# IIoT Solutions - WISE LPWAN Payload Format



| | | | | | |
|---|---|---|---|---|---|
| Initiated by | WISE F/W | Job Title | | Release Date | 2025/05/16 |
| Reviewed by | | Job Title | | Revision | V1.365 |
| Approved by | | Job Title | | Release Status | |

## Revision History:

| Document modifications | | | |
|---|---|---|---|
| **Revision** | **Date (year/mm/dd)** | **Author** | **Modifications** |
| 0.90 | 2019/01/02 | Carrie.Tung | Draft version. |
| 1.00 | 2019/01/08 | Carrie.Tung | 1. Chapter 3 describes LoRaWAN frame payload.<br>2. LPWAN payload format is detailed in chapter 4.<br>3. The endianness of LPWAN payload is little-endian.<br>4. Add DO data format.<br>5. Add position data in Device data (I/O type: 0x6).<br>6. Correct the frame control values in chapter 5 example. |
| 1.01 | 2019/01/08 | Carrie.Tung | 1. Insert 1-bit COM port index in the channel byte of coil and register data. |
| 1.02 | 2019/03/06 | Jay.Huang | 1. Change device data format and add battery voltage in chapter 4.5 |
| 1.03 | 2019/03/18 | Carrie.Tung | 1. Modify the sensor data for accelerometer. |
| 1.04 | 2019/04/09 | Jay.Huang | 1. Chapter 2 describes Sub-1G frame payload |
| 1.05 | 2020/02/15 | Carrie.Tung | 1. Add AI Modbus type code information in Ch4.4 AI data.<br>2. Add sub-1G message type for downlink and ACK in Chapter 2.<br>3. Add sub-1G WPayload examples in Ch 2.2.<br>4. Specify frame ver. 01 of LoRaWAN payload:<br>I. Change the CRC calculation for ver.01.<br>II. New payload format for each data type in chapter 4.x.2.<br>III. Add accelerometer Peak-to-Peak Displacement, massive sensor data (Raw data, FFT data) uplink.<br>5. Specify LoRaWAN downlink frame format in Ch 6. |
| 1.06 | 2020/03/24 | Carrie.Tung | 1. Add a range type for accelerometer $m/s^2$ and related description.<br>2. Add log index in accelerometer massive data section uplink frame Ch4.5.2.<br>3. Add the sample rate and number of samples/points in massive data information in Ch4.5.2. |

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|---|---|---|---|
| 1.07 | 2020/04/23 | Carrie.Tung | 1. Change clear high alarm status of accelerometer to “reserved” in chapter 6.5.<br>2. Add the function to adjust RTC by an offset value in chapter 6.6.1, |
| 1.08 | 2020/06/08 | Carrie.Tung | 1. Add RTD range codes in chapter 4.4.<br>2. Add a downlink command to query vibration massive data uplink at the specified UTC time. |
| 1.09 | 2020/08/12 | Carrie.Tung | 1. Add chapter 4.9 & 6.9: Meter Data<br>2. Add chapter 4.5.3 & 6.5.2: Stacklights |
| 1.10 | 2020/08/26 | Carrie.Tung | 1. Add the time of start measuring vibration in uplink accelerometer data. |
| 1.11 | 2020/09/03 | Carrie.Tung | 1. Correct the bit order of east-west and north-south of position data. |
| 1.12 | 2020/12/09 | Carrie.Tung | 1. Add more information in accelerometer massive data type in chapter 4.5.2.<br>2. Add light error states description in chapter 4.5.3. |
| 1.13 | 2021/04/08 | Carrie.Tung | 1. Add DI event byte in DI data format in chapter 4.1.<br>2. Remove the DI change of state bit from DI Status in chapter 4.1.<br>3. Remove the DO change of state bit from DO Status in chapter 4.2.<br>4. Add the AI not Ready bit in AI event in chapter 4.4.<br>5. Add accelerometer sensor error bit in the senor event in chapter 4.5.2.<br>6. Add device restart event bit in chapter 4.6.2.<br>7. Add downlink command index 7 in chapter 6.5.1.<br>8. Add downlink command indexes 12 and 14 in chapter 6.5.2. |
| 1.14 | 2021/07/23 | Carrie.Tung | 1. Add encryption bit in WHDR in chapter 3.1.<br>2. Add sensor/meter error information in device event in 4.6.2.<br>3. Add meter ID: 0x1 ~ 0x3 in chapter 4.9.<br>4. Add the response message in chapter 4.10.<br>5. Add chapter 5.2 Encryption Payload segmentation.<br>6. Add meter ID:0x1~0x3 downlink command in chapter 6.9. |

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|---|---|---|---|
| 1.15 | 2021/08/09 | Carrie.Tung | 1. Add Rx RSSI value in device data in chapter 4.6.2.<br>2. Provide Card Type/Status to replace 延遲斷電時間 in chapter 4.9.3.2.<br>3. Modify the bit 2 of status byte to 目前電表 Relay 狀態 in chapter 4.9.3.2.<br>4. Add response codes: 0x04 and 0x05 in chapter 4.10.<br>5. Modify the downlink command 0x84 and remove 0x90 in chapter 6.9.3. |
| 1.16 | 2021/08/30 | Carrie.Tung | 1. Add 延遲斷電時間, billing mode, 卡片及電表收費 in the periodic uplink format of meter with card reader in 4.9.3.<br>2. Update 讀卡機狀態 of Status A in 4.9.3.<br>3. Add command index 0x01 in 6.9.4. |
| 1.17 | 2021/09/08 | Zoe.Liang | 1. Add command index 0x90, 0x91, 0x93 in 6.9.3.<br>2. Modify meter rate in 4.9.3 |
| 1.18 | 2021/09/16 | Carrie.Tung | 1. Add CT/PT value in 4.9.2.<br>2. Add command indexes, 0x01, 0x81, in 6.9.2<br>3. Add command index 0x01 in 6.9.3<br>4. Support multiple command indexes in 6.9.4.<br>5. Provide the response format for multiple indexes in 4.10. |
| 1.19 | 2021/09/28 | Zoe.Liang | 1. Add Error/Warning Code in 4.9.2.<br>2. Modify CT/PT value reserved in 4.9.2, Vrms_B, Irms_B, 低餘額警報值, Billing Mode, 卡片每單位電量收費 value reserved in 4.9.3<br>3. Add 14-day search history data limit in 4.9.2, 4.9.3. |
| 1.20 | 2021/10/01 | Cloud.Lu | 1. Support 4 bytes vibration feature data in chapter 4.5.2.<br>2. Add downlink command to enable/disable band mask and get FFT by specific frequency range in chapter 6.5.2. |
| 1.21 | 2021/10/18 | Carrie.Tung | 1. Modify the packet format to support 4-bytes vibration sensor data and create chapter 4.5.4 for this new format. |
| 1.22 | 2021/11/16 | Zoe.Liang | 1. Add new payload format (multiple channel) of RS-485 Coil/Register in chapter 4.7.2, 4.8.2 |
| 1.23 | 2022/01/07 | Cloud.Lu | 1. Add downlink command to configure sensor schedule in chapter 6.6.2 |
| 1.24 | 2022/04/15 | Carrie.Tung | 1. Add the downlink command “開關上下吹風自動轉向功能” in 6.9.4. |

| | | | |
|---|---|---|---|
| 1.25 | 2022/07/04 | Carrie.Tung | 1. Add the device's firmware version in 4.6.2.<br>2. Add a downlink command to query the device's firmware version in 6.6.1.<br>3. Add the description of information length item of multiple coil and register format in 4.7.2.2 and 4.8.2.2.<br>4. Add a downlink command index, 0x80, to configure the scan interval of Modbus/RTU rules in 6.7 and 6.8. |
| 1.26 | 2022/08/02 | Cloud.Lu | 1. Modify the Accelerometer v2.0 format in 4.5.4.<br>2. Add a downlink command to configure band frequency in 6.5.2. |
| 1.27 | 2022/10/20 | Carrie.Tung | 1. Add two downlink commands to configure AI conversion interval, and DI conversion interval in chapter 6. |
| 1.28 | 2023/04/12 | Zoe.Liang | 1. Add new payload format of Application Raw Data in chapter 4.11 (corresponding to chapter 6.10)<br>2. Add new payload format (Application Raw Data) of Response Message in chapter 4.10 |
| 1.29 | 2023/6/5 | Carrie.Tung | 1. Rename Raw Data to Application Raw Data. |
| 1.30 | 2023/6/16 | Carrie.Tung | 1. Add a downlink command to configure LoRaWAN device class in chapter 6.6.3. |
| 1.31 | 2023/12/14 | Zoe.Liang | 1. Add new version in WHDR header in chapter 3.1, 3.3<br>2. Modify response message of Application Raw Data Downlink in chapter 4.10<br>3. Change raw application data payload length from 1 byte to 2 bytes in chapter 4.11, 6.10 |
| 1.32 | 2024/7/31 | Carrie.Tung | 1. Add AI physical scaling value in chapter 4.4.2. |
| 1.33 | 2024/10/24 | Carrie.Tung | 1. Remove new items in WHDR header in chapter 3.1, 3.3 which are still under planning.<br>2. Remove the log information payload format in chapter 4.5.2 and downlink commands in chapter 6.5.2. which are still under planning.<br>3. Remove accelerometer v2.0 (Range 0x7 & 0x8) related in chapter 4.5.4.<br>4. Remove stacklights chapter 4.5.3 and chapter 6.5.3..<br>5. Correct typos.<br>6. Modify the description of accelerometer commands in chapter 6.5.2. |

| | | | |
|---|---|---|---|
| 1.34 | 2024/11/6 | Carrie.Tung | 1. Add WHDR ver. 10b (for Application Raw Data).<br>2. Add examples in chapter 4.11.1 and 6.10.1.<br>3. Describe how the ver. 10b frame is segmented in chapter 5.1. |
| 1.35 | 2025/5/28 | Zoe Liang<br>Cloud.Lu | 1. Divide the chapter 4.10 (response message) according to IO type of downlink message.<br>2. Add a new error code and an extra byte in chapter 4.10.3.1.<br>3. Add Edge Hub Configuration with response message in chapter 4.10.3.2, uplink message in chapter 4.11.2, and the downlink message in chapter 6.10.2.<br>4. Add downlink command to get history feature data in chapter 6.5.2.<br>5. Add history data format in chapter 4.11.3. |
| 1.36 | 2025/6/6 | Cloud.Lu | 1. Add downlink command to configure message ACK and confirm message retries in chapter 6.6.3. |

格式化: 編號 + 階層: 1 + 編號樣式: 1, 2, 3, … + 起始號碼: 1 + 對齊方式: 左 + 對齊: 0 公分 + 縮排: 0.85 公分

# Table of Contents

# Documentation Conventions

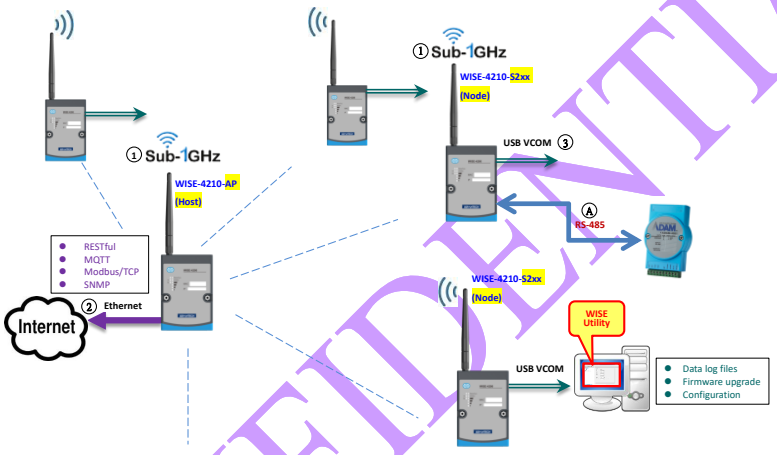
List of abbreviations:

| | |
|---|---|
| **LPWAN** | Low-Power Wide-Area Network |
| | |
| | |
| | |
| | |
| | |

# 1 WISE LPWAN Products

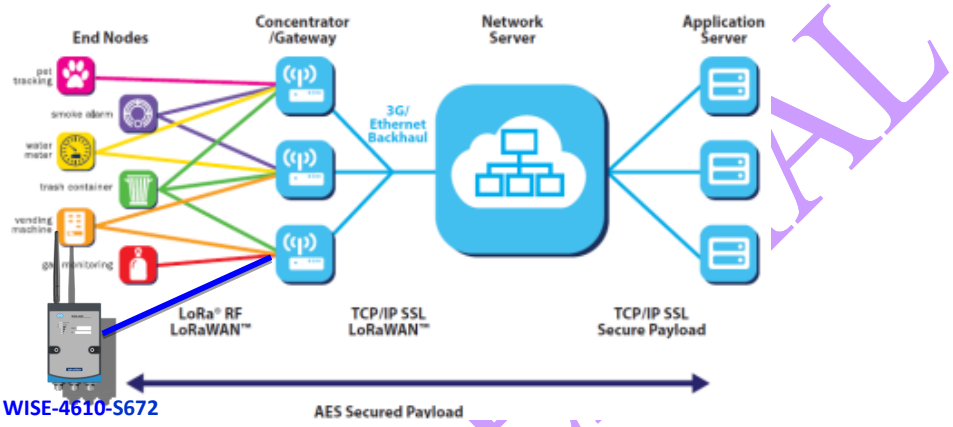
## 1.1 Sub-1G LPWAN IoT Wireless Sensor Network

WISE-2210 series nodes
WISE-4210 series AP and nodes

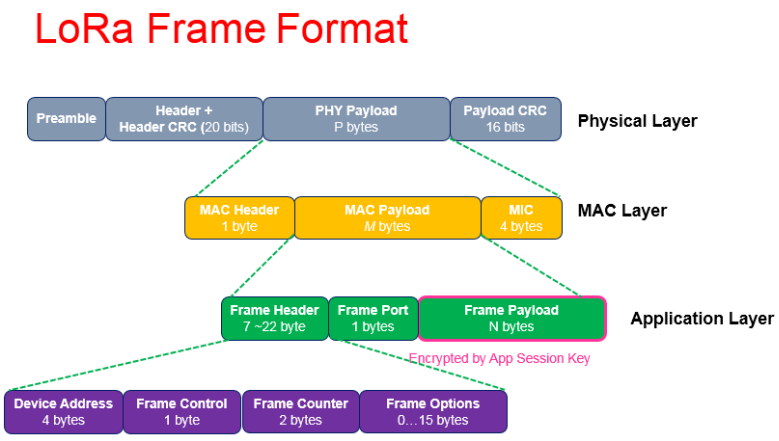


## 1.2 LoRaWAN

WISE-4610 series LoRaWAN nodes.

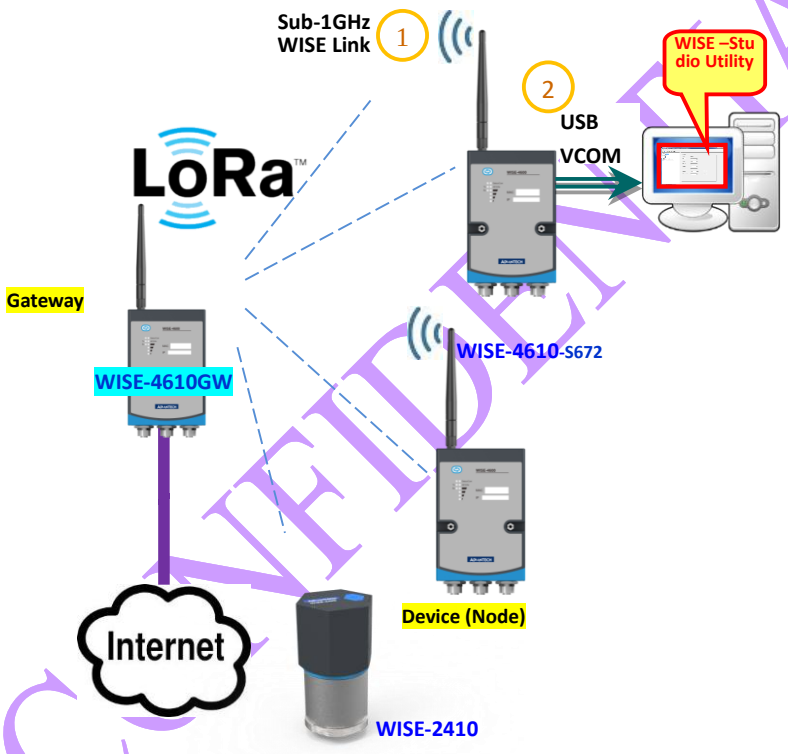



This specification describes the format of LoRaWAN Frame Payload.

