WD-209_GT06 Protocol

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First, the scope of the document

This document specifies that the communication protocol between the WD-209 IOT and the cloud server platform is based on the update of the GT06 standard protocol. The document is applicable to the development of locator terminals and cloud platforms.

Second, terms and definitions

Terminology	English	中文含义
GPS	Global Positioning System	全球卫星定位系统
GSM	Global System For Mobile Communication	全球移动通信系统
GPRS	General Packet Radio Service	通用无线分组业务
TCP	Transport Control Protocol	传输控制协议
LBS	Location Based Services	辅助定位服务
IMEI	International Mobile Equipment Identity	国际移动设备识别码
MCC	Mobile Country Code	移动用户所属国家代号
MNC	Mobile Network Code	移动网号码
LAC	Location Area Code	位置区码
Cell ID	Cell Tower ID	移动基站
UDP	User Datagram Protocol	用户数据报协议
NITZ	Network Identity And Time Zone,	时区

Third, the basic rules

1. The GPRS connection is successfully established and the first login packet is sent to the server. If the server responds to the data packet within 5 seconds, the connection is considered normal, and the location information (GPS, LBS packet) is sent. After 3 minutes, the status packet will be sent. Regularly confirm the normal communication;

2. When the GPRS connection establishment is unsuccessful, the terminal cannot send the login packet. When the GPRS connection fails 3 times, the terminal starts the scheduled restart function for 20 minutes. If the terminal successfully establishes a connection with the server within 20 minutes and receives a packet responding to the login packet sent by the server, the scheduled restart function is closed, the terminal does not restart, and otherwise the terminal automatically restarts after 20 minutes.

3. After receiving the login information report sent by the terminal, the server returns a response data packet to the terminal. If the terminal does not receive the server return packet after sending the login information packet or the status information packet for more than 5 seconds, the server considers that the current connection establishment is abnormal and starts GPS positioning data refill function, disconnect the current GPRS connection, re-establish a new GPRS connection and send a login packet

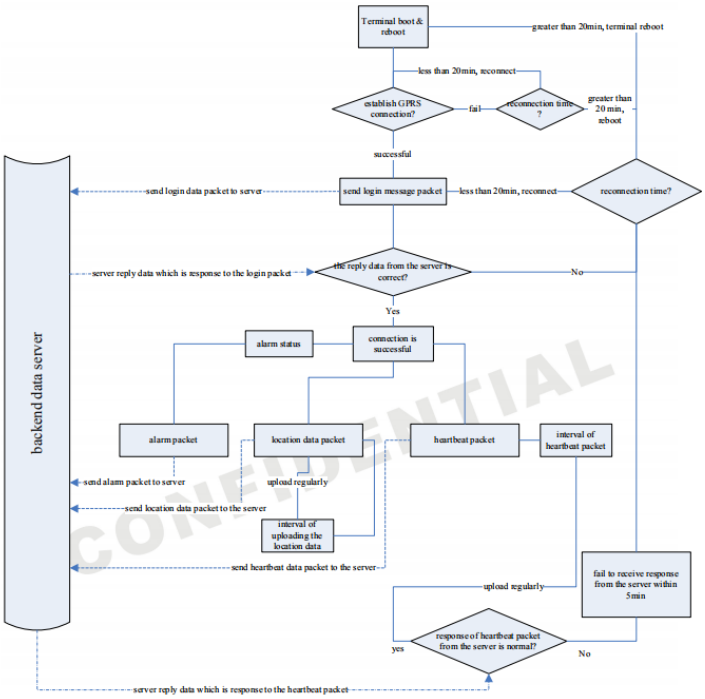
4. The connection is judged to be abnormal. The login packet or status packet sent after the connection is established 3 times cannot receive the data packet responded by the server. The terminal starts the timed restart function. The time is 10 minutes. If the terminal is within 10 minutes, after the server successfully establishes the connection and receives the data packet responded by the server, the scheduled restart function is closed, the terminal does not restart, and otherwise the terminal automatically restarts after 10 minutes.

5. After the connection is established normally, the terminal sends a GPS and LBS merged packet to the server periodically after the GPS information is changed. The

server can set the default sending protocol by command.

6. In order to ensure the validity of the connection, the status information is sent to the server at a fixed interval, and the server returns a response packet.

7. For the terminal that does not have the IMEI number registered, please reply to the login request response and the heartbeat packet response. Do not disconnect the connection directly. (If you disconnect directly or do not reply, it will lead to continuous reconnection of the terminal, GPRS traffic is severely consumed)



Fourth, the protocol description

4.1 Data format

The communication is transmitted asynchronously and in Bytes.

