



# User Manual For Ntrip Modem TP688 Industrial Modem for Ntrip Corrections

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# 1. Introduction

This chapter mainly introduces the outlook, accessories, specifications and principle of TP688.

### 1.1 Brief Introduction

The Ntrip Modem TP688 is an industrial modem ideal for Ntrip corrections. It equips built-in industrial 4G wireless communication module, built-in 2600mAh battery, RS232 serial port, mounting handle, high-speed Internet access and high-speed data transmission ability. It is a cost-effective industrial wireless modem.

The TP688 supports Ntrip protocol, and it can be used in Ntrip server mode and Ntrip client mode. The Ntrip function is configured by RS232 serial port and text message.



Figure 1.1 Front side of TP688



# 1.2 Product Outlook



Figure 1.3 TP688 side view 2



## 1.3 Standard Accessories



Figure 1.4 4G antenna



Figure 1.5 DB9 female to USB Type A male converter cable



Figure 1.6 DC-2pin AC Power Adapter with 1.2m cable



## 1.4 Working Principle



Figure 1.7 TP688 working principle

After setting the IP (or domain name) and port of the data center for the TP688, the TP688 uses the 4G wireless network to dial up to the Internet, and then initiates the connection of the configured IP and port (the monitor port of the mServer). In addition, the user software system connects to the mServer through an interface such as a virtual serial port, thereby implementing wireless and two-way data communication from the user device to the user software system.

### 1.5 Specifications

### 1.5.1 Technical Specifications

Electrical	
Input Voltage	+5 ~ +36V DC
Operating Current	125mA @ +12V DC
Standby Current	90mA @ +12V DC
Power consumption	1.5W
(typical)	
Battery	2600 mAh
Charging time	3.5 hours
Operating hours (typical)	18 hours
Network	
Chinese version	2G: GSM/GPRS/EDGE/CDMA2000 1x
	3G:UMTS/WCDMA/HDSPA/HSPA+/TD-SCDMA/CDMA2000
	EVDO
	4G: TDD-LTE/FDD-LTE
Eurasian version (Europe.	2G: GSM/GPRS/EDGE

Table 1.1 Technical Specifications



Middle East, Africa, South	3G: UMTS/WCDMA/HDSPA/HSPA+
Korea, Thailand)	4G: TDD-LTE/FDD-LTE
North American version	3G: UMTS/WCDMA/HDSPA/HSPA+
	4G: FDD-LTE
Australian version (New	2G: GSM
Zealand, Australia, South	3G: WCDMA
America)	4G: FDD-LTE/TDD-LTE
Operating Frequency Ban	d
Chinese version	TDD-LTE B38/B39/B40/B41
	FDD-LTE B1/B3/B8
	UMTS/HSDPA/HSPA+ B1/B8
	TD-SCDMA B34/B39
	CDMA2000 1x/EVDO BC0
	GSM/GPRS/EDGE 900/1800 MHz
Eurasian version	TDD-LTE B38/B40
	FDD-LTE B1/B3/B7/B8/B20
	UMTS/HSDPA/HSPA+ B1/B8
	GSM/GPRS/EDGE 900/1800 MHz
North American version	FDD-LTE B2/B4/B5/B17
	UMTS/HSDPA/HSPA+ B2/B5
Australian version	FDD-LTE B1/B2/B3/B4/B5/B7/B8/B28
	TDD-LTE B40
	WCDMA B1/B2/B5/B8
	GSM 850/900/1800/1900
Interfaces	
Serial Port	RS232 x1
Antenna Connector	SMA Female x1
Power Connector	2pin LEMO
Physical	
Dimension	160x102x37mm (w/o connectors)
Weight	650g
Operating Temperature	-40℃ ~+85℃
Relative Humidity	95% @ +40℃

### 1.5.2 Indicator Description

Table 1.2 TP688	power	indicator	on	the fi	ront
-----------------	-------	-----------	----	--------	------

Location	Color	Description
The rightmost LED	Orange	Indicates DC power input.
The left four LEDs	Green	Press the small white button to indicate battery
		power level. It flashes when charging.



LED indicator	Color	Status	Description
		Steady bright	Connected to the data center
Online	Green	Extinguished	Not connected to the data center
Onine		Fast flash	Connecting to the data center
		Slow flash	Dialing
Troponit	Ded	Flash	Transmitting data / Standby
Transmit	Rea	Extinguished	No data transmitting

#### Table 1.3 TP688 LED indicator on the side

### 1.5.3 Serial Port Definition

Table 1	4 TP688	RS232	serial	port	nin	definition
	- 11 000	10202	Schar	port	pin	uchinition

Pin	Signal	Definition
2	TXD	Data out
3	RXD	Data in
5	GND	Ground

## 1.6 Typical Applications

The five typical applications of TP688 are presented as below.



Figure 1.8 TP688 multi ends to center





Figure 1.9 TP688 one end to multi centers



Figure 1.10 TP688 realizes point to point via mServer mapping



# 2. Configurations

This chapter introduces how to use TP688 and related parameters.

### 2.1 Configurations

#### 2.1.1 Accessories Required

The accessories required are listed below:

- 1) One DB9 female to USB Type A male converter cable;
- 2) One PC (Personal Computer);
- 3) One 12V power supply;
- 4) One SIM card which can access internet.

Set up for TP688 configuration following the figure below. Power up TP688 by plugging the power adapter to the local 100~240V AC plug and long press the power button.



