

BC35-G&BC28&BC95 R2.0 **OneNET Application Note**

NB-IoT Module Series

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Our aim is to provide customers with timely and comprehensive service. For any assistance, please contact our company headquarters:

Quectel Wireless Solutions Co., Ltd.

7th Floor, Hongye Building, No.1801 Hongmei Road, Xuhui District, Shanghai 200233, China

Tel: +86 21 5108 6236

Email: info@quectel.com

Or our local office. For more information, please visit:

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About the Document

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1 Introduction

LwM2M (Lightweight Machine to Machine) is a secure, efficient and deployable client-server protocol for managing resource constrained devices on a variety of networks. LwM2M uses a modern architectural design based on REST, defines an extensible resource and data model and reuses and builds on an efficient secure data transfer standard called the Constrained Application Protocol (CoAP). LwM2M is a profile for device services based on CoAP (RFC 7252). LwM2M defines a simple object model and a number of interfaces and operations for device management.

This document mainly introduces how to use the LwM2M function of Quectel BC35-G, BC28 and BC95 R2.0 modules through AT commands to connect to the OneNET platform.

NOTES

1. Only BC35-G, BC28 and BC95 R2.0 modules with firmware version ended with “_ONT” support communication with OneNET platform.
2. When the Huawei IoT platform is not used, please disable the platform registration function with **AT+QREGSWT=2**.

2 OneNET Data Interaction Mechanism

This chapter gives the data interaction mechanism of OneNET platform.



Figure 1: OneNET Data Interaction Diagram

3 OneNET Related AT Commands

This chapter presents the AT commands for operating OneNET function.

3.1. AT Command Syntax

Table 1: Types of AT Commands and Responses

| | | |
|-------------------|--------------|--|
| Test Command | AT+<x>=? | This command returns the list of parameters and value ranges set by the corresponding Write Command or internal processes. |
| Read Command | AT+<x>? | This command returns the currently set value of the parameter or parameters. |
| Write Command | AT+<x>=<...> | This command sets the user-definable parameter values. |
| Execution Command | AT+<x> | This command reads non-variable parameters affected by internal processes in the UE. |

3.2. Description of OneNET Related AT Commands

3.2.1. AT+MIPLCONFIG OneNET Access Configuration Command

The command is used to configure bootstrap mode and bootstrap server address or LwM2M server address. It can also be used to set the parameter ACK_TIMEOUT of CoAP protocol. MAX_TRANSMIT_WAIT of CoAP protocol implemented by the UE = ACK_TIMEOUT * ((2⁽⁴⁺¹⁾) - 1).

If ACK_TIMEOUT is not configured, the default set will be used. Please refer to **Chapter 7** for possible <err> codes.

AT+MIPLCONFIG OneNET Access Configuration Command

| | |
|-----------------|---|
| Test Command | Response |
| AT+MIPLCONFIG=? | +MIPLCONFIG: <mode>,<parameter1>[,<parameter2>] |
| | OK |

| | |
|--|--|
| Read Command AT+MIPLCONFIG? | Response +MIPLCONFIG:<mode>,<ip>,<port> +MIPLCONFIG:<mode>,<rsp_timeout> +MIPLCONFIG:<mode>,<obs_autoack> OK If there is any error, response: ERROR Or +CME ERROR: <err> |
| Write Command AT+MIPLCONFIG=<mode>,<parameter1>[,<parameter2>] | Response OK If there is any error, response: ERROR Or +CME ERROR: <err> |
| Maximum Response Time | 300ms |

Parameter

| <mode> | Option mode 0 Disable bootstrap, and configure LwM2M server IP and port. <u>1</u> Enable bootstrap, and configure bootstrap server IP and port. The default bootstrap server address is 183.230.40.39:5683. 2 Set the parameter ACK_TIMEOUT of CoAP protocol. The default value of ACK_TIMEOUT is 2 seconds. 3 Set whether to enable the module to automatically respond to observe requests. | | | | | | | | | | | | | | | |
|----------------------------|--|----------------------------|---------------------------|---------------------------|---|-------------------|---------------------|---|-------------------|---------------------|---|---|----------------------------|---|----------------------------|--|
| | <table border="1"> <thead> <tr> <th><mode></th> <th><parameter1></th> <th><parameter2></th> </tr> </thead> <tbody> <tr> <td>0</td> <td><ip></td> <td><port></td> </tr> <tr> <td>1</td> <td><ip></td> <td><port></td> </tr> <tr> <td>2</td> <td>1</td> <td><rsp_timeout></td> </tr> <tr> <td>3</td> <td><obs_autoack></td> <td></td> </tr> </tbody> </table> | <mode> | <parameter1> | <parameter2> | 0 | <ip> | <port> | 1 | <ip> | <port> | 2 | 1 | <rsp_timeout> | 3 | <obs_autoack> | |
| <mode> | <parameter1> | <parameter2> | | | | | | | | | | | | | | |
| 0 | <ip> | <port> | | | | | | | | | | | | | | |
| 1 | <ip> | <port> | | | | | | | | | | | | | | |
| 2 | 1 | <rsp_timeout> | | | | | | | | | | | | | | |
| 3 | <obs_autoack> | | | | | | | | | | | | | | | |
| <ip> | When <mode>=0, <ip> is LwM2M server IP address. When <mode>=1, <port> is bootstrap server IP address. | | | | | | | | | | | | | | | |
| <port> | When <mode>=0, <port> is LwM2M server port. When <mode>=1, <port> is bootstrap server port. | | | | | | | | | | | | | | | |
| <rsp_timeout> | Value of ACK_TIMEOUT. Range: 2-20. Unit: second. Default value: 2. | | | | | | | | | | | | | | | |
| <obs_autoack> | Set whether to enable the module to automatically respond to observe requests. 0 Disable automatic observe request responding . <u>1</u> Enable automatic observe request responding and TE should not respond to | | | | | | | | | | | | | | | |

the request through **AT+MIPLOBSERVERSP** command.