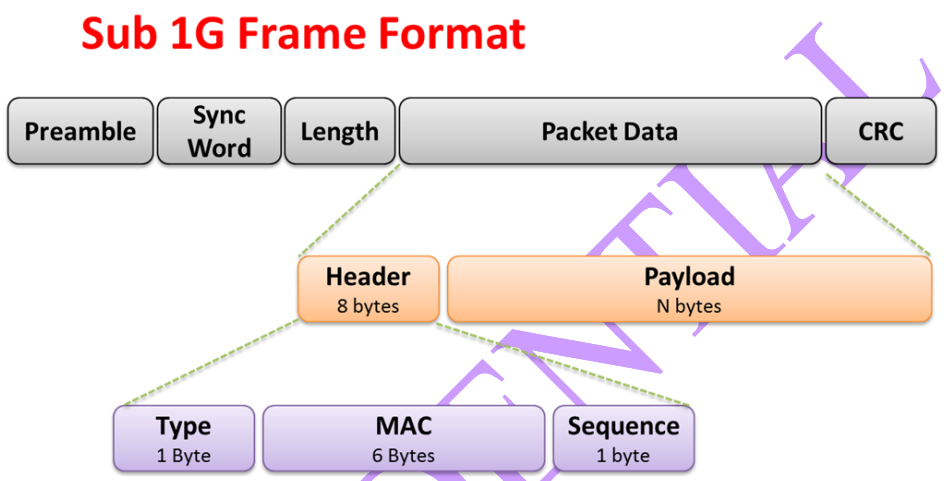


## 1.3 LoRa Private LPWAN Network

WISE-2410 vibration sensor nodes
WISE-4610 series



# 2 Sub-1G LPWAN – Frame Payload




The message structure of Sub-1g LPWAN Frame Payload is detailed in this chapter. Each frame payload starting with a several-octets WISE data header (**WHDR**), followed by a WISE LPWAN Payload (**WPayload**). A WISE Payload (WPayload) contains I/O statuses, Device information, and so on.

## 2.1 WHDR Header

**Frame Control**: 1 octet

| Frame Control | | | | | |
|---|---|---|---|---|---|
| Value | Message Type | Frame Control | | | |
| bit 4 ~ 7 | | bit 3 | bit 2 | bit 1 | bit 0 |
| 0x04 | Message Ack | Reserved | | | ACK |
| 0x06 | Site Survey event | | | | |
| 0x07 | OTA data | Reserved | | | |
| 0x09 | Get IO data | Write data | Changed data | All data | ACK |
| 0x0A | IO Data | Reserved | | | ACK |

**Source MAC address**: 6 octets

The Source MAC address of a node is a unique identifier and sent to the gateway to distinguish

**Frame Sequence Number**: 1 octet, 0 ~ 255

The sequence number of data frame sent uplink to the gateway. Each time an uplink packet transmitted done, the sequence number is increased for the next new uplink.

## 2.2 WPayload

**Site Survey event**

No payload data or feedback RSSI value (one octet).

**OTA data**

Group configuration or firmware image (fellow WISE Series - Open RESTful API Specification doc)

Example:

| | Frame Control | Source MAC | Sequence | Payload |
|---|---|---|---|---|
| **Request** | **0x60** | 66 55 44 33 22 11 | 00 | - |
| | **Frame Control** | **Source MAC** | **Sequence** | **Payload** |
| **Response** | **0x61** | 66 55 44 33 22 11 | 00 | RSSI |

**IO Data**

The **WPayload** structure is detailed chapter 4.

Example:

a. Push data without ACK

| | Frame Control | Source MAC | Sequence | Payload |
|---|---|---|---|---|
| **Request** | **0xA0** | 66 55 44 33 22 11 | 00 | LPWAN Payload |

b. Push data with ACK

| | Frame Control | Source MAC | Sequence | Payload |
|---|---|---|---|---|
| **Request** | **0xA1** | 66 55 44 33 22 11 | 00 | LPWAN Payload |
| | **Frame Control** | **Source MAC** | **Sequence** | **Payload** |
| **Response** | **0x41** | 66 55 44 33 22 | 00 | - |

| | | | | |
|---|---|---|---|---|
| | | 11 | | |

**Downlink data**

The **WPayload** structure is detailed chapter 4.

**The first 6 octets are destination MAC.**

Example:

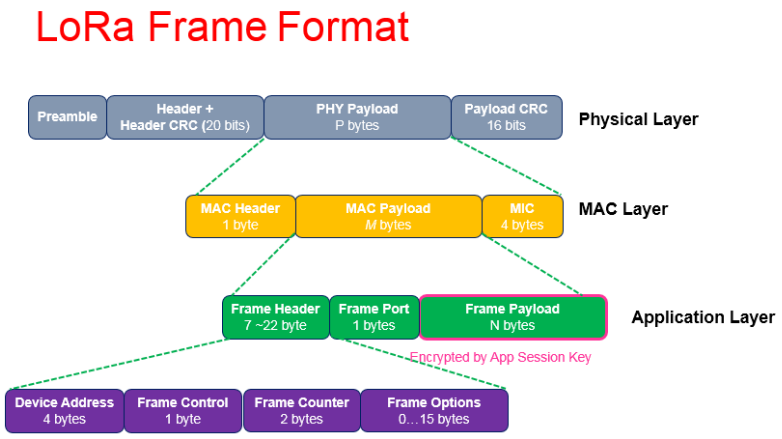
a. Get I/O data

| | Frame Control | Source MAC | Sequence | Destination MAC | Payload |
|---|---|---|---|---|---|
| **Request** | **0x92 (All data) 0x94 (Changed data)** | 66 55 44 33 22 11 | 20 | C9 66 00 64 00 46 | - |
| **Response** | **Frame Control** | **Source MAC** | **Sequence** | **Destination MAC** | **Payload** |
| | **0x93 (All data) 0x95 (Changed data)** | C9 66 00 64 00 46 | 00 | 66 55 44 33 22 11 | LPWAN Payload |

b. Write I/O data

| | Frame Control | Source MAC | Sequence | Destination MAC | Payload |
|---|---|---|---|---|---|
| **Request** | **0x98** | 66 55 44 33 22 11 | 20 | C9 66 00 64 00 46 | LPWAN Payload |
| **Response** | **Frame Control** | **Source MAC** | **Sequence** | **Destination MAC** | **Payload** |
| | **0x99** | C9 66 00 64 00 46 | 00 | 66 55 44 33 22 11 | - |

# 3 LoRaWAN - Frame Payload




The message structure of LoRaWAN Frame Payload is detailed in this chapter. Each frame payload starting with a several-octets WISE data header (**WHDR**), followed by a WISE LPWAN Payload (**WPayload**), and ending with a single-octet cyclic redundancy check (**CRC**) code. A WISE Payload (WPayload) contains I/O statuses, Device information, and so on.

<Frame version 00/01b>

| Frame Payload (FRM Payload) | | | | | |
|---|---|---|---|---|---|
| Octet: 1 | 1 | 0/1 | 0/2/8 | Variable | 1 |
| Frame Control | Frame Sequence Number | Total Length | Source Address | WISE LPWAN Payload | CRC |
| xx00xx0xb | | | | | |
| WHDR | | | | WPayload | WCRC |

<Frame version 10b>

| Frame Payload (FRM Payload) | | | | | | |
|---|---|---|---|---|---|---|
| Octet: 1 | 1 | 1 | 0/1/2 | 0/2/8 | Variable | 1 |

| Frame Control | Frame Sequence Number | Frame Control II | Total Length | Source Address | WISE LPWAN Payload | CRC |
|---|---|---|---|---|---|---|
| xx1xxx10b | | | | | | |
| WHDR | | | | | WPayload | WCRC |

## 3.1 WHDR Header

**Frame Control**: 1 octet

| Frame Control | | | | | |
|---|---|---|---|---|---|
| bit 7 | 6 | 5 | 4 | 3, 2 | 1, 0 |
| First Segment | WPayload Encrypted | Frame Control II exist | (RFU) | Address Mode | Frame Version |
| 0: not first one<br>1: first seg. | 0: no<br>1: AES-256-CBC encrypt | 0 Reserved | 0 Reserved | 00: No source address<br>01: the least LSB 2 octets of DevEUI<br>10 : 8 octets DevEUI | 00 : initial version<br>01 : 2nd version |
| | | 0: not exist<br>1: **Frame Control II** exist | (RFU)<br>0: no<br>1: FPort app. | | 10 : 3rd version |

- **First Segment** bit

  Set the First Segment bit to inform the server that this is the beginning of a packet with Total Length information of WISE payload data.

- **WPayload Encrypted** bit

  One bit to indicate the 'WPayload' part in frame structure is encrypted using AES-256-CBC or not. The initialization vector (IV) below is used.

  unsigned char IV[] = {0x27, 0x92, 0x78, 0x18, 0x57, 0x49, 0x53, 0x45, 0x22, 0x00, 0x4D, 0x54, 0x05, 0x15, 0x58, 0x53};

- **Address Mode** 2-bits

  When the Address Mode bit is unset 00, it indicates no Source Address is encapsulated. If set 01 and 10, the Source Address is the least significant two bytes and eight bytes of DevEUI, respectively.

- **Frame Version** bit

  Two bits for frame structure version.

- **Frame Control II exist** bit

  Set the Frame Control II exist bit to extend Frame Control.

| Frame Control | | | | | | Frame Sequence Number | Frame Control 2 | | Total Length | Source Address |
|---|---|---|---|---|---|---|---|---|---|---|
| First Segment | WPayload Encrypted | Frame Control 2 exist | FPort app. | Address Mode | Frame Version | | Reserved | 2-bytes length | LSB \| MSB | |
| 1 | 0 | 1 | 0 | 00 | 10 | | | 1 | | |

- **2-byte Length** bit: set the 2-byte length bit to extend total length to 2 bytes (length > 255)

**Frame Sequence Number**: 1 octet, 0 ~ 255

The sequence number of data frame sent uplink to the gateway. Each time an uplink packet transmitted done, the sequence number is increased for the next new uplink.

**Frame Control II**: 1 octet

| Frame Control 2 | |
|---|---|
| bit 7 - 1 | 0 |
| (RFU) | 2-bytes Total Length |
| 0000000 | 0 : 1-byte length<br>1 : 2-bytes length |

**Total Length**: 1/2 octet (optional)

When the First Segment bit of Frame Control is set, the Total Length octet will be added to signal the server the total bytes of WISE payload data.

If the 'WPayload' is encrypted, the 'Total Length' will be the byte amount after encryption.

**Source Address**: 0/2/8 octets (optional)

None, 2 LSB or 8 bytes of DevEUI according to the Address Mode bit of Frame Control.

If DevEUI is 74FE48FFFF19D121, the sequential order of 2-bytes address starts with D1 21. For complete DevEUI address, the sequence will be 74 FE 48 FF FF 19 D1 21.

## 3.2 WPayload

The **WPayload** structure is detailed chapter 4.

## 3.3 WCRC

**CRC**: 1 octet

An 8-bit CRC-8-CCITT value calculated from WISE Payload data, 'WPayload'. It's a standard CRC-8, with polynomial $x^8+x^2+x+1$ and initial value 0xFF.

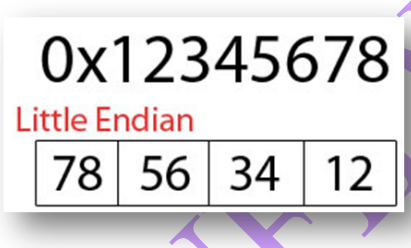
| Frame Version | CRC |
|---|---|
| **00** | **CRC-8** |
| **01** | **~CRC-8** |
| **10** | **~CRC-8** |

# 4 WISE LPWAN Payload Format

The message structure of WISE LPWAN Payload is detailed in this chapter. Each frame payload may contain several channels of I/O statuses and device information. Each I/O type has various data format.
For example, if there are DI 0, DI 2, AI 0, Coil 3, Coil 4, Register 1 and timestamp data to upload, the payload will contain the following segments with various length values.

| WISE LPWAN Payload | | | | | | |
|---|---|---|---|---|---|---|
| Octet: $N_{DI}$ | $N_{DI}$ | $N_{AI}$ | $N_{coil}$ | $N_{coil}$ | $N_{reg}$ | $N_{Dev}$ |
| DI_0 Data | DI_2 Data | AI_0 Data | Coil_3 Data | Coil_4 Data | Register_ 1 Data | Timestamp |

The endianness in WISE LPWAN Payload is Little-endian, the least significant bytes first.




The I/O Type in each segment is used to identify the I/O or device information message type.

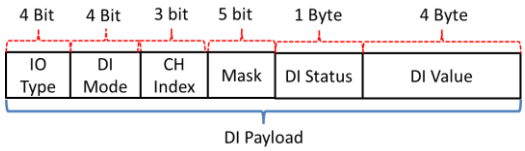
| (4 Bit) | Message Type |
|---|---|
| 0x0 | DI |
| 0x1 | DO |
| 0x3 | AI |
| 0x5 | Sensor |
| 0x6 | Device |
| 0x7 | Coil |
| 0x8 | Register |
| 0x9 | Meter Data |

| | |
|---|---|
| 0xA | Application Raw Data |
| 0xF | Response Message |

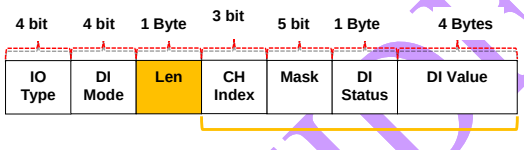
The details of I/O and device message structures are described below.

## 4.1 DI data (I/O Type: 0x0)

### 4.1.1 Sub-1G and LoRaWAN ver.00




### 4.1.2 LoRaWAN ver.01




■ **Len** (1 octet): 1 ~ 255
number of bytes after this octet (**Len**)

■ IO Type (bit 7 – 4): 0x0

■ DI Mode (bit 3 – 0):

| | |
|---|---|
| 0 | DI |
| 1 | Counter |
| 2 | LowToHighLatch |
| 3 | HighToLowLatch |
| 4 | Frequency |

■ CH Index (bit 7 – 5): I/O channel 0 ~ 7

■ MASK (bit 4 – 0)

| | |
|---|---|
| Bit 0 | DI Status |
| Bit 1 | DI Value (LSB first) |

| | |
|---|---|
| Bit 2 | DI Value Event |
| Bit 3 ~4 | (Reserved) |

■ DI (channel) Status: 1 octet

| DI channel status table | |
|---|---|
| Bit order | Data |
| 0 | Signal Logic Status<br>1, 0: Input signal is Logic High or Low. |
| 1 | Start Counter<br>Read 1: counter is counting<br>0: not counting |
| 2 | Get/Clear Counter Overflow Status<br>Read 1: overflow occurred.<br>0: no overflow |
| 3 | ~~Clear Counter~~<br>~~1 : Clear the counter value~~ |
| 4 | Get/Clear L2H Latch Status<br>Read 1: L2H latch occurred.<br>0: no L2H latch<br>Write 0: clear the L2H latch status |
| 5 | Get/Clear H2L Latch Status<br>Read 1: H2L latch occurred.<br>0: no H2L latch<br>Write 0: clear the H2L latch status |
| 6 | Reserved |
| 7 | Reserved |

■ DI Value: 4 octets

It will be the frequency value when DI Mode is Frequency mode. Otherwise, it is DI counter value.

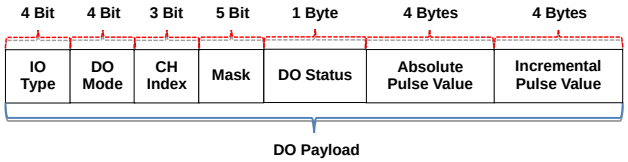
■ DI Value Event: 1 octet

DI event status table is shown below.

