ComNav Technology

User Guide

M300Plus GNSS Receiver



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1. Introduction

Thank you for choosing the M300Plus GNSS receiver.

This Getting Started Guide will provide useful information about M300Plus. It will also guide you through your first step of using M300Plus GNSS receiver.

1.1 Warning and Cautions

An absence of specific alerts does not mean that there are no safety risks involved. A Warning or Caution information is intended to minimize the risk of personal injury and/or damage to the equipment.

WARNING-A Warning alerts you to a potential misused or wrong setting of the equipment.

CAUTION- A Caution alerts you to a possible risk of serious injury to your person and/or damage to the equipment.

1.2 Use and Care

The M300Plus is designed to withstand the rough environment that typically occurs in the field. However, the M300Plus is high-precision electronic equipment and should be treated with reasonable care.

1.3 Technical Assistance

If you have any questions and can't find the answer that you need in this manual, please contact your local dealer from which you purchased the M300Plus. Alternatively, please request technical support using the ComNav Website at: <u>www.comnavtech.com</u> or technical support email: <u>support@comnavtech.com</u>.

1.4 Your Comments

Your feedback about this Getting Started Guide will help us to improve it with future revisions. Please email your comments to: *support@comnavtech.com*.

2. Overview

This chapter will introduce the main features, technical specifications and basic kit of M300Plus receiver.

2.1 Receiver features

The M300Plus is designed as a multi-purpose GNSS receiver for a wide range of applications. With its powerful integration ability, the M300Plus serves as a key part of positioning infrastructure, active geodetic network, deformation monitoring system, machine guidance, harbor construction, land surveying, marine surveying and in any project that accuracy and reliability matter the most. A standard SinoGNSS M300Plus smart antenna provides the following features:

- 574 GNSS tracking channels
- Working with all the running constellations
- Advanced QUANTUM[™] technology
- Optimized narrow band technologies targeting at higher data quality
- LED status indicator
- Compact and rugged housing with flexible interfaces for external devices
- Integrated Ethernet and 4G modem guarantees the stability internet communications
- PPS and Event
- SBAS differential correction compatibility

2.2 Technical specifications

Signal Tracking	- Extended NMEA-0183 BDGGA,
 574 channels with simultaneously tracked 	GPNTR, GPCDT, GPHPR
Satellite signals	Observations
- GPS: L1 C/A code, L1/L2 P code, L2C, L5	ComNav binary, BINEX, RTCM3.X,
- BeiDou: B1, B2, B3	compatible with major CORS software
- BeiDou Global Signal: B1C, B2a	(VRS, FKP and iMax).
- GLONASS: L1, L2	
- Galileo: E1, E5-A, E5-B	Data logging
- QZSS: Reserved	 Loop recording data function

- SBAS: WAAS, EGNOS, MSAS, GAGAN	supports long time record)
Advanced multipath mitigation technology	 Data logging frequency, maximum
• Low noise carrier phase measurements with	50Hz
<1 mm precision in a 1 Hz bandwidth	Storage capacity
High precision multiple correlates for	- 32 GB internal memory
GNSS pseudorange measurements	- 1TB External memory maximum
• Signal Noise Ratios reported in dB-Hz	• File format
	- Rinex 3. X or 2.X or ComNav binary
Time Precision	format
GPS+Glonass+Beidou 20ns	• File log session
	- Days or hours can be set by user
Positioning Specifications	Data transfer
Post Processing Static	- FTP and USB
- Horizontal: 2 mm + 0.5ppm RMS	
- Vertical: 4 mm +0.5 ppm RMS	Physical
 Single Baseline RTK(<30KM) 	• Size (L x W x H): 225mm x 176mm x
- Horizontal: 8 mm + 1 ppm RMS	67mm
- Vertical: 15 mm + 1 ppm RMS	• Weight: 2 kg
Network RTK	•Housing: Rugged aluminum housing
- Horizontal: 8 mm +0.5 ppm RMS	
- Vertical: 15 mm + 0.5 ppm RMS	Environmental
• E-RTK	 Operating temperature: -40°C to
- Horizontal: 0.2 m +1 ppm RMS	+80°C
- Vertical: 0.4 m + 1 ppm RMS	• Storage temperature: -45°C to +85°C
• DGPS : 0.5 m 3D RMS	Humidity: 100% no condensation
• SBAS : 1 m 3D RMS	 Water proof and dust proof: IP67,
• Standalone : 1.5 m 3D RMS	survives the temporary
	immersion to a depth of 1 m
Communications	 Shock: rugged aluminum case plus
• 3 Lemo Ports	plastic ring seal, designed to
- One Lemo port(2 pin): power supply	survive a 1m drop onto concrete
and battery charging	
- One Lemo ports(7 pin): USB UART port	Electrical
for system debugging and static data	•Power consumption: <5W
download	•External power input: 7-36 VDC, with
- One Lemo ports(7 pin): RS485 Protocol	over-voltage protection
for configuring and connecting with	
external device(meteorological	

sensor/barograph/inclinometer)	Antenna
• 1 DB9 male port	AT340 GNSS Geodetic Antenna
- Standard RS232 protocol	 AT350 GNSS Choke Ring Antenna
• 1 Standard USB port,	 AT500 GNSS Choke Ring Antenna
- Connect with external storage card	 AT600 GNSS Choke Ring Antenna
• 1 RJ45 LAN Ethernet port (10/100M	
Bit) supports	User Interface
protocols HTTP, HTTPS, TCP/IP, UDP,	 4 LEDS in front panel
FTP, NTRIP	ComNav M300 Plus Web Server
• 5 SMA male connectors	
- 1 PPS output	Specifications subject to change
- Event input	without notice.
- Reserve for WLAN	
- Frequency-marker oscillator input	
connector	
- GPRS antenna connector	
• 1 TNC connectors	
- GNSS Antenna connector	
• 1 SIM Card Slot	
- Nano-SIM card	
Data Format	
Correction data I/O:	
- RTCM 2.x, 3.x, RTCM3.2, MSM4,	
MSM5, CMR (GPS only), CMR+(GPS only)	
Positioning data outputs:	
- ASCII: NMEA-0183 GSV, RMC, HDT,	
VHD, GGA, GSA, ZDA,	
VTG, GST, PJK, PTNL	

2.3 M300Plus Basic Kit

The table below provides an overview of items included in the M300Plus basic Kit.