NOTES

1. The command should be used before creating communication instance through **AT+MIPLCREATE** command.
2. Parameters of the command will not be saved.

3.2.2. AT+MIPLCREATE Create a OneNET Communication Suite Instance

The command is used to create an instance of OneNET communication suite. Please refer to **Chapter 7** 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: ERROR Or +CME ERROR: <err> |
| Maximum Response Time | 300ms |

Parameter

<ref> Instance ID of OneNET communication suite.

3.2.3. AT+MIPLDELETE Delete a OneNET Communication Suite Instance

The command is used to delete a OneNET communication suite instance. Please refer to **Chapter 7** 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: ERROR Or +CME ERROR: <err> |
| Maximum Response Time | 3s |

Parameter

<ref> Instance ID of OneNET communication suite.

3.2.4. 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.

3.2.5. AT+MIPLADDOBJ Add a LwM2M Object

The command is used to add a LwM2M object. Please refer to **Chapter 7** 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>,<objId>,<insCount>,<insBitmap>,<attrCount>,<ac | Response OK |

| | |
|-----------------------|--|
| tCount > | If there is any error, response: ERROR Or +CME 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. |
| <insCount> | Instance count. |
| <insBitmap> | Instance bitmap. A string marked with double quotation marks. For example, if <insCount>=4 , and the <insBitmap>="1101" , it means that the instance ID 0, 1, 3 will be registered, while the instance ID 2 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. |

3.2.6. AT+MIPLDELOBJ Delete a LwM2M Object

The command is used to delete a LwM2M object. Please refer to **Chapter 7** for possible **<err>** codes.

| AT+MIPLDELOBJ Delete a LwM2M Object | |
|---|---|
| Test Command AT+MIPLDELOBJ=? | Response +MIPLDELOBJ: <ref>,<objId> OK |
| Write Command AT+MIPLDELOBJ=<ref>,<objId> | Response OK If there is any error, response: ERROR Or +CME ERROR: <err> |
| Maximum Response Time | 300ms |

Parameter

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

3.2.7. AT+MIPLOPEN Send Register Request

The command is used to send register request to OneNET platform. Please refer to **Chapter 7** for possible <err> codes.

| AT+MIPLOPEN Send Register Request | |
|--|---|
| Test Command AT+MIPLOPEN=? | Response +MIPLOPEN: <ref>,<lifetime>[,<timeout>] OK |
| Write Command AT+MIPLOPEN=<ref>,<lifetime>[,<timeout>] | Response OK If there is any error, response: ERROR Or +CME ERROR: <err> |
| Maximum Response Time | 300ms |

Parameter

| | |
|------------|---|
| <ref> | Instance ID of OneNET communication suite. |
| <lifetime> | Device lifetime. Range: 16-268435454. Unit: second. |
| <timeout> | Timeout of registration. Range: 30-65535. Unit: second. |

3.2.8. AT+MIPLCLOSE Send Deregister Request

The command is used to send deregister request to OneNET platform. Please refer to **Chapter 7** 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: ERROR Or +CME ERROR: <err> |

| | |
|-----------------------|----|
| Maximum Response Time | 3s |
|-----------------------|----|

Parameter

| | |
|-------|--|
| <ref> | Instance ID of OneNET communication suite. |
|-------|--|

3.2.9. AT+MIPLDISCOVERRSP Respond to the Discover Request

The command is used to respond to the discover request from OneNET platform. Please refer to **Chapter 7** for possible <err> codes.

AT+MIPLDISCOVERRSP Respond to the Discover Request

| | |
|--|---|
| Test Command AT+MIPLDISCOVERRSP=? | Response +MIPLDISCOVERRSP: <ref>,<msgId>,<result>[,<length>,<valuestring>[,<raiMode>]] OK |
| Write Command AT+MIPLDISCOVERRSP=<ref>,<msgId>,<result>[,<length>,<valuestring>[,<raiMode>]] | Response OK If there is any error, response: ERROR Or +CME ERROR: <err> |
| Maximum Response Time | 300ms |

Parameter

| | | | |
|---------------|---|--------------------|--|
| <ref> | Instance ID of OneNET communication suite. | | |
| <msgId> | The message identifier, which comes from the URC "+ MIPLDISCOVER:". | | |
| <result> | The result of the discover request. The result codes are as follows: | | |
| | Result code | CoAP response code | Description |
| | 1 | 2.05 | Content, indicating 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 includes the attributes of the object and should be marked with double | | |

quotation marks. Each attribute should be split with semicolon, such as "1101;1102;1103". The count of attributes should not be more than the sum of **<attrCount>** and **<actCount>** in command **AT+MIPLADDOBJ**.

<raiMode> Integer type. Specifies the flag of RAI (Release Assistant Indication) of message transmission. Values of this argument are in hex format:
0x200 Release Indicator: indicates release after the message
0x400 Release Indicator: indicates release after the message has been replied.
If no flag is set, a value of 0 may be provided if necessary.

3.2.10. AT+MIPLOBSERVERSP Respond to the Observe Request

The command is used to respond to the observe request from OneNET platform or Application Server, when automatic observe request responding is disabled. Please refer to **Chapter 7** for possible **<err>** codes.

