BC26 OneNET
AT Commands Manual

NB-IoT Module Series

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About the Document

History

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1.0	2018-08-02	Randy LI	Initial

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1 Introduction

This document describes the OneNET AT Commands Set supported by Quectel NB-IoT module BC26.

1.1. Definitions

- <CR>: Carriage return character.
- <LF>: Linefeed character.
- <..>: Parameter name. Angle brackets do not appear in command line。
- [..]: Optional parameter. Square brackets do not appear in the command line.

1.2. AT Command Syntax

Table 1: AT Command Syntax

Test Command	AT+<*x*>=?	Returns parameter lists and value ranges set by the corresponding Write Command or internal processes.
Read Command	AT+<*x*>?	Returns the currently set value of the parameter(s).
Write Command	AT+<x>=<…>	Sets the user-definable parameter values.
Execution Command	AT+<x>	Reads non-variable parameters affected by internal processes in the module.

2 Implementation Status

Table 2: Types of AT Commands and Implementation Status

AT Command	Description	Implementation Status
AT+MIPLCREATE	Create a OneNET Communication Suite Instance	R01A02
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AT+MIPLVER	Query the Current OneNET Communication Suite Version	R01A02
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3 OneNET Data Interaction Mechanism

This chapter illustrates the data interaction mechanism of OneNET platform.
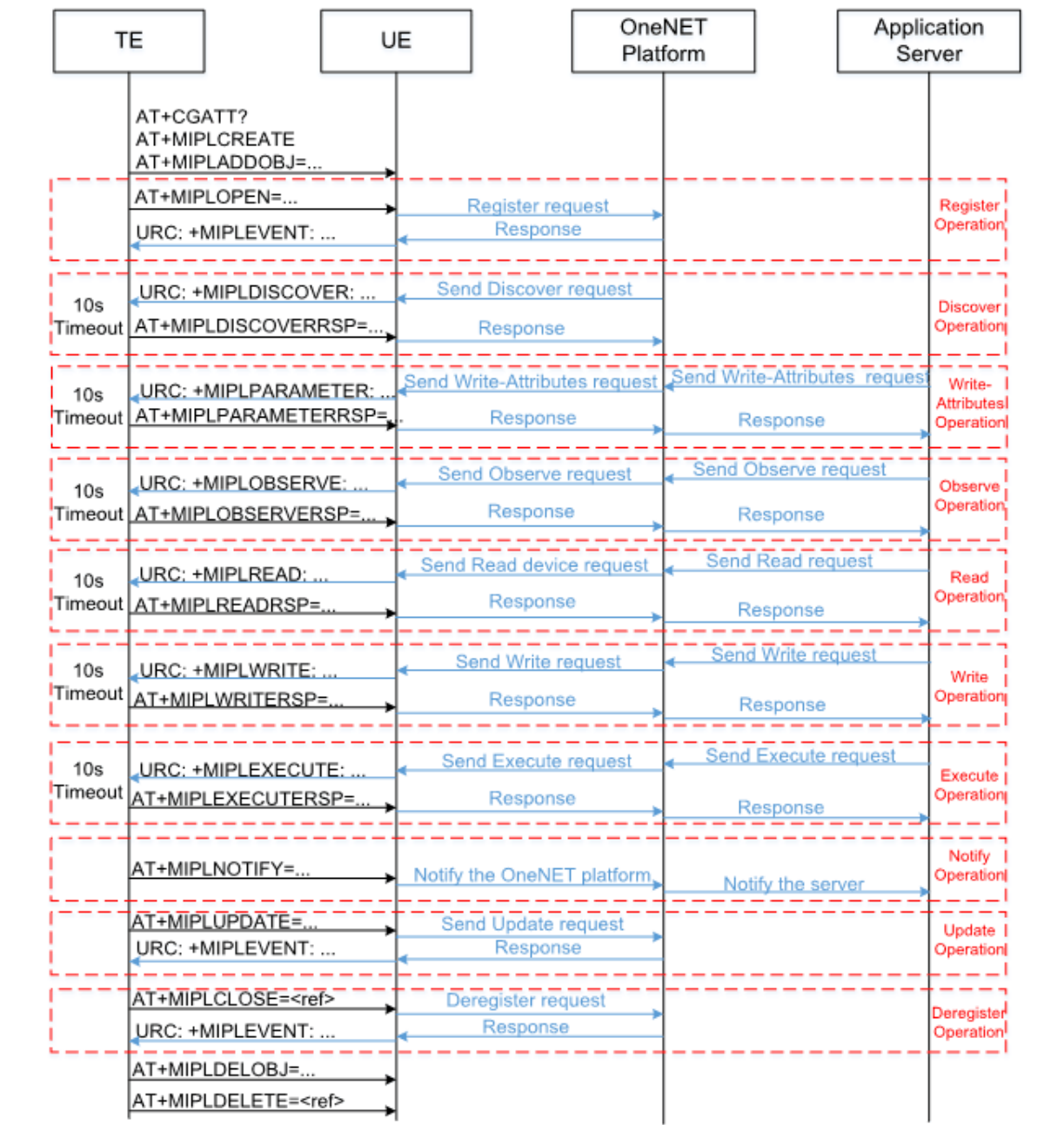
Figure 1: OneNET Data Interaction Diagram

4 OneNET Related AT Commands

4.1. AT+MIPLCREATE   Create a OneNET Communication Suite Instance

The command is used to create a OneNET communication suite instance. Please refer to *Chapter 5* for possible **<err>** codes.

AT+MIPLCREATE Create a OneNET Communication Suite Instance	
Execution Command **AT+MIPLCREATE**	Response **+MIPLCREATE: <ref>** **OK** If there is any error, response: **+CIS ERROR: <err>**
Maximum Response Time	300ms

Parameter

<ref>   Instance ID of OneNET communication suite.

4.2. AT+MIPLDELETE   Delete a OneNET Communication Suite Instance

The command is used to delete an OneNET communication suite instance. Please refer to *Chapter 5* for possible **<err>** codes.

AT+MIPLDELETE Delete a OneNET Communication Suite Instance	
Test Command **AT+MIPLDELETE=?**	Response **+MIPLDELETE: <ref>** **OK**
Write Command **AT+MIPLDELETE=<ref>**	Response **OK**

	If there is any error, response: **+CIS ERROR: <err>**
Maximum Response Time	5s

Parameter

<ref>	Instance ID of OneNET communication suite.