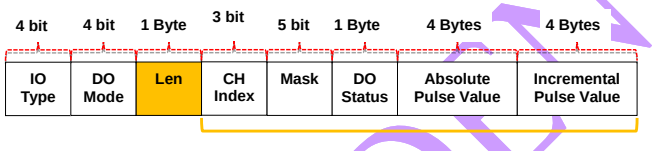
| DI value event table | |
|---|---|
| Bit order | Data |
| 0 | DI Not Ready<br>1: Input signal is not available<br>0: Input signal is normal. |
| 1~7 | Reserved |

## 4.2 DO data (I/O Type: 0x1)

### 4.2.1 Sub-1G and LoRaWAN ver.00




### 4.2.2 LoRaWAN ver.01




■ **Len** (1 octet): 1 ~ 255
number of bytes after this octet (**Len**)

■ IO Type (bit 7 – 4): 0x1

■ DO Mode (bit 3 – 0):

| | |
|---|---|
| 0 | DO |
| 1 | Pulse output |
| 2 | Low to High delay |
| 3 | High to Low delay |
| 4 | AI alarm drive |

■ CH Index (bit 7 – 5): I/O channel 0 ~ 7

■ MASK (bit 4 – 0)

| | |
|---|---|
| Bit 0 | DO Status |
| Bit 1 | Absolute Pulse Output Value (LSB first) |

| | |
|---|---|
| Bit 2 | Incremental Pulse Output Value (LSB first) |
| Bit 3 | (Reserved) |
| Bit 4 | (Reserved) |

■ DO (channel) Status: 1 octet

| DO channel status table | |
|---|---|
| Bit order | Data |
| 0 | Signal Logic Status<br>1, 0: Output signal is Logic High or Low |
| 1 | Pulse Output Continue State<br>1 / 0: Pulse outputting is continuous or not |
| 2 | ~~Stop Pulse Output~~<br>~~1: Stop the pulse outputting.~~ |
| 3 | Reserved |
| 4~7 | Reserved |

■ Absolute Pulse Output Value: 4 octets

When DO mode is set in Pulse Output mode, this is the absolute pulse value.

■ Incremental Pulse Output Value: 4 octets

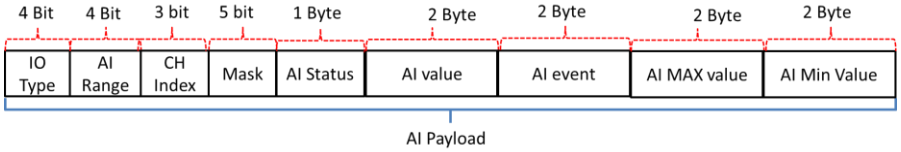
When DO mode is set in Pulse Output mode, this is the incremental pulse value.

## 4.3 AI data (not 16-bit) (I/O Type: 0x2)

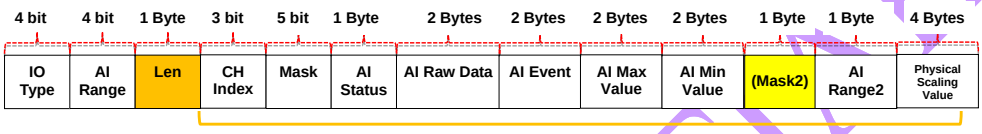
(TBD)

## 4.4 AI data (I/O Type: 0x3)

### 4.4.1 Sub-1G and LoRaWAN ver.00




### 4.4.2 LoRaWAN ver.01




■ **Len** (1 octet): 1 ~ 255
number of bytes after this octet (**Len**)

■ IO Type (bit 7 – 4): 0x3

■ AI Range (bit 3 – 0) :

| | Modbus Type Code | |
|---|---|---|
| 0 | **0x0103** | -150mv~150mv |
| 1 | **0x0104** | -500mv~500mv |
| 2 | **0x0140** | -1v~1v |
| 3 | **0x0142** | -5v~5v |
| 4 | **0x0143** | -10v~10v |
| 5 | **0x0105** | 0~150mv |
| 6 | **0x0106** | 0~500mv |
| 7 | **0x0145** | 0~1v |
| 8 | **0x0147** | 0~5v |
| 9 | **0x0148** | 0~10v |
| 10 | **0x0180** | 4mA~20mA |
| 11 | **0x0181** | -20mA~20mA |
| 12 | **0x0182** | 0~20mA |
| 13, 14 | | Reserved |
| 15 | **(see Range2)** | Others<br>(See the type in Mask2) |

■ AI Range2: 1 octet

| Value | Modbus Type Code | |
|---|---|---|
| 0 - 14 | | (same as AI Range) |
| 15 | **0x03A9** | PT100(385) -200~ +600℃ |
| 16 | **0x03C9** | PT100(392) -200~ +600℃ |
| 17 | **0x03E2** | PT1000 -40~ +160℃ |

■ CH Index (bit 7 – 5): I/O channel 0 ~ 7

■ Mask (bit 4 – 0)

| | |
|---|---|
| Bit 0 | AI Status |
| Bit 1 | AI Raw Value + resolution |
| Bit 2 | AI Event |
| Bit 3 | AI Max Value |
| Bit 4 | AI Min Value |
| (Need more … | Use Mask 2 in LoRaWAN ver.01) |

■ *Mask2 (bit 7 – 0):

| Bit | Description |
|---|---|
| Bit 0 | Range2: AI range (1 Byte) |
| Bit 1 | Physical Scaling Value *1000 (4 Bytes signed integer)<br>Value Range: -2147483648 ~ 2147483647 to represent –2147483.648 ~ 2147483.647 |
| Bit 2~7 | (Reserved) |

■ AI (channel) status: 1 octet

| AI channel status table | |
|---|---|
| Bit order | Data |
| 0 | Low Alarm Status<br>Read 1: low alarm occurred.<br>0: not occurred<br>Write 0: clear the low alarm status |
| 1 | High alarm status<br>Read 1: high alarm occurred.<br>0: not occurred |

| | |
|---|---|
| | Write 0: clear the high alarm status |
| 2 | ~~Clear Maximum AI Value~~<br>~~1: Clear the maximum AI value~~ |
| 3 | ~~Clear Minimum AI Value~~<br>~~1: Clear the minimum AI value~~ |
| 4-7 | <Reserved for internal use> |

■ AI Value: 2 octets

AI value is the measurement raw data with range 0 to 0xFFFF.

■ AI Event: 2 octets

AI event status table is shown below.

| Bit Order | Description |
|---|---|
| **0** | Fail to provide AI value (UART timeout, ADC error) |
| **1** | Over Range |
| **2** | Under Range |
| **3** | Open Circuit (Burnout) |
| **4** | AI Not Ready |
| 5 | Unavailable Channel Configuration (Channel Disabled, DI Mode Used) |
| 6 | Reserved |
| **7** | ADC initializing/Error |
| 8 | Reserved |
| **9** | Zero/Span Calibration Error |
| 10~15 | Reserved |

■ AI Max Value: 2 octets

The maximum of AI raw data with range 0 to 0xFFFF.

■ AI Min Value: 2 octets

The minimum of AI raw data with range 0 to 0xFFFF.

## 4.5 Sensor data (I/O Type: 0x5)

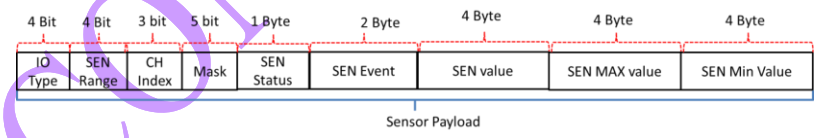
■ IO Type (bit 7 – 4): 0x5
■ Sensor Range (bit 3 – 0):

| (4 bit) | Sensor Type |
|---|---|
| 0x0 | 4096 - Temperature (℃) |
| 0x1 | 4097 - Temperature (℉) |
| 0x2 | 4098 - Temperature (K) |
| 0x3 | 4128 - Humidity (%) |
| 0x4 | 4256 - Accelerometer (g)<br>(g: the standard acceleration due to Earth's gravity is 980.665 cm/s2) |
| 0x5 | 4257 - Accelerometer ($m/s^2$) |
| 0x6 | Stacklights Sensor |
| 0x7 – 0xF | (RFU) |

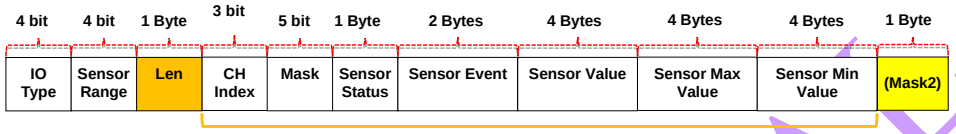
### 4.5.1 Temperature/Humidity (Range: 0x0 ~ 0x3)

#### 4.5.1.1 Sub-1G and LoRaWAN ver.00

Temperature/Humidity:



### 4.5.1.2 LoRaWAN ver.01




■ **Len** (1 octet): 1 ~ 255
number of bytes after this octet (**Len**)

■ CH Index/Axis Mask (bit 7 – 5):

| | Range: 0x0 – 0x3<br>Temp./Humidity |
|---|---|
| Bit 0 | 0 |
| Bit 1 | 0 |
| Bit 2 | 0 |

■ MASK (bit 4 – 0):

| Bit | Range: 0x0 – 0x3<br>Temp./Humidity |
|---|---|
| Bit 0 | Sensor Status (1 Byte) |
| Bit 1 | Sensor Event (2 Bytes) |
| Bit 2 | Sensor Value (4 Bytes) |
| Bit 3 | Sensor Max Value (4 Bytes) |
| Bit 4 | Sensor Min Value (4 Bytes) |
| (Need more … | Use Mask 2 in LoRaWAN ver.01) |

■ *Mask2 (bit 7 – 0): reserved for future use if any new items defined.

■ SEN Status (1 octet):

| | Range: 0x0 – 0x3<br>Temp./Humidity |
|---|---|
| Bit 0 | Sensor fail |

| | |
|---|---|
| Bit 1 - 7 | Reserved |

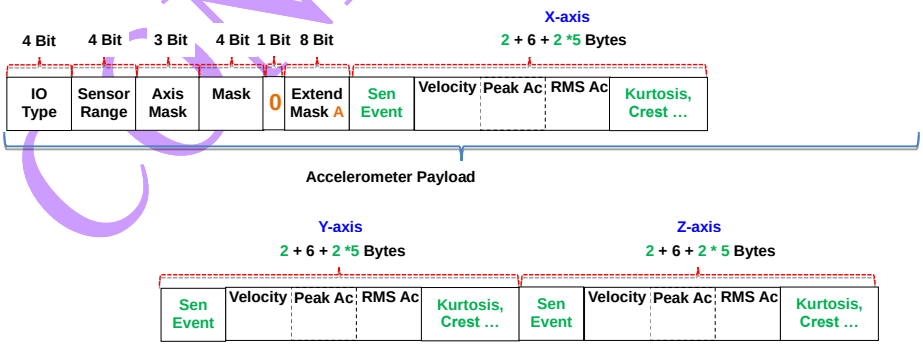
■ SEN Event (2 octets):

| Bit | Range: 0x0 – 0x3<br>Temp./Humidity |
|---|---|
| Bit 0 | High alarm status<br>Read 1: high alarm occurred.<br>0: not occurred<br>~~Write 0: clear the high alarm status~~ |
| Bit 1 | Low Alarm Status<br>Read 1: low alarm occurred.<br>0: not occurred<br>~~Write 0: clear the low alarm status~~ |
| Bit 2 | ~~Clear Maximum Sensor Value~~<br>~~1: Clear the maximum Sensor value~~ |
| Bit 3 | ~~Clear Minimum Sensor Value~~<br>~~1: Clear the minimum Sensor value~~ |
| Bit 4 | Alarm update |
| Bit 5 ~ 15 | (Reserved) |

## 4.5.2 Accelerometer (Range: 0x4, 0x5)

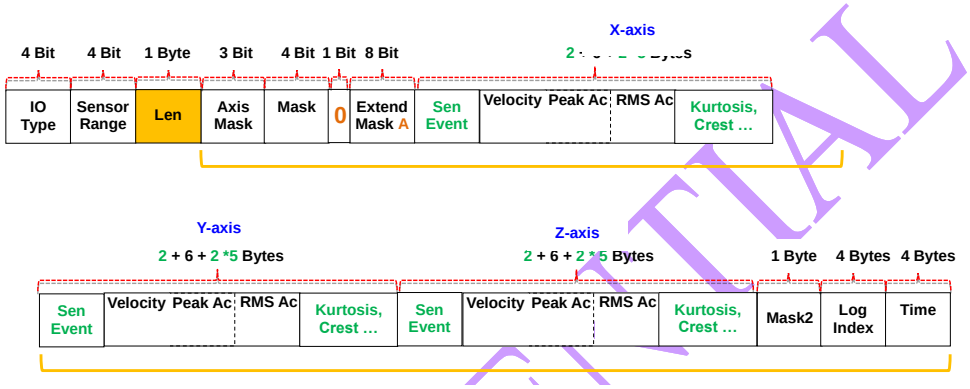
### 4.5.2.1 Sub-1G and LoRaWAN ver.00

Format Mask A:



### 4.5.2.2 LoRaWAN ver.01

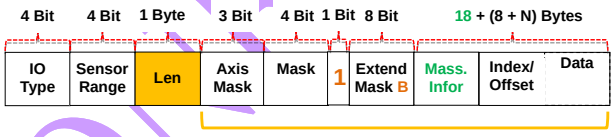
Format Mask A:




■ **Len** (1 octet): 1 ~ 255
number of bytes after this octet (**Len**)

Format Mask B:

Massive Data




■ **Len** (1 octet): 1 ~ 255
number of bytes after this octet (**Len**)

■ CH Index/Axis Mask (bit 7 – 5):

| | Range: 0x4/0x5 Accelerometer |
|---|---|
| Bit 0 | X-axis |
| Bit 1 | Y-axis |
| Bit 2 | Z-axis |

■ MASK (bit 4 – 0):

| Bit | Range: 0x4/0x5<br>Accelerometer |
|---|---|
| Bit 0 | 0 – next byte is Extend **Mask A**.<br>1 – next byte is Extend **Mask B**. |
| Bit 1 | Sensor Event (2 Bytes) for X, Y, Z axis respectively. |
| Bit 2 | (Reserved) |
| Bit 3 | (Reserved) |
| Bit 4 | (Reserved) |

Extend MASK (bit 7 – 0)

| Bit | Mask A | | Mask B |
|---|---|---|---|
| | Range: 0x4 | Range: 0x5 | |
| Bit 0 | OA Value of Vibration Velocity (0.01 mm/sec) (2 Bytes) | | Information of Massive data:<br>type (1 octet) +<br>Sample rate (3 octets) +<br>Number of samples/points (2 octets) +<br>Index number of logged data (4 octets) +<br>Unix timestamp at UTC (4 octets) +<br>total length (4 octets) |
| Bit 1 | Peak Value of Acceleration (2 Bytes) | | Massive data section:<br>Index number of logged data (4 octets)<br>+data offset (4 octets) +<br>partial data (n octets) |
| | Unit: (0.001g) | Unit: (0.01m/s$^2$) | |
| Bit 2 | RMS of Acceleration (2 Bytes) | | (Reserved) |
| | Unit: (0.001g) | Unit: (0.01m/s$^2$) | |
| Bit 3 | Kurtosis (2 Bytes) | | (Reserved) |
| Bit 4 | Crest factor (2 Bytes) | | (Reserved) |
| Bit 5 | Skewness (2 Bytes) | | (Reserved) |

| | | |
|---|---|---|
| Bit 6 | Standard deviation (2 Bytes) | (Reserved) |
| Bit 7 | Displacement (2 Bytes) | (Reserved) |

■ SEN Event (2 octets):

| Bit | Range: 0x4/0x5<br>Accelerometer |
|---|---|
| Bit 0 | High alarm status of velocity RMS<br>Read 1: high alarm occurred.<br>0: not occurred<br>~~Write 0: clear the high alarm status~~ |
| Bit 1 | Sensor error |
| Bit 2 | (Reserved) |
| Bit 3 | (Reserved) |
| Bit 4 | (Reserved) |
| Bit 5 ~ 15 | (Reserved) |

■ Mask 2 (bit 7 – 0):

| Bit | Range: 0x4/0x5<br>Accelerometer |
|---|---|
| Bit 0 | Index number of logged feature data, raw data or FFT data (4 Bytes) |
| Bit 1 | The time to start measuring vibration (4 Bytes). |
| Bit 2~7 | (Reserved) |

■ Accelerometer - Massive Data Type (1 octet):

| | Bit 7-5 | Bit 4 | Bit 3,2 | Bit 1,0 |
|---|---|---|---|---|
| Function Description | (Reserved) | Bytes per FFT sample /raw point<br>0: 2 bytes<br>1: 4 bytes | samples of FFT data per axis<br>00: points/2.56<br>01: points/2.56/2 | 01: FFT<br>10: Raw |



*[Example 1]*: Transmit accelerometer 3-axis FFT data 4800 bytes:

1st frame:

| Octet: 1 | 1 | 1 | Variable | | | | | | 1 |
|---|---|---|---|---|---|---|---|---|---|
| WHDR | | | WPayload | | | | | | WCRC |
| Frame Control | Seq. Num | Total Len | WISE LPWAN Payload | | | | | | CRC |
| | | | Type/ Sensor | Len | Axis/ Mask | Ext. Mask B | Data type (1)+ Sample rate (3) + points (2) + Log Index (4)+ Timestamp(4)+ Total Len(4) | Log Index (4) + offset (4) + data (L1) | |
| 0x81 | N | | 0x54 | | 0xE1 | 0x03 | 0x01 0x80 0x0C 0x00 0x00 0x08 0x01 0x00 0x00 0x00 0xAD 0x14 0x1D 0x5E 0xC0 0x12 0x00 0x00 | 0x01 0x00 0x00 0x00 0x00 0x00 0x00 0x00 ... | |

2nd frame:

| Octet: 1 | 1 | 1 | Variable | | | | | 1 |
|---|---|---|---|---|---|---|---|---|
| WHDR | | | WPayload | | | | | WCRC |
| Frame Control | Seq. Num | Total Len | WISE LPWAN Payload | | | | | CRC |
| | | | Type/ Sensor | Len | Axis/ Mask | Ext. Mask B | Log Index (4) + offset (4) + data (L2) | |
| 0x81 | N+1 | | 0x54 | | 0xE1 | 0x02 | 0x01 0x00 0x00 0x00 L1 0x00 0x00 0x00 ... | |

3rd frame …

*[Example 2]*: Transmit accelerometer 3-axis FFT data 32 bytes starting from the 100th-byte position of log data at a specific Unix timestamp.