Items	Picture
M300Plus GNSS Receiver	
Charger	
Network Cable	
GNSS Antenna Cable/ Special cable can be provided if you require	
Transport Case	



ComNav also supply various types of antennas, for additional introduction please see <u>chapter 3.1.3</u>.

3. Setting up the receiver

3.1 Guidelines

Please follow these guidelines when setting up your receiver.

3.1.1 Environmental requirements

To keep the receiver with a reliable performance, it is better to use the receiver in safe environmental conditions.

- Operating temperature: -40°C to +80°C
- Storage temperature: -45°C to +85°C
- Out of corrosive fluids and gases

3.1.2 Power supply

If you set M300Plus as a permanent site (reference station), an uninterruptible power supply (UPS) is recommended to protect receivers from power surges and power outage.

3.1.3 Mounting the antenna

Choosing the optimal location for the GNSS antenna is critical to the performance quality of your M300Plus receiver. Poor or incorrect placement of the antenna may

impact the accuracy and reliability of observation, resulting a degraded performance of normal operation.

Follow these guidelines to select the antenna location:

- If the application is mobile / kinematic, place the antenna on a flat surface along the centerline of the vehicle.
- Choose an area with an open view to the sky and far from metallic objects.
- Avoid areas with high vibration, excessive heat, electrical interference or strong magnetic fields.

Antenna type	AT340	AT350	AT500	AT500 3D
Descripti on	Geodetic, Mobile survey, machine control	Mini chock ring GNSS antenna, mainly used as monitoring	Chock ring antenna, high accuracy geodetic antenna, CORS station antenna	Chock ring antenna, very high accuracy, national CORS reference station antenna
Picture			. R INGA . 3	

• Avoid mounting the antenna close to electrical cables, metal masts and

generally close to other antennas

AT-series antenna is recommended, if you use other kinds of antenna, please check the specifications with the ComNav support team.

3.1.4 M300Plus connection view

M300Plus is mainly used as a CORS reference station. The below figure explains the connection of each equipment. The GNSS antenna and lighting rod are fixed on the ground or top of building, inner devices including the M300Plus, the power supply and internet, are settled in the office.



3.2 Front Panel

There are 4 LEDs in front panel, which indicate M300Plus work status.



- 1 Power indicator, it will always on when the power turn on.
- 2 Satellites indicator, flashes N times every 5 seconds, n is the number of tracked satellites
- ③ Static indicator, flashing means it is recording the raw data.
- ④ Alarm indicator, it will always on when receiver send the alarm message.

3.3 Rear connectors

All connectors are located on the back of the receiver, you can connect other external devices through these connectors.



- ① Port for external power supply, and internal battery charging of the receiver
- 2 Ethernet Port

Connect to internet

③ Com1 Port of Main Board (RS232 port)

Control the mainboard and request data from this port

4 SIM card slot

Install sim card

5 4G antenna Connector

Connect to 4G antenna

- 6 10 MHz frequency input
- 10MHz external frequency input, Used for precision timing
- ⑦ WIFI Antenna connector(Reserved)
- (8) GNSS Antenna Connector
- Connect to the GNSS antenna
- 9 USB

Connect to external USB drive for external data logging

10 Lemo to USB Data Download Connector

Connect with PC to download raw data from the internal memory

(1) Com2 Port of Main Board

Connect with Meteorological sensor, RS-485 communication protocol; receive and save meteorological data in RINEX format

(12) EVENT Signal Connector

Access Event signal trigger and can be configured through a web browser

(13) PPS Signal Connector

Output PPS signal and can be configured through a web browser

4. Receiver configuration through a Web Browser

M300Plus has an advanced built-in web server, you can access the web setting page and do configurations remotely. This section describes how to change receiver's settings through a web server.

4.1 Login the configuration page of M300Plus

The M300Plus receiver can connect to an Ethernet network through its Ethernet port. It means that you can configure and monitor the receiver's settings without a serial cable connection.

1. Firstly, make sure that the M300Plus and your computer are within the same Local Area Network (LAN). Then change your receiver's IP address by commands based on your office computer. For example IP address on your computer:

```
Ethernet adapter Local Area Connection:
Connection-specific DNS Suffix . :
Link-local IPv6 Address . . . . : fe80::45d1:8f50:7c4e:f827%12
IPv4 Address. . . . . . . . : 192.168.1.58
Subnet Mask . . . . . . . . : 255.255.255.0
Default Gateway . . . . . . . : 192.168.1.1
```

IP address of M300Plus:

Ethernet Config

IP Setting:	Static IP			-		
IP Address:	192	. 168	-	1	. 205	
Subnet Mask:	255	. 255		255	. 0	
Default Gateway:	192	. 168	-	1	. 1	

For configuring the IP, Subnet Mask, Gateway, please send the commands to M300Plus by com port, CRU software is recommended. You can get it from our website: http://www.comnavtech.com/companyfile/1/

Log ipconfig # Check current IP settings

<pre><command/> log ipconfig </pre>	Command Command Send File
Mac Address: 70-B3-D5-E3-B9-66; OK! Command accepted! Port: COM1.	Import

Set ipconfig XXX(IP) XXX(mask) XXX(gateway) # confige M300Plus IP

e.g. set ipconfig 192.168.1.205 255.255.255.0 192.168.1.1

<pre><command/> set ipconfig 192.168.1.205 255.255.25 </pre>	55.0 192.168.1.1		*
OK! Command accepted! Port: COM1.	Command		×
	Command Send	File set ipconfig 192.168.1.205 255.255.255.0 192.168.1.1	C On Time
	Import		
			Send

2. Enter the IP address and HTTP port of the receiver into the address bar, you will access the configuration page of M300Plus. The default setting for the HTTP port is 80, which is the standard port for web servers. However, HTTP port needs to be changed in some cases.

For example, using default port 80:<u>http://192.168.1.205</u>

If your receiver has a port other than 80, you must enter the IP address followed by port number. As example showed above: http://192.168.1.205:8000

	简体中文 Eng
	ſ
COMNAV REFERENCE STATION	
COMMAY RELEASE OFFICE	
Username :	
1 admin	
Password :	
p	
LOGIN	
	#"

- 3. Enter the default login settings to access the main page:
 - Username: admin
 - Password: admin

After accessing the main page, configuration menus are listed on the left, and receiver's settings on the right. Each configuration menu will be demonstrated in the following sections.

