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Communication Protocol for Road Transport Vehicle Videos and Satellite Positioning System

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1. Scope

This standard specifies the protocol basis and communication protocol between the on-board video terminal and the video platform in the road transport vehicle satellite positioning system, the code streaming communication between the audio and video streaming server and the client playback software, as well as the communication protocol basis, communication protocol flow, constant definition and protocol data body format between video platforms.

This standard applies to the transmission of audio and video data between the on-board video terminal of the road transport vehicle satellite positioning system and the enterprise video monitoring platform, as well as the exchange and sharing of audio and video resources between different video platforms.

2. Normative reference document

The following documents are essential for the application. For dated references, the date-only version applies to this document. For undated references, the latest version (including all modification points) applies to this document.

JT/T 808-2011 Road transport vehicle satellite positioning system
(terminal communication protocol and data format)

JT/T 809-2011 Road transport vehicle satellite positioning system
(platform data exchange)

JT/T 1076-2016 Road transport vehicle satellite positioning system
(technical requirements of vehicle video terminal)

JT/T 415-2006 Code Rules for road transport e-government platform

IETF RFC 3550 Real-time Transport Protocol (RTP)

IETF RFC 2854 The Text/Html Media Type

3. Terms and definitions, abbreviations

3.1 Terms and Definitions

The following terminology and definition apply to this document.

3.1.1

Code rate

When data is transmitted, it transmits the number of bits of data in unit time, and the common unit is kilobit per second (kbps).

3.1.2

Frame rate

It indicates the number of times a graphics processor can update a field per second. It is used to measure the number of display frames, and the common unit is Frame per Second (FPS).

3.2 Abbreviations

The following abbreviations apply to this document.

AAC: Advanced Audio Coding

MPEG: Moving Pictures Experts Group

RTP: Real-time Transport Protocol

TCP: Transmission Control Protocol

UDP: User Datagram Protocol

URL: Uniform Resource Locator

UTF-8:8-bit Unicode Transformation Format

FTP: File Transfer Protocol

4 Protocol basis for video terminal and platform

4.1 Protocol basis

The communication mode, data type, transmission rules and message composition of the protocol are in accordance with the requirements of Chapter 4 of JT/T 808-2011.

The communication connection mode of the protocol message is in accordance with the requirements of Chapter 5 of JT/T 808-2011.

The message processing mechanism of signaling data messages in the protocol is according to the requirements of Chapter 6 of JT/T 808-2011.

The encryption mechanism of signaling data packets in the protocol is according to the requirements of Chapter 7 of JT/T 808-2011.

The communication between the platform and the terminal in the protocol shall meet the following requirements:

- Unless expressly agreed, all messages should be answered.
- If no specific reply message is specified, the universal response shall be adopted.
- For subcontracted messages, each subcontracted message should be answered packet-by-packet.

4.2 Real-time audio and video transmission channel

A real-time audio and video transmission channel can transmit one video information or one audio information, or one video and audio information. The real-time audio and video transmission channel conventions are as follows:

- When using TCP mode, each TCP connection can carry multiple audio and video channels. If no data is transmitted within the set timeout period, both the terminal and the platform monitoring center can actively close the TCP connection for audio and video data transmission.
- When using UDP mode, each UDP connection can carry multiple audio and video channels.

4.3 Audio and video communication packets

Audio and video data packets are classified into the following two categories:

- Signaling data message: The data format should comply with JT/T 808-2011, and new protocol instructions and data formats should be added base on the protocol format. Positioning data communication should use the established link between the vehicle video terminal and the enterprise video surveillance platform. don't need to create a new link.

- Code stream data packet: used for real-time network audio and video transmission, network video playback, voice dialogue, voice monitoring, and voice broadcast. The data packet communication should create a new link instead of using the link for transmitting positioning data.

5 Communication protocol for video terminal and platform

5.1 Real-time Audio and Video transmission request

Message ID: 0x9101

Packet type: signaling data packet.

The platform sends requests to the terminal equipment for real-time audio and video transmission, including real-time video transmission, initiating two-way voice intercom, one-way monitoring, broadcasting voice to all terminals and specific transparent transmission. The message body data format is shown in Table 1.

After receiving this message, the terminal replies to the universal response, and then establishes a transmission link through the corresponding server IP address and port number, and then transmits the corresponding audio and video stream data according to the audio and video stream transmission protocol.

Table1 Real-time audio and video transmission request data format

Start byte	Segment	Data type	Description and requirements
0	Server IP address length	BYTE	Length n
1	Server IP address	STRING	Real-time video server IP address
1+n	Server video channel monitoring port (TCP)	WORD	Real-time video server TCP port
3+n	Server video channel monitoring port (UDP)	WORD	Real-time video server UDP port
5+n	Logical channel number	BYTE	According to Table 2 in JT/T 1076-2016
6+n	Data type	BYTE	0: Audio and video, 1: Video, 2: Two-way intercom, 3: Monitor, 4: Central broadcast, 5: Transparent transmission
7+n	Code stream type	BYTE	0: Primary stream, 1: Sub stream

After receiving the special alarm from the video terminal, the platform shall take the initiative to send this instruction without waiting for manual confirmation to start real-time audio and video transmission.

5.2 Real-time audio and video transmission control

Message ID: 0x9102

Packet type: signaling data packet.

The platform sends real-time audio and video transmission control commands, which are used to switch the stream, pause the stream transmission, close the audio and video transmission channel, etc. The data format of the message body is shown in Table 2.

