Communication protocol between monitoring platform and BMS

Version information

Versi	Date	Description	Author
	V20191124	First draft	
	V20200325	Update some description information, change 0xa10 to 0xd2, special charger switch command	
	V20200325	Determine the baud rate of transmitted data 115200	
	V20200329	Update the optimization instruction table and redefine the data identification code	
	V20200329	Add a command to read all data at once	
	V20200427	Write the ID and write the date of the factory for description	
	V20200429	Add 0xb7 address software version number	
	V20200429	Detailed description of 0x8b and 0x8c addresses	
	V20200508	Optimize 0x84 address unit: 0.1A to 0.01A	
	V20200512	0x81 address name to redefine the temperature in the battery box	
	V20200512	0xa0 0xa1 name redefine	
	V20200512	Add to 0x8b address alarm bit	
	V20200526	Add restart system ID 0xbb	
	V20200615	Add 0xb8 identification version change v2.0	
	V20200713	Add 0xbc identification to restore factory initialization version change v2.1	
		Add 309 fault information	
	V20200825	Add 0xBE 0xBF	
V2.4	20201204	Add 0xc0 to redefine current field data	
V2.5	20201217	Add necessary field reporting description	

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1 summary

This protocol defines the communication protocol between the monitoring platform and the

battery terminal, and defines the message format, transmission mode, communication mode,etc.

2 Reference standard

The communication uses TCP transmission in 2G GPRS, GAT1 in 4G, socket interface mode,

rs232ttl serial port, content custom communication format, and baud rate of 115200.

3 Network topology

This protocol is a point-to-point or bus mode between BMS, GPS, Bluetooth, PC and terminal.

4 Protocol content

4.1 Communication rules

In the communication process, the equipment has both active reporting frame and passive respons
frame.

Refer to the communication data format for details. The interval between packets shall be at least 100ms,

and the longest reply packet shall not exceed 5S. Broadcast regularly. If it is sleeping, send activation

information at the control end, activate BMS, and then communicate

4.2 Frame format

Frame is the basic unit of transmitting information. It includes start character, length, command word,

transmission type, information field, end ID, and checksum. The specific format is shown in Table 1. If

there is no mandatory description in the data unit, the low byte is on the right and the high byte is on the left. Sending is to send the high bit first and then the low bit.

Table. 1 frame format

NUM	Frame unit	Length	Remarks
1	STX	2	Start frame：0x4E(78"N") 0x57(87"W")
2	LENGTH	2	Frame length
3	BMS terminal number	4	4 byte ID
4	Command word	1	Refer to command word description,
5	Frame source	1	0. BMS, 1. Bluetooth, 2. GPS, 3. PC upper computer
6	Transmission type	1	0. Read data, 1. Reply frame, 2. BMS active upload
7	Frame information unit	N	Information field BMS setting data identification code
8	Record number	4	The upper 1 byte is random code, meaningless (reserved for encryption), and the lower 3 bytes are random code record number
9	End identification	1	0X68
10	Checksum	4	Accumulated Checksum (High 2 bytes for CRC not enabled fill 0, Low 2

4.2.1 Frame Starter Field

Two bytes.The first byte is 0x4e and the second byte is 0x57.

4.2.2 Length Domain

L: Two bytes, all data bytes except the first two characters include the checksum and the length field itself.

4.2.3 BMS terminal number ()

Four bytes in total: FF FF FF FF FF has a maximum 8-bit administrative backup number and a low 24-bit terminal number. (The highest byte is the default 00 and the low 3-byte is the one-dimensional ID number.

4.2.4 **Command word description**

A byte that defines the transmission capabilities of this frame.

Command Code	Command Items	Remarks
0x01	Activation directive	When the BMS hibernates, the control side must activate the command first to communicate with the BMS. Received Do other things after you reply.
0X02	Write instructions	Configure BMS parameter instructions,
0X03	Read instructions	Read BMS ID data,
0x05	Password directives	To modify a parameter, the first command must be correct before it can be changed
0x06	Read all data	Read the ID table all at once

4.2.5 **Frame Source Description**

1 byte. 0.BMS, 1.Bluetooth, 2.GPS, 3, PC upper computer relative to both receiver and receiver

4.2.6 **Transport type**

1 byte: 0 for request frame and 1 for answer frame.2 Represents

voluntary reporting.As long as 5-Bluetooth, 2-GPS, 3-PC host and 4-BMS are launched first, the reply is 1.

