UC20

Time Synchronization Application Note

UMTS/HSPA Module Series

Rev. UC20_Time_Synchronization_Application_Note_V1.0

Date：2019-04-09

Status: Released

Our aim is to provide customers with timely and comprehensive service. For any assistance, please contact our company headquarters:

Quectel Wireless Solutions Co., Ltd.

7th Floor, Hongye Building, No.1801 Hongmei Road, Xuhui District, Shanghai 200233, China

Tel: +86 21 5108 6236

Email: info@quectel.com

Or our local office. For more information, please visit:

http://www.quectel.com/support/sales.htm

For technical support, or to report documentation errors, please visit:

http://www.quectel.com/support/technical.htm

Or email to: support@quectel.com

About the Document

History

Revision	Date	Author	Description
1.0	2019-04-09	Winnie XI	Initial

Contents

1 Introduction

This document provides instructions on how to synchronize time of Quectel UC20 module.

2 Time Synchronization AT Commands

This chapter describes the AT commands related to the time synchronization features of Quectel UC20 modules.

2.1. AT+CTZU   Automatic Time Zone Update

This command is used to enable and disable automatic time zone update via NITZ. The configuration is stored in NV automatically.

AT+CTZU Automatic Time Zone Update	
Test Command **AT+CTZU=?**	Response **+CTZU: (0,1)** **OK**
Write Command **AT+CTZU=\<onoff>**	Response **OK** If there is any error: **ERROR**
Read Command **AT+CTZU?**	Response **+CTZU: \<onoff>** **OK**
Maximum Response Time	300ms

Parameter

\<onoff>	Integer type. The mode of automatic time zone update.
0	Disable automatic time zone update via NITZ
1	Enable automatic time zone update via NITZ

Example

```
AT+CTZU?
+CTZU: 0

OK
AT+CTZU=?
+CTZU: (0,1)

OK
AT+CTZU=1
OK
AT+CTZU?
+CTZU: 1

OK
```

2.2. AT+CTZR   Time Zone Reporting

This command is used to enable and disable the reporting of time zone change event. If the reporting is enabled, the MT (mobile terminal) returns the unsolicited result code **+CTZV: <tz>** or **+CTZE: <tz>,<dst>,<time>** whenever the time zone is changed. The configuration is stored in NV automatically.

AT+CTZR Time Zone Reporting	
Test Command **AT+CTZR=?**	Response **+CTZR: (0-2)** **OK**
Write Command **AT+CTZR=<reporting>**	Response **OK** If there is any error: **ERROR**
Read Command **AT+CTZR?**	Response **+CTZR: <reporting>** **OK**
Maximum Response Time	300ms

Parameter

<reporting>	Integer type. The mode of time zone reporting.
	0 Disable time zone change event reporting
	1 Enable time zone change event reporting with an unsolicited result code
	+CTZV: <tz>
	2 Enable extended time zone reporting with an unsolicited result code
	+CTZE: <tz>,<dst>,<time>
<tz>	String type. The sum of the local time zone (difference between the local time and GMT is expressed in quarters of an hour) plus daylight saving time. The format is "±zz", expressed as a fixed width, two-digit integer with the range -48 ... +56. To maintain a fixed width, numbers in the range -9 ... +9 are expressed with a leading zero, e.g. "-09", "+00" and "+09".
<dst>	Integer type. Indicate whether **<tz>** includes daylight savings adjustment
	0 **<tz>** includes no adjustment for Daylight Saving Time
	1 **<tz>** includes +1 hour (equals 4 quarters in **<tz>**) adjustment for daylight saving time
	2 **<tz>** includes +2 hours (equals 8 quarters in **<tz>**) adjustment for daylight saving time
<time>	String type. The local time. The format is "YYYY/MM/DD,hh:mm:ss", expressed as integers representing year (YYYY), month (MM), date (DD), hour (hh), minute (mm) and second (ss). This parameter can be provided by the network when delivering time zone information and will be presented in the unsolicited result code of extended time zone reporting if provided by the network.

Example

```
AT+CTZR=2
OK
AT+CTZR?
+CTZR: 2

OK

+CTZE: "+32",0,"2013/08/23,06:51:13"          //The value of <reporting> is 2
```

2.3. AT+QLTS   Obtain the Latest Time Synchronized Through Network

This command is used to obtain the latest time synchronized through network.

