



# Quectel Function Introduction

## Time Synchronization

2014.11.20

# Contents

**What is Time Synchronization?**

**Application of Time Synchronization**

**How to Synchronize Time?**

**Synchronize Time with Quectel Modules**

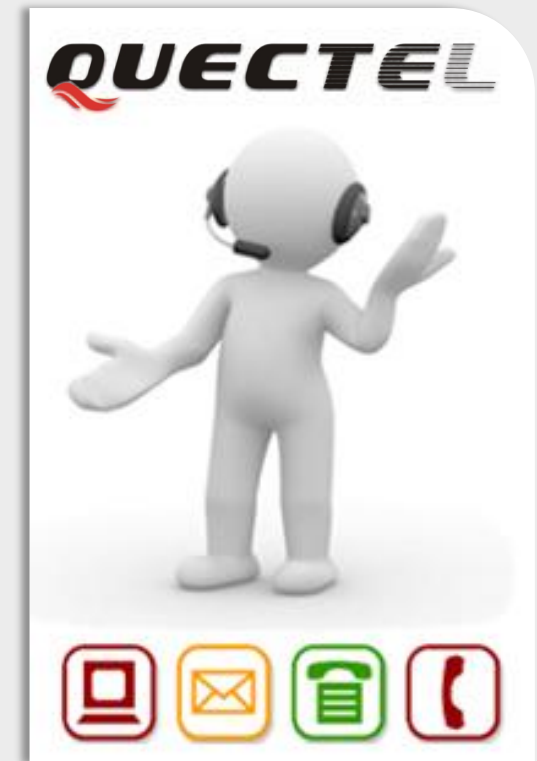


# What is Time Synchronization?

## » Time Synchronization

The computer or device clock should be kept consistent with standard time. Time source is provided by the base station, a server, GPS or set manually set.

In modern computer network time, synchronization is critical because every aspect of managing, securing, planning, and debugging a network involves determining when events happen. Time also provides the only frame of reference between all devices on the network. Without synchronized time, accurately correlating log files between these devices is difficult, even impossible.



# Contents

What is Time Synchronization?

Application of Time Synchronization

How to Synchronize Time?