4.3. AT+MIPLVER   Query the Current OneNET Communication Suite Version

The command is used to query the current OneNET communication suite version.

AT+MIPLVER Query the Current OneNET Communication Suite Version	
Read Command **AT+MIPLVER?**	Response **+MIPLVER: <version>** **OK**
Maximum Response Time	300ms

Parameter

<version>	The current OneNET communication suite version.

4.4. AT+MIPLADDOBJ   Add a LwM2M Object

The command is used to add a LwM2M object. Please refer to *Chapter 5* for possible **<err>** codes.

AT+MIPLADDOBJ Add a LwM2M Object	
Test Command **AT+MIPLADDOBJ=?**	Response **+MIPLADDOBJ: <ref>,<objId>,<insCount>,<insBitmap>, <attrCount>,<actCount>**

	OK
Write Command **AT+MIPLADDOBJ=<ref>,<objld>,<ins Count>,<insBitmap>,<attrCount>,<ac tCount>**	Response **OK** If there is any error, response: **+CIS ERROR: <err>**
Maximum Response Time	300ms

Parameter

<ref>	Instance ID of OneNET communication suite.
<objld>	Object identifier. If the object ID does not exist, the module will return an error.
<insCount>	Instance count.
<insBitmap>	Instance bitmap. A string which should be marked with double quotation marks. For example, if **<insCount>**=4, and the **<insBitmap>**="1101", it indicates that the instance ID 0, 2, 3 will be registered, and the instance ID 1 will not be registered.
<attrCount>	Attribute count, which indicates the count of readable and/or writeable resources.
<actCount>	Action count, which indicates the count of executable resources.

NOTE

Please refer to http://www.openmobilealliance.org/wp/OMNA/LwM2M/LwM2MRegistry.html for detailed explanation and description of object identifier.

4.5. AT+MIPLDELOBJ   Delete a LwM2M Object

The command is used to delete a LwM2M object. Please refer to *Chapter 5* for possible **<err>** codes.

AT+MIPLDELOBJ Delete a LwM2M Object	
Test Command **AT+MIPLDELOBJ=?**	Response **+MIPLDELOBJ: <ref>,<objld>** **OK**
Write Command **AT+MIPLDELOBJ=<ref>,<objld>**	Response **OK**

	If there is any error, response:
	+CIS ERROR: <err>
Maximum Response Time	300ms

Parameter

| <ref> | Instance ID of OneNET communication suite. |
| <objId> | Object identifier. If the object ID does not exist, the module will return an error. |

4.6. AT+MIPLRD   Retrieve the Received Data

The command is used to read the received data from buffer. In buffer access mode, after receiving data, the module will buffer the received data and then report URC "+MIPLWRITE: <ref>,<msgId>,<objId>,<insId>,<resId>,<valueType>,<len>,<flag>,<index>" to external MCU. Please refer to *Chapter 5* for possible **<err>** codes.

AT+MIPLRD Retrieve the Received Data	
Test Command **AT+MIPLRD=?**	Response **+MIPLRD: <length>** **OK**
Write Command **AT+MIPLRD=<length>**	Response **+MIPLRD: <read_actual_length>,<remain_length>** **<data>** **OK** If no data, response: **+MIPLRD: 0** **OK** If there is any error, response: **+CIS ERROR: <err>**
Maximum Response Time	300ms

Parameter

<length>	The length of data to be retrieved. Range: 1-512. Unit: byte.
<read_actual_length>	The actual length of received data. Unit: byte.
<remain_length>	The unread length of received data. Unit: byte.

Example

```
AT+MIPLRD=2      //Read data from buffer
+MIPLWRD: 2,0
021F

OK
AT+MIPLRD=4      //The buffer is empty
+MIPLRD: 0

OK
```

NOTES

1. If the received buffer is not empty, and the module receives data again, then the buffer will not report a new URC until all the received data has been retrieved from it.
2. The remaining length is not the total received bytes in buffer, which only indicates the current remaining data stored in one node.

4.7. AT+MIPLOPEN   Send Register Request

The command is used to send register request to OneNET platform. Please refer to *Chapter 5* for possible **<err>** codes.

AT+MIPLOPEN Send Register Request	
Test Command **AT+MIPLOPEN=?**	Response **+MIPLOPEN: <ref>,<lifetime>** **OK**
Write Command **AT+MIPLOPEN=<ref>,<lifetime>**	Response **OK** If there is any error, response: **+CIS ERROR: <err>**

Maximum Response Time	300ms

Parameter

<ref>	Instance ID of OneNET communication suite.
<lifetime>	Lifetime in seconds. Range: 0 or 15-268435455. "0" means the lifetime is 3600s.

4.8. AT+MIPLCONFIG   OneNET Access Configuration

The command is used to enable/disable bootstrap mode and configure bootstrap server address or access server address. Please refer to *Chapter 5* for possible **<err>** codes.

AT+MIPLCONFIG OneNET Access Configuration	
Test Command **AT+MIPLCONFIG=?**	Response **+MIPLCONFIG: <mode>,<recv_data_format>[,<bsMode>,<ip>,<port>]** **OK**
Write Command **AT+MIPLCONFIG=<mode>,<recv_data_format>[,<bsMode>,<ip>,<port>]**	Response **OK** If there is any error, response: **+CIS ERROR: <err>**
Maximum Response Time	300ms

Parameters

<mode>	Integer type. The data mode of OneNET platform.	
	0	Direct push mode
	1	Buffer access mode
<recv_data_format>	Integer type. Received data format.	
	0	Hex string
	1	Text string
<bsMode>	Integer type. Configure bootstrap mode.	
	0	Disable boostrap
	1	Enable boostrap
<ip>	When <bsMode>=0, <ip> represents access server IP.	
	When <bsMode>=1, <ip> represents bootstrap server IP.	
<port>	When <bsMode>=0, <port> represents access server port.	

When <bsMode>=1, <port> represents bootstrap server port.

NOTE

The command should be executed before the communication suite instance is created with **AT+MIPLCREATE** command.