No.	Name
1	Ntrip Modem TP688
2	4G antenna
3	DB9 female to USB Type A male converter cable
4	DC-2pin AC Power Adapter
5	Standard SIM card 15x25mm
6	Personal computer



Note:

- 1) TP688 can work both by plugging power adapter and built-in battery. The operating hours powered by battery can reach to 18 hours typically.
- 2) The 4G antenna can be bent 90 degrees.
- 3) The SIM card is the 15x25mm standard SIM card.

### 2.1.2 Configure TP688 through serial port

The Ntrip Modem TP688 can be configured through serial port by mDevice Batch Configuration Software or Tersus GNSS Center software.

2.1.2.1 Configure TP688 by mDevice configuration tool

The detailed steps of using mDevice Configuration software are as follows.

- 1) Unscrew the nut and open the dustproof cover, insert the SIM card (standard SIM card) into the TP688 modem.
- 2) Use the DB9 female to USB Type A male converter cable to connect the DB9 male connector of TP688 and the computer.
- 3) Right click [This Computer] -> [Manage] -> [Device Manager] -> [Ports (COM & LPT)], and find the port shown as below.

Ports (COM & LPT)
 Prolific USB-to-Serial Comm Port (COM3)
 Figure 2.1 COM port detected on the computer

- 4) Double click to run dtucfg2\_notm\_26.exe application.
- 5) Click the [Options] button on the top tool bar, modify the COM port number as the corresponding port of TP688, then click [OK].



mDevice Batch Configuration So	oftware				2.50	
	' 🙆 🍑 🛛		SI		0	
rt Config Stap Madify	Restore Update File Se	elete File Show Log	Options	About	Exit	
1 Coppost pDouis	to BC and coloct th	CON nort:		-	Ryport C	onf
2. Press "Start Co	onfig <sup>"</sup> button to conf	igure mDevice	and power	ംന	inport o	
mDevice in 30 seco	onds.	18dl O MDOVICO	ana power		Import C	onf
						1
mDevice IMEI:		mDevice Version:	1		Templat	:e
mDevice IMEI: 1. Item1	Settings	mDevice Version:	×	∏ Modify	Templat	:e
mDevice IMEI: 1. Item1 2. Item2	Settings	mDevice Version:	×	∏ Modify ∏ Modify	Clear	e
mDevice IMEI: 1. Item1 2. Item2 3. Item3	Settings COMM Port:	mDevice Version:	×	│ Modify │ Modify │ Modify	Templat Clear	:e
mDevice IMEI: 1. Item1 2. Item2 3. Item3 4. Item4	Settings COM Port:	mDevice Version:	×	│ Modify │ Modify │ Modify │ Modify	Clear	:e
mDevice IMEI: 1. Item1 2. Item2 3. Item3 4. Item4 5. Item5	COM Port:	mDevice Version:	×	│ Modify │ Modify │ Modify │ Modify │ Modify │ Modify	Clear	<u>.e</u>

Figure 2.2 Set COM port number

6) Click the [Start Config] button on the top, and power on TP688 in 30 seconds. The software pops out a window to input password. The default password is 1234, and it can be modified in the configuration password. This password is also the password of SMS configuration.

mDevice Batch Configuratio	n Software			- 🗆	
	Try Bartres IIsta		ક 💽 (		
Config Stop Mod	ify Restore   Update File Se	ete File Show Log Optic	ans About	Exit	
1. Connect mDevic	ce to PC and select the	e COM port;		Export Conf	
2. Press "Start (	Config" button to conf:	igure mDevice and	power on	<b>T 1 0 0</b>	
mDevice in 30 sec	conds.			Import Lonf	
mDevice TMET	5 <mark></mark> S	mDevice Version:		Template	
1 Thurst		mperioe relator.		1	
I. ITEMI	Input Password	×	Modify	Llear	
2. Item2			🥅 Modify		
3. Item3	Password:	_	🕅 Modify		
4. Item4			Modify		
5. Item5	0K [	Cancel	∏ Modify		
6. Item6					
7 Ttem7					
0 T. 0			Modify		
8. ltem8			Modify		
			- w 110		
9. Item9			Modify		

Figure 2.3 Input password



mDevice Batch Configuration S	oftware			
۸ 😥 🌔			ଓ 🎧 👩	
t Canfig Stop Modify	Restore Update File	Selete File Show Log Op	tions About Exit	
6. MOIDTE 1 - RTCM32 CCR /2 - RTCM30	1		Modify	
7. SELF DEFINED MOUNT:	jrjr	-	Modify	
8. DATA	1	-	Modify	
9. DATA CENTER 2 DN/IP	52. 82. 20. 179			
10. DATA CENTER 2 PORT	2180	-	- Modi fy	
11. DC2 USING mServer[Y/N]	v			
12 DC2 DATA	1	_	T modify	
SOURCE [O: NONE/1:COM1/2:COM2	μ		Modity	
13. DATA CENTER 3 DN/IP			∏ Modify	
14. DATA CENTER 3 PORT			∏ Modify	
15. DC3 USING mServer[Y/N]	У		Modify	
16. DC3 DATA SOURCE[0:NONE/1:COM1/2:COM2			Modi fy	
17. ACCOUNT		_	Modify	
18. APN		-	Modi fy	
19. PROTOCOL[UDP/TCP]	TCP	-	Modify	
20. OUTPUT STATUS[Y/N]	R	-		
21. DIAL ACCOUNT	, ctnet@nvcdma_cn	-		
22. DIAL PASSWORD	what make		- Madi fu	
23 CONFIGURATION PASSWORD	1024	-		
24 HEART BEAT INTERVAL	1234		modity	
24. IGARI DERI IMIENVAL(S)	60		Modify	

