SIM7020 Series_Low Power Mode_Application Note

LPWA Module

SIMCom Wireless Solutions Limited
Building B, SIM Technology Building, No.633, Jinzhong Road
Changning District, Shanghai P.R. China
Tel: 86-21-31575100
support@simcom.com
www.simcom.com

Document Title:	SIM7020 Series_Low Power Mode_Application Note
Version:	1.05
Date:	2020.6.10
Status:	Release

GENERAL NOTES

SIMCOM OFFERS THIS INFORMATION AS A SERVICE TO ITS CUSTOMERS, TO SUPPORT APPLICATION AND ENGINEERING EFFORTS THAT USE THE PRODUCTS DESIGNED BY SIMCOM. THE INFORMATION PROVIDED IS BASED UPON REQUIREMENTS SPECIFICALLY PROVIDED TO SIMCOM BY THE CUSTOMERS. SIMCOM HAS NOT UNDERTAKEN ANY INDEPENDENT SEARCH FOR ADDITIONAL RELEVANT INFORMATION, INCLUDING ANY INFORMATION THAT MAY BE IN THE CUSTOMER'S POSSESSION. FURTHERMORE, SYSTEM VALIDATION OF THIS PRODUCT DESIGNED BY SIMCOM WITHIN A LARGER ELECTRONIC SYSTEM REMAINS THE RESPONSIBILITY OF THE CUSTOMER OR THE CUSTOMER'S SYSTEM INTEGRATOR. ALL SPECIFICATIONS SUPPLIED HEREIN ARE SUBJECT TO CHANGE.

COPYRIGHT

SIMCom Wireless Solutions Limited
Building B, SIM Technology Building, No.633 Jinzhong Road, Changning District, Shanghai P.R. China
Tel: +86 21 31575100
Email: simcom@simcom.com

For more information, please visit:
https://www.simcom.com/download/list-863-en.html

For technical support, or to report documentation errors, please visit:
https://www.simcom.com/ask/ or email to: support@simcom.com

About Document

Version History

Version	Date	Owner	What is new
V1.00	2018.4.12	Xiping.Li	First Release
V1.01	2018.6.8	Quanjun.Mao	Revised
V1.02	2018.12.25	Xiuying.You	Revised
V1.03	2019.5.10	Xiuying.You	Revised
V1.04	2020.3.10	Wenjie.Lai	Revised
V1.05	2020.6.10	Wenjie.Lai	All

Scope

This document applies to the following products

Name	Type	Size（mm）	Comments
SIM7020C	NB1	17.6*15.7	Band 1/3/5/8
SIM7020E	NB1	17.6*15.7	Band 1/3/5/8/20/28
SIM7030	NB1	16*18	Band LTE FDD 1/3/5/8
SIM7060	NB1+GNSS	24*24	Band LTE FDD 5/8
SIM7020G	NB2	17.6*15.7	Band 1/2/3/4/5/8/12/13/17/18/19/20/25/26/28/66/70/71/85
SIM7060G	NB2+GNSS	24*24	Band 1/2/3/4/5/8/12/13/17/18/19/20/25/26/28/66/70/71/85

Contents

1 Introduction

1.1 Purpose of the document

Based on module AT command manual, this document will introduce low power mode application process.

Developers could understand and develop application quickly and efficiently based on this document.

1.2 Related documents

[1] SIM7020 Series_AT Command Manual

1.3 Conventions and abbreviations

In this document, the GSM engines are referred to as following term:
ME (Mobile Equipment);
MS (Mobile Station);
TA (Terminal Adapter);
DCE (Data Communication Equipment) or facsimile DCE (FAX modem, FAX board);

In application, controlling device controls the GSM engine by sending AT Command via its serial interface.
The controlling device at the other end of the serial line is referred to as following term:
TE (Terminal Equipment);
DTE (Data Terminal Equipment) or plainly "the application" which is running on an embedded system;

2 Lower Power Mode Introduction

NB-IoT supports three power saving modes: PSM (Power Saving Mode), DRX (Discontinuous Reception Mode), and eDRX (Extended DRX).

PSM (power saving mode) and eDRX (extended Discontinuous Reception) are used in NB-IOT to save power. In PSM mode, the terminal does not need to receive paging to detect whether there is downlink service, and eDRX mode has a longer paging detection period than DRX, which may result in a longer time delay, which has an impact on the real-time performance of the data. Whether the PSM or the eDRX are used depends on the capabilities and configuration of the terminal and the network. In terms of capabilities, the capability network that the terminal does not support must not be configured, and the capabilities supported by the terminal may be different in different situations of the network.