Synchronize Time with Quectel Modules

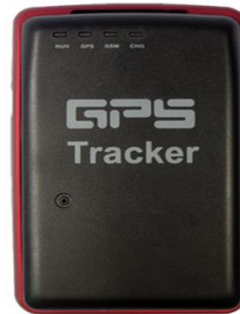


# Application of Time Synchronization

PDA



Personal Located



Transportation Management



# Contents

**What is Time Synchronization?**

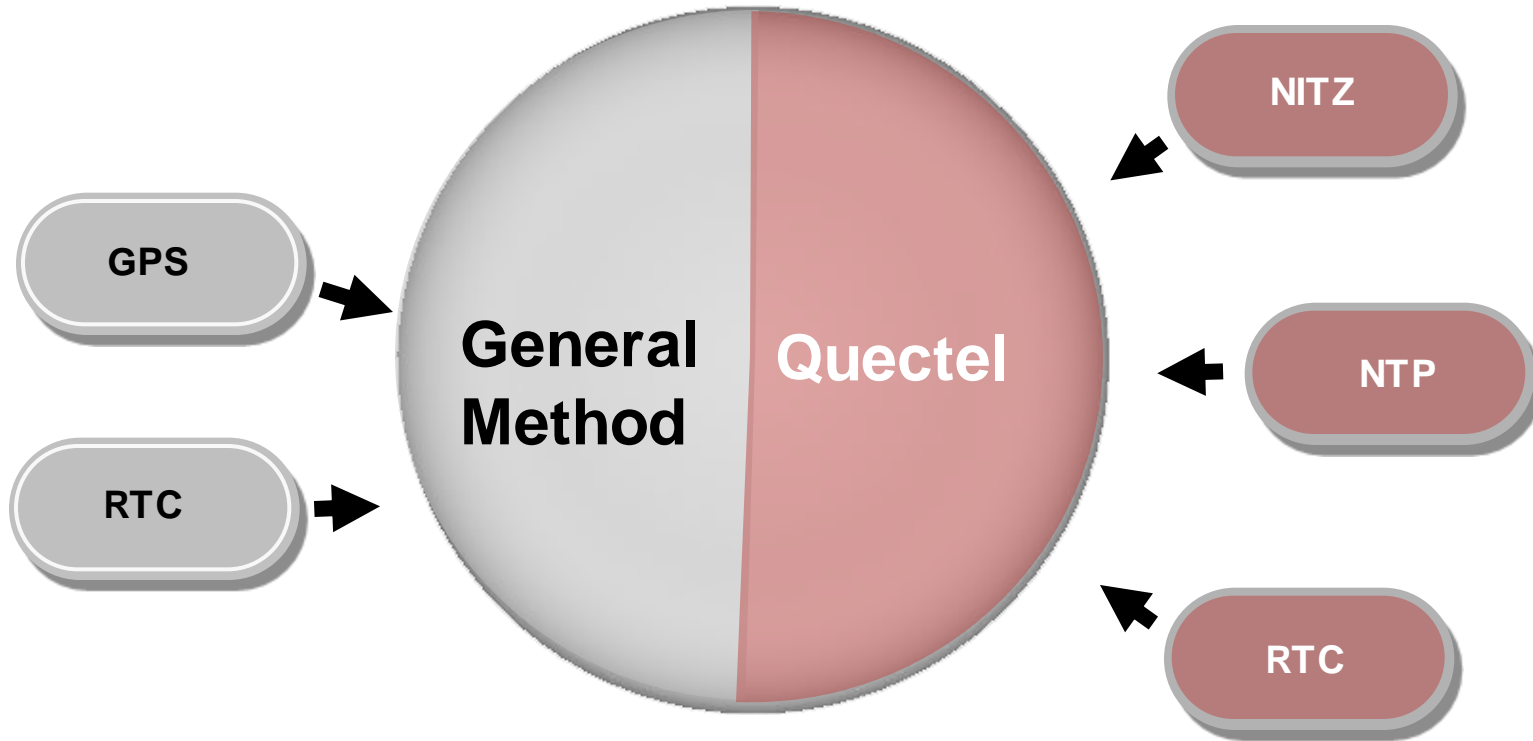
**Application of Time Synchronization**

**How to Synchronize Time?**

**Synchronize Time with Quectel Modules**



# How to Synchronize Time?



# How to Synchronize Time?

## General Method

### Time Synchronization with GPS

- Get accurate time information after GPS receives satellites
- Unable to obtain precise time if GPS signal is ineffective





# How to Synchronize Time?

## General Method

### Time Synchronization with RTC

- Get reliable system time
- Usually power supply with battery back-up
- There might be timing errors caused by chip temperature drift
- Affected by hardware, RTC cannot be guaranteed to use for long time if power cut.



# How to Synchronize Time?

## Quectel Methods

Compared with traditional methods, there are several ways to realize time synchronization by Quectel modules:

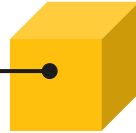
- **NITZ(Network Identity and Time Zone)**: This function needs the support of local GSM network and it will not generate GPRS data traffic.
- **NTP(Network Time Protocol)**: If local GSM network does not support NITZ, you can choose this method
- **RTC (Real-Time Clock)**. In addition, if the device is equipped with a backup battery, you can also realize time synchronization with RTC. In this case, the system clock can be initialized by RTC at system startup.