SÍNOGNSS By ComNav Technology Ltd.	admin	() [logout]
Status Position Information		
System Information Location		
Status Lat: 31°20′59.97073″N Lon : 121°17'32.92969″E Att: 35.345(m)		
Position Information Ellipsoid: WGS-84 Position Status: Base Station		
Configuration Receiver Clock		
GPS Week: 2124 GPS Seconds: 377252 UTC: 8:47:24.00		
Satellite Information Satellites Tracked (42):		
Data Record GPS(9): 10,12,15,18,20,21,24,25,32 GLONASS(7): 6,7,8,10,16,22,23		
BDS(17): 1,2,3,4,5,6,7,8,9,12,13,16,19,2 GALLIEO(9): 1,4,9,11,12,19,21,31,36		
I/O Configuration Q255(0). None SBAS(0). None		
Internet Service Satellites Used (42):		
GPS(9): 10,12,15,18,20,21,24,25,32 GLONASS(7): 6,7,8,10,16,22,23		
Firmware Upgrade EDS(17) 1,2,3,4,5,6,7,8,9,12,13,16,19,2 GALLECO(9): 1,4,9,11,12,19,21,31,36 0.2700/01 1,2,3,4,5,6,7,8,9,12,13,16,19,2 GALLECO(9): 1,4,9,11,12,19,21,31,36		
User Management		
DOP DOP		
PDOP: 0.778073 HDOP: 0.408121 VDOP: 0.662446 TDOP: 0.406643		

4.2 Checking the receiver status

Click **Status**->**System Information**, **Status** or **Position information**, you can check the corresponding receiver status, including:

- System information: IP address, SN, Firmware Version, Web Version etc.
- Status: work mode (Base or Rover), Disk Capacity etc.
- Position Information: GNSS constellation system tracked etc.

System Info	rmation	Status		
Deserves Trees	MOOD Dive	Work Mode :	Base	
Receiver Type.	M300 Plus	Temperature :	25℃	
Serial Number:	S4904712115241	Runtime :	0d/1h/19m/35s	
MAC:	80:86:db:d0:2b:15		Internal Memory	External Memory
Ethernet IP:	192.168.4.167		Used 128 M Free 30208 M	Used 0 M Free 0 M
Firmware Version:	MS20200111S29			
Board Version:	K707:399U6-2.071-2			
Web Version:	web8.0			

4.3 Receiver Configuration

Use *configuration* menu to do basic configurations of your receiver.

4.3.1 General Config

There are 2 work modes you can choose:

- Base station: configure the receiver as a Base station, you can change its settings in *Base Setup* menu
- Rover: setting the receiver as a rover, and *Base Setup* menu is not available for rover mode.

Also, active the external input/output as 1pps, please enable Event Marker and External clock only when the external clock or events are connected.

eneral con	iig		
ode Setting			
Work Mode:	Base		~
1PPS:	1		
Event In:			
External clock:			
	Enter	Cancel	

4.3.2 Antenna Setup

Enter the proper values of marker name and antenna height (height limited 0 to 6.5535m), select the antenna type and measurement method.

Antenna Set	up	
Marker Name:	comnav	APC
Antenna Type:	CNTAT350 NONE	но 1
	Antenna Type	
Antenna Height:	2.345 [m]	ARP "
measure method:	To the bottom (standard)	
	Enter	1111111111

4.3.3 Base setup

After setting the work mode as base station, the *base setup* menu is available for you. However, you can change the base setup only when it's on *manually start station* mode with *stopped* status.

To configure the base station:

- Change base start mode from *automatically to manually* -> press *enter*, ensure that Base Start Mode is on manual
- Press *Stop* to restart editing
- Then input coordinates of known sites, or press *Get Position* button to get coordinates of the current position
- Set proper base station ID based on your project planning
- Change base start mode from *manually to Automatically*, then click *Start* to active configuration

Base Setup							
Lon:	121	0	17	'	32.87109	" 🖲	ЕOW
Lat:	31	0	21	'	0.01464	" 🖲	N O S
Alt:	35.784	3				[m]
	Get	Pos	sition				
Base Station ID:	161						Set up
Status:	Stoped	1					
Base Start Mode:	Autom	acti	cally sta	art s	tation	~	
	Ente	r	Car	ncel			

4.3.4 Satellite Tracking

Select SBAS and smooth pseudorange, setup the mask angle and select the types of the tracking signal based on surveying requirements.

S: WAAS	Smooth Pseudorang	e : ON 🛛 🖌 Mask Angle	e: 10 degree
Туре	on-off	Signal	 Image: A second s
		L1-C/A	 Image: A set of the set of the
GPS	ON 🗸	L2-C/P	 Image: A set of the set of the
		L5	~
GLONASS	ON Y	G1P	×
ocon noo		G2P	 Image: A set of the set of the
		B1	
		B2	
BDS	ON V	B 3	
		B1C	
		B2A	×
		B2B	Image: A start of the start
		E1	×
GAL	ON Y	E5-A	~
		E5-B	×
	a	AltBOC	~
		L1	×
QZSS	ON V	L2C	 Image: A set of the set of the
		L5	1

4.3.5 Receiver Utility

In this section, you can control M300Plus remotely, including:

- Clean EPH: delete ephemeris information saved in the receiver
- Reboot: Restart the receiver
- Power Off: Turn off the receiver
- Factory Default: recover the receiver to factory default setting

lean EPH	
Reboot	Power Off

4.3.6 Running Log

Download user/system log to local;

- User Log contains power on/off, search satellite completed, TCP changed, data record changed, email alert, OEM status
- System Log contains system warning and system info.

log setting	
Download Log	
Download User Log	Download System Log
Power off Power off Search satellite compl TCP changed Data Record changed Email alert OEM status Enter	leted

4.3.7 Default Language

Two language options are available: Chinese/English

Default Lang	juage		
Default Language:	English		~
	Enter	Cancel	

4.4 Satellite Information

Satellite information menus provide you an overall view of satellite tracking details, including Tracking Table, Tracking Chat and Sky View. You can enable/disable GPS, BDS, GLONASS, GAL, QZSS and SBAS (WAAS/SDCM/EGNOS/MSAS/GAGAN) satellites' display without stopping tracking status.

These displays refresh every 5 seconds, always keeping satellites information up to date.



4.5 Data Record

Use the *data record* menu to set the storage mode (internal/external) for surveying date, and download data to your office computer, especially for the remote receiver

control.