Figure 2.4 Modify configuration password

7) After you input the password, the software reads the original configuration of TP688 shown as below.



mDevice Batch Configuration So	ftware			- 0
art Config Stop Modify	Restore Update File Set	ete File Show Log Options	About (	D Exit
1 Connect mDewice	to PC and select the	COM port:		Export Conf
2. Press "Start Co	nfig″button to confi	gure mDevice and pow	ver on	
mDevice in 30 seco	nds.			Import Cont
mDevice IMEI:	240305004079961	mDevice Version: Wingson c	14 3 2 6	Template
1 NTRIP CASTER DN/IP ADDR	zth style sums con	I	T W. 3: fr	Clear
2 NTRTP CASTER PORT	rtk. htrip. qxwr. com		moarry	
3 MERENER ACCOUNT	0001		modify	
A APN			modify	
			Modity	
<ul> <li>A CONTRCT TURE [11 ()1 (T]</li> </ul>			Modity	
6. CONNECT TYPE(M/N/T)	N		Modify —	
7. REGISTER WHEN NOT MSERVER	ETUNG: 240305004079961 \x00		🔲 Modify	
8. HEARTBEAT WHEN NOT MSERVER			🥅 Modi fy	
9. OUTPUT STATUS	N		🥅 Modi fy	
10. DNS	j.		🥅 Modify	
11. DIAL ACCOUNT	ctnet@mycdma.cn		🥅 Modify	
12. DIAL PASSWORD	vnet.mobi		🥅 Modi fy	
13. ID	13901234567		🥅 Modi fy	
14. CONNECTION MODE[1:FOREVER/2:WAKEUP/3:D	1		🥅 Modi fy	
15. SERIAL TIMEOUT(ms)	20		🥅 Modify	
16. SMS WAKEUP PASSWORD	1234		🥅 Modify	
17. HEART BEAT INTERVAL(s)	0		🥅 Modi fy	
18. BAUD RATE(bps)	9600		🥅 Modify	
ły				NUM

Figure 2.5 The software read the configuration automatically

8) Modify the first and second item of the parameter list. Change the first item NTRIP CASTER DN / IP ADDR and the second item NTRIP CASTER PORT to the Ntrip Caster's IP and port, then check the checkbox before [Modify].



mDevice Batch Configuration Soft	ware			- 0	
L Canfig Stop / Modify	Restore Update File Sele	te File Show Log Options	About	0 Exit	
1		001		Russing Conel	
1. Connect mDevice	to PC and select the	CUM port; guma mDavias and nav	(0.14 OT)	Export Conr	
z. riess start con mDevice in 30 secor	nig button to conn nds.	gure mpevice and pow		Import Conf	
-D		n i v. i v		Template	
mDevice IMLI.	240305004079961	mDevice version. MD649D_G	X 3.2.6		
1. NTRIP CASTER DN/IP ADDR	rtk. ntrip. qxwz. com	ххххх	🔽 Modify	Clear	
2. NTRIP CASTER PORT	8001	XXXXX	🔽 Modify		
3. MSERVER ACCOUNT			Modify		
4. APN	· · · · · · · · · · · · · · · · · · ·		🗔 Modi fv		
			Modily		
6. CUNNECT TIPE[M/N/T]	N		🥅 Modify		
7. REGISTER WHEN NOT MSERVER	ETUNG: 240305004079961 \x00		🥅 Modify		
8. HEARTBEAT WHEN NOT			🥅 Modi fy		
9. OUTPUT STATUS	N		🕅 Modify		
10. DNS		-	🖂 Madi fu		
			F w No		
II. DIAL ACCOUNT	ctnet@mycdma.cn		Modity		
12. DIAL PASSWORD	vnet.mobi		🔲 Modify		
13. ID	13901234567		🥅 Modify		
14. CONNECTION	1		🕅 Modify		
15. SERIAL TIMEOUT (ms)	20		∏ Modify		
			1		

Figure 2.6 Modify IP and port of the data center

9) Configure the RS232 baud rate as 115200 bps, fill in the correct Ntrip account, Ntrip password and self-defined mount point. Then check the checkbox before [Modify].



mDevice Batch Configuration Sof	tware		3 <u>-</u>	
Start Config Stop	Restore Update File	Selete File Show Log Options	About Exit	
<ol> <li>SERIAL TIMEOUT(ms)</li> <li>SMS WAKEUP PASSWORD</li> <li>HEART BEAT INTERVAL(s)</li> </ol>	20 1234 0		└ Modify └ Modify └ Modify	^
18. BAUD RATE(bps)	9600	115200	🔽 Modify	
19. DATA BITS[5/6/7/8] 20. PARITY[N/E/0/M/S] 21. STOP BITS[1/1.5/2]	8 N 1		│ Modify │ Modify │ Modify	
22. NTRIP ACCOUNT 23. NTRIP PASSWORD			₩ Modify Wodify	
24. MOUNT[1:RTCM32_GGB/2:RTCM30 25. SELF-DEFINED MOUNT:	1		☐ Modify ✓ Modify	
26. NTRIP TYPE[1:Client/2:Server] 27. NTRIP HEAD1	1		∏ Modify ∏ Modify	
20. MIRLY HEADS			☐ Modify ☐ Modify	
31. DEBUG MODE[Y/N]	232 N		☐ Modify ☐ Modify	
32. SIM PIN			Modify	

