EC2x&AG35-QuecOpen Linux System Time Description

LTE Standard/Automotive Module Series

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About the Document

History

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1.0	2018-09-21	Tyler KUANG	Initial

Contents

1 Time Source

AG35/EC20 QuecOpen supports an automatic system time synchronization and time source supports NITZ, GNSS and NTP.

NITZ: NITZ is a timing service provided by the operators specialized for mobile communication devices. Operator base station takes the initiative to send this service to mobile devices. At present, Operators are still not able to confirm whether all base stations support NITZ timing service. The premise condition for obtaining this time is that there are supports from the base station and the device can make a normal network registration.

GNSS: UTC time can be obtained after a successful GNSS positioning. The premise condition for obtaining this time is to call API related to GNSS within QuecOpen and successful positioning

NTP: NTP is a network protocol used to synchronize computer clocks on the Internet. It allows devices to synchronize its time with that of NTP servers. The prerequisite for obtaining this time is that the device can access the Internet. When performing NTP time synchronization, it will access the Internet and generate a little amount of traffic.

The AG35/EC20 module contains a hardware RTC (device file /dev/rtc0). Power will not be supplied to RTC separately. When the module is powered off, it can continue to work for a short time (Its power was supplied by an external capacitor. The working time depends on the capacitor capacity and usually it will last less than one minute time. When the capacitor capacity is exhausted, the RTC will reset). Both system soft restart and hard restart can ensure that RTC continues to work. The RTC is a restricted RTC and it should not be manipulated.

2 Time Synchronization Mechanism

ql_time_daemon, the backstage process, in QuecOpen will automatically synchronize system time and maintain the hardware RTC in the module. Check whether system time has already synchronized by using the flag file /tmp/ql_time_set_flag (If flag file exists, it means the system has completed time synchronization, if not, it means time synchronization has not been performed yet).

Item	Option	Description
sync_accuracy_ms	Required	In case of a frequent system time updating, the system time will be updated only when time difference between the time acquired by time source and the current system time is greater than this value. Its unit is millisecond. If the value is 0, it only needs to obtain time from time source and thus system time will update.
modem_sync_enable	Required	It enables to update system time from NITZ.
gnss_sync_enable	Required	It enables to update system time from GNSS position information.
ntp_sync_policy	Required	NTP updates the system time policy. At present, it supports assist and normal modes. Assist mode: Auxiliary mode. If the current system time is still not synchronized when the Internet is accessible, then NTP will be started up to update system time and the NTP service will stop after the NTP time is obtained. Normal mode: Start up NTP and perform time synchronization when the internet is accessible. After that, it needs to be exited or delayed for a period of time according to the configuration and then NTP will be started up again for time synchronization.
ntp_server_probe_interval_ms	Required	After a request failure to an NTP server, retry time interval. The retry numbers will be appointed by ntp_server_probe_retry_count. If retry number is 1, it will be meaningless to change configuration. Therefore, it must be an integer number greater than or equal to 1 and its unit is millisecond.

ntp_server_probe_retry_count	Required	It refers to the retry count after a request failure to an NTP server. It must be an integer number greater than or equal to 1.
ntp_failed_retry_interval_s	Required	It refers to the time interval for re-synchronization after all requests failures to NTP server. Its unit is second. If its value is 0, it means does not need to retry.
ntp_resync_interval_s	Required	It refers to the next synchronization time interval after a successful NTP time synchronization. It is valid only when in normal mode. Its unit is second. If it is 0, it will exit NTP following a successful time synchronization. It is suggested to set this value to a fairly large one.

3 Other Methods to Update System Time

The system time can be manually updated according to the following methods:
Write the time information to the file /tmp/ql_time_set_pipe, the format: user: UTC time (in millisecond).
Let’s take an example of setting the system time format to 20180101 01:01:10. It can be achieved by the following methods:

Echo "user: 1514768470000" > /tmp/ql_time_set_pipe

4 Setting System Time Zone

The AG35/EC20 uses GLIBC to set system time zone. The system time zone can be set in a common way. It only needs to copy time zone file to */etc/localtime*.

The following example shows how to set the system time zone to Asia/Shanghai.

Step 1: Copy time zone file corresponded to Linux system (the location in Ubuntu is */usr/share/zone info/Asia/Shanghai) to ql-ol-sdk/ql-ol-rootfs/etc/localtime* in the QuecOpen SDK.
Step 2: Compile rootfs in the SDK
Step 3: Download the compiled rootfs to the device
Step 4: After running date commands in the device, it can be seen that the current system time zone has been changed.

5 Appendix A Reference Documents and Term Abbreviations

Table 2: Reference Documents

Serial Number	Document Name	Note
[1]	Quectel_UC15_AT_Commands_Manual	UC15 AT commands manual
[2]	Quectel_M10_EVB_User_Guide	M10 EVB user guide
[3]	Quectel_UC15_Reference_Design	UC15 reference design
[4]	Quectel_Module_Secondary_SMT_User_Guide	Module secondary SMT user guide