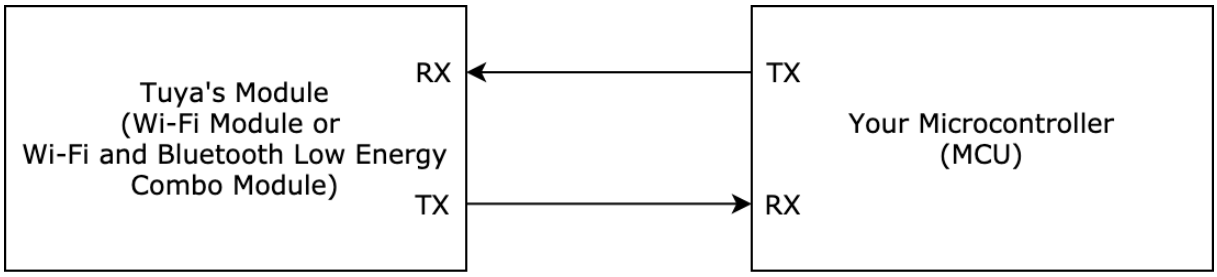
Serial Communication Protocol

Version: 20220706

Online Version

Contents

This topic describes the serial protocol that is used to implement serial communication between Tuya’ s Wi-Fi module or Wi-Fi and Bluetooth Low Energy (LE) combo module and the third-party MCU.



1 Serial communication

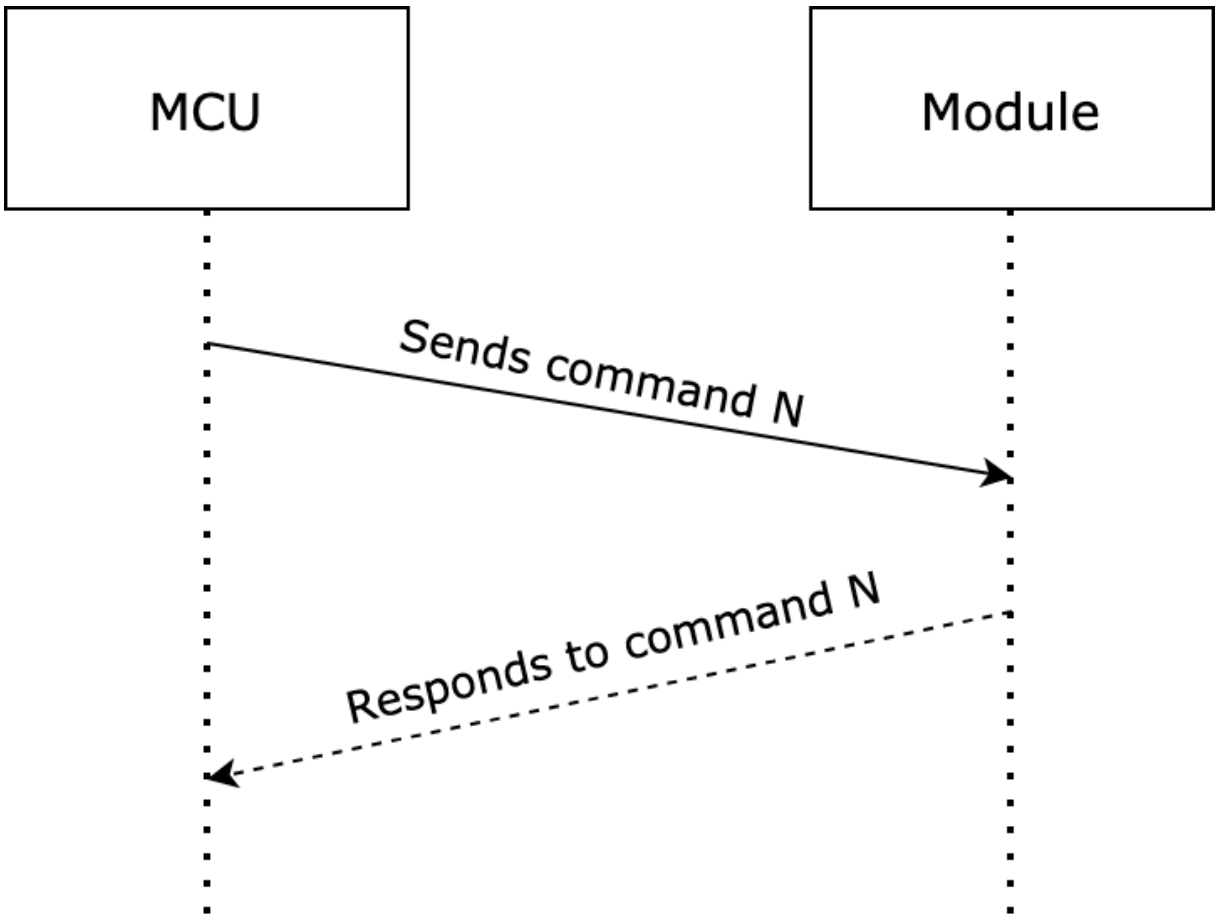
- Baud: 9600/115200
- Data bit: 8
- Parity check: none
- Stop bit: 1
- Data flow control: none
- MCU: microcontroller unit. Your MCU communicates with Tuya’ s modules through the serial port.

2 Frame format

Field	Bytes	Description
Header	2	It is fixed to `0x55aa`.
Version	1	It is used for updates and extensions.
Command	1	Frame type
Data length	2	Big-endian
Data	N	Entity data
Checksum	1	Start from the header, add up all the bytes, and then divide the sum by 256 to get the remainder.

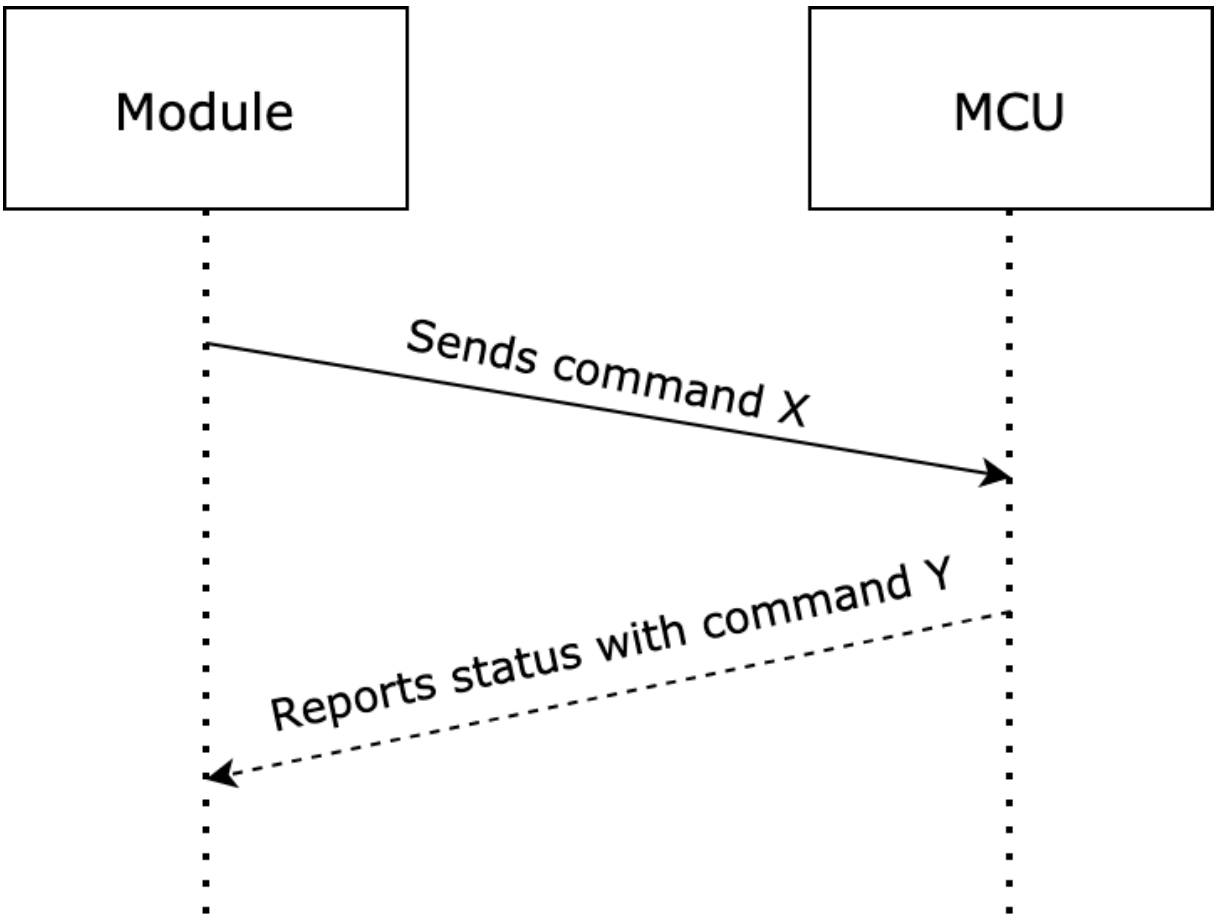
- All data greater than one byte is transmitted in big-endian format.
- Generally, one command is sent by one party and received by the other party synchronously.

  That is, one party sends a command and waits for a response from the other party. If the sender does not receive a correct response packet within a specified time period, the transmission times out, as shown in the following figure.

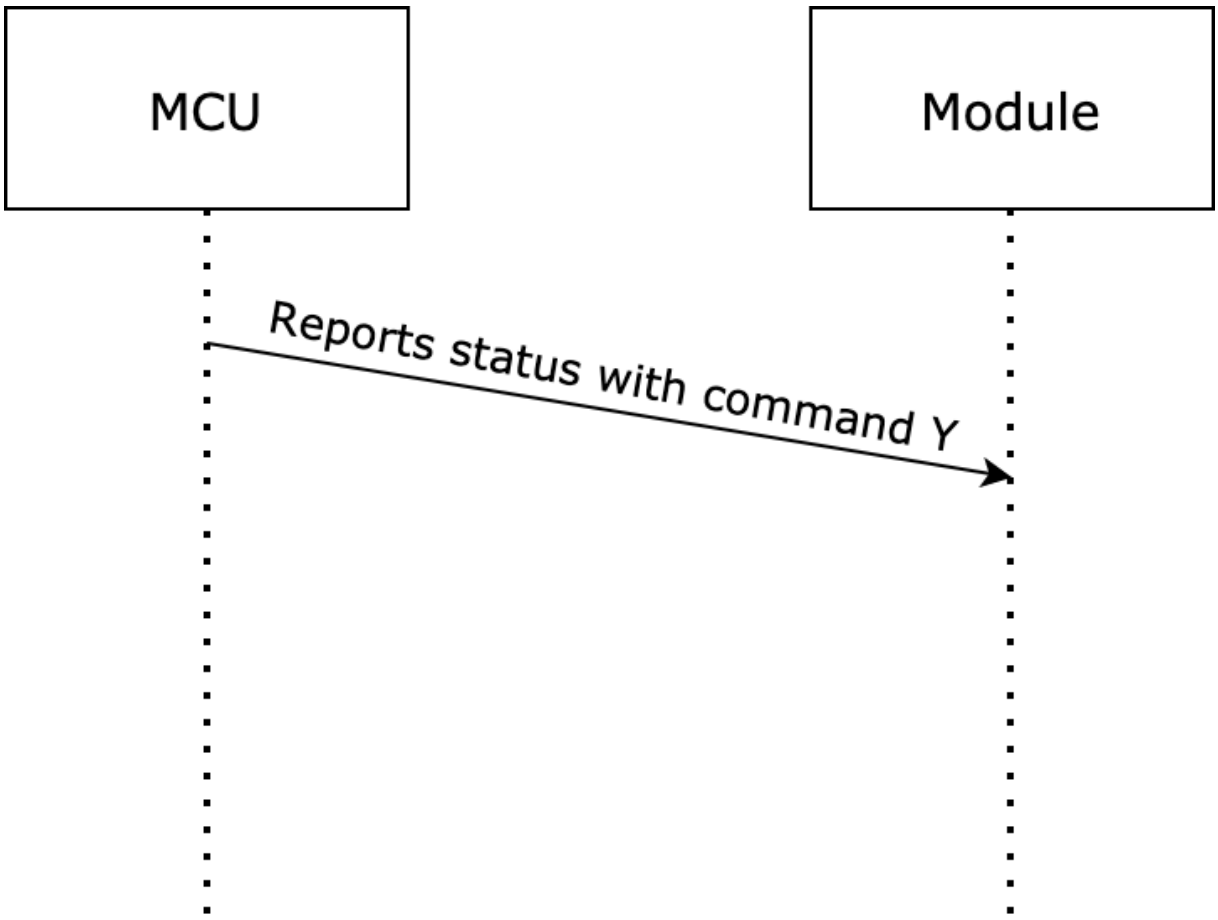


:::info For more information, see the **Protocol list**. :::

- The module sends control commands and the MCU reports data point (DP) status, which occurs asynchronously. Assume that the module sends a command `X` and the MCU reports a command `Y`. The data transmission is as follows.
  - The module sends a control command:



- The MCU reports status:



- The version field

  The version number is used to distinguish between the old and legacy version. To provide compatibility with new and legacy protocols, the module queries the MCU version using the command 0x00 and determines which protocol version it should use accordingly. The new protocol defaults to 0x03.

3 Serial buffer size of module

Chipset platform	Size of the receive buffer	Size of the send buffer	Notes
ESP8266	256 bytes	256 bytes	The buffer size is fixed.
Others	A minimum of 1,024 bytes	A minimum of 1,024 bytes	If the firmware supports the file transfer feature, the maximum buffer size depends on the maximum size of a single packet transmitted.

The length of the whole packet (including all bytes from **header** to **checksum**) sent from the MCU to the module must not exceed the maximum size of the receive buffer of the module. Otherwise, transmission errors might occur.

4 Data units

The DP command and status data units are defined as follows:

Data segment	Bytes	Description
dpid	1	The ID of a DP.
type	1	The data type of a DP defined on the Tuya IoT Development Platform . For more information, see the description of the `type` fields in the following table.
len	2	The bytes of a `value`. For more information, see the description of the `type` fields in the following table.
Value	1/2/4/N	Represented in hexadecimal format. Data greater than one byte is transmitted in big-endian format.

Description of the `type` fields

type	Data type	Bytes	Description
0x00	Raw	N	Represents a DP of raw data type. The data is passed through the module to the cloud.

type	Data type	Bytes	Description
0x01	Boolean	1	Represents a DP of Boolean data type. Valid values include `0x00` and `0x01`.
0x02	Value	4	Represents a DP of integer type. The data is represented in big-endian format.
0x03	String	N	Represents a DP of string type.
0x04	Enum	1	Represents a DP of enum type, ranging from 0 to 255.
0x05	Bitmap	1/2/4	Represents a DP of fault type. Data greater than one byte is represented in big-endian format.

:::info

- Except for the `raw` data type, all others belong to the `object` type.
- The status data can contain data units of multiple DPs. :::

5 Protocol list

5.1 Send heartbeats

- After the Wi-Fi module is powered on, it keeps sending a heartbeat to the MCU every one second and waits for a response. If the module receives a response to a heartbeat, it will send a heartbeat every 15 seconds and run the initialization command. Otherwise, the module will keep sending a heartbeat to the MCU every one second until receiving a response.
- The MCU can determine whether the module works properly by detecting heartbeats. If the module fails to send a heartbeat, the MCU can use the reset pin to reset the module. If the MCU fails to respond to a heartbeat within three seconds, the module determines the MCU is offline.

The module sends the following command.

Field	Bytes	Description
Header	2	0x55aa
Version	1	0x00
Command	1	0x00
Data length	2	0x0000
Data	0	None
Checksum	1	Start from the header, add up all the bytes, and then divide the sum by 256 to get the remainder.

For example, `55 aa 00 00 00 00 ff`

The MCU returns the following command.

Field	Bytes	Description
Header	2	0x55aa
Version	1	0x03

Field	Bytes	Description
Command	1	0x00
Data length	2	0x0001
Data	1	
		0x00: The MCU returns this value only one time after a restart. The module uses this value to determine whether the MCU restarts during operation.
		0x01: The MCU returns this value except for the first response after a restart.
Checksum	1	Start from the header, add up all the bytes, and then divide the sum by 256 to get the remainder.

- For example, the MCU returns `55 aa 03 00 00 01 00 03` after a restart.
- The MCU returns `55 aa 03 00 00 01 01 04` except for the first response after a restart.

5.2 Query product information

Product information consists of the product ID and MCU software version number.

- Product ID (PID): It is automatically generated for each product created on the Tuya IoT Development Platform for storing product information in the cloud.
- MCU software version number: It is expressed in dot-decimal notation, `x.x.x`. `x` is a decimal digit between 0 and 99.

The module sends the following command.

Field	Bytes	Description
Header	2	0x55aa
Version	1	0x00
Command	1	0x01
Data length	2	0x0000
Data	0	None
Checksum	1	Start from the header, add up all the bytes, and then divide the sum by 256 to get the remainder.

For example, `55 aa 00 01 00 00 00`

The MCU returns the following command.

Field	Bytes	Description
Header	2	0x55aa
Version	1	0x03
Command	1	0x01
Data length	2	N
Data	N	{ “p” : “AIp08kLIftb8x***“,” v” : “1.0.0” , “m” :1, “mt” :10, “n” :0, “ir” : “5.12” , “low” :0}
Checksum	1	Start from the header, add up all the bytes, and then divide the sum by 256 to get the remainder.

For example, `{"p":"AIp08kLIftb8x***","v":"1.0.0","m":1,"mt":10,"n":0,"ir":"5.12","low":0}`

Field description:

Field	Description
p	Indicates the product ID is `Ip08kLIftb8x***`, which is the PID of a product created on the Tuya IoT Development Platform.
v	Indicates the MCU version is `1.0.0`. The version number must be defined in the format `x.x.x`.
m	Indicates the operation mode of the module.
	`0`: active pairing. The module automatically enters the pairing mode and waits for pairing after startup.
	`1`: passive pairing. The module does not enter the pairing mode after startup until the MCU sends the reset command. In pairing mode, if the module is not paired within three minutes, it will automatically exit the pairing mode.
	`2`: Anti-misoperation mode A paired device that is physically reset will resume its network connection if it is not paired within three minutes. Similarly, if a device that is physically reset is shut down due to an outage, it will resume its network connection after startup. In this mode, if a user removed a device from the app, the network connection history of this device will be cleared. You can implement this mode for devices with a physical reset button or switch to prevent unintended device reset.

Field	Description
mt	Indicates the switching time period between the safe mode and anti-misoperation mode. You can set a period between 3 and 10 minutes. If you leave this field empty, the period defaults to 3 minutes.
n	Indicates the network pairing mode. If you leave this field empty, the pairing mode is switched between the Wi-Fi Easy Connect (EZ) mode and the access point (AP) mode.
	`0` indicates both the EZ mode and AP mode are supported. This enables automatic switching between these two modes. For more information, see Report network status .
	`1` indicates only the AP mode is supported.

Field	Description
ir	Used to enable the infrared (IR) feature and notify the module of the IR transmission (TX) pin and IR reception (RX) pin. If you leave this field empty, the IR feature is disabled. For example, `5.12` indicates the IR TX pin is I/O 5 and the IR RX pin is I/O 12. **Note**: If the module works in the self-processing mode, the IR I/Os must not be used for the reset button or the Wi-Fi status indicator. For cross-module I/O configuration, the pin number plus 32 makes the pin number we need. For example, the pin number to be set for PB20 is 52 (20 + 32 = 52). The IR TX pin requires PWM signals. The IR RX pin requires I/O interrupts. For more information about the pin configuration, see the datasheet of your modules. If you want to enable the IR status indicator, see (Optional) Notification of new feature setting and configure it.
low	Used to enable the low power mode. If you leave this field empty, the low power mode is disabled. In low power mode, when a device is connected to the router but not executing any commands, its power consumption can be lower than 15 mA on average. When the Wi-Fi and Bluetooth combo module runs in low power mode, it only supports Bluetooth pairing without device control. If power consumption is not your concern, you can leave this field as is.

Field	Description
	`0`: disable low power mode.
	`1`: enable low power mode.
vt	Indicates the MCU firmware type, which defaults to `9`. You can set a value between 10 and 19 to specify a firmware type. Your specified value must match the value of the field **Update Channel** that appears when you add firmware on the Tuya IoT Development Platform.

The value of `vt` you specified in the SDK must be consistent with the value of **Update Channel** specified on the Tuya IoT Development Platform. Otherwise, the device cannot receive OTA updates or receives the wrong OTA updates.

5.3 Query working mode

The working mode means how the Wi-Fi status is indicated and the module is reset. Two modes are available.

- The MCU works with the module to process network events.

