Wiser Zigbee Launcher Test Harness Serial Protocol

Contents

1. Description

The Serial Protocol for the communication between the Wiser Zigbee Launcher Test Harness and Host.

2. Serial Parameters

Baud Rate: 460800

Stop Bits: 1

Data Bits: 8

Parity: None

3. Frame Structure

Start of Frame	Primary Command ID	Secondary Command ID	Frame Sequence Number	Payload Length	Payload	CRC16
0xAA 0x55				N		LSB MSB
2Bytes	1Byte	1Byte	1Byte	1Byte	N Bytes	2Bytes

Frame Description

Byte Index	Field Name	Description
0	Start of Frame Header0	0xAA Fixed value
1	Start of Frame Header1	0x55 Fixed value
2	Primary Command ID	The frame Primary command id
3	Secondary Command ID	The frame secondary command id
4	Frame Sequence Number	0 – 127: Host initiated transactions 128 – 255: Module initiated transactions The sequence number be incremented by 1 for each newly initiated message. For the ACK frame need use the same sequence number that received.
5	Payload Length	The follow payload length. (Max Length 200 Bytes)
6 … 5+n	Payload	Different command with the different payload.
6+n	CRC16 LSB	The LSB of the XMODEM CRC16 calculate result.
7+n	CRC16 MSB	The MSB of the XMODEM CRC16 calculate result.

CRC16 calculate from the Primary command ID to the end of the Payload.

Using the XMODEM CRC16 as below.

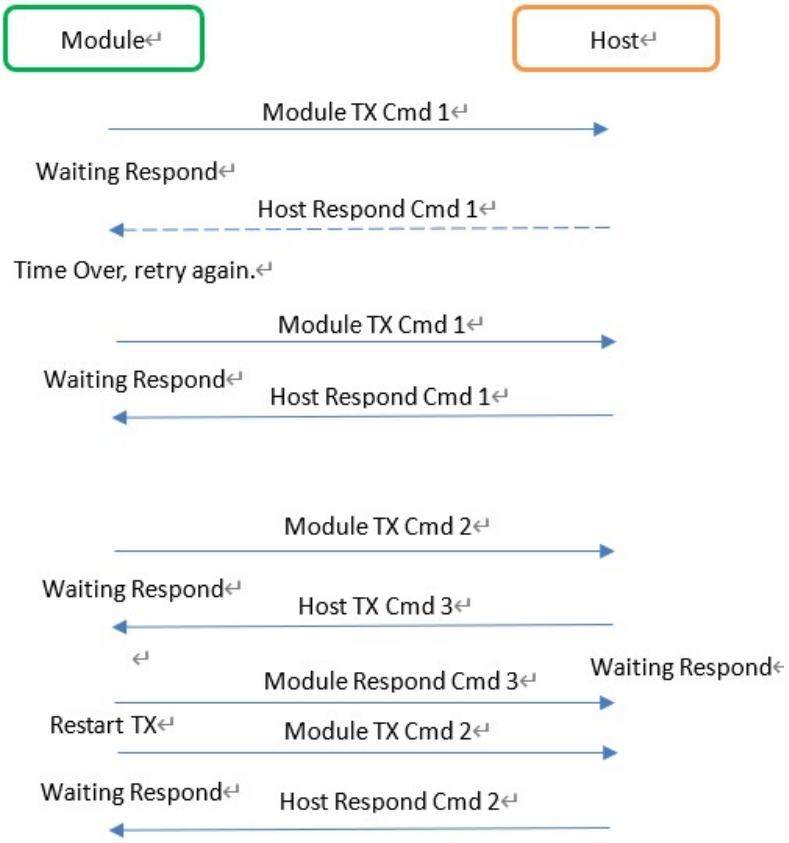
```
uint16_t CRC16_XMODEM(uint8_t *puchMsg, uint16_t usDataLen)
{
     uint16_t wCRCin = 0x0000;
     int16_t wCPoly = 0x1021;
     uint8_t wChar = 0;
     uint8_t i = 0;

    while (usDataLen--)
    {
        wChar = *(puchMsg++);
        wCRCin ^= (wChar << 8);

        for(i = 0; i < 8; i++)
        {
            if(wCRCin & 0x8000)
            {
                wCRCin = (wCRCin << 1) ^ wCPoly;
```

```
            }
            else
            {
                wCRCin = wCRCin << 1;
            }
        }
    }
    return (wCRCin);
}
```

The command flow as below



4. Command ID Definitions

4.1 Local Setting Command (Primary Command ID : 0xF0)

Module Reset (Secondary Command ID: 0x00)

4.1.1. (PCID: 0xF0 SCID: 0x00) – Module Reset Command

Overview

The Module Reset command is sent from the Host to the Module, and prompts the Module to reboot.

Payload

None

Effect on Receipt

The module reboots.

Allowed Context

All Contexts.

Sent By Host/Module

Host

4.1.2. (PCID: 0xF0 SCID: 0x01) – Module Reset To Bootloader Menu Command

Overview

The Module Reset To Bootloader Menu command is sent from the Host to the Module, and prompts the Module to reboot and change to the Bootloader Menu.

Payload

None

Effect on Receipt

The module reboots and runs the bootloader menu.

Allowed Context

All Contexts.

Sent By Host/Module

Host

4.1.3. (PCID: 0xF0 SCID: 0x02) – Module Info Request Command

Overview

The Module Info Request command is sent from the Host to the Module to query the Module's version and application type

Payload

None

Effect on Receipt

The Module will respond with a Module Info Response command.

Allowed Context

All Contexts.

Sent By Host/Module

Host

4.1.4. (PCID: 0xF0 SCID: 0x03) – Module Info Response Command

Overview

The Module Info Response command is sent from the Module to the Host in response to a Module Info Request command.