AT+QLTS Obtain the Latest Time Synchronized Through Network	
Test Command **AT+QLTS=?**	Response **OK**
Execution Command **AT+QLTS**	Response **+QLTS: <time>,<ds>** **OK**
Maximum Response Time	300ms

Parameter

<time>	String type. The format is "yy/mm/dd,hh:mm:ss±zz", indicating year (two last digits), month, day, hour, minutes, seconds and time zone (indicates the difference, expressed in quarters of an hour, between the local time and GMT; range -48...+56). E.g. 6th of May 2004, 22:10:00 GMT+2 equals to "04/05/06,22:10:00+08.
<ds>	Daylight saving time.

2.4. AT+CCLK   Real Time Clock

This command is used to manage real time clock (RTC) of the module. The current setting is retained until the module is totally disconnected from power.

AT+CCLK Real Time Clock	
Test Command **AT+CCLK=?**	Response **OK**
Read Command **AT+CCLK?**	Response **+CCLK: <time>** **OK**
Write Command **AT+CCLK=<time>**	Response **OK** If there is error related to ME functionality: **+CME ERROR: <err>**

	If there is any other error:
	ERROR
Maximum Response Time	300ms

Parameter

<time>	String type. The format is "yy/mm/dd,hh:mm:ss±zz", indicating year (two last digits), month, day, hour, minutes, seconds and time zone (indicates the difference, expressed in quarters of an hour, between the local time and GMT; range -48...+56). E.g. May 6th, 1994, 22:10:00 GMT+2 equals to "94/05/06,22:10:00+08".
<err>	An error related to mobile equipment or network. For more details, please refer to *Chapter 14.5* of *Quectel_UC20_AT_Commands_Manual*.

Example

AT+CCLK?   //Query the local time
+CCLK: "08/01/04,00:19:43+00"

OK

2.5. AT+QNTP   Synchronize Local Time with NTP Server

NTP is intended to synchronize the Coordinated Universal Time (UTC) with the time server. Before using NTP, the host should activate the context corresponding to <contextID> via **AT+QIACT** first. Depending on the network, it will take at most 125 seconds to return the result.

AT+QNTP Synchronize Local Time with NTP Server	
Test Command **AT+QNTP=?**	Response **+QNTP: (1-16),"SERVER",(**list of supported **<port>**s**),(0,1)** **OK**
Read Command **AT+QNTP?**	Response If in the process of synchronizing local time: **+QNTP: <server>,<port>** **OK** Or else, response: **ERROR**

Write Command **AT+QNTP=\<contextID\>,\<server\>[,\<port\>][,\<autosettime\>]**	Response If synchronized successfully: **OK** **+QNTP: \<err\>,\<time\>** If there is any error: **ERROR**
Maximum Response Time	125s, determined by network.

Parameter

\<contextID\>	Integer type. The context ID. The range is 1-16.
\<server\>	String type. The address of NTP server.
\<port\>	Integer type. The port of NTP server.
\<autosettime\>	Integer type. Indicate whether to automatically set synchronized time to local time. 0 not set <u>1</u> set
\<err\>	Integer type. Synchronization result. For possible values of the parameter, please refer to *Chapter 3* of *Quectel_UC20_TCPIP_AT_Commands_Manual*.
\<time\>	String type. The time synchronized from NTP server. The format is "YYYY/MM/DD,hh:mm:ss±zz". The range of zz is -48~56.

3 Time Synchronization Procedures

There are two ways to realize time synchronization:

● Synchronizing time with NITZ (Network Identity and Time Zone)
The NITZ is a mechanism for provisioning local time and date, time zone and DST offset, as well as network provider identity information, to mobile devices via a wireless network.

● Synchronizing time with NTP (Network Time Protocol)
The NTP is a networking protocol for clock synchronization between computer systems over packet-switched, variable-latency data networks.

The first way is highly recommended, but if the local network does not support NITZ, synchronizing time with NTP should be taken.

3.1. Time Synchronization via NITZ

To synchronize time via NITZ, customers should set **AT+CTZU=1** to enable automatic time zone update.

In addition, customers can check the time zone reporting by setting **AT+CTZR=1** or **AT+CTZR=2**. The settings of these commands will be saved automatically without using **AT&W**.

The settings of **AT+CTZU=1** and **AT+CTZR=1** or **AT+CTZR=2** will take effect after rebooting. After rebooted, the module will report the current GMT time once the network time information is received.

Customers can query GMT time by **AT+CCLK?**.

