Communication protocol between monitoring platform and BMS

Version information

version	The date of	describe	The author
	V20191124	The first draft	
	V20200325	Update some description information, change 0xA10 to 0xD2, dedicated charger switch refers to make	
	V20200325	Determine the transmitted data baud rate of 115200	
	V20200329	Update the optimization instruction table and redefine the data identifier	
	V20200329	Added instruction to read all data at once.	
	V20200427	Write ID write factory date for description	
	V20200429	Add 0xB7 address software version number	
	V20200429	The address 0x8B 0x8C is described in detail	
	V20200508	Modify 0x84 address from 0.1A to 0.01A	
	V20200512	The 0x81 address name is used to redefine the temperature in the battery box	
	V20200512	The 0 xa0 The 0xA1 name is redefined	
	V20200512	Alarm bit added for address 0x8B	
	V20200526	Add the restart system ID 0XBB	
	V20200615	Adding 0xB8 indicates a version change to V2.0	
	V20200713	Add 0xBC flag to restore factory initialization version change V2.1	
		Add 309 failure information	
	V20200825	Add 0 0 XBF xbe	
V2.4	20201204	Add 0xC0 to redefine current field data	echo
V2.5	20201217	Add necessary field reporting description	echo

directory

1 is described

This protocol defines the communication protocol between the monitoring platform and the battery terminal, as well as the message format, transmission mode and communication mode, etc.

2. Citation Criteria

Communication using 2G GPRS in TCP transmission, 4G in GAT1, Socket interface mode,RS232TTL serial port, content custom communication format, baud rate 115200.

3. Network topology

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

4. Content of Statute

4.1 Communication Rules

During the communication process, the device has active reporting frame and passive response frame. Please refer to the communication data format for details. The interval of each packet number is at least 100MS, and the longest reply packet is not more than 5S. Timed broadcast. If dormant, the control terminal will send the activation information, activate the BMS, and then communicate.

4.2 The frame format

A frame is the basic unit of information transmission. These include the start character, length, command word, transmission type, information field, end identifier, and checksum. The specific format is shown in Table 1. The low byte is to the right and the high byte is to the left of the data unit if it is not mandatory.Sending is sent high first and then low.

Table 1 Frame Format

The serial number	The frame unit	The length of the	note
1	STX	2	Start frame: 0x4E(78"N") 0x57(87"W")
2	LENGTH	2	The length of the frame
3	BMS terminal number	4	4 bytes ID
4	Command word	1	Refer to the command word description,
5	The frame source	1	BMS,1. Bluetooth,2.GPS,3. PC PC
6	Transport type	1	1. Response frame 2.BMS active upload
7	Frame information unit	N	The information domain BMS sets the data identifier code
8	Record number	4	High 1 byte is random code meaningless (reserved for encryption), low 3 bytes is Record the serial number
9	End of identity	1	0X68
10	The checksum	4	Accumulated checksum (high 2 bytes for CRC not yet enabled to fill 0, low 2 Byte for cumulative check)

4.2.1 The start of the frame

Two bytes. The first byte is 0x4E, the second byte is 0x57.

4.2.2 The length of the domain

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

4.2.3 BMS Terminal No. ()

Total four bytes: FF FF FF FF FF FF FF FF FF FF Maximum 8 bits management standby number, low 24 bits is the terminal number (The highest byte is the default 00, the lowest three bytes is the dimension one ID number)

4.2.4 Command word specification

A byte that defines the transmission function of this frame.

The command code	Ordered item	note
0x01	Activation instruction,	When the BMS is dormant, the controller to communicate with the BMS will issue an activation command.After receiving the reply, proceed to any other action.
0X02	Written instructions	Configure the BMS parameter instruction,

0X03	Read the instructions	Read the BMS identifier data,
0x05	Pair code instruction	To modify the parameters, the first command is correct before the change
0x06	Read all the data	Read all the data in the ID code table at one time

4.2.5 Frame source description

1 byte. Relative to both receiver and receiver, 0.BMS,1. Bluetooth,2.GPS,3. PC PC

4.2.6 Transport type

1 byte: 0 for request frame, 1 for reply frame. 2 is for active reporting.

As long as 5-Bluetooth,2-GPS,3-PC PC and 4-BMS are initiated first, the reply will use 1.