Payload

Byte Index	Field Name	Notes
0	Major Firmware Version	
1	Minor Firmware Version	
2	Build Firmware Version	
3	Application Information	The information for the serial protocol, currently no impact, 0x01 = Wiser Zigbee Launcher Test Harness Others = Reserved
4…11	EUI64	Extended Unique Identifier, 64 bits in length, LSB First
12	Hardware Version	0x01 = EFR32MG21A010F768 Others = Reserved
13	Bootloader Type	0x01 = Gecko Application Bootloader (XMODEM Transfer) Others = Reserved

Effect on Receipt

None

Allowed Context

Same context as the request.

Sent By Host/Module

Module

4.1.5. (PCID: 0xF0 SCID: 0x04) – Module Label String Request Command

Overview

The Module Label String Request command is sent from the Host to the Module to query the Module's Label String.

Payload

None

Effect on Receipt

The Module will respond with a Module Label String Response command.

Allowed Context

All Contexts.

Sent By Host/Module

Host

4.1.6. (PCID: 0xF0 SCID: 0x05) – Module Label String Response Command

Overview

The Module Label String Response command is sent from the Module to the Host in response to a Module Label String Request command.

Payload

Byte Index	Field Name	Notes
0…63	Label String	Length is the size of String, If the string is null, payload is none. The String Max length is 64.

Effect on Receipt

None

Allowed Context

Same context as the request.

Sent By Host/Module

Module

4.1.7. (PCID: 0xF0 SCID: 0x06) – Module Label String Write Command

Overview

The Module Label String Write command is sent from the Host to the Module to modify the Module's Label String.

Payload

None

Effect on Receipt

The Module will respond with a Module Label String Response command.

Allowed Context

All Contexts.

Sent By Host/Module

Host

4.1.8. (PCID: 0xF0 SCID: 0x07) – Identify Command

Overview

The Identify command is sent from the Host to the Module to find out which Module connected.

Payload

None

Effect on Receipt

The Module will blink the led 5 seconds.

Allowed Context

All Contexts.

Sent By Host/Module

Host

4.1.9. (PCID: 0xF0 SCID: 0x08) – Module State Request Command

Overview

The Module State Request command is sent from the Host to the Module to query the Module's State.

Payload

None

Effect on Receipt

The Module will respond with a Module State Response command.

Allowed Context

All Contexts.

Sent By Host/Module

Host

4.1.10. (PCID: 0xF0 SCID: 0x09) – Module State Response Command

Overview

The Module State Response command is sent from the Module to the Host in response to a Module State Request command. When the module power on, it will update the State to host.

Payload

Byte Index	Field Name	Notes
0	Running State	0x00 = Starting Up 0x01 = Already Running
1	Configuration State	0x00 = Factory Default 0x01 = No configured 0x02 = Fully Configured

Effect on Receipt

None

Allowed Context

Same context as the request.

Sent By Host/Module

Module

4.1.11. (PCID: 0xF0 SCID: 0x0A) – Module Configuration State Change Request Command

Overview

The Module State Change command is sent from the Host to the Module to change the Module's State.

Payload

Byte Index	Field Name	Notes
0	Configuration State	0x00 = Factory Default 0x01 = No configured 0x02 = Fully Configured

Effect on Receipt

The Module respond with a Module State Response command. If the module state is changed to No Configured, the Module will leave the network ,change the configuration state and clear all the configurated data, after that, then reboot.

Allowed Context

All Contexts.

Sent By Host/Module

Host

4.1.12. (PCID: 0xF0 SCID: 0xF0) – Status Response Command

Overview

The Status Response command may be issued either by the Module to the Host, or by the Host to the Module, in order to acknowledge the reception of a command.

Payload

Byte Index	Field Name	Notes
0	Status	0x00 = Success 0x01 = Invalid Call 0x02 = Invalid Data 0x03 = Unsupported 0x04 = Endpoint Not Found 0x05 = Cluster Not Found 0x06 = Attribute Not Found 0x07 = Invalid Data Type 0x08 = Invalid Length 0x09 = Out of Space 0x0A = Save Data to Flash Failure 0x0B = Get Data from Flash Failure 0x0C = Not Found Command In Cluster 0x0D = Configuration State Error 0x0E = Configurated Data Error 0xFE = Unknown Serial Command 0xFF = Unknown Failure

Effect on Receipt

None

Allowed Context

All Contexts.

Sent By Host/Module

Both

4.2 Network Config Command (Primary Command ID : 0x01)

4.2.1. (PCID: 0x01 SCID: 0x00) – Network Status Request Command

Overview

The Network Status Request is sent by the Host to the Module to query the application Network State. The Host is not required to issue this command, as the Module will automatically issue a Network Status Response on any change of the application Network State.

Payload

None

Effect on Receipt

The Module will respond with a Network Status Response.

Allowed Context

All Contexts.

Sent By Host/Module

Host

4.2.2. (PCID: 0x01 SCID: 0x01) – Network Status Response Command

Overview

The Network Status Response is sent by the Module to the Host, either as a response to the Network Status Request command, or automatically upon a change to the application Network State or Permit Join Duration (i.e., on transition from non-zero to zero or vice versa).

Payload

Byte Index	Field Name	Notes
0	Network State	0x00 = Network Down 0x01 = Network Up 0x02 = Joining (Commissioning) 0x03 = Forming 0x04 = Rejoining 0x10 = Orphan (No parent) 0x11 = Pairing (Attempt to scan and join network) 0xFF = Unknown (During Initialization)
1	Zigbee Device Type	0x00 = Coordinator 0x01 = Router 0x02 = End Device 0x03 = Sleepy End Device 0xFF = Unknown
2	Channel	0xFF = Unknown
3,4	PAN ID	0xFFFF = Unknown
5,6	Node ID	0xFFFE = Unknown
7…14	Extended PAN ID	All 0's = Unknown
15	Permit Join Time	The remaining Permit Join Duration at the time of issuance.