AT+MIPLOBSERVERSP Respond to the Observe Request

| | |
|--|---|
| Test Command AT+MIPLOBSERVERSP=? | Response +MIPLOBSERVERSP: <ref>,<msgId>,<result>[,<raiMode>] OK |
| Write Command AT+MIPLOBSERVERSP=<ref>,<msgId>,<result>[,<raiMode>] | Response OK If there is any error, response: ERROR Or +CME ERROR: <err> |
| Maximum Response Time | 300ms |

Parameter

| <ref> | Instance ID of OneNET communication suite. | | | | | | | | | | | | | | | | | | | | | |
|------------------------|---|--|--------------------|-------------|---|------|--|----|------|-------------|----|------|--------------|----|------|-----------|----|------|--------------------|----|------|----------------|
| <msgId> | The message identifier, which comes from the URC "+ MIPLOBSERVE:". | | | | | | | | | | | | | | | | | | | | | |
| <result> | The result of observe. The result codes are as follows: | | | | | | | | | | | | | | | | | | | | | |
| | <table border="1"> <thead> <tr> <th>Result code</th> <th>CoAP response code</th> <th>Description</th> </tr> </thead> <tbody> <tr> <td>1</td> <td>2.05</td> <td>Content, indicating the correct result</td> </tr> <tr> <td>11</td> <td>4.00</td> <td>Bad request</td> </tr> <tr> <td>12</td> <td>4.01</td> <td>Unauthorized</td> </tr> <tr> <td>13</td> <td>4.04</td> <td>Not found</td> </tr> <tr> <td>14</td> <td>4.05</td> <td>Method not allowed</td> </tr> <tr> <td>15</td> <td>4.06</td> <td>Not acceptable</td> </tr> </tbody> </table> | Result code | CoAP response code | Description | 1 | 2.05 | Content, indicating 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 |
| Result code | CoAP response code | Description | | | | | | | | | | | | | | | | | | | | |
| 1 | 2.05 | Content, indicating 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 | | | | | | | | | | | | | | | | | | | | |
| <raiMode> | Integer type. Specifies the flag of RAI (Release Assistant Indication) of message | | | | | | | | | | | | | | | | | | | | | |

transmission. Values of this argument are in hex format:
 0x200 Release Indicator: indicates release after the message
 0x400 Release Indicator: indicates release after the message has been replied.
 If no flag is set, a value of 0 may be provided if necessary.

3.2.11. AT+MIPLREADRSP Respond to the Read Request

The command is used to respond to the read request from OneNET platform or Application Server. Please refer to **Chapter 7** for possible <err> codes.

AT+MIPLREADRSP Respond to the Read Request

| | |
|--|---|
| Test Command AT+MIPLREADRSP=? | Response +MIPLREADRSP: <ref>,<msgId>,<result>[,<objId>,<insId>,<resId>,<valueType>,<len>,<value>,<index>,<flag>[,<raiMode>]] OK |
| Write Command AT+MIPLREADRSP=<ref>,<msgId>,<result>[,<objId>,<insId>,<resId>,<valueType>,<len>,<value>,<index>,<flag>[,<raiMode>]] | Response OK If there is any error, response: ERROR Or +CME 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 result of read request. The result codes are as follows: | | | | | | | | | | | | | | | | | | | | | |
| | <table border="1"> <thead> <tr> <th>Result code</th> <th>CoAP response code</th> <th>Description</th> </tr> </thead> <tbody> <tr> <td>1</td> <td>2.05</td> <td>Content, indicating the correct result</td> </tr> <tr> <td>11</td> <td>4.00</td> <td>Bad request</td> </tr> <tr> <td>12</td> <td>4.01</td> <td>Unauthorized</td> </tr> <tr> <td>13</td> <td>4.04</td> <td>Not found</td> </tr> <tr> <td>14</td> <td>4.05</td> <td>Method not allowed</td> </tr> <tr> <td>15</td> <td>4.06</td> <td>Not acceptable</td> </tr> </tbody> </table> | Result code | CoAP response code | Description | 1 | 2.05 | Content, indicating 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 |
| Result code | CoAP response code | Description | | | | | | | | | | | | | | | | | | | | |
| 1 | 2.05 | Content, indicating 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> | Value types. | | | | | | | | | | | | | | | | | | | | | |

| | |
|------------------------|--|
| | 1 String |
| | 2 Opaque |
| | 3 Integer |
| | 4 Float |
| | 5 Boolean |
| <len> | Value length. Unit: byte. When <valueType> is String, it is the string length of <value> . When <valueType> is Opaque, it is the hex string length of <value> . When <valueType> is Integer, it is 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 comprises 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 this is the last message of the data. |
| <flag> | The message indication. The range is 0-2. <flag>=0 Means the last message of the <value> . <flag>=1 Means the first message of the <value> . <flag>=2 Means the middle message of the <value> . Only <flag>=0 is supported in this version. |
| <raiMode> | Integer type. Specifies the flag of RAI (Release Assistant Indication) of message transmission. Values of this argument are in hex format: 0x200 Release Indicator: indicates release after the message 0x400 Release Indicator: indicates release after the message has been replied. If no flag is set, a value of 0 may be provided if necessary. |

NOTE

The command is used to make the module respond to the read request, and the total response data length should be less than 1024 bytes. If the value type is Opaque (**<valueType>=2**), the data length is counted as 2***<len>**.

3.2.12. AT+MIPLWRITERSP Respond to the Write Request

The command is used to respond to the write request from the OneNET platform or Application Server. Please refer to **Chapter 7** for possible **<err>** codes.

AT+MIPLWRITERSP Respond to the Write Request

| | |
|--|---|
| Test Command AT+MIPLWRITERSP=? | Response +MIPLWRITERSP: <ref>,<msgId>,<result>[,<raiMode>] OK |
| Write Command AT+MIPLWRITERSP=<ref>,<msgId>,<result>[,<raiMode>] | Response OK If there is any error, response: ERROR Or +CME 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 result of write request. The result codes are as follows: <table border="1"> <thead> <tr> <th>Result code</th> <th>CoAP response code</th> <th>Description</th> </tr> </thead> <tbody> <tr> <td>2</td> <td>2.04</td> <td>Changed, indicating the correct result</td> </tr> <tr> <td>11</td> <td>4.00</td> <td>Bad request</td> </tr> <tr> <td>12</td> <td>4.01</td> <td>Unauthorized</td> </tr> <tr> <td>13</td> <td>4.04</td> <td>Not found</td> </tr> <tr> <td>14</td> <td>4.05</td> <td>Method not allowed</td> </tr> </tbody> </table> | Result code | CoAP response code | Description | 2 | 2.04 | Changed, indicating the correct result | 11 | 4.00 | Bad request | 12 | 4.01 | Unauthorized | 13 | 4.04 | Not found | 14 | 4.05 | Method not allowed |
| Result code | CoAP response code | Description | | | | | | | | | | | | | | | | | |
| 2 | 2.04 | Changed, indicating the correct result | | | | | | | | | | | | | | | | | |
| 11 | 4.00 | Bad request | | | | | | | | | | | | | | | | | |
| 12 | 4.01 | Unauthorized | | | | | | | | | | | | | | | | | |
| 13 | 4.04 | Not found | | | | | | | | | | | | | | | | | |
| 14 | 4.05 | Method not allowed | | | | | | | | | | | | | | | | | |
| <raiMode> | Integer type. Specifies the flag of RAI (Release Assistant Indication) of message transmission. Values of this argument are in hex format: 0x200 Release Indicator: indicates release after the message 0x400 Release Indicator: indicates release after the message has been replied. If no flag is set, a value of 0 may be provided if necessary. | | | | | | | | | | | | | | | | | | |