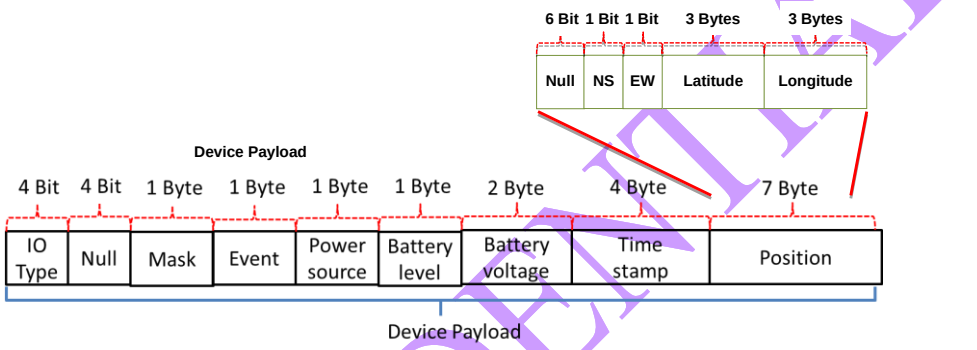
1st frame:

| Octet: 1 | 1 | 1 | Variable | 1 |
|---|---|---|---|---|
| WHDR | | | WPayload | WCRC |

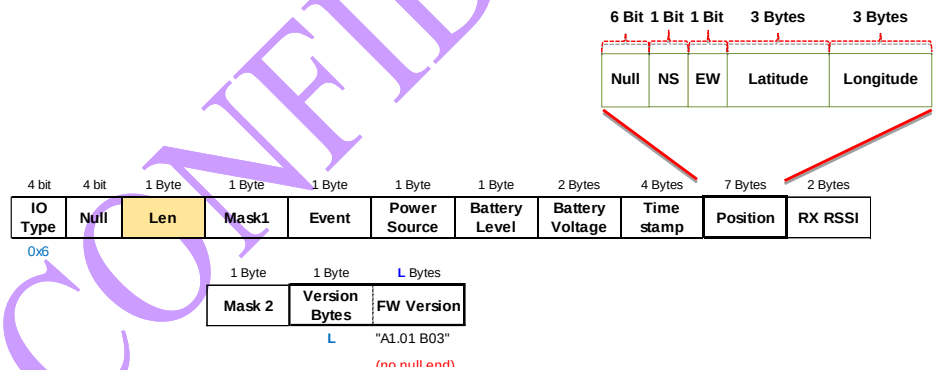
| Frame Control | Seq. Num | Total Len | WISE LPWAN Payload | | | | | | CRC |
|---|---|---|---|---|---|---|---|---|---|
| | | | Type/ Sensor | Len | Axis/ Mask | Ext. Mask B | Data type (1)+ Sample rate (3) + points (2) +Log Index (4)+ Timestamp(4)+ Total Len(4) | Log Index (4) + offset (4) + data (L1) | |
| **0x81** | **N** | | **0x54** | | **0xE1** | **0x03** | **0x01 0x80 0x0C 0x00 0x00 0x08 0x01 0x00 0x00 0x00 0x8E 0xD5 0x38 0x5E 0x20 0x00 0x00 0x00** | **0x01 0x00 0x00 0x00 0x64 0x00 0x00 0x00 ...** | |

## 4.6 Device data (I/O Type: 0x6)

### 4.6.1 Sub-1G and LoRaWAN ver.00




### 4.6.2 LoRaWAN ver.01




■ **Len** (1 octet): 1 ~ 255
number of bytes after this octet (**Len**)

■ IO Type (bit 7 – 4): 0x6

■ MASK1 (bit 7 – 0)

| Bit | Item |
|---|---|

| | |
|---|---|
| Bit 0 | Device event |
| Bit 1 | Power source |
| Bit 2 | Battery level |
| Bit 3 | Battery voltage |
| Bit 4 | Timestamp |
| Bit 5 | Position |
| Bit 6 | RX RSSI value |
| Bit 7 | Mask 2 |

■ Mask 2 (1 octet):

| Bit | Item |
|---|---|
| Bit 0 | Device node 's firmware version (Length + version string) |
| Bit 1~6 | Reserved |
| Bit 7 | Reserved for Mask 3 |

■ Device Event: 1 octet

Device event status table is shown below.

| Bit Order | Description |
|---|---|
| **0** | Battery low |
| **1** | RTC low |
| **2** | Restart due to RF fatal error |
| **3** | Sensor/meter error |
| **4~7** | Reserved |

■ Power Source: 1 octet

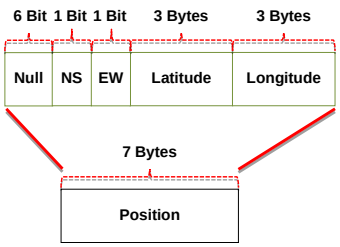
Power source table is shown below.

| Bit Order | Description |
|---|---|
| **0** | Power line |
| **1** | Battery |
| **2** | Solar panels |
| **3~7** | Reserved |

■ Battery Level: 1 octet

The level of battery with range 0 to 100 (%).

- Battery voltage: 2 octets
  The battery voltage with range 0 to 65.535V.
- Timestamp: 4 octets
- Position: 7 octets




[Note]

*Position (GNSS)

- EW (bit 0)
  Longitude: 0 for E, 1 for W
- NS (bit 1)
  Latitude: 0 for N, 1 for S

- Latitude/Longitude: 3 octets for each
  Latitude coordinate of the location, the value is $1/10^5$ scale. A minus sign if south of the equator.
  Longitude coordinate of the location, the value is $1/10^5$ scale. A minus sign if west of the prime meridian.
  Unit: Degree

  The format of GPS location is:
  Latitude dd[degree]mm.mmmm[minutes]
  Longitude ddd[degree]mm.mmmm[minutes]
  Each of them is encoded as 3-bytes hexadecimals by diving minutes by 60 and multiplying the result by a factor of 10^5, and use the first byte to indicate their sign values.
  For example:
  Latitude 4807.038,N => 48d07.038m => (48+07.038/60)*10^5 = 4811730 => 0x496BD2
  Longitude 01131.000,W=>11d31000m => (11+31/60)*10^5 = 1151666 => 0x1192B2

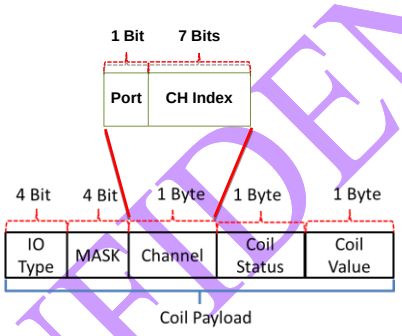
Sign 0 for N, 1 for W => (0x0 << 1) | (0x 1) = 0x01;
The position data above results in 7-bytes GPS payload as below:

0x01 0xD2 0x6B 0x49 0xB2 0x92 0x11

■ RX RSSI value: 2 octets
The RSSI value with range -127 (or smaller) to 11 (or larger) dBm.

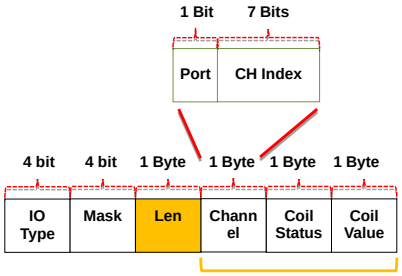
## 4.7 RS-485 Coil data (I/O Type: 0x7)

### 4.7.1 Sub-1G and LoRaWAN ver.00



### 4.7.2 LoRaWAN ver.01

#### 4.7.2.1 Single Coil




■ **Len** (1 octet): 1 ~ 255
number of bytes after this octet (**Len**)

■ IO Type (bit 7 – 4): 0x7

■ MASK (bit 3 – 0)

| | |
|---|---|
| Bit 0 | Coil Status |
| Bit 1 | Coil Value |
| Bit 2 | Multiple Channels |

■ Channel (1 octet):

COM port number and coil channel index.

| | |
|---|---|
| Bit 0 ~ 6 | Coil Channel Index:<br>0 ~ 31 or 0~63 |
| Bit 7 | COM Port Index:<br>0 – COM port 1<br>1 – COM port 2 |

■ Coil status: 1 octet

The error status of polling this coil

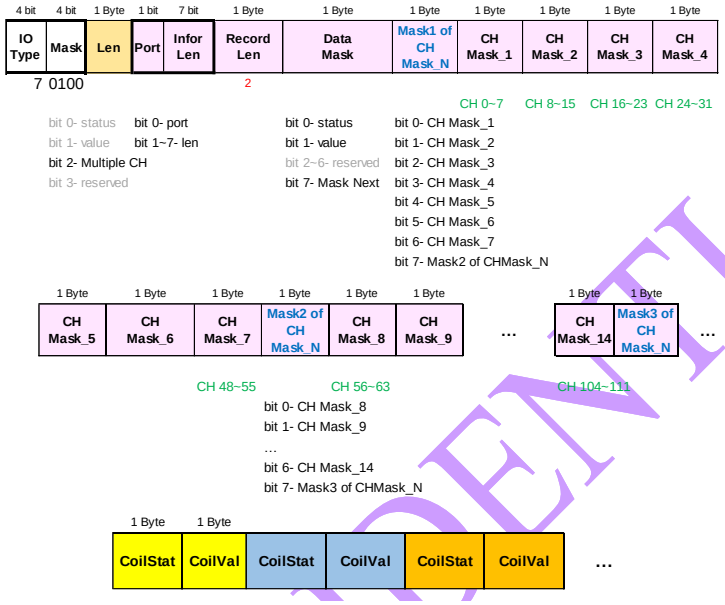
| Status Value | Description |
|---|---|
| 0 (0x00) | No error |

| | |
|---|---|
| 1 (0x01) | Illegal function |
| 2 (0x02) | Illegal data address |
| 3 (0x03) | Illegal data value |
| 4 (0x04) | Slave device failure |
| 5 (0x05) | Acknowledge |
| 6 (0x06) | Slave device busy |
| 7 (0x07) | Negative acknowledge |
| 8 (0x08) | Memory parity error |
| 9 (0x09) | Reserved |
| 10 (0x0A) | Gateway path unavailable |
| 11 (0x0B) | Gateway target device failed to respond |
| 12 ~15 | Reserved |
| 16 (0x10) | Unavailable |
| 17 (0x11) | Slave response timeout |
| 18 (0x12) | Checksum error |
| 19 (0x13) | Received data error |
| 20 (0x14) | Send request fail |
| 21(0x15) | Unprocessed |
| 22(0x16) | Read only |
| 23(0x17) | In processing |

■ Coil value: 1 octet

The coil data, 0 or 1

### 4.7.2.2 Multiple Coil




■ **Len** (1 octet): 1 ~ 255
number of bytes after this octet (**Len**)

■ IO Type (bit 7 – 4): 0x7

■ MASK (bit 3 – 0)

| | |
|---|---|
| Bit 0 | Coil Status |
| Bit 1 | Coil Value |
| Bit 2 | Multiple Channels |

■ Port (1 bit) and Information Length (7 bits)

| | |
|---|---|
| Bit 0 ~ 6 | Information Length<br>(The number of bytes of information header after this octet) |
| Bit 7 | Port |

■ Mask 0/1/2 of CH Mask_N (1 octet):

- Mask 0: CH Mask 0~7
- Mask 1: CH Mask 8~14
- Mask 2: CH Mask 15~20

■ CH Mask_N (1 octet): Channel N*8 ~ (N+1)*8-1

■ Coil status: 1 octet

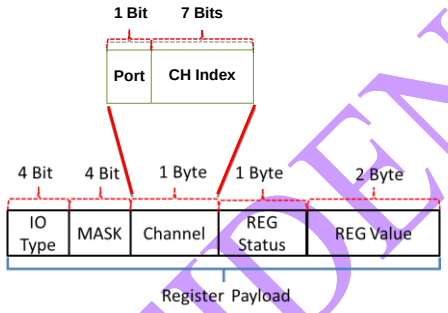
The error status of polling this channel can refer to Coil Status (4.7.2.1) in the previous section.

■ Coil value: 1 octet

The coil data, 0 or 1

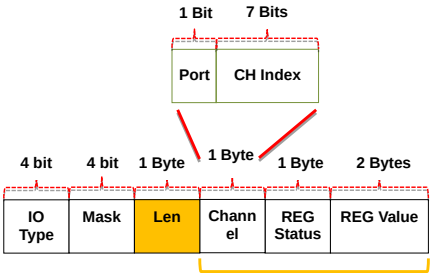
## 4.8 RS-485 Register data (I/O Type: 0x8)

### 4.8.1 Sub-1G and LoRaWAN ver.00



### 4.8.2 LoRaWAN ver.01

#### 4.8.2.1 Single Register




■ **Len** (1 octet): 1 ~ 255
number of bytes after this octet (**Len**)

■ IO Type (bit 7 – 4): 0x8

■ MASK (bit 3 – 0)

| | |
|---|---|
| Bit 0 | Register Status |
| Bit 1 | Register Value |
| Bit 2 | Multiple Channels |

■ Channel (1 octet):

COM port number and register channel index.

| | |
|---|---|
| Bit 0 ~ 6 | Register Channel Index:<br>0 ~ 31 or 0~63 |
| Bit 7 | COM Port Index:<br>0 – COM port 1<br>1 – COM port 2 |

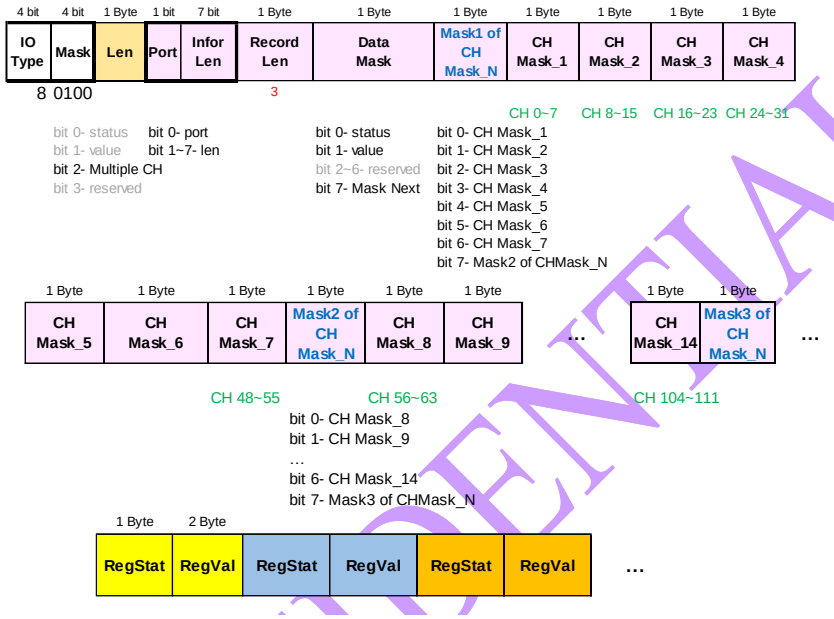
■ Register status: 1 octet

The error status of polling this channel can refer to Coil Status (4.7.2.1) in the previous section.