  When the MCU detects a pairing signal, it notifies the module of performing network reset through serial communication. The module sends the current Wi-Fi status to the MCU through serial communication. The MCU executes status indications accordingly. Home appliances usually use this mode.

- The module processes network events itself.

  The GPIO pin on the module drives the LED indicator to indicate the network status. The GPIO input signal determines module reset.

  When the module detects a low level on the GPIO input pin for more than five seconds, it will trigger a reset action. The following command specifies the GPIO pins of the LED indicator and the reset button.

The module sends the following command.

Field	Bytes	Description
Header	2	0x55aa
Version	1	0x00
Command	1	0x02
Data length	2	0x0000
Data	0	None
Checksum	1	Start from the header, add up all the bytes, and then divide the sum by 256 to get the remainder.

For example, `55 aa 00 02 00 00 01`

The MCU returns the following command.

Field	Bytes	Description
Header	2	0x55aa
Version	1	0x03
Command	1	0x02
Data length	2	
		0x0000: The module works with the MCU to process network events. The MCU must implement the required features mentioned above.
		0x0002/0x0003: The module processes network events itself.
Data	0/2/3	The data length is 2 bytes.

Field	Bytes	Description
		The first byte represents the GPIO pin used to indicate Wi-Fi status. The second byte represents the GPIO pin used to reset the Wi-Fi network.
Data	0/2/3	If data length is **2** bytes:Data[0]: represents the GPIO pin used to indicate Wi-Fi status.Data[1]: represents the GPIO pin used to reset the Wi-Fi network.If data length is **3** bytes:Data[0]: represents the GPIO pin used to indicate Wi-Fi status.Data[1]: represents the GPIO pin used to reset the Wi-Fi network.Data[3]: represents the GPIO pin used to indicate Bluetooth LE status.
Checksum	1	Start from the header, add up all the bytes, and then divide the sum by 256 to get the remainder.

Example:

- The MCU works with the module to process network events.

  ```
  55 aa 03 02 00 00 04
  ```

- The module processes network events itself. `0x0c` indicates the LED indicator is

connected to GPIO12. 0x0d indicates the reset button is connected to GPIO13.

```
55 aa 03 02 00 02 0c 0d 1f
```

5.4 (Optional) Notification of new feature setting

:::important

- After the device is powered on, the MCU sends this command to notify the module of feature configuration after the command 0x01 and before the command 0x02.
- If no new feature configuration is required, the MCU does not need to send this command.
- The MCU must send this command each time after the module is powered on or the module is restarted.
- The fields of this command will be added as the service is extended. :::

- ir: IR status indicator. It can share the same GPIO pin with the Wi-Fi status indicator but must not conflict with other GPIOs associated with the command 0x02. The IR status indicator is defined as follows.
  - Sharing the same GPIO pin with the Wi-Fi status indicator: The LED is on when the IR is idle. The LED is off when the IR is used.
  - Using an individual GPIO pin: The LED is on when the IR is used. The LED is off when the IR is idle.
- buf: the maximum buffer size of the MCU serial port. For the RF remote control feature, when multiple key values are transmitted, the buffer size depends on whether key values are transmitted using multiple packets.
- RF remote control: the 433 MHz RF remote controls developed with the Tuya standard RF solution.

For the RF remote control feature, when multiple key values are transmitted, the buffer size depends on whether key values are transmitted using multiple packets.

The MCU sends the following command.

Field	Bytes	Description
Header	2	0x55aa
Version	1	0x03

Field	Bytes	Description
Command	1	0x37
Data length	2	0x0001
Data	1	Subcommand: 0x00
	{ “mcu_ota” :xx, “abv” :x, “ir” :xx, “buf” :xx }	
		mcu_ota: specifies whether an MCU has a scratchpad. 0x00: The MCU has a scratchpad.
		0x01: The MCU does not have a scratchpad.
		abv: enables features.
		Bit0: Bluetooth connection notification (applies to Wi-Fi and Bluetooth combo modules). 1: enable. 0: disable.
		Bit1: RF remote control. 1: enable. 0: disable.
		Bit2-bit7: reserved, defaulting to 0.
		ir: sets the GPIO pin used for IR status indicator in the module self-processing mode. The data content follows the definition of the command 0x02. For more information, see IR feature .

Field	Bytes	Description
		`buf`: the MCU serial receive buffer, with a minimum size of 256 bytes. If the buffer size is not specified, the module considers the MCU can receive data of any length.
Checksum	1	Start from the header, add up all the bytes, and then divide the sum by 256 to get the remainder.

For example, if the MCU has a scratchpad, the RF remote control is enabled, and the buffer size is 1024 bytes, the MCU sends the following command. `{"mcu_ota":0,"abv":3,"buf":1024}`

```
55 aa 03 37 00 20 00 7b 22 6d 63 75 5f 6f 74 61 22 3a 30 2c 22 61 62 76 22 3a 33 2c 22
 62 75 66 22 3a 31 30 32 34 7d ab
```

The module returns the following command.

Field	Bytes	Description
Header	2	0x55aa
Version	1	0x00
Command	1	0x37
Data length	2	0x0002
Data	1	Subcommand: 0x00
	1	0x00: success.
		0x01: invalid data.
		0x02: failure.

Field	Bytes	Description
Checksum	1	Start from the header, add up all the bytes, and then divide the sum by 256 to get the remainder.

For example, `55 aa 03 37 00 02 00 00 3b`

Field description:

Field	Required	Description
mcu_ota	No	Specifies whether an MCU has a scratchpad. This field only applies to HomeKit accessories currently.
abv	No	Enables new features. Each bit represents a feature.
		Bit0: Bluetooth connection notification (applies to Wi-Fi and Bluetooth combo modules). `1`: enable. `0`: disable.
		Bit1: RF remote control. `1`: enable. `0`: disable.
		Bit2-bit7: reserved, defaulting to `0`.

Field	Required	Description
ir	No	Sets the GPIO pin used for IR status indicator in the module self-processing mode. The data content follows the definition of the command `0x02`. For example, `5` indicates the GPIO 5 is used for IR status indicator.
buf	No	The MCU serial receive buffer, with a minimum size of 256 bytes.

5.5 Report network status

Network status	Description	Status value
Status 1	Pairing in EZ mode.	0x00
Status 2	Pairing in AP mode.	0x01
Status 3	The Wi-Fi network is set up, but the device is not connected to the router.	0x02
Status 4	The Wi-Fi network is set up, and the device is connected to the router.	0x03
Status 5	The device is connected to the cloud.	0x04
Status 6	The device is in low power mode.	0x05
Status 7	EZ mode and AP mode coexist.	0x06

- Network status
  - Pairing in EZ mode.
  - Pairing in AP mode.
  - The Wi-Fi network is set up, but the device is not connected to the router.
  - The Wi-Fi network is set up, and the device is connected to the router.
  - The device is connected to the cloud.
- The LED activity in the module self-processing mode.
  - Status 1: blinking every 250 ms.
  - Status 2: blinking every 1,500 ms.
  - Status 3 or 6: steady off.
  - Status 4 or 5: steady on.
- When the module detects that the MCU is restarted or reconnected, it will proactively send the current Wi-Fi status to the MCU.
- When the Wi-Fi status changes, the module will proactively send the current status to the MCU.
- If you choose the module self-processing mode, implementing this protocol for your MCU is not necessary.

The module sends the following command.

Field	Bytes	Description
Header	2	0x55aa
Version	1	0x00
Command	1	0x03
Data length	2	0x0001
Data	1	Indicates Wi-Fi status. 0x00: status 1 0x01: status 2 0x02: status 3 0x03: status 4 0x04: status 5 0x05: status 6

Field	Bytes	Description
		0x06: status 7
Checksum	1	Start from the header, add up all the bytes, and then divide the sum by 256 to get the remainder.

For example, `55 aa 00 03 00 01 00 03`

The MCU returns the following command.

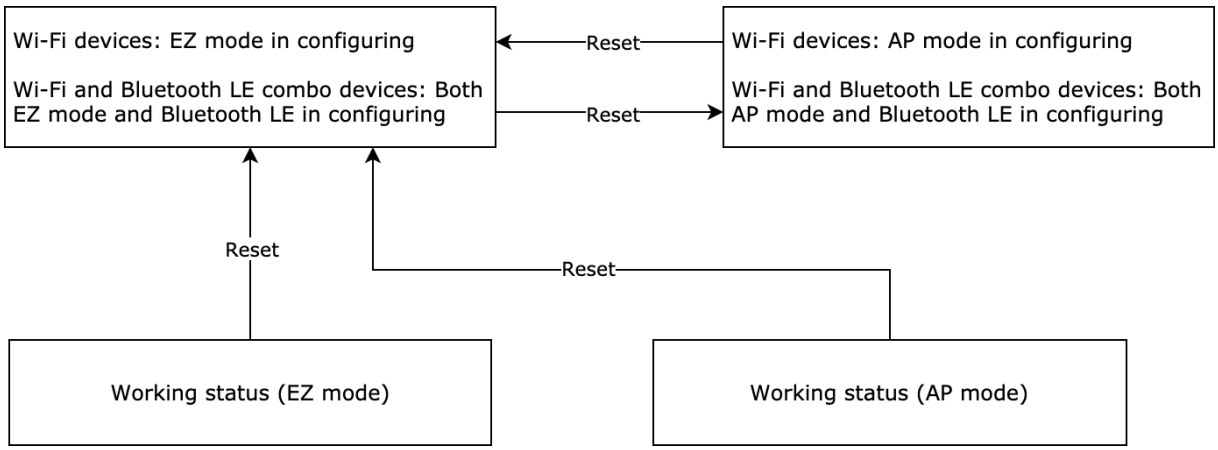
Field	Bytes	Description
Header	2	0x55aa
Version	1	0x03
Command	1	0x03
Data length	2	0x0000
Data	0	None
Checksum	1	Start from the header, add up all the bytes, and then divide the sum by 256 to get the remainder.

For example, `55 aa 03 03 00 00 05`

5.6 Reset Wi-Fi connection

When receiving a reset command, the module will restart, perform an initialization operation, and enter the pairing mode.

- The following figure shows how the working status of the module changes after a reset.



:::important

- The reset command must be sent after the module initialization is completed. Otherwise, the reset might not work. For more information, see Module initialization.
- After the Wi-Fi and Bluetooth LE combo module receives the reset command, both the Wi-Fi and Bluetooth LE networks are reset and ready for connection.
:::
- If you choose the module self-processing mode, implementing this protocol for your MCU is not necessary.

  When the module detects a low level on the GPIO input pin for more than five seconds, it will trigger a reset action.

The MCU sends the following command.

Field	Bytes	Description
Header	2	0x55aa
Version	1	0x03
Command	1	0x04
Data length	2	0x0000
Data	0	None
Checksum	1	Start from the header, add up all the bytes, and then divide the sum by 256 to get the remainder.

For example, `55 aa 03 04 00 00 06`

The module returns the following command.

Field	Bytes	Description
Header	2	0x55aa
Version	1	0x00
Command	1	0x04
Data length	2	0x0000
Data	0	None
Checksum	1	Start from the header, add up all the bytes, and then divide the sum by 256 to get the remainder.

For example, `55 aa 00 04 00 00 03`

5.7 Reset Wi-Fi and select pairing mode

This command is similar to the previous one of resetting the Wi-Fi connection.

- The difference lies in that this command allows the MCU to select a pairing mode after the network is reset.
- You can implement this protocol as needed.
- If you choose the module self-processing mode, implementing this protocol for your MCU is not necessary.

  :::important

  - The reset command must be sent after the module initialization is completed. Otherwise, the reset might not work. For more information, see Module initialization.
  - If the MCU sets the `n` field in Query product information, the pairing mode specified by this command does not work. :::

The MCU sends the following command.

Field	Bytes	Description
Header	2	0x55aa
Version	1	0x03
Command	1	0x05
Data length	2	0x0001
Data	1	
		0x00: Enter EZ mode.
		0x01: Enter AP mode.
Checksum	1	Start from the header, add up all the bytes, and then divide the sum by 256 to get the remainder.

For example, to enter EZ mode, the MCU will send the following command.

```
55 aa 03 05 00 01 00 08
```

The module returns the following command.

Field	Bytes	Description
Header	2	0x55aa
Version	1	0x00
Command	1	0x05
Data length	2	0x0000
Data	0	None
Checksum	1	Start from the header, add up all the bytes, and then divide the sum by 256 to get the remainder.

For example, `55 aa 00 05 00 00 04`

5.8 Send commands

- The command sent by the module can contain Data units of multiple DPs.
- The command sending is processed asynchronously. The module parses the received data and sends it to the MCU. The MCU executes the command accordingly and reports the changed DP status if required.

The module sends the following command.

Field	Bytes	Description
Header	2	0x55aa
Version	1	0x00
Command	1	0x06
Data length	2	Depends on the type and number of data units.
Data	N	Data units
Checksum	1	Start from the header, add up all the bytes, and then divide the sum by 256 to get the remainder.

For example, if DP 3 of a boolean type is used for on/off control, and `1` means to turn on the device, the module will send the following command.

```
55 aa 00 06 00 05 03 01 00 01 01 10
```

5.9 Report status (async)

- This is an asynchronous command. The MCU uses it to report DP status to the module, which can be triggered by three mechanisms.
  - After the MCU executes the command received from the module, it reports the changed DP status to the module.
  - When the MCU proactively detects status changes of DPs, it reports the changed DP status to the module.

  - When the MCU receives the DP status query, it sends the status of all DPs to the module.

- The MCU can report the status of multiple DPs. For more information about the DP status data unit, see Data units.

:::important

- It is recommended to report the status of a DP when it is changed to ensure stable data transmission. Try to avoid frequent status reporting for a short period of time.
- When the device is in the idle or stable state, make sure the frequency of reporting the status of the same DP is appropriate. The recommended minimum interval is one minute. :::

The MCU sends the following command.

Field	Bytes	Description
Header	2	0x55aa
Version	1	0x03
Command	1	0x07
Data length	2	It depends on the types and the number of data units.
Data	N	Data units
Checksum	1	Start from the header, add up all the bytes, and then divide the sum by 256 to get the remainder.

For example, if DP 5 of a value type is used for reporting the current humidity, and the current humidity is 30%, the MCU will send the following data to the module.

```
55 aa 03 07 00 08 05 02 00 04 00 00 00 1e 3a
```

Report data units of multiple DPs:

The DP 109 is of Boolean data type, and its value is `1`.

The DP 102 is of string data type, and its value is `201804121507`. The value is transferred in ASCII mode.

The MCU will send the following data to the module.

```
55 aa 03 07 00 15 6d 01 00 01 01 66 03 00 0c 32 30 31 38 30 34 31 32 31 35 30 37 62
```

5.10 Report status (sync)

- This is a synchronous command. The MCU reports DP status and then waits for the result from the module.
- The module must respond to each status reporting message. The MCU must not send a new reporting task until receiving a response from the module.
- If the data fails to be reported to the cloud due to poor network quality, the module will return a failure code five seconds later. In this case, the MCU should wait for more than five seconds.
- The MCU can report the status of multiple DPs. For more information about the DP status data unit, see Data units.

:::important

- It is recommended to report the status of a DP when it is changed to ensure stable data transmission. Try to avoid frequent status reporting for a short period of time.
- When the device is in the idle or stable state, make sure the frequency of reporting the status of the same DP is appropriate. The recommended minimum interval is one minute. :::

The MCU sends the following data.

Field	Bytes	Description
Header	2	0x55aa
Version	1	0x03
Command	1	0x22
Data length	2	It depends on the types and the number of **data units**.

Field	Bytes	Description
Data	N	Data units
Checksum	1	Start from the header, add up all the bytes, and then divide the sum by 256 to get the remainder.

For example, the status of Boolean DP 1 is `true`, the MCU reports the following data to the module:

```
55 aa 03 22 00 05 02 01 00 01 01 2e
```

The module returns the following data.

Field	Bytes	Description
Header	2	0x55aa
Version	1	0x00
Command	1	0x23
Data length	2	0x0001
Data	Data	
		`0x00`: Failure
		`0x01`: Success
Checksum	1	Start from the header, add up all the bytes, and then divide the sum by 256 to get the remainder.

For example, the module returns `55 aa 00 23 00 01 01 24`.

5.11 Report status (record-type)

- This is a synchronous command. The MCU reports DP status and then waits for the result from the module.

- The module must respond to each status reporting message. The MCU must not send a new reporting task until receiving a response from the module.
- If the data fails to be reported to the cloud due to poor network quality, the module will return a failure code five seconds later. In this case, the MCU should wait for more than five seconds.
- The MCU can report the status of multiple DPs. For more information about the DP status data unit, see Data units.
- For devices with records or metering features, such as door locks and smart plugs with energy monitoring, you can use this command to report the status of the corresponding DPs. If a single record message contains the status of multiple DPs, it should be reported in one packet.
- This type of status reporting only applies to Wi-Fi protocol currently. The Bluetooth protocol support for this type of status reporting will be added in the firmware update in the future.
- Before using this type of status reporting, check if the current firmware supports it.

:::important

- The module does not cache the data that fails to be reported.
- It is recommended to report the status of a DP when it is changed to ensure stable data transmission. Try to avoid frequent status reporting for a short period of time.
- When the device is in the idle or stable state, make sure the frequency of reporting the status of the same DP is appropriate. The recommended minimum interval is one minute. :::

The MCU sends the following data.

Field	Length	Description
Header	2	0x55aa
Version	1	0x03
Command	1	0x34
Data length	2	It depends on the types and the number of **data units**.

Field	Length	Description
Data	1	0x0b (subcommand)
	1	0x01 (default)
	1	The time data carried in the payload:
		0x00: Use the time on the module, which requires that the module have synced clock with the server.
		0x01: Use the local time.
		0x02: Use the GMT.
	6	Date and time format:
		Data[0] indicates the year. 0x00 indicates the year 2000.
		Data[1] indicates the month, ranging from 1 to 12.
		Data[2] indicates the day, ranging from 1 to 31.
		Data[3] indicates the hour, ranging from 0 to 23.
		Data[4] indicates the minute, ranging from 0 to 59.
		Data[5] indicates the second, ranging from 0 to 59.
	N	Data units

Field	Length	Description
Checksum	1	Start from the header, add up all the bytes, and then divide the sum by 256 to get the remainder.

For example, for the Boolean DP of DP ID 1, if its status is `true`, and the GMT is `2022.02.18.16:27:06`, the MCU reports `55 aa 03 34 00 0e 0b 01 02 16 02 12 10 1b 06 01 01 00 01 01 b1` to the module.

For example, for the value DP of DP ID 2, its status is `100`; for the enum DP of DP ID 3, its status is `3`. If the local time is `2022.02.22.11:22:33`, the MCU reports `55 aa 03 34 00 16 0b 01 01 16 02 16 0b 16 21 02 02 04 00 00 00 64 03 04 01 03 40` to the module.

The module returns the following data.

Field	Length	Description
Header	2	0x55aa
Version	1	0x00
Command	1	0x34
Data length	2	0x0002
Data	1	0x0b (subcommand)
	1	The result of status reporting:
		`0x00`: Success
		`0x02`: Failure
		`0x03`: Invalid data
Checksum	1	Start from the header, add up all the bytes, and then divide the sum by 256 to get the remainder.

For example, `55 aa 00 34 00 02 0b 00 40`

5.12 Query DP status

- The module asynchronously queries the status of all object DPs. When the MCU receives queries, it sends the status of DPs to the module. For more information, see Report status.
- The module sends DP status queries when the following two events occur.
  - When powered on for the first time, the module builds communication with the MCU and then sends status queries.
  - When the module detects the MCU is restarted or disconnected and then goes online, the module sends status queries.

The module sends the following command.

Field	Bytes	Description
Header	2	0x55aa
Version	1	0x00
Command	1	0x08
Data length	2	0x0000
Data	0	None
Checksum	1	Start from the header, add up all the bytes, and then divide the sum by 256 to get the remainder.