3.2.13. AT+MIPLEXECUTERSP Respond to the Execute Request

The command is used to respond to the execute request from OneNET platform or Application Server. Please refer to **Chapter 7** for possible **<err>** codes.

AT+MIPLEXECUTERSP Respond to the Execute Request

| | |
|--|---|
| Test Command AT+MIPLEXECUTERSP=? | Response +MIPLEXECUTERSP: <ref>,<msgId>,<result>[,<raiMode>] OK |
|--|---|

| | |
|--|---|
| Write Command AT+MIPLEXECUTERSP=<ref>,<msgld>,<result>[,<raiMode>] | Response OK If there is any error, response: ERROR Or +CME ERROR: <err> |
| Maximum Response Time | 300ms |

Parameter

| <ref> | Instance ID of OneNET communication suite. | | | | | | | | | | | | | | | | | | |
|------------------------|--|--|--------------------|-------------|---|------|--|----|------|-------------|----|------|--------------|----|------|-----------|----|------|--------------------|
| <msgld> | The message identifier, which comes from the URC "+MIPLEXECUTE:". | | | | | | | | | | | | | | | | | | |
| <result> | The result of execute request. The result codes are as follows: | | | | | | | | | | | | | | | | | | |
| | <table border="1"> <thead> <tr> <th>Result code</th> <th>CoAP response code</th> <th>Description</th> </tr> </thead> <tbody> <tr> <td>2</td> <td>2.04</td> <td>Changed, indicating the correct result</td> </tr> <tr> <td>11</td> <td>4.00</td> <td>Bad request</td> </tr> <tr> <td>12</td> <td>4.01</td> <td>Unauthorized</td> </tr> <tr> <td>13</td> <td>4.04</td> <td>Not found</td> </tr> <tr> <td>14</td> <td>4.05</td> <td>Method not allowed</td> </tr> </tbody> </table> | Result code | CoAP response code | Description | 2 | 2.04 | Changed, indicating the correct result | 11 | 4.00 | Bad request | 12 | 4.01 | Unauthorized | 13 | 4.04 | Not found | 14 | 4.05 | Method not allowed |
| Result code | CoAP response code | Description | | | | | | | | | | | | | | | | | |
| 2 | 2.04 | Changed, indicating the correct result | | | | | | | | | | | | | | | | | |
| 11 | 4.00 | Bad request | | | | | | | | | | | | | | | | | |
| 12 | 4.01 | Unauthorized | | | | | | | | | | | | | | | | | |
| 13 | 4.04 | Not found | | | | | | | | | | | | | | | | | |
| 14 | 4.05 | Method not allowed | | | | | | | | | | | | | | | | | |
| <raiMode> | Integer type. Specifies the flag of RAI (Release Assistant Indication) of message transmission. Values of this argument are in hex format: 0x200 Release Indicator: indicates release after the message 0x400 Release Indicator: indicates release after the message has been replied. If no flag is set, a value of 0 may be provided if necessary. | | | | | | | | | | | | | | | | | | |

3.2.14. AT+MIPLPARAMETERRSP Respond to the Write-Attributes Request

The command is used to respond to the write-attributes request from OneNET platform or Application Server. Please refer to **Chapter 7** for possible **<err>** codes.

AT+MIPLPARAMETERRSP Respond to the Write-Attributes Request

| | |
|--|---|
| Test Command AT+MIPLPARAMETERRSP=? | Response +MIPLPARAMETERRSP: <ref>,<msgld>,<result>[,<raiMode>] OK |
| Write Command AT+MIPLPARAMETERRSP=<ref>,<msgld>,<result>[,<raiMode>] | Response OK If there is any error, response: ERROR |

| | |
|-----------------------|--------------------------------------|
| | Or +CME 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 result of write-attributes operation. The result codes are as follows: <table border="1"> <thead> <tr> <th>Result code</th> <th>CoAP response code</th> <th>Description</th> </tr> </thead> <tbody> <tr> <td>2</td> <td>2.04</td> <td>Changed, indicating the correct result</td> </tr> <tr> <td>11</td> <td>4.00</td> <td>Bad request</td> </tr> <tr> <td>12</td> <td>4.01</td> <td>Unauthorized</td> </tr> <tr> <td>13</td> <td>4.04</td> <td>Not found</td> </tr> <tr> <td>14</td> <td>4.05</td> <td>Method not allowed</td> </tr> </tbody> </table> | Result code | CoAP response code | Description | 2 | 2.04 | Changed, indicating the correct result | 11 | 4.00 | Bad request | 12 | 4.01 | Unauthorized | 13 | 4.04 | Not found | 14 | 4.05 | Method not allowed |
| Result code | CoAP response code | Description | | | | | | | | | | | | | | | | | |
| 2 | 2.04 | Changed, indicating the correct result | | | | | | | | | | | | | | | | | |
| 11 | 4.00 | Bad request | | | | | | | | | | | | | | | | | |
| 12 | 4.01 | Unauthorized | | | | | | | | | | | | | | | | | |
| 13 | 4.04 | Not found | | | | | | | | | | | | | | | | | |
| 14 | 4.05 | Method not allowed | | | | | | | | | | | | | | | | | |
| <raiMode> | Integer type. Specifies the flag of RAI (Release Assistant Indication) of message transmission. Values of this argument are in hex format: 0x200 Release Indicator: indicates release after the message 0x400 Release Indicator: indicates release after the message has been replied. If no flag is set, a value of 0 may be provided if necessary. | | | | | | | | | | | | | | | | | | |