■ Register value: 2 octets

The register data with range 0 to 0xFFFF

### 4.8.2.2 Multiple Register




■ **Len** (1 octet): 1 ~ 255
number of bytes after this octet (**Len**)

■ IO Type (bit 7 – 4): 0x8

■ MASK (bit 3 – 0)

| | |
|---|---|
| Bit 0 | Register Status |
| Bit 1 | Register Value |
| Bit 2 | Multiple Channels |

■ Port (1 bit) and Information Length (7 bits)

| | |
|---|---|
| Bit 0 ~ 6 | Information Length<br>(The number of bytes of information header after this octet) |
| Bit 7 | Port |

■ Mask 0/1/2 of CH Mask_N (1 octet):

- Mask 0: CH Mask 0~7
- Mask 1: CH Mask 8~14

- Mask 2: CH Mask 15~20

■ CH Mask_N (1 octet): Channel N*8 ~ (N+1)*8-1

■ Register status: 1 octet

The error status of polling this channel can refer to Coil Status (4.7.2.1) in the previous section.

■ Register value: 2 octets

The register data with range 0 to 0xFFFF

## 4.9 Meter Data (I/O Type: 0x9)

- IO Type (bit 7 – 4): 0x9
- Application ID (Appl. ID) (bit 3 – 0) :

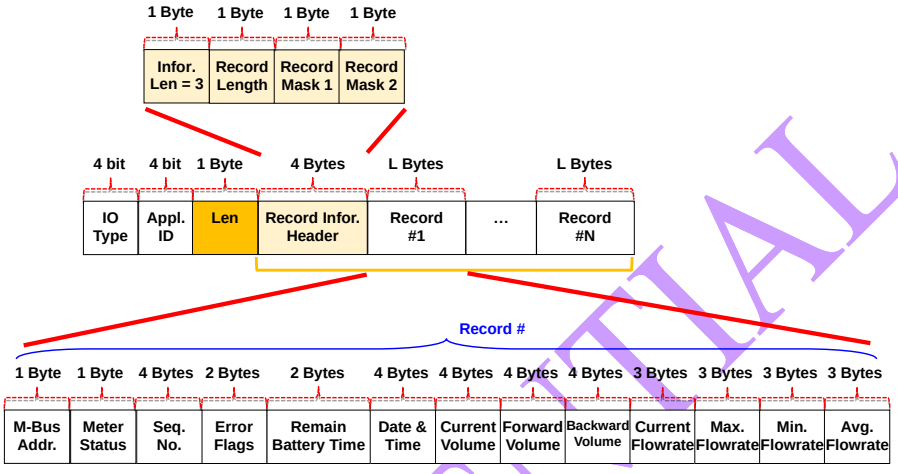
| (4 bit) | Application |
|---|---|
| 0x0 | IZAR Water Metering |
| 0x1 | Electric Meter (EBA-43) |
| 0x2 | Electric Meter with Card Reader (EBI-21) |
| 0x3 | Air Conditioner Data |
| | |
| 0x | Electric Meter (RX320S) |
| 0x | Electric Meter with Card Reader (EM1100) |

### 4.9.1 Water Metering (Appl. 0x0)

#### 4.9.1.1 Sub-1G and LoRaWAN ver.00

(None)

#### 4.9.1.2 LoRaWAN ver.01




■ **Len** (1 octet): 1 ~ 255
number of bytes after this octet (**Len**)

■ Record Mask 1 (1 octet):

| Bit | Item |
|---|---|
| 0 | UTC time (unit: sec)<br>Record date and time~~: year, month, day, hour and min~~<br>~~(~~UTC time (unit: sec)~~, but the sec part should be ignored)~~ |
| 1 | Current meter volume (unit: 1 L) |
| 2 | Current forward volume (unit: 1 L) |
| 3 | Current backward volume (unit: 1 L) |
| 4 | Current flowrate (unit: 1 L/hr) |
| 5 | Maximum flowrate (unit: 1 L/hr) |
| 6 | Minimum flowrate (unit: 1 L/hr) |
| 7 | Average flowrate (unit: 1 L/hr) |

■ Record Mask 2 (1 octet):

| Bit | Item |
|---|---|

| | |
|---|---|
| 0 | Sequence number of this record<br>Value: 0x00000001 ~ 0x00FFFFFF |
| 1 | Error flags |
| 2 | Remaining battery lifetime (unit: Day) |
| 3 - 7 | Reserved |

■ Error Flags: 2 octets

| Bit | Description |
|---|---|
| 0 | Current mechanical tampering |
| 1 | Indicate the flow direction (forward or reverse) |
| 2 | Currently meter is underflow |
| 3 | Currently meter is overflow |
| 4 | Currently there is a leak |
| 5 | Currently the meter is blocked or not counting |
| 6 | Currently the sensor is tampered |
| 7 | Currently the battery is low (< 1 year) |
| 8 | Historical mechanical tampering |
| 9 | Historical backflow alarm |
| 10 | Historical underflow alarm |
| 11 | Historical overflow alarm |
| 12 | Historical leakage alarm |
| 13 | Historical blocking alarm |
| 14 | Historical Sensor tampering |
| 15 | Historical cable cut |

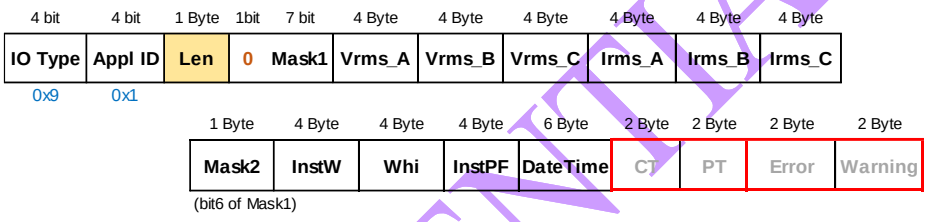
### 4.9.2 大同 Electric Meter (Appl. 0x1)

#### 4.9.2.1 Sub-1G and LoRaWAN ver.00

(None)

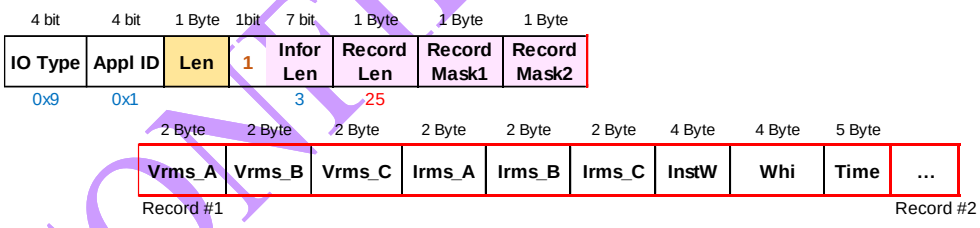
#### 4.9.2.2 LoRaWAN ver.01

Periodic Uplink Format (bit 7 of Mask1 = 0):




■ **Len** (1 octet): 1 ~ 255
number of bytes after this octet (**Len**)

歷史儲存資料回補 Format (bit 7 of Mask1 = 1):




■ **Len** (1 octet): 1 ~ 255
number of bytes after this octet (**Len**)

■ Mask 1 (1 octet):

| Bit | Item |
|---|---|
| 0 | A 相電壓 Vrms_A (0.01V) |

| | |
|---|---|
| 1 | B 相電壓 Vrms_B (0.01V) |
| 2 | C 相電壓 Vrms_C (0.01V) |
| 3 | A 相電流 Irms_A (0.01A) |
| 4 | B 相電流 Irms_B (0.01A) |
| 5 | C 相電流 Irms_C (0.01A) |
| 6 | Mask 2 |
| 7 | 0 – 週期上傳.<br>1 – 歷史儲存資料回補 (14 天內) |

■ Mask 2 (1 octet):

| Bit | Item |
|---|---|
| 0 | 瞬時實功率(正,負) Inst. W (W) |
| 1 | 總累積瓦時值 (Whi) (import) |
| 2 | 瞬時功率因數(rms) Inst. Power Factor (0.01) |
| 3 | 電表時間年月日時分秒 Date/Time |
| 4 | Reserved for 電流比/電壓比 CT/PT |
| 5 | Error/Warning Code |
| 6 | Reserved |
| 7 | Reserved for Mask 3 |

歷史儲存資料回補 Format (bit 7 of Mask1 = 1):

■ Infor Len (bit 6 – 0): 0x3

The bytes of record information header after this byte.

■ Record Len (1 octet): 25

Number of bytes of each record

■ Record Mask 1 (1 octet):

| Bit | Item |
|---|---|
| 0 | A 相電壓 Vrms_A (0.01V) |
| 1 | B 相電壓 Vrms_B (0.01V) |
| 2 | C 相電壓 Vrms_C (0.01V) |
| 3 | A 相電流 Irms_A (0.01A) |
| 4 | B 相電流 Irms_B (0.01A) |

| | |
|---|---|
| 5 | C 相電流 Irms_C (0.01A) |
| 6 | 瞬時實功率(正,負) Inst. W (W) |
| 7 | 總累積瓦時值 (Whi) (import) |

■ Record Mask 2 (1 octet):

| Bit | Item |
|---|---|
| 0 | 日期/時間 Date/Time (YY-MM-DD HH:MM) |
| 1-7 | reserved |
| | |

### 4.9.3 大同 Electric Meter with Card Reader (Appl. 0x2)

#### 4.9.3.1 Sub-1G and LoRaWAN ver.00

(None)

#### 4.9.3.2 LoRaWAN ver.01

Periodic Uplink Format (bit 7 of Mask1 = 0):

| 4 bit | 4 bit | 1 Byte | 1bit | 7 bit | 4 Byte | 4 Byte | 4 Byte | 4 Byte | 4 Byte | 4 Byte |
|---|---|---|---|---|---|---|---|---|---|---|
| IO Type | Appl ID | Len | 0 | Mask1 | Vrms_A | Vrms_B | Irms_A | Irms_B | W_tot | Whi |
| 0x9 | 0x2 | | | | | | | | | |

| 1 Byte | 8 Byte | 2 Byte | 1 Byte | 4 Byte | 2 Byte | 6 Byte | 2 Byte |
|---|---|---|---|---|---|---|---|
| Mask2 | Card SN | Card Status | Status A | Balance | Alarm Thresh | DateTime | Relay Off Delay Time |

(bit6 of Mask1=1)

| 1 Byte | 1 Byte | 2 Byte | 2 Byte | 2 Byte | 2 Byte |
|---|---|---|---|---|---|
| Mask3 | Billing Mode | Card wh | Card Rate | Meter wh | Meter Rate |

(bit7 of Mask2=1)

■ **Len** (1 octet): 1 ~ 255
number of bytes after this octet (**Len**)

歷史儲存資料回補 Format (bit 7 of Mask1 = 1):

| 4 bit | 4 bit | 1 Byte | 1bit | 7 bit | 1 Byte | 1 Byte | 2 Byte | 2 Byte | 2 Byte | 4 Byte | 5 Byte | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| IO Type | Appl ID | Len | 1 | Infor Len | Record Len | Record Mask1 | V_rms | I_rms | Inst_W | Wh_tot | Time | ... |
| 0x9 | 0x2 | | | 2 | 15 | | Record #1 | | | | | Record #2 |

■ **Len** (1 octet): 1 ~ 255
number of bytes after this octet (**Len**)

■ Mask 1 (1 octet):

| Bit | Item |
|---|---|
| 0 | A 相電壓 Vrms_A (0.01V) |
| 1 | Reserved for B 相電壓 Vrms_B (0.01V) |
| 2 | A 相電流 Irms_A (0.01A) |
| 3 | Reserved for B 相電流 Irms_B (0.01A) |
| 4 | 總實功率(正,負) Inst. W (W) |
| 5 | 總累積瓦時值 (Whi) (import) |
| 6 | Mask 2 |
| 7 | 0 – 週期上傳.<br>1 – 歷史儲存資料回補 (14 天內) |

■ Mask 2 (1 octet):

| Bit | Item |
|---|---|
| 0 | 卡片序號 SN |
| 1 | 卡片種類/狀態 Card Type/Status |
| 2 | **Status A*** |
| 3 | 儲值卡餘額(unit: 0.1 元) |
| 4 | Reserved for 低餘額警報值(unit: 0.01 元) |
| 5 | 電表時間年月日時分秒 Date/Time |
| 6 | 拔卡後 relay 延時斷電時間 Relay Off Delay Time<br>(unit: 10ms) |
| 7 | Mask 3 |

■ Mask 3 (1 octet):

| Bit | Item |
|---|---|
| 0 | Reserved for Billing Mode |

| | |
|---|---|
| 1 | Reserved for 卡片每單位電量收費(unit: Wh, 0.001 元) |
| 2 | **電表**每單位電量收費(unit: 0.1kWh, 0.01 元) |
| 3-6 | Reserved |
| 7 | Reserved for Mask 4 |

*Status A (1 octet):

| Bit | Item |
|---|---|
| 0-2 | 讀卡機狀態<br>(bit 0)<br>0：電表不接讀卡機<br>1：電表要接讀卡機<br>(bit 1)<br>0：卡片正常<br>1：卡片屬黑名單<br>(bit 2)<br>0：讀卡機連線正常<br>1：讀卡機連線斷線 |
| 3 | 目前電表 Relay 狀態 |
| 5-7 | Reserved |

*卡片種類/狀態: 2 octets

| Bit | 15 ~ 8 | 7 ~ 0 |
|---|---|---|
| Byte | Byte[1]: 卡片狀態 | Byte[0]: 卡片種類 |
| Data | 0：正常<br>1：黑名單卡 | 16：計費卡,<br>17：免費卡,<br>18：強制卡,<br>255：未插卡 |

歷史儲存資料回補 Format (bit 7 of Mask1 = 1):

- Infor Len (bit 6 – 0): 0x2

  The bytes of record information header after this byte.
- Record Len (1 octet): 15

  Number of bytes of each record

■ Record Mask 1 (1 octet):

| Bit | Item |
|---|---|
| 0 | 瞬時電壓 |
| 1 | 瞬時電流 Ia |
| 2 | 瞬時功率 kW_tot |
| 3 | 總累計度數 Total Wh |
| 4 | 日期/時間 Date/Time (YY-MM-DD HH:MM) |
| 5-7 | Reserved |

### 4.9.4 Air Conditioner Data (Appl. 0x3)

#### 4.9.4.1 Sub-1G and LoRaWAN ver.00

(None)

#### 4.9.4.2 LoRaWAN ver.01

| 4 bit | 4 bit | 1 Byte | 1 Byte | 1 Byte | 1 Byte | 1 Byte | 1 Byte | 1 Byte | 1 Byte | 1 Byte |
|---|---|---|---|---|---|---|---|---|---|---|
| **IO Type** | **Appl ID** | **Len** | **Mask1** | **Status** | **Op Mode** | **Fan Speed** | **Temp. Set** | **Indoor T** | **Indoor H** | **Ourdoor T** |
| 0x9 | 0x3 | | | | | | | | | |

| 1 Byte | 2 Byte | 2 Byte | 2 Byte | 2 Byte | 2 Byte | 2 Byte | 2 Byte |
|---|---|---|---|---|---|---|---|
| **Mask 2** | **Ctrl Mask** | **OutdoorUnit Power** | **Errors** | **Hr/Min _On** | **Hr/Min _Off** | **Hr/Min _Sys** | **Min to On** |

| 1 Byte | 2 Byte |
|---|---|
| **Mask 3** | **Min to Off** |

■ **Len** (1 octet): 1 ~ 255
number of bytes after this octet (**Len**)

■ Mask 1 (1 octet):

| Bit | Item |
|---|---|
| 0 | Status* |

| | |
|---|---|
| 1 | 運轉模式 |
| 2 | 風速設定 |
| 3 | 設定溫度 |
| 4 | 室內溫度 |
| 5 | 室內溼度顯示功能 |
| 6 | 室外溫度 |
| 7 | Mask 2 |

*Status (1 octet):

| Bit | Item |
|---|---|
| 0 | 電源開關 |
| 1 | 濾網清洗通知 |
| 2 | 節能運轉 |
| 3-7 | reserved |

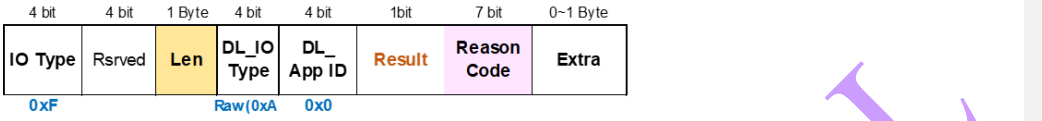
■ Mask 2 (1 octet):

| Bit | Item |
|---|---|
| 0 | 有線控制器、無線遙控器禁止 |
| 1 | 室外機即時功率 |
| 2 | 錯誤訊息顯示 |
| 3 | 排程: 開機時間 Hr/Min |
| 4 | 排程: 關機時間 Hr/Min |
| 5 | 系統絕對時間設定 Hr/Min |
| 6 | 定時開機 Min |
| 7 | Mask 3 |