2.1 PSM mode

In PSM mode, the terminal does not detect whether there is paging data in the downlink. As long as the TAU and uplink need to send data, the PSM state will be exited. T3412 is the time of TAU (Tracking Area Update), and T3324 is the timer that enters PSM in IDLE mode.

DRX can be considered that the downlink service can reach the terminal equipment at any time. In each DRX cycle (1.28s, 2.56s, 5.12s or 10.24s), the terminal will detect whether there is a downlink service arrival, which is applicable to services with high requirements for delay. Terminal equipment generally adopts a power supply method, such as a street light service.

- Since the DRX cycle is short (1.28s, 2.56s, 5.12s, or 10.24s, determined by the operator's network side setting), the downlink service can be considered to be reachable at any time with a small delay.
- Applicable to services with high latency requirements, but with relatively high power consumption. Terminal devices generally use power supply.

2.2 eDRX

eDRX has a longer paging cycle than DRX, which enables the terminal to save power and also causes longer downlink data delay (such as DRX value of 1.28s\2.56s, and eDRX value can be 20.48s, even 2.9h), so it is suitable for use in scenarios where time urgency is not very high.

2.3 The difference between three modes

DRX: Can find devices anytime, anywhere.
eDRX: It takes from few minutes to an hour or even longer time to find the device.
PSM: It may take a day or longer time to find the device.

3 PSM Mode

Power Saving Mode (**PSM**) will start after data connection terminates or periodic TAU completes. Data connection terminates, module will go to idle mode firstly, and then move to DRX (Discontinuous Reception) status. Once timer T3324 is expired, module will enter into PSM mode.

In PSM mode, module will be in a kind of deep sleep mode, in extremely low power mode, the current of SIM7020 is about 3.5 μA.

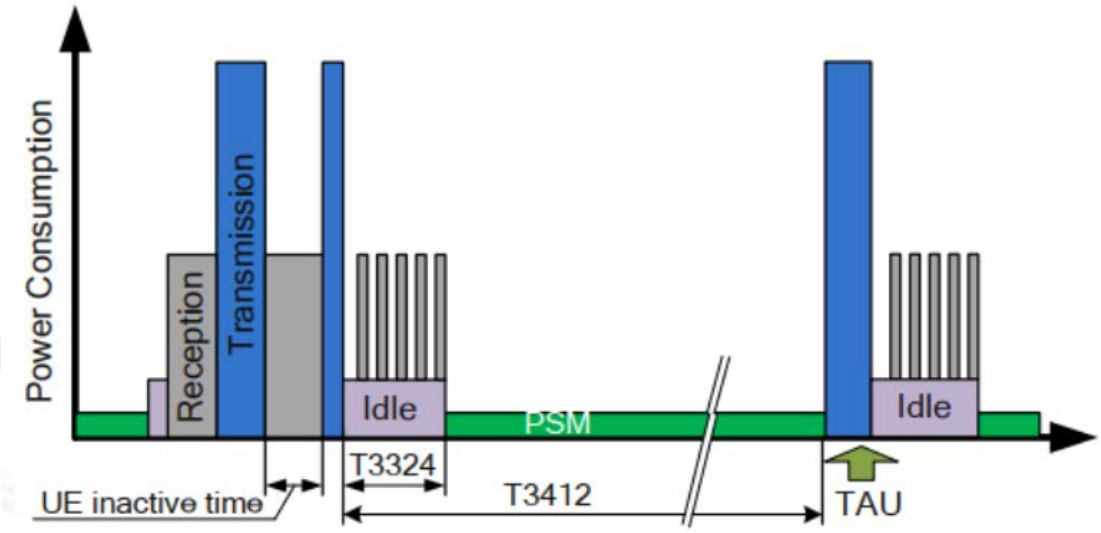

Figure1 PSM mode

3.1 PSM Wake-up

Wake-up conditions:

1) T3412 timer is expired
2) Pulling PWRKEY to low level
3) Pulling RTC_EINT to low level

3.2 AT Commands Related to PSM Mode

AT Command	Description
AT+CPSMS	Power Saving Mode Setting
AT+CNBIOTRAI	NB-IOT Release Assistance Indication
AT+RETENTION	Retention of Socket Scence

For the detail of these commands, Please refer to "SIM7020 Series AT Command Manual".

