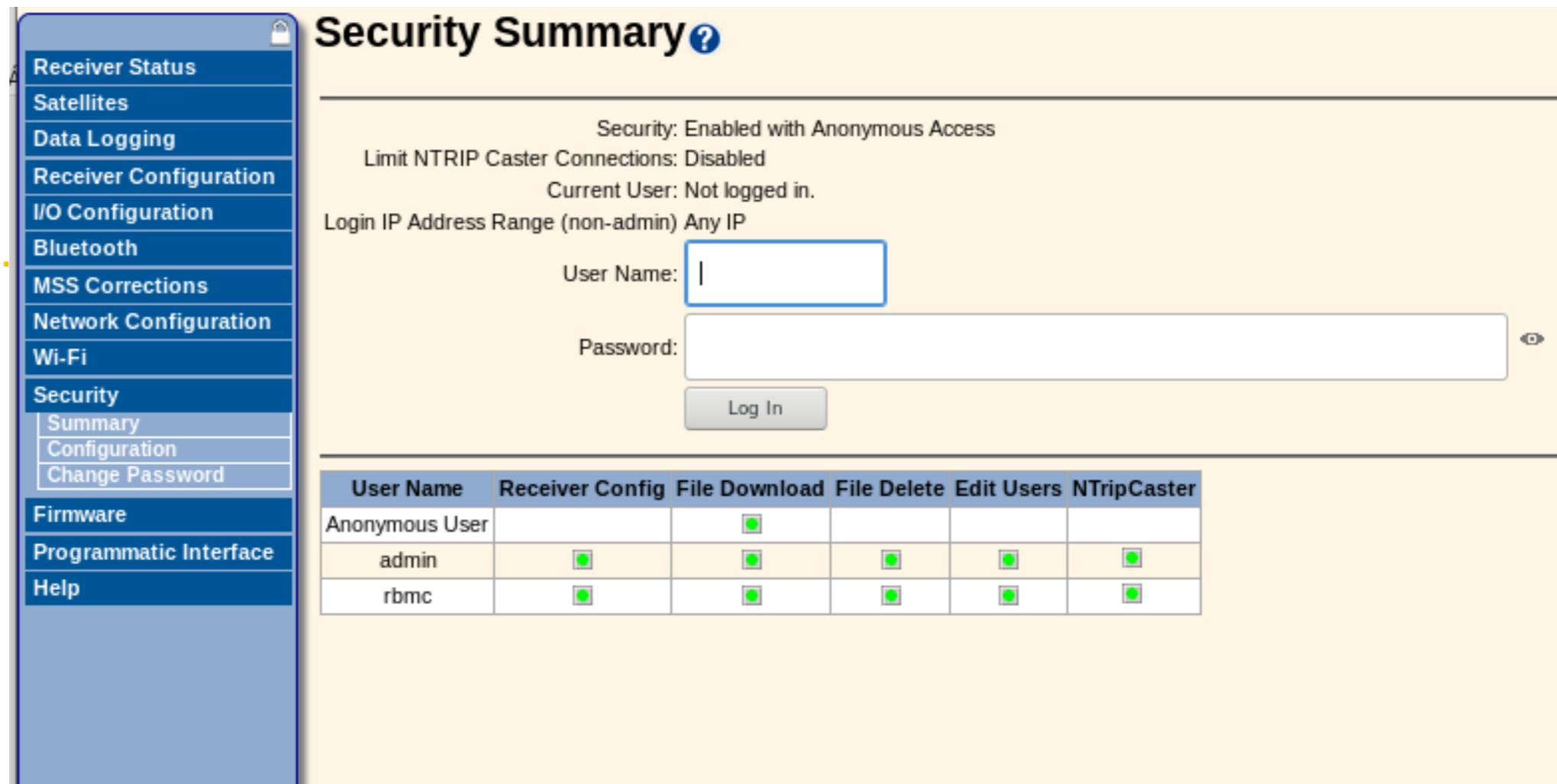
Password:

Verify Password:

Receiver Config	File Download	File Delete	Edit User	NTripCaster
<input type="checkbox"/>				

Basic Steps for receiver configuration

Any edition should be allowed only if you logging



The screenshot shows a web-based configuration interface for a GNSS receiver. On the left is a vertical sidebar menu with the following items:

- Receiver Status
- Satellites
- Data Logging
- Receiver Configuration
- I/O Configuration
- Bluetooth
- MSS Corrections
- Network Configuration
- Wi-Fi
- Security
 - Summary
 - Configuration
 - Change Password
- Firmware
- Programmatic Interface
- Help

A yellow dashed line highlights the "Security" section in the sidebar.