4.5.1 Recording Config

Information is showed below:

- Internal Memory: 32 GB, 1 Hz sample frequency could be used for 8-month record.
- External Memory: If set as external memory without inserting a USB drive, it will be prompted with a message that "Storage space is overrun. Please set according to the notes".
- Show record name, status, data format, record mode and operation in table, click **Setting** button to configure the data recording settings.

CAUTION - Please be careful to click the *Format Disk* button. It will empty all your data files in M300Plus.

	Location	Capacity	Free Storage	e	Operation	on
	Internal Memory	30336M	30207M		Format D	isk
	External Memory	OM	OM		Format D	isk
NO.	Record Name	Status	Data Format	Ν	Node	Operation
1	test1	Unrecorded	CNB	Manua	Recording	Setting
2	test2	Unrecorded	CNB	Manua	Recording	Setting
3	test3	Unrecorded	CNB	Manua	Recording	Setting

NOTE : System reserved the 400M storage space(Internal Memory)

To configure the data recording settings, please make sure that recording mode is on *manual* with *unrecorded status*.

Setting options are showed below:

- Record Name: Support only number or letter
- Storage Option: Choose storage location to internal memory or external memory
- Sample Interval: Choose sample frequency, support0.05\0.1\0.2\0.5\1\2\5 \15\30\60 S.
- File Split: Choose file split, support every 15 minutes or 1\2\4\24 hours to save a file. If you select 24 as file split, it will create two data files when it occurs to 24 o'clock (UTC Time). One is from start time to 24 o'clock, another is from 0 o'clock to end time.
- Data Format: Support CNB\ Rinex2.10\Rinex3.02\ Rinex3.04.
- Compression: Because RINEX data may be very large, when choosing to store RINEX data, provide compression options. But the compression option only

exists in the first storage area.

- Loop: When storage is full, Yes means delete earliest data and store continually, No means stop recording
- Storage Space: Separate storage space in internal memory\external memory
- Mode: Support manually and automatically recording mode.

Status	Unrecorded			
Record Name:	test1			
Storage Option:	Internal Memory	External Memory		
Sample Interval:	1		~ [S.]	
File Split:	1h		~	
Data Format:	CNB RINEX2.1	10 RINEX3.02	RINEX3.04	
Compression:				
Loop:	Yes No			
Storage Space:	150		MB	
Mode:	Manual Recording		~	

4.5.2 FTP Push Setting

FTP push can send data to another FTP server through the FTP address. You can click **Setting** button to configure the FTP push feature.

FTP Pu	ish Setting			
NO.	Host	Remote Folder	Push Data	Operation
1	ftp://0.0.0.0:0		Internal Memory/	Setting
2	ftp://0.0.0.0:0		Internal Memory/	Setting
3	ftp://0.0.0.0:0		Internal Memory/	Setting

Setting options are showed below:

Use: Check USE checkbox to enable FTP push feature Host: The FTP address and port of specified FTP server Remote Folder: Create a new folder to save the transferred data Data Source: Choose data in internal memory or external memory Push Data: Choose the data you want to push Username and Password: username and password of another FTP server

Use :	\checkmark		
Host :	192.186.1.167	: 8888	
emote Folder:	comnav		
Data Source:	Internal Memory	External Memory	
Push Data:	test1 ~	3	
Username:	admin		
Password:			

4.5.3 Data Download

You can download internal data files through a web server, USB drive or FTP.

1. Data download through a web server

Firstly, select data source (Internal or external memory), folder name, file type (CNB\ Rinex3.04\Rinex3.02\Rinex2.10) and date. Then click *Get Data*, you will see data files meet the demand. Click *Download* icon to download the data file you need, or click *Delete* icon to delete this file.

ata Do	ownlo	bad								
Data Sou	irce:	Interna	I Memory	External Memor	у					
Folde	r.	3-test3	-		~					
File Typ	e:	CNB	RINEX2.10	RINEX3.02	RINEX3.0	4				
Select Date :		2020-09-2	25							
		Get Da	ta							
Check	Itme		Fi	le Name		S	ize		Dat	a
	1		123456	2690833.CNB		71.4	44KB		Download	Delete
	5 Rov	All	Delete	First La	st Next	End	Jump	1	/1Pages	

2. Data download through a USB port

Use Lemo to USB cable to connect M300Plus with your office computer, internal memory will be identified automatically as a removable disk. Double click to open disk, and copy raw data files out.

3. Data download through FTP

Input FTP address in your browser, for example: ftp://192.168.1.236. Then download

your files.

単純物で使用。	WHERE ADDRESS TANKS (1977) and ADDRESS (1977)
(+) (2) (ftp://192.168.3)	1.236/data/2-RecUsr2/2018081/ 🔎 - 🔊 🎯 FTP directory /data/2-RecU ×
FTP directory	/data/2-RecUsr2/2018081/ at 192.168.1.236
To view this FTP sit	e in File Explorer: press Alt, click View, and then click Open FTP Site in File Explorer.
<u>Up to higher level d</u>	irectory
03/22/2018 01:00AM 03/22/2018 01:59AM 03/22/2018 02:59AM 03/22/2018 04:59AM 03/22/2018 04:59AM 03/22/2018 05:59AM 03/22/2018 07:59AM 03/22/2018 07:59AM 03/22/2018 07:59AM 03/22/2018 10:59AM 03/22/2018 11:59AM 03/22/2018 12:59PM 03/22/2018 03:59PM 03/22/2018 03:59PM 03/22/2018 05:59PM 03/22/2018 05:59PM 03/22/2018 07:59PM 03/22/2018 07:59PM 03/22/2018 07:59PM 03/22/2018 07:59PM 03/22/2018 07:59PM 03/22/2018 07:59PM 03/22/2018 07:59PM 03/22/2018 07:59PM 03/22/2018 07:59PM 03/22/2018 07:59PM	9, 289, 412 12345601000. cmb 8, 542, 916 1234560810200. cmb 9, 442, 748 1234560810200. cmb 9, 275, 442 1234560810500. cmb 9, 207, 940 1234560810500. cmb 9, 207, 940 1234560810500. cmb 9, 215, 756 1234560810800. cmb 8, 620, 388 1234560810900. cmb 8, 620, 388 1234560810900. cmb 8, 620, 388 1234560811000. cmb 8, 620, 388 1234560811000. cmb 9, 220, 828 1234560811200. cmb 9, 220, 828 1234560811200. cmb 9, 220, 828 1234560811200. cmb 9, 220, 828 1234560811300. cmb 9, 206, 824 1234560811300. cmb 9, 906, 884 1234560811300. cmb 9, 906, 884 1234560811300. cmb 9, 907, 036 1234560811200. cmb 8, 637, 932 1234560812200. cmb 8, 637, 932 1234560812200. cmb

4.6 I/O Configuration

There are two ways to transfer raw data from the M300Plus receiver to your office computer, LAN ports or serial ports. Serial ports support RS232 (com1, DB9 port) and RS485 (com2, Lemo port) protocol; the LAN ports support TCP and Ntrip protocol.