Figure 2.7 Set baud rate and Ntrip info

10)After completing the parameter modification, click the [Modify] button on the top. It pops out a prompt that the new parameter setting is successful. Then click [OK] and restart the Ntrip modem.



mDevice Batch Configuration Soft	ware	_	
Start Config Stop	Restore Update File Selete File Show Log Options	About Exit	
15. SERIAL TIMEOUT(ms)	20	🥅 Modify	^
16. SMS WAKEUP PASSWORD	1234	🥅 Modify	
17. HEART BEAT INTERVAL(s)	0	🥅 Modify	
18. BAUD RATE(bps)	115200 115200	🔽 Modify	
19. DATA BITS[5/6/7/8]	8	∏ Modify	
20. PARITY[N/E/0/M/S]	M mDevice Batch Configuration Software	🥅 Modify	
21. STOP BITS[1/1.5/2]	1	🥅 Modify	
22. NTRIP ACCOUNT	Succeed to set new parameters to mDevice	🥅 Modify	
23. NTRIP PASSWORD		🕅 Modify	
24. MOUNT[1:RTCM32_GGB/2:RTCM30 25. SELF-DEFINED MOUNT:	1 ОК	∏ Modify ∏ Modify	
26. NTRIP TYPE[1:Client/2:Server] 27. NTRIP HEAD1	1	□ Modify	
28. NTRIP HEAD2		- Modify	
29. NTRIP HEAD3		, _ modify	
30. SERIAL TYPE[232/485]	232	,	
31. DEBUG MODE[Y/N]	N I	∏ Modify	
32. SIM PIN		Modi fy	

Figure 2.8 Set parameters successfully

10) After completing the configuration, click [Stop] and [Exit] to exit the software.

#### 2.1.2.2 Configure TP688 by Tersus GNSS Center

The detailed steps of configuring TP688 by Tersus GNSS Center software are as follows.

- 1) Unscrew the nut and open the dustproof cover, insert the SIM card (standard SIM card) into the TP688 modem.
- 2) Use the DB9 female to USB Type A male converter cable to connect the DB9 female connector of TP688 and the computer.
- 3) Right click [This Computer] -> [Manage] -> [Device Manager] -> [Ports (COM & LPT)], and find the port shown as below.

Ports (COM & LPT)
 Prolific USB-to-Serial Comm Port (COM8)

Figure 2.9 COM port detected on the computer



 Double click the Tersus GNSS Center software, select Serial, COM8, 115200 (modified in mDevice Batch Configuration software) in the config window as below, and click [OK].

Action(A) View(V) Map(M) Tools(T) Help(H)		
🕨 💶 🗢 📼 🚍 😳 🏶 🟗 🖈 🗶 📰 🎰 🔊 🚥 🖬 🕬		
Report – pictoria		
Connector Type Series	2	+ × 10 200 220 240 260 280
Named Annual Cost	0.00	20 20 15 -10 5 -0 -5 -5 -10 -15 -20
Command Here(Ctrl+L	JP/DOWN to get history)	30 3 × 1 2 3 4 5
Command Here(Ctrl+L	JP/DOWN to get history)	2 3 4 5

Figure 2.10 Config window of Tersus GNSS Center

- 5) After the TP688 is powered on normally, type 'AT+ENTERCFG\r' in the text console window of Tersus GNSS Center to enter the configuration mode. If the execution is successful, it responses 'OK'.
- 6) Use AT+SET command to modify the configuration item of TP688. It will response 'OK' after successful execution. Each AT+SET command is used to modify the value of one configuration item. The quantity of AT+SET commands depends on the configuration requirement.
- 7) At last, type 'AT+EXITCFG' to exit configuration mode. At this time, TP688 will reboot automatically to make the modified configuration effective.

For example, there is a requirement to modify TP688's data center domain to usacaster1.tersus-gnss.com, set port as 2101, serial port baud rate as 115200, network protocol as Ntrip client, Ntrip account as test, Ntrip password as test, and customized mount point as mountpoint01. Type below AT commands **ONE** by **ONE** in the text console window of Tersus GNSS Center:

```
AT+ENTERCFG
AT+SET=1,usacaster1.tersus-gnss.com
AT+SET=2,2101
AT+SET=27,115200
AT+SET=3,1
```



AT+SET=4,test AT+SET=5,test AT+SET=7,mountpoint01 AT+EXITCFG

The command responses are shown as below.



Figure 2.11 AT commands and responses

More AT commands refers to section 2.1.4.



### 2.1.3 Configure TP688 remotely

The Ntrip Modem TP688 supports remote configuration including SMS (Short Message Service) and mServer configuration by AT commands.

#### 2.1.3.1 SMS configuration

SMS (Short Message Service) can be used to remotely modify the IP address and port of the data center of the Ntrip Modem TP688.

The detailed steps of remote setting IP address and port using SMS are as follows:

- 1) In the condition that TP688 is offline, TP688 detects incoming configuration SMS when it is dialing and then updates IP and port accordingly.
- 2) The format of SMS configuration is:
  - 1234;IP/domain;port

For example: 1234; usacaster1.tersus-gnss.com;2101

in which, 1234 is the initial password, ';' is semicolon in English. If you want change this initial password, connect TP688 to a PC using a DB9 female to USB Type A male converter cable, enter the TP688 configuration software menu, and change 'SMS wakeup password' (the default is 1234). Please be noted that this password can only be digits, English characters or the combination.