Effect on Receipt

None

Allowed Context

Same context as request

Sent By Host/Module

Module

4.2.3. (PCID: 0x01 SCID: 0x02) – Join Network Command

Overview

The Join Network command is sent by the Host to the Module to prompt the Module to scan for and join an existing network.

Payload

Byte Index	Field Name	Notes
0…3	Channel Mask	Channel mask. Each bit represents channels 0-31 Example: Channel 15 = 0x00008000 bit 15 is flipped Zigbee networks operate on channels 11 – 26.
4	Auto Options	Bit 0 = 1 – Auto PAN ID Bit 1 = 1 – Auto Extended PAN ID If both bits are "1" and multiple networks exist on the channel, the Module will join the first viable network that responds.
5,6	Short PAN ID	The Short PAN ID of the network that the Module need to join to.
7…14	Extended PAN ID	The Extended PAN ID of the network Module need to join to.

Effect on Receipt

The Module will sequentially scan all channels defined by the Channel Mask. The Module will attempt to join any network with an open Permit Join window and matching the PAN IDs as specified in the command payload. If a join attempt fails, the Module will resume scanning until it has tried all available and applicable networks. The possible Status Responses generated by the Module in response to this command are listed in the following table.

Status Response to Join Network command

Status Response	Enum	Description
Success	0x00	Module successfully processed and shall start to scan and join sequence.
Invalid Call	0x01	The module is already on a network.
Invalid Data	0x02	No channels are selected in channel mask.

Allowed Context

Network Down.

Sent By Host/Module

Host.

4.2.4. (PCID: 0x01 SCID: 0x03) – Form Network Command (Reserved)

Overview

The Form Network command is sent by the Host to the Module to prompt the latter to form a network. Additionally on reception of this command, the application Zigbee Device Type is set to Coordinator.

Payload

Byte Index	Field Name	Notes
0	Centralized	1=Centralized Network 0=Distributed Network
1	Channel	Channel number Zigbee networks operate on channels 11 – 26.
2	Auto Options	Bit 0 = 1 – Auto PAN ID Bit 1 = 1 – Auto Extended PAN ID
3,4	Short PAN ID	The Short PAN ID of the new network
5…12	Extended PAN ID	The Extended PAN ID of the mew network

Effect on Receipt

The Module will sequentially scan all channels defined by the channel mask and select the one with the least interference. It will then attempt to form a network with the Short and Extended PAN ID's specified by the Host. Otherwise, if the Host has enabled the Auto Options for those parameters, the Module will generate randomized PAN ID's that do not conflict with any other network within range.

The possible Status Responses generated by the Module in response to this command are listed in the following table. Additionally, when a network is successfully formed, the Module will inform the Host by issuing a Network Status Response indicating the new application network state.

Status Response to Network Join command

Status Response	Enum	Description
Success	0x00	Module successfully processed and shall start to form network.
Invalid Call	0x01	The module is already on a network.
Invalid Data	0x02	The channel number is out of range.
Unsupported	0x03	Module is configured as a Reduced Function Device.

Allowed Context

Network Down.

Sent By Host/Module

Host.

4.2.5. (PCID: 0x01 SCID: 0x04) – Permit Join Command

Overview

The Permit Join command is sent by the Host to the Module in order to prompt the Module to open its Permit Join window for a given duration.

Payload

Byte Index	Field Name	Notes
0	Permit Join Duration	0x00-0xFE The duration in seconds to permit joining 0xFF Always permit joining

Effect on Receipt

When configured as a coordinator, the Module will open its Permit Join window for the specified Permit Join Duration and will additionally broadcast a message to prompt all routers on its network to also permit joining. When configured as a router, the Module will open its Permit Join window for the specified Permit Join Duration. Other device type will ignore this command.

Status Response to Network Join command

Status Response	Enum	Description
Success	0x00	Module successfully processed and shall start to permit join network.
Invalid Call	0x01	The module is out of a network.
Unsupported	0x03	Module is configured as a Reduced Function Device.

Allowed Context

Network Up.

Sent By Host/Module

Host.

4.2.6. (PCID: 0x01 SCID: 0x05) – Leave Network Command

Overview

The Leave Network command is sent by the Host to the Module in order to prompt the Module to leave the network to which it is currently joined.

Payload

None

Effect on Receipt

The Module will leave the network and clear all data pertaining to that network from its non-volatile memory.

Allowed Context

Network Up.

Sent By Host/Module

Host.

4.2.7. (PCID: 0x01 SCID: 0x06) – Rejoin Network Command

Overview

The Rejoin Network command prompt the latter to rejoin the network to which it is currently joined.

Payload

None

Effect on Receipt

The application will enter the Rejoin state, alternating between Secure Rejoin and Trust Center Rejoin until it successfully rejoins the network.

Allowed Context

Sleepy End Device. Network Up and lost the parent.

Sent By Host/Module

Host.

4.2.8. (PCID: 0x01 SCID: 0x07) – Trust Center Device Update Command (Reserved)

Overview

When the application Zigbee device type is configured as a coordinator and a network has been formed, the Trust Center Device Update command is sent by the Module to the Host when any device attempts to join or leave that network.

Payload

Byte Index	Field Name	Notes
0,1	Node ID	Node ID of the device attempting to join or leave the network
2…9	EUI64	EUI64 of the device attempting to join or leave the network
10	Device Update Event	0x00 = MAC Association 0x01 = Secure Rejoin 0x02 = Trust Center Rejoin 0x03 = Network Leave
11,12	Parent Node ID	Node ID of the device's parent

Effect on Receipt

None

Allowed Context

Network Up.

Sent By Host/Module

Module.