4.9. AT+MIPLCLOSE Send Deregister Request

This command is used to send deregister request to OneNET platform. Please refer to *Chapter 5* for possible **<err>** codes.

AT+MIPLCLOSE Send Deregister Request	
Test Command **AT+MIPLCLOSE=?**	Response **+MIPLCLOSE: <ref>** **OK**
Write Command **AT+MIPLCLOSE=<ref>**	Response **OK** If there is any error, response: **+CIS ERROR: <err>**
Maximum Response Time	300ms

Parameter

<ref>	Instance ID of OneNET communication suite.

4.10. AT+MIPLDISCOVERRSP Respond to the Discover Request

This command is used to respond to the discover request from OneNET platform. Please refer to *Chapter 5* for possible **<err>** codes.

AT+MIPLDISCOVERRSP Respond to the Discover Request	
Test Command **AT+MIPLDISCOVERRSP=?**	Response **+MIPLDISCOVERRSP: <ref>,<msgId>,<result>,<length>,**

	<valuestring> **OK**
Write Command **AT+MIPLDISCOVERRSP=<ref>,<msg id>,<result>,<length>,<valuestring>**	Response **OK** If there is any error, response: **+CIS ERROR: <err>**
Maximum Response Time	300ms

Parameter

<ref>	Instance ID of OneNET communication suite.
<msgld>	The message identifier, which comes from the URC "+ MIPLDISCOVER:"
<result>	The results of discover operation and the result codes are as follows:

Result code	CoAP response code	Description
1	2.05	Content, indicates the correct result.
11	4.00	Bad Request
12	4.01	Unauthorized
13	4.04	Not Found
14	4.05	Method Not Allowed
15	4.06	Not Acceptable

<length>	The length of **<valuestring>**.
<valuestring>	A string which contains the attributes of the object and should be marked with double quotation marks. Each attribute should be split with a semicolon, such as "1101;1102;1103". The count of attributes should not be larger than the sum of **<attrCount>** and **<actCount>** in command **AT+MIPLADDOBJ**.

4.11. AT+MIPLOBSERVERSP   Respond to the Observe Request

The command is used to respond to the observe request from OneNET platform. Please refer to *Chapter 5* for possible **<err>** codes.

AT+MIPLOBSERVERSP Respond to the Observe Request	
Test Command **AT+MIPLOBSERVERSP=?**	Response **+MIPLOBSERVERSP: <ref>,<msgld>,<result>** **OK**
Write Command **AT+MIPLOBSERVERSP=<ref>,<msgl**	Response **OK**

d>,<result>	
	If there is any error, response: **+CIS ERROR: <err>**
Maximum Response Time	300ms

Parameter

<ref>	Instance ID of OneNET communication suite.
<msgld>	The message identifier, which comes from the URC "+ MIPLOBSERVE:".
<result>	The results of observe operation and the result codes are as follows:

Result code	CoAP response code	Description
1	2.05	Content, indicates the correct result.
11	4.00	Bad Request
12	4.01	Unauthorized
13	4.04	Not Found
14	4.05	Method Not Allowed
15	4.06	Not Acceptable

4.12. AT+MIPLREADRSP   Respond to the Read Request

The command is used to respond to the read request from OneNET platform. Please refer to *Chapter 5* for possible **<err>** codes.

AT+MIPLREADRSP Respond to the Read Request	
Test Command **AT+MIPLREADRSP=?**	Response **+MIPLREADRSP: <ref>,<msgld>,<result>[,<objld>,<insld>,<resld>,<valueType>,<len>,<value>,<index>,<flag>]** **OK**
Write Command **AT+MIPLREADRSP=<ref>,<msgld>,<result>[,<objld>,<insld>,<resld>,<valueType>,<len>,<value>,<index>,<flag>]**	Response **OK** If there is any error, response: **+CIS ERROR: <err>**
Maximum Response Time	300ms

Parameter

<ref>	Instance ID of OneNET communication suite.

<msgId>	The message identifier, which comes from the URC "+MIPLREAD:".
<result>	The results of read operation and the result codes are as follows:

Result code	CoAP response code	Description
1	2.05	Content, indicates the correct result.
11	4.00	Bad Request
12	4.01	Unauthorized
13	4.04	Not Found
14	4.05	Method Not Allowed
15	4.06	Not Acceptable

<objId>	Object identifier.
<insId>	The instance identifier, which comes from the URC "+MIPLREAD:".
<resId>	The resource identifier, which comes from the URC "+MIPLREAD:".
<valueType>	The value types.
	1 String
	2 Opaque
	3 Integer
	4 Float
	5 Boolean
<len>	The value length.
	When **<valueType>** is String, its string length is **<value>**.
	When **<valueType>** is Opaque, it is in hex string format and is **<value>**.
	When **<valueType>** is Integer, it may be 2, 4 or 8.
	When **<valueType>** is Float, it is 4.
	When **<valueType>** is Boolean, it is 1.
<value>	The value.
	When **<valueType>** is String, it is in string format, and the string should be marked with double quotation marks.
	When **<valueType>** is Opaque, it is in hex string format.
	When **<valueType>** is Integer/Float/Boolean, it is an Integer/Float/Boolean type text.
<index>	The index number of the data. If the data is combined with several messages, it should be split into several parts. If it is split into N parts, the order number of **<index>** is N-1 to 0 in descending order, and the AT command is called in the order from the largest to the smallest number. If **<index>** is 0, it means that this is the last message of the data.
<flag>	The message indication. The range is 0-2. If **<flag>**=1, it indicates the first message of the **<value>**. If **<flag>**=2, it indicates the middle message of the **<value>**. If **<flag>**=0, it indicates the last message of the **<value>**. **<flag>**=0 is supported only in this version.

NOTES

1. The length of the response data should be less than 512 bytes.
2. If the value type is Opaque (**<valueType>**=2), the data length is counted as 2***<len>**.

4.13. AT+MIPLWRITERSP   Respond to the Write Request

The command is used to respond to the write request from the OneNET platform. Please refer to *Chapter 5* for possible **<err>** codes.