#### Note: The content of SMS must be characters in English and digit numbers in single byte, and cannot be double byte. If SMS configuration is successful or fail, TP688 will response SUCCESS/FAIL; it will not response if the SMS does not meet the format requirements.

More SMS configuration commands:

a) AT+RESTORE

Restore to default setting, mainly used when the SMS password was changed.

b) 1234;value1;value2;value3;...

The quantity of configuration item is not limited currently. If no change for some item, leave two continuous semicolons; to clear some item, leave a space. For example:

1234;value1;value2;; ;value5

in which, the value of the first item is value1, the value of the second item is value1, the value of the third item remains unchanged, the value of the fourth item is clear, and the value of the fifth item is value5.

c) 1234+AT commands



The AT commands can be multiple, separated by semicolon. Once a command is regarded as an error, the commands afterwards will not be processed. If TP688 receives an unknown AT command, it will response ERROR. The configuration commands take into effect after reboot, which means there should be 'AT+REBOOT' at the end of a SMS or send a separate SMS with 'AT+REBOOT'.

The AT commands should be in CAPITAL letters, while the parameters within the AT commands have no such limitation.

#### 2.1.3.2 mServer configuration

The detailed steps of remote setting IP address and port using mServer software are as follows:

- 1) Only when TP688 is displayed as online in mServer software, the IP address and port can be modified.
- Select this terminal in mServer software, right-click and choose [Remote Configure]. Type "AT+MSERVER=IP,PORT" in the command list of the pop up window.

For example: AT+MSERVER= usacaster1.tersus-gnss.com;2101 After typing the above command, click [Run]. If the operation is correct, it will display OK in the response on the right. Therefore, TP688 will be offline from mServer and connected to the new data center and port.

More AT commands refers to section 2.1.4.

#### 2.1.4 AT commands

Note: The AT commands in this section should be capital letters, and need to end with enter (0x0d) key expressed as '\r' in the following description.

The commonly used AT commands supported by the serial port configuration software (including Tersus GNSS Center, mServer and Vircom) are listed below.

1) AT+CELLID\r

Query the area code and cell code of the base station.



#### 2) AT+CSQ\r

It is to query signal strength. It will return a value between 0 and 31, and a larger value indicates a better signal.

- AT+DC1=addr,port,mserver,data-source\r Configure parameters of data center 1. addr: data center's domain or IP address; port: port of the data center; mserver: whether connected to mserver, Y: connected, N: not connected; data-source: data source, 1: none, 2: RS232, 3: RS485
- 4) AT+DC2=addr,port,mserver,data-source\r Configure parameters of data center 2.
- 5) AT+DC3=addr,port,mserver,data-source\r Configure parameters of data center 3.

#### 6) AT+ENTERCFG\r

It is to enter configuration mode. Returning a response 'OK' indicates that TP688 has entered the AT command configuration mode and the TP688 will automatically go offline from the data center.

#### 7) AT+EXITCFG\r

It is to exit configuration mode. TP688 will reboot automatically.

- 8) AT+ENTERSMS\r Enter SMS mode.
- 9) AT+EXITSMS\r Exit SMS mode.

#### 10)AT+GET=n\r

It is to obtain the value of the configuration item with the sequence number n. For example, check the value of configuration 1, type command 'AT+GET=1\r' will get a response of

- 1,usacaster1.tersus-gnss.com
- OK

If n=0, it indicates query the values of all configuration items.

#### 11)AT+HBI=hb, hb\_to\r

Set heartbeat parameters of the Ntrip Modem: heartbeat interval and heartbeat time out. It can be simplified to "AT+HBI=heartbeat interval". If only the heartbeat interval is set, the heartbeat timeout is automatically set to 3 times the heartbeat interval.



12)AT+IMEI\r

It is to query IMEI number.

13)AT+OPER\r

It is to query operator.

14)AT+REBOOT\r It is for reboot.

#### 15)AT+RESTORE\r

It is to restore to the factory setting.

16)AT+SERPORT=<baud rate>,<data bit>,<parity>,<stop bit>,<flow control>\r

It is to configure the serial port attribute.

Baud rate: from 300 to 115200 bps;

Data bit: 5, 6, 7, 8;

Parity: N: no parity; E: even parity; O: odd parity; M: mark; S: space. Stop bit: 1, 1.5, 2;

Flow control: N: no flow control, H: hard flow control, S: soft flow control; If only change baud rate, it can be simplified to "AT+SERPORT=baud rate", for example "AT+SERPORT=115200".

#### 17)AT+SERPORT?\r

Query the serial port attribute of the current Ntrip Modem.

#### 18)AT+SET=n,value\r

Set the value of the configuration item with the sequence number n to a specific value. For example, to configure the value of the first configuration item as usacaster1.tersus-gnss.com, write the command as 'AT+SET=1, usacaster1.tersus-gnss.com\r'. After TP688 receives the configuration modification command successfully, it returns 'OK'.

For the sequence number and corresponding description of the configuration item, refer to Table 2.1 Configuration item of TP688.

#### 19)AT+SIMID\r

Query the IMSI number and CCID number of the SIM card.