3.3 Speciality

***NOTE*：Parameters for AT+CPSMS command**

+CPSMS:
<mode>,<Requested_Periodic-RAU>,<Requested_GPRS-Ready-timer>,<Requested_periodic-TAU>,<Requested_Active-Time>

Here, parameters <Requested_Periodic-RAU> and<Requested_GPRS-Ready-timer> are not need to configure. <Requested_periodic-TAU> is T3412_ext, <Requested_Active-Time> is timer T3324.

Parameter includes unit (high 3 bits) and value (low 5 bits), below is the table.

<Requested_Periodic-TAU>

Unit	Base	Min. in Second	Max. in Second
0	10min	2400	18600
1	1h	21600	111600
2	10h	144000	1116000
3	2sec	0	62
4	30sec	90	930
5	1min	960	1860
6	320h	1152000	35712000

Table 1 <Requested_Periodic-TAU> of AT+CPSMS

For example, <TAU>=01000111 means, unit=2(010 hours) and value=7(00111), so total period is 7*10hours=70 hours.

<Requested_Active-Time>

Unit	Base	Min. in Second	Max. in Second
0	2sec	0	62

1	1min	120	1860
2	6min	2160	11160

Table 2 <Requested_Active-Time> of AT+CPSMS

3.4 Notice

1) After module wake up from PSM mode by PWRKEY or RTC_EINT, it will enter into PSM mode automatically after 5s timer (The module will not do the Random Access Channel (RACH) procedure to attach to the base station). There is a 5s timer for UART port (Refer to section 5.2.5). If MCU sends AT command every second, the module will not enter into PSM mode.

2) The module only makes network requests when it switches from CPSMS 0 to CPSMS 1, and gets the parameters issued by the operator. When the value of CPSMS is already 1, reconfiguring AT+CPSMS=1 will not do network requests.

3) The actual value of T3324 and T3412 is issued by the operator. The parameters of T3324 and T3412 manually configured by AT+CPSMS command can only take effect after they are accepted and issued by the operator. The actual value of T3324 and T3412 can be used according to the query through AT+CEREG command (Refer to section 5.2.1).

4) When USB interface of module is connected to the PC, the module can’t enter into the PSM mode.

5) For TCP connection, it must close the socket after the data exchange, and then the module can enter into the PSM mode. Otherwise, the module can’t enter into the PSM mode.

4 eDRX Mode

4.1 eDRX introduction

4.1.1 eDRX Mode

The eDRX mode is a new feature in the Rel-13. Its main purpose is to support longer-cycle paging monitoring to save power. The traditional 2.56-second paging interval consumes a large amount of power for the UE, and the downlink data transmission frequency is small. Through the negotiation cooperation between the core network and the user terminal, the user terminal skips most of the paging monitoring, thereby achieving the purpose of power saving.

The power saving effect of the eDRX mode is worse than the PSM mode, but the accessibility of the downlink communication link is greatly improved relative to the PSM mode.

The eDRX cycle is shown in Figure 3. The user can check the eDRX cycle by consulting the relevant AT command (AT+CEDRXS).

4.1.2 PTW

During each eDRX cycle, there is a Paging Time Window (PTW). The UE can only listen to the paging channel according to the DRX cycle in the PTW to receive downlink traffic. The time outside the PTW is in a sleep state and does not monitor. The paging channel cannot receive downlink traffic.

The PTW cycle is shown in Figure 3. The user can perform the PTW cycle setting by consulting the relevant AT command (AT+CEDRX).

NOTE

- The user terminal and the core network negotiate the length of the eDRX through the attach and TAU procedures.

