UC20 GNSS

AT Commands Manual

WCDMA Module Series

Rev. UC20_GNSS_AT_Commands_Manual_V1.1

Date: 2015-11-30

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About the Document

History

Revision	Date	Author	Description
1.0	2013-08-23	Scott HU	Initial
1.1	2015-11-30	Jacky ZHANG	1. Added the GPS channel description 2. Modified ODP description and HTTP AT command 3. Updated the XTRA server

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1 Introduction

UC20 integrates a GNSS engine, which supports GPS and GLONASS system and provides XTRA assistance. UC20 GNSS engine is high-performance and suitable for various applications which lowest-cost and accurate positioning are needed. Meanwhile, it can also support position tracking without network assistance, and GNSS capabilities when GSM/WCDMA is out of network coverage areas. UC20 GNSS can be applied in the following occasions: turn-by-turn navigation applications, asset tracking, buddy tracking, location-aware games, homing and fleet management. UC20 supports 16 GPS active channels and 14 GLONASS active channels. The number of active channels also means the number of SV that can be tracked simultaneously.

1.1. How to Use GNSS

UC20 GNSS engine allows calculating location without any assistance from the network. The procedure of turning on GNSS is shown as below:

Step 1: Configure corresponding demands by **AT+QGPSCFG**.

Step 2: Active GNSS engine by **AT+QGPS**.

Step 3: After GNSS session is started successfully and GNSS has fixed, positioning information can be obtained by three ways:

1) NMEA sentences output to "usbnmea" port by default, you can read data from the port to obtain NMEA sentences.
2) You can use **AT+QGPSLOC** to obtain some positioning information directly, such as latitude, longitude, height, time and positioning type and so on.
3) After enabling **<nmeasrc>** by **AT+QGPSCFG**, you can acquire the specified NMEA sentence by **AT+QGPSGNMEA**. If **<nmeasrc>** is disabled, this command cannot be used.

Step 4: You can terminate GNSS by two ways:

1) If the parameter **<fixcount>** of the **AT+QGPS** is set to 0 in Step 2, GNSS engine will get position continuously, and it can be ended by **AT+QGPSEND**.
2) If the actual fix times reach to the specified **<fixcount>** value, the engine will stop automatically; in this process you can use the command **AT+QGPSEND** to end the session.

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1.2. NMEA Sentence Type

The NMEA sentences are compatible with NMEA-0183 protocol, and all of the standard NMEA sentences have two kinds of prefix.

For GPS sentences, the prefix is “GP”, as below:

- GPGGA - Global Positioning System Fix Data, Time, Position and related fix data
- GPRMC - Recommended minimum data
- GPGSV - Detailed satellite data
- GPGSA - Overall satellite data
- GPVTG - Vector track and speed over the ground

And for GLONASS sentences, the prefixes are "GL" and "GN", as below:

- GLGSV - Detailed satellite data
- GNGSA - Overall satellite data (Two GNGSA sentences will be generated, one contains the GPS satellites and the other contains the GLONASS satellites.)
- GNGNS - Positioning System

1.3. Introduction of XTRA

XTRA assistance enhances standalone performance, and simplifies GNSS assistance delivery to GNSS engine, including ephemeris, almanac, ionosphere, UTC, health and coarse time assistance. After booting XTRA, TTFF (Time to First Fix) can be reduced by 18 to 30 sec (or more in harsh signal environments). And the XTRA data needs to be updated once per day (or every a couple of days) which is obtained from an XTRA server on the network.

In order to apply XTRA feature in GNSS engine, valid XTRA assistance data is necessary. Firstly download a new XTRA binary file from one of the XTRA assistance web servers via HTTP. The files are named as xtra.bin for GPS only and xtra2.bin for GPS+GLONASS. The exact file size should be less than 60kB:

Notice for Qualcomm XTRA server migration:

Although both XTRA 1.0 (GPS only) and XTRA 2.0 (GPS+GLO) predicted orbit download services will continue to be provided on the previously used host-based xtra.net and the latest cloud-based izatcloud.net, users should use the latest izatcloud.net as the preferred XTRA server for XTRA 1.0 (GPS) and XTRA 2.0 (GPS+GLO) services.

