

UC20 GNSS

AT Commands Manual

WCDMA Module Series

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About the Document

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1 Introduction

UC20 integrates a GNSS engine, which supports GPS and GLONASS system and provides gpsOneXTRA 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.

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 had fixed, positioning information can be obtained by three ways:

- (1) NMEA sentences output to "usb nmea" port by default, you can read 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 fixed times reach the specified value which is set to **<fixcount>**, the engine will stop automatically; in this process it can use the command AT+QGPSEND also to end session.

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.
- GNGNS - Positioning System.

1.3. Introduction of gpsOneXTRA

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

In order to apply gpsOneXTRA feature in GNSS engine, valid gpsOneXTRA assistance data is necessary. Firstly download a new gpsOneXTRA binary file from one of the gpsOneXTRA assistance web servers via HTTP. The files are named xtra.bin for GPS only and xtra2.bin for GPS+GLONASS. The exact file size is less than 50kB:

<http://xtra1.gpsonextra.net/xtra.bin>

<http://xtra2.gpsonextra.net/xtra.bin>

<http://xtra3.gpsonextra.net/xtra.bin>

<http://xtra1.gpsonextra.net/xtra2.bin>

<http://xtra2.gpsonextra.net/xtra2.bin>

<http://xtra3.gpsonextra.net/xtra2.bin>

gpsOneXTRA data needs to be updated regularly. Actually, you can query the gpsOneXTRA data status by AT+QGPSXTRADATA?, then you can update gpsOneXTRA data properly.

The working procedure of gpsOneXTRA is shown as follows:

Step 1: If gpsOneXTRA is disabled, enable it by AT+QGPSXTRA and restart the module.

Step 2: Confirm the current validity of gpsOneXTRA 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, 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 when **<dpoenable>** is configured 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:

- 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 gpsOneXTRA assistance data.
- (2) ODP requires that UC20 is in service.

If these two requirements are not fulfilled ODP will be turned off automatically. 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. The impact on battery life is great in this mode. 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 5 min).
- In weak signal condition, use longer interval, but less frequent ODP session (i.e., twice per hour).

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.

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) 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+QGPSCGNMEA. AT+QGPSCFG="nmeasrc"[,<nmeasrc>]	Response When there are two parameters: OK or +CME ERROR: <errcode>

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

	<p>When the second parameter is omitted, query the current setting: +QGPSCFG: "odpcontrol",<odpcontrol></p> <p>OK</p>
<p>configure DPO AT+QGPSCFG="dpoenable",<dpoenable>]</p>	<p>Response</p> <p>When there are two parameters: OK or +CME ERROR: <errcode></p> <p>When the second parameter is omitted, query the current setting: +QGPSCFG: "dpoenable",<dpoenable></p> <p>OK</p>
Reference	

Parameter

<outport>	<p>Configure the output port of NMEA sentences, and the setting will be auto saved to NVRAM.</p> <p>"none" Close NMEA sentence outputting.</p> <p>"usb nmea" Output through USB NMEA port.</p> <p>"uartdebug" Output through debug UART port and set baudrate to 115200.</p> <p>"cmux3" Output through cmux3 port and the baudrate of cmux3 is determined by the main UART port</p>
<nmeasrc>	<p>After enabled, original NMEA sentences can be acquired by AT+QGPSSGNMEA, and the setting will be auto saved to NVRAM. Meanwhile, sentences are outputted through NMEA port as before.</p> <p>0 Disable.</p> <p>1 Enable.</p>
<gpsnmeatype>	<p>Configure output type of GPS NMEA sentences, the parameters by ORed to take effect. The setting will be auto saved to NVRAM. The default value is 31, which means the five types of sentences will be outputted.</p> <p>1 GGA.</p> <p>2 RMC.</p> <p>4 GSV.</p> <p>8 GSA.</p> <p>16 VTG.</p>
<glonassnmeatype>	<p>Configure output type of GLONASS NMEA sentences, the parameters by</p>

	<p>ORed to take effect. The setting will be auto saved to NVRAM. The default value is 0, which means none sentence will be outputted.</p> <p>1 GSV.</p> <p>2 GSA.</p> <p>4 GNS.</p>
<glonassenable>	<p>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 outputted.</p> <p>0 Disable GLONASS.</p> <p><u>1</u> Enable GLONASS.</p>
<odpcontrol>	<p>Set ODP mode, the setting will be auto saved to NVRAM.</p> <p><u>0</u> Disable ODP.</p> <p>1 Low power mode.</p> <p>2 Ready mode.</p>
<dpoenable>	<p>Enable/Disable DPO, the setting will be auto saved to NVRAM.</p> <p>0 Disable DPO.</p> <p><u>1</u> Enable DPO.</p>
<errcode>	<p>Integer type, indicate the error code of the operation. If it is not 0, it is the type of error. (Please refer to the chapter 5).</p>

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

Parameter

<deletetype>	Delete data type.
0	Delete all assistance data, except for XTRA 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 gpsOneXTRA 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 the chapter 5).