For example, `55 aa 00 08 00 00 07`

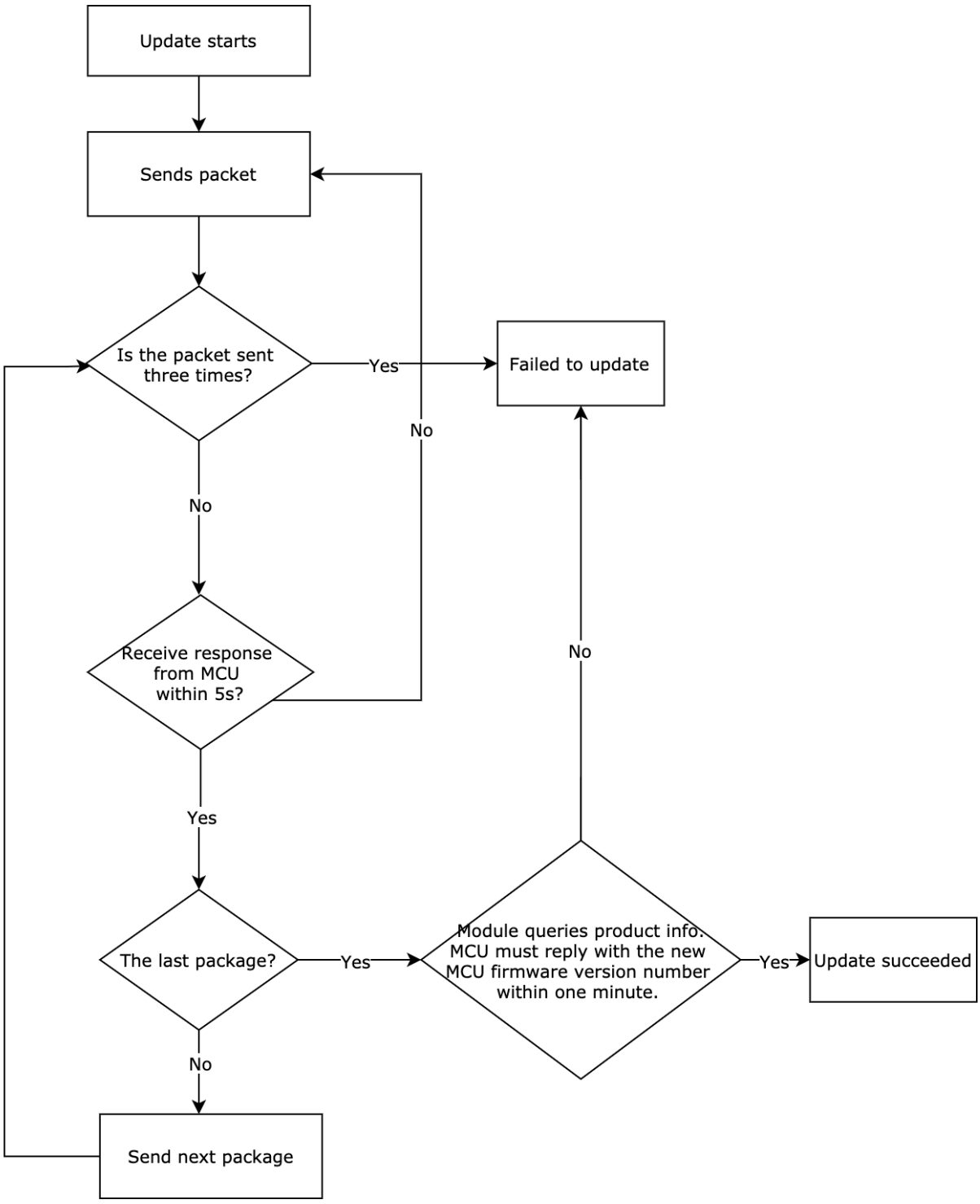
5.13 Update MCU firmware

- You can specify the update method for OTA MCU firmware updates. The module only serves as the channel for OTA data transmission, without any data parsing operation.
- The Tuya IoT Development Platform provides four update methods.
  - Update notification: Users receive a firmware update notification on the

app and choose whether to install updates.

  - Automatic update: Users will not receive any update pop-up window. The module checks for firmware updates within one minute after power-on. If any new version is available, it will automatically pull the updates. The module checks for updates every 24 hours after the first-time power-on.
  - Forced update: Users receive a firmware update notification on the app and have no option but to update the firmware.
  - Check for updates: Users will not receive a firmware update notification on the app but need to manually check for new updates.

- The following flowchart shows how the OTA firmware update works. After the module has sent all update packages, it will send the command `0x01` to query the product information. The MCU must reply with the new MCU firmware version number within one minute. The new version number should be consistent with that configured on the Tuya IoT Development Platform.


Update starts
Sends packet
Is the packet sent three times?
Yes
Failed to update
No
No
Receive response from MCU within 5s?
No
Yes
The last package?
Yes
Module queries product info. MCU must reply with the new MCU firmware version number within one minute.
Yes
Update succeeded
No
Send next package

5.13.1 Start OTA update

The OTA update can be initiated automatically or manually. For automatic updates, when the module detects MCU firmware updates from the cloud, the transmission of the update package automatically starts. For manual updates, the module initiates updates only when updates are confirmed on the app.

The module sends the following command.

Field	Bytes	Description
Header	2	0x55aa
Version	1	0x00
Command	1	0x0a
Data length	2	0x0004
Data	4	The size of the update package. The data type is an unsigned integer, and the data is stored in big-endian format.
Checksum	1	Start from the header, add up all the bytes, and then divide the sum by 256 to get the remainder.

For example, `55 aa 00 0a 00 04 00 00 68 00 75`

It indicates the size of the update package is 26624 bytes, namely 26 KB.

The MCU returns the following command.

Field	Bytes	Description
Header	2	0x55aa
Version	1	0x03
Command	1	0x0a
Data length	2	0x0001

Field	Bytes	Description
Data	1	The update package size of a single packet:
		0x00: 256 bytes by default, compatible with legacy firmware
		0x01: 512 bytes
		0x02: 1024 bytes
Checksum	1	Start from the header, add up all the bytes, and then divide the sum by 256 to get the remainder.

For example, `55 aa 03 0a 00 01 00 0d`

5.13.2 Transmit update package

- The data format of update package transmission: packet offset + packet data.
- If the MCU receives the frame with a data length equal to 4 bytes and the packet offset is equal to or greater than the size of firmware, the transmission ends.

The module sends the following command.

Field	Bytes	Description
Header	2	0x55aa
Version	1	0x00
Command	1	0x0b
Data length	2	0x0004+N
Data	4+N	data[0] to data[3]: fixed to packet offset.

Field	Bytes	Description
		data[4] to data[n]: the packet content.
Checksum	1	Start from the header, add up all the bytes, and then divide the sum by 256 to get the remainder.

Example:

The size of the update file is 530 bytes. The MCU can skip the response to the last packet.

- For the first packet, the packet offset is `0x00000000`, and the packet length is 256 bytes. `55 aa 00 0b 01 04 00000000 xx···xx XX`
- For the second packet, the packet offset is `0x00000100`, and the packet length is 256 bytes. `55 aa 00 0b 01 04 00000100 xx···xx XX`
- For the third packet, the packet offset is `0x00000200`, and the packet length is 18 bytes. `55 aa 00 0b 00 16 00000200 xx···xx XX`
- For the last packet, the packet offset is `0x00000212`, and the packet length is 0 bytes. `55 aa 00 0b 00 04 00000212 xx···xx XX`

The MCU returns the following command.

Field	Bytes	Description
Header	2	0x55aa
Version	1	0x03
Command	1	0x0b
Data length	2	0x0000
Data	0	None
Checksum	1	Start from the header, add up all the bytes, and then divide the sum by 256 to get the remainder.

For example, `55 aa 03 0b 00 00 0d`

5.14 Get system time in GMT

- As the international standard of civil time, GMT is independent of the time zone and DST.
- Before connecting to the network, the module returns success and valid time data after the local timestamp is calibrated.

The MCU sends the following command.

Field	Bytes	Description
Header	2	0x55aa
Version	1	0x03
Command	1	0x0c
Data length	2	0x0000
Data	0	None
Checksum	1	Start from the header, add up all the bytes, and then divide the sum by 256 to get the remainder.

For example, `55 aa 03 0c 00 00 0e`

The module returns the following command.

Field	Bytes	Description
Header	2	0x55aa
Version	1	0x00
Command	1	0x0c
Data length	2	0x0007
Data	7	The data length is 7 bytes.

Field	Bytes	Description
		Data[0]: indicates whether the system time is obtained successfully. 0: failure. 1: success.
		Data[1]: indicates the year. 0x00 represents the year 2000.
		Data[2]: indicates the month, ranging from 1 to 12.
		Data[3]: indicates the day, ranging from 1 to 31.
		Data[4]: indicates the hour, ranging from 0 to 23.
		Data[5]: indicates the minute, ranging from 0 to 59.
		Data[6]: indicates the second, ranging from 0 to 59.
Checksum	1	Start from the header, add up all the bytes, and then divide the sum by 256 to get the remainder.

For example, if the system time is 05:06:07 on April 19, 2016 (GMT), the module will return the following command.

```
55 aa 00 0c 00 07 01 10 04 13 05 06 07 4c
```

5.15 Get local time

- The local time is calculated by adding the time zone offset and DST to the GMT. The time zone is where the device is activated.
- Before connecting to the network, the module returns success and valid time data after the local timestamp is calibrated.

The MCU sends the following command.

Field	Bytes	Description
Header	2	0x55aa
Version	1	0x03
Command	1	0x1c
Data length	2	0x0000
Data	0	None
Checksum	1	Start from the header, add up all the bytes, and then divide the sum by 256 to get the remainder.

For example, `55 aa 03 1c 00 00 1e`

The module returns the following command.

Field	Bytes	Description
Header	2	0x55aa
Version	1	0x00
Command	1	0x1c
Data length	2	0x0008
Data	8	The data length is 8 bytes.

Field	Bytes	Description
		Data[0]: indicates whether the local time is obtained successfully. 0: failure. 1: success.
		Data[1]: indicates the year. 0x00 represents the year 2000.
		Data[2]: indicates the month, ranging from 1 to 12.
		Data[3]: indicates the day, ranging from 1 to 31.
		Data[4]: indicates the hour, ranging from 0 to 23.
		Data[5]: indicates the minute, ranging from 0 to 59.
		Data[6]: indicates the second, ranging from 0 to 59.
		Data[7]: indicates the week, ranging from 1 to 7. 1 indicates Monday.
Checksum	1	Start from the header, add up all the bytes, and then divide the sum by 256 to get the remainder.

- If the device is activated in mainland China, the local time is Beijing time (GMT+08:00). For example, if the local time is 05:06:07 on April 19, 2016 (GMT+08:00), the module will return the following command. `55 aa 00 1c 00 08 01 10 04 13 05 06 07 02 5f`

- If the device is activated in other countries or regions, the local time is the time zone in which the device is located.

5.16 Test Wi-Fi functionality (scanning)

- The module scans the router whose SSID is `tuya_mdev_test` and returns the result and signal strength in percentage.
- To prevent quality defects, it is recommended that the distance between the router and the device under test should be about 5 meters. If the signal strength is greater than or equal to 60%, the device is acceptable. The specific testing conditions depend on your production line and environment.

  :::important The test command must be sent after the module initialization is completed. Otherwise, the command might not work. For more information, see Module initialization. :::

The MCU sends the following command.

Field	Bytes	Description
Header	2	0x55aa
Version	1	0x03
Command	1	0x0e
Data length	2	0x0000
Data	0	None
Checksum	1	Start from the header, add up all the bytes, and then divide the sum by 256 to get the remainder.

For example, `55 aa 03 0e 00 00 10`

The module returns the following command.

Field	Bytes	Description
Header	2	0x55aa
Version	1	0x00
Command	1	0x0e
Data length	2	0x0002
Data	2	The data length is 2 bytes.
		Data[0]: `0x00` indicates failure and `0x01` indicates success.
		If Data[0] is `0x01`, Data[1] indicates the signal strength, ranging from 0 to 100, 0 for the weakest and 100 for the strongest.
		If Data[0] is `0x00`, Data[1] indicates failure reasons. `0x00` indicates the specified SSID is not found. `0x01` indicates the authorization key is not flashed to the module.
Checksum	1	Start from the header, add up all the bytes, and then divide the sum by 256 to get the remainder.

For example, if the module does not find the specified SSID, it returns `55 aa 00 0e 00 02 00 00 0f`.

5.17 Get module's memory

Get the remaining memory of the Wi-Fi module.

The MCU sends the following command.

Field	Bytes	Description
Header	2	0x55aa
Version	1	0x03
Command	1	0x0f
Data length	2	0x0000
Data	Data	None
Checksum	1	Start from the header, add up all the bytes, and then divide the sum by 256 to get the remainder.

For example, `55 aa 03 0f 00 00 11`

The module returns the following command.

Field	Bytes	Description
Header	2	0x55aa
Version	1	0x00
Command	1	0x0f
Data length	2	0x0004
Data	4	The data length is 4 bytes. The value is represented in big-endian format. For example, `0x00 0x00 0x28 0x00` represents 10240 bytes remaining memory.

Field	Bytes	Description
Checksum	1	Start from the header, add up all the bytes, and then divide the sum by 256 to get the remainder.

For example, if the remaining memory size is 53,328 bytes, the module returns `55 aa 00 0f 00 04 50 d0 00 00 32`.

5.18 (Optional) Enable weather services

Enable the module to get the weather data.

The MCU sends the following command.

Field	Bytes	Description
Header	2	0x55aa
Version	1	0x03
Command	1	0x20
Data length	2	N((L+K)+(L+K)...)
Data	n	`L`: consumes 1 byte and indicates the length of `K`.
		`K`: indicates the name of the request parameter.
		Example:
		`L`: 0x06, `K`: `w.temp`.
		`L`: 0x06, `K`: `w.pm25`.
		`L`: 0x0a, `K`: `w.humidity`.
Checksum	1	Start from the header, add up all the bytes, and then divide the sum by 256 to get the remainder.

For more information about the weather data, see Weather Service. For example, if the MCU requests `w.temp` and `w.pm25`, it sends `55 aa 03 20 00 0e 06 77 2e 74 65 6d 70 06 77 2e 70 6d 32 35 80`.

The module returns the following command.

Field	Bytes	Description
Header	2	0x55aa
Version	1	0x00
Command	1	0x20
Data length	2	0x0002
Data	2	Data[0]:
		0x00: failure.
		0x01: success. Data[1]:
		0x00: no error.
		0x01: invalid data format.
		0x02: exception.
Checksum	1	Start from the header, add up all the bytes, and then divide the sum by 256 to get the remainder.

For example, `55 aa 00 20 00 02 01 00 22`

5.19 (Optional) Send weather data

The module will send the weather data immediately as the weather service is enabled and then sends data every 30 minutes.

The module sends the following command.

Field	Bytes	Description
Header	2	0x55aa
Version	1	0x00
Command	1	0x21
Data length	2	N((LKTLV)+(LKTLV)+...)
Data	Data	
		0x00: indicates a failure.
		0x01: indicates an unauthorized parameter service. Check whether you have subscribed to specific weather services.
		0x01: indicates a success.
		L: the length of the parameter name.
		K: the name of the parameter.
		T: 0x00 indicates an integer and 0x01 indicates a string.
		L: the length of the field name.
		V: the value of the field.
Checksum	1	Start from the header, add up all the bytes, and then divide the sum by 256 to get the remainder.

The MCU returns the following command.

Field	Bytes	Description
Header	2	0x55aa
Version	1	0x03
Command	1	0x21
Data length	2	0x0000
Data	0	None
Checksum	1	Start from the header, add up all the bytes, and then divide the sum by 256 to get the remainder.

:::info

- If a request contains two request parameters such as `w.temp` and `w.pm25`, only `w.temp` returns a value, you need to check whether the request parameter name is correct.
- For more information about the weather data, see Weather Service. :::

For example, if the weather data is `w.humidity:69`, `w.temp:32`, and `w.pm25:10`, the module will send the following command. `55 aa 00 21 00 30 01 0a 77 2e 68 75 6d 69 64 69 74 79 00 04 00 00 00 45 06 77 2e 74 65 6d 70 00 04 00 00 00 20 06 77 2e 70 6d 32 35 00 04 00 00 00 10 1e 5c`

5.20 Proactively request weather data

- Besides passively receiving weather data from the module, the MCU can proactively request weather data using this command.
- The minimum request interval is one minute. If the MCU sends multiple requests within one minute, the request is only processed once.
- The module only uses this command to confirm a request and sends weather data still through the command `0x21`.

The MCU sends the following command.

Field	Length	Description
Header	2	0x55aa
Version	1	0x03
Command	1	0x34
Data length	2	0x0001
Data	1	0x03 (subcommand)
Checksum	1	Start from the header, add up all the bytes, and then divide the sum by 256 to get the remainder.

For example, `55 aa 03 34 00 01 03 3a`

The module returns the following command.

Field	Bytes	Description
Header	2	0x55aa
Version	1	0x00
Command	1	0x34
Data length	2	0x0002
Data	1	0x03 (subcommand)
	1	
		0x00: success.
		0x01: failure.
Checksum	1	Start from the header, add up all the bytes, and then divide the sum by 256 to get the remainder.

For example, `55 aa 00 34 00 02 03 00 38`

5.21 (Optional) Get Wi-Fi signal strength

The MCU sends the following command.

Field	Bytes	Description
Header	2	0x55aa
Version	1	0x03
Command	1	0x24
Data length	2	0
Data	N	None
Checksum	1	Start from the header, add up all the bytes, and then divide the sum by 256 to get the remainder.

For example, `55 aa 03 24 00 00 26`

The module returns the following command.

Field	Bytes	Description
Header	2	0x55aa
Version	1	0x00
Command	1	0x24
Data length	2	0x0001
Data	Data	0x00: failure. A value less than 0: indicates signal strength, such as -60 dB.
Checksum	1	Start from the header, add up all the bytes, and then divide the sum by 256 to get the remainder.

For example, if the value of RSSI is -20 dB, the module returns `55 aa 00 24 00 01 ec 10`.

5.22 (Optional) Disable heartbeats

The MCU sends the following command.

Field	Bytes	Description
Header	2	0x55aa
Version	1	0x03
Command	1	0x25
Data length	2	0
Data	N	None
Checksum	1	Start from the header, add up all the bytes, and then divide the sum by 256 to get the remainder.

For example, `55 aa 03 25 00 00 27`

The module returns the following command.

Field	Bytes	Description
Header	2	0x55aa
Version	1	0x00
Command	1	0x25
Data length	2	0
Data	N	None
Checksum	1	Start from the header, add up all the bytes, and then divide the sum by 256 to get the remainder.

For example, `55 aa 00 25 00 00 24`

Before the module goes to sleep for reducing power consumption, the MCU can send this command to notify the module to disable the heartbeat. Because heartbeats are required for building communication between the module and the MCU, this command must not be sent when the device is just powered on.

5.23 (Optional) Pairing via serial port

- If your device pairing solution is implementing by the communication between the mobile app and the module, implementing this command is not necessary.
- This command applies to local pairing. You can get the pairing information from Tuya's app and send them to the module through serial communication to complete pairing.
- To be paired via serial port, the module must be in the state of waiting for pairing.
- The module will use the received information to connect to the router and register in the cloud.

The MCU sends the following command.

Field	Bytes	Description
Header	2	0x55aa
Version	1	0x03
Command	1	0x2A
Data length	2	xx
Data	Data	`{"s":"xxx","p":"yyy","t":"zzz"}` `s`: SSID `p`: password `t`: token, generated by the mobile app.

Field	Bytes	Description
Checksum	1	Start from the header, add up all the bytes, and then divide the sum by 256 to get the remainder.

For example, if the pairing information is `{"s":"xxx","p":"12345678","t":"zzz"}`, the MCU will return the following command. `55 aa 03 2a 00 24 7b 22 73 22 3a 22 78 78 78 22 2C 22 70 22 3a 22 31 32 33 34 35 36 37 38 22 2c 22 74 22 3a 22 7a 7a 7a 22 7d B7`

The module returns the following command.

Field	Bytes	Description
Header	2	0x55aa
Version	1	0x00
Command	1	0x2A
Data length	2	0x0001
Data	x	
		0x00: Data is received.
		0x01: The module is not waiting for pairing.
		0x02: JSON data is invalid.
		0x03: Other errors occur.
Checksum	1	Start from the header, add up all the bytes, and then divide the sum by 256 to get the remainder.

For example, `55 aa 00 2a 00 01 01 2b`

5.24 Get Wi-Fi status

Network status	Description	Status value
Status 1	Pairing in EZ mode.	0x00
Status 2	Pairing in AP mode.	0x01
Status 3	The Wi-Fi network is set up, but the device is not connected to the router.	0x02
Status 4	The Wi-Fi network is set up, and the device is connected to the router.	0x03
Status 5	The device is connected to the cloud.	0x04
Status 6	The device is in low power mode.	0x05
Status 7	EZ mode and AP mode coexist.	0x06

The status definition must be consistent with that in Report network status.

The MCU sends the following command.

Field	Bytes	Description
Header	2	0x55aa
Version	1	0x03
Command	1	0x2B
Data length	2	0x0000
Data	Data	None
Checksum	1	Start from the header, add up all the bytes, and then divide the sum by 256 to get the remainder.