4.2.9. (PCID: 0x01 SCID: 0x08) – Trust Center Removed Device Notification Command (Reserved)

Overview

The Trust Center Removed Device Notification is sent by the Module to notify the Host that Module, as the Trust Center of the network, removed a device from the network. The command payload indicates the reason.

Note: The notification means that Module has requested the device to leave. A device that is malicious may not voluntarily leave the network.

Payload

Byte Index	Field Name	Notes
0,1	Node ID	
2…9	EUI64	
10	Remove Reason	0x00 = TC Key Exchange Failed or Timed Out.

Effect on Receipt

None

Allowed Context

Network Up.

Sent By Host/Module

Module.

4.2.10. (PCID: 0x01 SCID: 0x09) – Data Request Command

Overview

The Data Request command prompt the Sleepy End Device to send the Data Request to parent for request the data.

Payload

None.

Effect on Receipt

Send the data request to parent.

Allowed Context

Sleepy End Device. Network Up

Sent By Host/Module

Host.

4.3 Zigbee Configuration Command (Primary Command ID : 0x02)

4.3.1. (PCID: 0x02 SCID: 0x00) – Node Info Write Command

Overview

The Node Info Write command is sent by the Host to the Module in order to configure the application's Zigbee Device Type Tx Power and Manufacture Code. The Host is only required to issue this command once after synchronizing with not configured, as the configuration is preserved in the application's non-volatile memory.

Payload

Byte Index	Field Name	Notes
0	Zigbee Device Type	0x00 = Coordinator 0x01 = Router 0x02 = End Device 0x03 = Sleepy End Device 0xFF = Unknow
1	RT TX power	Int8 (-6Db to 10 Db)
2,3	Manufacture Code	Manufacture Code, LSB first.

Effect on Receipt

If the command is valid, the Module will update the setting and save it to non-volatile memory while also relaying a Device Type Response to the Host to confirm the setting. The following table lists the possible Status Responses on reception of the command.

Status Response	Enum	Description
Success	0x00	Zigbee device type has been updated and backed up to non-volatile memory.
Invalid Call	0x01	The Module is already on a network or configured, cannot modify its device type.
Invalid Data	0x02	Field values are outside of valid range.

Allowed Context

The module is in No Configured State

Sent By Host/Module

Host.

4.3.2. (PCID: 0x02 SCID: 0x01) – Node Info Request Command

Overview

The Node Info Request is sent by the Host to the Module in order to query the application Zigbee device type, Tx Power and Manufacture Code.

Payload

None

Effect on Receipt

The Module will respond with a Node Info Response.

Allowed Context

All Contexts.

Sent By Host/Module

Host.

4.3.3. (PCID: 0x02 SCID: 0x02) – Node Info Response Command

Overview

The Device Type Response is sent by the Module to the Host in response to a Node Info Request.

Payload

Byte Index	Field Name	Notes
0	Zigbee Device Type	0x00 = Coordinator 0x01 = Router 0x02 = End Device 0x03 = Sleepy End Device 0xFF = Unknow
1	RT TX power	Int8 (-6Db to 10 Db)
2,3	Manufacture Code	Manufacture Code, LSB first.

Effect on Receipt

None

Allowed Context

Same context as request.

Sent By Host/Module

Module.

4.3.4. (PCID: 0x02 SCID: 0x03) – Add Endpoint Command

Overview

The Add Endpoint command is sent by the Host to the Module in order to configure an application endpoint. This includes defining the Endpoint ID, Profile ID, Device ID, Device Version and the lists of server and client clusters supported on that endpoint.

The Add Endpoint command may also be used to update the definition of an existing endpoint by specifying its Endpoint ID in the payload. If an update operation does not include previously specified clusters, those clusters are removed along with their associated attributes.

Payload

Byte Index	Field Name	Notes
0	Endpoint ID	Valid range 1 - 240
1,2	Profile ID	0x0104 (ZHA)
3.4	Device ID	Device IDs used in the HA profile.
5	Device Version	
6	Number of Server Clusters	The number of server clusters, n
7	Number of Client Clusters	The number of client clusters, m
8…7+4n	List of Server Clusters	List of 2-byte Cluster IDs, LSB first with 2-Byte Manufacturer Code (0x0000 means the standard cluster)
8+4n…7+4n+4m	List of Client Clusters	List of 2-byte Cluster IDs, LSB first 2-Byte with Manufacturer Code (0x0000 means the standard cluster)

Effect on Receipt

The Module will verify that the Endpoint ID is valid and that there is sufficient memory for the new endpoint and its associated clusters. Likewise, the application will automatically configure all mandatory attributes for specified known clusters. The following table lists the possible Status Responses on reception of the command.

Status Response	Enum	Description
Success	0x00	The endpoint was successfully added tor updated.
Invalid Call	0x01	The Module is already on a network or configured, cannot modify its endpoint information.
Invalid Data	0x02	Field values are outside of valid range.
Out of Space	0x09	The storage space is full.

Allowed Context

The module is in No Configured State

Sent By Host/Module

Host

4.3.5. (PCID: 0x02 SCID: 0x04) – Endpoint List Request Command

Overview

The Endpoint List Request is sent by the Host to the Module in order to query the application endpoint list. The Host may apply this command to verify the configuration of application endpoints after having created them.

Payload

None.

Effect on Receipt

The Module will respond with an Endpoint List Response conveying a list of Endpoint ID's. There are no Status Responses issued on reception of this command.

Allowed Context

All Contexts.

Sent By Host/Module

Host

4.3.6. (PCID: 0x02 SCID: 0x05) – Endpoint List Response Command

Overview

The Endpoint List Response is sent by the Module to the Host in response to an Endpoint List Request. The command conveys the Endpoint ID's of all the configured endpoints supported by the application.