3.2.15. 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 7** 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>[,<raiMode>]] OK |
| Write Command AT+MIPLNOTIFY=<ref>,<msgId>,<objId>,<insId>,<resId>,<valueType>,<len>,<value>,<index>,<flag>[,<ackid>[,<raiMode>]] | Response OK If there is any error, response: ERROR Or +CME ERROR: <err> |
| Maximum Response Time | 300ms |

Parameter

| | |
|--------------------------|--|
| <ref> | Instance ID of OneNET communication suite. |
| <msgid> | The message identifier, which comes from the URC "+MIPLOBSEVE:". |
| <objid> | Object identifier. |
| <insid> | The instance identifier, which comes from the URC "+MIPLOBSEVE:". |
| <resid> | The resource identifier, which comes from the URC "+MIPLOBSEVE:". |
| <valueType> | Value types. 1 String 2 Opaque 3 Integer 4 Float 5 Boolean |
| <len> | Value length. Unit: byte. When <valueType> is String, it is the string length of <value> . When <valueType> is Opaque, it is the hex string length of <value> . When <valueType> is Integer, it is 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 comprises 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 this is the last message of the data. |
| <flag> | The message indication. The range is 0-2. <flag>=0 Means the last message of the <value> . <flag>=1 Means the first message of the <value> . <flag>=2 Means the middle message of the <value> . Only <flag>=0 is supported 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 and the result of message sent will be indicated by "+MIPLEVENT" URC. |
| <raiMode> | Integer type. Specifies the flag of RAI (Release Assistant Indication) of message transmission. Values of this argument are in hex format: 0x200 Release Indicator: indicates release after the message. 0x400 Release Indicator: indicates release after the message has been replied. |

When **<ackid>** is nonzero, only **<raiMode>=0x400** is supported.
If no flag is set, a value of 0 may be provided if necessary.

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 $2 * \text{<len>}$.
2. If the data comprises 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.

3.2.16. AT+MIPLUPDATE Send Update Request

The command is used to send an update request to update lifetime and objects. Please refer to **Chapter 7** for possible **<err>** codes.

AT+MIPLUPDATE Send Update Request

| | |
|---|--|
| Test Command AT+MIPLUPDATE=? | Response +MIPLUPDATE: <ref>,<lifetime>,<withObjectFlag>[,<raiMode>] OK |
| Write Command AT+MIPLUPDATE=<ref>,<lifetime>,<withObjectFlag>[,<raiMode>] | Response OK If there is any error, response: ERROR Or +CME ERROR: <err> |
| Maximum Response Time | 300ms |

Parameter

| | |
|-------------------------------|---|
| <ref> | Instance ID of OneNET communication suite. |
| <lifetime> | Updated lifetime value. The range is 0 or 16-268435454. Unit: second. "0" means that lifetime is 86400 seconds. |
| <withObjectFlag> | Whether to update with objects list. 0 Update without objects list. 1 Update with objects list. |
| <raiMode> | Integer type. Specifies the flag of RAI (Release Assistant Indication) of message transmission. Values of this argument are in hex format: 0x400 Release Indicator: indicates release after the message has been replied. If no flag is set, a value of 0 may be provided if necessary. |

4 OneNET Related URCs

This chapter shows OneNET related URCs and their descriptions.

Table 2: OneNET Related URCs

| Index | URC | Description |
|-------|---|--|
| [1] | +MIPLDISCOVER: <ref>,<msgId>,<objId> | When the OneNET platform sends a discover request, the module will report the URC when it receives the request. |
| [2] | +MIPLOBSERVE: <ref>,<msgId>,<flag>,<objId>,<insId>,<resId> | When the OneNET platform or Application Server sends an observe request, the module will report the URC once it receives such a request. |
| [3] | +MIPLREAD: <ref>,<msgId>,<objId>,<insId>,<resId> | When the OneNET platform or Application Server sends a read request, the module will report the URC when it receives the request. |
| [4] | +MIPLWRITE: <ref>,<msgId>,<objId>,<insId>,<resId>,<valueType>,<len>,<value>,<flag>,<index> | When the OneNET platform or Application Server sends a write request, the module will report the URC once it receives such a request. |
| [5] | +MIPLEXECUTE: <ref>,<msgId>,<objId>,<insId>,<resId>[,<len>,<arguments>] | When the OneNET platform or Application Server sends an execute request, the module will report the URC once it receives such a request. |
| [6] | +MIPLPARAMETER: <ref>,<msgId>,<objId>,<insId>,<resId>,<len>,<parameter> | When the OneNET platform or Application Server sends a write-attributes request, the module will report the URC once it receives such a request. |
| [7] | +MIPLEVENT: <ref>,<evtid>[,<extend>][,<ackId>] | Report the URC when there is an event to be notified to TE. |

4.1. “+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. The TE should respond to the request with **AT+MIPLDISCOVERRSP** in 10 seconds (starting from the output of URC), and the response should begin once the URC is completely exported.

“+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. |
|--|--|

Parameter

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

4.2. “+MIPLOBERVE” URC to Notify the TE to Respond to the Observe Request

Request

The URC is mainly used to notify the TE to respond to the observe request from OneNET platform or Application Server. If automatic observe request responding is disabled, the TE should respond to the request with **AT+MIPLOBERVERSP** in 10 seconds (starting from the output of URC), and the response should begin once the URC is completely exported.