The main content area is titled "Security Summary" with a question mark icon. It displays the following information:

- Security: Enabled with Anonymous Access
- Limit NTRIP Caster Connections: Disabled
- Current User: Not logged in.
- Login IP Address Range (non-admin) Any IP

Below this is a login form with fields for "User Name" and "Password", and a "Log In" button. To the right of the password field is a small "Remember Me" checkbox.

At the bottom is a table showing user permissions:

User Name	Receiver Config	File Download	File Delete	Edit Users	NTripCaster
Anonymous User		<input checked="" type="checkbox"/>			
admin	<input checked="" type="checkbox"/>				
rbmc	<input checked="" type="checkbox"/>				

Basic Steps for receiver configuration

Receiver Status > Identity



Identity

Receiver Type:	NetR9
System Name:	UFPR
Serial Number:	5750R51572
MAC Address(Ethernet):	00:60:35:2C:65:EF
Ethernet IP:	????.???.???.???
DNS Address:	0.0.0.0
Secondary DNS Address:	0.0.0.0
DNS Resolved Name:	----
Zeroconf/mDNS address:	NetR9.local
MAC Address(Bluetooth):	00:03:19:9f:fc:92
Firmware Version:	5.33
Core Engine Version:	5.33
Firmware Date:	2018-01-31
RTK Version:	ALGO_2017.03_53X C133131
HP/XP Firmware Version:	HP 7.19
VBS Firmware Version:	VBS 2.21c
Monitor Version:	5.33
Antenna Database Version:	8.32
Hardware Version:	3.2
T0x Library Version:	9.00

System Name:

OK

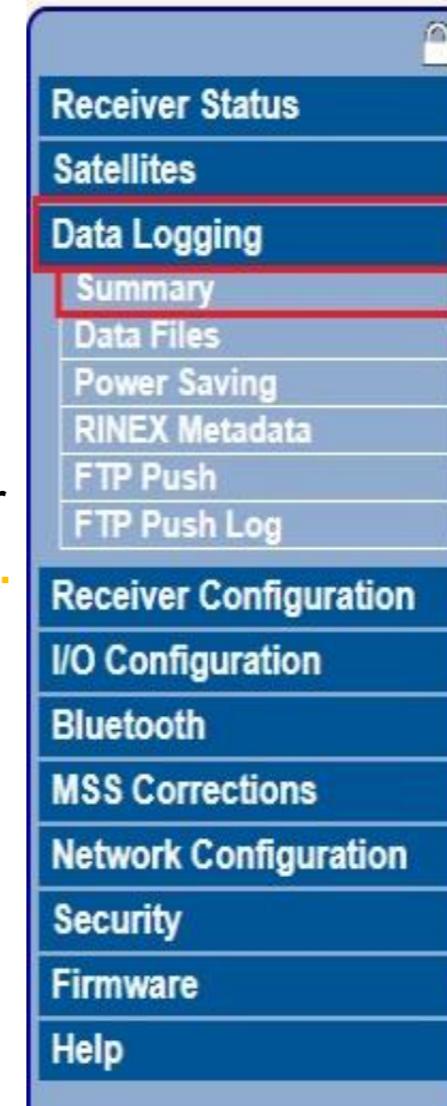


Basic Steps for receiver configuration

Session Configuration (How to save data)

Data Logging > Summary

“Auto Delete” option must be selected
(why: Delete old data and keep receiver running)



Data Logging

File System	Size	Available	Auto Delete	
/Internal	2 GB	1.618 GB	81%	<input checked="" type="checkbox"/> Format
/External				<input type="checkbox"/>

Session	Schedule	Status	Enable
DEFAULT Measurements 5 Sec. Positions 5 Min.	Continuous 15 Min.	Logging /Internal/201804/ 5750R51572201804271400.T02	<input checked="" type="checkbox"/>

New Session

Basic Steps for receiver configuration

Session Configuration

(How to save data)

Data Logging > Summary > DEFAULT

Enable: SELECTED

Schedule: Continuous;

Duration: 1 hour;

Format: SELECT T02;

Measurement Interval: 30 sec;

Smooth Pseudorange / Smooth Phase /

Include Doppler: don't SELECT

File System: /Internal;

Path Style: YYYYMM;

Name Style: #####YYYYMMDDhhmm

Pool: off;

FTP Push: select 1

Convert:

T01/T02/T04 file & Zipped V3.03 RINEX

(Observables & Combined Ephemeris)

The screenshot shows the 'Data Logging Configuration' window with the following settings:

- Session Name:** DEFAULT
- Enable:** checked
- Schedule:** Continuous
- Duration:** 15 Minutes
- File Format:** T02 (selected)
- Measurement Interval:** 5 Sec.
- Smooth Pseudorange:** unchecked
- Smooth Phase:** unchecked
- Include Doppler:** unchecked
- Position Interval:** 5 Min.
- Log Received Corrections:** unchecked
- Voltage/Temperature Records:** Off
- Log Raw Nav Data:** unchecked
- Log SBAS Data:** unchecked

At the bottom, the 'FTP Push' section is highlighted with a red box:

- File System:** /Internal
- Path Style:** YYYYMM
- Name Style:** #####YYYYMMDDhhmm
- Pool:** Off
- FTP Push:** 1 (selected)
- Convert:** T01/T02/T04 file & Zipped V3.04 RINEX (Observables & Combined Ephemeris)
- Email Push:** unchecked

Basic Steps for receiver configuration

Session Configuration (How to send data)

Data Logging > FTP Push

Server Number: (the same number chosen in session configuration)

Server Address: IP number of data

FTP Server Port: 21

Username: server account

Password: server password

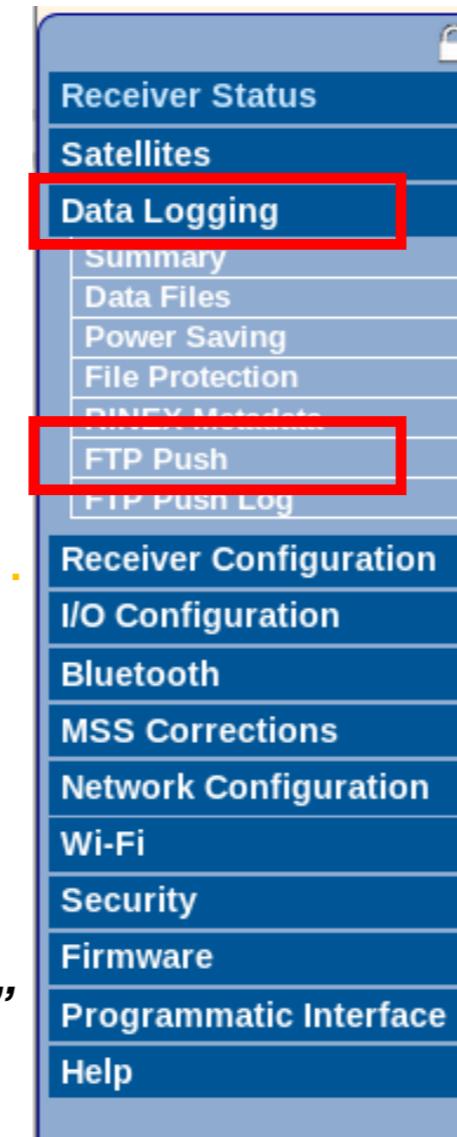
Remote Directory:

/home/CORS/YYYY//ssss/ssssdddh[mm].yyo

Path Style: Flat

Transfer Mode: Passive with fallback to active

Press "Test". Button and wait for message "OK"



FTP Push ?

Server Number: 1 ▾

Server Address: ????.???.???.???

FTP Server Port: 21

User Name: rbmc

Password: ████████

Verify Password: ████████

Delay: 0 Minutes

Remote Directory: /home/rbmc/neia

Path Style: Flat ▾

Rename: No ▾

Transfer mode: Passive with fallback to active ▾

OK Cancel Test

Basic Steps for receiver configuration

Session Configuration (How to send data)

Data Logging > RINEX Metadata

Observer Name: IBGE (the name of your institution)

