JTT 1078-2016 (En)

MettaX

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Foreword

This standard is in accordance with GB/T 1.1-2009 given the drafting of the rules.

This standard is proposed and managed by the Transportation Information Communication and Navigation Standardization Technical Committee.

Video Communication Protocol for Satellite Positioning System of Road Transport Vehicles

1 Scope

This standard specifies the protocol basis and communication protocol between the vehicle-mounted video terminal and the video platform in the satellite positioning system for road transport vehicles, the code stream communication between the audio and video stream server and the client playback software, and the communication protocol basis between video platforms,communication protocol flow, constant definition and protocol data body format.

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

2 Normative references

The following documents are indispensable for the application of this document. For dated references, only the dated version applies to this document. For undated reference documents, the latest version (including all amendments) applies to this document.

JT/T 808-2011 Communication protocol and data format of satellite positioning system terminal for road transport vehicles

JT/T 809-2011 Data exchange of satellite positioning system platform for road transport vehicles

JT/T 1076-2016 Technical requirements for on-board video terminals of satellite positioning system for road transport vehicles

JT/T 415-2006 Road transport e-government platform catalog coding rules

IETF RFC 3550 RTP Real-time Transport Protocol (Real-time Transport Protocol)

IETF RFC 2854 Text/Hypertext markup language multimedia type (The Text/Html Media Type)

3 Terms and definitions, abbreviations

3. 1 Terms and Definitions

The following terms and definitions apply to this document.

3. 1. 1

Code rate: data bits transmitted per unit of time during data transmission, and the common unit is kilobits per second (kbps).

3. 1. 2

Frame rate: the number of updates per second when the graphics processor processes the field, and is used to measure the number of display frames. The measurement unit is the number of display frames per second (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 between video terminal and video platform

4. 1. Basic stipulations of the agreement

The communication method, 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 signaling data message in the protocol is in accordance with the requirements of Chapter 5 of JT/T 808-2011.

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

The encryption mechanism of the signaling data message in the protocol is in accordance with the requirements of Chapter 7 of JT/T 808-2011.

In the agreement, the communication parties between the platform and the terminal shall meet the following requirements:

—— Unless expressly agreed, all messages shall be responded;

—— If the dedicated response message is not clearly specified, a general response shall be used to reply;

—— For messages with sub-packages, the responder shall respond to each sub-packet message one by one.

4. 2. Real-time audio and video transmission channel agreement

One channel of real-time audio and video transmission can transmit one channel of video information or one channel of audio information, and can also transmit one channel of video information and one channel of audio frequency information. There are two types of real-time audio and video transmission channel conventions:

——When the TCP is used, each TCP connection can carry multiple audio and video channels. If there is no data within the set timeout,, both the terminal and the monitoring center can actively close the TCP connection used for audio and video data transmission.

——When the UDP is used, each UDP port can carry multiple audio and video channels.

4. 3 Classification of audio and video communication packets

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

——Signaling data packets: the data format should comply with the provisions of JT/T 808-2011, and add new protocol instructions and data formats on the basis of its protocol format. The communication should use the established link between the vehicle video terminal and the enterprise video surveillance platform for transmission of positioning information, and no new link should be created.

—— Bit stream data message: used for network real-time audio and video transmission, network video playback, voice dialogue, voice monitoring, voice broadcasting, etc. A new link should be created instead of the link for transmitting positioning information.

5 Communication protocol between video terminal and video platform

5. 1 Protocol instruction set

 See Appendix A for the comparison table of instruction messages between video terminals and video platforms.

5. 2 Inheritance command

 Inherit and use other commands in JT/T 808-2011 except the message ID 0x8804 (recording start command). In addition, in JT/T 808-2011 there are 0x0800 (multimedia event message upload), 0x0801

(multimedia data upload), 0x8802 (stored multimedia data retrieval), 0x0802 (stored multimedia data retrieval response), and 0x8803 (stored multimedia data upload). The multimedia type field in

the 5 instructions above shall be in accordance with 5. 4 and 5. 5 requirements in this standard for the image, audio and video type data transmission.

5. 3 Parameter setting instructions

5. 3. 1 Terminal audio and video parameter settings

The terminal audio and video parameter setting message adopts 0x8103 message defined in JT/T 808-2011 8. 8 , and add the following audio and video parameters settings, see Table 1.