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http://xtrapath1.izatcloud.net/xtra.bin
http://xtrapath2.izatcloud.net/xtra.bin
http://xtrapath3.izatcloud.net/xtra.bin
http://xtrapath1.izatcloud.net/xtra2.bin
http://xtrapath2.izatcloud.net/xtra2.bin
http://xtrapath3.izatcloud.net/xtra2.bin

XTRA data needs to be updated regularly. You can query the XTRA data status by **AT+QGPSXTRADATA?** to update XTRA data properly.

The working procedure of XTRA is shown as follows:

Step 1: If XTRA is disabled, enable it by **AT+QGPSXTRA** and restart the module.
Step 2: Confirm the current validity of XTRA data by **AT+QGPSXTRADATA?**.
Step 3: Download xtra.bin or xtra2.bin to the module via HTTP AT command.
Step 4: Inject the correct time by **AT+QGPSXTRATIME**.
Step 5: Inject the downloaded xtra.bin or xtra2.bin file by **AT+QGPSXTRADATA**.
Step 6: Others steps see chapter 1.1.

1.4. GNSS Power Saving Management

UC20 GNSS engine provides power saving solutions by DPO and ODP, thus extending battery life, maximizing talk and standby time, and enhancing accuracy and TTFF.

1.4.1. DPO (Dynamic Power Optimization)

DPO (Dynamic Power Optimization) is a power-saving solution which attempts to turn off GNSS RF and other unneeded components. DPO takes effect after configuring **<dpoenable>** via **AT+QGPSCFG**. There are several preconditions to turn on the DPO, shown as below:

- All SVs>26 dB-Hz must have ephemeris or recent (<3.5 days) XTRA almanac corrections for those SVs.
- Health or UTC information is not transmitted over-the-air.
- Valid position and HEPE is less than 50m and also less than the users' specified value in QoS.
- 6 SVs>37 dB-Hz or 4 SVs>26 dB-Hz and have almanac and health for all SVs.

Benefits and impacts of DPO:

- When the DPO feature is on and the SV or navigational data cannot be decoded, the GPS receiver will not be continuous.
- During the DPO, the SBAS feature is effectively disabled. The receiver cannot demodulate the SBAS

messages. DPO always takes precedence over SBAS.
- TTFF and yield will not be impacted.

1.4.2. ODP (On-Demand Positioning)

When On-Demand Positioning (ODP) is enabled, standalone GNSS positioning will be triggered in the background. The positions calculated as a result of ODP are not presented to the application, NMEA, or the network. However, when the on-demand session is operating and the users or network request a GNSS session, the on-demand session is immediately terminated and the incoming request is implemented.

ODP system requirements:
(1) ODP requires valid XTRA assistance data.
(2) ODP requires that UC20 is in service.

If these two requirements are not fulfilled ODP will be turned off automatically. And ODP will be suspended if a regular GNSS fix is running.

In the enabled low power mode, the GNSS engine is turned on to consume low power. Requests to determine the GNSS position are returned with a reduced time-to-fix while this mode is active. In the enabled Ready mode, the GNSS engine is kept active and is available to perform fixed position. Requests to determine the GNSS position are immediately returned while this mode is active. Maintenance of position and time uncertainty also improves the performance of E911 on UMTS.

Configure **<odpcontrol>** to set two different modes by **AT+QGPSCFG**:

Low power mode:

- Low-frequency background GNSS tracking session.
- In good signal condition, use shorter interval with frequent ODP session (i.e., per 10 min).
- In weak signal condition, use longer interval, but less frequent ODP session (i.e., per hour).
- Small impact on battery power consumption.

Ready mode:

- GNSS engine will start 1 Hz positioning session.
- Main goal is to keep GNSS engine ready so that when the application demands a position from the GNSS engine, position can be reported quickly.
- After ready mode is turned off, positioning will continue for 60 sec to ensure that if the application quickly asks for a request again, GPS will be able to provide a quick position back to application.
- Significant impact on battery power consumption.

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2 Description of AT Command

2.1. AT+QGPSCFG Configure GNSS

This command can be used to configure the using of GLONASS, switchover of NMEA sentences output port and setting of power saving and so on.