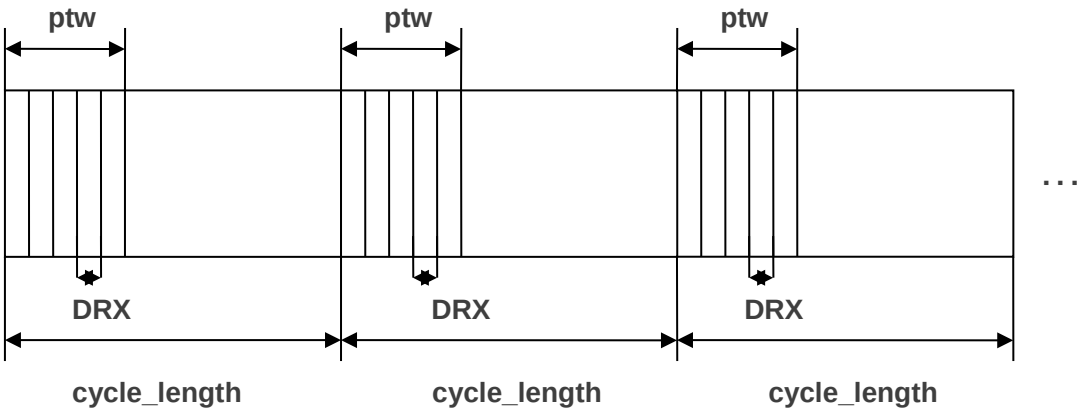

Figure 3 eDRX diagrammatic sketch

4.1.3 eDRX cycle length

Paging Time Window (PTW), octet 3 (bit 8 to 5)
The field contains a PTW value. The PTW value can be applied for NB-S1 mode as specified below.

NB-S1 mode
The field contains the PTW value in seconds for NB-S1 mode. The PTW value is used as specified in 3GPP TS 23.682 [133a].The PTW value is derived as follows:

Bit

8	7	6	5	Paging Time Window Length
0	0	0	0	2,56 seconds
0	0	0	1	5,12 seconds
0	0	1	0	7,68 seconds
0	0	1	1	10,24 seconds
0	1	0	0	12,8 seconds
0	1	0	1	15,36 seconds
0	1	1	0	17,92 seconds
0	1	1	1	20,48 seconds
1	0	0	0	23,04 seconds
1	0	0	1	25,6 seconds
1	0	1	0	28,16 seconds
1	0	1	1	30,72 seconds
1	1	0	0	33,28 seconds
1	1	0	1	35,84 seconds
1	1	1	0	38,4 seconds

1	1	1	1	40,96 seconds

表 3　PTW value

eDRX value, octet 3 (bit 4 to 1)
The octet contains the eDRX value field. The parameter values are applied for A/Gb mode, Iu mode or S1 mode according to the tables below.

S1 mode
The field contains the eDRX value for S1 mode. The E-UTRAN eDRX cycle length duration value and the eDRX cycle parameter 'TeDRX' as defined in 3GPP TS 36.304 [121] are derived from the eDRX value as follows:

Bit

4	3	2	1	eDRX cycle length duration
0	0	0	0	5.12 seconds
0	0	0	1	10.24 seconds
0	0	1	0	20.48 seconds
0	0	1	1	40.96 seconds
0	1	0	0	61.44 seconds
0	1	0	1	81.92 seconds
0	1	1	0	102.4 seconds
0	1	1	1	122.88 seconds
1	0	0	0	143.36 seconds
1	0	0	1	163.84 seconds
1	0	1	0	327.68 seconds
1	0	1	1	655.36 seconds
1	1	0	0	1310.72 seconds
1	1	0	1	2621.44 seconds
1	1	1	0	5242.88 seconds
1	1	1	1	10485.76 seconds

表 4　eDRX cycle length

4.2　AT Commands Related to eDRX Mode

AT Command	Description
AT+CEDRXS	Entended-DRX Setting

AT+CEDRXRDP	eDRX Read Dynamic Parameters
AT*MEDRXCFG	Configure EDRX parameters

For the detail of these commands, Please refer to"SIM7020 Series AT Command Manual".

4.3 Notice

1) AT+CEDRXS can be used to enable and disable the EDRX function of the module. If it has been registered to the network, executing this command will initiate a TAU update process. If accepted by the network, these parameters will take effect immediately.

2) The AT+CEDRXRDP command can be used to query whether the request sent by the module to the network is accepted by the network. If the response "+CEDRXRDP: 0" indicates that the EDRX request is not accepted by the carrier's network.

3) The AT+CEDRX command can be used to configure the EPRX paging cycle and PTW parameters, but the configuration parameters need to be restarted. This command can be used for the need to modify the PTW parameters.

5 Sleep Mode

In sleep mode, module will consume very low power, but still can receive paging.
When DRX is 2.56s, the current is about 0.46 mA, for the detail, please refer to “SIM7020 Hardware Design”.