4.2.7 Record number

One byte high is a random code and three bytes low is a record code

4.2.8 End Code Field

One byte 0x68

4.2.9 Check Code Domain

High 2-byte CRC16 is temporarily not used, and the checksum identifies the sum of all data from the start to the end.

4.3 Communication data format

Example: GPS Read (All, Single) Data Reference

NUM	Frame unit	Length bytes	
1	STX	2	Start Frame：0x4E(78"N")
2	LENGTH	2	Frame Length
3	BMS Terminal number	4	4 byte ID
4	Command word	1	Write instructions with reference to
5	Frame Source	1	0. Data box, 1. Bluetooth, 2. GPS, 3, PC PC PC
6	Transport type	1	0.Read data, 1.Answer frame 2.Data box active upload
7	Data Identification Code	1	Read a single data reference (5.1 table);Read all data and fill in 0x00
8	Record number	4	High 1 byte is meaningless for random code (keep encryption), and low 3 bytes is record number
9	End Identity	1	0x68
10	Checksum	4	

BMS Response

NUM	Frame unit	Length	
1	STX	2	Start Frame：0x4E(78"N")　　0x57(87"W")
2	LENGTH	2	
3	Terminal number	4	
4	Command word	1	
5	Frame Source	1	0. Data box, 1. Bluetooth, 2. GPS, 3, PC PC PC
6	Transport type	1	0.Read data, 1.Answer frame 2.Data box active upload
7	ID + Data	1+N	ID + Data
8	Record number	4	High 1 byte is meaningless for random code (keep encryption), and low 3 bytes is record number
9	End Identity	1	0X68
10	Checksum	4	

Example: GPS Writing Data Reference

NUM	Frame unit	Length bytes	
1	STX	2	Start Frame：0x4E(78"N") 0x57(87"W")
2	LENGTH	2	Frame Length
3	BMS Terminal Number	4	4 byte ID
4	Command word	1	Write instructions with reference to commands
5	Frame Source	1	0. Data box, 1. Bluetooth, 2. GPS, 3, PC PC PC
6	Transport type	1	0.Read data, 1.Answer frame 2.Data box active upload
7	ID + Data	1+N	ID + Data
8	Record number	4	High 1 byte is meaningless for random code (keep encryption), and low 3 bytes is record number
9	End Identity	1	0x68
10	Checksum	4	

BMS Response

NUM	Frame unit	Length bytes	
1	STX	2	Start Frame：0x4E(78"N")　　0x57(87"W")
2	LENGTH	2	
3	Terminal number	4	
4	Command word	1	
5	Frame Source	1	0.BMS, 1.Bluetooth, 2.GPS, 3, PC host
6	Transport type	1	0.Read data, 1.Answer frame 2.BMS active upload
7	Identification Code	1	Write a single data reference (5.1table);
8	Record number	4	High 1 byte is meaningless for random code (keep encryption), and low 3 bytes is record number
9	End Identity	1	0X68
10	Checksum	4	

Sign Code Note: (Background Data Identification Code 0x00 when reading all data)

5.1 BMS Set Data Identification Code

Use instruction	Data Identificatio	Name	byte	type	
R	0x79	Single battery voltage	3 *n	HEX	The first byte is the battery number, followed by the voltage value MV, when reading all the data 0 x 79 followed by a byte length data, And then each set of three bytes represents the battery voltage.
R	0x80	Reader tube temperature	2	HEX	Over 100 percent of the 0 -- 140 (- 40 to 100 degrees C) temperature is negative, such as 101 being negative 1 degrees (100 benchmarks)
R	0x81	Read the temperature in the battery box	2	HEX	0-140 (- 40 to 100 ℃), the part exceeding 100 is the negative temperature, as above (100 reference)
R	0x82	Read battery temperature	2	HEX	0-140 (- 40 to 100 ℃), the part exceeding 100 is the negative temperature, as above (100 reference)
R	0 X 83	Total battery voltage	2	HEX	0. 01 V 3500 * 0 . 01 = 35 . 0 0 v Minimum unit: 10 MV
		Current data		Hex	10000 (10000-11000) * 0.01 = -10.00a (discharge)
R	0 X 85	Remaining battery	1	HEX	SOC， 0 - 100%,
R	0 X 86	Number of NTC	1	HEX	Two battery temperature sensors,
R	0 X 87	Number of battery cycles	2	HEX	
R	0 X 89	Total battery cycle capacity	4	HEX	Ah
R	0x8a	Total number of battery strings	2	HEX	