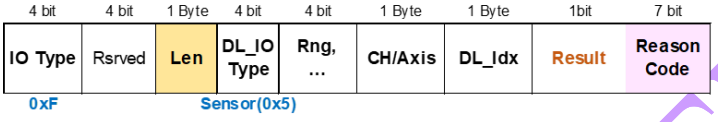
■ Mask 3 (1 octet):

| Bit | Item |
|---|---|
| 0 | 定時關機 Min |
| 1-6 | Reserved |
| 7 | Reserved for Mask 4 |

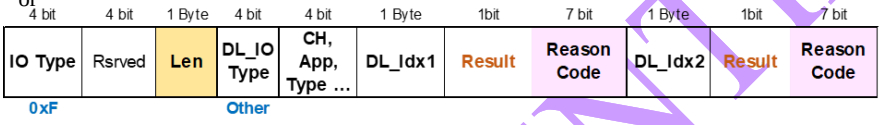
## 4.10 Response Message (I/O Type: 0xF)

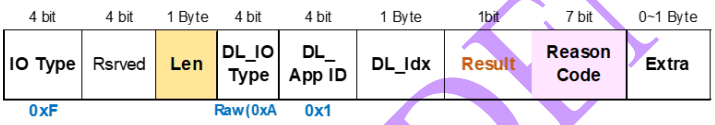


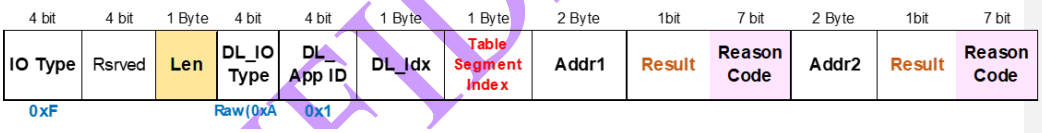

or




or




■ **Len** (1 octet): 1 ~ 255
number of bytes after this octet (**Len**)

■ IO Type (bit 7 – 4): 0xF

■ Len (1 octet): 1 ~ 255
Total data length of all indexes and its data

### 4.10.1 Meter Data Response (DL_IOType: 0x9)


■ **Len** (1 octet): 1 ~ 255
number of bytes after this octet (**Len**)

■ IO Type of the downlink message (DL_IO Type): 0x9

■ Channel, Application, Type (CH, App, Type): 1 octet, refer to 6.9 Meter Data (I/O Type: 0x9)~~Meter Data (I/O Type: 0x9)~~

已設定格式: 字型: 12 點, 底線, 字型色彩: 藍色

■ Data Index of the downlink message: 1 octet

■ Response Data: 1 octet

- Result (bit 7)
  0: Success
  1: Fail
- Reason Code (bit 6-0)

| Reason Code | | Description |
|---|---|---|
| 0x00 | RESP_ERROR_NONE | no error<br>success |
| 0x01 | RESP_ERROR_REPLY_TIMEOUT | timeout when receive the response from the target function. |
| 0x02 | RESP_ERROR_FAIL_TO_SET | unable to set or write the command to the target function (Tx error) |
| 0x03 | RESP_ERROR_ERROR_RESPONSE | get error response |
| 0x04 | RESP_ERROR_SERVICE_NOT_SUPPORTED | the service is not supported |
| 0x05 | RESP_ERROR_NOT_IN_LIST | Not found in list of searching historical data |

### 4.10.2 Coil / Register Data Response (DL_IOType: 0x7, 0x8)


■ **Len** (1 octet): 1 ~ 255
number of bytes after this octet (**Len**)

■ IO Type of the downlink message (DL_IO Type): 0x7,0x8
■ Channel, Application, Type (CH, App, Type): 0x0
■ Data Index of the downlink message: 1 octet
■ Response Data: 1 octet
● Result (bit 7)
0: Success
1: Fail
● Reason Code (bit 6-0)

| Reason Code | | Description |
|---|---|---|
| 0x01 | ILLEGAL_FUNCTION | Illegal function |
| 0x02 | ILLEGAL_DATA_ADDRESS | Illegal data address |
| 0x03 | ILLEGAL_DATA_VALUE | Illegal data value |
| 0x04 | SLAVE_DEVICE_FAILURE | Server device failure |
| 0x05 | ACKNOWLEDGE | Acknowledge |
| 0x06 | SLAVE_DEVICE_BUSY | Server device busy |
| 0x07 | NEGATIVE_ACKNOWLEDGE | Negative acknowledge |
| 0x08 | MEMORY_PARITY_ERROR | Memory parity error |
| 0x0A | | Gateway path unavailable |
| 0x0B | | Gateway target device failed to respond |
| 0x10 | UNAVAILABLE | Unavailable |
| 0x11 | RESPONSE_TIMEOUT | Server response timeout |
| 0x12 | CHECKSUM_ERROR | Checksum error |
| 0x13 | DATA_MISMATCH | Received data error |
| 0x14 | SEND_ERROR | Send request fail |
| 0x15 | WAIT_PROCESS | Unprocessed |
| 0x16 | READ_ONLY | Read only |
| 0x17 | IN_PROCESSING | In processing |

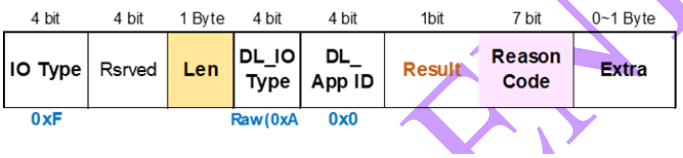
| | | |
|---|---|---|
| 0x18 | INVALID_PROTOCOL | Invalid Protocol |

### 4.10.3 Application Raw Data Downlink (DL_IOType: 0xA)

■ DL_App ID table:

| (4 Bit) | DL_App ID |
|---|---|
| 0x0 | Transparent mode data |
| 0x1 | Edge Hub configuration data |
| 0x2 | Reserved for History IO/ sensor data |

#### 4.10.3.1 Transparent mode data (DL_App ID: 0x0)



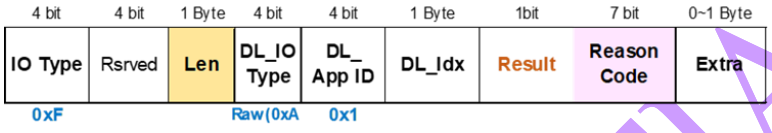

■ **Len** (1 octet): 1 ~ 255
number of bytes after this octet (**Len**)

■ IO Type of the downlink message (DL_IO Type): 0xA
■ Application ID of the downlink message (DL_App ID): 0x0
■ Response Data: 1 octet
- Result (bit 7)
  0: Success
  1: Fail
- Reason Code (bit 6-0)

| Reason Code | | Description | Extra |
|---|---|---|---|
| 0x01 | ERROR_LEN | Minimum length not reached | |
| 0x02 | OUT_OF_BUFFER | out of memory | |
| 0x06 | BUSY | Server device busy | Downlink sequence number |
| 0x11 | RESPONSE_TIMEOUT | Server response timeout | Downlink sequence number |
| 0x14 | SEND_ERROR | Send request fail | Downlink sequence number |
| 0x18 | INVALID_PROTOCOL | Invalid Protocol | |

### 4.10.3.2 Edge Hub Configuration (DL_App ID: 0x1)

#### 4.10.3.2.1 Only with Result

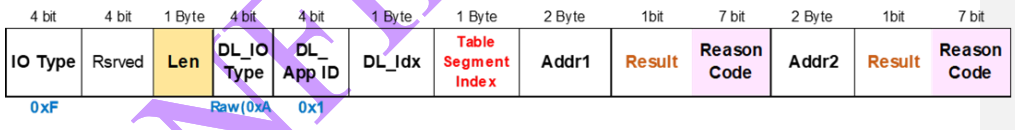



■ **Len** (1 octet): 1 ~ 255
number of bytes after this octet (**Len**)

■ IO Type of the downlink message (DL_IO Type): 0xA
■ Application ID of the downlink message (DL_App ID): 0x1

** Data format reference Edge hub document

#### 4.10.3.2.2 With Address and Result




■ **Len** (1 octet): 1 ~ 255
number of bytes after this octet (**Len**)

■ IO Type of the downlink message (DL_IO Type): 0xA
■ Application ID of the downlink message (DL_App ID): 0x1

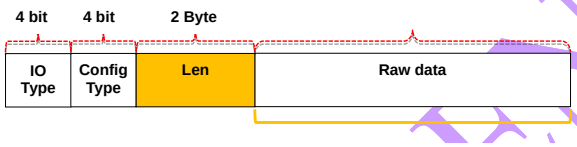
** Data format reference Edge hub document

## 4.11 Application Raw data (I/O Type: 0xA)

■ Config type table:

| (4 Bit) | Config Type |
|---|---|
| 0x0 | Transparent mode data |
| 0x1 | Edge Hub configuration data |
| 0x2 | History IO/ sensor data |

### 4.11.1 Transparent mode data (Config Type: 0x0)




■ **Len** (2 octet): 1 ~ 65532 (except I/O Type and Len)
number of bytes after this octet (**Len**)

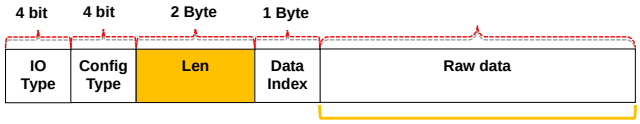
■ IO Type (bit 7 – 4): 0xA
■ Config Type (bit 3 – 0): 0x0

* WHDR frame version 10b format should be used when the Total Length of WPayload is more than 255.

[Example]:
Used in Transparent mode of WISE-2200-M.
In the case of the length of raw data 21 bytes, WHDR frame version 01b format can be remained.
[81, seq, 18,] A0, 15, 00, 07, 03, 10, 00, 07, 54, 30, 30, 35, 32, 32, 30, 32, 30, 30, 30, 30, 30, 31, F2, 97, [CRC]

For a larger frame with raw data 0x017F bytes, use WHDR frame version 10b format instead for 2-bytes total length.
[A**2**, seq, 01, 82, 01,] A0, 7F, 01, 4F, …. , [CRC]

### 4.11.2 Edge Hub Configuration data (Config Type: 0x1)



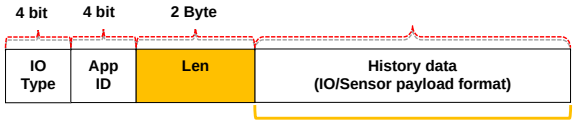

■ **Len** (2 octet): 1 ~ 65532 (except I/O Type and Len)
number of bytes after this octet (**Len**)

■ IO Type (bit 7 – 4): 0xA

■ Config Type (bit 3 – 0): 0x1

** Data format reference Edge hub document.

### 4.11.3 History IO/ sensor data (Config Type: 0x2)




■ **Len** (2 octet): 1 ~ 65532 (except I/O Type and Len)
number of bytes after this octet (**Len**)

■ IO Type (bit 7 – 4): 0xA
■ Config Type (bit 3 – 0): 0x2

* WHDR frame version 10b format should be used when the Total Length of WPayload is more than 255.

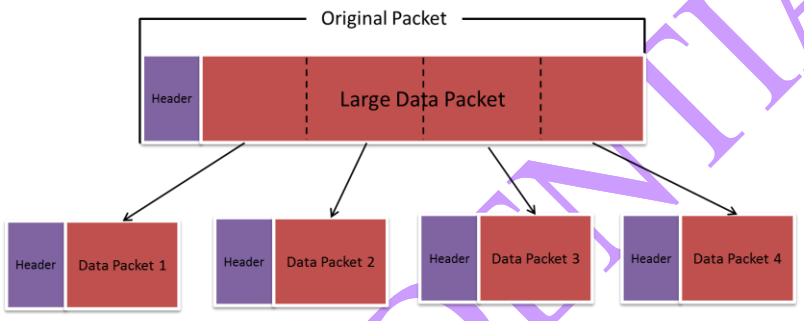
[Example]:
Update IO/sensor history data
[80, seq, Len+3,] A2, Len, Len, **[IO/Sensor payload format]**, [CRC]

[80, seq, 3D,] A2, 3A, 00, **[50 08 07 00 00 00 13 65 00 00 54 23 E2 07 00 00 06 00 05 00 04 00 00 00 05 00 04 00 03 00 00 00 0A 00 05 00 04 00 03 00 00 00 00 AD 74 36 68]**, [CRC]

Payload format reference chapter 4.1~4.8.

# 5 Packet Fragmentation and Reassembly

Because the data rate is controlled by the network, the length of each uplink is not fixed. The Frame Payload (FRM Payload) will be split into multiple fragments.




A complete frame can be divided into several uplink messages.

| Frame Payload (FRM Payload) | | |
|---|---|---|
| WHDR | WPayload | WCRC |

## 5.1 No Encryption Payload

<Frame version 01b>

1st message:

| WHDR | | | | WPayload* |
|---|---|---|---|---|
| Octet: 1 | 1 | 1 | 0 | Variable |
| Frame Control | Frame Sequence Number | Total Length | Source Address | A partial of WISE Payload |
| 0x81 | S | M | | |

2nd ~ nth messages

| WHDR | | | | WPayload* |
|---|---|---|---|---|
| Octet: 1 | 1 | 0 | 0 | Variable |
| Frame Control | Frame Sequence Number | Total Length | Source Address | A partial of WISE Payload |
| 0x01 | (S+1) ~ | | | |

The last message:

| WHDR | | | | WPayload* | WCRC |
|---|---|---|---|---|---|
| Octet: 1 | 1 | 0 | 0 | Variable | 1 |
| Frame Control | Frame Sequence Number | Total Length | Source Address | The rest of WISE Payload | CRC |
| 0x01 | (S+n) | | | | 0x23 |

<Frame version 10b>

1st message:

| WHDR | | | | | WPayload* |
|---|---|---|---|---|---|
| Octet: 1 | 1 | 1 | 2 | 0 | Variable |
| Frame Control | Frame Sequence Number | Frame Control 2 | Total Length | Source Address | A partial of WISE Payload |
| 0xA2 | S | 0x01 | M | | |

2nd ~ nth messages

| WHDR | | | | | WPayload* |
|---|---|---|---|---|---|
| Octet: 1 | 1 | 0 | 0 | 0 | Variable |
| Frame Control | Frame Sequence Number | Frame Control 2 | Total Length | Source Address | A partial of WISE Payload |
| 0x02 | (S+1) ~ | | | | |

The last message:

| WHDR | | | | | WPayload* | WCRC |
|---|---|---|---|---|---|---|
| Octet: 1 | 1 | 0 | 0 | 0 | Variable | 1 |
| Frame | Frame | Frame | Total | Source | The rest of WISE | CRC |

| Control | Sequence Number | Control 2 | Length | Address | Payload | |
|---|---|---|---|---|---|---|
| 0x02 | (S+n) | | | | | |

[Example]:
Uplink data in Transparent mode of WISE-2200-M.
1st frame:

A28D018B01A07F014F766572766965770D0A5072697661746520 4C6F526120616E64204C6F526157414E2
070726F746F636F6C7320656E61626C652076657279206C6F6E672072616E6765207472616E736D6973736
96F6E732077697468206C6F7720706F77657220636F6E73756D7074696F6E2C206F7065726174696E67206
96E20746865206E6F6E2D6C6963656E73656420737065637472756D0D0A0D0A574953452D323230302D4
D2069732061204C6F526157414E204D6F6462757320726561642F777269746520636F6D6D756E69636174
696F6E20646576696365206520706F776572656420627920416476616E7465

Last frame:

028E63682E20574953452D323230302D4D20737570706F727473206D6178696D756D20313238206164647
265737320616E642033302072756C652073657474696E672063616E20656173696C7920636F6E6E6563742
0746F206D6F646275732073656E736F727320616E64206D657465727320666F722064696666657265 6E742
06B696E6473206F66206170706C69636174696F6E732E600750FA7D0265C7FF2A

## 5.2 AES-256 Encryption Payload

An original frame without encrytion:

| Frame Payload (FRM Payload) | | | | |
|---|---|---|---|---|
| WHDR | | | WPayload | WCRC |
| 0x81 | S | M | ...<br>Length = M | 0xXY |

After encryption

| Frame Payload (FRM Payload) | | | | |
|---|---|---|---|---|
| WHDR | | | *EncryptWPayload* | WCRC_*new* |
| 0xC1 | S | 16*n | ...<br>length = 16*n = [(M+15)/16]*16 | 0xPQ |

1st message:

| WHDR | | | | *EncryptWPayload* * |
|---|---|---|---|---|
| Octet: 1 | 1 | 1 | 0 | Variable |
| Frame Control | Frame Sequence Number | Total Length | Source Address | A partial of WISE Payload |
| 0xC1 | S | 16*n | | |

2nd ~ nth messages

| WHDR | | | | *EncryptWPayload* * |
|---|---|---|---|---|
| Octet: 1 | 1 | 0 | 0 | Variable |
| Frame Control | Frame Sequence Number | Total Length | Source Address | A partial of WISE Payload |
| 0x41 | (S+1) ~ | | | |

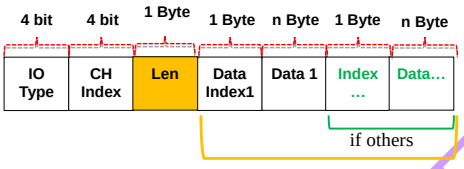
The last message:

| WHDR | | | | *EncryptWPayload* * | WCRC_*new* |
|---|---|---|---|---|---|
| Octet: 1 | 1 | 0 | 0 | Variable | 1 |
| Frame Control | Frame Sequence Number | Total Length | Source Address | The rest of WISE Payload | CRC |
| 0x41 | (S+n) | | | | 0xPQ |

# 6 Downlink LPWAN Payload Format (Gateway to Node)

The LoRaWAN frame version in WHDR header is ver.00b or ver.10b.
FPort for data downlink is identical to uplink FPort.

