



NE866B1-E1/NL865B1-E1 Quick Start Guide

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1 Introduction

1.1 Scope

Scope of this document is to give an overview and basic instructions of how to start using the NE866/NL865, a module that based on the NB-IoT technology.

1.2 Audience

This document is intended for customers who want to use and test the NE866/NL865 product.

1.3 Contact Information, Support

For general contact, technical support services, technical questions and report documentation errors contact Telit Technical Support at:

TS-EMEA@telit.com

For detailed information about where you can buy the Telit modules or for recommendations on accessories and components visit:

<http://www.telit.com>

Our aim is to make this guide as helpful as possible. Keep us informed of your comments and suggestions for improvements.

Telit appreciates feedback from the users of our information.

1.4 Related Documents

- Telit_NE866B1-E1_Datasheet
- NE866B1 Product Update
- 80534ST10817A_NE866B1/NL865B1_AT_Commands_Reference_Guide_r2

2 General Description

2.1 NE866B1/NL865B1 Main Features

Dual-Band LTE FDD B8 (900MHz) & B20 (800MHz)

Currently support UART only w/o Flow Control with 9600 baud rate

UDP data session with Command mode only

With 3GPP Rel 12/13 main features:

- Power Saving Mode (PSM)
- Extended Discontinuous Reception (eDRX)
- Extended Coverage

3 Basic Set Up

3.1 Three non-backward compatible CRs

NE866B1-E1/NL865B1=E1 FW includes the following 3GPP Rel 13 non-backward compatible CRs:
 36.211 CR 0353 R1-1703964 NPBCH symbol rotation for interference randomization in NB-IoT
 36.211 CR 0338 R1-1703913 Correction on the scrambling of NPDSCH carrying the BCCH
 36.213 CR 0859 R1-1704069 NPDCCH scheduling of conflicted NSIB

Before start using the NE866B1/NL865 on live network, please consult with the operator if these 3 CRs are supported.

If not, please disable the CRs in the module side using the following procedure:

```
AT+NCONFIG?
+NCONFIG:AUTOCONNECT,TRUE
+NCONFIG:CR_0354_0338_SCRAMBLING,TRUE
+NCONFIG:CR_0859_SI_AVOID,TRUE
```

```
AT+NCONFIG=CR_0354_0338_scrambling,false
OK
AT+NCONFIG=CR_0859_SI_AVOID,false
OK
```

```
AT+NCONFIG?
+NCONFIG:AUTOCONNECT,TRUE
+NCONFIG:CR_0354_0338_SCRAMBLING,FALSE
+NCONFIG:CR_0859_SI_AVOID,FALSE
```

```
OK
```

3.2 Auto Attach & Context ID

By default the device perform auto attach and receive an auto IP from the network.

In this case the active CID is 0 and APN will be filled automatically from the network.

If different CID is required, the auto attach should be disabled and APN should be filled manually in the relevant CID

```
AT#AUTOATT=0           // Disable auto attach.  
AT#AUTOATT?           // Confirm the change  
#AUTOATT: 0  
AT+CGDCONT=1,"IP","<APN>" // Set APN  
AT#SGACT=1,1          // Context Activation
```


4 UDP script

4.1 Full AT-COMMANDS script for UDP in commands mode on CID=1 with Auto attach disable:

```

AT+CFUN=0 // Minimum functionality
AT#AUTOATT=0 // Disable auto attach
AT+CGDCONT=1,"IP",<APN> // Set CID=1 with APN
AT+CFUN=1 // Full functionality
AT#SCFG=1,1,300,90,600,50 // Socket Configuration
AT#SGACT=1,1 // Internal modem process(expect to receive: ERROR)
AT+COPS=0 // Set auto selection
AT+CEREG? // Read the EPS NW registration status
AT#SGACT? // Confirm Context activated
AT+CGPADDR=1 // Read IP address
AT#SD=1,1,<Dest. Port>,<"IP address">,0,1234,1 // Open a UDP socket to remote server
AT#SENDEXT=1,100 // Send 100 bytes of data through a connected socket
MyData // Transmit the data
SRING: 1 // Unsolicited report for incoming data
AT#SRECV=1,100 // Read 100 bytes of incoming data
AT#SH=1 // Close the socket

```

4.2 Full AT-COMMANDS script for UDP in commands mode on CID=0 with Auto attach enable:

```

AT+CGPADDR=0 // Read IP address
AT#SD=1,1,<Dest. Port>,<"IP address">,0,1234,1 // Open a UDP socket to remote server
AT#SENDEXT=1,100 // Send 100 bytes of data through a connected socket
MyData // Transmit the data
SRING: 1 // Unsolicited report for incoming data
AT#SRECV=1,100 // Read 100 bytes of incoming data
AT#SH=1 // Close the socket

```

5 PSM/eDRX

5.1 PSM – Power Saving Mode

Power Saving mode is a feature designed, in 3GPP Rel 12, for the IoT devices, in order to save battery consumption and therefore potentially achieve 10 years of battery life.