4.2.7 record number

High 1 byte is the random code, low 3 bytes is the recording code

4.2.8 End code domain

One byte 0x68

4.2.9 Check code domain

The second byte CRC16 is not used for the time being. The checksum identifies the sum of all data from start to end.

4.3 Communication data format

Example: GPS reads (whole, single) data reference

The serial number	The frame unit	The length of the byte	
1	STX	2	Start frame: 0x4E(78"N") 0x57(87"W")
2	LENGTH	2	The length of the frame
3	BMS terminal number	4	4 bytes ID
4	Command word	1	Refer to the command to write the instructions
5	The frame source	1	Data box,1. Bluetooth,2.GPS,3
6	Transport type	1	1. Response frame 2. Active upload of data box
7	Data identification code	1	Read individual data references (Table 5.1);Read all data and fill in 0x00
8	Record number	4	The high 1 byte is the random code meaningless (reserved for encryption), the low 3 bytes is the record sequence number
9	End of	1	0x68

	identity		
10	The checksum	4	
			6/15

BMS reply

The serial number	The frame unit	The length of the	
1	STX	2	Start frame: 0x4E(78"N") 0x57(87"W")

2	LENGTH	2	
3	Terminal no.	4	
4	Command word	1	
5	The frame source	1	Data box,1. Bluetooth,2.GPS,3
6	Transport type	1	1. Response frame 2. Active upload of data box
7	Identifier + data	1+N	Identifier + data
8	Record number	4	The high 1 byte is the random code meaningless (reserved for encryption), the low 3 bytes is the record sequence number
9	End of identity	1	0X68
10	The checksum	4	

Example: GPS write data reference

The serial number	The frame unit	The length of the byte	
1	STX	2	Start frame: 0x4E(78"N") 0x57(87"W")
2	LENGTH	2	The length of the frame
3	BMS terminal number	4	4 bytes ID
4	Command word	1	Refer to the command to write the instructions
5	The frame source	1	Data box,1. Bluetooth,2.GPS,3
6	Transport type	1	1. Response frame 2. Active upload of data box
7	Identifier + data	1+N	Identifier + data
8	Record number	4	The high 1 byte is the random code meaningless (reserved for encryption), the low 3 bytes is the record sequence number
9	End of identity	1	0x68

10	The checksum	4	

BMS reply

The serial number	The frame unit	The length of the	
1	STX	2	Start frame: 0x4E(78"N") 0x57(87"W")
2	LENGTH	2	
3	Terminal no.	4	

4	Command word	1	
5	The frame source	1	BMS,1. Bluetooth,2.GPS,3. PC PC
6	Transport type	1	1. Response frame 2.BMS active upload
7	**Identification code**	1	Write a single data reference (Table 5.1);
8	Record number	4	The high 1 byte is the random code meaningless (reserved for encryption), the low 3 bytes is the record sequence number
9	End of identity	1	0X68
10	The checksum	4	

Note :(The background data identification code is 0x00 when reading all data)

5.1   The BMS sets the data identification code

Use instruction	Data identification code	The name of the	byte	type	
R	0x79	Single battery voltage	3 *n	HEX	The first byte is the battery number, and the second is the voltage value mV. When reading all the data, 0 x 79 is followed by a byte length data, and then every three bytes in a group represents the electricity Pool voltage.
R	0x80	Read power tube temperature	2	HEX	0 -- 140 (-40 to 100 ° C) parts over 100 are negative temperatures, such as 10, 1 is negative 1 ° C (100 Benchmark)
R	0x81	Read the temperature in the battery box	2	HEX	0 -- 140 (-40 to 100 ℃) The part over 100 is negative temperature, as above (100 reference)
R	0x82	Read battery temperature	2	HEX	0 -- 140 (-40 to 100 ℃) The part over 100 is 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 The minimum unit is 10 mV
R	0 X 84	The current data	2	Hex	10000 (10000-11000) * 0.01 = 10.00), a (discharge) (10000−9500) *0.01= 5.00A (charging) Precision 10 mA unit: 01A Note: C 0:0 x 01 redefines the 0 x 84 current data in 10 mA, with the highest bit being 0 "1" means "discharge" and "1" means charge If the discharge is 20 A, the transmitted data is 2000 (0x 07 D0) If the charge is 20 A, the transmission data is 34768 (0x 87 D0)
R	0 X 85	Battery residual capacity	1	HEX	SOC, 0-100%,