AT+QGPSCFG Configure GNSS	
Test command **AT+QGPSCFG=?**	Response **+QGPSCFG: "outport",("none","usbnmea","uartdebug","cmux3")** **+QGPSCFG: "nmeasrc",(0,1)** **+QGPSCFG: "gpsnmeatype",(0-31)** **+QGPSCFG: "glonassnmeatype",(0-7)** **+QGPSCFG: "glonassenable",(0,1)** **+QGPSCFG: "odpcontrol",(0-2)** **+QGPSCFG: "dpoenable",(0,1)** **+QGPSCFG: "lnacontrol",(0,1)"** **+QGPSCFG: "autogps",(0,1)** **OK**
Configure NMEA sentences out port. **AT+QGPSCFG="outport"[,<outport>]**	Response When there are two parameters: **OK** or **+CME ERROR: <errcode>** When the second parameter is omitted, query the current setting: **+QGPSCFG: "outport",<outport>** **OK**
Enable nmeasrc, obtain NMEA sentences by AT+QGPSGNMEA. **AT+QGPSCFG="nmeasrc"[,<nmeasrc>]**	Response When there are two parameters: **OK** or **+CME ERROR: <errcode>**

	When the second parameter is omitted, query the current setting: **+QGPSCFG: "nmeasrc",<nmeasrc>** **OK**
Configure output type of GPS NMEA sentences. **AT+QGPSCFG="gpsnmeatype"[,<gpsnmeatype>]**	Response When there are two parameters: **OK** or **+CME ERROR: <errcode>** When the second parameter is omitted, query the current setting: **+QGPSCFG: "gpsnmeatype",<gpsnmeatype>** **OK**
Configure output type of GLONASS NMEA sentences. **AT+QGPSCFG="glonassnmeatype"[,<glonassnmeatype>]**	Response When there are two parameters: **OK** or **+CME ERROR: <errcode>** When the second parameter is omitted, query the current setting: **+QGPSCFG: "glonassnmeatype",<glonassnmeatype>** **OK**
Configure GLONASS. **AT+QGPSCFG="glonassenable"[,<glonassenable>]**	Response When there are two parameters: **OK** or **+CME ERROR: <errcode>** When the second parameter is omitted, query the current setting: **+QGPSCFG: "glonassenable",<glonassenable>** **OK**
Configure ODP mode. **AT+QGPSCFG="odpcontrol"[,<odpcontrol>]**	Response When there are two parameters: **OK** or **+CME ERROR: <errcode>**

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	When the second parameter is omitted, query the current setting: **+QGPSCFG: "odpcontrol",<odpcontrol>** **OK**
configure DPO **AT+QGPSCFG="dpoenable"[,<dpoenable>]**	Response When there are two parameters: **OK** or **+CME ERROR: <errcode>** When the second parameter is omitted, query the current setting: **+QGPSCFG: "dpoenable",<dpoenable>** **OK**
Enable the external LNA **AT+QGPSCFG="lnaenable"[,<lnaenable>]**	Response When there are two parameters: **OK** or **+CME ERROR: <errcode>** When the second parameter is omitted, query the current setting: **+QGPSCFG: "lnaenable",<lnaenable>** **OK**
Configure GPS running automatically **AT+QGPSCFG="autogps"[,<autogps>]**	Response When there are two parameters: **OK** or **+CME ERROR: <errcode>** When the second parameter is omitted, query the current setting: **+QGPSCFG: "autogps",<autogps>** **OK**
Reference	

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Parameter

<outport>	Configure the output port of NMEA sentences, and the setting will be auto saved to NVRAM except “cmux3” “none” Close NMEA sentence outputting “usbnmea” Output through USB NMEA port “uartdebug” Output through UART debug port and set buad rate to 115200 “cmux3” Output through cmux3 port and the baud rate of cmux3 is determined by the main UART port
<nmeasrc>	After enabled, original NMEA sentences can be acquired by **AT+QGPSGNMEA**, and the setting will be auto saved to NVRAM. Meanwhile, sentences are output through NMEA port as before 0 Disable 1 Enable
<gpsnmeatype>	Configure output type of GPS NMEA sentences by ORed, the setting will be auto saved to NVRAM. The default value is 31, which means the five types of sentences will be output 1 GGA 2 RMC 4 GSV 8 GSA 16 VTG
<glonassnmeatype>	Configure output type of GLONASS NMEA sentences by ORed, the setting will be auto saved to NVRAM. The default value is 0, which means no sentence will be output 1 GSV 2 GSA 4 GNS
<glonassenable>	Enable/Disable GLONASS. The setting will be auto saved to NVRAM. Parameter takes effect after module reset. If GLONASS is disabled and **<glonassnmeatype>** is not zero, the GLONASS NMEA sentences will be output 0 Disable GLONASS 1 Enable GLONASS
<odpcontrol>	Set ODP mode, the setting will be auto saved to NVRAM 0 Disable ODP 1 Low power mode 2 Ready mode
<dpoenable>	Enable/Disable DPO, the setting will be auto saved to NVRAM 0 Disable DPO 1 Enable DPO
<lnaenable>	Enable the external LNA. Setting will be saved to NV automatically 0 Disable external LNA 1 Enable external LNA
<autogps>	Configure GPS whether to run automatically or not after powering on the module.