AT+MIPLWRITERSP Respond to the Write Request	
Test Command **AT+MIPLWRITERSP=?**	Response **+MIPLWRITERSP: <ref>,<msgId>,<result>** **OK**
Write Command **AT+MIPLWRITERSP=<ref>,<msgId>,<result>**	Response **OK** If there is any error, response: **+CIS ERROR: <err>**
Maximum Response Time	300ms

Parameter

<ref>	Instance ID of OneNET communication suite.
<msgId>	The message identifier, which comes from the URC "+MIPLWRITE:"
<result>	The results of write operation and the result codes are as follows:

Result code	CoAP response code	Description
2	2.04	Changed, indicates the correct result.
11	4.00	Bad Request
12	4.01	Unauthorized
13	4.04	Not Found
14	4.05	Method Not Allowed

4.14. AT+MIPLEXECUTERSP   Respond to the Execute Request

The command is used to respond to the execute request from OneNET platform. Please refer to **Chapter 5** for possible **<err>** codes.

AT+MIPLEXECUTERSP Respond to the Execute Request	
Test Command **AT+MIPLEXECUTERSP=?**	Response **+MIPLEXECUTERSP: <ref>,<msgId>,<result>** **OK**
Write Command **AT+MIPLEXECUTERSP=<ref>,<msgId>,<result>**	Response **OK** If there is any error, response: **+CIS ERROR: <err>**
Maximum Response Time	300ms

Parameter

<ref>	Instance ID of OneNET communication suite.
<msgId>	The message identifier, which comes from the URC "+MIPLEXECUTE:".
<result>	The results of execute operation and the result codes are as follows:

Result code	CoAP response code	Description
2	2.04	Changed, indicates the correct result.
11	4.00	Bad Request
12	4.01	Unauthorized
13	4.04	Not Found
14	4.05	Method Not Allowed

4.15. AT+MIPLPARAMETERRSP   Respond to the Write-Attributes

Request

The command is used to respond to the write-attributes request from OneNET platform. Please refer to **Chapter 5** for possible **<err>** codes.

AT+MIPLPARAMETERRSP Respond to the Write-Attributes Request	
Test Command **AT+MIPLPARAMETERRSP=?**	Response **+MIPLPARAMETERRSP: <ref>,<msgId>,<result>**

	OK
Write Command **AT+MIPLPARAMETERRSP=<ref>,<m sgId>,<result>**	Response **OK** If there is any error, response: **+CIS ERROR: <err>**
Maximum Response Time	300ms

Parameter

<ref>	Instance ID of OneNET communication suite.
<msgId>	The message identifier, which comes from the URC "+MIPLPARAMETER:".
<result>	The results of write-attributes operation and the result codes are as follows:

Result code	CoAP response code	Description
2	2.04	Changed, indicates the correct result.
11	4.00	Bad Request
12	4.01	Unauthorized
13	4.04	Not Found
14	4.05	Method Not Allowed

4.16. AT+MIPLNOTIFY   Notify the Data to OneNET Platform or Application Server

The command is used to notify the data to OneNET platform or Application Server. Please refer to *Chapter 5* for possible **<err>** codes.

AT+MIPLNOTIFY Notify the Data to OneNET Platform or Application Server	
Test Command **AT+MIPLNOTIFY=?**	Response **+MIPLNOTIFY: <ref>,<msgId>,<objId>,<insId>,<resId><valueType>,<len>,<value>,<index>,<flag>[,<ackid>]** **OK**
Write Command **AT+MIPLNOTIFY=<ref>,<msgId>,<objId>,<insId>,<resId>,<valueType>,<len>,<value>,<index>,<flag>[,<ackid>]**	Response **OK** If there is any error, response: **+CIS ERROR: <err>**

Maximum Response Time	300ms

Parameter

\<ref\>	Instance ID of OneNET communication suite.
\<msgId\>	The message identifier, which comes from the URC "+MIPLOBSERVE:".
\<objId\>	Object identifier.
\<insId\>	The instance identifier, which comes from the URC "+MIPLOBSERVE:".
\<resId\>	The resource identifier, which comes from the URC "+MIPLOBSERVE:".
\<valueType\>	The value types.
	1 String
	2 Opaque
	3 Integer
	4 Float
	5 Boolean
\<len\>	The value length.
	When **\<valueType\>** is String, its string length is**\<value\>**.
	When **\<valueType\>** is Opaque, it is in hex string format and is**\<value\>**.
	When **\<valueType\>** is Integer, it may be 2, 4, or 8.
	When **\<valueType\>** is Float, it is 4.
	When **\<valueType\>** is Boolean, it is 1.
\<value\>	The value.
	When **\<valueType\>** is String, it is in string format, and the string should be marked with double quotation marks.
	When **\<valueType\>** is Opaque, it is in hex string format.
	When **\<valueType\>** is Integer/Float/Boolean, it is an Integer/Float/Boolean type text.
\<index\>	The index number of the data. If the data is combined with several messages, it should be split into several parts. If it is split into N parts, the order number of **\<index\>** is N-1 to 0 in descending order, and the AT command is called in the order from the largest to the smallest number. If **\<index\>** is 0, it means that this is the last message of the data.
\<flag\>	The message indication. The range is 0-2. If **\<flag\>**=1, it indicates the first message of the **\<value\>**. If **\<flag\>**=2, it indicates the middle message of the **\<value\>**. If **\<flag\>**=0, it indicates the last message of the **\<value\>**.**\<flag\>**=0 is supported only in this version..
\<ackid\>	Integer type. Range: 0-65535
	0 The data will be sent in Non-confirmable (NON) message.
	1-65535 The data will be sent in Confirmable (CON) message.

> **NOTES**
>
> 1. This command is used to notify data. The total data length should be less than 1024 bytes. If the value type is opaque, the data length is counted as 2***<len>**.
> 2. If the data contains several messages, the messages which have already been sent in the first place will be sent out as usual until a message error is reported.

4.17. AT+MIPLUPDATE   Send Update Request

The command is used to send an update request to update lifetime and objects. Please refer to *Chapter 5* for possible **<err>** codes.