Total package length: (10+N) Byte

Format	Length (Byte)
Start bit	2
Packet length	1
Agreement number	1
Information	N
Information serial number	2
Error check	2
Stop bit	2

Start bit

Fixed value, unified to hex 0x78 0x78 .

Packet length

Length = protocol number + information content + information serial number + error check,

A total of (5+N) Bytes, because the information content is an indefinite long field.

Agreement number

Types of	Value
Login information	0x01
Positioning data	0x12
Status information	0x13
String information	0x15
Alarm data	0x16
BMS packet	0x20
Multimedia packet	0x21
Multimedia upload remote control	0x22
GPS, phone number query address information	0x1A
The server sends instruction information to the terminal.	0x80

Information

According to different applications, corresponding to the corresponding "protocol number", determine the specific content.

Information serial number

The first item sent after booting GPRS Data (including status packages and GPS, LBS Such as the data packet) serial number is '1'. After that, the serial number of each data sent (including the status packet, GPS, LBS data packets) will be automatically increased by 1.

Error check

The terminal or the server can use the check code to determine whether the received information is in error. In order to prevent data has errors during transmission, error checking is added to prevent data misoperation, which increases the security and efficiency of the system. The error check code uses the CRC-ITU check method.

The data in the protocol body from "packet length" to "information serial number" (including "packet length", "information serial number")
of CRC-ITU value.

If the receiver receives a message with a CRC error, it ignores it and discards the packet.

Stop bit

Fixed value, unified to hex 0x0D 0x0A .

4.2 Common data types

Types	Length B	Remarks
Date time	4	The time accumulated by the system function time_t, the number of seconds from January 1, 1970 to the present time, the maximum is January 19, 2038, 11:14:07 UTC timestamp

Start bit	2	Fixed value, unified to hex 0x78 0x78
Packet length	1	Length = protocol number + information content + information serial number + error check
Agreement number	1	Indicates the packet type 0x40: Battery Status Packet 0x41: Multimedia packet 0x42: Multimedia upload remote control packet
Device serial number	8	The terminal uses a 15-digit IMEI number. Such as: 123456789012345 Then the terminal serial number is: 0x01, 0x23, 0x45, 0x67, 0x89 0x01, 0x23, 0x45
Relative SOC	1	Relative capacity percentage, no unit
Available remaining capacity	2	The unit is the value of mAh residual capacity.The remaining capacity is the capacity of the battery pack that can be discharged under the current temperature environment and current discharge current conditions.
Absolute SOC	1	Absolute capacity percentage, no unit
Absolute full capacity	2	The unit is the value of mAh full capacity. The full capacity is the full capacity of the battery pack discharged at a small current under normal temperature conditions.
SOH	1	Battery health percentage
Internal temperature	2	The unit is Kelvin's temperature value, resolution 0.1K. The algorithm for converting to Celsius is as follows: If the data read is 0xb90 0xb90=2960 2960-2731=229=22.9 degree
Real-time current	2	The value is signed data and the most significant bit is the sign bit. The unit is mA. For example, discharge current 20A 20000=0x4e20 Its complement is ~0x4e20+1=0xB1E0 Note: The current value is the average value of the current value in the previous 5.12s time range.
Voltage	2	The unit of the voltage value is is mV .
Cycle index	2	Expressed as the number of cycles of the battery pack.Battery pack cycle count calculation method is based on the actual discharge capacity accumulated to reach the rated capacity of the battery pack 80% cumulative 1 Cycles.
1～7 battery voltage	14	Cell 1—cell 7 Section voltage read single cell voltage command, before returning to data area 14 byte 16 binary data in units mV. 1~7 battery voltage, number 1, 2 Byte integer, for the first 1 battery voltage; 3, 4 Byte integer, for the first 2 battery voltage; subsequent bytes are in order 3~7 byte voltage.
8 to 14 battery voltage	14	Cell 8---cell 14 Section voltage read single cell voltage command, before returning to data area 14 byte 16 binary data in unit mV. which is 8~14 battery voltage, number 1, 2 Byte integer, for the first 8 battery voltage; 3, 4 Byte integer, for the first 9 battery voltage; subsequent bytes are in order 10~14 Battery voltage.
Current charging interval	2	It’s the current charging interval time in user mode with unit h.