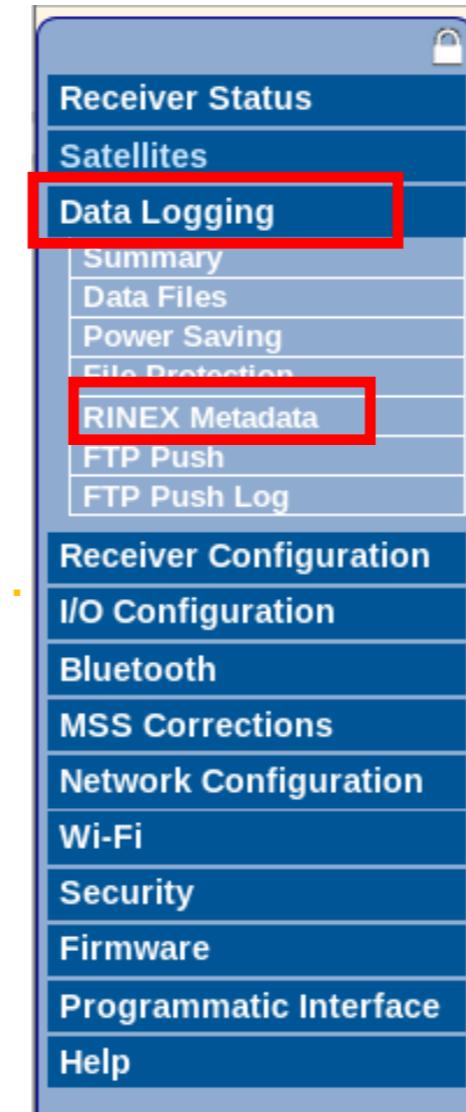
Agency Name: IBGE

Station Name: station ID ssss

Marker Number: 0

Receiver Number: 0

ISO Country Code: BRA (RINEX3)



RINEX Metadata?

Observer Name: IBGE

Agency Name: IBGE

Station Name: NEIA

Marker Number: 0

Receiver Number: 0

ISO Country Code: BRA

OK

Cancel

Basic Steps for receiver configuration

Receiver Configuration > Antenna

Antenna type: from manufacturer

If not available select “unknown external”

RINEX name: standard name from IGS

Antenna Serial Number: include

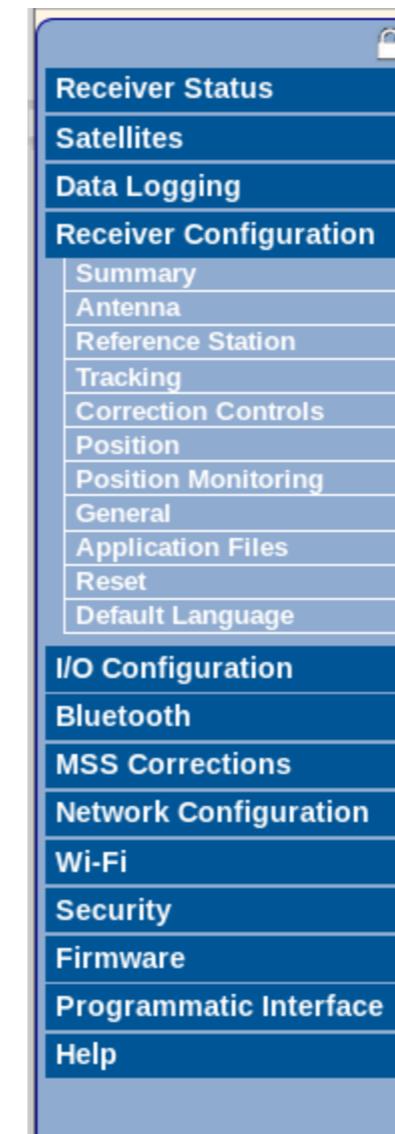
Radome Serial Number: include

Antenna Measurement Method: **Bottom of antenna mount**

Antenna Height: include antenna height - meters

Apply Antenna Correction to RTCM V3: **DON’T SELECT**

“unknown external” : Rinex header must inform the correct standard name of antenna/radome adopted by IGS



Antenna Configuration?

Antenna Type Zephyr 3 Geodetic

RINEX Name TRM115000.00 NONE

Antenna Serial Number 61123G0027

Radome Serial Number

Antenna Measurement Method Bottom of antenna mount

Antenna Height [m] 0.1003

Gain Amplification Disable



Apply Antenna Correction to:

RTCM V3

Antenna Query

Antenna Query

Save to Antenna Configuration

Basic Steps for receiver configuration

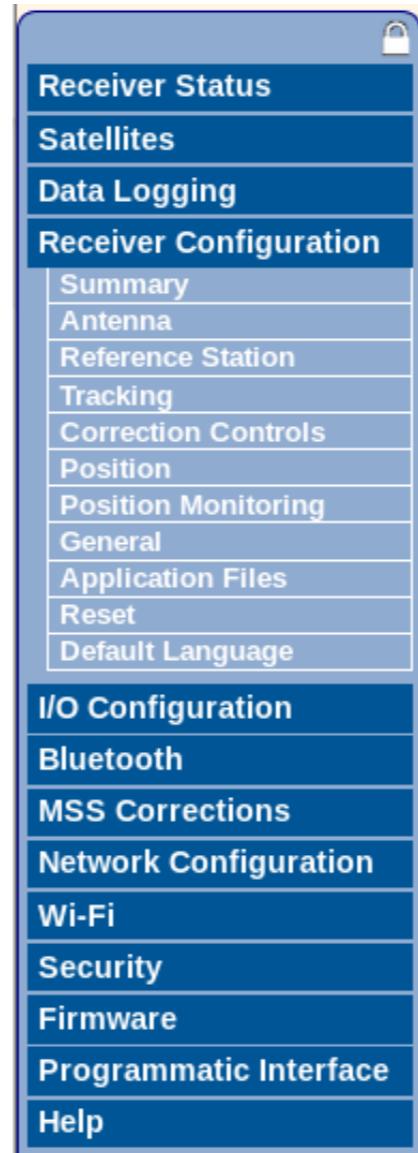
Receiver Configuration > Reference Station