AT+MIPLUPDATE Send Update Request	
Test Command **AT+MIPLUPDATE=?**	Response **+MIPLUPDATE: <ref>,<lifetime>,<withObjectFlag>** **OK**
Write Command **AT+MIPLUPDATE=<ref>,<lifetime>, <withObjectFlag>**	Response **OK** If there is any error, response: **+CIS ERROR: <err>**
Maximum Response Time	300ms

Parameter

<ref>	Instance ID of OneNET communication suite.
<lifetime>	Updated lifetime value. Range: 0 or 15-268435455 (unit in seconds). "0" means that lifetime is 3600s.
<withObjectFlag>	Whether to update with objects list.
	0 Update without objects list.
	1 Update with objects list.

5 Summary of \<err\> Codes

This chapter introduces the **\<err\>** codes related to module BC26. The **\<err\>** codes listed in the following table are compliant with the 3GPP specification. Customers can refer to *3GPP TS 27.007 V13.5.0, sub-clause 9.2* for all possible **\<err\>** codes.

Table 3: Description of \<err\> Codes

\<err\> Codes	Description
0	Unknown error
1	System error
2	Network error
3	Registration failed
651	Memory error
652	Parameter error
653	Operation not supported
654	SDK error
655	Not found error

6 OneNET Related URCs

This chapter describes OneNET related URCs.

Table 4: OneNET Related URCs

Index	URC	Description
[1]	**+MIPLDISCOVER: <ref>,<msgld>,<objld>**	When the OneNET platform sends a discover request, the module will report the URC once it receives the request.
[2]	**+MIPLOBSERVE: <ref>,<msgld>,<flag>,<objld>,<insld>,<resld>**	When the OneNET platform sends an observe request, the module will report the URC once it receives the request.
[3]	**+MIPLREAD: <ref>,<msgld>,<objld>,<insld>, <resld>**	When the OneNET platform sends a read request, the module will report the URC once it receives the request.
[4]	**+MIPLWRITE: <ref>,<msgld>,<objld>,<insld>, <resld>,<valueType>,<len>[,<value>],<flag>,<index>**	When the OneNET platform sends a write request, the module will report the URC once it receives the request.
[5]	**+MIPLEXECUTE: <ref>,<msgld>,<objld>,<insld>,<resld>[,<len>,<arguments>]**	When the OneNET platform sends an execute request, the module will report the URC once it receives the request.
[6]	**+MIPLPARAMETER: <ref>,<msgid>,<objld>,<insld>,<resld>,<len>,<parameter>**	When the OneNET platform sends a write-attributes request, the module will report the URC once it receives the request.
[7]	**+MIPLEVENT: <ref>,<evtid>[,<extend>,<ackid>]**	Report the URC when there is an event to be notified to TE.

6.1. "+MIPLDISCOVER" URC to Notify the TE to Respond to the

Discover Request

The URC is mainly used to notify the TE to respond to the discover request from OneNET platform. TE should respond to the request with command **AT+MIPLDISCOVERRSP** in ten seconds (starting from the output of URC), and the response should start after the URC is outputted completely.

"+MIPLDISCOVER" URC to Notify the TE to Respond to the Discover Request	
URC Format: **+MIPLDISCOVER: <ref>,<msgId>,<objId>**	Notify the TE to respond to the discover request from OneNET platform.

Parameters

<ref>	Instance ID of OneNET communication suite.
<msgId>	The message identifier of packet.
<objId>	The object identifier that is received from OneNET platform.

6.2. "+MIPLOBSERVE" URC to Notify the TE an Observe Request

The URC is mainly used to notify the TE that there is an observe request from OneNET platform or Application Server. TE should respond to the request with command **AT+MIPLOBSERVERSP** in ten seconds (starting from the output of URC), and the response should start after the URC is outputted completely.

"+MIPLOBSERVE" URC to Notify the TE an Observe Request	
URC Format: **+MIPLOBSERVE: <ref>,<msgId>,<flag>,<objId>,<insId>,<resId>**	Notify the TE that there is an observe request from OneNET platform or Application Server.

Parameters

<ref>	Instance ID of OneNET communication suite.	
<msgId>	The message identifier of packet.	
<flag>	Indicates whether or not to observe.	
	0	Cancel observe
	1	Observe
<objId>	The object identifier that is received from OneNET platform or Application Server.	

| <insId> | The instance identifier that is received from OneNET platform or Application Server. "-1" indicates observing or cancelling the observation of all resources under all instances. |
| <resId> | The resource identifier that is received from OneNET platform or Application Server. "-1" indicates observing or cancelling the observation of all resources under a specific instance. |

6.3. "+MIPLREAD" URC to Notify the TE to Respond to the Read Request

The URC is mainly used to notify the TE to respond to the read request from OneNET platform or Application server. TE should respond to the request with command **AT+MIPLREADRSP** in ten seconds (starting from the output of URC), and the response should start after the URC is outputted completely.

"+MIPLREAD" URC to Notify the TE to Respond to the Read Request	
URC Format: **+MIPLREAD: <ref>,<msgId>,<objId>, <insId>,<resId>**	Notify the TE to respond to the read request from OneNET platform or Application Server.

Parameters

<ref>	Instance ID of OneNET communication suite.
<msgId>	The message identifier of packet.
<objId>	The object identifier that is received from OneNET platform or Application Server.
<insId>	The instance identifier that is received from OneNET platform or Application Server. "-1" indicate read all resources under a specific object.
<resId>	The resource identifier that is received from OneNET platform or Application Server. "-1" indicate read all resources under a specific instance.

6.4. "+MIPLWRITE" URC to Notify the TE to Respond to the Write Request

The URC is mainly used to notify the TE to respond to the write request from OneNET platform or Application Server. TE should respond to the request with command **AT+MIPLWRITERSP** in ten seconds (starting from the output of URC), and the response should start after the URC is outputted completely.

"+MIPLWRITE" URC to Notify the TE to Respond to the Write Request

URC Format: **+MIPLWRITE: <ref>,<msgld>,<objl d>,<insld>,<resld>,<valueType>,<le n>[,<value>],<flag>,<index>**	Notify the TE to respond to the write request from OneNET platform or Application Server.