2.3. AT+QGPS Operate GPS Session

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

AT+QGPS Operate GPS Session	
Test Command AT+QGPS=?	Response +QGPS: 1,(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 start mode. 1 Standalone.
<fixmaxtime>	The max positioning time, unit: s, indicates the response time during the measurement of the GNSS pseudo range, the upper time limit of the GNSS satellite searching, include the time for demodulating the ephemeris data and calculating the position. 1-30-255 Max positioning time.
<fixmaxdist>	Accuracy threshold of positioning, unit: m. 0-50-1000.
<fixcount>	Positioning times. 0-1000 Positioning time. 0 indicates continuous position. Non 0 indicates the actual positioning times.
<fixrate>	The intervals between the first and second positioning, unit: s. 1-65535.
<errcode>	Integer type, indicates the error code of the operation. If it is not 0, it is the type of error (Please refer to the chapter 5).

2.4. AT+QGPSEND Terminate GNSS Session

Turn on GNSS engine by AT+QGPS, when **<fixcount>** is 0, GNSS engine will position continuously, you can force to terminate it by AT+QGPSEND. When **<fixcount>** is not 0, and the actual positioning times reach 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 the chapter 5).
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2.5. AT+QGPSLOC Obtain Fixed Position

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

AT+QGPSLOC Obtain Fixed Position

Test Command AT+QGPSLOC=?	Response +QGPSLOC: <UTC>,<latitude>,<longitude>,<hdop>,<altitude>,<fix>,<cofix>,<spkm>,<spkn>,<date>,<nsat> OK
Read Command AT+QGPSLOC?	Response +QGPSLOC: <UTC>,<latitude>,<longitude>,<hdop>,<altitude>,<fix>,<cofix>,<spkm>,<spkn>,<date>,<nsat> OK or +CME ERROR: <errcode>
Reference	

Parameter

<UTC>	UTC time. Format: hhmmss.sss (quoted from GPGL sentence).
<latitude>	Latitude. Format: ddmm.mmmm N/S (quoted from GPGL sentence). dd 00-89 (degree). mm.mmmm 00.0000-59.9999 (minute). N/S North latitude/ South latitude.
<longitude>	Longitude. Format: dddmm.mmmm E/W (quoted from GPGL 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 GPGL sentence).
<altitude>	The altitude of the antenna away from the sea level(unit: m), accurate to one decimal

	place(quoted from GPGLA 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 GPVT 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 12 (the first 0 will also be transferred, quoted from GPGLA sentence).
<errcode>	Integer type, indicate the error code of the operation. If it is not 0, it is the type of error. (Please refer to chapter 5).

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 +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 the chapter 5).
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2.7. AT+QGPSXTRA Enable gpsOneXTRA Functionality

This command can be used to enable gpsOneXTRA functionality, restarting GNSS engine take effect.

AT+QGPSXTRA Enable gpsOneXTRA Functionality	
Test Command AT+QGPSXTRA=?	Response +QGPSXTRA: (0,1) OK
Read Command AT+QGPSXTRA?	Response +QGPSXTRA: <xtraenable> OK
Write Command AT+QGPSXTRA=<xtraenable>	Response OK or +CME ERROR: <errcode>
Reference	

Parameter

<xtraenable>	Enable gpsOneXTRA functionality, the setting will be auto saved to NVRAM. 0 Disable gpsOneXTRA. 1 Enable gpsOneXTRA, restarting UC20 take effect.
<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 chapter 5).

2.8. AT+QGPSXTRATIME Inject gpsOneXTRA 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 gpsOneXTRA functionality, GNSS engine will ask for gpsOneXTRA time and gpsOneXTRA data. Meanwhile, before injecting gpsOneXTRA data, gpsOneXTRA time must be injected first by this command.

AT+QGPSXTRATIME Inject gpsOneXTRA Time	
Test Command AT+QGPSXTRATIME=?	Response +QGPSXTRATIME: 0,<xtratime>,(0,1),(0,1),<uncrtn> OK
Read Command AT+QGPSXTRATIME?	Response OK

Inject XTRA time manually AT+QGPSXTRATIME=<op>,<xtratime>[,<utc>[,<force>,<uncrtn>]]	Response OK or +CME ERROR: <errcode>
Reference	

Parameter

<op>	Operation type. 0 inject gpsOneXTRA time.
<xtratime>	Current UTC/GPS time, the format of time: YYYY/MM/DD, hh:mm:ss, e.g.2013/02/10,15:34:50.
<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 chapter 5).