CMR ID / RTCM 2.x ID / RTCM 3.x ID: 0

Station Name: station ID

Station Code: Domes number

Cartesian or Geographical: Coord. from your official reference frame



Reference Station?

CMR ID: 0

RTCM 2.x ID: 0

RTCM 3.x ID: 0

Station Name: NEIA

Station Code: 91716

Cartesian Geographical

Reference Latitude: 25 ° 1 ' 12.86150 " N S

Reference Longitude: 47 ° 55 ' 29.88667 " E W

Reference Height: 6.055 [m]

Here Load Current Position

Average Load Average Position

Position Averaging

Current Position

Basic Steps for receiver configuration

Receiver Configuration > Tracking

Elevation Mask: 0

Select all signals from SBAS, GPS, Glonass, Galileo and Beidou

GPS: L1C, L1 C/A, L2E (L2P), L2C, L5

GLONASS: L1 C/A2 and unencrypted P code, L2 C/A and unencrypted P code, L3 CDMA

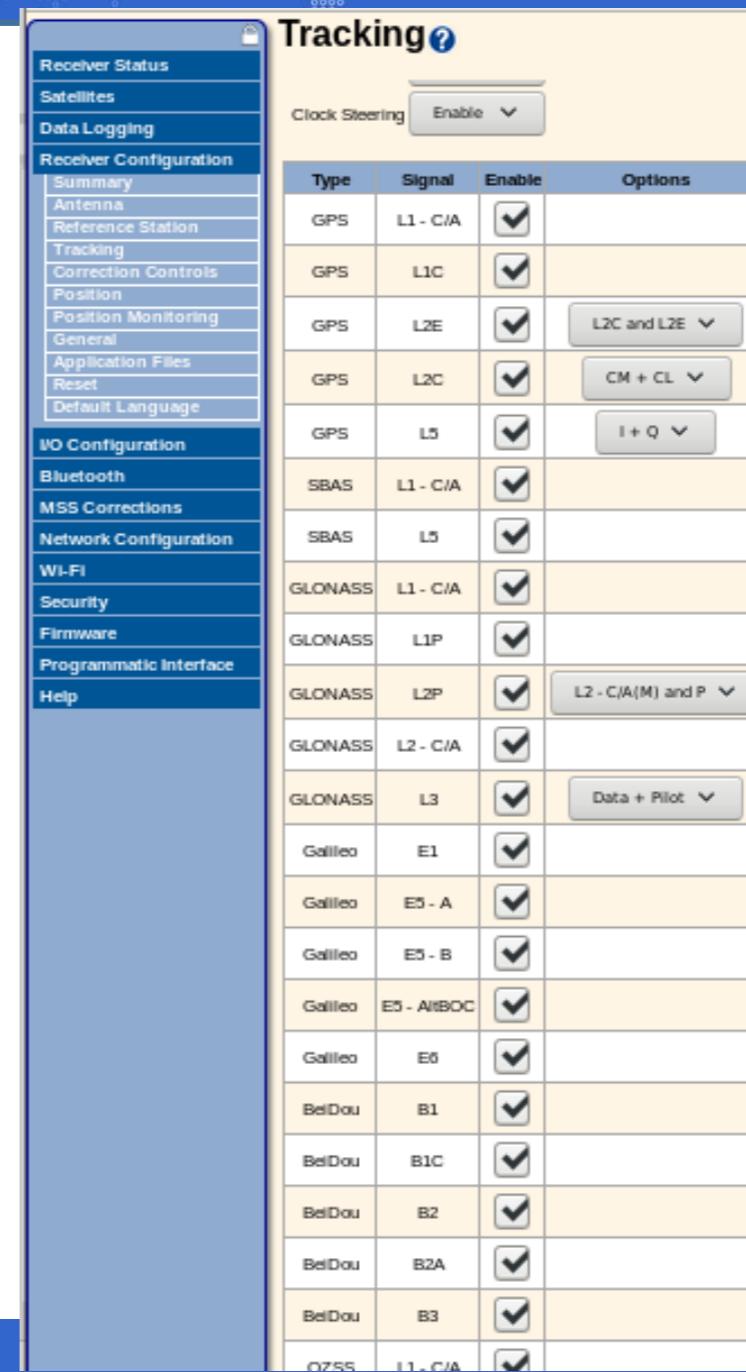
Galileo: E1, E5A, E5B and E5AltBOC, E6

BeiDou: B1, B2, B3, B1C, B2A

QZSS: L1 C/A, L1C, L1S, L2C, L5, LEX/L63

IRNSS: L5, S-Band

SBAS: L1 C/A (EGNOS/MSAS GAGAN/SDCM), L1 C/A and L5 (WAAS)



Type	Signal	Enable	Options
GPS	L1 - C/A	<input checked="" type="checkbox"/>	