For example, `55 aa 03 2b 00 00 2d`

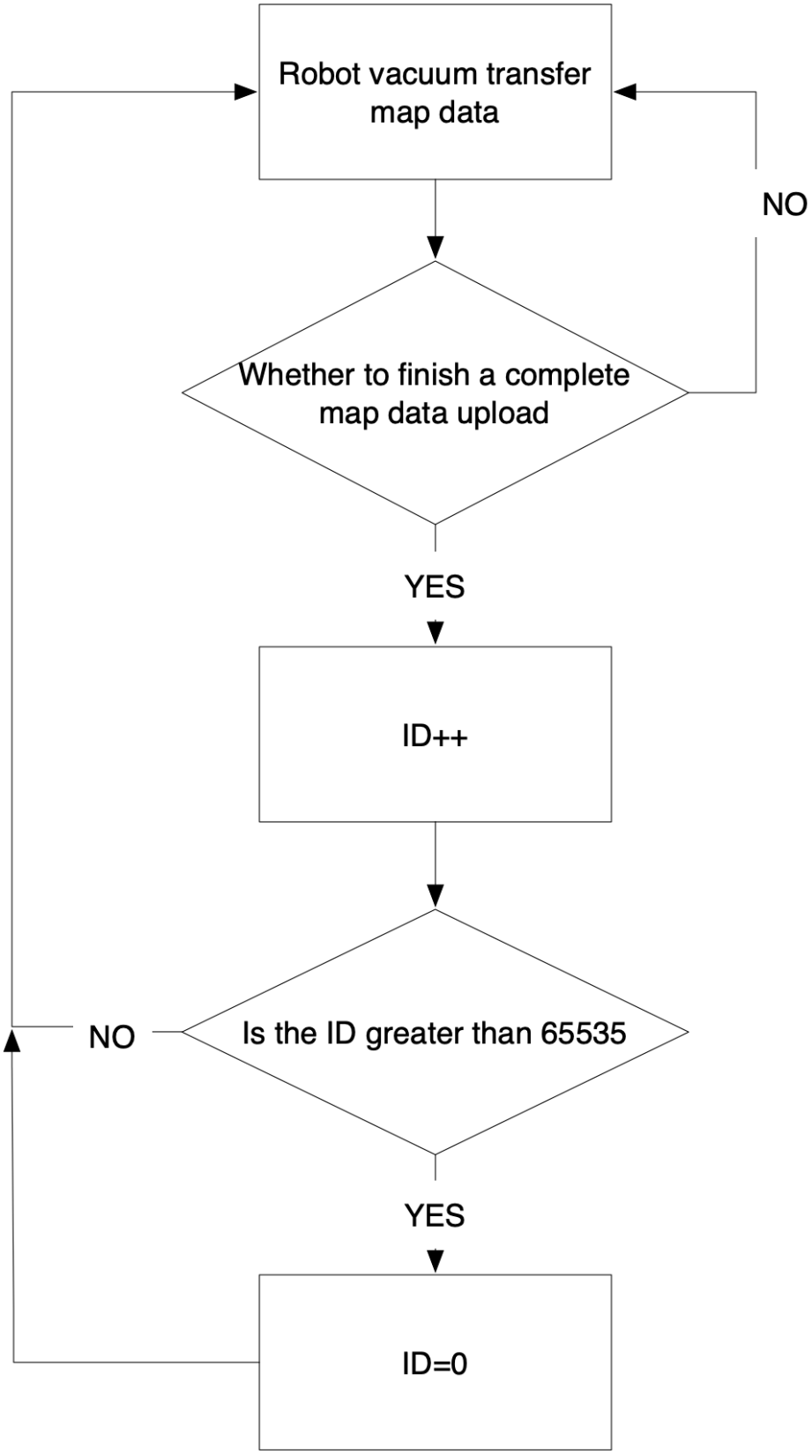
The module returns the following command.

Field	Bytes	Description
Header	2	0x55aa
Version	1	0x00
Command	1	0x2B
Data length	2	0x0001
Data	1	
		0x00: Pairing in EZ mode.
		0x01: Pairing in AP mode.
		0x02: The Wi-Fi network is set up, but the device is not connected to the router.
		0x03: The Wi-Fi network is set up, and the device is connected to the router.
		0x04: The device is connected to the router and the cloud.
		0x05: The device is in low power mode.
		0x06: EZ mode and AP mode coexist.
Checksum	1	Start from the header, add up all the bytes, and then divide the sum by 256 to get the remainder.

For example, if the device is connected to the router and the cloud, the module returns `55 aa 00 2b 00 01 04 2f`.

5.25 (Optional) Map streaming for robot vacuum

- Only specific modules support map streaming services for robot vacuums, which must be purchased to use.
- This service serves as a quick channel for the map data transmission between the mobile app and the robot vacuum.
- The map data is identified by the map ID. Data of the same map ID is processed as one cleaning task by the mobile app.
- The robot vacuum goes around the whole house during cleaning. However, if the wireless signals in some areas are weak, data upload might fail. In this case, with sufficient memory, the module can store 24 pieces of the data cache.


Robot vacuum transfer map data
NO
Whether to finish a complete map data upload
YES
ID++
NO
Is the ID greater than 65535
YES
ID=0

5.25.1 Map data streaming

- For streaming data of a complete map, the map data offset indicates the total length of data that has been sent.
- The maximum serial buffer of the module is 1024 bytes. A packet of map data cannot exceed 1024 bytes. The recommended size of each packet is 512 bytes.
- The map ID indicates a cleaning map. The robot builds a map of the cleaning area each time it starts a new cleaning job that a new map ID will be assigned to. When the map ID is changed, the map data displayed on the mobile app will be replaced with the current map.
- After data transmission starts, the module will stop sending heartbeats to ensure the map data traffic is prioritized. The heartbeat will not be resumed unless the module is restarted after a shutdown.

The MCU sends the following command.

Field	Bytes	Description
Header	2	0x55aa
Version	1	0x03
Command	1	0x28
Data length	2	0x0006+N
Data	2	data[0] to data[1]: the map ID, an identifier of a map created for a cleaning task.
	4	data[2] to data[5]: the map data offset, which is 0 for the first packet.
	N	data[6] to data[N]: the entity data in big-endian format.

Field	Bytes	Description
Checksum	1	Start from the header, add up all the bytes, and then divide the sum by 256 to get the remainder.

For example, if the map ID is `123` and the map data offset is `0`, the MCU will send the following command. `55 aa 03 28 xx xx 00 7b 00 00 00 00 xx xx xx xx xx`

The module returns the following command.

Field	Bytes	Description
Header	2	0x55aa
Version	1	0x00
Command	1	0x28
Data length	2	0x0001
Data	1	
		0x00: Success.
		0x01: Streaming service is not enabled.
		0x02: Failed to connect to the streaming server.
		0x03: Data transmission times out.
		0x04: Data length error.
Checksum	1	Start from the header, add up all the bytes, and then divide the sum by 256 to get the remainder.

For example, `55 aa 00 28 00 01 00 28`

5.26 (Optional) Map data streaming for multiple maps

- Only specific modules support map streaming services for robot vacuums, which must be purchased to use.
- This service serves as a quick channel for the map data transmission between the mobile app and the robot vacuum.
- This command applies to transmitting the map that is made up of several maps.

The MCU sends the following command.

Field	Bytes	Description
Header	2	0x55aa
Version	1	0x03
Command	1	0x30
Data length	2	0x0009+N
Data	1	The map service protocol: 0x00
	2	Map service session ID: an identifier of a map displayed on the mobile app.
	6	BUF[0]: the ID of a sub-map. A map session can be made up of several maps, such as route maps.
		BUF[1]: The processing method for the map data of a sub-map ID. 0x00: The map data is accumulated. 0x01: The map data is cleared.

Field	Bytes	Description
		BUF[2] to BUF[5]: the sub-map data offset, which is 0 for the first packet.
	N	The entity data in big-endian format.
Checksum	1	Start from the header, add up all the bytes, and then divide the sum by 256 to get the remainder.

For example, `55 aa 03 30 00 xx 00 00 00 01 00 00 00 00 xx xx xx xx xx xx`

The module returns the following command.

Field	Bytes	Description
Header	2	0x55aa
Version	1	0x00
Command	1	0x30
Data length	2	0x0001
Data	1	0x00: success.
		0x01: failure.
Checksum	1	Start from the header, add up all the bytes, and then divide the sum by 256 to get the remainder.

For example, `55 aa 03 30 00 01 00 33`

5.27 (Optional) Get the map session ID

- This command is a supplement to the map streaming service for single and multiple maps.
- The module manages the map session ID. Before the MCU transmits a new map, it will request a map session ID from the module and include the allocated session ID in each session data transmission. The sub-map ID is incremented by 1 as a new sub-map is added, such as `0x01`, `0x02`, `0x03`, and more.
- If you do not want the module to manage the session ID, implementing this command is not necessary.

The MCU sends the following command.

Field	Length	Description
Header	2	0x55aa
Version	1	0x03
Command	1	0x34
Data length	2	0x0001
Data	1	0x06 (subcommand)
Checksum	1	Start from the header, add up all the bytes, and then divide the sum by 256 to get the remainder.

For example, `55 aa 03 30 00 01 00 33`

The module returns the following command.

Field	Bytes	Description
Header	2	0x55aa
Version	1	0x00
Command	1	0x34
Data length	2	0x0004

Field	Bytes	Description
Data	1	0x06 (subcommand)
	1	Transmission result:
		0x00: Success.
		0x01: The map streaming service is not enabled.
		0x02: Failed to get the session ID.
	2	The map session ID. If the transmission fails, this data is invalid.
Checksum	1	Start from the header, add up all the bytes, and then divide the sum by 256 to get the remainder.

For example, `55 aa 00 34 00 04 06 00 00 00 3d`

5.28 Test Wi-Fi functionality (connection)

- The MCU sends the SSID and password of a router to the module. The module scans for this designated router.
- The MCU determines whether the module is connected to the designated router based on the received network status. The test is considered failed if the MCU receives a failure or does not receive a result of a successful connection within 15 seconds.
- The MCU can send the test command to enable the module to enter test mode again even after a successful test. However, if the MCU does not receive a result of a successful connection, it indicates the module is in the test progress. In this case, the module must be reset or restarted, and then the MCU sends the test command.
- Make sure that the module has not paired. Otherwise, the test will fail.

- Before the test, make sure that the MCU has responded to the heartbeat and product information query from the module and the initialization is completed.
- The maximum length of the SSID and password is 32 bytes and 64 bytes respectively.

The MCU sends the following command.

Field	Bytes	Description
Header	2	0x55aa
Version	1	0x03
Command	1	0x2C
Data length	2	n
Data	n	`{"ssid":"xxx","password":"xxxxxxxx"}`
		`ssid`: the name of the router.
		`password`: the password of the router.
Checksum	1	Start from the header, add up all the bytes, and then divide the sum by 256 to get the remainder.

For example, if the SSID and password is `{"ssid":"xxx","password":"12345678"}`, the MCU will send the following command. `55 aa 03 2c 00 24 7b 22 73 73 69 64 22 3a 22 78 78 78 22 2c 22 70 61 73 73 77 6f 72 64 22 3a 22 31 32 33 34 35 36 37 38 22 7d 2c`

The module returns the following command.

Field	Bytes	Description
Header	2	0x55aa
Version	1	0x00
Command	1	0x2C

Field	Bytes	Description
Data length	2	0x0001
Data	1	The data length is one byte.
		Data[0]:
		0x00: Failed to receive the router information. Check whether the JSON packet is complete.
		0x01: router information is received. Regarding the connection result, view the network status .
Checksum	1	Start from the header, add up all the bytes, and then divide the sum by 256 to get the remainder.

For example, `55 aa 00 2c 00 01 01 2d`

5.29 Get module' s MAC address

The MCU sends the following command.

Field	Bytes	Description
Header	2	0x55aa
Version	1	0x03
Command	1	0x2d
Data length	2	0x0000
Data	Data	None

Field	Bytes	Description
Checksum	1	Start from the header, add up all the bytes, and then divide the sum by 256 to get the remainder.

For example, `55 aa 03 2d 00 00 2f`

The module returns the following command.

Field	Bytes	Description
Header	2	0x55aa
Version	1	0x00
Command	1	0x2d
Data length	2	0x0007
Data	Data	Data[0]: indicates whether the MAC address is obtained successfully.
		0x00 indicates success and the next 6 bytes denote a valid MAC address.
		0x01 indicates failure and the next 6 bytes denote an invalid MAC address. Data[1] to Data[6]: indicates the valid MAC address of the module on a success.
Checksum	1	Start from the header, add up all the bytes, and then divide the sum by 256 to get the remainder.

For example, if the MAC address is 508A0E3A2D9, the module returns the following command. 55 aa 00 2d 00 07 00 50 8a 06 e3 a2 d9 71

5.30 (Optional) IR status notification

IR status	Description	Status value
Status 1	IR code is being sent.	0x00
Status 2	IR code is sent.	0x01
Status 3	IR learning is in progress.	0x02
Status 4	IR learning is completed.	0x03

- You can configure the IR feature on the Tuya IoT Development Platform or contact your project manager to enable this feature.
- The short retention of IR code availability determines that serial data is sent directly without a resending mechanism.
- You can configure the IR status indication as needed.
- The IR TX and RX pins require two I/Os. If your module processes network events itself, do not use the IR pins for other configurations.

The module sends the following command.

Field	Bytes	Description
Header	2	0x55aa
Version	1	0x00
Command	1	0x2e
Data length	2	0x0001
Data	Data	IR status indication:
		0x00: status 1
		0x01: status 2
		0x02: status 3
		0x03: status 4

Field	Bytes	Description
Checksum	1	Start from the header, add up all the bytes, and then divide the sum by 256 to get the remainder.

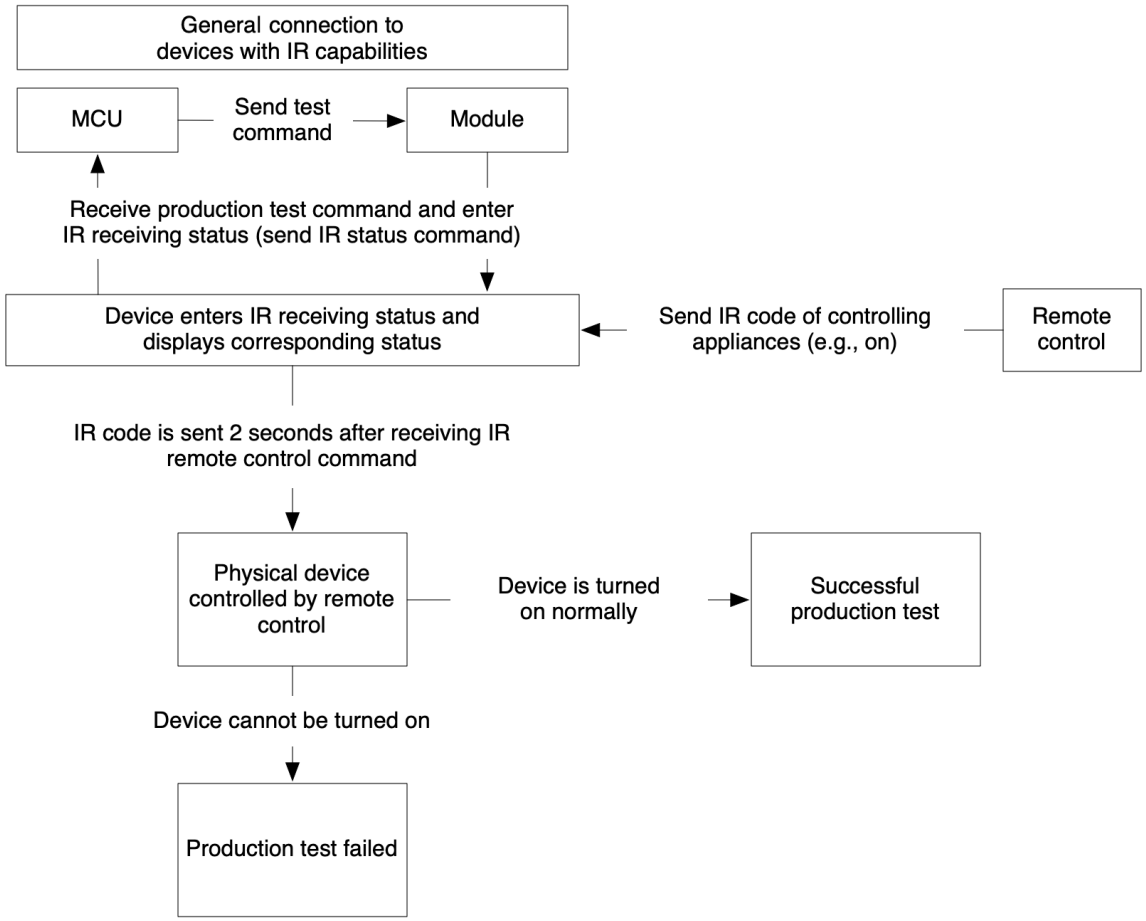
For example, `55 aa 00 2e 00 01 00 2e`

The MCU returns the following command.

Field	Bytes	Description
Header	2	0x55aa
Version	1	0x03
Command	1	0x2e
Data length	2	0x0000
Data	Data	None
Checksum	1	Start from the header, add up all the bytes, and then divide the sum by 256 to get the remainder.

For example, `55 aa 03 2e 00 00 30`

5.31 (Optional) IR functionality test



- Only the unpaired module can enter IR test mode.
- The module enters IR learning status as it enters test mode.
- Once the module enters test mode, it is in IR learning status and keeps transmitting the learned code until the module is paired or powered off.

The MCU sends the following command.

Field	Bytes	Description
Header	2	0x55aa
Version	1	0x03
Command	1	0x2f
Data length	2	0x0000

Field	Bytes	Description
Data	Data	None
Checksum	1	Start from the header, add up all the bytes, and then divide the sum by 256 to get the remainder.

For example, `55 aa 03 2f 00 00 31`

The module returns the following command.

Field	Bytes	Description
Header	2	0x55aa
Version	1	0x00
Command	1	0x2f
Data length	2	0x0001
Data	Data	
		0x00: The module successfully enters test mode.
		0x01: The module failed to enter test mode.
Checksum	1	Start from the header, add up all the bytes, and then divide the sum by 256 to get the remainder.

For example, `55 aa 00 2f 00 01 00 2f`

5.32 (Optional) RF functionality

- To use RF functionality, you need to enable the RF remote control in the `abv` field through the command `0x3700`.
- When you use the RF code, multiple key values might be transmitted in a single operation. According to the maximum data length of the key value, the MCU serial buffer must be larger than 256 bytes. The MCU can use the `buf` field in the command `0x3700` to notify the module of the MCU serial buffer size. When multiple key values are to be transmitted in a single operation, the module can determine whether to transmit data in multiple packets based on the MCU serial buffer. The minimum packet size is a key value. For transmission of multiple key values, data of all key values is sent using one command by default.
- Since the MCU executes RF commands, the module is not intended to process status indication itself.

5.32.1 RF learning control

- The module sends commands to control the RF learning status of the MCU.

The module sends the following command.

Field	Bytes	Description
Header	2	0x55aa
Version	1	0x00
Command	1	0x33
Data length	2	0x0002
Data	1	Subcommand: 0x01 (RF learning command)
	1	RF leaning status:
		0x01: enter the RF learning status.
		0x02: exit the RF learning status.

Field	Bytes	Description
Checksum	1	Start from the header, add up all the bytes, and then divide the sum by 256 to get the remainder.

For example, `55 aa 00 33 00 02 01 01 36`

The MCU returns the following command.

Field	Bytes	Description
Header	2	0x55aa
Version	1	0x03
Command	1	0x33
Data length	2	0x0003
Data	1	Subcommand: 0x01
	1	RF leaning status:
		0x01: enter the RF learning status.
	1	Acknowledgement status:
		0x00: Success.
		0x02: Exit the RF learning status.
		0x01: Failure.
Checksum	1	Start from the header, add up all the bytes, and then divide the sum by 256 to get the remainder.

For example, `55 aa 03 33 00 03 01 01 00 3a`

5.32.2 Send RF data

- A piece of RF data can consist of multiple key values. If a piece of RF data exceeds the serial buffer capacity, key values can be transmitted in multiple packets.
- RF data has a fixed encoding. The transmission time of each bit depends on the transmission rate. If a bit is `1`, data is transmitted. If a bit is `0`, data is not transmitted and the high bit is transmitted first.
- The MCU only needs to parse the `Data` field without the fields of frequency and transmission rate.

The module sends the following command.

Field	Length	Description
Header	2	0x55aa
Version	1	0x00
Command	1	0x33
Data length	2	0x07+n*(T+D+I+L+C)
Data	1	Subcommand: 0x02
	1	Type:
		0x00: send code library
		0x01: send learning code
	1	The number of key values: n
	1	The serial number of the key value offset:
		0xFF: send all key values in one packet.