Table 1 Audio and video setting parameter table

parameter	type of data	Description and requirements
0x0075		Audio and video parameter settings, see Table 2 for description
0x0076		Audio and video channel list settings, see Table 3 for description
0x0077		Individual video channel parameter settings, see Table 5 for description
0x0079		Special alarm recording parameter setting, description see Table 7
0x007A	DWORD	Video-related alarm masking words, and corresponding to the definition of the alarm flag bit in Table 13; if the corresponding bit is 1, the corresponding Types of alarms are masked
0x007B		Image analysis alarm parameter setting, description is shown in Table 8
0x007C		Terminal sleep wake-up mode setting, description see Table 9

Table 2 Definition and description of audio and video parameters

start byte	field	type of data	Description and requirements
0	live stream encoding mode	BYTE	0: CBR (constant bit rate); 1: VBR (variable bit rate); 2: ABR (average bit rate); 100 ~ 127: Customized
1	Live Streaming Resolution	BYTE	0: QCIF; 1: CIF; 2: WCIF; 3: D1; 4: WD1; 5: 720P; 6: 1080P; 100 ~ 127: Customized
2	Live Stream Keyframe Interval	WORD	Range (1 ~ 1 000) frames
4	Live Stream Target Frame Rate	BYTE	Range (1 ~ 120) frame/s
5	Real-time streaming target bit rate	DWORD	The unit is kilobits per second (kbps)
9	Save Stream Encoding Mode	BYTE	0: CBR (constant bit rate); 1: VBR (variable bit rate); 2: ABR (average bit rate); 100 ~ 127: Customized
10	Save Stream Resolution	BYTE	0: QCIF; 1: CIF; 2: WCIF; 3: D1; 4: WD1; 5: 720P; 6:1 080P; 100 ~ 127: Custom
11	Save Stream Keyframe Interval	WORD	Range (1 ~ 1000) frames
13	Save Stream Target Frame Rate	BYTE	Range (1 ~ 120) frame/s
14	Storage stream target bit rate	DWORD	The unit is kilobits per second (kbps)

start byte	field	type of data	Description and requirements
18	OSD subtitle overlay settings	WORD	Set by bit: 0 means not superimposed, 1 means superimposed; bit0: date and time; bit1: license plate number; bit2: logical channel number; bit3: latitude and longitude; bit4: driving record speed; bit5: satellite positioning speed; bit6: continuous driving time; bit7 ~ bit10: Reserved; bit11 ~ bit15: Customized
20	Whether to enable audio output	BYTE	0: disable; 1: enable

Table 3 List of audio and video channels

start byte	field	type of data	Description and requirements
0	Total number of audio and video channels	BYTE	expressed by l
1	Total number of audio channels	BYTE	expressed by m
2	Total number of video channels	BYTE	expressed by n
3	Audio and video channel comparison table	BYTE [4 × (l + m + n)]	See Table 4

Table 4 Audio and video channel comparison table

start byte	field	type of data	Description and requirements
0	physical channel number	BYTE	start from 1
1	logical channel number	BYTE	According to Table 2 in JT/T 1076-2016
2	channel type	BYTE	0: audio and video; 1: Audio; 2: Video
3	Whether to connect to the gimbal	BYTE	This field is valid when the channel type is 0 and 2; 0: not connected; 1: connected

Table 5 Definition and description of individual channel video parameters

start byte	field	type of data	Description and requirements
0	Number of channels whose video parameters need to be set separately	BYTE	expressed by n
1	Single channel video parameter setting list	BYTE[21 × n]	See Table 6

Table 6 Individual channel video parameter settings

start byte	field	type of data	Description and requirements

start byte	field	type of data	Description and requirements
0	logical channel number	BYTE	According to Table 2 in JT/T 1076-2016
1	live stream encoding mode	BYTE	0: CBR (constant bit rate); 1: VBR (variable bit rate); 2: ABR (average bit rate); 100 ~ 127: Custom
2	Live Streaming Resolution	BYTE	0: QCIF; 1: CIF; 2: WCIF; 3: D1; 4: WD1; 5: 720P; 6:1 080P; 100 ~ 127: Custom
3	Live Stream Keyframe Interval	WORD	Range (1 ~ 1 000) frames
5	Live Stream Target Frame Rate	BYTE	Range (1 ~ 120) frame/s
6	Real-time streaming target bit rate	DWORD	The unit is kilobits per second (kbps)
10	Save Stream Encoding Mode	BYTE	0: CBR (constant bit rate); 1: VBR (variable bit rate); 2: ABR (average bit rate); 100 ~ 127: Customized
11	Save Stream Resolution	BYTE	0: QCIF; 1: CIF; 2: WCIF; 3: D1; 4: WD1; 5: 720P; 6:1 080P; 100 ~ 127: Customized
12	Save Stream Keyframe Interval	WORD	Range (1 ~ 1 000) frames
14	Save Stream Target Frame Rate	BYTE	Range (1 ~ 120) frame/s
15	Storage stream target bit rate DW	ORD	The unit is kilobits per second (kbps)