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	The function should be valid for standalone mode. GLONASS engine should be enabled when **<glonassenable>** is non-zero. Setting will be saved to NVRAM automatically 0 Disable GPS to run automatically 1 Enable GPS to run automatically
<errcode>	Integer type, indicate the error code of the operation. If it is not 0, it is the type of error. (Please refer to Appendix B)

2.2. AT+QGPSDEL Delete Assistance Data

Delete assistance data to operate cold start, hot start and warm start. This command can only be executed when GPS engine is turned off. After deleting the assistance data by this command, cold start will be enforced by **AT+QGPS**, or perform hot/warm start when the hot/warm start condition is permitted.

AT+QGPSDEL Delete Assistance Data	
Test Command **AT+QGPSDEL=?**	Response **+QGPSDEL: (0-3)** **OK**
Write Command **AT+QGPSDEL=<deletetype>**	Response **OK** or **+CME ERROR: <errcode>**
Reference	

Parameter

<deletetype>	Delete data type 0 Delete all assistance data. Enforce cold start after starting GNSS 1 Does not delete any data. Perform hot start if the conditions are permitted after starting GNSS 2 Delete related data. Perform warm start if the conditions are permitted after starting GNSS 3 Delete XTRA data
<errcode>	Integer type, indicate the error code of the operation. If it is not 0, it is the type of error. (Please refer to Appendix B)

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2.3. AT+QGPS Operate GPS Session

AT+QGPS is used to turn on GNSS engine. When **<fixcount>** is 0, GNSS engine will fix continuously. You can terminate the session by **AT+QGPSEND**. When **<fixcount>** is not 0, and the actual fix times reach to the specified value, GNSS engine will terminate automatically.

AT+QGPS Operate GPS Session	
Test Command **AT+QGPS=?**	Response **+QGPS: (1-7),(1-255),(0-1000),(0-1000),(1-65535)** **OK**
Read current GNSS session state **AT+QGPS?**	Response **+QGPS: <gnssstate>** **OK**
Write Command **AT+QGPS=<gnssmode>[,<fixmaxtime>[,<fixmaxdist>[,<fixcount>[,<fixrate>]]]]**	Response **OK** or **+CME ERROR: <errcode>**
Reference	

Parameter

<gnssstate>	GNSS state 0 GNSS off 1 GNSS on
<gnssmode>	GNSS mode 1 Standalone. No network assistance is required, and the MS can be within or out of network coverage 2- 7 Reserved
<fixmaxtime>	Indicates the response time during the measurement of the GNSS pseudo range. The upper time limit of the GPS satellite searching includes the time for demodulating the ephemeris data and calculating the position. The unit is second. The range is 1-30-255
<fixmaxdist>	Accuracy threshold of fix. The unit is meter. The range is 0-50-1000
<fixcount>	Fix times. The range is 0–1000. 0 means continuous positioning
<fixrate>	The time interval between the two positioning. The unit is second. The range is 1–65535
<errcode>	Integer type, indicate the error code of the operation. If it is not 0, it is the type of error. (Please refer to Appendix B)

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2.4. AT+QGPSEND Terminate GNSS Session

Turn on GNSS engine by **AT+QGPS**, when **<fixcount>** is 0, GNSS engine will fix continuously, you can force to terminate it by **AT+QGPSEND**. When **<fixcount>** is not 0, and the actual fix times reach to the specified value, it will terminate automatically.