R	0 X 86	Number of battery temperature sensors	1	Hex	Two battery temperature sensors,
R	0 X 87	Cycle times of battery use	2	Hex	
R	0 X 89	Total capacity of battery cycle	4	HEX	When Ann
R	0x8a	Total number of battery strings	2	HEX	

R	0 X 8 b	Battery Warning Message	2	hex	Bit 0: Low capacity alarm — 1 call the police — 0 normal. Warning only Bit 1: MOS tube overtemperature alarm — 0 normal, alarm Position 2: Charge over voltage alarm — 1 call the police — 0 normal, alarm Position 3: Discharge undervoltage alarm — 0 normal, alarm Position 4: Battery overtemperature alarm — 1 call the police — 0 normal, alarm Position 5: Charge overcurrent alarm — 0 normal, alarm Position 6: discharge over current alarm Position 7: core differential pressure alarm 1 call the police (repeated) 8 bit: overtemperature alarm in the battery box — 1 call the police — 0 normal, alarm Position 9: Battery low temperature alarm — 0 normal, alarm Position 10: Unit overvoltage alarm — 1 alarm — 0 normal, alarm Position 11: Unit undervoltage alarm — 1 alarm Bit 12:309_A protection — 1 call the police — 0 normal, alarm Bit 13:309_B protection — 0 normal, alarm 1 call the police 14 bits: reserved Position 15: Reserved Ex. : 0x0001: Represents the low volume alarm value 0x0001 ----> Low Capacity Alarm
R	0 X 8 c	Battery status information	2		0-bit charging MOS tube state 1 on 0 off This is for uploading prompts 1 bit discharge MOS tube state 1 on 0 off This is for uploading prompts. 2 bit equalization switching state 1 on,0 off this is for the upload prompt The 3-bit battery is down 1 normal.0 dropped, this is the upload prompt, 4-15 bits: reserved example: 00 01: The charging MOS tube is turned on
RW	0x8e	Total voltage overvoltage protection	2	HEX	1000-15000. (10mV)Minimum unit: 10mV
RW	0x8f	Total voltage under voltage protection	2	HEX	1000-15000. (10mV)Minimum unit: 10mV
RW	0 X 90	Monomer overvoltage protection voltage	2	Hex	1000 -- 4500 MV,
RW	0x91	Overvoltage recovery voltage of monomer	2	HEX	1000 - 4500 MV
RW	0x92	Monomer overvoltage protection delay	2	HEX	1 to 60 seconds

RW	0x93	Unit undervoltage protection voltage	2	Hex	1000 -- 4500 MV
RW	0x94	Monomer undervoltage recovery voltage	2	HEX	1000 - 4500 MV
RW	0x95	Monomer undervoltage protection delay	2	HEX	1-60 seconds
RW	0x96	Core differential pressure protection value	2	Hex	0 - 1000 MV
RW	0x97	Discharge overcurrent protection value	2	Hex	1 - 1000A
RW	0x98	Overcurrent delay of discharge	2	Hex	1-60 seconds
RW	0x99	Charge overcurrent protection value	2	Hex	1 - 1000 A
RW	0 x9a	Charge overcurrent delay	2	HEX	1 - 60 S
RW	0x9b	Equalizing starting voltage	2	Hex	2000 - 4500 MV