“+MIPLOBERVE” URC to Notify the TE to Respond to the Observe Request

| | |
|---|--|
| URC Format: +MIPLOBERVE: <ref>,<msgId>,<flag>,<objId>,<insId>,<resId> | Notify the TE that there is an observe request from OneNET platform or Application Server. |
|---|--|

Parameter

| | |
|----------------------|---|
| <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 observe or cancel observe all resources under all instances. |
| <resId> | The resource identifier that is received from OneNET platform or Application Server. “-1” indicates observe or cancel observe all resources under the instance. |

4.3. “+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. The TE should respond to the request with **AT+MIPLREADRSP** in 10 seconds (starting from the output of URC), and the response should begin once the URC is completely exported.

“+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. |
|--|--|

Parameter

| | |
|---------|---|
| <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” indicates read all resources under the object. |
| <resId> | The resource identifier that is received from OneNET platform or Application Server. “-1” indicates read all resources under the instance. |

4.4. “+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. The TE should respond to the request with **AT+MIPLWRITERSP** in 10 seconds (starting from the output of URC), and the response should begin once the URC is completely exported.

“+MIPLWRITE” URC to Notify the TE to Respond to the Write Request

| | |
|--|---|
| URC Format: +MIPLWRITE: <ref>,<msgId>,<objId>,<insId>,<resId>,<valueType>,<len>,<value>,<flag>,<index> | Notify the TE to respond to the write request from OneNET platform or Application Server. |
|--|---|

Parameter

| | |
|--------------------------|---|
| <ref> | Instance ID of OneNET communication suite. |
| <msgId> | The message identifier of packet. |
| <objId> | The object identifier received from OneNET platform or Application Server. |
| <insId> | The instance identifier received from OneNET platform or Application Server. |
| <resId> | The resource identifier received from OneNET platform or Application Server. |
| <valueType> | Value types (only shows in opaque currently). 1 String 2 Opaque 3 Integer 4 Float 5 Boolean |
| <len> | Value length. Unit: byte. |
| <value> | The value received from OneNET platform or Application Server, in hex string format. |
| <flag> | The message indication. The range is 0-2. <flag>=0 Means the last message of the <value> . <flag>=1 Means the first message of the <value> . <flag>=2 Means the middle message of the <value> . Only <flag>=0 is supported in this version. |
| <index> | The index number of the write request. If the write request comprises 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 to the smallest number. 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.

4.5. “+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. The TE should respond to the request with **AT+MIPLEXECUTERSP** in 10 seconds (starting from the output of URC), and the response should begin once the URC is completely exported.

“+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 the execute request from OneNET platform or Application Server. |
|---|--|

Parameter

| | |
|-------------|--|
| <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> | The arguments of execute operation in string type. |

NOTE

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

4.6. “+MIPLPARAMETER” URC to Notify the TE to Respond to the Write-Attributes Request

The URC is mainly used to notify the TE to respond to the write-attributes request from OneNET platform or Application Server. The TE should respond to the request with **AT+MIPLPARAMETERESP** in 10 seconds (starting from the output of URC), and the response should begin once the URC is completely exported.

“+MIPLPARAMETER” URC to Notify the TE to Respond to the Write-Attributes Request

| | |
|---|--|
| URC Format: +MIPLPARAMETER: <ref>,<msgid>,<objId>,<insId>,<resId>,<len>,<parameter> | Notify the TE to respond to the Write-Attributes request from OneNET platform or Application Server. |
|---|--|

Parameter

| | |
|-------|--|
| <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” indicates the <parameter> apply to all resources under the object. |
| <resid> | The resource identifier that is received from OneNET platform or Application Server. “-1” indicates the <parameter> apply to all resources under the instance. |
| <len> | The length of <parameter>. |
| <parameter> | The parameter of write-attributes operation in string type. |

4.7. “+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: | Notify the TE of events. |
| +MIPLEVENT: <ref>,<evtid>[,<extend>][,<ackid>] | |

Parameter

| | |
|---------|--|
| <ref> | Instance ID of OneNET communication suite. |
| <evtid> | Event identifier. |
| | 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 |

- 40 EVENT_FIRMWARE_DOWNLOADING
- 41 EVENT_FIRMWARE_DOWNLOAD_FAILED
- 42 EVENT_FIRMWARE_DOWNLOADED
- 43 EVENT_FIRMWARE_UPDATING
- 44 EVENT_FIRMWARE_UPDATE_SUCCESS
- 45 EVENT_FIRMWARE_UPDATE_FAILED
- 46 EVENT_FIRMWARE_UPDATE_OVER
- 47 EVENT_FIRMWARE_DOWNLOAD_DISCONNECT
- 48 EVENT_FIRMWARE_ERASE_SUCCESS
- 49 EVENT_FIRMWARE_ERASE_FAIL

<extend> Extended parameter. When **<evtid>** is 20, it shows the message ID of the response command. When **<evtid>** is 14, it shows the remaining time of lifetime in seconds.

<ackid> Integer type. Range: 1-65535. Acknowledgement identifier of the CON message notified through **AT+MIPLNOTIFY**.

5 Examples

This chapter exhibits examples about how to use OneNET related AT commands.

5.1. Access Configuration

This example shows how to configure bootstrap mode and bootstrap server address, how to configure access server and how to set the parameter ACK_TIMEOUT of CoAP protocol.

```
AT+MIPLCONFIG=?
+MIPLCONFIG: <mode>,<parameter1>[,<parameter2>]

OK

//Enable bootstrap and configure bootstrap server IP and port.
AT+MIPLCONFIG=1,183.230.40.39,5683
OK

AT+MIPLCONFIG?
+MIPLCONFIG:1,183.230.40.39,5683
+MIPLCONFIG:2,2
+MIPLCONFIG:3,1

OK

//Disable bootstrap and configure access server IP and port.
AT+MIPLCONFIG=0,183.230.40.40,5683
OK

AT+MIPLCONFIG?
+MIPLCONFIG:0,183.230.40.40,5683
+MIPLCONFIG:2,2
+MIPLCONFIG:3,1

OK

//Set ACK_TIMEOUT value to nine seconds.
```

```
AT+MIPLCONFIG=2,1,9
OK

AT+MIPLCONFIG?
+MIPLCONFIG:0,183.230.40.40,5683
+MIPLCONFIG:2,9
+MIPLCONFIG:3,1

OK
```