Field	Length	Description
		0x00 to 0xFE: offset value, which is 0 for the first packet. The number of key values for the last packet is -1.
	1	Frequency:
		0: 315 MHz
		1: 433.92 MHz
	2	Transmission rate: such as 2,777 bps
	N	Data
		T: stands for times. It is **1 byte in length** and indicates the number of transmission times. If the module sends **learning code**, this data is valid and defaults to **0x00**.
		D: stands for delay. It is **2 bytes** in length and indicates the interval between key values. If the module sends **learning code**, this data is valid and defaults to **0x0000**.

Field	Length	Description
		I: stands for intervals. It is **2 bytes** in length and indicates the transmission interval. If the module sends **learning code**, this data is valid and defaults to **0x0000**.
		L: stands for code length. It is **2 bytes** in length and indicates the length of data sent by the RF.
		C: stands for code. It is **N byte(s)** in length and indicates the data sent by the RF.
Checksum	1	Start from the header, add up all the bytes, and then divide the sum by 256 to get the remainder.

For example, `55 aa 00 33 00 xx 02 01 00 ff 00 0a d9 00 00 00 00 00 00 xx xx xx xx xx xx xx xx`

The MCU returns the following command.

Field	Bytes	Description
Header	2	0x55aa
Version	1	0x03
Command	1	0x33
Data length	2	0x0002
Data	1	Subcommand: 0x02

Field	Bytes	Description
	1	Acknowledgement status:
		0x00: Success.
		0x01: Failure.
Checksum	1	Start from the header, add up all the bytes, and then divide the sum by 256 to get the remainder.

For example, `55 aa 00 33 00 02 02 00 36`

5.32.3 Report RF learning

The MCU sends the following command.

Field	Length	Description
Header	2	0x55aa
Version	1	0x03
Command	1	0x33
Data length	2	0x0002+N
Data	1	Subcommand: 0x03
	1	Learning result:
		0: success.
		1: failure.
	N	Data content:
		If learning failed, the MCU will not send this field. If learning succeeded, the MCU can send data in a custom format.

Field	Length	Description
Checksum	1	Start from the header, add up all the bytes, and then divide the sum by 256 to get the remainder.

For example, `55 aa 03 33 xx xx 03 00 xx xx xx xx xx xx`

The module returns the following command.

Field	Bytes	Description
Header	2	0x55aa
Version	1	0x00
Command	1	0x33
Data length	2	0x0002
Data	1	Subcommand: 0x03
	1	Acknowledgement status:
		0x00: Success.
		0x01: Failure.
Checksum	1	Start from the header, add up all the bytes, and then divide the sum by 256 to get the remainder.

For example, `55 aa 00 33 00 02 03 00 37`

5.33 (Optional) File transfer service

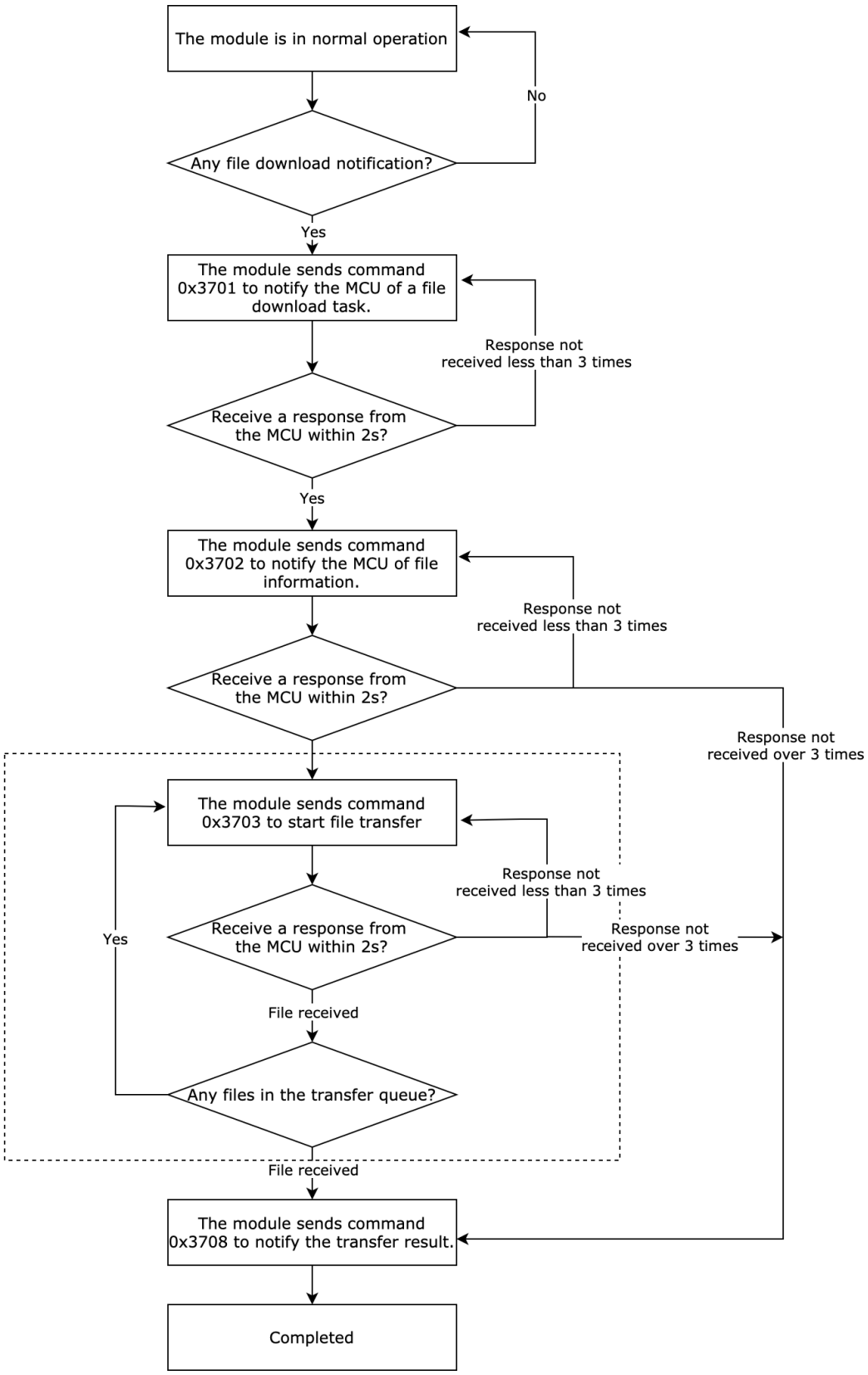
:::important

- File transfer is not executed when MCU OTA updates are in progress. This command supports the transfer of large files and various file formats.

- To enable the file transfer feature, check whether the firmware supports this feature. :::

5.33.1 File download

Block diagram of file download


The module is in normal operation
No
Any file download notification?
Yes
The module sends command 0x3701 to notify the MCU of a file download task.
Response not received less than 3 times
Receive a response from the MCU within 2s?
Yes
The module sends command 0x3702 to notify the MCU of file information.
Response not received less than 3 times
Receive a response from the MCU within 2s?
Response not received over 3 times
The module sends command 0x3703 to start file transfer
Response not received less than 3 times
Yes
Receive a response from the MCU within 2s?
Response not received over 3 times
File received
Any files in the transfer queue?
File received
The module sends command 0x3708 to notify the transfer result.
Completed

- This diagram shows the download progress of a single file. Downloading multiple files work the same way, which repeats the process until all files are downloaded.
- During file transfer, if the module exits the transfer process due to a time out, the whole process stops.
- During file transfer, **heartbeat interaction** and DP data sending stop.

5.33.1.1 File download notification

- The module sends this command to notify the MCU of a file download task. The MCU returns whether to execute the download task based on the current operation.
- This command does not apply to download tasks for robot vacuum voice files.

The module sends the following command.

Field	Bytes	Description
Header	2	0x55aa
Version	1	0x00
Command	1	0x37
Data length	2	0x0002
Data	1	Subcommand: 0x01
	1	0x01: fixed to `0x01`
Checksum	1	Start from the header, add up all the bytes, and then divide the sum by 256 to get the remainder.

For example, `55 aa 00 37 00 02 01 01 3a`

The MCU returns the following command.

Field	Bytes	Description
Header	2	0x55aa
Version	1	0x03
Command	1	0x37
Data length	2	0x0003
Data	1	Subcommand: 0x01
	1	The module returns whether to execute file download.
		0x01: reject
		0x00: accept
	1	If the MCU returns `0x00`, this field indicates the file size in each packet. The available parameters are as follows.
		0x00: 256 bytes
		0x01: 512 bytes
		0x02: 1,024 bytes
		0x03: 2,048 bytes
		0x04: 3,072 bytes
		0x05: 4,096 bytes
		0x06: 5,120 bytes
		0x07: 10,240 bytes If the MCU returns `0x01`, this field indicates the download task is rejected. For more information about reasons, see Appendix 2 .

Field	Bytes	Description
Checksum	1	Start from the header, add up all the bytes, and then divide the sum by 256 to get the remainder.

For example, `55 aa 00 37 00 03 01 00 07 41`

5.33.1.2 File information sync

- The module sends this command to notify the MCU of the information of the download file.
- This command does not apply to download tasks for robot vacuum voice files.

The module sends the following command.

Field	Bytes	Description
Header	2	0x55aa
Version	1	0x00
Command	1	0x37
Data length	2	0x0001+N
Data	1	Subcommand: 0x02
	N	
		`num`: the number of files in the download task.
		`name`: the file name.
		`id`: the serial number of the file.
		`len`: the file length.
		`type`: the file type.
		`file_info`: the custom data of each file.

Field	Bytes	Description
		`ext_info`: the custom data, used to extend data.
		`act`: the specific actions performed in the download task.
Checksum	1	Start from the header, add up all the bytes, and then divide the sum by 256 to get the remainder.

Field description

- **Name**: the file name, which can be customized.
- **Id**: the file ID.
- **Len**: the file length.
- **Type**: the file type, such as TXT and JPG. For more information about file formats, see Appendix 5.
- **File_info**: the custom data of each file. You can use this field to add self-defined data. The module will transfer the raw data of this field to the MCU.
- **Ext_info**: the custom data of the download file. You can use this field to add self-defined information for download operations. The module will transfer the raw data of this field to the MCU.
- **Act**: the action performed in the download task, such as print and audio play. The following table lists the definition.

Name	Print	Text display	Audio play	Video play	Store
Type value	1	2	3	4	5

Note that if you do not specify a value for this field, the module **will not transmit**

this field.

The MCU returns the following command.

Field	Bytes	Description
Header	2	0x55aa
Version	1	0x03
Command	1	0x37
Data length	2	0x0002
Data	1	Subcommand: 0x02
	1	
		0x00: success.
		0x01: failure.
Checksum	1	Start from the header, add up all the bytes, and then divide the sum by 256 to get the remainder.

For example, 55 aa 03 37 00 02 02 00 3d

5.33.1.3 File transfer

- The data format of the file transfer: packet offset (unsigned short) + packet data.
- If the MCU receives a frame with a data length equal to 5 bytes and the packet offset is equal to or greater than the file size, the packet transmission ends.

The module sends the following command.

Field	Bytes	Description
Header	2	0x55aa
Version	1	0x00
Command	1	0x37

Field	Bytes	Description
Data length	2	0x02 + 0x0004 + packet length
Data	1	Subcommand: 0x03
	1	The serial number of the file in transfer. The first file is 1. The second one is 2, and so on.
	4	The packet offset.
	N	The packet content.
Checksum	1	Start from the header, add up all the bytes, and then divide the sum by 256 to get the remainder.

For example, if the serial number of the file is 1 and packet offset is 0, the module will send the following command. `55 aa 00 37 xx xx 03 01 00 00 00 00 00 xx xx xx xx xx`

The MCU returns the following command.

Field	Bytes	Description
Header	2	0x55aa
Version	1	0x03
Command	1	0x37
Data length	2	0x0002
Data	1	Subcommand: 0x03
	1	
		0x00: success. 0x01: failure.

Field	Bytes	Description
Checksum	1	Start from the header, add up all the bytes, and then divide the sum by 256 to get the remainder.

For example, `55 aa 03 37 00 02 03 00 3e`

5.33.1.4 (Optional) Execution results The MCU can use this command to send execution status to the module.

This command is **optional**. You can implement it if your product requires execution feedback. Data of `act` is also optional, depending on your product features.

Data of `id` corresponds to the `id` field (serial number of the file) of the command `0x3702`.

The MCU sends the following command.

Field	Bytes	Description
Header	2	0x55aa
Version	1	0x03
Command	1	0x37
Data length	2	0x01+l+L+2
Data	1	Subcommand: 0x05
	1	The length of `id`.
	L	The ID of a file, corresponding to the data of `id` field of the command `0x3702`.
	1	`act`:
		0x00: Task is executed successfully.

Field	Bytes	Description
		0x01: Task is in progress.
		0x02: Failed to execute the task.
	1	If `act` is `0x00`, set this field to `0x00`.
		If `act` is `0x01`, set this field to the progress in percentage. For example, if the progress is 20%, set the field to the value `20`.
		If `act` is `0x02`, this field indicates the error code. For more information, see Appendix 2 .
Checksum	1	Start from the header, add up all the bytes, and then divide the sum by 256 to get the remainder.

For example, if a printer is printing a file of ID 10 and the task progress is at 20%, the MCU will send the following command.

```
55 aa 03 37 05 05 01 0a 01 14 63
```

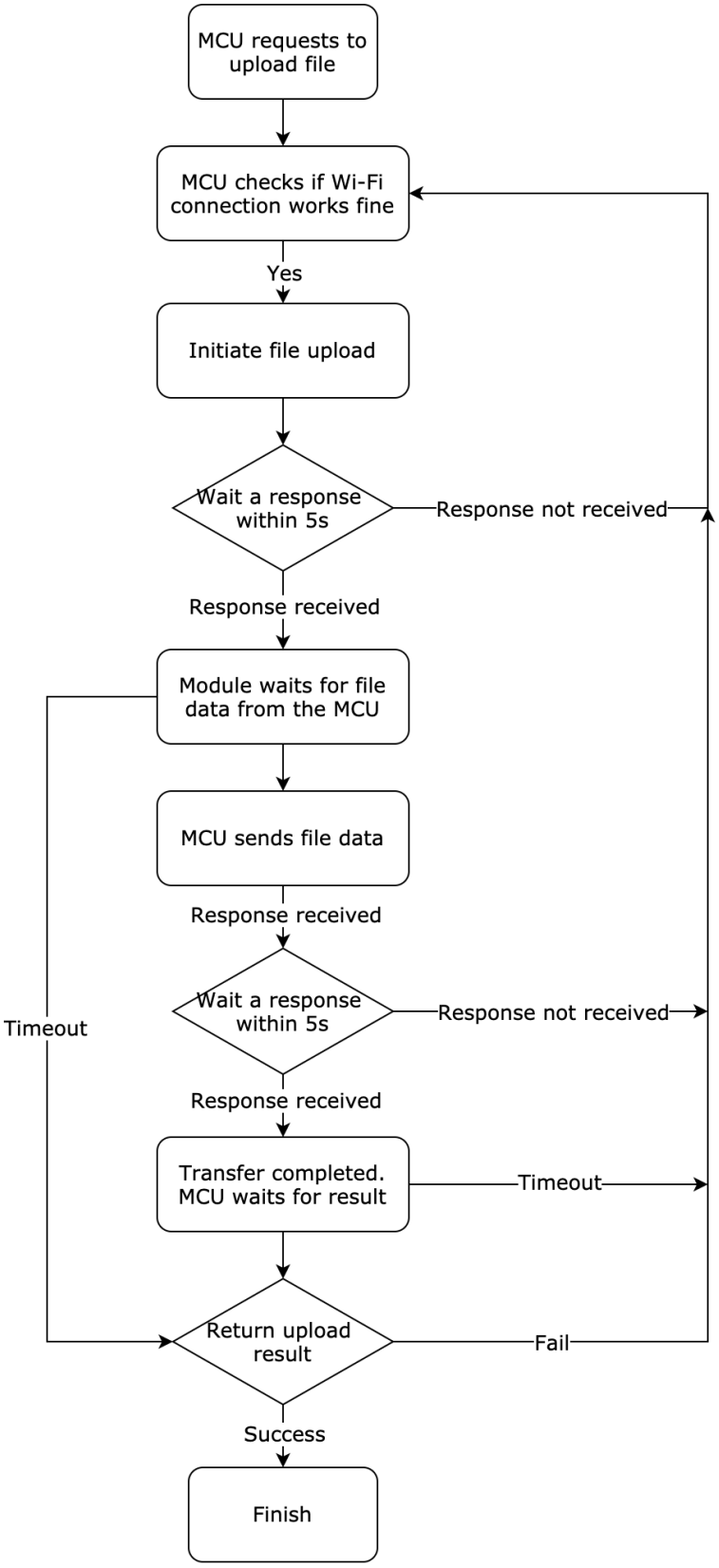
The module returns the following command.

Field	Bytes	Description
Header	2	0x55aa
Version	1	0x00
Command	1	0x37
Data length	2	0x0002
Data	1	Subcommand: 0x05

Field	Bytes	Description
	1	
		0x00: success.
		0x01: invalid data.
		0x02: failed to report data.
Checksum	1	Start from the header, add up all the bytes, and then divide the sum by 256 to get the remainder.

For example, `55 aa 00 37 00 02 05 00 3d`

5.33.2 File upload service



5.33.2.1 Initiate file upload The MCU sends this command to the module to request uploading files.

The MCU sends the following data.

Field	Length (byte)	Description
Header	2	0x55aa
Version	1	0x03
Command	1	0x37
Data length	2	0x0001+N
Data	1	Subcommand: 0x06
	N	{ “num” :n; the number of files in the download task.” files” [] “ext_info” : “xxxx” }
Checksum	1	Start from the header, add up all the bytes, and then divide the sum by 256 to get the remainder.

The module returns the following data.

Field	Length (byte)	Description
Header	2	0x55aa
Version	1	0x00
Command	1	0x37
Data length	2	0x0002
Data	1	Subcommand: 0x06
	1	`Ret`: The result of command execution.
		`0x00`: Success
		`0x01`: Failure

Field	Length (byte)	Description
Checksum	1	Start from the header, add up all the bytes, and then divide the sum by 256 to get the remainder.

5.33.2.2 File upload :::info

- Data format: packet offset (unsigned short) + payload.
- When the module receives a frame with a data length equal to 4 bytes and the packet offset is greater than or equal to the size of the update, the transfer is completed. :::

The MCU sends the following data.

Field	Length (byte)	Description
Header	2	0x55aa
Version	1	0x03
Command	1	0x37
Data length	2	0x00020x0004 + packet length
Data	1	Sub-command: 0x07
	2	The ID of the file being transferred.
	4	File offset.
	N	The packet content.
Checksum	1	Start from the header, add up all the bytes, and then divide the sum by 256 to get the remainder.

The module sends the following data.

Field	Length (byte)	Description
Header	2	0x55aa
Version	1	0x03
Command	1	0x37
Data length	2	0x0003
Data	1	Subcommand: 0x06
	1	
		`Ret`: The result of operation.
		`0x00`: Success
		`0x01`: Failure
		`0x02`: Canceled
	1	
		If `Ret` is `0x00`, `0x00` is returned.
		If `Ret` is `0x01`, a value from `0x01` to `0x0FF` is returned, indicating the failure reason. For more information, see Appendix 3 .
Checksum	1	Start from the header, add up all the bytes, and then divide the sum by 256 to get the remainder.

5.33.3 The MCU proactively get or update file transfer status

- If the MCU proactively interrupts the file transfer, it can use this command to notify the module of the current transfer status.

The MCU sends the following command.

Field	Bytes	Description
Header	2	0x55aa
Version	1	0x03
Command	1	0x37
Data length	2	0x0003
Data	1	Subcommand: 0x04
	1	
		0x00: All transfer tasks are terminated.
		0x01: Current transfer task is terminated. When multiple tasks are in the queue, this command will terminate the current task and start the next task.
		0x02: Get the transfer status.
		.....
	1	
		0x00/0x01: The reason for task termination. For more information, see Appendix 2 .
		Other values: Set this field to 0x00.
Checksum	1	Start from the header, add up all the bytes, and then divide the sum by 256 to get the remainder.

For example, 55 aa 03 37 00 03 04 02 00 42

The module returns the following command.

Field	Bytes	Description
Header	2	0x55aa
Version	1	0x00
Command	1	0x37
Data length	2	0x0003
Data	1	Subcommand: 0x04
	1	
		0x01: Terminate file transfer.
		0x02: Get the current file transfer status.
	1	
		0x01: indicates execution result.
		0x00: success.
		0x01: failure.
		0x02: indicates the file transfer status. For more information, see Appendix 3 .
Checksum	1	Start from the header, add up all the bytes, and then divide the sum by 256 to get the remainder.