6 Low Power Mode Examples

6.1 Bear Configuration

Usually module will register PS service automatically.

6.1.1 PDN Auto-activation

```
//Example of PDN Auto-activation.

AT+CPIN?                                    // Check SIM card status
+CPIN: READY

OK
AT+CSQ                                      // Check RF signal
+CSQ: 27,99

OK
AT+CGATT?                                   // Check PS service. 1 indicates PS has attached.
+CGATT: 1

OK
AT+CGACT?                                   // PDN active success
+CGACT:1,1

OK
AT+COPS?                                    // Query Network information, operator and
+COPS:0,0,”CHN-UNICOM”,9                    network mode 9, NB-IOT network

OK
AT+CGCONTRDP                                // Attached PS domain and got IP address
+CGCONTRDP:                                 automatically
1,5,"shnbiot","10.250.0.213.255.255.255.0"

OK
```

6.1.2 APN Manual Configuration

```
//Example of APN Manual configuration.

AT+CFUN=0                                   // Disable RF
+CPIN: NOT READY

OK
AT*MCGDEFCONT="IP","3GNET"                  // Set the APN manually

OK
AT+CFUN=1                                   // Enable RF

OK
+CPIN:READY
AT+CGATT?                                   // Inquiry PS service
+CGATT: 1

OK
AT+CGCONTRDP                                // Attached PS domain and got IP address
+CGCONTRDP:                                 automatically
1,5,"3GNET","10.250.0.253.255.255.255.0"

OK
```

6.2 PSM Mode

6.2.1 Enable/Disable PSM Mode

```
//Example of Enable/Disable PSM Mode
AT+CPSMSTATUS=1
                                            //Enable PSM Event report
OK
AT+IPR=115200                               //Fix baud rate
OK
AT+CEREG=4
OK
AT+C EREG?
+CEREG:
```

```
4,1,"5B57","01A50B1A",9,"00",,,"11100000","11100000"

OK
AT+CPSMS=1,,,"01011111","00000001"

OK

+CEREG: 1,"5B57","01A50B1A",9,"00",,,"11100000","11100000"
                                                          //Enable PSM mode and set the specific T3412_ext and T3324

+CEREG: 1,"5B57","01A50B1A",9,"00",,,"00000001","11100000"

+CPSMSTATUS: "ENTER PSM"
AT+CEREG?
+CEREG: 4,1,"5B57","01A50B1A",9,"00",,,"00000001","11100000"
                                                          //Inquiry timers configured by network.

OK
AT+CEREG=0                                                //Disable network registration unsolicited result code
OK
AT+CPSMS=0                                                //Disable PSM
OK
```

6.2.2 PSM and UDP test case

```
//Example of PSM and UPD test case
AT+CPSMSTATUS=1                                           //Enable PSM Event report
OK
AT+IPR=115200                                             //Fix baud rate
OK
AT+CPSMS=1,,,"01011111","00000001"                        //Enable PSM mode and set the specific T3412_ext and T3324
OK

+CPSMSTATUS: "ENTER PSM"

+CPIN: READY                                              //Pull PWRKEY to low level to wake up module from PSM mode

+CPSMSTATUS: "EXIT PSM"                                   //URC reports for waking up from PSM
```

	mode
AT+CSOC=1,2,1	//Set up UDP connection
+CSOC: 0	
OK	
AT+CSOCON=0,8309,"117.131.85.139"	
OK	
AT+CSOSEND=0,0,"Hello Light"	//Send data to UDP server
OK	//Receive the data from the UDP server
+CSONMI: 0,28,68656C6C6F2053494D3730323045	//The module will enter into PSM mode automatically after data exchange
+CPSMSTATUS: "ENTER PSM"	

6.2.3 PSM and TCP test case

//Example of PSM and TCP test case	
AT+CPSMSTATUS=1	//Enable PSM Event report
OK	
AT+IPR=115200	//Fix baud rate
OK	
AT+CPSMS=1,,,"01011111","00000001"	//Enable PSM mode and set the specific T3412_ext and T3324
OK	
+CPSMSTATUS: "ENTER PSM"	
+CPIN: READY	//Pull PWRKEY to low level to wake up module from PSM mode
+CPSMSTATUS: "EXIT PSM"	//URC reports for waking up from PSM mode
AT+CSOC=1,1,1	//Set up TCP connection
+CSOC: 0	
OK	
AT+CSOCON=0,8409,"117.131.85.139"	
OK	
AT+CSOSEND=0,0,"Hello Light"	//Send data to TCP server
OK	
	//Receive the data from the TCP server
+CSONMI: 0,28,68656C6C6F2053494D3730323045	
AT+CSOCL=0	//For TCP connection, must close the socket, otherwise the module can't enter into PSM mode
OK	

```
+CPSMSTATUS: "ENTER PSM"
```