Payload

Byte Index	Field Name	Notes
0	Number of Endpoints	The number of endpoints. n
1…n	List of Endpoint IDs	1 Byte each

Effect on Receipt

None

Allowed Context

Same context as request.

Sent By Host/Module

Module

4.3.7. (PCID: 0x02 SCID: 0x06) – Endpoint Descriptor Request Command

Overview

The Endpoint Descriptor Request is sent by the Host to the Module in order to query the definition of a given application endpoint. The Host may apply this command to verify the full configuration of an application Endpoints after having created it.

Payload

Byte Index	Field Name	Notes
0	Endpoint ID	The Endpoint ID of the Endpoint to query.

Effect on Receipt

The Module will respond with an error if it does not support the specified endpoint. Otherwise, it relays the appropriate Endpoint Descriptor Response to the Host. The following table lists the possible Status Responses on reception of the command.

Status Response to Endpoint Descriptor Request Command

Status Response	Enum	Description
Endpoint Not Found	0x04	The specified endpoint is not supported.

Allowed Context

All Contexts.

Sent By Host/Module

Host

4.3.8. (PCID: 0x02 SCID: 0x07) – Endpoint Descriptor Response Command

Overview

The Endpoint Descriptor Response is sent by the Module to the Host in response to an Endpoint Descriptor Request.

Payload

Byte Index	Field Name	Notes
0	Endpoint ID	Valid range 1 - 240
1,2	Profile ID	0x0104 (ZHA)
3.4	Device ID	Device IDs used in the HA profile.
5	Device Version	
6	Number of Server Clusters	The number of server clusters, n
7	Number of Client Clusters	The number of client clusters, m
8…7+4n	List of Server Clusters	List of 2-byte Cluster IDs, LSB first with 2-Byte Manufacturer Code (0x0000 means the standard cluster)
8+4n…7+4n+4m	List of Client Clusters	List of 2-byte Cluster IDs, LSB first 2-Byte with Manufacturer Code (0x0000 means the standard cluster)

Effect on Receipt

None

Allowed Context

Same context as request.

Sent By Host/Module

Module.

4.3.9. (PCID: 0x02 SCID: 0x08) – Add Attributes to Cluster Command

Overview

The Add Attribute to Cluster command is sent by the Host to the Module in order to append attribute definitions to a configured application cluster. The command may specify as many attributes as the maximum payload capacity of a serial protocol frame allows. For a cluster with large number of attributes, the command may be issued as many times as required.

Payload

Byte Index	Field Name	Notes
0	Endpoint ID	Valid range 1 - 240
1,2	Cluster ID	
3.4	Manufacture ID of Cluster ID	0x0000 is for standard cluster ID
5	Cluster Server/Client	0x00 = Client 0x01 = Server
6	Number of Attributes	n
7+(7+M)*n..8+(7+M)*n,	Attribute ID	2-byte attribute IDs, LSB first.
9+(7+M)*n,10+(7+M)*n	Manufacture ID of Attribute ID	2-byte Manufacture IDs, LSB first.
11+(7+M)*n	Attribute Type	Follow the ZCL Data Types
12+(7+M)*n	Attribute Property Bitmask	Bit Description Bit 0 0 = Not Writable 1 = Writable Bit 1 0 = Not Reportable 1 = Reportable Bit 2-7 Reserved
13+(7+M)*n	Attribute Value Max Length	The Attribute Value Max length, when the attribute type is available length, defined the max length. Max length = M.
14+(7+M)*n…13+M+(7+M)*n	Attribute Value	M Bytes

Effect on Receipt

The application will issue an appropriate Status Response. Furthermore, the application will ignore duplicate definitions (i.e. corresponding exactly to an existing configuration) but will update existing attributes if the configuration specified is different.

Allowed Context

The module is in No Configured State

Sent By Host/Module

Host

4.3.10. (PCID: 0x02 SCID: 0x09) – Attribute List Request Command

Overview

The Attribute List Request is sent by the Host to the Module in order to query the attributes on a given application cluster and endpoint.

Payload

Byte Index	Field Name	Notes
0	Endpoint ID	The target endpoint to query
1,2	Cluster ID	
3.4	Manufacture ID of Cluster ID	0x0000 is for standard cluster ID
5	Cluster Server/Client	0x00 = Client 0x01 = Server

Effect on Receipt

If the Module supports the target endpoint and cluster, it will relay a Status Response, after that Module sent an appropriate number of Attribute List Response commands to the Host actively. Otherwise, a Status Response is generated indicating an error.

Allowed Context

All Contexts.

Sent By Host/Module

Host

4.3.11. (PCID: 0x02 SCID: 0x0A) – Attribute List Response Command

Overview

The Attribute List Response command is sent by the Module to the Host in response to an Attribute List Request. The message conveys a list of attributes supported on the cluster and endpoint queried. Should the number of attributes exceed the payload capacity of the message, they will be conveyed as multiple responses, or pages.

Payload

Byte Index	Field Name	Notes
0	Endpoint ID	Valid range 1 - 240
1,2	Cluster ID	
3.4	Manufacture ID of Cluster ID	0x0000 is for standard cluster ID
5	Cluster Server/Client	0x00 = Client 0x01 = Server
6	Total Number of Attributes	The total number of attributes that will be sent to complete the response.
7	Remain number of attributes	The Remain number of attributes to response.
8	Number of Attributes	Number of attributes in the current page. n
9+7n..10+7n,	Attribute ID	2-byte attribute IDs, LSB first.
11+7n,12+7n	Manufacture ID of Attribute ID	2-byte Manufacture IDs, LSB first.
13+7n	Attribute Type	Follow the ZCL Data Types
14+7n	Attribute Property Bitmask	Bit Description Bit 0 0 = Not Writable 1 = Writable Bit 1 0 = Not Reportable 1 = Reportable Bit 2-7 Reserved
15+7n	Attribute Value Max Length	The Attribute Value Max length, when the attribute type is available length, defined the max length.
16+(7+M)*n···15+M+(7+M)*n	Attribute Value	M Bytes

Effect on Receipt

None

Allowed Context

Same context as request.