## 6.1 DI data (I/O Type: 0x0)




- IO Type (bit 7 – 4): 0x0
- CH Index (bit 3 – 0): I/O channel 0 ~ 15

- Len (1 octet): 1 ~ 255
  Total data length of all indexes and its data

- Data Index: 1 octet
- Data: n octets

| Data index | Data length n | Data content |
|---|---|---|
| 1 | 1 | Start Counter<br>Write 1: start counting<br>0: stop counting |
| 2 | 1 | Get/Clear Counter Overflow Status<br>Write 0: clear the overflow status |
| 3 | 1 | Clear Counter<br>Write 1 : Clear the counter value |
| 4 | 1 | Get/Clear L2H Latch Status<br>Write 0: clear the L2H latch status |

| | | |
|---|---|---|
| 5 | 1 | Get/Clear H2L Latch Status<br>Write 0: clear the H2L latch status |
| 6 | 4 | Configure the Conversion Interval of the specified DI channel used for power output enabled.<br>Value range: 1~86400, unit: Sec |

[Example]:

To clear the counter value of DI channel 1

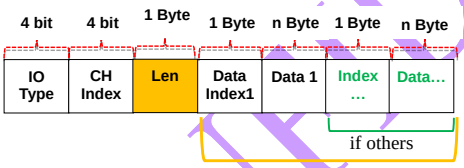
[ WHDR ] WPayload [CRC]

[0x80, seq, 0x04,] 0x01, 0x02, 0x03, 0x01, [CRC]

To configure the conversion interval value of DI channel 1 to 60 sec

[0x80, seq, 0x07,] 0x01, 0x05, 0x06, 0x3C, 0x00, 0x00, 0x00, [CRC]

## 6.2 DO data (I/O Type: 0x1)




- IO Type (bit 7 – 4): 0x1
- CH Index (bit 3 – 0): I/O channel 0 ~ 15
- Len (1 octet): 1 ~ 255
  Total data length of all indexes and its data
- Data Index: 1 octet
- Data: n octets

| Data index | Data length<br>n | Data content |
|---|---|---|

| | | |
|---|---|---|
| **1** | 1 | Set signal logic status<br>Write 1: set output signal High<br>0: set output signal Low |
| **2** | 1 | Set Pulse Output Continue State<br>Write 1: Pulse outputting is continuous<br>0: Disable the continuous mode |
| **3** | 1 | Stop Pulse Output<br>Write 1: Stop the pulse outputting. |
| **4** | | |

[Example]:

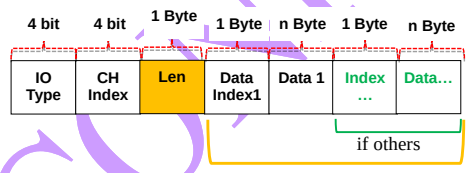
To pull the DO channel 1 to high

[0x80, seq, 0x04,] 0x11, 0x02, 0x01, 0x01, [CRC]

## 6.3 AI data (not 16-bit) (I/O Type: 0x2)

(TBD)

## 6.4 AI data (I/O Type: 0x3)




- IO Type (bit 7 – 4): 0x3
- CH Index (bit 3 – 0): I/O channel 0 ~ 15
- Len (1 octet): 1 ~ 255
  Total data length of all indexes and its data
- Data Index: 1 octet

■ Data: n octets

| Data index | Data length n | Data content |
|---|---|---|
| 1 | 1 | High alarm status<br>Write 0: clear the high alarm status |
| 2 | 1 | Low Alarm Status<br>Write 0: clear the low alarm status |
| 3 | 1 | Clear Maximum AI Value<br>1: Clear the maximum AI value |
| 4 | 1 | Clear Minimum AI Value<br>1: Clear the minimum AI value |
| 5 | 4 | Configure the Conversion Interval of all AI channels.<br>(The 'CH index' in the format will be ignored.)<br>Value range: 1~86400, unit: Sec |

[Example]:

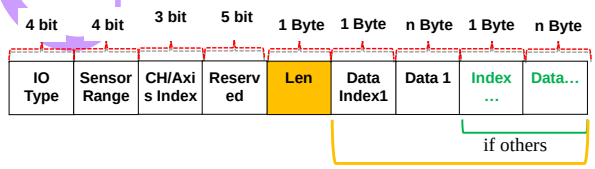
To clear the Max. and Min. AI value of channel 2

[0x80, seq, 0x06,]0x32, 0x04, 0x03, 0x01, 0x04, 0x01, [CRC]

To configure the conversion interval value to 60 sec

[0x80, seq, 0x07,] 0x30, 0x05, 0x05, 0x3C, 0x00, 0x00, 0x00, [CRC]

## 6.5 Sensor data (I/O Type: 0x5)




■ IO Type (bit 7 – 4): 0x5

■ Sensor Range (bit 3 – 0):

| (4 bit) | Sensor Type |
|---|---|
| 0x0 | 4096 - Temperature (℃) |
| 0x1 | 4097 - Temperature (℉) |
| 0x2 | 4098 - Temperature (K) |
| 0x3 | 4128 - Humidity (%) |
| 0x4 | 4256 - Accelerometer (g) |
| 0x5 | 4257 - Accelerometer ($m/s^2$) |
| 0x6 | Stacklights Sensor |
| 0x5 – 0xF | (RFU) |

■ CH Index/Axis Mask (bit 7 – 5):

| | Range: 0x0 – 0x3<br>Temp./Humidity | Range: 0x4/0x5<br>Accelerometer | Range: 0x6<br>Stacklights Sensor |
|---|---|---|---|
| Bit 0 | 0 | X-axis | Sensor Index 0 ~ 7 |
| Bit 1 | 0 | Y-axis | |
| Bit 2 | 0 | Z-axis | |

■ Len (1 octet): 1 ~ 255

Total data length of all indexes and its data

■ Data Index: 1 octet

■ Data: n octets

### 6.5.1 Temperature/Humidity (Range: 0x0 ~ 0x3)

| Data index | Data length n | Data content |
|---|---|---|
| | | Range: 0x0 – 0x3<br>Temp./Humidity |
| **1** | 1 | High alarm status<br>Write 0: clear the high alarm status |
| **2** | 1 | Low Alarm Status<br>Write 0: clear the low alarm status |
| **3** | 1 | Clear Maximum Sensor Value |

| | | |
|---|---|---|
| | | 1: Clear the maximum value |
| **4** | 1 | Clear Minimum Sensor Value<br>1: Clear the minimum value |
| **5** | 4 | Set the high alarm limit value.<br>(unit: 0.001 ℃/℉/K/%)(4 bytes) |
| **6** | 4 | Set the low alarm limit value.<br>(unit: 0.001 ℃/℉/K/%)(4 bytes) |
| **7** | 4 | Set the offset value.<br>(unit: 0.001 ℃/℉/K/%)(4 bytes) |

### 6.5.2 Accelerometer (Range: 0x4 ~ 0x5)

| Data index | Data length n | Data content<br>Range: 0x4/0x5<br>Accelerometer |
|---|---|---|
| **1** | 1 | (Reserved)<br>~~High alarm status of velocity RMS~~<br>~~Write 0: clear the high alarm status~~ |
| **2** | 1 | (Reserved) |
| **3** | 1 | (Reserved) |
| **4** | 1 | (Reserved) |
| **5** | 4 | Set the high alarm limit value of velocity RMS (unit: 0.01 mm/s) (4 bytes). |
| **6** | 4 | (Reserved) |
| **7** | 9 | (Reserved) |
| **8** | 3 | (Reserved) |
| **9** | 4 | Get the log massive data with a specific log index number.<br>Log Index number (4)<br><Note>: If log index number= 0xFFFFFFFF, the latest data will be uploaded. |
| **10** | 8 | Read the ***n*** bytes starting from the ***K***th byte position of log data with a specific |

<table>
<tr><td></td><td></td><td>log index number.<br>Log index number (4) + n (2) + K (2)</td></tr>
<tr><td>11</td><td>8</td><td>Get the log massive data with a specific log index number at specific UTC time.<br>Log index number (4) + UTC (4)<br><Note>: IF UTC time is 0 or less than current time of module, module will upload FFT data immediately.</td></tr>
<tr><td>12</td><td>2</td><td>Enable or disable the feature data (2 byte).<br>WISE-2410
<table>
<tr><td>Bit</td><td colspan="2">15-8</td><td>7</td><td>6</td><td>5</td></tr>
<tr><td>Data Type</td><td colspan="5">Reserved</td></tr>
<tr><td>Bit</td><td>4</td><td>3</td><td>2</td><td>1</td><td>0</td></tr>
<tr><td>Data Type</td><td>Displacement</td><td>Standard deviation</td><td>Skewness</td><td>Crest Factor</td><td>Kurtosis</td></tr>
</table>
1: Enable<br>0: Disable</td></tr>
<tr><td>13</td><td>2</td><td>(Reserved)</td></tr>
<tr><td>14</td><td>0</td><td>Clear all log massive data query commands stored in device.</td></tr>
<tr><td>15</td><td></td><td>Get the log massive data with a specific log index number and specific frequency range at specific UTC time.<br>Log index number (4) + UTC (4) + Frequency Start (4) + Frequency End (4)<br>Frequency unit: Hz<br><Note>: IF UTC time is 0 or less than current time of module, module will upload FFT data immediately.</td></tr>
<tr><td>16</td><td>5</td><td>Get the feature data with a specific log index number.<br>Log index number (4) + Send temperature data or not (1)<br><Note>: If log index number= 0xFFFFFFFF, the latest data will be uploaded.<br>Send temperature data or not:
<table>
<tr><th>Value</th><th>Description</th></tr>
<tr><td>0</td><td>Without temperature data</td></tr>
<tr><td>1</td><td>With temperature data</td></tr>
</table></td></tr>
<tr><td>17</td><td></td><td>(Reserved)</td></tr>
</table>

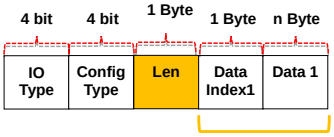
[Example]:

To set the high alarm limit value of Z-axis of accelerometer to 15.25 mm/s (= 0x5F5 $*10^{-2}$).

[0x80, seq, 0x08,]0x54, 0x80, 0x05, 0x05, 0xF5, 0x05, 0x00, 0x00, [CRC]

## 6.6 Device data (I/O Type: 0x6)

*Single index per frame only




- IO Type (bit 7 – 4): 0x6
- Config Type (bit 3 – 0):

| | |
|---|---|
| 0 | Reserved |
| 1 | General configurations |
| 2 | LPWAN application configurations |
| 3 | LPWAN network configurations |
| 4 | |

- Len (1 octet): 1 ~ 255
  Total data length of all indexes and its data
- Data Index: 1 octet
- Data: n octets

### 6.6.1 General (Type: 0x61)

| Data index | Data length n | Data content |
|---|---|---|
| 1 | 4 | Adjust RTC time by UNIX timestamp of UTC time (4 bytes). |
| 2 | ~25 + 1 | Adjust RTC time by ISO 8601 format<br>YYYY-MM-DDThh:mm:ssTZD |

| | | |
|---|---|---|
| | Where 1 octect is 0x00 (NULL end) | where:<br>YYYY = four-digit year<br>MM = two-digit month (01=January, etc.)<br>DD = two-digit day of month (01 through 31)<br>hh = two digits of hour (00 through 23) (am/pm NOT allowed)<br>mm = two digits of minute (00 through 59)<br>ss = two digits of second (00 through 59)<br>TZD = time zone designator (Z or +hh:mm or -hh:mm) |
| **3** | 3 | Restart the system<br>Write: **RST** |
| **4** | 4 | Adjust RTC time by an offset value in unit of seconds.<br>Value range: **-2,147,483,647** ~ **+2,147,483,647** (signed 4-byte) |
| **5** | 1 | Query the device's firmware version.<br>Write: 0x00<br>(Response packet: Refer to 4.6.2) |

[Example]:

To set the RTC time to 2019-12-26T10:55:30+08:00

[0x80, seq, 0x1D,]0x61, 0x1B, 0x02, '2', '0', '1', '9', '-', '1', '2', '-', '2', '6', 'T', '1', '0', ':', '5', '5', ':', '3', '0', '+', '0', '8', ':', '0', '0', 0x00, [CRC]

To restart the module

[0x80, seq, 0x06,]0x61, 0x04, 0x03, 'R', 'S', 'T' , [CRC]

To adjust the RTC time by offset -120 seconds

[0x80, 0x01, 0x07,] 0x61, 0x05, 0x04, 0x88, 0xFF, 0xFF, 0xFF, 0xF3

To adjust the RTC time by offset +120 seconds

[0x80, 0x01, 0x07,] 0x61, 0x05, 0x04, 0x78, 0x00, 0x00, 0x00, 0xFF

### 6.6.2 LPWAN Application (Type: 0x62)

| Data index | Data length<br>n | Data content |
|---|---|---|

| | | |
|---|---|---|
| **1** | 4 | The interval of updating I/O data.<br>Value range: 1 ~ 2592000 seconds |
| **2** | 10 | The schedule of updating data<br>**Mode (1) + Weekday (1) + Start Time (2) + End Time (2) + Interval (4)**<br><br>Mode: **0** for Basic, **1** for Advance<br>Weekday - Bit mask **0 ~ 6** for Sunday ~ Saturday<br>Start Time:<br>Start hour: **0~23**<br>Minute: **0 ~ 59**<br>End Time:<br>Start hour: **0~23**<br>Minute: **0 ~ 59**<br>Interval: **1 ~ 2592000** seconds |
| | | |
| | | |

[Example]:

To set the Data updating interval to 15 seconds (Little Endian)

[0x80, seq, 0x07,]0x62, 0x05, 0x01, 0x0F, 0x00, 0x00, 0x00, [CRC]

To set the schedule to **Advance** mode

Weekday: Monday, Tuesday, Thursday

Time: 8:30 to 17:30

Interval: 600 seconds

[0x80, seq, 0x0D,] 0x62, 0x0B, 0x02, 0x01, 0x16, 0x08, 0x1E, 0x11, 0x1E, 0x58, 0x02, 0x00, 0x00, [CRC]

To set the schedule to **Basic** mode

Weekday and start/end time are useless in basic mode, but make sure those parameters are in valid range.

[0x80, seq, 0x0D,] 0x62, 0x0B, 0x02, 0x00, 0x16, 0x08, 0x1E, 0x11, 0x1E, 0x58, 0x02, 0x00, 0x00, [CRC]

### 6.6.3 LPWAN Network (Type: 0x63)

<table>
<tr><th>Data index</th><th>Data length<br>n</th><th>Data content</th></tr>
<tr><td>1</td><td>1</td><td>Configure the LoRaWAN device class type.<br>Type value:
<table>
<tr><th>Value</th><th>Device Class</th></tr>
<tr><td>0x01</td><td>Class A</td></tr>
<tr><td>0x03</td><td>Class C</td></tr>
</table></td></tr>
<tr><td>2</td><td>1</td><td>Enable/disable the LoRaWAN message ACK.
<table>
<tr><th>Value</th><th>Enable/disable</th></tr>
<tr><td>0</td><td>Disable</td></tr>
<tr><td>1</td><td>Enable</td></tr>
</table></td></tr>
<tr><td>3</td><td>1</td><td>Configure retry counts for confirm message<br>Counts: 1~8</td></tr>
</table>

已設定格式: 字型色彩: 藍色

[Example]:

To set the device node to Class C.