R	0x8b	Battery warning message	2	HEX	Bit 0: low capacity alarm 1. Alarm 0 is normal. Only warning Bit 1: MOS tube overtemperature alarm 1, alarm 0, normal, alarm Bit 2: charging overvoltage alarm 1, alarm 0, normal, alarm Bit 3: discharge undervoltage alarm 1, alarm 0, normal, alarm Bit 4: battery over temperature alarm 1, alarm 0, normal, alarm Bit 5: charging overcurrent alarm 1, alarm 0, normal, alarm Bit 6: discharge overcurrent alarm 1, alarm 0, normal, alarm Bit 7: cell differential pressure alarm 1, alarm 0, normal, alarm Bit 8: overtemperature alarm in battery box 1, alarm 0, normal, alarm Bit 9: battery low temperature alarm 1, alarm 0, normal, alarm Bit 10: monomer overvoltage alarm 1, alarm 0, normal, alarm Bit 11: monomer undervoltage alarm 1, alarm 0, normal, alarm Bit 12: 309_ A protection 1 alarm 0 normal, alarm Bit 13: 309_ B protection 1 alarm 0 normal, alarm 14 bits: reserved 15 bits: reserved Example: 0x0001: indicates low capacity alarm value 0x0001 ---- > low capacity alarm 0x0002 ---- > over temperature alarm of power board

R	0x8C	Battery status information	2		0-bit:charging MOS state 1 on 0 off this is for uploading prompt 1-bit:discharge MOS tube status 1 on 0 off. This is for uploading prompt. 2-bit： The status of equalizing switch is 1 on and 0 off. This is for uploading prompt 3-bit： The battery is disconnected. 1 is normal. 0 is disconnected. This is an upload prompt, Bits 4-15: reserved example: 00 01: indicates that the charging MOS tube is on
RW	0x8e	Total voltage overvoltage protection	2	HEX	1000 - 15000 (10 MV) minimum unit: 10 MV
RW	0x8f	Total voltage undervoltage protection	2	HEX	1000 - 15000 (10 MV) minimum unit: 10 MV
RW	0 X 90	Single overvoltage protection	2	HEX	1000 -- 4500 MV,
RW	0x91	Monomer overvoltage recovery voltage	2	HEX	1000 -- 4500 MV,
RW	0x92	Single overvoltage protection delay	2	HEX	1 - 60 sec
RW	0x93	Differential voltage protection value	2	HEX	0 - 1000 MV
RW	0x94	Discharge overcurrent protection value	2	HEX	1 - 1000A
RW	0x95	Discharge overcurrent delay	2	HEX	1 - 60 sec
RW	0x96	Charging overcurrent protection value	2	HEX	1 - 1000A
RW	0x97	Charging overcurrent delay	2	HEX	1 - 60 sec
RW	0x98	Equalizing starting voltage	2	HEX	2000 - 4500 MV

RW	0x99	Equalizing opening differential	2	HEX	10 - 1000 MV
RW	0 x9a	Active equalization switch	1	HEX	0 off or 1 on
RW	0x9b	Power tube temperature protection value	2	HEX	0 -- 100 ℃
RW	0x9f	Temperature protection value in battery box	2	HEX	0 - 100 ℃
RW	0 xa 0	Recovery value of battery in box	2	HEX	40 -- 100 ℃
RW	0 xa 1	Battery temperature difference	2	HEX	40 -- 100 ℃
RW	0 xa 2	Battery charging high temperature protection value	2	HEX	5 - 20 ℃
RW	0 xa 3	High Temperature Protection Value for Battery Charging	2	HEX	0 - 100 ℃
RW	0 xa 4	High Temperature Protection Value for Battery Discharge	2	HEX	0 - 100 ℃
RW	0 xa 5	Charging cryoprotection value	2	HEX	- 45 ℃ /+ 25 ℃(No datum - signed data)
RW	0 xa 6	Recovery value of charge cryoprotection	2	HEX	- 45 ℃ /+ 25 ℃(No datum - signed data)
RW	0 xa 7	Discharge cryoprotection value	2	HEX	- 45 ℃ /+ 25 ℃(No datum - signed data)
RW	0 xa 8	Discharge Low Temperature Protection Recovery Value	2	HEX	- 45 ℃ /+ 25 ℃(No datum - signed data)