20)AT+SMS=<target number>,<encoding format>,<data length>,<data>\r Send SMS, command format is as below:

Target number: the mobile number which receives SMS;



Encoding format: 1: ASCII code, 2: 8bit code, 3: Unicode; Data length: length of the real data;

Data: data to be sent, each byte is formatted to a 2-byte hexadecimal number, for example, to send "1234", type "31323334". Examples:

- a. Send "1234" to 13812345678 in ASCII encoding: AT+SMS=13812345678,1,4,31323334\r
- b. Send "1234" to 13812345678 in 8bit encoding: AT+SMS=13812345678,2,4,31323334\r
- c. Send "1234" to 13812345678 in Unicode encoding: AT+SMS=13812345678,3,4,31323334\r

21)AT+SMSA=<target number>,<data length>,<data>\r

Send SMS of ASCII code, command format is as below: Target number: the mobile number which receives SMS; Data length: length of the real data; Data: data to be sent, should be ASCII string. Example: Send "1234" to 13812345678 in ASCII encoding: AT+SMSA=13812345678,4,1234\r

#### 22)AT+SMSPING=PN\r

Make Ntrip Modem send a SMS to the phone number, the SMS content is the IMEI number of the Ntrip Modem.

#### 23)AT+STATUS\r

It is to query connection status. 0: not connected to data center; 1: connected to data center.

#### 24)AT+SVR=udp\_tcp,self\_reg,self\_hb

Configure data center protocol, self-defined registration pack and heartbeat packet.

Udp\_tcp: data center protocol, UDP or TCP;

Self\_reg: self-defined registration packet when not connecting to mServer, set 'NULL' to clear self-defined registration packet;

Self\_hb: self-defined heartbeat packet when not connecting mServer, set 'NULL' to clear self-defined heartbeat packet.

#### 25)AT+UPTIME\r

Query the operation time of the device.

#### 26)AT+VER\r

It is to query firmware version of the Ntrip Modem.



27)AT+232SERPORT=baud rate, data bit, parity, stop bits\r Configure parameters of RS232 serial port. Baud rate: 2400/4800/9600/19200/57600/115200 Data bit: 5/6/7/8 Parity: N: none, E: even, O: odd Stop bit: 1/2

28)AT+232SERPORT?\r

Query parameters of RS232 serial port.

## The following AT commands only support mServer and Vircom software.

29)AT+TIME\r

Query the system time of the Ntrip Modem. Example response: +TIME: 2019/07/13 11:12:13 OK

30)AT+CICCID\r

It is to query the ICCID info of the SIM card.

#### 31)AT+CPSI?\r

It is to query the UE system information.

**Note**: After the terminal dials up to the data center, it cannot interact with the Ntrip Modem in real time. This information is the buffer that the terminal queries before dialing, and will not change during the terminal's current dial-up connection.

#### 32)AT+CNBP?\r

It is to query the frequency band selection.

#### 33)AT+CSCA?\r

It is to query the number of the SMS service center.

The CSCA and CNBP information can be modified through item 37 and 38 in the serial configuration software shown as below. It is only effective after reboot.



mDevice Batch Configuration	n Software	1 <u></u>	
Start Canfig Stop	y Restore Update File Selete File Show Log Options	About Exit	
24. HEART BEAT INTERVAL(s)		, mourry	^
25. CUSTOM REGISTRATION PACKAGE	ETUNG: 240305004079955 \x00	Modify	
26. HEARTBEAT WHEN NOT MSERVER	ETUNG\x00	🥅 Modi fy	
27. COM1 BAVD RATE(bps)	115200	🥅 Modify	
28. COM1 DATA BITS[5/6/7/8]	8	🥅 Modi fy	
29. COM1 PARITY[N/E/O/M/S]	N	🥅 Modify	
30. COM1 STOP BITS[1/1.5/2]	1	🥅 Modify	
31. COM2 BAVD RATE(bps)	9600	🥅 Modify	
32. COM2 DATA BITS[5/6/7/8]	8	🥅 Modify	
33. COM2 PARITY[N/E/O/M/S]	N	🥅 Modify	
34. COM2 STOP BITS[1/1.5/2]	1	🥅 Modify	
35. NET MODE[1:AUTO/2:2G/3:3G/4:4G	] 1	🥅 Modify	
36. DEBUG MODE[Y/N]	N	🥅 Modi fy	
37. SMS SERVICE CENTRE ADDRESS		🥅 Modi fy	
38. BAND SELECTION		🥅 Modí fy	
39. Item39		🥅 Modify	
40. Item40		☐ Modify	

Figure 2.12 Modify CSCA or CNBP

**Note**: If the CSCA is set incorrectly, the SMS will not be able to send. The setting of CNBP will affect the network registration, and improper setting may cause the module to fail to register the network.



The supported AT commands for **SMS configuration** are as follows:

- AT+CFG? The Ntrip Modem will response: OK;item 1;item2;...
- AT+DC1=addr,port,mserver,data-source Configure parameters of data center 1. addr: data center's domain or IP address; port: port of the data center; mserver: whether connected to mserver, Y: connected, N: not connected; data-source: data source, 1: none, 2: RS232, 3: RS485
- 3) AT+DC2=addr,port,mserver,data-source Configure parameters of data center 2.
- 4) AT+DC3=addr,port,mserver,data-source Configure parameters of data center 3.
- 5) AT+INFO?

The Ntrip Modem will response: OK;IMEI;version;signal strength;network mode;modem version

6) AT+PWD=password

Set new SMS password, with no more than 8 characters, excluding ";",",",",":", "=", and etc. It is advised to use digit number and English characters only. The response is OK or ERROR.

7) AT+REBOOT

Reboot the device, with response OK.

8) AT+RESTORE

Restore to default settings and reboot automatically, with response OK. No need to add additional command AT+REBOOT.