Туре	Port	Data Flow	Operation
сом	LEMO	Raw Observeation Data	Setting
сом	COM	Raw Observeation Data	Setting
TCP/IP 1	1211	Correction Data	Setting
TCP/IP 2	1121	Raw Observeation Data	Setting
TCP/IP 3	1122	Raw Observeation Data	Setting
NTRIP Server 1	-	Correction Data	Setting
NTRIP Server 2	67	Correction Data	Setting
NTRIP Server 3	-	Correction Data	Setting
NTRIP Client	-	-	Setting
NTRIP Caster	4567	2	Setting

4.6.1 Serial Port Config

The data will output from the Lemo or COM port of the receiver when you complete the serial port settings. Select proper baud rate and data flow, and click *Enter*, the corresponding serial port will output data. The format of Data flow includes:

- Raw observation data: ComNav binary format raw data
- Correction data: format from RTCM
- Navigation data: GPGGA and GPZDA message

Port Configuration	Port Configuration
LEMO	СОМ
Serial Port	Serial Port
Baud Rate : 115200 V Odd/Even : ODD V	Baud Rate : 115200 🛩 Odd/Even : ODD 🛩
Data Flow	Data Flow
Raw Observeation Data	Raw Observeation Data
	RAW-EPH: OFF V RANGECMPB: OFF V
Enter Cancel	Correction Data RTCM3.2 V
	1005: 1s v 1007: 1s v 1033: 1s v 1074: 1s v
	1084: 1s v 1124: 1s v 0063: OFF v 1006: OFF v
	1019: OFF V 1020: OFF V 4011: OFF V
	☑ Navigation Data
	GPGGA: 1s V GPZDA: 1s V
	Enter Cancel

COM--- COM1, RS232 (DB9 port), Lemo—COM2, RS485 (Lemo port)

4.6.2 TCP/IP Config

Dataflow can be transferred via the internet by using TCP Server or TCP Clients. TCP Server: Any user can receive the data through TCP Clients protocol TCP Clients: Send data to the specified IP address and port For data flow:

- Correction data: Choose the format and the corresponding message
- Navigation data: GPGGA message
- Raw observation data: ComNav binary format raw data
- Direct connection: Please refer to 4.6.2.1 Direct connection model

Port Configuration	Port Configuration
TCP/IP 1 1211	TCP/IP 1 1211
TCPServer TCP 192.168.4.167 : 1211	TCPClient TCP 192.168.4.167
☐ Client ☑ Active	☑ Client ☑ Active
Data Flow Correction Data RTCM3.2	Remote IP: 211.144.120.104 : 8888
1005: ON V 1007: ON V 1033: ON V 1074: ON V	Data Flow Correction Data YRTCM3.2
1084: ON V 1124: ON V 1042: ON V 1006: OFF V	1005: ON V 1007: ON V 1033: ON V 1074: ON V
1019: OFF - 1020: OFF - 1045: OFF - 1046: OFF -	1084: ON Y 1124: ON Y 1042: ON Y 1006: OFF Y
1094: OFF 🗸 1095: OFF 🖌 4011: OFF 🖌 1230: OFF 🖌	1019: OFF > 1020: OFF > 1045: OFF > 1046: OFF >
1075: OFF - 1085: OFF - 1125: OFF - 1044: OFF -	1094: OFF > 1095: OFF > 4011: OFF > 1230: OFF > 1075: OFF > 1085: OFF > 1125: OFF > 1044:
1114: OFF 🛩	1114: OFF ~
Enter Cancel	Enter Cancel

4.6.2.1 Direct connection model

The M300Plus provides a more machine friendly method for users to check and configure receivers by TCP/IP. This function only can be used in TCP/IP1.

- Enable *Active* button
- Enter TCP server port
- Select Direct connection in data flow
- Click *Enter* button

Port Co	onfiguration	
TCP/IP 1 12	11	~
TCPServe	r TCP 192.168.4.16	7: 1211
	Client	
	Active	
Data Flow	Direct connection	✓
Notic	e:The receiver wi	ll be in debug mode,it won't work properly. Please reboot it when you finished.
Enter	Cancel	

Then connect it by TCP Client in CRU software.

Connection Setting	js			×
C Serial Port	СОМ		*	
Ba	ud Rate	115200	*	
• TCP Client	Host	192.168.4	.167	
	Port	1211		
C Data File				
-				— 256 B/s
		<u>S</u> etup	<u>O</u> k	<u>C</u> ancel

For programmatic commands, Please refer to **5.1 Frequently used commands**.

4.6.3 Ntrip Config

The M300Plus can support Ntrip Client, Ntrip Server and Ntrip Caster protocols. You can acquire correction data from CORS through Ntrip Client protocol if setting the receiver as a rover. It is also very easy to transmit correction data as the base station by using Ntrip Server and Ntrip Caster protocols.

For a base station, you can broadcast correction data by using Ntrip Server protocol or the data forward software (supporting Ntrip Caster protocol, such as SinoGNSS's CDC+ software) running in the server. If you have a static IP address, you can use Ntrip Server and Ntrip Caster of M300Plus simultaneously to create a single reference station. This mode does not need any software to support, and is very convenient for using.



Tips: You need to uncheck all **Active** (Client, Server and Caster), and click **Enter** button to disconnect them before you configure this interface.

1. Ntrip Client

Before setting the Ntrip Client, you should configure the receiver as Rover mode.

- Enable *Active* button
- Enter IP address, Port, User name and Password of CORS
- Click Get List to acquire the Mount Point list
- Choose one of mount point and click *Enter* button, you will receive correction data from CORS.

NTRIP Client		\sim	
NTRIP Client			
Status:	Disconnect		
Active:			
Ntrip Version:	NTRIPv1.0 ~		
Eagle Mode:			
CasterAddress:	211.144.120.104	8888	
User:	comnav		
Password:	•••••		
Maximit Delints			Y Cat List

Click *position information* in *Status menu* to check the rover's status, and position status should be Fixed.

