

1 Nomination

SU: Upper Device

SM: Lower Device

2 Communication Message Format

No.	1	2	3	4	5	6	7	8	9
Bits per Byte	2	1	1	1	1	1	LENID	2	1
Name	SOI	VER	ADR	CID1	CID2	Length	Info	CHKSUM	EOI
Code Format	ASCII	Hex	Hex	Hex	Hex	Hex	Hex	Hex	Hex
Data	0x37 0x45	0x10		0x46	CID2 value				

Note:

1. Transmit Sequence: SOI, VER ……., CHKSUM, EOI
2. High byte is before Low byte

2.1 Definition of Each Field

No.	Field Name		Description	Note
	Field Name	Part Name		
1	SOI	/	Start	
2	VER	/	Communication protocol version number, 0x10 is v1.0	
3	ADR	/	Slave Address	
4	CID1	/	Control Identify	Always 0x46
5	CID2	/	Query	SU->SM
			Response	SM->SU
6	LENGTH	/	Length of INFO field. Hi4 is check code. Lo12 is the length value	
7	INFO	Info Head	For extension of CID2	4 bytes
		Info Data	Info Data	Related to CID2
		Info CRC32	Universal Ethernet CRC32, only for Info Data	4 bytes
8	CHKSUM	/	MOD(Sum of Byte Value of all fields except SOI, EOI, CHKSUM/65536)+1	
9	EOI	/	End	Always 0x0D

2.2 Field VER

VER is 1 byte. Hi4 is main version value, Lo4 is subversion value. For example:

21H -> 2.1

2AH -> 2.10

10H -> V1.0

2.3 Field ADR

Address of slave device, 0x01 – 0xFE. 0xFF is the slave device of all devices.

2.4 Field CID1, CID2

CID is Control Identify.

CID1 is always 0x46H.

While SU sending data to SM, CID2 is Query code. (check Table CID2, CID3)

While SM sending data to SU, CID2 is Response code. (check Table RTN)

Table RTN

		RTN Code	Definition	Note
SM->SU	DATA_RTN	00H	Normal	
		01H	VER Error	
		02H	CHKSUM Error	
		03H	LCHKSUM Error	
		04H	CID2 Invalid	
		05H	Command Format Error	
		06H	Invalid Data	
		90H	ADR Error	User Defined
		91H	Communication Error	User Defined

Table CID2, CID3 Function Code List

Category	CID2	CID3	Description
General	0xA0	/	Read communication protocol version
	0xA1	/	Read device SN
	0xA2	/	Write device SN
	0xA3	/	Read product info
IAP	0xA8	0x01	Switch SM to IAP mode
	0xA8	0x02	Read SM IAP version
	0xA8	0x03	Read SM working mode
	0xA8	0x04	Comparison result of update file from SU
	0xA8	0x05	Storage location of update file from SU
	0xA8	0x06	Switch working mode of SM
Other	0xB0	/	Read analog data of Battery
	0xB1	/	Read all warning, protection and faults info
Read Protect Parameters	0xC0	0x01	Read Cell_OVP (cell over voltage)
	0xC0	0x02	Read Cell_UVP (cell under voltage)
	0xC0	0x03	Read Cell Fail Voltage
	0xC0	0x04	Read Pack_OVP (pack over voltage)
	0xC0	0x05	Read Pack_UVP (pack under voltage)
	0xC0	0x06	Read CHG OC (charge over current)
	0xC0	0x07	Read DSG OC1 (discharge over current)
	0xC0	0x08	Read DSG SC (discharge short circuit)
	0xC0	0x09	Read Charging Temp
	0xC0	0x0A	Read Discharging Temp
	0xC0	0x0B	Read Ambient Temp
	0xC0	0x0C	Read MOS Temp
	0xC0	0x0D	Read Heating-Film Temp
	0xC0	0x0E	Read SOC Low
White Protect Parameters	0xC1	0x01	Write Cell_OVP (cell over voltage)
	0xC1	0x02	Write Cell_UVP (cell under voltage)
	0xC1	0x03	Write Cell Fail Voltage
	0xC1	0x04	Write Pack_OVP (pack over voltage)
	0xC1	0x05	Write Pack_UVP (pack under voltage)
	0xC1	0x06	Write CHG OC (charge over current)

	0xC1	0x07	Write DSG OC1 (discharge over current)
	0xC1	0x08	Write DSG SC (discharge short circuit)
	0xC1	0x09	Write Charging Temp
	0xC1	0x0A	Write Discharging Temp
	0xC1	0x0B	Write Ambient Temp
	0xC1	0x0C	Write MOS Temp
	0xC1	0x0D	Write Heating-Film Temp
	0xC1	0x0E	Write SOC Low
Read System Parameter	0xC2	0x01	Read Pack Setup
	0xC2	0x02	Read Current and Charging Para
	0xC2	0x03	Read Power Parameter
	0xC2	0x04	Read Balance Parameter
	0xC2	0x05	Read Communication Setting
	0xC2	0x06	Read Version Log
	0xC2	0x07	Read BMS Production Info
	0xC2	0x08	Read Protocol Version
	0xC2	0x09	Read RTC Time Setting
	0xC2	0x0A	Read Pack Production Info
	0xC2	0x0B	Read Function Switch
Write System Parameter	0xC3	0x01	Write Pack Setup
	0xC3	0x02	Write Current and Charging Para
	0xC3	0x03	Write Power Parameter
	0xC3	0x04	Write Balance Parameter
	0xC3	0x05	Write Communication Setting
	0xC3	0x06	Write Version Log
	0xC3	0x07	/
	0xC3	0x08	/
	0xC3	0x09	Write RTC Time Setting
	0xC3	0x0A	Write Pack Production Info
	0xC3	0x0B	Write Function Switch
TestCali	0xC8	0x01	Read Calibration State
	0xC8	0x02	Read Calibration Value
	0xC9	0x01	Reset Calibration State
	0xC9	0x02	Write Calibration Value
Debug	0xD0	0x01	Read Balance State
	0xD0	0x02	Read Function Switch State
	0xD1	0x01	Turn On/Off Balance State
	0xD1	0x02	Turn On/Off Function
Parallel Connect	0xE0	0x01	Read number of parallel connected devices

2.5 Field LENGTH

Length of field INFO.

Hi								Lo							
LCHKSUM				LENID (ASCII bytes number of INFO)											
D15	D14	D13	D12	D11	D10	D9	D8	D7	D6	D5	D4	D3	D2	D1	D0

- When LENID = 0, INFO is null. LENID has 12 bits, so max bytes is 4095.

● LCHKSUM is the checksum value of LENID, algorithm is:

1. $S = D11D10D9D8 + D7D6D5D4 + D3D2D1D0$
2. $M = \text{MOD}(S/16)$
3. $R = \sim M + 1$

Example:

INFO has 18 bytes, LENID = 0000 0001 0010B

$S = D11D10D9D8 + D7D6D5D4 + D3D2D1D0 = 0000B + 0001B + 0010B = 0011B$

$M = 0011B$

$R = 1101B$

LCHKSUM = 1101B