Maximum charging interval	2	The largest charge interval value in history, namely 1, 2 The integer value of the byte is in h The maximum charge interval in user mode.
Read and write finished barcode	16	Battery finished barcode
Read version number	2	They are the hardware version number and the software version number.
Battery manufacturer name	16	Battery pack manufacturer name command
Battery status	4	Bye0(ERROR) Bit0: Overvoltage Bit1: Undervoltage Bit2: Discharge overcurrent Bit3: Reserved Bit4: Discharge over temperature Bit5: Charging over temperature Bit6: Discharge under temperature Bit7: Charging under temperature Byte1 (WARRING) Bit0: Overvoltage Bit1: Undervoltage Bit2: Discharge overcurrent Bit3: Reserved Bit4: Discharge over temperature Bit5: Charging over temperature Bit6: Discharge under temperature Bit7: Charging under temperature Byte2 Maximum discharge current allowed by the battery Byte3 Bit0~bit6: Maximum allowable charging current of the battery Bit7: Charging flag 0: Not charged 1: Charging status
Controller status	4	
Controller fault code	4	
Latitude	4	
Longitude	4	
Altitude	2	
Azimuth	1	
GPS speed	1	
Signal state	2	
MCC	2	
MNC	2	
LAC	2	
CELLID	2	
Multimedia ID	4	The UTC time stamp of the time the photo was taken
Multimedia packet	2	

id		
Multimedia packet	N	
Photo interval/recording time	2	
Brightness	1	
Contrast	1	
Saturation	1	
Chroma	1	

4.3 New Packet Description

4.3.01 Remote Control Command

Instruction sequence	Instruction content	Instruction description	Remarks
1	DWXX#	Obtaining the positioning information, the mobile phone user and the short message server can obtain the positioning information through this instruction.	
2	DYD#	Cut off the vehicle oil and electricity control circuit	For the WD-209 project, it is a remote return
3	HFYD#	Switch on the vehicle oil and electricity control circuit	For the WD-209 project, it is a remote borrowing
4	SHOOT, PARAM1, PARAM2, PARAM3, PARAM4, PARAM5	PARAM1: Shooting command 0x00: Stop taking pictures 0x01: Start taking pictures PARAM2: Photo interval/recording time, see protocol description in 4.2 common data types. PARAM3: Save the logo 0x01: Save locally 0x02: Real-time upload PARAM4: Resolution, 0x00: Default Resolution PARAM5: Whether to allow compression, 0x00: not allowed 0x01: Allow PARAM6: Brightness PARAM7: Contrast PARAM8: Saturation PARAM9: Chroma	Where PARAM is allowed to be empty, if it is empty, it means the configuration is the default value.
5	SEARCH#	Remote car search	
6	BATLOCK,PARAM1	Remote switch battery lock, PARAM1:0 to open the battery lock , 1 to close the battery lock	

4.3.03 (0x40) Battery Status Packet

When the device is powered on for the first time, it is sent to the cloud server platform once. When the terminal detects the BMS related hardware information (version number, manufacturer, SN number, etc.), it actively uploads the battery status data packet. At the same time, when the query command is sent remotely on the cloud server platform, the battery status data packet is actively uploaded.

(1) Terminal upload

	Field		length	content
Transport layer header	Start code		2	Fixed value, unified to hex 0x78 0x78
	Packet length		1	See 4.2 Common Data Types
	Agreement number		1	The upper four digits are the major version number, and the lower four digits are the minor version number.
Loading data	Device serial number		8	See 4.2 Common Data Types
	Current time		4	See 4.2 Common Data Types
	Battery information	Relative SOC	1	See 4.2 Common Data Types
		Available remaining capacity	2	See 4.2 Common Data Types
		Absolute SOC	1	See 4.2 Common Data Types
		Absolute full capacity	2	See 4.2 Common Data Types
		SOH	1	See 4.2 Common Data Types
		Internal temperature	2	See 4.2 Common Data Types
		Real-time current	2	See 4.2 Common Data Types
		Voltage	2	See 4.2 Common Data Types
		Cycle index	2	See 4.2 Common Data Types
		1 ~7 battery voltage	14	See 4.2 Common Data Types
		8~ 14 battery voltage	14	See 4.2 Common Data Types
		Current charging interval	2	See 4.2 Common Data Types
		Maximum charging interval	2	See 4.2 Common Data Types
		Read and write	16	See 4.2 Common Data Types

		finished barcode		
		Read version number	2	See 4.2 Common Data Types
		Battery manufacturer name	16	See 4.2 Common Data Types
		Battery status	4	See 4.2 Common Data Types
	Controller packet	Controller status	4	See 4.2 Common Data Types
		Controller fault code	4	See 4.2 Common Data Types
		Serial number	2	Message serial number
Transport layer tail	CRC check		2	See 4.2 Common Data Types
	End position		2	Fixed value, unified to sixteen for 0x0d 0x0a

(2) Server response

	Field	Length	Content
Transport layer header	Start code	2	Fixed value, unified to hex 0x78 0x78
	Packet length	1	See 4.2 Common Data Types
	Agreement number	1	0x40
	Serial number	2	Message serial number
Transport layer tail	CRC check	2	See 4.2 Common Data Types
	End position	2	Fixed value, unified to sixteen for 0x0d 0x0a

4.3.04 (0x41) multimedia data packet

The multimedia data packet is used for the terminal to upload the recording file, the image file captured by the camera, and the video file. The uploading method includes uploading after remote query by the server, and triggering uploading by the terminal according to the event judgment.