Sent By Host/Module

Module

4.3.12. (PCID: 0x02 SCID: 0x0B) – Attribute Request Command

Overview

The Attribute Request is sent by the Host to the Module in order to query the definition and value of an attribute on a given cluster and endpoint.

Payload

Byte Index	Field Name	Notes
0	Endpoint ID	The target endpoint to query
1,2	Cluster ID	The target cluster to query on the given endpoint
3	Cluster Server/Client	0x00 = Client 0x01 = Server
4,5	Attribute ID	The ID of the attribute to query
6,7	Manufacture Code of Attribute	0x0000 = The Standard Attribute Other Value = The Manufacture code for Private Cluster / Attribute

Effect on Receipt

If the Module supports the requested attribute, it will respond with an Attribute Response. Otherwise, the application will relay a Status Response indicating an error, as described in the following table.

Status Response to Endpoint Descriptor Request Command

Status Response	Enum	Description
Endpoint Not Found	0x04	The specified endpoint is not supported.
Cluster Not Found	0x05	The cluster cannot be found.
Attribute Not Found	0x06	The attribute cannot be found.
Out of Space	0x09	The attribute data length greater than 120 bytes.

Allowed Context

All Contexts.

Sent By Host/Module

Host

4.3.13. (PCID: 0x02 SCID: 0x0C) – Attribute Response Command

Overview

An Attribute Response is sent by the Module to the Host in response to an Attribute Request. Or when the locate attribute is changed host can received this command from module.

Payload

Byte Index	Field Name	Notes
0	Endpoint ID	The target endpoint to query
1,2	Cluster ID	The target cluster to query on the given endpoint
3	Cluster Server/Client	0x00 = Client 0x01 = Server
4,5	Attribute ID	The ID of the attribute to query
6,7	Manufacture Code	0x0000 = The Standard Attribute Other Value = The Manufacture code for Private Cluster / Attribute
8	Attribute Property Bitmask	Bit Description Bit 0 0 = Not Writable 1 = Writable Bit 1 0 = Not Reportable 1 = Reportable Bit 2-7 Reserved
9	Attribute Type	Follow the ZCL Data Types
10…n	Attribute Value	Size dependent on Attribute Type. For strings, the length of the string will immediately precede the string itself.

Effect on Receipt

None

Allowed Context

Same context as request. Or attribute changed.

Sent By Host/Module

Module

4.3.14. (PCID: 0x02 SCID: 0x0D) – Attribute Write Command

Overview

The Attribute Write command is sent by the Host to the Module in order to set the value of an existing attribute residing on a target cluster and endpoint.

Payload

Byte Index	Field Name	Notes
0	Endpoint ID	The target endpoint to query
1,2	Cluster ID	The target cluster to query on the given endpoint
3	Cluster Server/Client	0x00 = Client 0x01 = Server
4,5	Attribute ID	The ID of the attribute to query
6,7	Manufacture Code	0x0000 = The Standard Attribute Other Value = The Manufacture code for Private Cluster / Attribute
8	Attribute Type	Follow the ZCL Data Types
9…n	Attribute Value	Size dependent on Attribute Type. For strings, the length of the string will immediately precede the string itself.

Effect on Receipt

If the attribute is supported, the specified Attribute Type matches and the Attribute Value is the correct size, the Module will return a Status Response indicating Success. Otherwise, the response will indicate an error. The possible Status Responses are listed in the following table.

Status Response to Endpoint Descriptor Request Command

Status Response	Enum	Description
Success	0x00	
Endpoint Not Found	0x04	The specified endpoint is not supported.
Cluster Not Found	0x05	The cluster cannot be found.
Attribute Not Found	0x06	The attribute cannot be found.
Invalid Data Type	0x07	The Attribute Type does not conform to any defined ZCL data type.
Invalid Length	0x08	The size of the attribute value doesn't match what is expected.

Allowed Context

All Contexts.

Sent By Host/Module

Host

4.3.15. (PCID: 0x02 SCID: 0x0E) – Attribute Default Value Write Command

Overview

The Attribute Default Value Write command is sent by the Host to the Module in order to set the value of an existing attribute residing on a target cluster and endpoint. And the valued will storage in the NVM for the default set value.

Payload

Byte Index	Field Name	Notes
0	Endpoint ID	The target endpoint to query
1,2	Cluster ID	The target cluster to query on the given endpoint
3	Cluster Server/Client	0x00 = Client 0x01 = Server
4,5	Attribute ID	The ID of the attribute to query
6,7	Manufacture Code	0x0000 = The Standard Attribute Other Value = The Manufacture code for Private Cluster / Attribute
8	Attribute Type	Follow the ZCL Data Types
9…n	Attribute Value	Size dependent on Attribute Type. For strings, the length of the string will immediately precede the string itself.

Effect on Receipt

If the attribute is supported, the specified Attribute Type matches and the Attribute Value is the correct size, the Module will return a Status Response indicating Success. Otherwise, the response will indicate an error. The possible Status Responses are listed in the following table.

Status Response to Endpoint Descriptor Request Command

Status Response	Enum	Description
Success	0x00	
Endpoint Not Found	0x04	The specified endpoint is not supported.
Cluster Not Found	0x05	The cluster cannot be found.
Attribute Not Found	0x06	The attribute cannot be found.
Invalid Data Type	0x07	The Attribute Type does not conform to any defined ZCL data type.
Invalid Length	0x08	The size of the attribute value doesn't match what is expected.

Allowed Context

All Contexts.