5.2. Register and Discover Operations

5.2.1. Register and Discover Operations (Without Auto Subscription)

The following example illustrates register and discover operations under the scenario that the auto subscription function of the OneNET platform has been disabled.

```
//Create a communication suite instance with a single command, with bootstrap mode enabled.
AT+MIPLCREATE
+MIPLCREATE:0 //Created the communication suite instance successfully.

OK

//Add a LwM2M object.
AT+MIPLADDOBJ=0,3311,2,"11",4,2
OK //Added the object successfully. And the instance ID 0 and 1
will be registered.

//Send register request to the OneNET platform.
AT+MIPLOPEN=0,600,60
OK

+MIPLEVENT: 0,1
+MIPLEVENT: 0,2
+MIPLEVENT: 0,4
+MIPLEVENT: 0,6 //Registered successfully.
+MIPLDISCOVER: 0,26384,3311 //Received resource discover request.

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

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


OK

//Send deregister request to OneNET platform.

AT+MIPLCLOSE=0

OK

+MIPLEVENT: 0,15 //Deregistered successfully.

//Delete the communication suite instance.

AT+MIPLDELETE=0

OK

//Deleted the communication suite instance successfully.

5.2.2. Register and Discover Operations (With Auto Subscription)

The following example illustrates register and discover operations under the scenario that the auto subscription function of the OneNET platform has been enabled.

//Create a communication suite instance with a single command, with default setting.

AT+MIPLCONFIG?

+MIPLCONFIG:1,183.230.40.39,5683

+MIPLCONFIG:2,2

+MIPLCONFIG:3,1 //Enable the module to automatically respond to the observe request.

OK

AT+MIPLCREATE

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

OK

//Add a LwM2M object.

AT+MIPLADDOBJ=0,3311,2,"11",4,2

OK

//Added the object successfully. And the instance ID 0 and 1 will be registered.

//Send register request to the OneNET platform.

AT+MIPLOPEN=0,600,60

OK

+MIPLEVENT: 0,1

+MIPLEVENT: 0,2

+MIPLEVENT: 0,4

+MIPLEVENT: 0,6 //Registered successfully.

```
+MIPLOBSERVE: 0,78025,1,3311,0,-1 //Received observe(3311/0) request.

+MIPLOBSERVE: 0,143562,1,3311,1,-1 //Received observe(3311/1) request.

+MIPLDISCOVER: 0,12491,3311 //Received resource discover request.

//Respond to the resource discover request with resource ID list.
AT+MIPLDISCOVERRSP=0,12491,1,19,"5850;5851;5706;5805"
OK

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

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

+MIPLEVENT: 0,15 //Deregistered successfully.

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

5.3. Read Operation

5.3.1. Read Resource

Prerequisites:

1. The UE has registered to the OneNET platform successfully.
2. The Application Server has sent a read request to UE to read the resource (3311/0/5805).

```
//Received read resource request
+MIPLREAD: 0,3123,3311,0,5805

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

5.3.2. Read Instance

Prerequisites:

1. The UE has registered to OneNET platform successfully.
2. The Application Server has sent a read request to UE to read the instance (3311/0).

```
//Received read instance request
+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
```

5.3.3. Read Object

Prerequisites:

1. The UE has registered to OneNET platform successfully.
2. The Application Server has sent a read request to UE to read the object (3311).

```
//Received read object request
+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
```

5.4. Write Operation

5.4.1. Write Resource

Prerequisites:

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

```
//Received write resource request.  
+MIPLWRITE: 0,38017,3311,0,5706,2,5,68656C6C6F,0,0  
  
//Respond to the write request with result code (2).  
AT+MIPLWRITERSP=0,38017,2  
OK
```

5.4.2. Write Instance

Prerequisites:

1. The UE has registered to OneNET platform successfully.
2. The Application Server has sent a write request to UE to write the instance (3311/0).

```
//Received write instance request.  
+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
```

5.5. Execute Operation

Prerequisites:

1. The UE has registered to OneNET platform successfully.
2. The Application Server has sent an execute request to UE with argument "reset".

```
//Received execute request.  
+MIPLEXECUTE: 0,36476,3303,0,5605,5,"reset"
```

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

5.6. Write-Attributes Operation

Prerequisites:

1. The UE has registered to OneNET platform successfully.
2. The Application Server has sent a Write-Attributes request to UE.

```
//Received Write-Attributes request.  
+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
```

5.7. Observe Operation

Prerequisites:

1. The UE has registered to OneNET platform successfully.
2. The Application Server has sent an observe request to UE.
3. Disable the module from automatically respond to observe requests.

```
//Received observe request.  
+MIPLOBSERVE: 0,29620,1,3311,0,-1  
  
//Confirm observe request.  
AT+MIPLOBSERVERSP=0,29620,1  
OK
```

5.8. Notify Operation

5.8.1. Notify Resource Data

Prerequisites:

1. The UE has registered to OneNET platform successfully.

- The Application Server has observed the resource (3303/0/5700) successfully and **<msgId>** of the observe request is 122179.

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

5.8.2. Notify Instance Data

Prerequisites:

- The UE has registered to OneNET platform successfully.
- The Application Server has observed the instance (3303/0) successfully and **<msgId>** of the observe request is 653687.

```
//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
```

5.8.3. Notify Object Data

Prerequisites:

- The UE has registered to OneNET platform successfully.
- The Application Server has observed the object (3303) successfully and **<msgId>** of the observe request is 196301.

```
//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
```

5.8.4. Notify Resource Data with <ackid>

Prerequisites:

1. The UE has registered to OneNET platform successfully.
2. The Application Server has observed the resource (3303/0/5701) successfully and <msgid> of the observe request is 307353.