Position Info	ormation				
Location					
Lat: Ellipsoid:	31°20'59.99189"N WGS-84	Lon : Position Status:	121°17'32.90253"E Fixed	Alt: 3	38.067[m]
Receiver Clock					
GPS Week:	2125	GPS Seconds:	292318	UTC: 9	9:11:40.00
Satellites Tracked	d (38):				
GPS(9):	10,12,15,18,20,21,2	24,25,32	GLONASS(6):	4,5,6,14,15,16	a)
BDS(16):	1,2,3,4,5,6,7,8,9,10	,13,16,21,2	GALILEO(7):	3,5,9,15,24,25	i,31
QZSS(0):	None		SBAS(0):	None	
Satellites Used (3	38):				
GPS(9):	10,12,15,18,20,21,2	24,25,32	GLONASS(6):	4,5,6,14,15,16	
BDS(16):	1,2,3,4,5,6,7,8,9,10	,13,16,21,2	GALILEO(7):	3,5,9,15,24,25	i,31
QZSS(0):	None		SBAS(0):	None	
DOP					
PDOP:	0.847793	HDOP: 0.426658	VDOP: 0.73260	9 TD	OP: 0.466213

2. Ntrip Server

Before setting the Ntrip Server, you should configure the receiver as *Base mode*, also select correction data format as RTCM3.0 or RTCM3.2 (recommended). Then start Ntrip Server configuration:

- Enable *Active* button
- Enter the server IP address as Ntrip Caster address and Ntrip Caster port. As the example showed above, our company's server is under running: 211.144.120.104: 8888
- Set custom username and password (Username and password of our server can be anything you choose).
- Mount point: Ntrip caster mount point
- Correction: Choose the format and the corresponding message
- Click *Enter* button, you will transmit the correction data to server.

NTRIP Server 1		~						
NTRIP Server								
Status:	Disconnect							
Active:								
Ntrip Version:	NTRIPv1.0 ~							
CasterAddress:	211.144.120.104	8888						
User:	comnav							
Password:	•••••							
Mount Point:	COMNAV							
Correction RTCM3	.0 ~							
1004: ON 🔽 1	005: ON V 1012: ON	V 1033: ON V						
1006: <mark>ON </mark> 1	007: OFF 🖌 1019: OF	F 🗸 1020: OFF 🗸						
1104: OFF 🗸								
Enter	Cancel							

3. Ntrip Caster

M300Plus can also work as a single reference station and send correction data through Ntrip Caster protocol. You need to configure both Ntrip Server and Ntrip Caster when you use this protocol. The setting is shown below:

1. Configuration of Ntrip Server:

- Enable *Active* button of Ntrip Server
- Set the Ntrip Caster address and Nrtip Caster port; this IP address is the same as M300Plus IP address, and the port should be mapped by router.
- Enter custom username and password
- Access point: the Ntrip Caster mount point
- Press *Enter* to save the configuration
- 2. Configuration of Ntrip Caster:

Enable **Active** button of Ntrip Caster

- Enter port, this port should be same with Ntrip Server
- Enter Username and Password, this Username and Password should be also same with Ntrip Server
- Press *Enter* to save configuration

All configurations of Ntrip Caster Protocol are shown above, then you can use a rover to get correction data.

NTRIP Caster		~	
NTRIP Caster			
Status:	Disconnect		
Active:			
NtripCaster Port:	4567		
User:	comnav		
Password:	•••••		
Entor	Cancol		

4.7 Internet Service

4.7.1 Ethernet Config

Use the *Ethernet Config* menu to set IP Setting, IP address, subnet mask, default gateway and DNS. After changing those settings, you need to change your computer's IP address and relogin configuration webpage based on the new IP address.

IP Setting:	Static IP					~
IP Address:	192	. 168	-	4	. 167	
Subnet Mask:	255	. 255		255	- 0	
Default Gateway:	192	. 168		4	. 1	
DNS1:	0	. 0	-	0	. 0	
DNS2:	0	. 0	-	0	. 0	

You can choose IP Setting as DHCP(Dynamic Host Configuration Protocol). And set a device name. After pressing *Enter* button, M300plus will randomly generate a new valid IP address.

Ethernet Co	onfig		
IP Setting:	DHCP		~
Device:	comnav		
	Enter	Cancel	

4.7.2 WIFI Config

After setting WIFI Config, you can search the WIFI of this M300plus. After connecting to WIFI, you can log in to the web interface through the IP address you set.

- Two mode options are available: AP/Shut down. When you want to turn off this feature, you can select the mode as *Shut down*.
- MAC and SSID are default values and cannot be changed. SSID is also the WIFI name.
- Password: WIFI password
- IP Address: Set the IP address that can log in to the web interface

Press *Enter* to save the configuration

WIFI Config		
WIFI		
Mode:	AP	~
MAC:	0:0:0:0:0):0
SSID:	COMNAN	/_M300PRO_5241
Password:	*****	***
IP Address:	192.168	.12.12
	Enter	Cancel

4.7.3 Port Forwarding

A port forward is a way of making a computer on your home or business network accessible to computers on the internet.

In fact, the router has rules to send your request on particular ports to a certain host (defined by you). Servers listen for incoming connections on certain ports but without telling your router where to send these connections they will never arrive. Port forwarding sets up your router to correctly redirect external inbound service requests to the correct internal computer on your network. After that, when you try to connect by ip and port, router will follow the rules, then everything will goes fine. You can set HTTP and FTP ports to log in to the web interface and ftp interface.

	ang	
HTTP Port :	80	
FTP Port :	21	
	Enter	Cancel

4.7.4 PPP Dial Setting

When you use a SIM card, you must enable this feature. It is best to insert the SIM card before turning on the power, and connect the 4G antenna.

- Check *Enable* checkbox to enable PPP dial
- Carrier Operator: choose the carrier operator of your SIM card. If there is no option you want to choose, you can choose *Definition By Yourself*.
- VPN: Enter VPN according to the carrier of your SIM card.
- UseName and Password: Username and password of your SIM card

Press *Enter* to save the configuration

PPP Dial Setti	ing
Status:	
Signal Intensity:	۳×۱۱
SIM Status:	Search SIM Card
Dialing	Dial-up Not Started
IP:	0.0.0.0
Params:	
Enable:	
CarrierOperator:	Definition By Yourself
APN:	3GNET
UserName:	admin
Password:	•••••
	Enter Cancel

When *Status* becomes as shown in the figure below, it means the dialing is successful.