Sent By Host/Module

Host

4.3.16. (PCID: 0x02 SCID: 0x0F) – Add Supported Commands to Cluster Command

Overview

The Add Supported Commands to Cluster command is sent by the Host to the Module in order to append Supported Commands definitions to a configured application cluster. The command may specify as many commands as the maximum payload capacity of a serial protocol frame allows. For a cluster with large number of commands, the command may be issued as many times as required.

Payload

Byte Index	Field Name	Notes
0	Endpoint ID	Valid range 1 - 240
1,2	Cluster ID	
3.4	Manufacture ID of Cluster ID	0x0000 is for standard cluster ID
5	Cluster Server/Client	0x00 = Client 0x01 = Server
6	Number of Commands	n
7+4n	Command ID	1-byte command ID.

8+4n	Command Mask	Bit Description Bit 0 0 = C->S 1 = S->C Bit 1-7 Reserved
9+4n…10+4n	Manufacture ID of command ID	0x0000 is for standard

Effect on Receipt

The application will issue an appropriate Status Response. Furthermore, the application will ignore duplicate definitions (i.e. corresponding exactly to an existing configuration) but will update existing commands if the configuration specified is different.

Allowed Context

The module is in No Configured State

Sent By Host/Module

Host

4.3.17. (PCID: 0x02 SCID: 0x10) – Supported Commands List Request Command

Overview

The Commands List Request is sent by the Host to the Module in order to query the commands on a given application cluster and endpoint.

Payload

Byte Index	Field Name	Notes
0	Endpoint ID	The target endpoint to query
1,2	Cluster ID	
3.4	Manufacture ID of Cluster ID	0x0000 is for standard cluster ID
5	Cluster Server/Client	0x00 = Client 0x01 = Server

Effect on Receipt

If the Module supports the target endpoint and cluster, it will relay an appropriate number of Commands List Response commands to the Host. Otherwise, a Status Response is generated indicating an error.

Allowed Context

All Contexts.

Sent By Host/Module

Host

4.3.18. (PCID: 0x02 SCID: 0x11) – Supported Commands List Response Command

Overview

The Commands List Response command is sent by the Module to the Host in response to an Commands List Request. The message conveys a list of attributes supported on the cluster and endpoint queried. Should the number of commands exceed the payload capacity of the message, they will be conveyed as multiple responses, or pages.

Payload

Byte Index	Field Name	Notes
0	Endpoint ID	Valid range 1 - 240
1,2	Cluster ID	
3.4	Manufacture ID of Cluster ID	0x0000 is for standard cluster ID
5	Cluster Server/Client	0x00 = Client 0x01 = Server
6	Total number of Commands	The total number of commands that will be sent to complete the response.
7	Remaining number of	The remaining number of commands response.

	Commands	
8	Number of Commands	The number of Commands in current frame. n
9+4n	Command ID	1-byte command ID.
10+4n	Command Mask	Bit Description Bit 0 0 = C->S 1 = S->C Bit 1-7 Reserved
11+4n…12+4n	Manufacture ID of command ID	0x0000 is for standard

Effect on Receipt

None

Allowed Context

Same context as request.

Sent By Host/Module

Module

4.4 ZDO Message (Primary Command ID : 0x03)

4.4.1. (PCID: 0x03 SCID: 0x00) – ZDO Message Received Indication

Overview

The ZDO Message Received Indication is sent by the Module to the Host on reception of ZDO Message from the network.

Payload

Byte Index	Field Name	Notes
0,1	Source Node ID	
2	Last Hop LQI	
3,4	ZDO Command ID	
5	Transaction Sequence Number	
6	Payload Length	
7…n	Payload	

Effect on Receipt

No action is expected from the Host.

Allowed Context

All Contexts.

Sent By Host/Module

Module.

4.4.2. (PCID: 0x03 SCID: 0x01) – Send ZDO Command

Overview

The Send ZDO Command is sent by the Host to the Module in order to prompt the Module to send a ZDO message to the network. The command configures the following options:
reception of APS ACK

Payload

Byte Index	Field Name	Notes
0,1	Destination Node ID	0xFFFF = All Device Broadcast 0xFFFD = All Non-Sleepy Devices Broadcast 0xFFFC = All Routers and Coordinator Broadcast Others = unicast destination node
2,3	ZDO Command ID	
4	Transaction Sequence Number	The Host must apply a number in the range of 0-127. The range 128-255 is reserved for commands generated by the Module.
5	Payload Length	
6…n	Payload	

Effect on Receipt

The Module will attempt to issue the ZDO message over the network. And reply the ZDO Send Command Status to Host.

Allowed Context

Network Up.

Sent By Host/Module

Host

4.4.3. (PCID: 0x03 SCID: 0x02) – ZDO Send Status Respond

Overview

The ZDO Send Status message is sent by the Module to the Host after the transmission of a Send ZDO Unicast or Send ZDO Broadcast.

Payload

Byte Index	Field Name	Notes
0	Status	Follow the EmberStatus.

Effect on Receipt

No action is expected from the Host as the command is for notification purposes only. The Host may choose to display the Status in some manner, or it may also choose to re-send the message if the Status indicates an error occurred.

Allowed Context

Same context as request

Sent By Host/Module

Module.

4.5 ZCL Message (Primary Command ID : 0x04)

4.5.1. (PCID: 0x04 SCID: 0x00) – ZCL Message Received Command

Overview

The ZCL Message Received command is sent by the Module to the Host on reception of ZCL Message from the network.