AT+QGPSEND Terminate GNSS Session	
Test Command **AT+QGPSEND=?**	Response **OK**
Read command **AT+QGPSEND?**	Response **OK**
Execution Command, terminate GNSS session **AT+QGPSEND**	Response **OK** or **+CME ERROR: <errcode>**
Reference	

Parameter

<errcode>	Integer type, indicate the error code of the operation. If it is not 0, it is the type of error. (Please refer to Appendix B)

2.5. AT+QGPSLOC Obtain Position

Before using this command, GNSS engine must be turned on by **AT+QGPS**. If it does not fix successfully, **+CME ERROR: <errcode>** will be returned to indicate the corresponding situation. Note: the response appears on current AT port.

AT+QGPSLOC Obtain Position	
Test Command **AT+QGPSLOC=?**	Response **+QGPSLOC:** **<UTC>,<latitude>,<longitude>,<hdop>,<altitude>,<fix>,<cog>,<spkm>,<spkn>,<date>,<nsat>** **OK**
Read Command **AT+QGPSLOC?**	Response **+QGPSLOC:**

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	<UTC>,<latitude>,<longitude>,<hdop>,<altitude>,<fix>,<cog>,<spkm>,<spkn>,<date>,<nsat> **OK** or **+CME ERROR: <errcode>**
Write Command **AT+QGPSLOC=<mode>**	Response **+QGPSLOC:** **<UTC>,<latitude>,<longitude>,<hdop>,<altitude>,<fix>,<cog>,<spkm>,<spkn>,<date>,<nsat>** **OK** or **+CME ERROR: <errcode>**
Reference	

Parameter

<UTC>	UTC time. Format: hhmmss.sss (quoted from GPGGA sentence)
<latitude>	Latitude. Format: ddmm.mmmmN/S (quoted from GPGGA sentence) dd 00-89 (degree) mm.mmmm 00.0000-59.9999 (minute) N/S North latitude/South latitude.
<longitude>	Longitude. Format: dddmm.mmmmE/W (quoted from GPGGA sentence) ddd 000-179 (degree) mm.mmmm 00.0000-59.9999 (minute) E/W East longitude/West longitude
<hdop>	Horizontal precision, 0.5-99.9 (quoted from GPGGA sentence)
<altitude>	The altitude of the antenna away from the sea level (unit: m), accurate to one decimal place (quoted from GPGGA sentence)
<fix>	GNSS positioning mode (quoted from GNGSA/GPGSA) 2 2D positioning 3 3D positioning
<cog>	Ground heading based on true north. Format: ddd.mm (quoted from GPVTG sentence) ddd 000-359 (degree) mm 00-59 (minute)
<spkm>	Speed over ground. Format: xxxx.x, unit: Km/h, accurate to one decimal place (quoted from GPVTG sentence)
<spkn>	Speed over ground. Format: xxxx.x, unit: knots, accurate to one decimal place (quoted from GPVTG sentence)
<date>	UTC date when positioning. Format: ddmmyy (quoted from GPRMC sentence)
<nsat>	Number of satellites, from 00 to 24 (the first 0 will also be transferred, quoted from

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	GPGGA sentence)
<mode>	Control the latitude and longitude displayed format 0 <latitude>,<longitude> format: ddmm.mmmmN/S,dddmm.mmmmE/W 1 <latitude>,<longitude> format: ddmm.mmmmmm,N/S,dddmm.mmmmmm,E/W 2 <latitude>,<longitude> format: (-)dd.ddddd,(-)ddd.ddddd
<errcode>	Integer type, indicate the error code of the operation. If it is not 0, it is the type of error. (Please refer to Appendix B)

2.6. AT+QGPSGNMEA Obtain NMEA Sentences

Before using this command, GNSS engine must be turned on by **AT+QGPS**, and **<nmeasrc>** must be enabled by **AT+QGPSCFG**. This command can be used to obtain NMEA sentences whose type is set by the parameters of **<gpsnmeatype>** and **<glonassnmeatype>** in **AT+QGPSCFG**. These NMEA sentences will be output on the current AT port, not on NMEA port.