Example

```
//When AT+CTZR=2:
AT+CTZU=1
OK
AT+CTZR=2
OK

RDY                              //Take effect after rebooting
```

```
+CFUN: 1

+CPIN: READY

+QUSIM: 1

+CTZE: "+32",0,"2019/04/04,01:03:33"        //Report time when receiving network time information
AT+CCLK?                                      //Query current clock
+CCLK: "19/04/04,01:03:35+32"

OK

//When AT+CTZR=1
AT+CTZU=1
OK
AT+CTZR=1
OK

RDY                                          //Take effect after rebooting

+CFUN: 1

+CPIN: READY

+QUSIM: 1

+CTZV: "+32"                                  //Report time zone
AT+CCLK?
+CCLK: "19/04/04,01:17:44+32"                //Query current clock

OK
```

3.2. Time Synchronization via NTP Server

Before using NTP server, the host should activate the context corresponding to <contextID> via **AT+QIACT** first. And then, Customers should set **AT+QNTP** to synchronize the local time via NTP.

The recommended optional NTP server addresses are listed below:

- Windows NTP server address: *time.windows.com; Port:123*
- The official time server of the United States: *time.nist.gov; Port:123*
- The NTP server address commonly used in China: *ntp.neu.edu.cn / cn.ntp.org.cn; Port:123*

Besides, customers can select server addresses tested by themselves.

Example

```
AT+CCLK="80/01/06,00:02:16+32"        //Setup time zone
OK
AT+CGREG?
+CGREG: 0,1                           //Registered to GPRS network

OK
AT+QIACT=1                            //Activate the context
OK
AT+QNTP=1,"time.windows.com",123      //Synchronize the local time via NTP
OK

+QNTP: 0,"2019/04/04,02:13:43+32"     //Successfully synchronize the time
AT+CCLK?                              //Query real time
+CCLK: "19/04/04,02:13:52+32"         //GMT time

OK
```

NOTE

If customers need to setup time zone, the command **AT+CCLK=<time>** should be used, for the time zone cannot be synchronized via NTP.

3.3. Recommended Time Synchronization Process
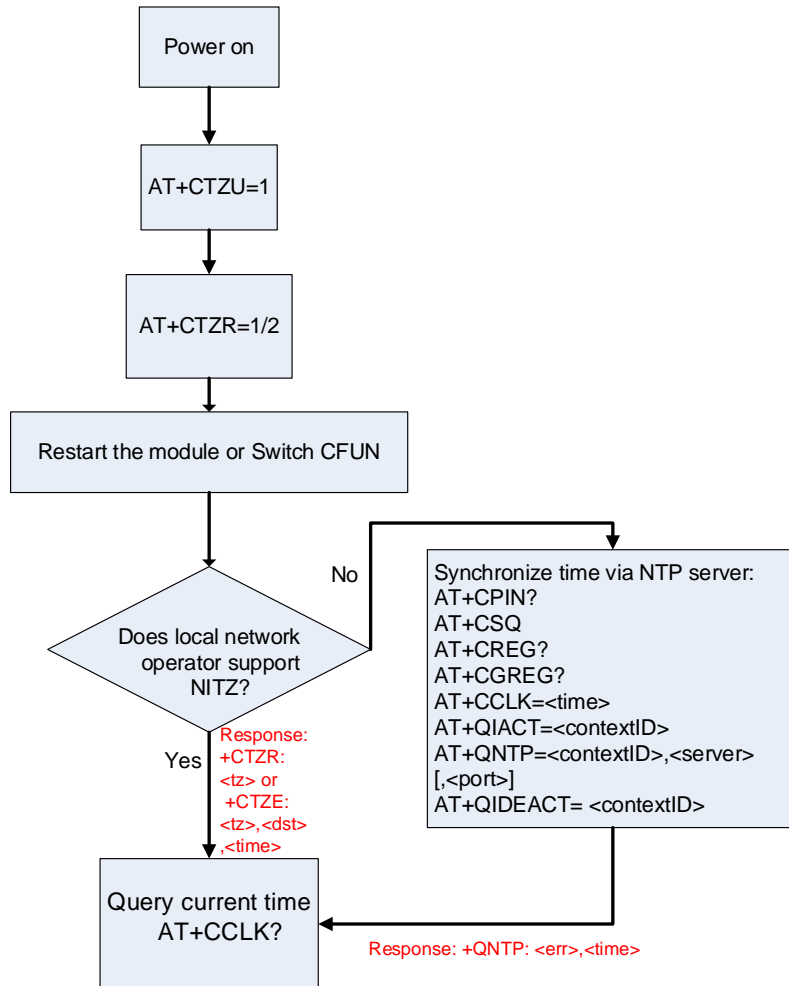
The recommended time synchronization process is shown below.

Figure 1: Recommended Time Synchronization Process