RW	0x9c	Equalize the opening differential pressure	2	hex	10-1000. The MV,
RW	0x9d	Active equalizing switch	1	Hex	0 off or 1 on
RW	0x9e	Power tube temperature protection value	2	Hex	0-100 ℃
RW	0x9f	Power tube temperature recovery value	2	Hex	0-100 ℃
RW	0 xa 0	Temperature protection value in the battery box	2	Hex	40 -- 100 ℃,
RW	0 xa 1	Temperature recovery value in the battery box	2	Hex	40-100 ℃
RW	0 xa 2	Temperature difference protection value of battery	2	Hex	5-20 ℃,
RW	0 xa 3	Battery charging high temperature protection value	2	HEX	0-100 ℃
RW	0 xa 4	Battery discharge high temperature protection value	2	HEX	0-100 ℃
RW	0 xa 5	Charge low temperature protection value	2	Hex	-45 ℃ /+ 25 ℃ (no reference - signed data)
RW	0 xa 6	Charge low temperature protection recovery value	2	Hex	-45 ℃ /+ 25 ℃ (no reference - signed data)
RW	0 xa 7	Discharge low temperature protection value	2	Hex	-45 ℃ /+ 25 ℃ (no reference - signed data)
RW	0 xa 8	Discharge cryogenic protection recovery value	2	Hex	-45 ℃ /+ 25 ℃ (no reference - signed data)
RW	0 xa 9	Battery string count Settings	1	Hex	3-32
RW	0 xaa	Battery capacity setting	4	Hex	AH (Ann)
RW	0 xab	Charge MOS tube switch	1	Hex	0 to shut down 1 open
RW	0 xac	Discharge MOS tube switch	1	Hex	0 to shut down 1 open
RW	0 xad	Current calibration	2	Hex	100 MA- 20000 MA
RW	0 xae	Guard plate address	1	Hex	This one is reserved, used for cascading,
RW	0 xaf	The battery type	1	HEX	0: lithium iron phosphate, 1: ternary, 2: lithium titanate
RW	0xb0	Dormancy waiting time	2	Hex	Seconds of data, for reference,
RW	0xb1	Low capacity alarm value	1	Hex	0-80%
RW	0xb2	Change parameter password	10	hex	Just for reference, fix a password,
RW	0xb3	Special charger switch	1	Hex	0 off or 1 on

RW	0 Xb 4	The device ID code	8	character	Example 6 03 00001 (60 - nominal voltage grade defined according to the voltage grade, such as 60 for the 60V series 48 for the 48V series 3 - Material system: according to the battery material system definition, such as lithium iron code 1, manganese acid code 2, ternary code 3; 00001 - Production serial number: according to the manufacturer's production of the month of the manufacturer's production of the model group N, the serial number is N (example: type Group 1 of, then N is 00001)) character
RW	0 Xb 5	Manufacture date	4	character	Example 2004 - Year of production: take the last two digits according to the actual year of production; The battery produced in 2020, year code 20; Production month: January -- December; character

RW	0xb6	System working time	4	HEX	Factory clearance, unit points
R	0xb7	Software version number	15	character	NW_1_0_0_200428
RW	0xb8	Whether to start current calibration	1	HEX	1: Start calibration 0: Close calibration
RW	0xb9	Actual battery capacity	4	HEX	AH (Ann)
RW	0 x BA	Name of Manufacturer ID	24	character	Column: "BT 30720201200000200521001" * Product name: battery BT * Material system: lithium iron code 1; Manganese acid code 2; Ternary code 3 * Voltage grade: 48V series 48; 60 for the 60 V series and 72 for the V series * Capacity grade: 20 Ah specification with 20 * Cycle life: 04 mark for 400 cycles and 12 mark for 1200 cycles * Manufacturer's code: English code of low-speed car battery manufacturer. If the English code of the manufacturer is less than four digits, the character 0 is used to fill in the digits * Year of production: take the last two digits according to the actual year of production; List 2019 battery year code "19" * Production months: January to December * Production date: 01-31 * Production serial number: according to the production date of the manufacturer, the serial number is N(for example: the first group of a certain model, it is 001)
W	0 x BB	Restart the system	1	HEX	1: Restart the system
W	0 x BC	factory data reset	1	He X	1: Restore (only restore the factory base parameters)
W	0 x BD	Remote Upgrade Identification	1	He X	1 Start (wait for identification reply when sending the file)
W	0 x BE	The cell turns off GPS with low voltage	2	Hex	Unit: MV (turn off the power supply to GPS when low voltage is detected)
W	0 x BF	Cell low voltage recovery GPS	2	Hex	Unit: MV (turn on the power to GPS when the recovery voltage value is detected)

R	0 x C 0	Agreement version number	1	Hex	Default: 0 x 00
					0 x 01: Redefine the 0 x 84 current data as 10 mA, with the highest bit being 0 for discharge and 1 for charge
					    If the discharge is 20A, the transmitted data is 2000 (0 x 07 D 0)
					    If the charge is 20A, then the transfer data is 34768 (0 x 87 D 0)

【note】

1. All fields marked with R or RW in 0x79 ~ 0XB9 should be reported. For those not reported in the shipped old version, try to upgrade.If it is not convenient to upgrade, please contact our technical suppor.

2. Name 0xBA manufacturer ID. This field is mainly used for the electric changing cabinet. If there is a demand for the electric changing cabinet, this field must be added.