In the period of the time before the PSM, devices was turned off in order to conserve the battery power. Consequently, every power on of the device, an attach procedure to the network was performed. The acomulative energy consumption during a life time of a device can be significant and this can be avoided by using the PSM.

The PSM cycle actually stops the paging in front of the network and defines the interval between periodic Tracking Area Update (TAU) message. During the PSM time the device can't receive any MT message (Data/SMS) from the network side.

This will decrease the battery consumption due to the decreasing of the device <-> network messaging.

During the PSM time, the IoT device will enter a low power mode, and will save battery consumption by not sending network messages.

Two types of Timers can be requested by the device to the network:

1. T3324 Active Time

This timer defines the time the IoT device stays in active/idle mode, following a TAU procedure OR data transmission. During this time, the device still performs paging with the network. Once the timer is expired the device will switch to PSM mode.

2. T3412 TAU time

This time defines the interval between two periodic Tracking Area Updates.

Actually this timer can be set even if the PSM is disable.

Notes:

- A device can send any MO data during the PSM time. Once data is sent, the device switches to connected state and the 2 timers (T3324 & T3412) are reset.
- User can request the two timers value, but the network decides the final vlaue.

5.2 eDRX - Extended Discontinuous Reception

eDRX is the extended of the DRX feature, designed in 3GPP Rel 13, for IoT devices in order to reduce power consumption and increase battery life.

eDRX allows to increase the time, in which the IoT device is not listening to the network.

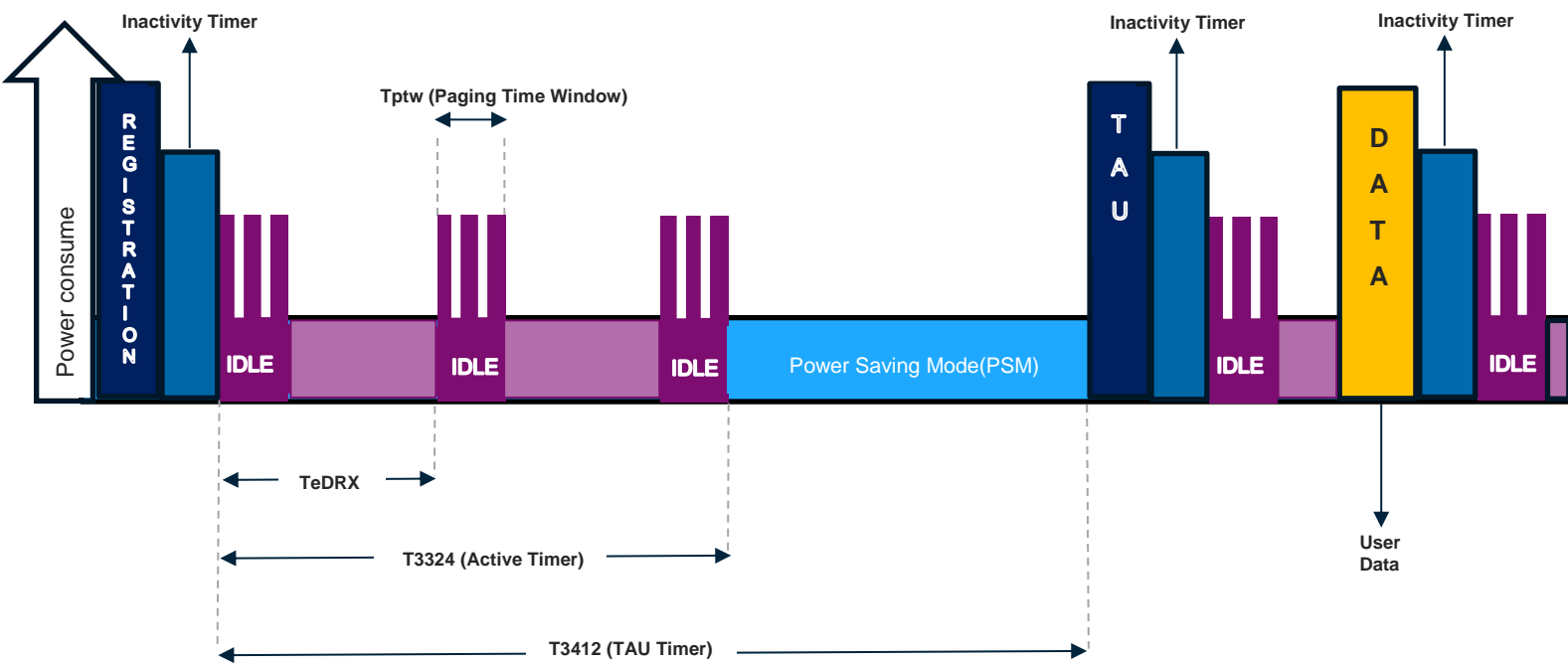
The device can configure the eDRX cycle (TeDRX) and every cycle can be configured with the Paging Transmission Window time (Tptw).