[0x80, seq, 0x04,]0x63, 0x02, 0x01, 0x03, [CRC]

To enable message ACK.

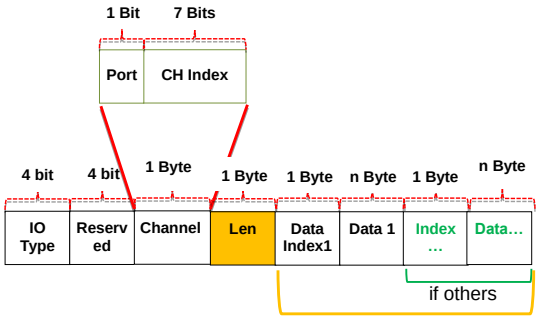
[0x80, seq, 0x04,]0x63, 0x02, 0x02, 0x01, [CRC]

已設定格式: 字型: (英文)Times New Roman, (中文) Times New Roman

To set retry counts for confirm message to 2.

[0x80, seq, 0x04,]0x63, 0x02, 0x03, 0x02, [CRC]

## 6.7 RS-485 Coil data (I/O Type: 0x7)




■ IO Type (bit 7 – 4): 0x7

■ Channel (1 octet):

COM port number and coil channel index.

| | |
|---|---|
| Bit 0 ~ 6 | Coil Channel Index:<br>0 ~ 31 or 0~63 |
| Bit 7 | COM Port Index:<br>0 – COM port 1<br>1 – COM port 2 |

■ Len (1 octet): 1 ~ 255

Total data length of all indexes and its data

■ Data Index: 1 octet

■ Data: n octets

| Data index | Data length<br>n | Data content |
|---|---|---|
| **1** | 1 | Set Coil Value<br>Write 0 or 1 |
| **2** | | Reserved |
| **0x80** | 8 | Configure the Scan Interval value (seconds) of certain rules. |

| | | |
|---|---|---|
| | | Rule index mask (4) + Scan Interval (4) |
| | | |

[Example]:

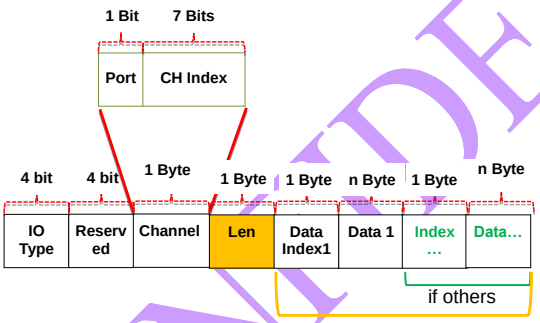
To set the coil channel 4 of COM port 2 to 1

[0x80, seq, 0x05,]0x70, 0x84, 0x02, 0x01, 0x01, [CRC]

To set the Scan Interval value of rule index 0 and 9 of COM port 2 to 300 (0x12C) seconds.

[0x80, seq, 0x0C,]0x70, 0x80, 0x09, 0x80, 0x01, 0x02, 0x00, 0x00, 0x2C, 0x01, 0x00, 0x00, [CRC]

## 6.8 RS-485 Register data (I/O Type: 0x8)




- IO Type (bit 7 – 4): 0x8
- Reserved (bit 3 – 0): 0x0
- Channel (1 octet):

COM port number and Register channel/rule index.

| | |
|---|---|
| Bit 0 ~ 6 | Register Channel Index:<br>0 ~ 31, 0~63 or 0~127 |
| Bit 7 | COM Port Index:<br>0 – COM port 1<br>1 – COM port 2 |

■ Len (1 octet): 1 ~ 255
Total data length of all indexes and its data

■ Data Index: 1 octet
■ Data: n octets

| Data index | Data length n | Data content |
|---|---|---|
| **1** | 2 | Set Register Value (by channel index)<br>Write 0 ~ 0xFFFF |
| **2** | | Reserved |
| **0x80** | 8 | Configure the Scan Interval value (seconds) of certain rules.<br>Rule index mask (4) + Scan Interval (4) |

[Example]:
To set the Register channel 31 of COM port 1 to 0x3184
[0x80, seq, 0x06,]0x80, 0x1F, 0x03, 0x01, 0x84, 0x31, [CRC]

To set the Scan Interval value of rule index 0 and 9 of COM port 2 to 300 (0x12C) seconds.
[0x80, seq, 0x0C,]0x80, 0x80, 0x09, 0x80, 0x01, 0x02, 0x00, 0x00, 0x2C, 0x01, 0x00, 0x00, [CRC]

## 6.9 Meter Data (I/O Type: 0x9)

| 4 bit | 4 bit | 1 Byte | 1 Byte | n1 Byte | 1 Byte | n2 Byte | |
|---|---|---|---|---|---|---|---|
| **IO Type** | **Appl ID** | **Len** | **Idx1** | **Data1** | **Idx2** | **Data2** | … |
| 0x9 | | | | | | | |

■ **Len** (1 octet): 1 ~ 255
number of bytes after this octet (**Len**)

■ IO Type (bit 7 – 4): 0x9
■ Application ID (Appl. ID) (bit 3 – 0) :

| (4 bit) | Application |
|---|---|
| 0x0 | IZAR Water Metering |
| 0x1 | Electric Meter (EBA-43) |
| 0x2 | Electric Meter with Card Reader (EBI-21) |
| 0x3 | Air Conditioner Data |
| | |
| 0x | Electric Meter (RX320S) |
| 0x | Electric Meter with Card Reader (EM1100) |

- Len (1 octet): 1 ~ 255
  Total data length of all indexes and its data

- Data Index: 1 octet
- Data: n octets

### Response message Format

uplink packet for Unicast downlink

| 4 bit | 4 bit | 1 Byte | 4 bit | 4 bit | 1 Byte | 1bit | 7 bit |
|---|---|---|---|---|---|---|---|
| **IO Type** | Rsrved | **Len** | **DL_IO Type** | **DL_ Appl ID** | **DL_Idx** | **Result** | **Reason Code** |
| **0xF** | | | | | | | |

- **Len** (1 octet): 1 ~ 255
  number of bytes after this octet (**Len**)

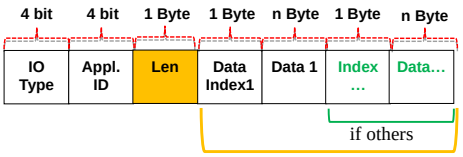
- IO Type (bit 7 – 4): 0xF
- Len (1 octet): 1 ~ 255
  Total data length of all indexes and its data

- IO Type of the downlink message (bit 7 – 4):
- Application ID (Appl. ID) of the downlink message (bit 3 – 0) :
- Data Index of the downlink message: 1 octet
- Response Data: 1 octet

| bit 7 | bit 6-0 |
|---|---|
| Result<br>0: Success<br>1: Fail | Reason Code<br>0x00 – no error, or success response<br>… |

[see Chapter 4.10]

### 6.9.1 Water Metering (Appl. 0x0)




- IO Type (bit 7 – 4): 0x9
- Application ID (Appl. ID) (bit 3 – 0) :

| (4 bit) | Application |
|---|---|
| 0x0 | Water Metering |

- Len (1 octet): 1 ~ 255
  Total data length of all indexes and its data

- Data Index: 1 octet
- Data: n octets

| Data index | Data length n | Data content |
|---|---|---|
| 1 | 5 | Query the meter with address A‘s data record by its log sequence number.<br><br>Meter Address (1) + Log Sequence Number (4). |

### 6.9.2 大同 Electric Meter (Appl. 0x1)

■ Application ID (Appl. ID) (bit 3 – 0) : 0x1

■ Data Index: 1 octet
■ Data: n octets

| Data index | Data length<br>n | Data content<br>(Max. 4 bytes, for SF10 一包內送完) |
|---|---|---|
| 0x01 | 1 | Query a periodic packet with current statuses.<br>0x00 |

| Data index | Data length<br>n | Data content<br>(Max. 4 bytes, for SF10 一包內送完) |
|---|---|---|
| 0x80 | 6 | 年月日時分秒<br>1st byte: 年 byte: (西元年- 2000) |
| 0x81 | 4 | 2 bytes CT, 2 bytes PT<br>CT : 1~ 65535 (只記錄設定值，電表的電量不會乘 CT 比)<br>PT : 1~ 65535 (只記錄設定值，電表的電量不會乘 PT 比) |
| 0xC0 | 4+n | query 多筆、不連續歷史資料<br>4 Byte: base Timestamp<br>1 Byte: Record Mask1 with T_offset<br>1 Byte: Record Mask2 with T_offset<br>...<br>bit 0: +0min<br>bit 1: +15min<br>bit 2: +30min<br>bit 3: +45min<br>bit 4: +15*4min<br>bit 5: +15*5min<br>bit 6: +15*6min<br>bit 7: Record Mask2<br>bit 0: +15*7min<br>bit 1: +15*8min<br>bit 7: Record Mask3 |

[Example]:
To set the 年月日時分秒: 2021/07/23 14:25:30
[0x80, seq, 0x09,]0x91, 0x07, 0x80, 0x15, 0x07, 0x17, 0x0E, 0x19, 0x1E, [CRC]

### 6.9.3 大同 Electric Meter with Card Reader (Appl. 0x2)

- Application ID (Appl. ID) (bit 3 – 0) : 0x2
- Data Index: 1 octet
- Data: n octets

| Data index | Data length n | Data content (Max. 4 bytes, for SF10 一包內送完) |
|---|---|---|
| 0x01 | 1 | Query a periodic packet with current statuses.<br>0x00 |

| Data index | Data length n | Data content (Max. 4 bytes, for SF10 一包內送完) |
|---|---|---|
| 0x80 | 6 | 年月日時分秒<br>1st byte: 年 byte: (西元年- 2000) |
| 0x84 | 1 | Relay on/off<br>=> 0x00 (後台強制斷電<br>=> 0x0F (後台強制供電 |
| 0x8A | 2 | 低餘額警報值 (unit: 0.01 元) |
| 0x90 | 2 | 延遲斷電時間 (unit: 10 ms) |
| 0x91 | 1 | Billing mode<br>0：卡片扣款(依讀取卡片上費率)<br>1：電表扣款(依電表設定費率，可不接讀卡機通信<br>2：卡片扣款(依電表設定費率) (default) |
| 0x93 | 4 | 2 bytes for kWh, 2 bytes for Rate<br>kWh：扣款度數，單位為 0.1kWh，範圍為 1 ~ 99， |

| | | |
|---|---|---|
| | | 設定 10，表示每 1 度扣款<br>Rate：扣款金額，單位為 0.01 元，範圍為 0~6000，<br>設定 500，表示每次扣款 5.0 元 |
| 0xC0 | 4+n | query 多筆、不連續歷史資料<br>4 Byte / 1 Byte / 1 Byte<br>base Timestamp \| Record Mask1 with T_offset \| Record Mask2 with T_offset …<br>bit 0: +0min<br>bit 1: +15min<br>bit 2: +30min<br>bit 3: +45min<br>bit 4: +15*4min<br>bit 5: +15*5min<br>bit 6: +15*6min<br>bit 7: Record Mask2<br>bit 0: +15*7min<br>bit 1: +15*8min<br>bit 7: Record Mask3 |
| | | |

### 6.9.4 Air Conditioner Data (Appl. 0x3)

- Application ID (Appl. ID) (bit 3 – 0) : 0x3
- Data Index: 1 octet
- Data: n octets

| Data index | Data length<br>n | Data content<br>(Max. 4 bytes, for SF10 一包內送完) |
|---|---|---|
| 0x01 | 1 | Query a periodic packet with current statuses.<br>0x00 |

TaiSEIA related commands:

| Data index | Data length<br>n | Data content<br>(Max. 4 bytes, for SF10 一包內送完) |
|---|---|---|
| 0x40 | 2 | 電源開關,<br>0x00, 0x00 關閉<br>0x01, 0x00 開啓 |
| 0x41 | 2 | 運轉模式 |

<table>
<tr><td></td><td></td><td>0x00, 0x00 冷氣<br>0x01, 0x00 除溼<br>0x02, 0x00 送風<br>0x03, 0x00 自動<br>0x04, 0x00 暖氣</td></tr>
<tr><td>0x42</td><td>2</td><td>風速設定: 0 ~ 15<br>0: Auto</td></tr>
<tr><td>0x43</td><td>2</td><td>設定溫度: 0 ~ 35 ºC</td></tr>
<tr><td>0x49</td><td>2</td><td>排程: 開機時間 Hr/Min<br>0xMin, 0xHr</td></tr>
<tr><td>0x4a</td><td>2</td><td>排程: 關機時間 Hr/Min<br>0xMin, 0xHr</td></tr>
<tr><td>0x4b</td><td>2</td><td>定時開機 Min: 0 ~ 1440</td></tr>
<tr><td>0x4c</td><td>2</td><td>定時關機 Min: 0 ~ 1440</td></tr>
<tr><td>0x4d</td><td>2</td><td>系統絕對時間設定 Hr/Min<br>0xMin, 0xHr</td></tr>
<tr><td>0x4e</td><td>2</td><td>開關上下吹風自動轉向功能<br>0x00, 0x00 停止<br>0x01, 0x00 開啓</td></tr>
<tr><td>0x52</td><td>2</td><td>濾網清洗通知<br>W: 0 重置狀態</td></tr>
<tr><td>0x5b</td><td>2</td><td>節能運轉<br>0x00, 0x00 關閉<br>0x01, 0x00 開啓</td></tr>
<tr><td>0x5d</td><td>2</td><td>有線控制器、無線遙控器禁止<br>0xMM, 0x00
<table>
<tr><th>0xMM<br>Bit</th><th>功能</th><th></th></tr>
<tr><td>0</td><td>開關</td><td rowspan="6">0: 許可<br>1: 禁止</td></tr>
<tr><td>1</td><td>運轉模式</td></tr>
<tr><td>2</td><td>溫度設定</td></tr>
<tr><td>3</td><td>風速</td></tr>
<tr><td>4</td><td>自動風向板(上下左右)</td></tr>
<tr><td>5</td><td>停止鍵常時有效</td></tr>
</table></td></tr>
</table>

| | | |
|---|---|---|
| | | |

[Example]:

To set the 電源開關為關閉

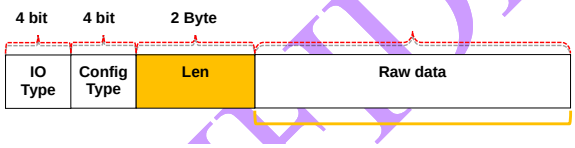
[0x80, seq, 0x05,]0x93, 0x03, 0x40, 0x00, 0x00, [CRC]

## 6.10 Application Raw data (I/O Type: 0xA)

■ Config type table:

| (4 Bit) | Config Type |
|---|---|
| 0x0 | Transparent mode data |
| 0x1 | Edge Hub configuration data |
| 0x2 | Reserved for History IO/ sensor data |

### 6.10.1 Transparent mode data (Config Type: 0x0)




■ **Len** (2 octet): 1 ~ 65532 (except I/O Type and Len)
number of bytes after this octet (**Len**)

■ IO Type (bit 7 – 4): 0xA

■ Config Type(bit 3 – 0): 0x0

* WHDR frame version 10b format should be used when the Total Length of WPayload is more than 255.

[Example]:

Used in Transparent mode of WISE-2200-M.

If total length of raw data is less than or equal to 253, WHDR frame version 00b format can be remained.

[80, seq, 0B,] A0, 08, 00, 07, 03, 05, 00, 00, 08, 44, A6, [CRC] **(*Recommend)**

*WHDR frame version 10b format can also be used, but NOT recommended.

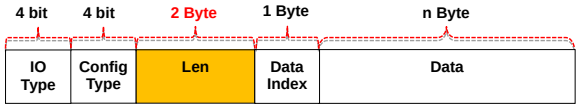
[A2, seq, 00, 0B,] A0, 08, 00, 07, 03, 05, 00, 00, 08, 44, A6, [CRC]

[A2, seq, 01, 0B, 00] A0, 08, 00, 07, 03, 05, 00, 00, 08, 44, A6, [CRC]

For a larger frame with raw data 0x0120 bytes, use WHDR frame version 10b format instead.

[A2, seq, 01, 23, 01] A0, 20, 01, 07, …, [CRC]

### 6.10.2 Edge Hub Configuration (Config Type: 0x1)




- **Len** (2 octet): 1 ~ 65532 (except I/O Type and Len)
  number of bytes after this octet (**Len**)

- IO Type (bit 7 – 4): 0xA
- Config Type (bit 3 – 0): 0x1

** Command format reference Edge hub document.