# How to Synchronize Time?

## Time Synchronization with NITZ

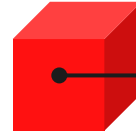
### Introduction

- Get mobile end-user time through network operators
- GMT



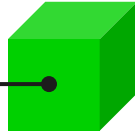
### Advantages

- High-precision time correction
- Does not generate GPRS data traffic
- It takes 9s to get time after start-up



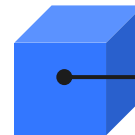
### AT Commands

- AT+QNITZ=1
- AT+CTZU=1 or 3
- The setting of these two commands can be auto saved. It is no need to use AT&W.



### Requirement

- This function needs the support of local GSM network



# How to Synchronize Time?

## AT commands

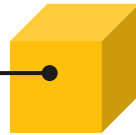
```
AT+QNITZ=1 // Enable to update time zone via NITZ
              automatically
OK
AT+CTZU=1 or 3 // Enable to synchronize RTC via GSM network
                (1: GMT time; 3: Local time)
OK
*****Restart the module or switch CFUN *****
RDY // Take effect after restarting module on
      the initial setup
+CFUN: 1
+CPIN: READY
Call Ready
+QNITZ: "14/11/20,07:09:54+32,0" // Report time after receiving network
                                  time message
AT+CCLK? //Query current clock, AT+CTZU=3
+CCLK: "14/11/20,15:10:06+32"
OK
```

# How to Synchronize Time?

## Time Synchronization with NTP Server

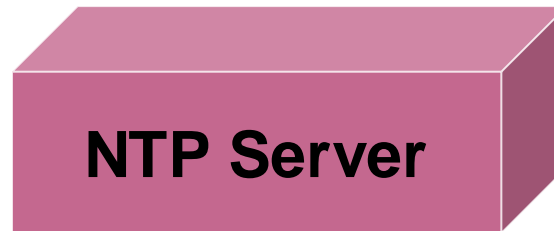
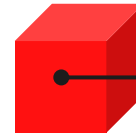
### ■ Introduction

- Connect to network time server
- GMT without time zone



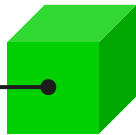
### ■ Advantages

- High-precision time correction
- Enable time self-synchronization by AT command
- No restrictions on any hardware or external environment



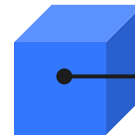
### ■ AT Commands

- AT+QNTPT="IP", port
- AT+CCLK="04/01/01,00:00:02+32"



### ■ Requirement

- Generate GPRS data traffic



# How to Synchronize Time?

## AT commands

```
AT+CCLK="04/01/01,00:00:02+32" // Setup time zone
OK

AT+CGREG? // Registered to GPRS network
+CGREG: 0,1
OK

AT+QNTTP="IP", port //Synchronize the local time via NTP
OK //Successfully synchronize the local time
+QNTTP: 0

AT+CCLK? //Query current local time
+CCLK: "14/11/20,17:01:14+32"
OK

AT+QIDEACT //Deactivate GPRS PDP context
DEACT OK
```

# How to Synchronize Time?

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## Recommended optional NTP server address:

- WINDOWS 2008 NTP: [time.windows.com](http://time.windows.com)
- The official U.S. time : [time.nist.gov](http://time.nist.gov)

# How to Synchronize Time?

## Comparison of Several Methods for Time Synchronization

|                                       | <b>GPS</b>                           | <b>RTC</b>              | <b>NTP</b> | <b>NITZ</b> |
|---------------------------------------|--------------------------------------|-------------------------|------------|-------------|
| First time to get time information /s | About 15s for getting the satellites | As soon as start up     | 10s typ.   | 9s typ.     |
| Accuracy /s                           | No delay (Good signal)               | Based on operating time | >2s        | <1s         |