AT+QGPSGNMEA Obtain NMEA Sentences	
Test Command **AT+QGPSGNMEA=?**	Response **+QGPSGNMEA:** **(“GGA”,“RMC”,“GSV”,“GSA”,“VTG”,“GNS”)** **OK**
Read Command **AT+QGPSGNMEA?**	Response **OK**
Query GGA information **AT+QGPSGNMEA=“GGA”**	Response **+QGPSGNMEA: GGA sentence** **OK** or **+CME ERROR: <errcode>**
Query RMC information **AT+QGPSGNMEA=“RMC”**	Response **+QGPSGNMEA: RMC sentence** **OK** or **+CME ERROR: <errcode>**
Query GSV information **AT+QGPSGNMEA=“GSV”**	Response **+QGPSGNMEA: GSV sentence** **OK** or

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	+CME ERROR: <errcode>
Query GSA information **AT+QGPSGNMEA="GSA"**	Response **+QGPSGNMEA: GSA sentence** **OK** or **+CME ERROR: <errcode>**
Query VTG information **AT+QGPSGNMEA="VTG"**	Response **+QGPSGNMEA: VTG sentence** **OK** or **+CME ERROR: <errcode>**
Query GNS information **AT+QGPSGNMEA="GNS"**	Response **+QGPSGNMEA: GNS sentence** **OK** or **+CME ERROR: <errcode>**
Reference	

Parameter

<errcode>	Integer type, indicate the error code of the operation. If it is not 0, it is the type of error. (Please refer to Appendix B)

2.7. AT+QGPSXTRA Enable XTRA Functionality

This command can be used to enable XTRA functionality after restarting GNSS engine.

AT+QGPSXTRA Enable XTRA Functionality	
Test Command **AT+QGPSXTRA=?**	Response **+QGPSXTRA: (0-2)** **OK**
Read Command **AT+QGPSXTRA?**	Response **+QGPSXTRA: <xtraenable>** **OK**

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Write Command **AT+QGPSXTRA=<xtraenable>**	Response **OK** or **+CME ERROR: <errcode>**
Reference	

Parameter

<xtraenable>	Enable XTRA function. The setting will be saved to NVRAM automatically 0 Disable XTRA 1 Enable XTRA and inject XTRA data manually. Take effect after restarting 2 Reserved
<errcode>	Integer type, indicate the error code of the operation. If it is not 0, it is the type of error. (Please refer to Appendix B)

2.8. AT+QGPSXTRATIME Inject XTRA Time

This command can be used to inject time to GNSS engine. Before using it, you must turn off the GNSS engine and configure **<xtraenable>** by **AT+QGPSXTRA**. After activating XTRA functionality, GNSS engine will ask for XTRA time and XTRA data. Meanwhile, before injecting XTRA data, XTRA time must be injected first by this command.

AT+QGPSXTRATIME Inject XTRA Time	
Test Command **AT+QGPSXTRATIME=?**	Response **+QGPSXTRATIME: 0,<xtratime>,(0,1),(0,1),<uncrtn>** **OK**
Read Command **AT+QGPSXTRATIME?**	Response **OK**
Write Command **AT+QGPSXTRATIME=<op>[,<xtratime>[,<utc>[,<force>,<uncrtn>]]]**	Response **OK** or **+CME ERROR: <errcode>**
Reference	

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Parameter

<op>	Operation type 0 Inject XTRA time manually
<xtratime>	Current UTC/GPS time, the format of time: YYYY/MM/DD, hh:mm:ss, e.g. 2015/05/07,05:34:50
<utc>	The type of time 0 GPS time 1 UTC time
<force>	Force or allow GPS subsystem to accept the time entered 0 Allow acceptances 1 Force acceptances
<uncrtn>	Uncertainty of time. Unit: ms, default value: 3500ms. It indicates the time difference between sending a request to the SNTP server and receiving a response from the SNTP server. If the set time is less than 3.5s, it will be counted as 3.5s
<errcode>	Integer type, indicate the error code of the operation. If it is not 0, it is the type of error. (Please refer to the Appendix B)

2.9. AT+QGPSXTRADATA Inject XTRA Data Manually

This command can be used to inject XTRA data to GNSS engine. Before using it, you must turn off the GNSS engine and enable XTRA by **AT+QGPSXTRA**. Meanwhile, before injecting XTRA data, XTRA time must be injected first by **AT+QGPSXTRATIME**.