Status:	
Signal Intensity:	¥
SIM Status:	SIM Card Ready
Dialing:	Dial Successfully
IP:	10.34.95.101

4.7.5 DDNS

Dynamic DNS (DDNS) is a method of automatically updating a name server in the Domain Name System (DNS). M300plus has built-in Dynamic DNS capabilities, which means that it is capable of sending an update to your DDNS account when your IP address changes. After registering the DDN account, you can set it up in M300plus. Before setting, you should ensure network cable is connected and routing setting is eth0 now. Importantly, you need to register a DDNS account.

- Check **Boot** checkbox to enable DDNS
- Choose your DDNS Service, M300plus supports no-ip, dyndns and freedns.
- Input your Username, Password and Domain name.
- Click *Enter* to active DDNS feature.

After setting, you can input Domain Name in the browser to remote check the webpage of M300plus. (When using this function, do not let the remote device and M300plus be in the same LAN.)

DDNS Status:	Boot	
DDNS Service:	default@no-ip.com	~
Domain Name:	m900test1.ddns.net	
Username:	hnycgmj@gmail.com]
Password:	•••••	
	Enter	

4.7.6 natapp and Ngrok

Network Address Translation (NAT) is the process where a network device, usually a firewall, assigns a public address to a computer (or group of computers) inside a private network. Ngrok exposes local servers behind NATs and firewalls to the public internet over secure tunnels. After registering the Ngrok or natapp account, you can set it up in M300plus.

Before setting, you should ensure PPP dial is set successfully and routing setting is ppp0 now.

- Check **Boot** checkbox to enable ngrok
- Input Domain Name and authtoken.
- Click *Enter* to active Natapp/ ngrok service.

ngrok Status:	☑ Boot
Domain Name:	
authtokon	
autitoken.	

4.7.7 Routing Setting

The routing setting provides a function to select the main network source. It is also possible to switch the network source automatically. Currently only supports switching from SIM card to network cable.

- Routing strategy: M300plus supports default and customize.
- Main route: eth0 means using the network cable first, ppp0 means using SIM card first.(If you want to use SIM card, please set PPP dial first)

When routing strategy is default, main route defaults to the network cable and can't change. If you want to use SIM card first, you just need to set routing strategy as customize and main route as ppp0.

Routing Con	fig		Routing Con	fig	
Routing strategy:	default	~	Routing strategy:	Custom	nize∨
Main route:	eth0	~	Main route:	eth0	~
				eth0	
	Ent	er		ppp0	

4.7.8 Email Client

Before setting a Email Client, open your mail client SMTP authorization firstly, then set SMTP Server, SMTP Port, Email Address and password. Enable Enter button to save configuration.

Email Client	
SMTP Server:	smtp.163.com
SMTP Port:	25
Email Address:	support@comnavtech.com
Password:	•••••
	Enter

4.7.9 Email Alert

After set the Email Client, you can add no more than 3 email addresses to receive M300Plus's alarm, including Power on/External Power Break/Battery low/FTP Push Failed/Code expired.

Email Alert		
Boot Receiver Info		
Email Address1:	support@comnavtech.com	
	Add	
Alarm Content		
 ✓ Power on ✓ External Power E ✓ FTP Push Faild 	Break	
Code expired(3 of	days in advance)	
Enter		

4.8 Firmware Update

You can update the system firmware, board firmware and front panel firmware in this menu.

Select system, board or front panel upgrade according to your demand, then click *Browse* to select the latest firmware version. Click *Install*, a progress bar shows 0 to 100% and status will be "Not allowed to do other operations during the upgrade". When completing firmware update, the receiver will restart automatically and information prompted below:

System I	Firmware	Information	
Firmware	Version:	MS20200111S29	
System	Upgrade		
Firmwa	re Path:	Firmware-M300Plus-MS20200111S29.zip	Browse
		Install	
Sta	tus:		
mware Up	grade		
r mware Up stem Firmware	grade	n	
rmware Up stem Firmware	grade Information MS2020011	n 11529	
rmware Up stem Firmware rmware Version: stem Upgrade	grade Information MS2020011	n 11529	
rmware Up stem Firmware mware Version: stem Upgrade Firmware Path:	grade Information MS2020011 Firmware-N	n 11S29 M300Plus-MS20200111S29.zip Browse	
rmware Up stem Firmware mware Version: stem Upgrade	grade Information MS2020011 Firmware-M	n 11S29 M300Plus-MS20200111S29.zip Browse	
rmware Up stem Firmware mware Version: stem Upgrade irmware Path: Status:	grade Information MS2020011 Firmware-N Install The firmwa	n 11S29 M300Plus-MS20200111S29.zip Browse are is being upgraded, please wait	
rmware Up stem Firmware mware Version: stem Upgrade irmware Path: Status:	grade Information MS2020011 Firmware-N Install The firmwa	n 11S29 M300Plus-MS20200111S29.zip Browse are is being upgraded, please wait	

4.9 User Management

Use user management menu to add, delete users or edit limits of authority.

I User				
Name	Limits of Authority	Status	Opera	tion
admin	Adminstrator	Online		Edit
quest	Ordinary User	Offline	Delete	Edit

Click **Add User** button, enter the name, password, and choose limits of authority, then click **Enter**, you will add a user successfully. The maximum number of user is 100.

	17		
Name:			
Password:			
rassword.			
Limits of Authority:			

5. Programmatic Interface

This section describes a method of controlling M300Plus receiver through programmatic commands. It provides a more machine friendly method for users to check and configure receivers, such as base/rover, NMEA data output. Please read these tips before sending commands to your M300Plus receiver.

- Select and send proper commands, all commands are case insensitive: Log version=LOG VERSION
- Press *Enter* button at the end of every command to check receivers' feedback information or input another command
- For More detailed programmatic commands, please refer to ComNav OEM CARD REFERENCE MANUAL

WARNING-These commands are only suitable for COM1. The COM2 and COM3 are connected to the web interface, please do not change the baud rate and the data output of these two ports.