Payload

Byte Index	Field Name	Notes
0,1	Source Node ID	
2	Source Endpoint	
3	Local Endpoint ID	
4,5	Profile ID	0x0104 = ZHA
6,7	Cluster ID	
8	Encryption Level	0x00 = Network Encryption Only 0x01 = Network + APS Encryption
9	Frame Control	8-bit Bitmap: Bits 0,1: 00 = ZCL General Command 01 = Cluster-Specific Command Bit 2: 1 = Manufacturer-Specific Command Bit 3: 0 = Client to Server 1 = Server to Client Bit 4: 1 = Disable Default Response Bit 5-7: Reserved
10,11	Manufacturer Code	Applicable if Bit 2 of Frame Control field is enabled.
12	Transaction Sequence Number	The Transaction Sequence Number of the original request.
13	Command ID	
14	Payload Length	
15…n	Payload	

Effect on Receipt

None.

Allowed Context

All Contexts.

Sent By Host/Module

Module.

4.5.2. (PCID: 0x04 SCID: 0x01) – Send ZHA ZCL Command

Overview

The Send ZHA ZCL Command is sent by the Host to the Module in order to transmit a ZCL Message to the network.

Payload

Byte Index	Field Name	Notes
0,1	Destination Node ID	0xFFFF = All Device Broadcast 0xFFFD = All Non-Sleepy Devices Broadcast 0xFFFC = All Routers and Coordinator Broadcast Others = unicast destination node
2	Destination Endpoint ID	
3	Local Endpoint ID	
4,5	Cluster ID	
6	Encryption Level	0x00 = Network Encryption Only 0x01 = Network + APS Encryption
7	Frame Control	8-bit Bitmap: Bits 0,1: 00 = ZCL General Command 01 = Cluster-Specific Command Bit 2: 1 = Manufacturer-Specific Command Bit 3: 0 = Client to Server 1 = Server to Client Bit 4: 1 = Disable Default Response Bit 5-7: Reserved

8,9	Manufacturer Code	Applicable if Bit 2 of Frame Control field is enabled.
10	Transaction Sequence Number	The Host must apply a number in the range of 0-127. The range 128-255 is reserved for commands generated by the Module.
11	Command ID	
12	Payload Length	
13…n	Payload	

Effect on Receipt

The Module will attempt to issue the ZCL message over the network. The status of the transmission and its assigned sequence number will be relayed to the Host via a ZCL Send Status command.

Allowed Context

Network Up.

Sent By Host/Module

Host.

4.5.3. (PCID: 0x04 SCID: 0x02) – Send ZHA ZCL Multicast Command

Overview

The Send ZHA ZCL Multicast Command is sent by the Host to the Module in order to transmit a ZCL Message to the network.

Payload

Byte Index	Field Name	Notes
0,1	Group ID	The Group ID of the Group to which the target devices belong.
2	Local Endpoint ID	
3,4	Cluster ID	
5	Frame Control	8-bit Bitmap: Bits 0,1: 00 = ZCL General Command 01 = Cluster-Specific Command Bit 2: 1 = Manufacturer-Specific Command Bit 3: 0 = Client to Server 1 = Server to Client Bit 4: 1 = Disable Default Response Bit 5-7: Reserved
6,7	Manufacturer Code	Applicable if Bit 2 of Frame Control field is enabled.
8	Transaction Sequence Number	The Host must apply a number in the range of 0-127. The range 128-255 is reserved for commands generated by the Module.
9	Command ID	
10	Payload Length	
11…n	Payload	

Effect on Receipt

The Module will attempt to issue the ZCL message over the network. The status of the transmission and its assigned sequence number will be relayed to the Host via a ZCL Send Status command.

Allowed Context

Network Up.

Sent By Host/Module

Host.

4.5.4. (PCID: 0x04 SCID: 0x03) –ZHA ZCL Send Status Respond

Overview

The ZCL Send Status message is sent by the Module to the Host after the transmission of a Send ZCL Unicast \ Broadcast or Multicast.

Payload

Byte Index	Field Name	Notes
0	Status	Follow the EmberStatus.

Effect on Receipt

No action is expected from the Host as the command is for notification purposes only. The Host may choose to display the Status in some manner, or it may also choose to re-send the message if the Status indicates an error occurred.

Allowed Context

Same context as request

Sent By Host/Module

Module.

4.5.5. (PCID: 0x04 SCID: 0x04) – Pre-Send ZHA ZCL Indication

Overview

The Pre-Send ZHA ZCL Indication is sent by the Module to Host in order to indicate the host a ZCL Message will be send from module to the network.

Payload

Byte Index	Field Name	Notes
0	Command Type	0= Unicast 1= Unicast using entry in the address table 2= Unicast using entry in the binding table 3= Multicast 5= Broadcast
1,2	Destination Node ID /Index /Group id	For the Unicast or Broadcast command type, it's the destination node id. 0xFFFF = All Device Broadcast 0xFFFD = All Non-Sleepy Devices Broadcast 0xFFFC = All Routers and Coordinator Broadcast Others = unicast destination node For the Unicast using entry in the address table command type, it's the index of the address table. For the Unicast using entry in the binding table command type, it's the index of the binding table For the Multicast command type, it's the group id.
3	Destination Endpoint ID	Unused for the Multicast command type.
4	Local Endpoint ID	
5,6	Cluster ID	
7	Encryption Level	0x00 = Network Encryption Only 0x01 = Network + APS Encryption

8	Frame Control	8-bit Bitmap: Bits 0,1: 00 = ZCL General Command 01 = Cluster-Specific Command Bit 2: 1 = Manufacturer-Specific Command Bit 3: 0 = Client to Server 1 = Server to Client Bit 4: 1 = Disable Default Response Bit 5-7: Reserved
9,10	Manufacturer Code	Applicable if Bit 2 of Frame Control field is enabled. 0x0000 for the standard.
11	Transaction Sequence Number	
12	Command ID	
13	Payload Length	
14…n	Payload	

Effect on Receipt

No action is expected from the Host.

Allowed Context

All Contexts.

Sent By Host/Module

Module.

Reference: https://mmbnetworks.atlassian.net/wiki/spaces/SPRC2/pages/110561750/Frame+Payload+Definitions