Parameters

<ref>	Instance ID of OneNET communication suite.
<msgld>	The message identifier of packet.
<objld>	The object identifier that is received from OneNET platform or Application Server.
<insld>	The instance identifier that is received from OneNET platform or Application Server.
<resld>	The resource identifier, received from OneNET platform or Application Server.
<valueType>	The value type (only shows in opaque currently).
	1 String
	2 Opaque
	3 Integer
	4 Float
	5 Boolean
<len>	The value length.
<value>	The value that is received from OneNET platform or Application Server, in hex string format. Only valid in direct push mode.
<flag>	The message indication. The range is 0-2. If **<flag>**=1, it means the first message of the **<value>**. If **<flag>**=2, it means the middle message of the **<value>**. If **<flag>**=0, it means the last message of the **<value>**.**<flag>**=0 is supported only in this version.
<index>	The index number of the write request. If the write request is combined with several messages, it should be split into several parts. If it is split into N parts, the order number of **<index>** is N-1 to 0 in descending order, and the URC is sorted from the largest one to the smallest. If **<index>** is 0, it means that this is the last message of the write request.

NOTE

The data length of write operation from Application Server should be less than 1000 bytes, otherwise there may be an operation failure.

6.5. "+MIPLEXECUTE" URC to Notify the TE to Respond to the Execute Request

The URC is mainly used to notify the TE to respond to the execute request from OneNET platform or Application Server. TE should respond to the request with command **AT+MIPLEXECUTERSP** in ten seconds, (starting from the output of URC), and the response should start after the URC is outputted completely.

"+MIPLEXECUTE" URC to Notify the TE to Respond to the Execute Request	
URC Format: **+MIPLEXECUTE: <ref>,<msgId>,<objId>,<insId>,<resId>[,<len>,<arguments>]**	Notify the TE to respond to the execute request from OneNET platform or Application Server.

Parameters

<ref>	Instance ID of OneNET communication suite.
<msgId>	The message identifier of packet.
<objId>	The object identifier that is received from OneNET platform or Application Server.
<insId>	The instance identifier that is received from OneNET platform or Application Server.
<resId>	The resource identifier that is received from OneNET platform or Application Server.
<len>	The length of **<arguments>**.
<arguments>	String type. The arguments of execute operate.

NOTE

The **<arguments>** length of execute operation from Application Server shall be less than 1000 bytes, otherwise there may be an operation failure.

6.6. "+MIPLPARAMETER" URC to Notify the TE to Respond to the Write-Attributes Request

This URC is mainly used to notify the TE to Respond to the write-attributes request from OneNET platform or Application Server. TE should respond to the request with command **AT+MIPLPARAMETERRSP** in ten seconds (starting from the output of URC), and the response should start after the URC is outputted completely.

"+MIPLPARAMETER" URC to Notify the TE to Respond to the Write-Attributes Request	
URC Format: **+MIPLPARAMETER: <ref>,<msgid>,<objld>,<insld>,<resld>,<len>,<parameter>**	Notify the TE to respond to the write-attributes request from OneNET platform or Application Server.

Parameters

<ref>	Instance ID of OneNET communication suite.
<msgld>	The message identifier of packet.
<objld>	The object identifier that is received from OneNET platform or Application Server.
<insld>	The instance identifier that is received from OneNET platform or Application Server. "-1" indicate the **<parameter>** apply to all resources under a specific object.
<resld>	The resource identifier that is received from OneNET platform or Application Server. "-1" indicate the **<parameter>** apply to all resources under a specific instance.
<len>	The length of **<parameter>**.
<parameter>	The parameter of write-attributes operation in string type.

6.7. "+MIPLEVENT" URC to Notify the TE of Events

The URC is mainly used to notify the TE of events.

"+MIPLEVENT" URC to Notify the TE of Events	
URC Format: **+MIPLEVENT: <ref>,<evtid>[,<extend>[,<ackid>]]**	Notify the TE of events.

Parameters

<ref>	Instance ID of OneNET communication suite.
<evtid>	The identifier of event
	1 EVENT_BOOTSTRAP_START
	2 EVENT_BOOTSTRAP_SUCCESS
	3 EVENT_BOOTSTRAP_FAILED
	4 EVENT_CONNECT_SUCCESS
	5 EVENT_CONNECT_FAILED
	6 EVENT_REG_SUCCESS
	7 EVENT_REG_FAILED
	8 EVENT_REG_TIMEOUT

	9	EVENT_LIFETIME_TIMEOUT
	10	EVENT_STATUS_HALT
	11	EVENT_UPDATE_SUCCESS
	12	EVENT_UPDATE_FAILED
	13	EVENT_UPDATE_TIMEOUT
	14	EVENT_UPDATE_NEED
	15	EVENT_DEREG_DONE
	20	EVENT_RESPONSE_FAILED
	21	EVENT_RESPONSE_SUCCESS
	25	EVENT_NOTIFY_FAILED
	26	EVENT_NOTIFY_SUCCESS
<extend>		Extended parameter. When **<evtid>** is 20 or 25, it is the message ID of the response command. When **<evtid>** is 14, it is the remaining time of lifetime (unit in seconds).
<ackid>		Integer type. Range: 1-65535. Acknowledgement identifier of the CON message notified through **AT+MIPLNOTIFY**.

7 Examples

This chapter illustrates how to use OneNET related AT commands with examples.

7.1. Register and Discover Operations

7.1.1. Register to the Chongqing-based OneNET Platform

The example shows how to register to the Chongqing-based OneNET platform which is connected to the bootstrap IP (183.230.40.39) by default.

```
AT+MIPLCREATE
+MIPLCREATE: 0                      //Created the communication suite instance successfully.
OK


AT+MIPLADDOBJ=0,3311,1,"1",4,2      //Add a LwM2M object.
OK                                  //Added the object successfully and the instance ID 0 will
                                       be registered.


AT+MIPLOPEN=0,86400                 //Send a register request to the OneNET platform.
OK


+MIPLEVENT: 0,1                     //Start to connect to the bootstrap server.
+MIPLEVENT: 0,2                     //Connected to the bootstrap server successfully.
+MIPLEVENT: 0,4                     //Connected to the OneNET platform successfully.
+MIPLEVENT: 0,6                     //Registered to the OneNET platform successfully.
+MIPLOBSERVE: 0,69234,1,3311,0,-1   //Received an observe (3311/0) request.


AT+MIPLOBSERVERSP=0,69234,1         //Respond to the observe request with result code (1).
OK


+MIPLDISCOVER: 0,26384,3311         //Received the resource discover request.


AT+MIPLDISCOVERRSP=0,26384,1,19,"5850;5851;5706;5805"   //Respond to the resource discover
                                                           request with resource ID list.
OK
```

```
AT+MIPLDELOBJ=0,3311          //Delete a LwM2M object.
OK


AT+MIPLCLOSE=0                //Send a deregister request to OneNET platform.
OK


+MIPLEVENT: 0,15              //Deregistered successfully.


AT+MIPLDELETE=0
OK                           //Deleted the communication suite instance successfully.
```