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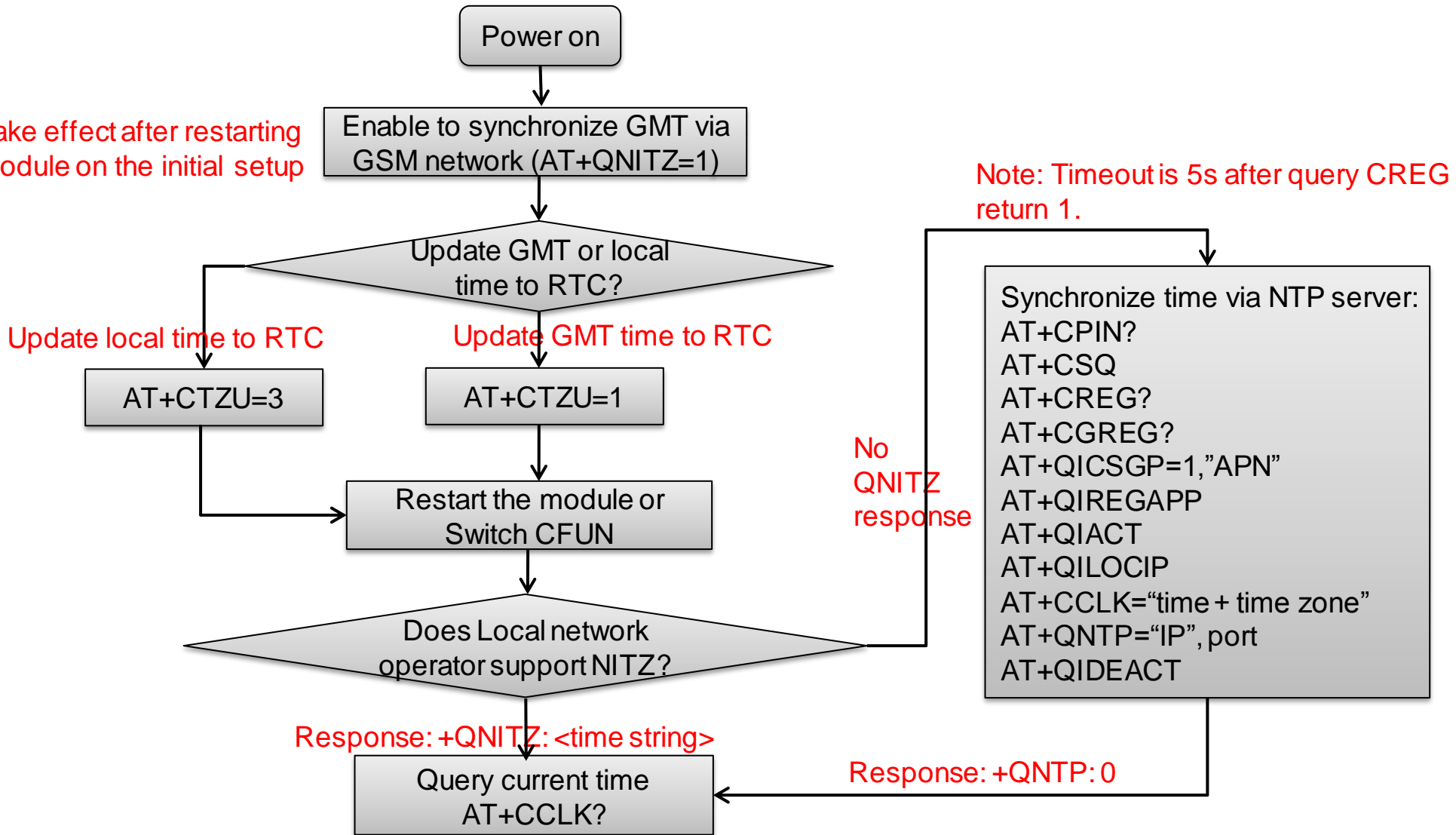
Application of Time Synchronization

How to Synchronize Time?

Synchronize Time with Quectel Modules



# Recommended Process



# Synchronize Time with Quectel Modules

The following figure shows a step-by-step procedure to synchronize time with Quectel module.



Time Source



NTP server / NITZ



Quectel module



Hardware Indicator

**Thank you**

