QuecPython NTP Application Note

LTE Standard Module Series

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1 Introduction

This document takes EC100Y-CN as an example to show how to synchronize NTP time with ntptime module.

2 NTP Time Synchronization

2.1. Overview

NTP, which stands for Network Time Protocol, is a protocol used for synchronizing computer time over a network. This protocol enables computer to synchronize the time of its server or time source (such as quartz clock, GPS, and etc.) and provides high-accuracy time calibration (the time difference between LAN and standard time is less than 1 ms, and that between WAN and standard time is about tens of milliseconds). It can also prevent malicious protocol attacks by encryption and confirmation. The purpose of NTP is to provide accuracy and strong time service in a disorderly internet environment.

UTC, the correct time source, is needed before NTP can proved correct time. NTP can obtain UTC from atomic clock, astronomical observatory, satellites or internet. The time is transmitted according to the NTP server level. All servers are classified into different stratums according to the distance from the external UTC time source. Stratum-1 is on the top floor and has external UTC access; Stratum-2 obtains time from Stratum-1; Stratum-3 obtains time from Stratum-2, ..., and so on. The total number of stratums is limited to 15. All the servers are connected to each other on a stepped structure formed logically, and the time server of stratum-1 is the basis of the entire system. The host is generally connected to multiple time servers, and filters the time obtained from different servers with statistical algorithms to select the best path and source to correct the host time. Even if the host cannot be connected to a certain time server for a long time, NTP service still works effectively.

To prevent malicious damage to the time server, NTP adopts an authentication mechanism to check whether the time information is actually from the claimed server and check the data return path. In this way, NTP provides a protection mechanism against interference. The time contained in the NTP time synchronization message is Greenwich Mean Time, which is the number of seconds since 1900.

2.2. Realizing Time Synchronization

To synchronize time, it needs to obtain time from NTP server, so you have to connect to network before realizing time synchronization. This document takes connecting to network with SIM card as an example.

1. Prepare an available Nano SIM card. Slid to open the SIM card slot on EVB and insert the card. Close the SIM card slot and power on the EVB. Then wait for auto dialing. Here takes EC100Y-CN as an example. The SIM card slot is shown as below:

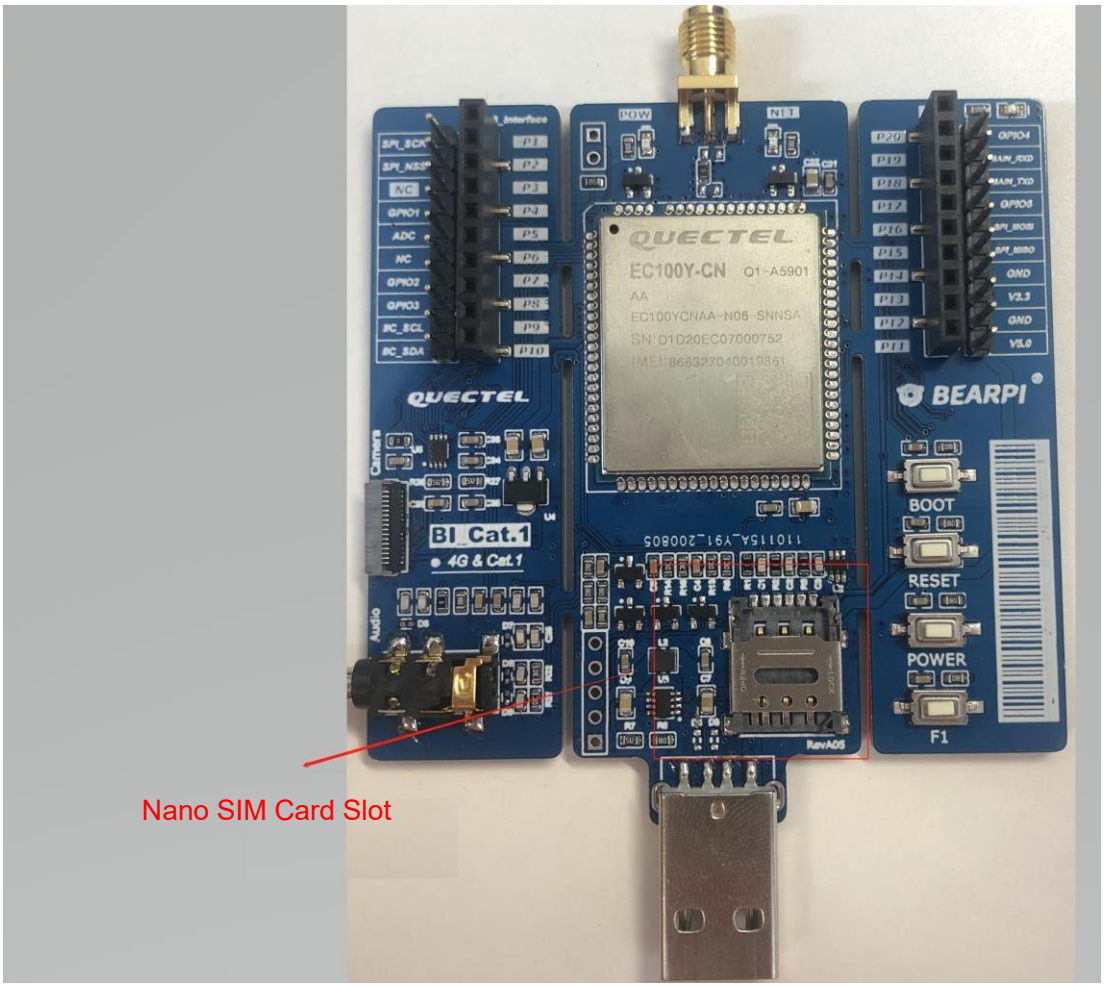

Figure 1: Insert a SIM Card

You can check the data call result as below:

```
>>> import dataCall
>>> dataCall.getInfo(1,0)
(1, 0, [1, 0, '10.22.246.141', '58.242.2.2', '218.104.78.2'])
>>>
```

Figure 2: Check Data Call Result

2. Import ntptime module after the data call is successful.

```
import ntptime ntptime.host
Then the current NTP
```

server is returned, the default is "ntp.aliyun.com".

```
>>>
>>> ntptime.host
'ntp.aliyun.com'
>>>
```

Figure 3: Returning Current NTP Server

3. Set NTP server. Returning 0 indicates the NTP server is set successfully. Returning 1 indicates failure.

```
ntptime.sethost(host)
```

```
>>> ntptime.sethost('pool.ntp.org')
0
>>>
```

Figure 4: Set NTP Server

4. Synchronize NTP time. Returning 0 indicates the NTP time is synchronized successfully. Returning 1 indicates failure.

```
ntptime.settime()
```

The time synchronization result can be checked with *utime.localtime()*. Execution of *utime.localtime()* returns current time. The return value is a tuple **(year, month, mday, hour, minute, second, weekday, yearday)**. For details, see *Quectel_QuecPython_Class_Library_API_Introduction*.

The returned time of *ntptime.settime()* is UTC time. Beijing time is eight hours ahead of UTC, so after time synchronization, the time is eight hours less than the current time.

```
>>> import ntptime
>>> import utime
>>>
>>> utime.localtime()
(2020, 10, 28, 11, 14, 55, 2, 302)
>>> ntptime.settime()
0
>>> utime.localtime()
(2020, 10, 28, 3, 15, 11, 2, 302)
>>>
```

Figure 5: Successful Time Synchronization

3 Appendix A References

Table 1: Terms and Abbreviations

Abbreviation	Description
GPS	Global Positioning System
LAN	Local Area Network
NTP	Network Time Protocol
RTC	Real_Time Clock
SIM	Subscriber Identity Module
UTC	Coordinated Universal Time
WAN	Wide Area Network