9) AT+SERPORT= baud,data\_bits,parity,stop\_bits,type baud: baud rate (2400/4800/9600/19200/38400/57600/115200) data\_bits: data bits (5/6/7/8) parity: parity checking (N: None/E: Even/O: Odd) stop\_bits: stop bits (1/2) type: serial port type, for Ntrip Modems that supports RS232 and RS485 at the same time, configure this parameter to specific serial port type (RS232/RS485).

10)AT+SET=n,value



Set the value of the configuration item with the sequence number n to a specific value. For example, to configure the value of the first configuration item as usacaster1.tersus-gnss.com, write the command as 'AT+SET=1, usacaster1.tersus-gnss.com\r'. After TP688 receives the configuration modification command successfully, it returns 'OK'.

#### 11)AT+SVR=udp\_tcp,self\_reg,self\_hb

Configure data center protocol, self-defined registration pack and heartbeat packet.

Udp\_tcp: data center protocol, UDP or TCP;

Self\_reg: self-defined registration packet when not connecting to mServer, set 'NULL' to clear self-defined registration packet;

Self\_hb: self-defined heartbeat packet when not connecting mServer, set 'NULL' to clear self-defined heartbeat packet.

#### 12)AT+WN=apn,user,password

Configure parameters related to dialing, TP688 will response OK or ERROR.

apn: Access point name, this parameter is unused for CDMA/EVDO device and can be null. Set 'auto' to select APN automatically.

user: dialing account, the dialing password should be changed together with the dialing account.

password: dialing password, the dialing account should be changed together with the dialing password.

13)AT+232SERPORT=baud rate, data bit, parity, stop bits

Configure parameters of RS232 serial port. Baud rate: 2400/4800/9600/19200/57600/115200 Data bit: 5/6/7/8 Parity: N: none, E: even, O: odd Stop bit: 1/2



# 2.2 Configuration Parameters

Detailed configuration parameters are described as below.

Table 2.1 Configuration item of TP688

No.	Configuration item	Description
1	Ntrip Caster domain or IP address	Configure data center domain or IP
2	Ntrip Caster port	Configure data center port
3	Ntrip type (1: client; 2: server)	Configure the Ntrip type, 1: Client; 2:
		Server. Default 1
4	Ntrip account	Configure the Ntrip account
5	Ntrip password	Configure the Ntrip password
6	Mount (1: RTCM32_GGB, 2:	Configure the mount point, 1:
	RTCM30_GG)	RTCM32_GGB; 2: RTCM30_GG, default 1
7	Self-defined mount point	Customized mount point
8	Data source (0:None, 1:COM1,	Default 1
	2:COM2)	
9	Data center 2 DN/IP	Data center 2 domain or IP
10	Data center 2 port	Data center 2 port
11	DC2 using mServer (Y/N)	Default N
12	DC2 data source (0:None, 1:COM1,	Data center 2 data source
	2:COM2)	
13	Data center 3 DN/IP	Data center 3 domain or IP
14	Data center 3 port	Data center 3 port
15	DC3 using mServer (Y/N)	Default N
16	DC3 data source (0:None, 1:COM1,	Data center 3 data source
	2:COM2)	
17	Account	Configure the user name that has been
		applied for
18	APN name	Configure the APN name for the wireless
		network
19	Network protocol (TCP/UDP)	Configure data communication protocol,
		TCP or UDP
20	Output status (Y/N)	Configure the connection information
		outputs from serial port when the modem is
		connected or disconnected with server, the
		default is N (no output).
21	Dial account	Configure dialing account, normally no
		need to change
22	Dial password	Configure dialing password, normally no
		need to change
23	Configuration password	Set up password



24	Heartbeat interval (seconds)	Configure the heartbeat interval, the unit is
		second.
25	Customize registration pack	Customize register pack when the modem
		is not connected to mServer
26	Heartbeat when not mServer	Customize heartbeat pack when the
		modem is not connected to mServer
27	COM1 baud rate (bps)	Configure the serial baud rate for data
		transmission mode. Default 9600
28	COM1 data bits (5/6/7/8)	Configure the serial data bit for data
		transmission mode. Default 8
29	COM1 parity (N/E/O/M/S)	Configure the parity for data transmission
		mode. N: no parity; E: even parity; O: Odd
		parity; M: mark parity; S: space parity.
		Default N
30	COM1 stop bits (1/1.5/2)	Configure the serial stop bit for data
		transmission mode. Default 1
31	COM2 baud rate (bps)	Default 9600
32	COM2 data bits (5/6/7/8)	Default 8
33	COM2 parity (N/E/O/M/S)	Default N
34	COM2 stop bits (1/1.5/2)	Default 1
35	Net mode (1: Auto, 2:2G, 3:3G, 4:4G)	Default auto
36	Debug mode (Y/N)	Set debug mode, default N
37	SMS service center address	
38	Band selection	
39	Item 39	Reserved
40	Item 40	Reserved



### 2.3 Firmware Upgrade

Make the connections stated in section 2.1 and then double click to run dtucfg2\_notm.exe application which is shown as below.

e mDevice l	Batch Config	uration Softw					ß				×
Start Config	Stop	Modify	Restore	Update File	Selete File	Show Log	Options	About	Exit	Conf	
1. CC 2. Pr mDevi	ress "St .ce in 3	art Conf 0 second	ig″but is.	ton to co	onfigure	mDevice	and pow	er on	Import	Conf	

Figure 2.13 Firmware upgrade software

Connect the Ntrip Modem TP688 in the way stated in section 2.1 and find the port number in computer management. Click [Options], fill the port number in the pop out window of settings.