(1) Terminal upload

	Field	Length	Content
Transport layer header	Start code	2	Fixed value, unified to hex 0x79 0x79
	Packet length	2	See 4.2 Common Data Types
	Agreement number	1	The upper four digits are the major

				version number, and the lower four digits are the minor version number.
Loading data	Device serial number		8	See 4.2 Common Data Types
	Current time		4	See 4.2 Common Data Types
	GPS location information	Latitude	4	See 4.2 Common Data Types
		Longitude	4	See 4.2 Common Data Types
		Altitude	2	See 4.2 Common Data Types
		Azimuth	1	See 4.2 Common Data Types
		GPS speed	1	See 4.2 Common Data Types
		Signal state	2	See 4.2 Common Data Types
	Base station information	MCC	2	See 4.2 Common Data Types
		MNC	2	See 4.2 Common Data Types
		LAC	2	See 4.2 Common Data Types
		CELLID	2	See 4.2 Common Data Types
	Multimedia information	Multimedia ID	4	See 4.2 Common Data Types
		size of Multimedia	4	Complete Multimedia Packet Size
		Multimedia type	1	0: Image 1: Audio 2: Video
		Multimedia file encoding	1	0: JEPG 1: TIF 2: MP3 3: WAV 4: WMV
		Upload event type	1	0: The platform sends an active query. 1: Terminal timing upload (reserved) 2: Terminal alarm trigger (reserved) 3: Falling rollover trigger (reserved) 4: Overspeed trigger (reserved) 5: ACC illegal alarm trigger (reserved) 6: Borrowing car trigger (reserved) 7: Returning the car to trigger (reserved)
		Multimedia packet id	2	See 4.2 Protocol Description in Common Data Types
		Multimedia packet	N	See 4.2 Protocol Description in Common Data Types
		serial number	2	Message serial number
Transport layer tail	CRC check		2	See 4.2 Common Data Types
	End position		2	Fixed value, unified to sixteen for 0x0d 0x0a

(2) Server response

	Field	Length	Content

Transport layer header	Start code	2	Fixed value, unified to hex 0x79 0x79
	Packet length	2	See 4.2 Common Data Types
	Agreement number	1	0x41
	Serial number	2	Message serial number
Transport layer tail	CRC check	2	See 4.2 Common Data Types
	End position	2	Fixed value, unified to sixteen for 0x0d 0x0a

Image file multimedia package
Video multimedia package
Audio file multimedia package

4.3.05 (0x42) Multimedia upload remote control data packet (reserved)

The upload control of the multimedia data packet can trigger the terminal upload through this message, or can be triggered by the GT06 remote control command.

(1) The server delivers

	Field		Length	Content
Transport layer header	Start code		2	Fixed value, unified to hex 0x78 0x78
	Packet length		1	See 4.2 Common Data Types
	Agreement number		1	See 4.2 Common Data Types
Loading data	Current time		4	See 4.2 Common Data Types
	Multimedia upload control packet	Shooting order	1	0x00: Stop taking pictures 0x01: Start taking pictures
		Photo interval/recording time	2	See 4.2 Protocol Description in Common Data Types
		Save the logo	1	0x01: Save locally 0x02: Real-time upload
		Resolution	1	0x00: default resolution
		Whether to allow compression	1	0x00: not allowed 0x01: Allow
		Brightness	1	See 4.2 Protocol Description in Common Data Types
		Contrast	1	See 4.2 Protocol Description in Common Data Types
		Saturation	1	See 4.2 Protocol Description in

				Common Data Types
		Chroma	1	See 4.2 Protocol Description in Common Data Types
		Serial number	2	Message serial number
Transport layer tail	CRC check		2	See 4.2 Common Data Types
	End position		2	Fixed value, unified to sixteen for 0x0d 0x0a

(2) Terminal response

	Field	Length	Content
Transport layer header	Start code	2	Fixed value, unified to hex 0x78 0x78
	Packet length	1	See 4.2 Common Data Types
	Agreement number	1	0x42
	Serial number	2	Message serial number
Transport layer tail	CRC check	2	See 4.2 Common Data Types
	End position	2	Fixed value, unified to sixteen for 0x0d 0x0a

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