GPS	L1C	<input checked="" type="checkbox"/>	
GPS	L2E	<input checked="" type="checkbox"/>	L2C and L2E
GPS	L2C	<input checked="" type="checkbox"/>	CM + CL
GPS	L5	<input checked="" type="checkbox"/>	I + Q
SBAS	L1 - C/A	<input checked="" type="checkbox"/>	
SBAS	L5	<input checked="" type="checkbox"/>	
GLONASS	L1 - C/A	<input checked="" type="checkbox"/>	
GLONASS	L1P	<input checked="" type="checkbox"/>	
GLONASS	L2P	<input checked="" type="checkbox"/>	L2 - C/A(M) and P
GLONASS	L2 - C/A	<input checked="" type="checkbox"/>	
GLONASS	L3	<input checked="" type="checkbox"/>	Data + Pilot
Galileo	E1	<input checked="" type="checkbox"/>	
Galileo	E5 - A	<input checked="" type="checkbox"/>	
Galileo	E5 - B	<input checked="" type="checkbox"/>	
Galileo	E5 - AltBOC	<input checked="" type="checkbox"/>	
Galileo	E6	<input checked="" type="checkbox"/>	
BeiDou	B1	<input checked="" type="checkbox"/>	
BeiDou	B1C	<input checked="" type="checkbox"/>	
BeiDou	B2	<input checked="" type="checkbox"/>	
BeiDou	B2A	<input checked="" type="checkbox"/>	
BeiDou	B3	<input checked="" type="checkbox"/>	
QZSS	L1 - C/A	<input checked="" type="checkbox"/>	