5.1 Frequently used commands

• Check Version Information

log version // Version information about the board

```
<VERSION COM1 0 60.0 UNKNOWN 1869 200404.500 00000000 0000 1114
< 1< GPSCARD "S32030K708" "02801074" "CRDK-708AA-TTT-0" "2.20R-
2.032-1" "5.000" "2015/Aug/25" "17:27:16"
OK!
OK!
Command accepted! Port: COM1.</pre>
```

• Check Port Information

log com configa // Information of the port.

response ====================================								
= COM1 115200	0	8	1	0	0	1	1	1
COM2 921600	0	8	1	0	0	1	1	1
COM3 115200	0	8	1	0	0	1	1	1
1 COM4 115200	0	8	1	0	0	1	1	1

• Change the serial port baud rate

com com1 9600// Change the baud rate of com1 to 9600

• Check System Information

log sysconfiga //All the configuration of the system can be viewed by this command.

• Check the Output data Information

log loglista//View the output data information about all the ports.

```
<command>
log loglista
</command>
#LOGLISTA, COM1, 0, 60. 0, UNKNOWN, 1869, 201015. 800, 00000000, 0000, 1114:
COM2, RAWEPHEM, BINARY, ONCHANGED, 1. 000,
COM2, BESTPOS, BINARY, ONCHANGED, 1. 000,
COM2, BD2EPHEM, BINARY, ONCHANGED, 1. 000,
COM2, PSRDOP, BINARY, ONTIME, 1. 000,
COM2, BD2RAWEPHEM, BINARY, ONCHANGED, 1. 000,
COM2, GSEPHEM, BINARY, ONCHANGED, 1. 000,
COM2, GLOEPHEMERIS, BINARY, ONCHANGED, 1. 000,
COM3, GPGGA, ABBASCII, ONTIME, 1. 000,
COM3, GPGSV, ABBASCII, ONTIME, 1. 000,
COM3, GPZDA, ABBASCII, ONTIME, 1. 000,
COM3, GPZDA, ABBASCII, ONTIME, 1. 000,
```

Lockout/unlockout satellite system

Command	Description			
(un)lockout bd2	(un)lockout Beidou system			
(un)lockout gps	(un)lockout GPS system			
(un)lockout GLONASS	(un)lockout Glonass			
Unlockoutall	Unlock all GNSS system			

• NMEA data output

The serial port is for COM1, you can output any NMEA data through COM1.

For example:

log com1 gpgga ontime 1 log com1 gpgsv ontime 1

• Raw data output

Log com1 rawephemb onchanged //Output GPS ephemeris Log com1 glorawephemb onchanged //Output Glonass ephemeris Log com1 bd2rawephemb onchanged //Output Beidou ephemeris Log com1 galephemerisb onchanged //Output Galileo ephemeris

Log com1 rangecmpb ontime 1//Set com1 output *cmp*¹ data, the frequency is 1Hz. Saveconfig //Save configuration

Base setup & Rover setup

Output/Input correction data from serial port(com1). For base(RTCM3): fix auto log com1 rtcm1004b ontime 1 //Extended L1&L2 GPS RTK Observables log com1 rtcm1104b ontime 1 //Extended B1, B2, B3 BD2 RTK Observables log com1 rtcm1012b ontime 1 //Extended L1&L2 GLONASS Observables log com1 rtcm1005b ontime 5 // Base station coordinate saveconfig //Save configuration For rover: interfacemode com1 auto auto on //Config com1 to detect RTCM corrections log com1 gpgga ontime 1 //Com1 output GPGGA data saveconfig //Save configuration

5.2 Commands related to external devices

5.2.1 Event marker

The M300Plus receiver supports the event marker function. Use the command *MARKCONTROL* to control the event functions.

Format

MARKCONTROL signal switch [polarity] [timebias [timeguard]]

Description

At present, *Signal* only supports *mark1, and Switch* supports *ENABLE* and *DISABLE*. *Polarity* supports *POSITIVE* (positive pulse triggering) and *NEGATIVE* (negative pulse triggering). Timebias and timeguard are not available currently.

Example

markcontrol mark1 enable negative 0 0

After configuration, you can save and check settings via command *saveconfig* and *logsysconfig*.

Output Messages

Markpos and *marktime* provide the position and accurate time of the event moment. The two messages support binary and ASCII formats, so the messages provide formats *markposa*, *markposb*, *marktimea* and *marktimeb*.

Examples

logcom1 markposa onnew logcom1 marktimea onnew

Once you trigger the Event signal connector, it will output the event information from the serial port(com1). The event information(marktime&markpos) will record the raw data once it is triggered if you have enabled the event function.

```
#MARKPOSA, COM1, 0, 60. 0, FINESTEERING, 1869, 266789, 692, 00000000, 0000, 1114; SOL_COMPUTED, FIXEDPOS, 3
1. 17449545000, 121. 38782552000, 47. 6820, 0. 0000, WGS84, 0. 1361, 0. 5493, 1. 3065, "0008", 99. 000, 658. 000
, 26, 26, 26, 26, 0, 0, 0, 25*3dd5ce03
#MARKTIMEA, COM1, 0, 60. 0, FINESTEERING, 1869, 266789. 692, 00000000, 0000, 1114; 1869, 266789. 692000000,
4. 895151192e-04, 8. 062574872e-04, -17. 00000001, WALID*8169c4d9
```

5.2.2 PPS output

The M300Plus receiver supports the PPS output. Use the command *PPSCONTROL* to configure the PPS output.

Format

PPSCONTROL <switch><polarity><period><pulse-width>

Description

This command can be used to set the polarity, period and pulse-width of PPS output.

Parameters

<*switch>*: switch 'enable' or 'disable', the switch should be set to 'enable', and 'disable' is not allowed.

<polarity>: Select 'positive' if with a high level pulse, and 'negative' mode if a low
level pulse.

<period>: fixed to 1 second

<pulse-width>: in microseconds, should be less than half of period.

Example

PPSCONTROL ENABLE POSITIVE 1 1000

5.2.3 10 MHz frequency input

This port is used for external clock input, and it can be an external atomic clock. Command: Set atom on/off // on: use the external atomic clock; off: use the internal atomic clock.

Appendix A: Advantages of Beidou B3 signal

ComNav technology is a high-tech company with CORE GNSS Positioning technology, in China. So we have a better understanding of Beidou signal, providing reliable receivers and positioning solutions for you. ComNav declares that Beidou B3 signal is only used for customers in China with its two advantages:

E-RTK: long baseline RTK(supper wide int solution), which can reach 100km distance. RTK initialization time and RTK stability: the Beidou B3 can improve the RTK fix time.