RW	0 xa 9	Number of battery strings settings	1	HEX	3 - 32
RW	0 xaa	Battery Capacity Settings	4	HEX	AH
RW	0 xab	Charging MOS switch	1	HEX	0 OFF 1 ON
RW	0 xac	Discharge MOS switch	1	HEX	0 OFF 1 ON
RW	0 xad	Current Calibration	2	HEX	100 MA- 20000 MA
RW	0 xae	Protective Board Address	1	HEX	This site is reserved and used in cascade,
RW	0 xaf	Battery type	1	HEX	0: lithium iron phosphate, 1: ternary, 2: lithium titanate
RW	0xb0	Sleep Wait Time	2	HEX	Second data, for reference,
RW	0xb1	Low Capacity Alarm Value	1	HEX	0 -- 80 %
RW	0xb2	Modify parameter password	10	HEX	For temporary reference, fix a password,
RW	0xb3	Special Charger Switch	1	HEX	0 OFF 1 ON
RW	0 Xb 4	Device ID Code	8	Code	Example 60300001 (60 - nominal voltage level: defined according to the voltage level, for example, 60 is 60V Series 48 is 48V series; 3 - material system: according to the system definition of battery material, for example, iron lithium code is 1 manganese acid code 2 ternary code 3; 00001 - production serial number: according to group n of the model produced by the manufacturer in the current month, the number is n (for example, group 1 of a model, n is 00001))

RW	0 Xb 5	Date of production	4	Code	Example 2004 - production year: take the last two digits according to the actual production year; List the batteries produced in 2020, year code 20; Production month: from January to December; character
RW	0xb6	System working time	4	HEX	Reset when leaving the factory, unit: Min
R	0xb7	Software Version Number	15	Code	NW_ 1 _ 0 _ 0 _ 200428
RW	0xb8	Start Current Calibration	1	HEX	1: Start Calibration 0: Turn off calibration
RW	0xb9	Actual battery capacity	4	HEX	AH
RW	0 x BA	Naming of factory ID	24	Code	Column: "BT 3072020120000200521001" *Product name: BT for batteries *Material system: lithium-iron code 1;Manganic acid code 2;Ternary code 3 * Voltage level: 48V series 48;60 V Series 6072 V Series 72 * Capacity level: 20 for 20AH specification *Cycle life: 04 marks for 400 cycles, 12 marks for 1200 cycles * Factory Code: English code of battery manufacturer for low-speed vehicles, if the English code of the manufacturer is less than four digits, the character 0 is used to complement it. *Year of production: two digits after actual year of production;List the battery year code "19" produced in 2019 *Month of production: January-December *Date of production: 01 - 31 *Production Pipeline Number: According to Group N of the model produced on the day of the manufacturer's production date, the number is N (example: Group 1 of a model, 001)

W	0 x BB	Restart the system	1	HEX	1: Restart the system
W	0 x BC	Restore factory settings	1	He X	1: Recovery (restore only factory-based parameters)
W	0 x BD	Remote Upgrade Identity	1	He X	1 Start (wait for identification reply when file is posted)
W	0 x BE	Core Low Voltage Off GPS	2	Hex	Unit: MV (power off to GPS when low voltage is detected)
W	0 x BF	Core Low Voltage Recovery GPS	2	Hex	Unit: MV (power to GPS when recovery voltage value is detected)
R		Protocol Version Number	1		Default value: 0 x 00 0 x 01: redefine 0 x 84 current data in 10 MA, the highest bit is 0 for discharge and 1 for

[Note]

1. In all fields of 0x79 ~ 0xb9, R or RW marked should be reported, for the old version that has been shipped, upgrade as far as possible;If upgrade is not convenient, please contact our technical support at 13755639263/13480924112
2. 0xBA manufacturer ID name, this field is mainly used for switching cabinets, if there is a need for switching cabinets, this field must be added.