For example, `55 aa 00 37 00 03 04 02 00 3f`

5.33.4 File transfer result

The module can use this command to notify the MCU of the result of file download or upload.

The module sends the following command.

Field	Bytes	Description
Header	2	0x55aa
Version	1	0x00
Command	1	0x37
Data length	2	0x0004
Data	1	Subcommand: 0x08
	1	
		0x01: file download.
		0x02: file upload.
	1	Execution result.
		0x00: success.
		0x01: failure.
	1	If the execution result is `0x00`, `0x00` will be returned. If the execution result is `0x01`, a failure reason will be returned. For more information, see Appendix 3 .
Checksum	1	Start from the header, add up all the bytes, and then divide the sum by 256 to get the remainder.

For example, `55 aa 00 37 00 04 08 01 00 00 43`

The MCU returns the following command.

Field	Bytes	Description
Header	2	0x55aa
Version	1	0x03
Command	1	0x37
Data length	2	0x0001
Data	1	Subcommand: 0x08
Checksum	1	Start from the header, add up all the bytes, and then divide the sum by 256 to get the remainder.

For example, `55 aa 03 37 00 01 08 42`

5.34 (Optional) Voice features

The protocols in this section only apply to the voice module VWXR2.

5.34.1 (Optional) Get voice status

The voice module will send the voice status to the MCU. Alternatively, the MCU can proactively query the voice status.

The MCU sends the following command.

Field	Bytes	Description
Header	2	0x55aa
Version	1	0x03
Command	1	0x60
Data length	2	0x0000
Data	0	None

Field	Bytes	Description
Checksum	1	Start from the header, add up all the bytes, and then divide the sum by 256 to get the remainder.

For example, `55 aa 03 60 00 00 62`

The module returns the following command.

Field	Bytes	Description
Header	2	0x55aa
Version	1	0x00
Command	1	0x60
Data length	2	0x0001
Data	1	Voice status code. 0: idle. 1: Mic is muted. 2: woken up. 3: recording voices. 4: recognizing voices. 5: voice is recognized. 6: failed to recognize voices.
Checksum	1	Start from the header, add up all the bytes, and then divide the sum by 256 to get the remainder.

For example, `55 aa 00 60 00 01 00 60`

5.34.2 (Optional) Mute the mic

The MCU can use this command to mute the mic or query the mic status.

The MCU sends the following command.

Field	Bytes	Description
Header	2	0x55aa
Version	1	0x03
Command	1	0x61
Data length	2	0x0001
Data	1	
		0: Turn on the mic.
		1: Mute the mic.
		0xA0: Query the mic status.
Checksum	1	Start from the header, add up all the bytes, and then divide the sum by 256 to get the remainder.

For example, `55 aa 03 61 00 01 00 64`

The module returns the following command.

Field	Bytes	Description
Header	2	0x55aa
Version	1	0x00
Command	1	0x61
Data length	2	0x0001
Data	1	
		0: Mic is on.
		1: Mic is muted.

Field	Bytes	Description
Checksum	1	Start from the header, add up all the bytes, and then divide the sum by 256 to get the remainder.

For example, `55 aa 00 61 00 01 00 61`

5.34.3 (Optional) Adjust the speaker volume

The MCU can use this command to adjust the speaker volume or query the current volume.

The MCU sends the following command.

Field	Bytes	Description
Header	2	0x55aa
Version	1	0x03
Command	1	0x62
Data length	2	0x0001
Data	1	
		Volume: 0 to 10.
		Query volume: 0xA0
Checksum	1	Start from the header, add up all the bytes, and then divide the sum by 256 to get the remainder.

For example, `55 aa 03 62 00 01 03 68`

The module returns the following command.

Field	Bytes	Description
Header	2	0x55aa
Version	1	0x00
Command	1	0x62
Data length	2	0x0001
Data	1	Volume: 0 to 10.
Checksum	1	Start from the header, add up all the bytes, and then divide the sum by 256 to get the remainder.

For example, `55 aa 00 62 00 01 03 65`

5.34.4 (Optional) Test audio functionality

Record voices and while play the recording. Use acoustic equipment to compare the input and output audio signals.

The MCU sends the following command.

Field	Bytes	Description
Header	2	0x55aa
Version	1	0x03
Command	1	0x63
Data length	2	0x0001
Data	1	
		0: Disable audio test.
		1: Perform audio loop test on mic1.
		2: Perform audio loop test on mic2.

Field	Bytes	Description
		0xA0: Query the test status.
Checksum	1	Start from the header, add up all the bytes, and then divide the sum by 256 to get the remainder.

For example, `55 aa 03 63 00 01 02 68`

The module returns the following command.

Field	Bytes	Description
Header	2	0x55aa
Version	1	0x00
Command	1	0x63
Data length	2	0x0001
Data	1	
		0: Disable audio test.
		1: Perform audio loop test on mic1.
		2: Perform audio loop test on mic2.
Checksum	1	Start from the header, add up all the bytes, and then divide the sum by 256 to get the remainder.

For example, `55 aa 00 63 00 01 02 65`

5.34.5 (Optional) Test waking up voice assistant

After the voice module enters test mode, the wake word must be delivered within 10 seconds. If the module is not woken up within 10 seconds, it returns a failure result.

The MCU sends the following command.

Field	Bytes	Description
Header	2	0x55aa
Version	1	0x03
Command	1	0x64
Data length	2	0x0000
Data	0	None
Checksum	1	Start from the header, add up all the bytes, and then divide the sum by 256 to get the remainder.

For example, `55 aa 03 64 00 00 66`

The module returns the following command.

Field	Bytes	Description
Header	2	0x55aa
Version	1	0x00
Command	1	0x64
Data length	2	0x0001
Data	0	
		0: failed to be woken up.
		1: woken up successfully.

Field	Bytes	Description
Checksum	1	Start from the header, add up all the bytes, and then divide the sum by 256 to get the remainder.

For example, `55 aa 00 64 00 01 01 65`

5.34.6 Extended features

You can implement the following extended features for your voice modules.

- Notifications and settings of play/pause, Bluetooth on/off, local alarm, and grouped voice controls.
- Play/pause: applies to songs, jokes, and more.
- Bluetooth on/off: turns on or off Bluetooth of a Bluetooth speaker.
- Local alarm: sync alarms set by the voice control to the mobile app.
- Grouped voice controls: notifications of voice control commands. For example, play next or previous media.

The MCU sends the following command.

Field	Bytes	Description
Header	2	0x55aa
Version	1	0x03
Command	1	0x65
Data length	2	N
Data	1	Subcommand: 0x00
	Data:	
	{	`play`: play/pause.
	“play” :true,	`true`: play. `false`: pause.
	“bt_play” :true	`bt_play`: turn on or off Bluetooth.

Field	Bytes	Description
	, “ctrl_group” : “xxxx” }	true: turn on Bluetooth. false: turn off Bluetooth.
		ctrl_group: grouped control commands.
		next: play the next media. pre: play the previous media.
		You can only implement the play/pause and Bluetooth on/off features on the MCU.
Checksum	1	Start from the header, add up all the bytes, and then divide the sum by 256 to get the remainder.

For example, if the data is `{"play":true,"bt_play":true,"ctrl_group":"next"}`, the MCU will send the following command. `55 aa 03 65 00 31 00 7b 22 70 6c 61 79 22 3a 74 72 75 65 2c 22 62 74 5f 70 6c 61 79 22 3a 74 72 75 65 2c 22 63 74 72 6c 5f 67 72 6f 75 70 22 3a 22 6e 65 78 74 22 7d c7`

The module returns the following command.

Field	Bytes	Description
Header	2	0x55aa
Version	1	0x00
Command	1	0x65
Data length	2	0x0002
Data	1	Subcommand: 0x00
	1	
		0x00: success.

Field	Bytes	Description
		0x01: failure.
Checksum	1	Start from the header, add up all the bytes, and then divide the sum by 256 to get the remainder.

For example, `55 aa 00 65 00 02 00 00 66`

5.34.6.1 Status notification **The module sends the following command.**

Field	Bytes	Description
Header	2	0x55aa
Version	1	0x00
Command	1	0x65
Data length	2	1+N
Data	1	Subcommand: 0x01
	Data: {	
	“play” :true,	`play`: play/pause. `true`: play. `false`: pause.
	“bt_play” :true,” alarm” : “xxxx” , “ctrl_group” : “xxxx” }	`bt_play`: turn on or off Bluetooth. `true`: turn on Bluetooth. `false`: turn off Bluetooth.
		`alarm`: local alarm. `xxx` is a string.
		`ctrl_group`: grouped voice commands. `xxx` is a string.

Field	Bytes	Description
Checksum	1	Start from the header, add up all the bytes, and then divide the sum by 256 to get the remainder.

For example, if the data is {"play":true,"bt_play":true,"ctrl_group":"next","alarm":"xxx"}, the module sends the following command. 55 aa 00 65 00 3f 01 7b 22 70 6c 61 79 22 3a 74 72 75 65 2c 22 62 74 5f 70 6c 61 79 22 3a 74 72 75 65 2c 22 63 74 72 6c 5f 67 72 6f 75 70 22 3a 22 6e 65 78 74 22 2c 22 61 6c 61 72 6d 22 3a 22 78 78 78 22 7d 36

The MCU returns the following command.

Field	Bytes	Description
Header	2	0x55aa
Version	1	0x03
Command	1	0x65
Data length	2	2
Data	1	Subcommand: 0x01
	1	
		0x00: success.
		0x01: failure.
Checksum	1	Start from the header, add up all the bytes, and then divide the sum by 256 to get the remainder.

For example, 55 aa 03 65 00 02 01 00 6a

5.34.6.2 Wake up the module

- The MCU can send this command to wake up the module.

- This command only applies to modules that run on Linux and are interfaced using the general protocols.

The MCU sends the following command.

Field	Bytes	Description
Header	2	0x55aa
Version	1	0x03
Command	1	0x65
Data length	2	0x01
Data	1	Subcommand: 0x02
Checksum	1	Start from the header, add up all the bytes, and then divide the sum by 256 to get the remainder.

For example, `55 aa 03 65 00 01 02 6a`

The module returns the following command.

Field	Bytes	Description
Header	2	0x55aa
Version	1	0x00
Command	1	0x65
Data length	2	0x02
Data	1	Subcommand: 0x02
	1	
		0x00: success.
		0x01: failure.
Checksum	1	Start from the header, add up all the bytes, and then divide the sum by 256 to get the remainder.

For example, 55 aa 00 65 00 02 02 00 68

5.34.6.3 Notification of turning on/off automatic speech recognition (ASR) After this feature is enabled, ASR processed texts will be transmitted through the command 0x6504.

The MCU sends the following command.

Field	Bytes	Description
Header	2	0x55aa
Version	1	0x03
Command	1	0x65
Data length	2	0x02
Data	1	Subcommand: 0x03
	1	
		0x00: turn off ASR.
		0x01: turn on ASR.
Checksum	1	Start from the header, add up all the bytes, and then divide the sum by 256 to get the remainder.

For example, 55 aa 03 65 00 02 03 00 6c

The module returns the following command.

Field	Bytes	Description
Header	2	0x55aa
Version	1	0x00
Command	1	0x65
Data length	2	0x02
Data	1	Subcommand: 0x03
	1	

Field	Bytes	Description
		0x00: success.
		0x01: failure.
Checksum	1	Start from the header, add up all the bytes, and then divide the sum by 256 to get the remainder.

For example, `55 aa 00 65 00 02 03 00 69`

5.34.6.4 Notification of ASR processing **The module sends the following command.**

Field	Bytes	Description
Header	2	0x55aa
Version	1	0x03
Command	1	0x65
Data length	2	0xXX
Data	1	Subcommand: 0x04
	1	
		`text`: content in UTF-8
		`speaker`
		`id`
Checksum	1	Start from the header, add up all the bytes, and then divide the sum by 256 to get the remainder.

For example, if the data is `{"text":"xx","speaker":"human", "id":1171}`, the module will send the following command. `55 aa 03 65 00 2b 04 7b 22 74 65 78 74 22 3a 22 78 78 22 2c 22 73 70 65 61 6b 65 72 22 3a 22 68 75 6d 61 6e 22 2c 20 22 69 64 22 3a 31 31 37`

```
31 7d 69
```

The MCU returns the following command.

Field	Bytes	Description
Header	2	0x55aa
Version	1	0x00
Command	1	0x65
Data length	2	0x01
Data	1	Subcommand: 0x04
Checksum	1	Start from the header, add up all the bytes, and then divide the sum by 256 to get the remainder.

For example, `55 aa 00 65 00 01 04 69`

5.34.6.5 Query the current playing media

- The MCU can use this command to query the current playing media.
- The returned content is represented in UTF-8 format and transmitted in hex.

The MCU sends the following command.

Field	Bytes	Description
Header	2	0x55aa
Version	1	0x03
Command	1	0x65
Data length	2	0x01
Data	1	Subcommand: 0x05
Checksum	1	Start from the header, add up all the bytes, and then divide the sum by 256 to get the remainder.

For example, `55 aa 03 65 00 01 05 6d`

The module returns the following command.

Field	Bytes	Description
Header	2	0x55aa
Version	1	0x00
Command	1	0x65
Data length	2	0x0002+N
Data	1	Subcommand: 0x05
	1	Data[0]:
		0x00: success.
		0x01: failure.
	N	If the result is `0x01`, this part is empty.
		If the result is `0x00`, the data is `artist` and `trackTitle`.
Checksum	1	Start from the header, add up all the bytes, and then divide the sum by 256 to get the remainder.

For example, if the data is `{"artist":"Beethoven", "trackTitle":"Serenade in D major, Op.8"}`, the module sends the following command. `55 aa 00 65 00 34 05 00 7b 22 61 72 74 69 73 74 22 3a 22 e8 96 9b e4 b9 8b e8 b0 a6 22 2c 22 74 72 61 63 6b 54 69 74 6c 65 22 3a 22 e5 8a a8 e7 89 a9 e4 b8 96 e7 95 8c 22 7d dc`

5.34.6.6 Report status to the module

The MCU sends the following command.

Field	Bytes	Description
Header	2	0x55aa

Field	Bytes	Description
Version	1	0x03
Command	1	0x65
Data length	2	0x02
Data	1	Subcommand: 0x06
		0x00: online. 0x01: Bluetooth connected. 0x02: in-call
Checksum	1	Start from the header, add up all the bytes, and then divide the sum by 256 to get the remainder.

For example, `55 aa 03 65 00 02 06 00 6f`

The module returns the following command.

Field	Bytes	Description
Header	2	0x55aa
Version	1	0x00
Command	1	0x65
Data length	2	0x02
Data	1	Subcommand: 0x06
	1	0x00: success. 0x01: failure.

Field	Bytes	Description
Checksum	1	Start from the header, add up all the bytes, and then divide the sum by 256 to get the remainder.

For example, `55 aa 00 65 00 02 06 00 6c`

5.34.6.7 Report recording (auto) The MCU can send this command to trigger voice recording. The module will pick up voices and automatically end the recording. The recording can be up to 10 seconds long in one go.

The MCU sends the following command.

Field	Bytes	Description
Header	2	0x55aa
Version	1	0x03
Command	1	0x65
Data length	2	0x02
Data	1	Sub-command: 0x07
		0x01: start recording.
Checksum	1	Start from the header, add up all the bytes, and then divide the sum by 256 to get the remainder.

For example, `55 aa 03 65 00 02 07 01 71`

The module returns the following command.

Field	Bytes	Description
Header	2	0x55aa

Field	Bytes	Description
Version	1	0x00
Command	1	0x65
Data length	2	0x02
Data	1	Sub-command: 0x07
	1	
		0x00: success.
		0x01: failure.
Checksum	1	Start from the header, add up all the bytes, and then divide the sum by 256 to get the remainder.

For example, `55 aa 00 65 00 02 07 00 6d`

5.34.6.8 Report recording (manual) The MCU can send this command to trigger voice recording but the recording must be ended manually. The recording can be up to 10 seconds long in one go.

The MCU sends the following command.

Field	Bytes	Description
Header	2	0x55aa
Version	1	0x03
Command	1	0x65
Data length	2	0x02
Data	1	Subcommand: 0x08
	1	
		0x00: recording stopped.

Field	Bytes	Description
		0x01: recording started.
Checksum	1	Start from the header, add up all the bytes, and then divide the sum by 256 to get the remainder.

For example, `55 aa 03 65 00 02 08 00 71`

The module returns the following command.

Field	Bytes	Description
Header	2	0x55aa
Version	1	0x00
Command	1	0x65
Data length	2	0x02
Data	1	Subcommand: 0x08
	1	
		0x00: success.
		0x01: failure.
Checksum	1	Start from the header, add up all the bytes, and then divide the sum by 256 to get the remainder.

For example, `55 aa 00 65 00 02 08 00 6e`

5.34.6.9 Turn on/off alarms

After this feature is enabled, alarm data will be transmitted through the command `0x650A`.

The MCU sends the following command.

Field	Bytes	Description
Header	2	0x55aa
Version	1	0x03
Command	1	0x65
Data length	2	0x02
Data	1	Subcommand: 0x09
	1	
		0x00: disabled.
		0x01: enabled.
Checksum	1	Start from the header, add up all the bytes, and then divide the sum by 256 to get the remainder.

For example, `55 aa 03 65 00 02 09 01 73`

The module returns the following command.

Field	Bytes	Description
Header	2	0x55aa
Version	1	0x00
Command	1	0x65
Data length	2	0x02
Data	1	Subcommand: 0x09
	1	
		0x00: success.
		0x01: failure.
Checksum	1	Start from the header, add up all the bytes, and then divide the sum by 256 to get the remainder.

For example, `55 aa 00 65 00 02 09 00 6f`

5.34.6.10 Send alarms **The module sends the following command.**

Field	Bytes	Description
Header	2	0x55aa
Version	1	0x00
Command	1	0x65
Data length	2	0xXX
Data	1	Subcommand: 0x0A
		Data[0]: the number of alarms.
		Data[1]: the operation type. `0`: poll. `1`: add. `2`: delete. `3`: update.
		The following is the repeated content.
		Data[2] to Data[7]: the alarm ID.
		Data[8]: the year.
		Data[9]: the month.
		Data[10]: the day.
		Data[11]: the hour.
		Data[12]: the minute.
		Data[13]: the schedule rule.
		`bit7` to `bit1` represent Sunday through Saturday.
		If a bit is `1`, it means an alarm is scheduled to repeat on that day.

Field	Bytes	Description
		0000000 indicates a one-time alarm. bit0 represents alarm status. 0: enabled. 1: dismissed.
		For example, 0111000 indicates an alarm is repeated every Monday, Tuesday, and Wednesday. Data[14]: alarm ringtone. 0: online ringtone. Other values: local ringtone.
		Data[15] to Data[35]: a ringtone description, used to match a song.
Checksum	1	Start from the header, add up all the bytes, and then divide the sum by 256 to get the remainder.

For example, if a one-time alarm with ID 1 is scheduled to go off at 17:32 on August 23, 2021, the module will send the following command.

```
55 aa 00 65 00 24 0a 01 01 00 00 00 00 00 01 15 08 17 11 20 00 00 00 00 00 00 00 00 00
 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 fa
```

The MCU returns the following command.

Field	Bytes	Description
Header	2	0x55aa
Version	1	0x03
Command	1	0x65
Data length	2	0x01
Data	1	Subcommand: 0x0A

Field	Bytes	Description
Checksum	1	Start from the header, add up all the bytes, and then divide the sum by 256 to get the remainder.

For example, `55 aa 03 65 00 01 0a 72`

5.34.6.11 Query alarm list

The MCU sends the following command.

Field	Bytes	Description
Header	2	0x55aa
Version	1	0x03
Command	1	0x65
Data length	2	0x01
Data	1	Subcommand: 0x0B
Checksum	1	Start from the header, add up all the bytes, and then divide the sum by 256 to get the remainder.

For example, `55 aa 03 65 00 01 0b 73`

The module returns an alarm list through the command `0x650A`.

5.34.6.12 Turn on/off local alarms

The MCU sends the following command.

Field	Bytes	Description
Header	2	0x55aa
Version	1	0x03
Command	1	0x65

Field	Bytes	Description
Data length	2	0x02
Data	1	Subcommand: 0x0C
		0x00: Turn off a local alarm.
		0x01: Turn on a local alarm.
Checksum	1	Start from the header, add up all the bytes, and then divide the sum by 256 to get the remainder.

For example, `55 aa 03 65 00 02 0c 00 75`

The module returns the following command.

Field	Bytes	Description
Header	2	0x55aa
Version	1	0x00
Command	1	0x65
Data length	2	0x02
Data	1	Subcommand: 0x0C
	1	
		0x00: success.
		0x01: failure.
Checksum	1	Start from the header, add up all the bytes, and then divide the sum by 256 to get the remainder.