When TeDRX expires, it is restarted and Tptw is started. When Tptw expires, the device stops monitoring paging occasions.

Notes:

- This eDRX feature can be used with or without the PSM feature.
- With eDRX the device can be reachable but still keep low power consumption.
- MO data can be sent any time during the eDRX. Once data is sent, the device switches to connected state.
- The user can request the two timers value, but in the end, the network makes the decision.

5.3 PSM/eDRX Timer



6 Useful Commands

- AT+CPSMS // PSM mode enable disable
 - AT+CEDRXS // eDRX setting
 - AT+CEDRXRDP // eDRX read dynamics parameters
 - AT+CSCON // Connection status
- Please refer to: 80534ST10817A_NE866B1/NL865B1_AT_Commands_Reference_Guide_r2
 - Please refer to: 3GPP TS 24.008

6.1 AT+CPSMS

<Requested_Periodic-TAU> - This parameter define the T3412

Bits 5 to 1 represent the binary coded timer value.

Bits 6 to 8 defines the timer value unit as follows:

Bits 8 7 6:

0 0 0 value is incremented in multiples of 10 minutes

0 0 1 value is incremented in multiples of 1 hour

0 1 0 value is incremented in multiples of 10 hours

0 1 1 value is incremented in multiples of 2 seconds

1 0 0 value is incremented in multiples of 30 seconds

1 0 1 value is incremented in multiples of 1 minute

1 1 0 value is incremented in multiples of 320 hours

1 1 1 value indicates that the timer is deactivated.

For example: 10100010 -> 1minute * 2 = 2 minutes

<Requested_Active-Time> - This parameter define the T3324

Bits 5 to 1 represent the binary coded timer value.

Bits 6 to 8 defines the timer value unit for the GPRS timer as follows:

Bits 8 7 6

0 0 0 value is incremented in multiples of 2 seconds

0 0 1 value is incremented in multiples of 1 minute

0 1 0 value is incremented in multiples of decihours

For example: 00100100 -> 1minute * 4 = 4 minutes

6.2 AT+CEDRXS/+CEDRXRDP

<Requested_eDRX_value> - This parameter define the requested eDRX cycle (Tedx)

<NW-provided_eDRX_value> - This parameter define the provided eDRX cycle (Tedx)

<Paging_time_window> - This parameter define the paging time window (Tptw)

<Requested_eDRX_value>/<NW-provided_eDRX_value> - refers to bits 4 to 1

<Paging_time_window> - refers to bits 8 to 5

bit	E-UTRAN eDRX cycle length duration				eDRX cycle parameter 'T _{eDRX} '
4	3	2	1		
0	0	0	0	5,12 seconds (NOTE 4)	NOTE 3
0	0	0	1	10,24 seconds (NOTE 4)	2 ⁰
0	0	1	0	20,48 seconds	2 ¹
0	0	1	1	40,96 seconds	2 ²
0	1	0	0	61,44 seconds (NOTE 5)	6
0	1	0	1	81,92 seconds	2 ³
0	1	1	0	102,4 seconds (NOTE 5)	10
0	1	1	1	122,88 seconds (NOTE 5)	12
1	0	0	0	143,36 seconds (NOTE 5)	14
1	0	0	1	163,84 seconds	2 ⁴
1	0	1	0	327,68 seconds	2 ⁵
1	0	1	1	655,36 seconds	2 ⁶
1	1	0	0	1310,72 seconds	2 ⁷
1	1	0	1	2621,44 seconds	2 ⁸
1	1	1	0	5242,88 seconds (NOTE 6)	2 ⁹
1	1	1	1	10485,76 seconds (NOTE 6)	2 ¹⁰

All other values shall be interpreted as 0000 by this version of the protocol.

NOTE 3: For E-UTRAN eDRX cycle length duration of 5,12 seconds the eDRX cycle parameter 'T_{eDRX}' is not used as a different algorithm compared to the other values is applied. See 3GPP TS 36.304 [121] for details.

NOTE 4: The value is applicable only in WB-S1 mode. If received in NB-S1 mode it is interpreted as if the Extended DRX parameters IE were not included in the message by this version of the protocol.

NOTE 5: The value is applicable only in WB-S1 mode. If received in NB-S1 mode it is interpreted as 0010 by this version of the protocol.

NOTE 6: The value is applicable only in NB-S1 mode. If received in WB-S1 mode it is interpreted as 1101 by this version of the protocol.

bit				Paging Time Window length
8	7	6	5	
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



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Link to www.telit.com and contact our technical support team for any questions related to technical issues.

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