		🙆 👹			ß		0	
Config Stop	Modify	Restore Update F	ile Selete File	Show Log	Options	About	Exit	
1. Connect	mDevice ·	to PC and selec	t the COM	port;			Export	Conf
2. Press "	Start Con:	fig″ button to	configure	mDevice	and pow	ver on	Import	Conf
mDevice in	20 00000	de					1	
Indevice III	SV Secon	12.						
mDevi Ce III	ce IMEI:	ls.	mDe	evice Version			Templ	ate
mDeviCe III mDevi 1. Item1	ce IMEI:	Settings	mDe	evice Version	:   ×	<b>∏ M</b> odify	Templ	ate
mDevice III mDevi 1. Item1 2. Item2	oe IMEI:	Settings	mDe	evice Version	×	∏ Modify ∏ Modify	Templ	ate ] ar
mDeviCe III mDevi 1. Item1 2. Item2 3. Item3	oe IMEI:	Settings	mDe ort: 3	evice Version	×	│ Modify │ Modify │ Modify	Cle	ate   ar
mDevi . Item1 2. Item2 3. Item3 4. Item4	oe IMEI:	Settings	mDe ort: 3	evice Version	: [ × ]	│ Modify │ Modify │ Modify │ Modify │ Modify	Templ	ate
mDevi 1. Item1 2. Item2 3. Item3 4. Item4 5. Item5	oe IMEI:	Settings	mDe	Cancel	×	│ Modify │ Modify │ Modify │ Modify │ Modify │ Modify	Templ	ate ar

Figure 2.14 Set COM port

Click [Select File], find the firmware file and click [Open] to load the firmware file. Contact Tersus Support for firmware file to upgrade.



mDevice Batch Configuration Software							—		$\times$	
Start Config Stop	Modify	Restore	Update File	Selete File	Show Log	Options	About	Exit		
1. Connect π	Device	🙁 Please se	elect new firmv	vare file			×	Export	Conf	^
2. Press "St mDevice in 3	art Con 30 secon	Look in:	TR649-TP688		•	E 💣 🛙		Import	: Conf	
mDevice	IMEI:	MD649	)_QX_EN_326.b	in				Temp	late	
1. Item1							1	fyCle	ar	
2. Item2 3. Item3								îy îv		
4. Item4		File <u>n</u> ame:	MD649D_QX	_EN_326.bin		- 6	Open H	îy		
5. Item5		Files of type:	Firmware File	(*.bin;*.img)		-	Cancel	ŷ		
0. itemb 7 Ttom7			C Open as re	ad-only				iy		

Figure 2.15 Select firmware file

Click [Update File], power on the Ntrip Modem TP688 and it starts upgrading automatically. The screenshot below shows the upgrading progress.

mulevice Batch (	Configuration Software								3
				)	B	<b>Aberut</b>	Exit		
rt Config Sto	op Modify	Restore U	pdate File Selete F	The Show Log	Options	About	Exit		
1. Conne	ct mDevice to	PC and s	select the C	OM port;			Enpo	rt Conf	
2. Press	"Start Confi	g″ button	n to configu	re mDevice	and pow	er on	Impo	rt Conf	
mDevice	in 30 seconds.								
- 1	Tranfer File						XII	splate	
1. Itenl	Tranfer File						× Ie	lear	
1. Iten1 2. Iten2	Tranfer File File:	D:W_			T	P688\MD6	× Te	splate lear	
n <sup>1</sup> 1. Iten1 2. Iten2 3. Iten3	Tranfer File File:	D: <b>V</b>			din T	P688\MD6-		lear	
1. Iteni 2. Iten2 3. Iten3 4. Iten4	Tranfer File File: Progress:	D:W			-time-t	P688\MD6-		lear	
1. Iten1 2. Iten2 3. Iten3 4. Iten4 5. Iten5	Tranfer File File: Progress:	<b>D:</b>			т	P688\MD6-	X Te	lear	
1. Iten1 2. Iten2 3. Iten3 4. Iten4 5. Iten5 6. Iten6	Tranfer File File: Progress:	D:4			T	P688\MD6-	X Te	leur	

Figure 2.16 Firmware upgrade in progress

When the firmware upgrade is completed, the software shows the status 'Updated firmware successfully!' and it will restart automatically.



🔵 mDevice B	Batch Config	uration Softv	vare						12			$\times$
		1	A	R			ß		6	3		
Start Config	Stop	Modify	Restore	Update File	Selete File	Show Log	Options	About	Exit			
1 64	oppact m	Device :	to PC an	d select	the COM	port:			Ex	port Co	onf	^
1. CC 2. Pr	ress ″St	art Con	to rt an fig″ but	ton to co	onfigure	mDevice	and now	er on		Porcov	OALL	
mDevi	.ce in 3	0 second	ds.	000 00 00	An Igui C	MEDC VICC	ana pow		Im	port Co	onf	
	Tranfer	File							× 1	Cemplat	e	
1. Itemi			Inf	0		>	<			Clear		
2. Item2	2	File:					TR649-T	P688\MD6				
3. Item3	)			Updat	ed firmware s	uccessfully!						
4. Item4		Progress	:						Ī			
5. Items	5					OK			'			
6. Itemé	3				-							
					Cance							

Figure 2.17 Firmware upgrade finished



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