For example, 55 aa 00 65 00 02 0c 00 72

5.34.6.13 Manage alarms

The MCU sends the following command.

Field	Bytes	Description
Header	2	0x55aa
Version	1	0x03
Command	1	0x65
Data length	2	0xXX
Data	1	Subcommand: 0x0D
		0x01: Set an alarm.
		0x02: Edit an alarm.
		0x03: Delete an alarm.
		0x04: Turn on an alarm.
		0x05: Turn off an alarm.
		Data is in JSON format.
Checksum	1	Start from the header, add up all the bytes, and then divide the sum by 256 to get the remainder.

For example, if the data is {"date":"20210326","time":"17:05","loops":"0000000","timeZone":"+08:00","bell":0}, the MCU will send the following command.

```
55 aa 03 65 00 53 0d 01 7b 22 64 61 74 65 22 3a 22 32 30 32 31 30 33 32 36 22 2c 22 74
 69 6d 65 22 3a 22 31 37 3a 30 35 22 2c 22 6c 6f 6f 70 73 22 3a 22 30 30 30 30 30 30
30 22 2c 22 74 69 6d 65 5a 6f 6e 65 22 3a 22 2b 30 38 3a 30 30 22 2c 22 62 65 6c 6c 22
 3a 30 7d 9e
```

The module returns the following command.

Field	Bytes	Description
Header	2	0x55aa
Version	1	0x00
Command	1	0x65
Data length	2	0x09
Data	1	Subcommand: 0x0D
	1	
		0x01: Set an alarm.
		0x02: Edit an alarm.
		0x03: Delete an alarm.
		0x04: Turn on an alarm.
		0x05: Turn off an alarm.
	1	
		0x00: Operation succeeded.
		0x01: JSON format error occurs.
		0x02: Parameter is missing.
		0x03: Failed to call service.
		0x04: Other errors.
	6	`timerId` of an operation.
Checksum	1	Start from the header, add up all the bytes, and then divide the sum by 256 to get the remainder.

For example, `55 aa 00 65 00 09 0d 01 00 00 00 00 00 00 0a 85`

Manage alarms in JSON format

Set an alarm

Name	Type	Description	Optional
time	String	Set a time for an alarm, such as 08:30.	N
loops	String	Repeat an alarm. Sunday through Saturday, specify the day or days of the week when the alarm should recur. 1 means an alarm recurs on that day every week. For example, 0100001 represents an alarm that should go off on Monday and Saturday every week.	N
date	String	Set a date for an alarm. For a recurring alarm, this field defaults to 00000000. To schedule a one-time alarm, specify a date when an alarm should go off, such as 20181126.	N
timeZone	String	The timezone, such as +08:00.	N

Name	Type	Description	Optional
bell	Integer	The alarm ringtone, represented by a positive integer and defaulting to 1. 0: online ringtone. Other values: local ringtone.	Y
bellDesc	String	The ringtone description, used to match a song.	Y

- One-time alarm: `{ "date": "20181126", "time": "20:30", "loops": "0000000", "timeZone": "+08:00", "bell":1 }`
- Recurring alarm: `{ "date": "00000000", "time": "08:00", "loops": "0111110", "timeZone": "+08:00", "bell":1 }`

Edit an alarm

Name	Type	Description	Optional
time	String	Set a time for an alarm, such as 08:30.	N

Name	Type	Description	Optional
loops	String	Repeat an alarm. Sunday through Saturday, specify the day or days of the week when the alarm should recur. 1 means an alarm recurs on that day every week. For example, 0100001 represents an alarm that should go off on Monday and Saturday every week.	N
date	String	Set a date for an alarm. For a recurring alarm, this field defaults to 00000000. To schedule a one-time alarm, specify a date when an alarm should go off, such as 20181126.	N
timerId	Long	Alarm ID	N
timeZone	String	The timezone, such as +08:00.	N

Name	Type	Description	Optional
bell	Integer	The alarm ringtone, represented by a positive integer and defaulting to 1. 0: online ringtone. Other values: local ringtone.	Y
bellDesc	String	The ringtone description, used to match a song.	Y

- One-time alarm: `{ "timerId": 10164075, "date": "20210322", "time": "14:30", "loops": "0000000", "timeZone": "+08:00", "bell":1 }`
- Recurring alarm: `{ "timerId": 10164075, "date": "20210322", "time": "14:30", "loops": "0111110", "timeZone": "+08:00", "bell":1 }`

Delete an alarm

Request parameters

Name	Type	Description	Optional
timerId	Long	Alarm ID	N

Sample request

{ “timerId” : 1002}

Dismiss an alarm

Request parameters

Name	Type	Description	Optional
timerId	Long	Alarm ID	N

Sample request

{ “timerId” : 1002}

Enable an alarm

Request parameters

Name	Type	Description	Optional
timerId	Long	Alarm ID	N

Sample request

{ “timerId” : 1002}

5.34.6.14 Query the number of reminders

The MCU sends the following command.

Field	Bytes	Description
Header	2	0x55aa
Version	1	0x03
Command	1	0x65
Data length	2	0x01
Data	1	Subcommand: 0x0E
Checksum	1	Start from the header, add up all the bytes, and then divide the sum by 256 to get the remainder.

For example, `55 aa 03 65 00 01 0e 76`

The module returns the following command.

Field	Bytes	Description
Header	2	0x55aa
Version	1	0x00
Command	1	0x65
Data length	2	0x02
Data	1	Subcommand: 0x0E
	1	The number of reminders: 0 to 30.
Checksum	1	Start from the header, add up all the bytes, and then divide the sum by 256 to get the remainder.

For example, `55 aa 00 65 00 02 0e 02 76`

5.34.6.15 Send alarm data The MCU sends the following command.

Field	Bytes	Description
Header	2	0x55aa
Version	1	0x03
Command	1	0x65
Data length	2	0x0001+N
Data	1	Subcommand: 0x0F
	N	`text`: The texts or text commands stored on the device.
		`type`: `tts` indicates the text the speaker reads out.

Field	Bytes	Description
		`music` indicates the custom ringtone to be set.
		`target`: `alert` indicates a reminder. `clock` indicates an alarm.
Checksum	1	Start from the header, add up all the bytes, and then divide the sum by 256 to get the remainder.

For example, if the data is `{"text":"Play Beethoven","type":"music","target":"alert"}`, the MCU will send the following command.

```
55 aa 03 65 00 41 0f 7b 22 74 65 78 74 22 3a 22 e6 92 ad e6 94 be e6 9e 97 e4 bf 8a e6
 9d b0 e7 9a 84 e6 ad 8c 22 2c 22 74 79 70 65 22 3a 22 6d 75 73 69 63 22 2c 22 74 61
73 67 65 74 22 3a 22 61 6c 65 72 74 22 7d 91
```

The module returns the following command.

Field	Bytes	Description
Header	2	0x55aa
Version	1	0x00
Command	1	0x65
Data length	2	0x0002
Data	1	Subcommand: 0x0F
	1	
		0x00: Operation succeeded.
		0x01: JSON format error occurs.
		0x02: Parameter is missing.

Field	Bytes	Description
		0x03: Other errors.
Checksum	1	Start from the header, add up all the bytes, and then divide the sum by 256 to get the remainder.

For example, `55 aa 00 65 00 02 0f 00 75`

5.35 Extended services

5.35.1 Enable time service notification

- This feature enables the module to notify the MCU of whether it has synced time with the server after startup.
- The MCU sends a command to enable the required time service. The module syncs time with the server after startup and then returns the time data the MCU requests.
- If the time service has already been enabled, the module will reject the repeated enablement request unless it is restarted. In this case, the MCU should use the common command of getting time data.
- When you use Get system time in GMT and Get local time, the module will not immediately sync time with the server after it is connected to the server. However, during this period, the MCU still keeps requesting time data. This notification feature allows the MCU to wait for the message from the module without keeping asking.

The MCU sends the following command.

Field	Length	Description
Header	2	0x55aa
Version	1	0x03
Command	1	0x34

Field	Length	Description
Data length	2	0x0002
Data	1	0x01 (sub-command)
	1	
		0x00: GMT.
		0x01: local time.
Checksum	1	Start from the header, add up all the bytes, and then divide the sum by 256 to get the remainder.

For example, `55 aa 03 34 00 02 01 01 3a`

The module returns the following command.

Field	Bytes	Description
Header	2	0x55aa
Version	1	0x00
Command	1	0x34
Data length	2	0x0002
Data	1	0x01 (sub-command)
	1	
		0x00: The service is enabled.
		0x01: Failed to enable the service.
Checksum	1	Start from the header, add up all the bytes, and then divide the sum by 256 to get the remainder.

For example, `55 aa 00 34 00 02 01 00 36`

5.35.2 Time service notification

- The module sends the time data according to the time service the MCU requests.
- After the module is restarted, the time service is disabled. The MCU must send the command to enable the time service notification.

The module sends the following command.

Field	Length	Description
Header	2	0x55aa
Version	1	0x00
Command	1	0x34
Data length	2	0x0009
Data	1	0x02 (sub-command)
	1	
		0x00: GMT.
		0x01: local time.
	7	The data length is 7 bytes.
		Data[0]: indicates the year. `0x00` represents the year 2000.
		Data[1]: indicates the month, ranging from 1 to 12.
		Data[2]: indicates the day, ranging from 1 to 31.
		Data[3]: indicates the hour, ranging from 0 to 23.

Field	Length	Description
		Data[4]: indicates the minute, ranging from 0 to 59.
		Data[5]: indicates the second, ranging from 0 to 59.
		Data[6]: indicates the week, ranging from 1 to 7. 1 indicates Monday.
Checksum	1	Start from the header, add up all the bytes, and then divide the sum by 256 to get the remainder.

For example, if the local time is Monday at 18:35:28 on August 23, 2021, the module sends the following command. `55 aa 00 34 00 09 02 01 15 08 17 12 23 1c 01 c5`

The MCU returns the following command.

Field	Bytes	Description
Header	2	0x55aa
Version	1	0x03
Command	1	0x34
Data length	2	0x0001
Data	1	0x02 (sub-command)
Checksum	1	Start from the header, add up all the bytes, and then divide the sum by 256 to get the remainder.

For example, `55 aa 03 34 00 01 02 39`

5.35.3 (Optional) Enable reset status notification

A device can be reset with operations on the hardware or the mobile app. However, the MCU will not be notified of related status. This feature will enable the module to proactively send its status to the MCU.

The MCU sends the following command.

Field	Length	Description
Header	2	0x55aa
Version	1	0x03
Command	1	0x34
Data length	2	0x0001
Data	1	0x04 (sub-command)
Checksum	1	Start from the header, add up all the bytes, and then divide the sum by 256 to get the remainder.

For example, `55 aa 03 34 00 01 04 3b`

The module returns the following command.

Field	Bytes	Description
Header	2	0x55aa
Version	1	0x00
Command	1	0x34
Data length	2	0x0002
Data	1	0x04 (sub-command)
	1	
		0x00: success.
		0x01: failure.

Field	Bytes	Description
Checksum	1	Start from the header, add up all the bytes, and then divide the sum by 256 to get the remainder.

For example, `55 aa 00 34 00 02 04 00 39`

5.35.4 (Optional) The reset status

Reset status	Description	Status value
Status 1	Reset by hardware operation	0x00
Status 2	Reset performed on the mobile app	0x01
Status 3	Factory reset performed on the mobile app	0x02

The module will resend the packet two times at a one second interval if it receives no response.

The module sends the following command.

Field	Bytes	Description
Header	2	0x55aa
Version	1	0x00
Command	1	0x34
Data length	2	0x0002
Data	1	0x05 (sub-command)
	1	

Field	Bytes	Description
		0x00: reset by hardware operation.
		0x01: reset performed on the mobile app.
		0x02: factory reset performed on the mobile app.
Checksum	1	Start from the header, add up all the bytes, and then divide the sum by 256 to get the remainder.

For example, `55 aa 00 34 00 02 05 00 3a`

The MCU returns the following command.

Field	Bytes	Description
Header	2	0x55aa
Version	1	0x03
Command	1	0x34
Data length	2	0x0001
Data	1	0x05 (sub-command)
Checksum	1	Start from the header, add up all the bytes, and then divide the sum by 256 to get the remainder.

For example, `55 aa 03 34 00 01 05 3c`

5.35.5 Get information about Wi-Fi module

- The running data of the Wi-Fi module is required for some products. This field is used to get the required information.
- The MCU can send a specified code to the module to get the required information. If the MCU requires multiple types of information, the codes must be sent in order.
- If the MCU requires all the information available, it can use the code `0xff`.
- This command only supports getting the SSID of an AP.
- If the SSID of an AP is the default `smartlife`, this command only returns `smartlife`. The actual SSID is `smartlife_xxxx`. `xxxx` represents the last four digits of the MAC address.

  :::important

  - The data format of this field is in JSON string and the data length varies depending on the information type.
  - The length of data that the MCU sends to the module must be at least 2 bytes, namely the sub-command plus a 1-byte data code. If the data length is incorrect, the module will return a failure.
  - The data codes have a one-to-one relationship with the information types. Make sure you use the correct data code and do not use the reserved code.
    :::

Name	Encoding
All the information available	0xff
SSID of an AP	0x01
Country code	0x02
Serial number (SN) of the module	0x03
Frustration-Free Setup (FFS) authorization history	0x04
.....	.....

- For more information about the returned fields, see Appendix 4.

  :::warn

- The common Wi-Fi modules do not support getting their SNs.
- If a module does not have FFS authorization history, the `ffs` field will return `0`.
- If a module has FFS authorization history, the `ffs` field will return `1`, coupled with the SN value to assist in verification. :::

The MCU sends the following command.

Field	Length	Description
Header	2	0x55aa
Version	1	0x03
Command	1	0x34
Data length	2	0x01+0x01+...N
Data	1	Sub-command: 0x07
	Data(1)	
		0x01: the SSID of an AP.
		0x02: the country code.
		0x03: the SN of the module.
		0xFF: all the information available. This code is valid only when it is set as the first byte and enjoys the highest priority. When the module receives this code, it will return all the information available.
	Data(2)	
		0x01: the SSID of an AP.

Field	Length	Description
		0x02: the country code.
		0x03: the SN of the module.
	Data(N)	
		0x01: the SSID of an AP.
		0x02: the country code. 0x03: the SN of the module.
Checksum	1	Start from the header, add up all the bytes, and then divide the sum by 256 to get the remainder.

For example, `55 aa 03 34 00 02 07 01 40`

The module returns the following command.

Field	Bytes	Description
Header	2	0x55aa
Version	1	0x00
Command	1	0x34
Data length	2	0x02+N
Data	1	0x07 (sub-command)
	1	
		0x00: success.
		0x01: failure. No subsequent data will be returned.
	Data (N)	

Field	Bytes	Description
		ap
		cc
		sn
		ffs
Checksum	1	Start from the header, add up all the bytes, and then divide the sum by 256 to get the remainder.

For example, if the data is {"ap":"PlusStyle"}, the module returns the following command. 55 aa 00 34 00 14 07 00 7b 22 61 70 22 3a 22 50 6c 75 73 53 74 79 6c 65 22 7d 8e

5.36 (Optional) Bluetooth features

5.36.1 Bluetooth functional test

- The module scans for the designated Bluetooth beacon ty_mdev and returns the result and signal strength in percentage.
- To prevent quality defects, it is recommended that the distance between the router and the device under test should be about 5 meters. If the signal strength is greater than or equal to 60%, the device is acceptable. The specific testing conditions depend on your production line and environment.

The MCU sends the following command.

Field	Length	Description
Header	2	0x55aa
Version	1	0x03
Command	1	0x35
Data length	2	0x0001

Field	Length	Description
Data	1	0x01 (sub-command)
Checksum	1	Start from the header, add up all the bytes, and then divide the sum by 256 to get the remainder.

For example, `55 aa 03 35 00 01 01 39`

The module returns the following command.

Field	Bytes	Description
Header	2	0x55aa
Version	1	0x00
Command	1	0x35
Data length	2	0x0003
Data	1	0x01 (sub-command)
	2	The data length is 2 bytes.
		Data[0]: `0x00` indicates failure, and `0x01` indicates success.
		When Data[0] is `0x01`, Data[1] indicates the signal strength, ranging from 0 to 100, 0 for the weakest and 100 for the strongest.

Field	Bytes	Description
		When Data[0] is 0x00, if Data[1] is 0x00, it indicates the module does not find the designated Bluetooth beacon. If Data[1] is 0x01, it indicates the module is not flashed with the license.
Checksum	1	Start from the header, add up all the bytes, and then divide the sum by 256 to get the remainder.

For example, 55 aa 00 35 00 03 01 01 14 4d

5.36.2 Report Bluetooth connection status

Bluetooth connection status	Description	Status value
Status 1	Unbound and not connected	0x00
Status 2	Unbound and connected	0x01
Status 3	Bound and not connected	0x02
Status 4	Bound and connected	0x03
Status 5	Unknown status	0x04

- The module enters status 1 and status 2 when pairing over Bluetooth.
- The LED activity in the module self-processing mode.
  - Status 1: Blink quickly.
  - Status 2 or Status 3: Steady off.

- Status 4: Steady on.
- Status 5: Blink slowly.

When the module detects that the MCU is restarted or reconnected, it will proactively send the current Bluetooth connection status to the MCU.

- When the Bluetooth connection status changes, the module will proactively send the current status to the MCU.
- If you choose the **module self-processing mode**, implementing this protocol for your MCU is not necessary.

To enable reporting Bluetooth connection status, the MCU should enable **Bit 0** in `abv` field when it sends `0x3700` command to the module after power on.

The Bluetooth connection when power on defaults to unknown status.

The module sends the following data.

Field	Length (byte)	Description
Header	2	0x55aa
Version	1	0x00
Command	1	0x35
Data length	2	0x0002
Data	Subcommand	0x04
	1	Indicate the work status of Bluetooth.
		`0x00`: Status 1
		`0x01`: Status 2
		`0x02`: Status 3
		`0x03`: Status 4
		`0x04`: Status 5
		`0x05`: Status 6
Checksum	1	Start from the header, add up all the bytes, and then divide the sum by 256 to get the remainder.

Example: 55 aa 00 35 00 02 04 03 3d

The MCU returns the following data.

Field	Length (byte)	Description
Header	2	0x55aa
Version	1	0x03
Command	1	0x35
Data length	2	0x0001
Data	Subcommand	0x04
Checksum	1	Start from the header, add up all the bytes, and then divide the sum by 256 to get the remainder.

Example: 55 aa 00 35 00 01 04 39

5.36.3 Request Bluetooth connection status

Bluetooth connection status	Description	Status value
Status 1	Unbound and not connected	0x00
Status 2	Unbound and connected	0x01
Status 3	Bound and not connected	0x02
Status 4	Bound and connected	0x03
Status 5	Unknown status	0x04

The status definition must be consistent with that defined in **Report Bluetooth connection status**.

The MCU sends the following data.

Field	Length (byte)	Description
Header	2	0x55aa
Version	1	0x03
Command	1	0x35
Data length	2	0x0001
Data	Data	05
Checksum	1	Start from the header, add up all the bytes, and then divide the sum by 256 to get the remainder.

Example: `55 aa 03 35 00 01 05 3D`

The module returns the following data.

Field	Length (byte)	Description
Header	2	0x55aa
Version	1	0x00
Command	1	0x35
Data length	2	0x0002
Data	Subcommand	0x05
	Data	Indicate the work status of Bluetooth.
		`0x00`: Status 1
		`0x01`: Status 2
		`0x02`: Status 3
		`0x03`: Status 4
		`0x04`: Status 5
		`0x05`: Status 6

Field	Length (byte)	Description
Checksum	1	Start from the header, add up all the bytes, and then divide the sum by 256 to get the remainder.

Example: `55 aa 03 35 00 02 05 00 3E`

5.36.4 Data notification for Bluetooth/Beacon remote control

:::info

- Bluetooth remote control service must be enabled to use this feature.
- The module enters pairing mode after the `0x02` command interaction. The pairing mode is only active for 30 seconds.
- Up to five devices can be paired with the Bluetooth remote control. Otherwise, pairing will fail. :::

The module sends the following data.

Field	Length (byte)	Description
Header	2	0x55aa
Version	1	0x00
Command	1	0x35
Data length	2	0x0007
Data	1	Subcommand: 0x06
	N	
		Data[0]: The category ID (1 byte).
		Data[1]: The control command (1 byte).
		Data[2] to Data[5]: The command data (4 bytes)

Field	Length (byte)	Description
Checksum	1	Start from the header, add up all the bytes, and then divide the sum by 256 to get the remainder.

Example: 55 aa 03 35 00 02 05 00 3E

The MCU returns the following data.