7.1.2. Register to the Bootstrap-enabled OneNET Platform

The example shows how to register to an OneNET platform which supports bootstrap mode.

```
AT+MIPLCONFIG=0,1,1,"183.230.40.39",5683 //Enable the bootstrap mode and configure the bootstrap
                                           server IP and port number.
OK


AT+MIPLCREATE
+MIPLCREATE: 0               //Created the communication suite instance successfully.


OK


AT+MIPLADDOBJ=0,3311,1,"1",4,2    //Add a LwM2M object.
OK                                //Added the object successfully. And the instance ID 0 will
                                    be registered.


AT+MIPLOPEN=0,86400          //Send a register request to the OneNET platform.
OK


+MIPLEVENT: 0,1              //Start to connect to the bootstrap server.
+MIPLEVENT: 0,2              //Connected to the bootstrap server successfully.
+MIPLEVENT: 0,4              //Connected to the OneNET platform successfully.
+MIPLEVENT: 0,6              //Registered to the OneNET platform successfully.
+MIPLOBSERVE: 0,91530,1,3311,0,-1    //Received observe (3311/0) request.


AT+MIPLOBSERVERSP=0,91530,1  //Respond to the observe request with result code (1).
OK


+MIPLDISCOVER: 0,25995,3311  //Received resource discover request.


//Respond to the resource discover request with resource ID list.
AT+MIPLDISCOVERRSP=0,25995,1,19,"5850;5851;5706;5805"
```

```
OK

AT+MIPLDELOBJ=0,3311              //Delete a LwM2M object.
OK

AT+MIPLCLOSE=0                    //Send deregister request to OneNET platform.
OK

+MIPLEVENT: 0,15                  //Deregistered successfully.

AT+MIPLDELETE=0
OK                               //Deleted the communication suite instance successfully.
```

7.1.3. Register to the Bootstrap-disabled OneNET Platform

The example shows how to register to an OneNET platform which does not support bootstrap mode.

```
AT+MIPLCONFIG=0,1,0,"183.230.40.40",5683   //Disable the bootstrap mode and configure the access
                                             server IP and port number.

OK

AT+MIPLCREATE
+MIPLCREATE: 0                   //Created the communication suite instance successfully.

OK

AT+MIPLADDOBJ=0,3311,1,"1",4,2   //Add a LwM2M object.
OK                               //Added the object successfully and the instance ID 0 will
                                   be registered.

AT+MIPLOPEN=0,86400              //Send a register request to the OneNET platform.
OK

+MIPLEVENT: 0,4                  //Connected to the OneNET platform successfully.
+MIPLEVENT: 0,6                  //Registered to the OneNET platform successfully.
+MIPLOBSERVE: 0,111068,1,3311,0,-1  //Received a observe (3311/0) request.

AT+MIPLOBSERVERSP=0,111068,1     //Respond to the observe request with result code (1).
OK

+MIPLDISCOVER: 0,45533,3311       //Received a resource discover request.

AT+MIPLDISCOVERRSP=0,45533,1,19,"5850;5851;5706;5805"   //Respond to the resource discover
                                                          request with resource ID list.
```

OK

AT+MIPLDELOBJ=0,3311 //Deleted a LwM2M object.
OK

AT+MIPLCLOSE=0 //Send a deregister request to OneNET platform.
OK

+MIPLEVENT: 0,15 //Deregistered successfully.

AT+MIPLDELETE=0
OK //Deleted the communication suite instance successfully.

7.2. Read Operation

7.2.1. Read Resource

//After UE has registered to the OneNET platform successfully.
//The Application Server has sent a read request to UE with the intention of reading the resource (3311/0/5805).

+MIPLREAD: 0,3123,3311,0,5805

AT+MIPLREADRSP=0,3123,1,3311,0,5805,4,4,1.88,0,0 //Respond to the read request.
OK //Sent data 1.88 to Application Server
       successfully.

7.2.2. Read Instance

//After UE has registered to the OneNET platform successfully.
//The Application Server has sent a read request to UE with the intention of reading the resource (3311/0).

+MIPLREAD: 0,25466,3311,0,-1

//Respond to the read request with four messages.
AT+MIPLREADRSP=0,25466,1,3311,0,5851,5,1,1,3,0
OK
AT+MIPLREADRSP=0,25466,1,3311,0,5852,3,2,123,2,0
OK
AT+MIPLREADRSP=0,25466,1,3311,0,5706,1,10,"1234567890",1,0
OK
AT+MIPLREADRSP=0,25466,1,3311,0,5805,4,4,1.88,0,0

OK

7.2.3. Read Object

//After UE has registered to the OneNET platform successfully.
//The Application Server has sent a read request to UE with the intention of reading the resource (3311).

+MIPLREAD: 0,39299,3311,-1,-1

//Respond to the read request with six messages.
AT+MIPLREADRSP=0,39299,1,3311,0,5851,5,1,1,5,0
OK
AT+MIPLREADRSP=0,39299,1,3311,0,5852,3,2,123,4,0
OK
AT+MIPLREADRSP=0,39299,1,3311,1,5851,5,1,1,3,0
OK
AT+MIPLREADRSP=0,39299,1,3311,1,5852,3,2,123,2,0
OK
AT+MIPLREADRSP=0,39299,1,3311,1,5706,1,10,"1234567890",1,0
OK
AT+MIPLREADRSP=0,39299,1,3311,1,5805,4,4,1.88,0,0
OK

7.3. Write Operation

7.3.1. Write Resource

//After UE has registered to the OneNET platform successfully.
//The Application Server has sent a write request to UE with the intention of writing the resource
(3311/0/5706) with value in string (hello).