```
//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.
```

5.8.5. Notify Resource Data with <ackid> and RAI Flag

Prerequisites:

1. The UE has registered to OneNET platform successfully.
2. The Application Server has observed the resource (3303/0/5701) successfully and <msgid> of the observe request is 307353.
3. Execute the **AT+CSCON=1** command to enable "+CSCON" URC reporting function, which can be used to indicate whether the RAI identifier takes effect.

```
//Notify resource data with <ackid> (256) and RAI flag (0x400).
[15:04:15:919]AT+MIPLNOTIFY=0,307353,3303,0,5701,1,3,"Cel",0,0,256,0x400
[15:04:15:983]OK
[15:04:16:736]
[15:04:16:736]+CSCON:1 //Set up a RRC connection and start sending the
message.
[15:04:17:118]
[15:04:17:118]+MIPLEVENT: 0,26,256 //Return notification results.
[15:04:17:437]
[15:04:17:437]+CSCON:0 //After ACK is received, the RRC connection will
be immediately released.
```

NOTE

“+MIPLEVENT:” URC and “+CSCON:” URC may be outputted in any order.

5.8.6. Notify Instance Data with <ackid>

Prerequisites:

1. The UE has registered to OneNET platform successfully.
2. The Application Server has observed the resource (3303/0) successfully and <msgid> of the observe request is 487674.

```
//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
```

5.8.7. Notify Instance Data with <ackid> and RAI Flag

Prerequisites:

1. The UE has registered to OneNET platform successfully.
2. The Application Server has observed the resource (3303/0) successfully and <msgid> of the observe request is 450380.
3. Execute the **AT+CSCON=1** command to enable “+CSCON” URC reporting function, which can be used to indicate whether the RAI identifier takes effect.

```
//Notify resource data with <ackid> (257). and RAI flag(0x400).
[15:37:14:339]AT+MIPLNOTIFY=0,450380,3303,0,5700,4,4,170.1,3,0,257,0x400
[15:37:14:403]OK
[15:37:14:643]AT+MIPLNOTIFY=0,450380,3303,0,5701,1,3,"Cel",2,0,257,0x400
[15:37:14:692]OK
[15:37:14:931]AT+MIPLNOTIFY=0,450380,3303,0,5601,4,4,106.1,1,0,257,0x400
[15:37:14:995]OK
[15:37:15:235]AT+MIPLNOTIFY=0,450380,3303,0,5602,4,4,660.9,0,0,257,0x400
[15:37:15:299]OK
[15:37:16:281]
```



```
[15:37:16:281]+CSCON:1 //Set up a RRC connection and start sending
                          the message.
[15:37:16:828]
[15:37:16:828]+MIPLEVENT: 0,26,257 //Return notification results.
[15:37:17:477]
[15:37:17:477]+CSCON:0 //After ACK is received, the RRC connection will
                          be immediately released.
```

NOTE

“+MIPLEVENT” URC and “+CSCON” URC may be outputted in any order.

5.9. Update Operation

5.9.1. Update Operation without RAI Flag

Prerequisite:

The UE has registered to OneNET platform successfully.

```
//Update lifetime to 86400 seconds.
AT+MIPLUPDATE=0,86400,0
OK
+MIPLEVENT: 0,11 //Return update result.
```

5.9.2. Update Operation with RAI Flag

Prerequisites:

1. The UE has registered to OneNET platform successfully.
2. Execute the **AT+CSCON=1** command to enable “+CSCON” URC reporting function, which can be used to indicate whether the RAI identifier takes effect.

```
[14:43:14:359]AT+MIPLUPDATE=0,86400,0,0x400 //Update lifetime to 86400 seconds.
[14:43:14:391]OK
[14:43:14:832]
[14:43:14:832]+CSCON:1 //Set up a RRC connection and start sending
                          update request.
[14:43:15:182]
[14:43:15:182]+MIPLEVENT: 0,11 //Return update result.
[14:43:15:389]
```

[14:43:15:389]+CSCON:0

//After ACK is received, the RRC connection will be immediately released.

6 Summary of Error Codes

This chapter introduces the error codes related to BC35-G, BC28 and BC95 R2.0 modules.

The error codes listed in the following two tables are compliant with 3GPP specifications. Please refer to *3GPP TS 27.007 V13.5.0, sub-clause 9.2* for all possible <err> codes.

Table 3: General Errors (27.007)

| Code of <err> | Description |
|---------------|--|
| 3 | Operation not allowed |
| 4 | Operation not supported |
| 23 | Memory failure |
| 30 | No network service |
| 50 | Incorrect parameters |
| 51 | Command implemented but currently disabled |
| 52 | Command aborted by user |
| 159 | Uplink busy/flow control |

Table 4: General Errors (27.005)

| Code of <err> | Description |
|---------------|----------------------------|
| 300 | ME failure |
| 301 | SMS service of ME reserved |
| 302 | Operation not allowed |
| 303 | Operation not supported |
| 304 | Invalid PDU mode parameter |

| | |
|-----|-----------------------------------|
| 305 | Invalid text mode parameter |
| 310 | USIM not inserted |
| 311 | USIM PIN required |
| 312 | PH-USIM PIN required |
| 313 | USIM failure |
| 314 | USIM busy |
| 315 | USIM wrong |
| 316 | USIM PUK required |
| 317 | USIM PIN2 required |
| 318 | USIM PUK2 required |
| 320 | Memory failure |
| 321 | Invalid memory index |
| 322 | Memory full |
| 330 | SMSC address unknown |
| 331 | No network service |
| 332 | Network timeout |
| 340 | No +CNMA acknowledgement expected |
| 500 | Unknown error |

NOTE

AT+CME=<n> command disables (<n>=0) or enables (<n>=1) the use of final result code “**+CME ERROR:<err>**”. When <n>=1, a limited set of error codes will be returned.

7 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 LwM2M Specification |

Table 6: Terms and Abbreviations

| Abbreviation | Description |
|--------------|--|
| CoAP | Constrained Application Protocol |
| LwM2M | Lightweight Machine to Machine |
| 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) |
| URC | Unsolicited Result Code |