Basic Steps for receiver configuration

Receiver Configuration > Position

PDOP Mask: 99

RTK Mode: Low Latency

RTCM 2 Type 31 Input Glonass Datum: PZ90

Signal Tracking Bandwidth: Narrow

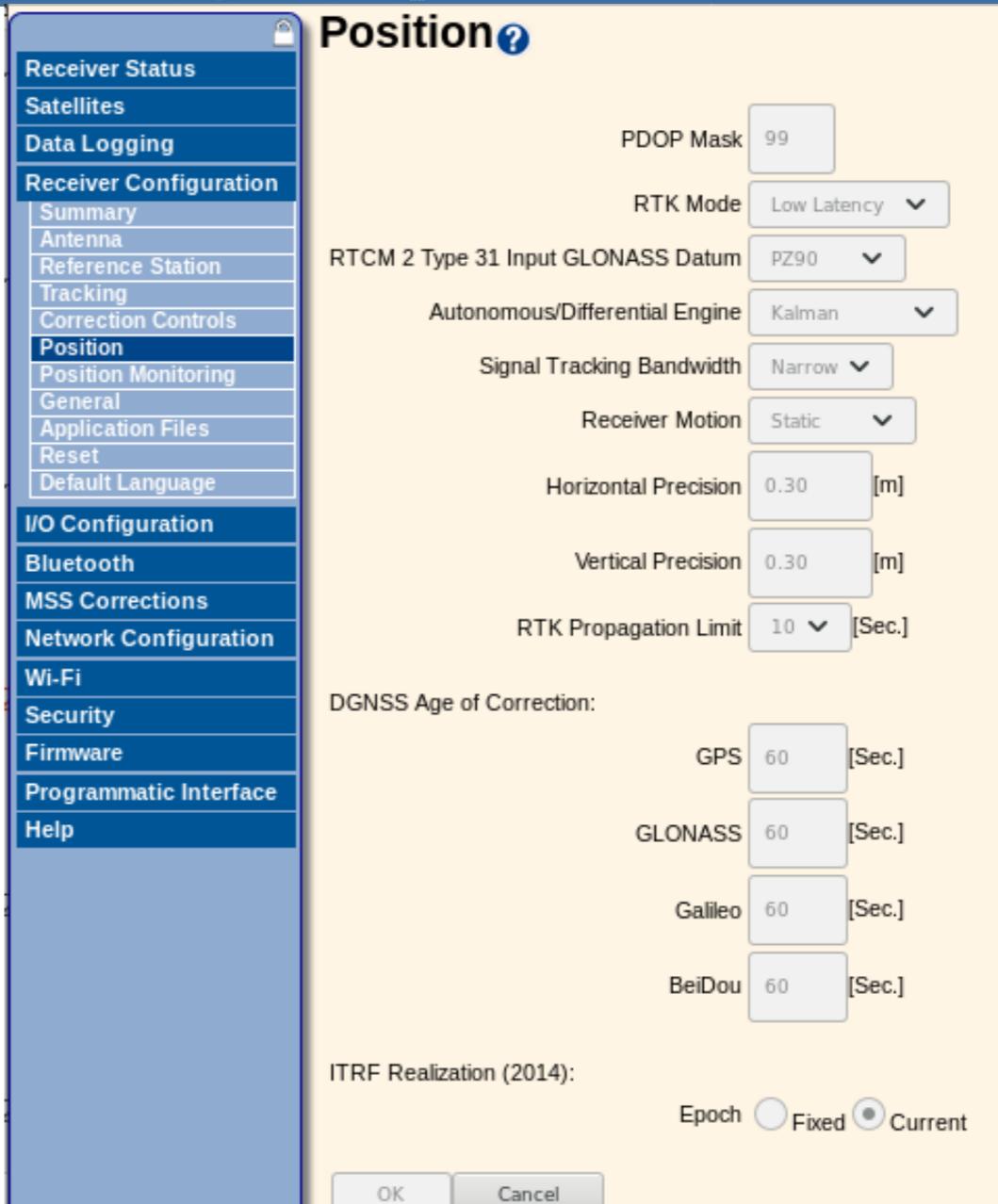
Receiver Motion: Static

Horizontal Precision: 0.30

Vertical Precision: 0.30

DGNSS Age of Correction: 60 (GPS / GLONASS / Galileo / BeiDou)

ITRF Realization (2014): Current.





Basic Steps for receiver configuration – Real time ntripserver

I/O Configuration > Port Summary > IBSS/NTRIP Server 3 > RTCM

I/O Configuration

Trimble

Type	Port	Input	Output
TCP/IP	5017	-	-
TCP/IP	5018	-	RT27(1Hz)
TCP/IP	28001	-	-
TCP/IP	28002	-	-
IBSS/NTRIP Client 1	-	-	-
IBSS/NTRIP Client 2	-	-	-
IBSS/NTRIP Client 3	-	-	-
IBSS/NTRIP Server 1	-	-	RT27(1Hz)
IBSS/NTRIP Server 2	-	-	RT27(1Hz)
IBSS/NTRIP Server 3	-	-	RTCM_V3
NTRIP Caster 1	2101	-	-
NTRIP Caster 2	2102	-	-
NTRIP Caster 3	2103	-	-
Serial	COM1 (115K-8N1)	-	-
Serial	COM2 (115K-8N1)	-	-
Serial	COM3 (115K-8N1)	-	-
Serial	COM4 (115K-8N1)	-	-
Bluetooth	1	-	-
Bluetooth	2	-	-
Bluetooth	3	-	-
USB	-	-	-

Basic Steps for receiver configuration – Real time

I/O Configuration > Port Configuration

Enable: selected

IBSS Mode: don't select

NTRIP Version: NTRIP v2.0

Ntrip Caster http:// (IP of ntripcaster)

Mount Point: XXXX0 (station ID+0)