+MIPLWRITE: 0,38017,3311,0,5706,2,5,68656C6C6F,0,0

AT+MIPLWRITERSP=0,38017,2   //Respond to the write request with result code (2).
OK

AT+MIPLCONFIG=1,1   //Set buffer mode and receive text string format data.
OK

//Simply display the received data length, and then send **AT+MIPLRD** to read the data on its own.
+MIPLWRITE: 0,38018,3311,0,5706,2,5,0,0

AT+MIPLWRITERSP=0,38018,2   //Respond to the write request with result code (2).

OK

AT+MIPLRD=5   //Read data from the buffer.

+MIPLRD: 5,0   //Read actual data length and unread data length.

hello   //Data in text string format.

OK

7.3.2. Write Instance

//After UE has registered to the OneNET platform successfully.
//The Application Server has sent a write request to UE with the intention of writing the instance (3311/0).

+MIPLWRITE: 0,46584,3311,0,5706,2,5,68656C6C6F,0,2
+MIPLWRITE: 0,46584,3311,0,5850,2,1,01,0,1
+MIPLWRITE: 0,46584,3311,0,5851,2,8,00000002DFDC1C3E,0,0.

//Respond to the write request with result code (2).
AT+MIPLWRITERSP=0,46584,2
OK

7.4. Execute Operation

//After UE has registered to the OneNET platform successfully.
//The Application Server has sent an execute request to UE with argument "reset".

+MIPLEXECUTE: 0,36476,3303,0,5605,5,"reset"

//Respond to the execute request with result code (2).
AT+MIPLEXECUTERSP=0,36476,2
OK.

7.5. Write-Attributes Operation

//After the UE has registered to OneNET platform successfully.
//The Application Server has sent a Write-Attributes request to UE.

+MIPLPARAMETER: 0,56642,3303,0,5700,38,"pmin=2;pmax=190;gt=100.0;lt=1.0;st=0.2"

//Respond to the execute request with result code (2).
AT+MIPLPARAMETERRSP=0,56642,2
OK

7.6. Observe Operation

//After the UE has registered to OneNET platform successfully.
//The Application Server has sent an observe request to UE.

+MIPLOBSERVE: 0,29620,1,3311,0,-1

//Confirm observe request.
AT+MIPLOBSERVERSP=0,29620,1
OK

7.7. Notify Operation

7.7.1. Notify Resource Data

//After the UE has registered to OneNET platform successfully and the Application Server has observed the resource (3303/0/5700) successfully.

//Notify resource data.
AT+MIPLNOTIFY=0,122179,3303,0,5700,4,4,25.6,0,0
OK

7.7.2. Notify Instance Data

//After the UE has registered to the OneNET platform successfully and the Application Server has observed the instance (3303/0) successfully.

//Notify instance data.
AT+MIPLNOTIFY=0,653687,3303,0,5700,4,4,10.24,3,0
OK
AT+MIPLNOTIFY=0,653687,3303,0,5701,1,3,"Cel",2,0
OK
AT+MIPLNOTIFY=0,653687,3303,0,5601,4,4,0.16,1,0
OK
AT+MIPLNOTIFY=0,653687,3303,0,5602,4,4,100.86,0,0

OK

7.7.3. Notify Object Data

//After the UE has registered to the OneNET platform successfully and the Application Server has observed the object (3303) successfully.

//Notify instance (0) data.
AT+MIPLNOTIFY=0,196301,3303,0,5700,4,4,9.8,3,0
OK
AT+MIPLNOTIFY=0,196301,3303,0,5701,1,3,"Cel",2,0
OK
AT+MIPLNOTIFY=0,196301,3303,0,5601,4,4,0.16,1,0
OK
AT+MIPLNOTIFY=0,196301,3303,0,5602,4,4,99.8,0,0
OK

//Notify instance (1) data
AT+MIPLNOTIFY=0,196301,3303,1,5700,4,4,0.2,3,0
OK
AT+MIPLNOTIFY=0,196301,3303,1,5701,1,3,"Cel",2,0
OK
AT+MIPLNOTIFY=0,196301,3303,1,5601,4,4,3.2,1,0
OK
AT+MIPLNOTIFY=0,196301,3303,1,5602,4,4,100.1,0,0
OK

7.7.4. Notify Resource Data with <ackid>

//After the UE has registered to the OneNET platform successfully and the Application Server has observed the object (3303) successfully.

//Notify resource data with **<ackid>**(255).
AT+MIPLNOTIFY=0,307353,3303,0,5701,1,3,"Cel",0,0,255
OK

+MIPLEVENT: 0,26,255   //Return notification results.

7.7.5. Notify Instance Data with <ackid>

//After the UE has registered to OneNET platform successfully and the Application Server has observed the object (3303) successfully.

//Notify resource data with **\<ackid\>**(258).
AT+MIPLNOTIFY=0,487674,3303,0,5700,4,4,170.1,3,0,258
OK
AT+MIPLNOTIFY=0,487674,3303,0,5701,1,3,"Cel",2,0,258
OK
AT+MIPLNOTIFY=0,487674,3303,0,5601,4,4,106.1,1,0,258
OK
AT+MIPLNOTIFY=0,487674,3303,0,5602,4,4,660.9,0,0,258
OK

+MIPLEVENT: 0,26,258   //Return notification results.

7.7.6. Update Operation

//After the UE has registered to OneNET platform successfully.

//Update lifetime to 86400 seconds.
AT+MIPLUPDATE=0,86400,0
OK

+MIPLEVENT: 0,11   //Return update results.

8 Appendix A References

Table 5: Related Documents

SN	Document Name	Remark
[1]	IPSO-Smart-Objects-Starter-Pack	Internet Protocol for Smart Objects (IPSO) Alliance
[2]	OMA-TS-LightweightM2M-V1_0	Open Mobile Alliance

Table 6: Terms and Abbreviations

Abbreviation	Description
LwM2M	Lightweight Machine to Machine
CoAP	Constrained Application Protocol
URC	Unsolicited Result Code
ME	Mobile Equipment
NB-IoT	Narrow Band Internet of Things
REST	Representational state transfer
TE	Terminal Equipment (Typically the MCU)
UE	User Equipment (Typically the Module)