6.2.4 PSM and UDP test case with AT+RETENTION=1

```
//Example of PSM and UDP test case with AT+RETENTION=1
AT+CPSMSTATUS=1                          //Enable PSM Event report
OK
AT+IPR=115200                            //Fix baud rate
OK
AT+CPSMS=1,,,"01011111","00000001"       //Enable PSM mode and set the specific
OK                                       T3412_ext and T3324

+CPSMSTATUS: "ENTER PSM"
+CPIN: READY                             //Pull PWRKEY to low level to wake up
                                         module from PSM mode
+CPSMSTATUS: "EXIT PSM"                  //URC reports for waking up from PSM
                                         mode
AT+RETENTION=1                           //Recover scene when module exited
OK                                       PSM mode
                                         (Default value is 0)
AT+CSOC=1,2,1                            //Set up UDP connection
+CSOC: 0

OK
AT+CSOCON=0,8309,"117.131.85.139"
OK
AT+CSOSEND=0,0,"Hello Light"             //Send data to UDP server
OK
                                         //Receive the data from the UDP server
+CSONMI: 0,28,68656C6C6F2053494D3730323045

                                         //The module will enter into PSM mode
+CPSMSTATUS: "ENTER PSM"                 automatically after data exchange
+CPIN: READY                             Pull PWRKEY to low level to wake up
                                         module from PSM mode
+CPSMSTATUS: "EXIT PSM"                  //URC reports for waking up from PSM
                                         mode
AT+CSOSEND=0,0,"Hello Light"             //Send data to the previous UDP server
OK                                       directly

+CPSMSTATUS: "ENTER PSM"                 //The module will enter into PSM mode
                                         automatically after data exchange
```

6.2.5 PSM and UDP test case with AT+CNBIOTRAI mode 0&1

```
//Example of PSM and UDP test case with AT+CNBIOTRAI mode 0&1
AT+CPSMSTATUS=1                          //Enable PSM Event report
OK
AT+IPR=115200                            //Fix baud rate
OK
AT+CPSMS=1,,,"01011111","00000001"       //Enable PSM mode and set the specific
OK                                       T3412_ext and T3324

+CPSMSTATUS: "ENTER PSM"
+CPIN: READY                             //Pull PWRKEY to low level to wake up
                                         module from PSM mode
+CPSMSTATUS: "EXIT PSM"                  //URC reports for waking up from PSM
                                         mode
AT+CNBIOTRAI?
+CNBIOTRAI: 0

OK
AT+CSOC=1,2,1                            //Set up UDP connection
+CSOC: 0

OK
AT+CSOCON=0,8309,"117.131.85.139"
OK
2019-04-17 15:44:31                      //The module will enter into PSM mode
AT+CSOSEND=0,0,"Hello Light"             automatically after data exchange
OK                                       It takes about 20s with T3324=2s setting
                                         to enter into the PSM mode
2019-04-17 15:44:51
+CPSMSTATUS: "ENTER PSM"
+CPIN: READY                             //Pull PWRKEY to low level to wake up
                                         module from PSM mode
+CPSMSTATUS: "EXIT PSM"                  //URC reports for waking up from PSM
                                         mode
AT+CNBIOTRAI=1                           //Enable Release Assistance Indication
OK
AT+CSOC=1,2,1                            //Set up UDP connection
+CSOC: 0

OK
AT+CSOCON=0,8309,"117.131.85.139"
OK
2019-04-17 15:56:37                      //The module will enter into PSM mode
AT+CSOSEND=0,0,"Hello Light"             automatically after data exchange
```