2.9. AT+QGPSXTRADATA Inject gpsOneXTRA Data Manually

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

Before operating AT+QGPSXTRADATA command, you should store the valid gpsOneXTRA data into RAM or UFS of the mudule(it is recommended to save it to RAM). After operating this command successfully, gpsOneXTRA data can be deleted. At this moment, you can query the validity of gpsOneXTRA data by AT+QGPSXTRADATA?.

AT+QGPSXTRADATA Inject gpsOneXTRA Data Manually

Test Command AT+QGPSXTRADATA=?	Response +QGPSXTRADATA: <xtradatafilename>
--	--

	OK
Query the validity of the current gpsOneXTRA data AT+QGPSXTRADATA?	Response +QGPSXTRADATA: <xtradataendtime>,<injecteddatatime> OK or +CME ERROR: <errcode>
Inject gpsOneXTRA data manually AT+QGPSXTRADATA=<xtradatafilename>	Response OK or +CME ERROR: <errcode>
Reference	

Parameter

<xtradatafilename>	Filename of gpsOneXTRA data file, e.g. "RAM:xtra2.bin" or "UFS:xtra2.bin" or "xtra2.bin".
<xtradataendtime>	Valid time of injected gpsOneXTRA data, unit: minute. 0 No gpsOneXTRA file or gpsOneXTRA file is overdue. 1-10080 Valid time of gpsOneXTRA file.
<injecteddatatime>	Starting time of the valid time of XTRA data, format: "YYYY/MM/DD, hh:mm:ss", e.g. "2013/02/10, 15:34:50".
<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 chapter 5).

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",<xtradataendtime>,<injecteddatatime>	XTRA data is expired, and need to be updated.

Parameter

<xtradataurtime>	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. "2013/02/10,15:34:50"

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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 outputted from “usb nmea” port by default.

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

//After turning on GNSS engine, NMEA sentences will be outputted
//from “usb nmea” port by default.

AT+QGPSLOC? //Obtain position information.
+QGPSLOC: 061951.0,3150.7223N,11711.9293E,0.7,62.2,2,0.0,0.0,0.0,110513,09
OK

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

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,103647.0,3150.721154,N,11711.925873,E,1,02,4.7,59.8,M,-2.0,M,,*77
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 gpsOneXTRA

You must enable gpsOneXTRA before injecting gpsOneXTRA 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 gpsOneXTRA is disable, enable it by AT+QGPSXTRA and reset UC20, then Performing the following procedures.

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

//Restart UC20, enable gpsOneXTRA of GNSS engine.

//If gpsOneXTRA data is invalid (query by AT+QGPSXTRADATA ?), then performing 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 of UC20_ HTTP_ AT_ Commands_ Manual").

```
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+QHTTPCFG="contextid",1    //Set PDP context ID.
```

```
OK
```

```
AT+QHTTPURL=37,800           //Set the XTRA data URL which will be downloaded.
```

```
CONNECT
```

```
http://xtra1.gpsonextra.net/xtra2.bin
```

```
OK
```

//The current UTC time is approximately 2013/06/25,15:30:23.

AT+QHTTPGET=800

//Start download.

OK

<It may cost a few time>

+QHTTPGET: 0,200

AT+QHTTPREAD=1,"RAM:xtra2.bin",800 //Store data to RAM file: RAM :xtra2.bin.

OK

<It may cost a few time>

+QHTTPREAD: 0

//Prompt download success

//<utc> format is YYYY/MM/DD,hh:mm:ss, e.g. 2013/06/25,15:30:30.

AT+QGPSXTRATIME=0,"2013/06/25,15:30:30",1,1,5 //Inject gpsOneXTRA time to GNSS engine.

OK

AT+QGPSXTRADATA="RAM:xtra2.bin"

//Inject gpsOneXTRA 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

4 Appendix A Reference

Table 1: Related Documents

SN	Document name	Remark
[1]	UC20_TCPIP_AT_Commands_Manual	Introduction about UC20 TCP/IP AT commands.
[2]	UC20_FILE_AT_Commands_Manual	Introduction about UC20 file AT commands.
[3]	UC20_AT_Commands_Manual	UC20 AT commands sets.
[4]	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.
gpsOneXTRA	An auxiliary positioning technology provides by Qualcomm.
DPO	Dynamic Power Optimization.
ODP	On-Demand Positioning.

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.