Table 2 real-time audio and video transmission control data format

Start byte	Segment	Data type	Description and requirements
0	Logical channel number	BYTE	According to Table 2 in JT/T 1076-2016
1	Control instruction	BYTE	Platform can control the real-time audio and video of the device through this command: 0: Turn off the audio and video transmission command. 1: Switch the stream (add pause and continue). 2: Pause the sending of all streams in the channel. 3: Recover the sending of the stream before the pause, consistent with the stream type before the pause. 4: Turn off the two-way intercom.
2	Turn off the audio and video types	BYTE	0: Turn off the audio and video data of the channel. 1: Only turn off the audio of the channel, and keep the video of the channel. 2: Only turn off the video of the channel, and keep the audio of the channel.
3	Switch the code stream type	BYTE	Switch the previously applied old stream to the new stream, and the audio remains the same as before . The new stream is: 0: Primary stream 1: Sub stream

5.3 Platform sends remote video playback request

Message ID: 0x9201

Packet type: signaling data packet.

The platform sends a request to the terminal device for audio and video playback, and the terminal shall respond with the instruction 0x1205 (terminal upload video file list), and then transmit the video data. This data is the packet format of Table 2 (real-time audio and video streaming data transfer RTP protocol).

The message body data format is shown in Table 3.

Table 3 The data format for platform sends remote video playback request

Start byte	Segment	Data type	Description and requirements
0	Server IP address length	BYTE	Length n
1	Server IP address	STRING	Real-time audio and video server IP address
1+n	Server audio and video channel monitoring port (TCP)	WORD	Real-time audio and video server port, when TCP is not used for transmission, set: 0
3+n	Server audio and video channel monitoring port (UDP)	WORD	Real-time audio and video server port, when UDP is not used for transmission, set: 0
5+n	Logical channel number	BYTE	According to Table 2 in JT/T 1076-2016
6+n	Audio and video type	BYTE	0: Audio and video, 1: Audio, 2: Video, 3: Video or audio and video
7+n	Code stream type	BYTE	0: Primary stream or sub stream 1: Primary stream 2: Sub stream If the channel only transmits audio, set 0
8+n	Memory type	BYTE	0: Primary memory or backup memory 1: Primary memory 2: Backup memory
9+n	Playback mode	BYTE	0: Normal playback. 1: Fast forward playback 2: key frame fast back 3: key frame playback 4: Single-frame upload

10 + n	Fast forward or fast backward multiples	BYTE	When the playback mode is 1 or 2, the content of this field is valid, otherwise it is set to 0. If no, this field is invalid. 0: invalid 1:1x 2:2x 3:4x 4:8x 5:16x
11 + n	Start time	BCD[6]	YY-MM-DD-HH-MM-SS. When the playback mode is 4, this field indicates the upload time of a single frame.
17 + n	End time	BCD[6]	YY-MM-DD-HH-MM-SS, 0 means always playing back.When it is 0, and indicates continuous playback When the playback mode is 4, this field is invalid.

5.4 Platform sends remote video playback control

Message ID: 0x9202

Packet type: signaling data packet

When the terminal device plays back the audio and video, the platform can send playback control instruction to control the playback process. The format of message body data is shown in Table 4.

Table 4 The data format for platform sends the remote video playback control

Start byte	Segment	Data type	Description and requirements
0	Audio and video channel number	BYTE	According to Table 2 in JT/T 1076-2016
1	Playback control	BYTE	0: Start playback 1: Pause playback 2: End playback 3: Fast forward playback 4: key frame fast back 5: Drag playback 6: Play key frames

2	Fast forward or fast backward multiples	BYTE	When the playback control is set to 3 or 4, this field is valid. If no, this field is invalid. 0: invalid 1:1X 2:2X 3:4X 4:8X 5:16X
3	Drag playback position	BCD[6]	YY-MM-DD-HH-MM-SS. When the playback control is set to 5, the field is valid.

5.5 File upload instruction

Message ID: 0x9206

Packet type: signaling data packet.

The platform sends the file upload command to the terminal. After the terminal replies to the universal response, then it uploads the file to the specified path of the target FTP server through FTP. The message body data format is shown in Table 5.

Table 5 File upload instruction data format

Start byte	Segment	Data type	Description and requirements
0	Server address Length	BYTE	Length k
1	Server address	STRING	FTP server address
1+k	Port	WORD	FTP server port
3+k	User name length	BYTE	Length l
4+k	User name	STRING	FTP user name
4 + k + l	Password length	BYTE	Length m
5 + k + l	Password	STRING	FTP password
5 + k + l + m	File upload path length	BYTE	Length n
6 + k + l + m	File upload path	STRING	File upload path
6 + k + l + m + n	Logical channel number	BYTE	Table 2 in JT/T 1076-2016
7 + k + l + m + n	Start time	BCD[6]	YY-MM-DD-HH-MM-SS

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13 + k + l + m + n	End Time	BCD[6]	YY-MM-DD-HH-MM-SS
19 + k + l + m + n	Warning mark	64BITS	64BITS bit0 ~ bit31 JT/T 808-2011 Table 18 Alarm flag bit definition. bit32 ~ bit63 shown in Table 12 All 0 indicate that the alarm is not specified.
27 + k + l + m + n	Audio and video source type	BYTE	0: Audio and video 1: Audio 2: Video 3: Video or audio and video
28 + k + l + m + n	Code stream type	BYTE	0: Primary stream or sub stream 1: Primary stream 2: Sub stream
29 + k + l + m + n	Memory location	BYTE	0: Primary memory or backup memory 1: Primary memory 2: Backup memory
30 + k + l + m + n	Task execution condition	BYTE	It indicates with bit: bit0: WIFI, 1 indicates that it can be downloaded when WI-FI is connected. bit1: LAN, 1 indicates that it can be downloaded when the LAN is connected. bit2: 3G/4G, 1 indicates that it can be downloaded when the 3G/4G is connected.

If you have any other questions, please send an email to info@istartek.com, we are happy to serve you.