OK	It takes ONLY about 4s with T3324=2s setting to enter into the PSM mode
2019-04-17 15:56:41 +CPSMSTATUS: "ENTER PSM"	
+CPIN: READY	//Pull PWRKEY to low level to wake up module from PSM mode
+CPSMSTATUS: "EXIT PSM"	//URC reports for waking up from PSM mode
2019-04-17 16:00:15 AT+CNBIOTRAI? +CNBIOTRAI: 0 OK	//After PSM cycle test, it will return back to the default value 0
2019-04-17 16:00:20 +CPSMSTATUS: "ENTER PSM"	//SIM7020 will enter into PSM mode automatically after 5s timer

6.3 eDRX Mode

6.3.1 Enable eDRX mode

//Example of Enable eDRX mode	
AT+COPS? +COPS: 0,2,"46000",9 OK	//Check operator info “46000” is operator’s name 9 is NB-IOT network
AT+CEDRXS=? +CEDRXS: (0-3),(5),("0000"-"1111") OK	//Query eDRX parameters range
AT+CEDRXS? +CEDRXS: 5,"0000" OK	//Query eDRX current status
AT+CEDRXS=1 OK	//Enable eDRX function. This configuration will be saved after reboot.
AT+CEDRXRDP +CEDRXRDP: 5,"0010","0010","0011" OK	//If eDRX supported, “0010” Requested cycle length “0010” Cycle length from network “0011” PTW

```
AT+CEDRXRDP                          //If eDRX not supported, return with 0.
+CEDRXRDP: 0

OK
```

NOTE

- After eDRX enabled, you need to let module enter into sleep mode. To disable eDRX, you need to exit sleep mode firstly. In order to achieve real power saving.
- If not enter into sleep mode, Enable eDRX mode is used to enter eDRX in standby mode.

6.3.2 Set eDRX with cycle length 20.48s

```
//Example of Set eDRX with cycle length 20.48s
AT+CEDRXS?                           //Query eDRX current status
+CEDRXS: 5,"0000"

OK
AT+CEDRXS=1,5, "0010"                //Set eDRX cycle length with "0010",which
OK                                   is 20.48 s.
AT+CEDRXRDP                          "0010" Requested cycle length
+CEDRXRDP: 5,"0010","0010","0001"    "0010" Cycle length from network
                                     "0001" PTW from network
OK
```

6.3.3 Set eDRX with cycle length 20.48s and PTW 10.24s

```
//Example of Set edrx with cycle length 20.48s and PTW 10.24s
AT+CEDRXS?                           //Query eDRX current status
+CEDRXS: 5,"0000"

OK
AT*MEDRXCFG=1,5,"0010","0011"        //Set eDRX cycle length with "0010"(20.48
OK                                   s). PTW with "0011"(10.24s).
AT+CEDRXRDP                          "0010" Requested cycle length
+CEDRXRDP: 5,"0010","0010","0011"    "0010" Cycle length from network
```

```
                                                    “0011” PTW from network
OK
```

6.3.4 Set eDRX with cycle length 163.84s to enter into deep sleep mode

```
//Example of Set edrx with cycle length 163.84s to enter into deep sleep mode
AT+CEDRXS?                                          //Query eDRX current status
+CEDRXS: 5,"0000"

OK
AT+CEDRXS=1,5, "1001"                               //Set eDRX cycle length with
OK                                                  "1001",which is 163.84 s.
AT+CEDRXRDP                                         “1001” Requested cycle length
+CEDRXRDP: 5,"1001","1001","0001"                   “1001” Cycle length from network
                                                    “0001” PTW from network
OK
```

NOTE

If the cycle length is greater than or equal to 163.84 s, the module will enter into deep sleep. The wake up requires the following conditions:

- Cycle length timer is expired
- Pulling PWRKEY to low level (Typ. 800ms)
- Pulling RTC_EINT to low level

6.3.5 Disable eDRX mode

```
//Example of Disable edrx Mode
AT+CEDRXS=0                                         //Disable eDRX function
OK
AT+CEDRXRDP
+CEDRXRDP: 0

OK
```

6.4 Sleep Mode Demo

6.4.1 Hardware Method

//Example of Sleep Mode	

AT+CSCLK=1
OK
	//Enable sleep mode 1.
	//Pulling up DTR pin, module will go to normal sleep mode
	//Pulling down DTR pin will wake module up from sleep mode.

6.4.2 Software Method

//Example of Sleep Mode	
AT+CSCLK=2 **OK**	//After mode 2 configured, module will go to sleep mode automatically, if there is no data exchanged via UART. //Sending twice (any) AT command will wake up module from the sleep mode.