Before operating **AT+QGPSXTRADATA** command, you should store the valid XTRA data into RAM or UFS of the module. After operating this command successfully, XTRA data can be deleted. At this moment, you can query the validity of XTRA data by **AT+QGPSXTRADATA?**.

AT+QGPSXTRADATA Inject XTRA Data Manually	
Test Command **AT+QGPSXTRADATA=?**	Response **+QGPSXTRADATA: <xtradatafilename>** **OK**
Read Command **AT+QGPSXTRADATA?**	Response **+QGPSXTRADATA: <xtradatadurtime>,<injecteddatatime>** **OK** or **+CME ERROR: <errcode>**
Write Command **AT+QGPSXTRADATA=<xtradatafilena**	Response **OK**

me>	or **+CME ERROR: <errcode>**
Reference	

Parameter

<xtradatafilename>	Filename of XTRA data file, e.g. “RAM:xtra2.bin” or “UFS:xtra2.bin” or “xtra2.bin”
<xtradatadurtime>	Valid time of injected XTRA data, unit: minute 0 No XTRA file or XTRA file is overdue 1-10080 Valid time of XTRA file
<injecteddatatime>	Starting time of the valid time of XTRA data, format: “YYYY/MM/DD,hh:mm:ss”, e.g. “2015/05/07,05:34:50”
<errcode>	Integer type, indicate the error code of the operation. If it is not 0, it is the type of error (Please refer to the Appendix B)

2.10. Introduction of URC

UC20 GNSS engine will inform you of some information via URC.

2.10.1. Expired XTRA Data

When XTRA data is expired, it will be informed to you by URC.

Expired XTRA Data	
+QGPSURC: “xtradataexpire”,<xtradatadurtime>,<injecteddatatime>	XTRA data is expired, and needs to be updated.

Parameter

<xtradatadurtime>	Valid time of injected XTRA data, unit: minute 0 No XTRA file or XTRA file is expired
<injecteddatatime>	Starting time of the valid time of XTRA data, format: “YYYY/MM/DD,hh:mm:ss”, e.g. “2015/05/07,05:34:50”

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3 Example

3.1. Turn On and Off the GNSS Engine

The following example uses default arguments to start GNSS engine. After turning on GNSS engine, NMEA sentences will be output from “usbnmea” port by default.

```
AT+QGPS=1                    //Turn on GNSS engine.
OK

//After turning on GNSS engine, NMEA sentences will be output from “usbnmea” port by default.

AT+QGPSLOC?                  //Obtain position information.
                               Position format is ddmm.mmmmN/S,dddmm.mmmmE/W
+QGPSLOC: 031054.0,3150.7899N,11711.9261E,2.1,48.4,2,0.00,0.0,0.0,070515,04

OK
AT+QGPSLOC=0                 //Obtain position information.
                               Position format is ddmm.mmmmN/S,dddmm.mmmmE/W
+QGPSLOC: 031109.0,3150.7904N,11711.9266E,1.2,49.3,2,0.00,0.0,0.0,070515,05

OK
AT+QGPSLOC=1                 //Obtain position information.
                               Position format is ddmm.mmmmmm,N/S,dddmm.mmmmmm,E/W
+QGPSLOC: 031058.0,3150.789909,N,11711.926117,E,2.1,48.5,2,0.00,0.0,0.0,070515,04

OK
AT+QGPSLOC=2                 //Obtain position information. Position format is (-)dd.ddddd,(-)ddd.ddddd
+QGPSLOC: 031102.0,31.84650,117.19877,2.1,48.4,2,0.00,0.0,0.0,070515,04

OK
AT+QGPSEND                   //Turn off GNSS engine.
OK
```

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3.2. Application of GNSS nmeasrc

When GNSS was started, you can turn on nmeasrc feature, and obtain NMEA sentences by **AT+QGPSGNMEA** directly.

```
AT+QGPSCFG="nmeasrc",1          //Enable nmeasrc functionality.
OK
AT+QGPSGNMEA="GGA"              //Obtain GGA sentence.
+QGPSGNMEA: $GPGGA,032026.0,3150.792650,N,11711.929445,E,1,05,1.4,63.2,M,-2.0,M,,*79

OK
AT+QGPSCFG="nmeasrc",0          //Disable nmeasrc functionality.
OK
AT+QGPSGNMEA="GGA"              //Disable nmeasrc functionality. GGA sentence cannot be obtained.
+CME ERROR: 507
```

3.3. Examples of Injecting XTRA

You must enable XTRA before injecting XTRA time and data to GNSS engine. In the following example, UC20 gets the XTRA file by **AT+QHTTPGET**, and stores it in RAM file.