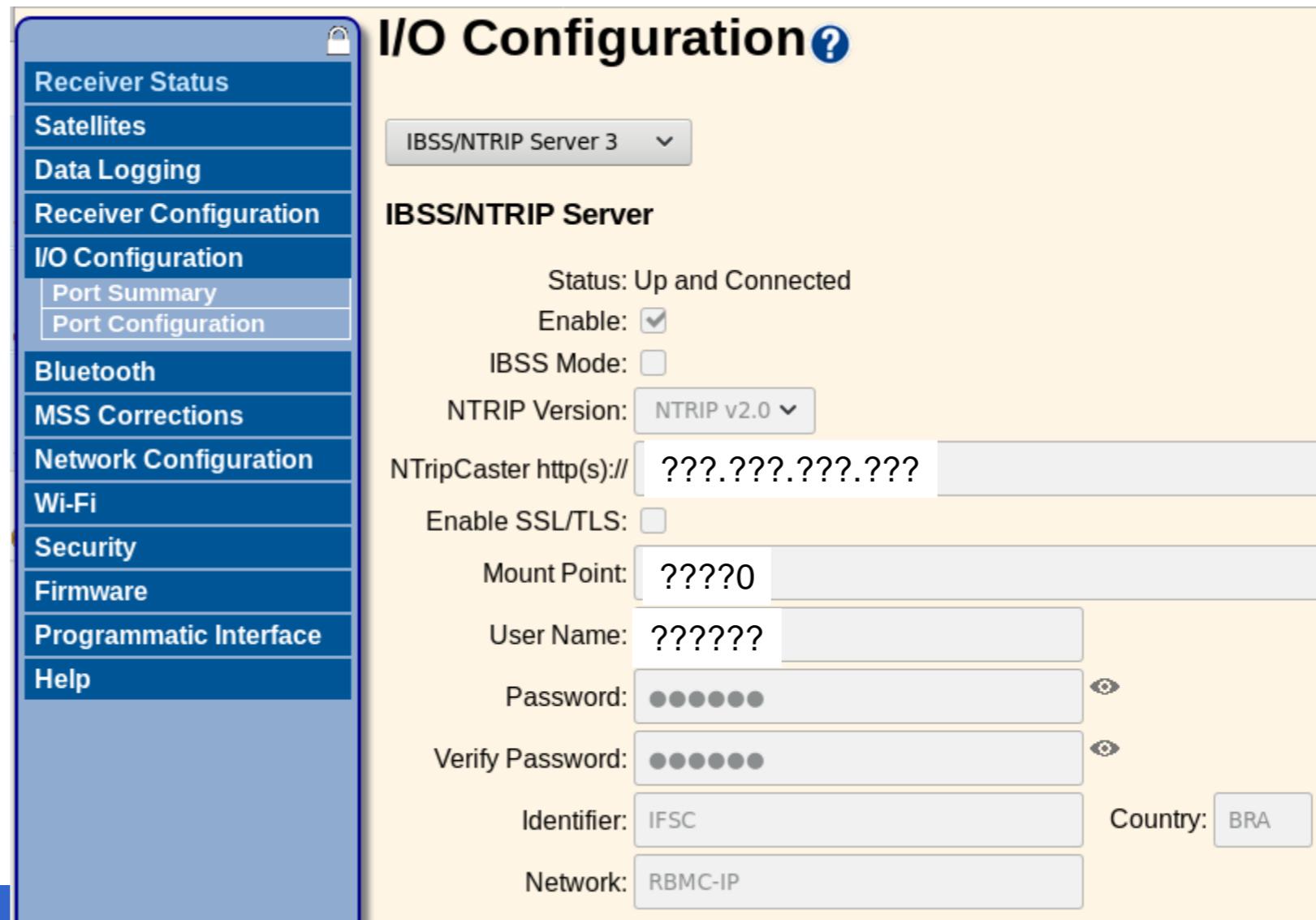
Username: ntripcaster account

Password: ntripcaster password

Identifier: station name

Country: BRA

Network: network identification



I/O Configuration ?

IBSS/NTRIP Server 3 ▾

IBSS/NTRIP Server

Status: Up and Connected

Enable:

IBSS Mode:

NTRIP Version: NTRIP v2.0

NTripCaster http(s):// ????.????.????.???

Enable SSL/TLS:

Mount Point: ????0

User Name: ??????

Password: *****

Verify Password: *****

Identifier: IFSC

Country: BRA

Network: RBMC-IP

Basic Steps for receiver configuration – Real time

I/O Configuration > Port Configuration

CMR: disable

RT27: off

Binex: off

Metada: off or on

Version 3.0 : GPS+Glonass

Version 3.2: multi-constellation



I/O Configuration

RTCM

Enabled: Version: 3.2 Type: RTK Bandwidth limit:

Advanced Settings

Record Type 1019: 10 Sec.

Record Type 1020: 10 Sec.

Fugro Type 4087 Variants:

Measurements from Unhealthy SVs:

Reference Station Records:

L2 Signal: Legacy with L2 - CS fallback

Multiple Signal Message Settings

MSM Records: MSM4

Streaming Mode:

Ephemeris: 120 Sec.

GPS:

GLONASS:

Galileo:

QZSS:

BeiDou:



¡Gracias!
Thank you!

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