Field	Length	Description
Header	2	0x55aa
Version	1	0x03
Command	1	0x35
Data length	2	0x0001
Data	1	0x06 (subcommand)
Checksum	1	Start from the header, add up all the bytes, and then divide the sum by 256 to get the remainder.

Example: 55 aa 03 35 00 02 05 00 3E

Control commands

Command (1 byte)

Generic command (1 byte)

Command data (4 bytes) Padded with 0 if needed

Category ID

Generic: 0xFF Individual category Lighting product: 0x01 Socket/power strip: 0x02 Curtain switch: 0x03 Drying rack: 0x04 Fan: 0x05 Bathroom heater: 0x06 Air conditioner: 0x07 Garage door opener: 0x08 Water valve: 0x09 Disinfector: 0x0A Thermostat plug: 0x0B Dimmer switch: 0x0C Scene socket: 0x0D Switch: 0x0E Smart curtain switch module: 0x0F

Send key values: 0x01

Byte 1: Button behavior (0 –Single press. 1 –Double press. 2 –Long press. 3 –Press and hold. 4 –Press and release) Byte 2: The key value.

Switch: 0x04

Byte 1: 0 –Turn off. 1 –Turn on. 2 –Pause. Byte 2: The number of gangs. 0 represents the main control.

Add favorites: 0x05

Byte 1: 1 –Favorite a state. 2 –Go to a specified favorite. Byte 2: The ID of a favorite, ranging from 0 to 3.

Countdown timer: 0x06

Bytes 1 to 2: The countdown time, in seconds and big-endian format. 0 indicates canceling the countdown timer. Byte 3: The action to run when the countdown timer is done. (Reserved byte)

One-click group query: 0x07

The sub-device advertises the information about the added group.

Light on/off: 0x08

Byte 1: 0 –Turn off. 1 –Turn on. Byte 2: 0 –The main switch. 1 –White light switch. 2 –Colored light switch.

Brightness adjustment: 0x09

Byte 1: 0 –Brightness value. 1 –Brightness up. 2 –Brightness down. Byte 2: 0 –Brightness of the current mode. 1 –Brightness of white light. Byte 3: When Byte 1 is 0, this byte indicates brightness percentage (1 to 100%). When Byte 1 is 1 or 2, this byte indicates the step value of brightness (1 to 100%).

Stepless brightness adjustment: 0x0A

Byte 1: 0 –Start incrementing. 1 –Start decrementing. 2 –Stop adjustment. Byte 2: 0 –Brightness of the current mode. 1 –Brightness of white light. Byte 3: Rate (adjustment percentage per second) Byte 4: The target value.

Color temperature adjustment: 0x0B

Byte 1: 0 –Color temperature value. 1 –Color temperature up. 2 –Color temperature down. Byte 2: When Byte 1 is 0, this byte indicates color temperature percentage (1 to 100%). When Byte 1 is 1 or 2, this byte indicates the step value of color temperature (1 to 100%).

Stepless color temperature adjustment: 0x0C

Byte 1: 0 –Start incrementing. 1 –Start decrementing. 2 –Stop adjustment. Byte 2: Rate (adjustment percentage per second) Byte 3: The target value.

Color adjustment: 0x0D

Byte 1: 0 –Relative transition. 1 –The specified color. 2 –Start cycling adjustment. 3 –Stop cycling adjustment. Byte 2: The ID of the specified color when Byte 1 is 1.

Hue adjustment: 0x0E

Byte 1: 0 –Hue value. 1 –Hue up. 2 –Hue down. Byte 2: When Byte 1 is 0, this byte indicates hue percentage (1 to 100%). When Byte 1 is 1 or 2, this byte indicates the step value of hue (1 to 100%).

Stepless hue adjustment：0x0F

Byte 1: 0 –Start incrementing. 1 –Start decrementing. 2 –Stop adjustment. Byte 2: Rate (adjustment percentage per second) Byte 3: The target value.

Saturation adjustment: 0x10

Byte 1: 0 –Saturation value. 1 –Saturation up. 2 –Saturation down. Byte 2: When Byte 1 is 0, this byte indicates saturation percentage (1 to 100%). When Byte 1 is 1 or 2, this byte indicates the step value of saturation (1 to 100%).

Stepless saturation adjustment: 0x11

Byte 1: 0 –Start incrementing. 1 –Start decrementing. 2 –Stop adjustment. Byte 2: Rate (adjustment percentage per second) Byte 3: The target value.

Value adjustment: 0x12

Byte 1: 0 –Value. 1 –Value up. 2 –Value down. Byte 2: When Byte 1 is 0, this byte indicates value percentage (1 to 100%). When Byte 1 is 1 or 2, this byte indicates the step value of value (1 to 100%).

Stepless value adjustment: 0x13

Byte 1: 0 –Start incrementing. 1 –Start decrementing. 2 –Stop adjustment. Byte 2: Rate (adjustment percentage per second) Byte 3: The target value.

HSV (hue, saturation, value) adjustment: 0x14

Byte 1: Hue percentage (0 to 100%) Byte 2: Saturation (0 to 100%) Byte 3: Value percentage (0 to 100%)

Scene adjustment: 0x15

Byte 1: 0 –Relative transition. 1 –The specified scene. 2 –Start cycling adjustment. 3 –Stop cycling adjustment. Byte 2: The ID of the specified scene when Byte 1 is 1.

Lighting mode selection: 0x16

Byte 1: 1 –Night light mode.

Motor rotation adjustment: 0x20

Byte 1: 0 –Clockwise rotation. 1 –Counterclockwise rotation. 2 –Pause. Byte 2: Travel percentage (0 to 100%). 0 –Continuous rotation. Byte 3: The number of channels. 0 represents the total channel.

Motor travel setting : 0x21

Byte 1: 0 –The start position. 1 –The fine-tuning position. 2 –The end position. Byte 2: 0 –The up limit. 1 –The down limit. 2 –The intermediate limit. Byte 3: The number of channels. 0 represents the total channel.

Movement speed adjustment: 0x22

Byte 1: 0 –Speed. 1 –Step increment. 2 –Step decrement. Byte 2: The specified speed or step value of speed. Byte 3: The number of channels. 0 represents the total channel.

Stepless movement speed adjustment: 0x23

Byte 1: 0 –Start incrementing. 1 –Start decrementing. 2 –Stop adjustment. Byte 2: Rate (adjustment percentage per second) Byte 3: The target value. Byte 4: The number of channels. 0 represents the total channel.

Temperature adjustment: 0x24

Byte 1: 0 –The temperature value. 1 –Temperature up. 2 –Temperature down. Bytes 2 to 3: When Byte 1 is 0, this byte indicates the specified temperature. When Byte 1 is 1 or 2, this byte indicates the step value of temperature. The 2-byte temperature value is stored in big-endian. The most significant bit represents the sign (minus or plus) and the rest of the bits represent the number. The number multiplied by 0.1°C is the actual temperature.

Stepless temperature adjustment: 0x25

Byte 1: 0 –Start incrementing. 1 –Start decrementing. 2 –Stop adjustment. Byte 2: Rate (adjustment percentage per second) Bytes 3 to 4: The target value of temperature, which is calculated same as above.

Humidity adjustment: 0x26

Byte 1: 0 –Humidity value. 1 –Humidity up. 2 –Humidity down. Byte 2: The specified humidity.

Stepless humidity adjustment: 0x27

Byte 1: 0 –Start incrementing. 1 –Start decrementing. 2 –Stop adjustment. Byte 2: Rate (adjustment percentage per second) Byte 3: The target value.

Custom command

Custom category (1 byte)

Custom command (1 byte)

Parameter (3 bytes)

Lights: 0xFF

RGBY (red, green, blue, yellow) adjustment： 0x01

Byte 1: 0 –Change color to red. 1 –Change color to green. 2 –Change color to blue. 3 –Change color to yellow.

Fan: 0xFE

Fan mode: 0x01

Byte 1: 0 –Manual adjustment. 1 –Natural wind. 2: Sleep wind.

Bathroom heater: 0xFD

Bathroom heater mode: 0x01

Byte 1: 0 –Heating. 1 –Ventilation. 2 –Drying. 3 –Fan.

Air conditioner: 0xFC

Sleep: 0x01

Byte 1: 0 –Off. 1 –On.

5.37 Report and send data of extended DPs

This feature only applies to voice services.

5.37.1 Enable the extended DP service

- This service extends the source of data sending to LAN, WAN, and Bluetooth.

- This service conflicts with Send commands.

The MCU sends the following command.

Field	Bytes	Description
Header	2	0x55aa
Version	1	0x03
Command	1	0x36
Data length	2	0x0002
Data	1	Subcommand: 0x01
	1	
		0x00: disable the extended DP service.
		0x01: enable the extended DP service.
Checksum	1	Start from the header, add up all the bytes, and then divide the sum by 256 to get the remainder.

For example, `55 aa 03 36 00 02 01 01 3c`

The module returns the following command.

Field	Bytes	Description
Header	2	0x55aa
Version	1	0x00
Command	1	0x36
Data length	2	0x0002
Data	1	Subcommand: 0x01
	1	
		0x00: The service is enabled or disabled.

Field	Bytes	Description
		0x01: Failed to enable or disable the service.
Checksum	1	Start from the header, add up all the bytes, and then divide the sum by 256 to get the remainder.

For example, `55 aa 00 36 00 02 01 00 38`

5.37.2 Send commands of extended DPs

- For more information, seeData units.
- A command can contain data units of multiple DPs.
- The module sends control commands and the MCU reports DP status, which occurs asynchronously.
- The source of extended DP data sending must be set manually, which **conflicts** with the Send commands and Report status.

The module sends the following command.

Field	Bytes	Description
Header	2	0x55aa
Version	1	0x00
Command	1	0x36
Data length	2	Depends on the type and number of data units (N+2).
Data	1	Subcommand: 0x02
	1	The source of data sending:

Field	Bytes	Description
		0x00: unknown sources.
		0x01: LAN.
		0x02: WAN
		0x03: scheduled tasks in LAN.
		0x04: scene linkage in WAN.
		0x05: reliable channels.
		0x06: Bluetooth.
		0x07: scene linkage in LAN.
		0xF0: offline voice modules.
	N	Data units
Checksum	1	Start from the header, add up all the bytes, and then divide the sum by 256 to get the remainder.

For example, in LAN, if DP 3 of a boolean type is used for on/off control, and `1` means to turn on the device, the module will send the following command.

For example, `55 aa 00 36 0007 02 01 03 01 0001 01 45`

5.37.3 Report status of extended DPs

- This feature only applies to offline voice modules.
- For more information, see Data unit.
- The MCU asynchronously reports DP status, which can be triggered by three mechanisms.

- After the MCU executes the command of extended DPs from the module, it reports the changed status of extended DPs to the module.
- When the MCU proactively detects status changes of DPs, it reports the changed DP status to the module.
- When the MCU receives DP status queries, it sends the status of all DPs to the module.
- The MCU can report data units of multiple DPs.

The MCU sends the following command.

Field	Bytes	Description
Header	2	0x55aa
Version	1	0x03
Command	1	0x36
Data length	2	Depends on the type and number of data units (N+3).
Data	1	Subcommand: 0x03
	1	
		0x00: The MCU proactively reports status.
		0x01: The MCU responds to status queries.
		0x02: The MCU responds to commands of extended DPs.

Field	Bytes	Description
	1	When the MCU proactively reports DP status or responds to status queries, it responds to the data source requested by Send commands of extended DPs with 0x00.
		0x00: unknown sources.
		0x01: LAN.
		0x02: WAN
		0x03: scheduled tasks in LAN.
		0x04: scene linkage in WAN.
		0x05: reliable channels.
		0x06: Bluetooth.
		0x07: scene linkage in LAN.
		0xF0: offline voice modules.
	N	Data units
Checksum	1	Start from the header, add up all the bytes, and then divide the sum by 256 to get the remainder.

For example, in WAN, if the DP 5 of value type indicates the current humidity of 30%, the MCU sends the following command to the module.

For example, 55 aa 03 36 000b 03 02 02 05 02 0004 0000001e 73

5.38 (Optional) Smart fan features

This section only applies to specific fan categories.

5.38.1 Fan functional test

For example, a fan with a step of 20 and a hold-time of five seconds. The module can adjust the motor to 0%, 20%, 40%, 60%, 80%, and 100% in sequence at an interval of five seconds.

The MCU sends the following command.

Field	Length	Description
Header	2	0x55aa
Version	1	0x03
Command	1	0x72
Data length	2	0x03
Data	1	0x01 (sub-command)
	1	0x0a: step of fan speed, ranging from 1 to 99.
	1	0x05: the speed level hold-time, ranging from 1 to 100 seconds.
Checksum	1	Start from the header, add up all the bytes, and then divide the sum by 256 to get the remainder.

For example, 55 aa 03 72 00 03 01 0a 05 87

The module returns the following command.

Field	Bytes	Description
Header	2	0x55aa
Version	1	0x00
Command	1	0x72
Data length	2	0x02
Data	1	0x01 (sub-command)
	1	
		0x00: success.
		0x01: failure.
Checksum	1	Start from the header, add up all the bytes, and then divide the sum by 256 to get the remainder.

For example, `55 aa 00 72 00 02 01 00 74`

5.38.2 Set duty cycle

If the duty cycle is set to 70%, PWM1 outputs 70%, and PWM2 outputs 0%. If zero-crossing is detected, PWM1 outputs 0% and PWM2 outputs 70%.

The MCU sends the following command.

Field	Length	Description
Header	2	0x55aa
Version	1	0x03
Command	1	0x72
Data length	2	0x02
Data	1	0x02 (sub-command)
	1	0x0a: ranging from 0% to 100%.

Field	Length	Description
Checksum	1	Start from the header, add up all the bytes, and then divide the sum by 256 to get the remainder.

For example, `55 aa 03 72 00 02 02 0a 82`

The module returns the following command.

Field	Bytes	Description
Header	2	0x55aa
Version	1	0x00
Command	1	0x72
Data length	2	0x02
Data	1	0x02 (sub-command)
	1	
		0x00: success.
		0x01: failure.
Checksum	1	Start from the header, add up all the bytes, and then divide the sum by 256 to get the remainder.

For example, `55 aa 00 72 00 02 02 00 75`

6 Appendix

This appendix only provides the defined contents. Do not use any undefined content.

6.1 Appendix 1: Module information

Name	Description	Options	Obtain	Set
cc	Country code	0: applies to Chinese mainland, Korea, Singapore, Australia, Japan (1-13), and others.	Supported	Not supported
		1: applies to the United States, Taiwan (China), and Canada.		
		2: applies to Japan (1-14)		
		3: applies to Europe		
ap	Access point (AP)	String	Supported	Not supported
sn	Serial number (SN) of the module	The SN written to the module.	Not supported	Not supported

Name	Description	Options	Obtain	Set
ffs	Indicates whether a module has FFS authorization information.	0: A module does not have FFS authorization information.	Supported	Not supported
		1: A module has FFS authorization information.		

6.2 Appendix 2: File download exceptions

Description	Status value
Device is shut down.	0x00
File transfer times out.	0x01
Battery level is low.	0x02
Device is overheating.	0x03
File is large.	0x04
Memory is not enough.	0x05
Operation anomaly occurs.	0x06
For example, out of paper, paper jam, and cover open.	

6.3 Appendix 3: File transfer status

Status	Description	Status value
Status 1	No file transfer task.	0x00
Status 2	File transfer is starting.	0x01

Status	Description	Status value
Status 3	File transfer is in progress.	0x02
Status 4	File transfer/download is completed.	0x03
Status 5	File upload to the server succeeded.	0x04
Status 6	File transfer with the MCU times out.	0x05
Status 7	Failed to get the URL for file upload.	0x06
Status 8	Failed to upload the file to the server.	0x07
Status 9	Failed to get the file from the server.	0x08
Status 10	The MCU fails to respond to file transfer.	0x09

6.4 Appendix 4: OTA MCU firmware update

Status	Description	Status value
Status 1	Start update.	0x00
Status 2	Update is in progress.	0x01
Status 3	Update is completed.	0x02
Status 4	Update failed.	0x03

6.5 Appendix 5: File type

Description	Value
TXT	1
DOC	2
PDF	3
EXCEL	4
PNG	5
JPG	6
BMP	7
TIF	8
GIF	9
PCX	10
TGA	11
Exif	12
FPX	13
SVG	14
PSD	15
CDR	16
PCD	17
DXF	18
UFO	19
EPS	20
AI	21
Raw	22
WMF	23
WebP	24
AVIF	25
WAV	26
FLAC	27

Description	Value
APE	28
ALAC	29
WavPack (WV)	30
MP3	31
AAC	32
Ogg Vorbis	33
Opus	34
MP4	35

7 Version history

Version	Description	Date	Note
1.2.5	Modified	June 16, 2022	1. Added file download feature.
			2. Added the protocol for Bluetooth/Beacon remote control.
			3. Added the protocol for Bluetooth connection status notification.
1.2.4	Modified	July 1, 2021	1. Added support for multiple types of MCU firmware.
			2. Added RF protocols.
			3. Added support for getting Wi-Fi module information.
			4. Added IR status indicator.
			5. Updated voice module feature extension.
			6. Added features of Bluetooth remote controls.
			7. Added features of fans.

Version	Description	Date	Note
1.2.3	Modified	May 21, 2020	1. Added fields of IR feature and low-power mode enablement in the production info packet.
			2. Added commands of proactively weather service requests.
			3. Added command of notification of module reset.
			4. Modified the description of module working mode.
1.2.2	Modified	April 11, 2020	Add features of voice module VWXR2, including play/pause, Bluetooth on/off, local alarm, and group control.
1.2.1	Modified	April 9, 2020	1. Added Wi-Fi functional test.
			2. Added Wi-Fi remote control feature.

Version	Description	Date	Note
1.2.0	Modified	March 31, 2020	Added features to adapt to CI baseline. Added fields of network status and production information.
1.1.9	Modified	March 26, 2020	1. Updated voice service protocols.
			2. Add extension features for modules.
			3. Added production test for Wi-Fi and Bluetooth LE combo module.
1.1.8	Modified	February 18, 2020	1. Added volume setting for voice module VWXR2.
			2. Added production test for audio and wake-up.
1.1.7	Modified	November 19, 2019	1. Added map data streaming for multiple maps.
			2. Added channels for third-party file download.
			3. Updated protocol description.

Version	Description	Date	Note
1.1.6	Modified	August 28, 2019	Added IR features.
1.1.5	Modified	August 24, 2019	1. Added interface to get the MAC address of the module.
			2. Updated description of requesting weather data.
1.1.4	Modified	June 17, 2019	1. Added performance test for Wi-Fi connection modes.
			2. Updated streaming service.
1.1.3	Modified	April 15, 2019	1. Updated the description of commands.
			2. Added features of robot vacuum.
1.1.2	Modified	December 17, 2018	1. Added pairing via serial port.
			2. Added commands for the MCU to get the Wi-Fi network status.

Version	Description	Date	Note
1.1.1	Modified	August 10, 2018	Updated the returns from the MCU to respond to the firmware update. (legacy version is compatible)
1.1.0	Modified	March 29, 2018	Added the feature of turning off heartbeats.
1.0.9	Modified	January 19, 2018	1. Added synchronous reporting, enabling the module to return the report result on each data reporting task.
			2. Added the feature to getting Wi-Fi signal strength, in dB.
1.0.8	Modified	May 12, 2017	1. Added the interface to enable weather service.
			2. Added the interface to send the weather data to the MCU.
			3. Modified the heartbeat interval to 15 seconds.

Version	Description	Date	Note
1.0.7	Modified	February 16, 2017	1. Added pairing mode setting, with an extended interface for product information query.
			2. Updated the command to query MCU version number to 0x03.
1.0.6	Modified	November 10, 2016	1. Added Wi-Fi working status.
			2. Updated the command to query MCU version number to 0x02.
1.0.5	Modified	June 7, 2016	1. Deleted update query command.
			2. Delete the command used to notify the MCU to enter test mode.
			3. Modified the protocol of starting firmware update, support for files over 64 KB in size.
1.0.4	Modified	May 12, 2016	1. Added the command to get the local time.
			2. Added Wi-Fi functional test.

Version	Description	Date	Note
			3. Added the command to get the module memory.
1.0.3	Modified	November 14, 2015	1. Added the command for the MCU to get the time data.
			2. Added the command for the MCU to get the time zone.
			3. Added the feature to enter test mode.
1.0.2	Modified	October 17, 2015	1. Added the feature of MCU restart detection in the heartbeat mechanism.
			2. Modified the interval of heartbeat detection to 10 seconds.
			3. Modified the proactive Wi-Fi status reporting to sending Wi-Fi status to the MCU.

Version	Description	Date	Note
1.0.1	Modified	October 13, 2015	1. Modified product ID query to module information query. 2. Added returning version number.
1.0.0	Create	October 10, 2015	The first release.