//If XTRA is disable, enable it by **AT+QGPSXTRA** and reset UC20, then perform the following procedures.

```
AT+QGPSXTRA=1                                   //Enable XTRA.
OK
```

//Restart UC20, enable XTRA of GNSS engine.

//If XTRA data is invalid (query by **AT+QGPSXTRADATA?**), then perform the following procedures.

//Before downloading XTRA file by **AT+QHTTPGET**, please first configure the PDP context parameters of <apn>, <username>, <password> and PDP context ID by **AT+QICSGP**, then activate the PDP context ID by **AT+QIACT**. (For more details about this command, please refer to document Quectel_*UC20_HTTP_AT_Commands_Manual*").

```
AT+QHTTPCFG="contextid",1                       //Set PDP context ID.
OK
AT+QICSGP=1,1,"UNINET","","",1                  //Configure context 1, APN is "UNINET" for China Unicom.
OK
AT+QIACT=1                                      //Activate context 1.
```

```
OK                                          //Activate successfully.
AT+QIACT?                                   //Query the state of context.
+QIACT: 1,1,1,"10.7.157.1"

OK
AT+QHTTPURL=40,80                           //Set the XTRA data URL which will be downloaded.
CONNECT
http://xtrapath1.izatcloud.net/xtra2.bin

OK
AT+QHTTPGET=80                              //Start downloading. Send HTTP GET request and
                                            maximum response time is 80s
OK

+QHTTPGET: 0,200,60831                      //A few seconds later, it will report the HTTP response.
AT+QHTTPREAD=1,“RAM:xtra2.bin”,80           //Store data to RAM file: RAM:xtra2.bin.
OK

+QHTTPREADFILE: 0                           //A few seconds later, it will report the URC for the result.

                                            //The current UTC time is about 2015/05/07,05:30:23.
AT+QGPSXTRATIME=0,“2015/05/07,05:30:23”,1,1,5   //Inject XTRA time to GNSS engine.
OK
AT+QGPSXTRADATA=“RAM:xtra2.bin”             //Inject XTRA data to GNSS engine successfully.
OK
AT+QFDEL=“RAM:xtra2.bin”                    //Delete XTRA data file from RAM file
OK
AT+QGPS=1                                   //Turn on GNSS engine
OK
```

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4 Appendix A Reference

Table 1: Related Documents

SN	Document Name	Remark
[1]	Quectel_UC20_TCPIP_AT_Commands_Manual	Introduction about UC20 TCP/IP AT commands
[2]	Quectel_UC20_FILE_AT_Commands_Manual	Introduction about UC20 file AT commands
[3]	Quectel_UC20_AT_Commands_Manual	UC20 AT commands sets
[4]	Quectel_UC20_HTTP_ AT_ Commands_Manual	Introduction about UC20 HTTP AT commands

Table 2: Abbreviations

Abbreviation	Description
GNSS	Global Navigation Satellite Systems
GPS	Global Positioning System provides by USA
GLONASS	Global Navigation Satellite System provides by Russia
NMEA	National Marine Electronics Association
XTRA	GpsOne XTRA. An auxiliary positioning technology provides by Qualcomm
DPO	Dynamic Power Optimization
ODP	On-Demand Positioning

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5 Appendix B Summary of Error Codes

The error code <errcode> indicates an error related to GNSS operations. The detail about <errcode> is described in the following table.

Table 3: Summary of Error Codes

<errcode>	Meaning
501	Invalid parameter(s)
502	Operation not supported
503	GNSS subsystem busy
504	Session is ongoing
505	Session not activated
506	Operation timeout
507	Function not enabled
508	Time information error
509	XTRA not enabled
510	XTRA file open failed
511	Bad CRC for XTRA data file
512	Validity time out of range
513	Internal resource error
514	GNSS locked
515	End by E911
516	Not fixed now
549	Unknown error

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