start byte	field	type of data	Description and requirements
19	OSD Overlay Settings	WORD	Set by bit: 0 means not superimposed, 1 means superimposed; bit0: date and time; bit1: license plate number; bit2: logical channel number; bit3: latitude and longitude; bit4: driving record speed; bit5: satellite positioning speed; bit6: continuous driving time; bit7 ~ bit10: Reserved; bit11 ~ bit15: Customized

Table 7 Definition and description of special alarm recording parameters

start byte	field	type of data	Description and requirements
0	Special alarm recording storage threshold	BYTE	Special alarm recording takes up main memory storage threshold %, ranges from 1 to 99, default value is 20
1	Special alarm recording duration	BYTE	The maximum duration of special alarm recording, the unit is minutes (min), the default value is 5
2	Special alarm flag start time	BYTE	The recording time marked before the special alarm occurs, The unit is minutes (min), the default value is 1

Table 8 Definition and description of video analysis alarm parameters

start byte	field	type of data	Description and requirements
0	Approved number of passengers in the vehicle	BYTE	trigger an alarm when video analysis results exceeded the approved passengers
1	fatigue threshold	BYTE	trigger an alarm when video analysis results exceeded the fatigue threshold

Table 9 Terminal sleep wake-up mode setting data format

start byte	field	type of data	Description and requirements
0	sleep wake mode	BYTE	Set by bit: 0 means not set, 1 means set; bit0: conditional wake-up; bit1: Timing wake-up; bit2: manual wake-up
1	Wake up condition type	BYTE	When bit0 is 1 in sleep wake-up mode, this field is effective, otherwise set to 0; Set by bit: 0 means not set, 1 means set; bit0: emergency alarm; bit1: Collision and rollover alarm; bit2: vehicle door open
2	Timed wake-up day setting	BYTE	Set by bit: 0 means not set, 1 means set; bit0: Monday; bit1: Tuesday; bit2: Wednesday; bit3: Thursday; bit4: Friday; bit5: Saturday; bit6: Sunday
3	List of daily wake-up parameters	BYTE[17]	See Table 10, each time period should not overlap

Table 10 Day wake-up parameter definition

start byte	field	type of data	Description and requirements
0	Timing wakeup enable flag	BYTE	Set by bit: 0 means not set, 1 means set; bit0: Time period 1 wake-up time enabled; bit1: Time period 2 wake-up time enabled; bit2: Time period 3 wake-up time enabled; bit3: time period 4 wake-up time enable
1	Time Zone 1 Wake Up Time	BCD[2]	HHMM, value range 00:00 ~ 23:59
3	Time Period 1 Closing Time	BCD[2]	HHMM, value range 00:00 ~ 23:59
5	Time Period 2 Wake Up Time	BCD[2]	HHMM, value range 00:00 ~ 23:59
7	Time Period 2 Closing Time	BCD[2]	HHMM, value range 00:00 ~ 23:59
9	Time Period 3 Wake Up Time	BCD[2]	HHMM, value range 00:00 ~ 23:59
11	Time Period 3 Closing Time	BCD[2]	HHMM, value range 00:00 ~ 23:59
13	Time Period 4 Wake Up Time	BCD[2]	HHMM, value range 00:00 ~ 23:59
15	Time Period 4 Closing Time	BCD[2]	HHMM, value range 00:00 ~ 23:59

5. 3. 2 Query the audio and video properties of the terminal

 Message ID: 0x9003.

The message body is empty.

5. 3. 3 Terminal upload audio and video attributes

Message ID: 0x1003.

Message type: signaling data message.

Use the terminal upload audio and video attribute command to respond to the query terminal audio and video attribute message issued by the platform. The message body data format is shown in Table 11.

Table 11 Terminal upload audio and video attribute data format

start byte	field	type of data	Description and requirements
0	Input audio encoding method	BYTE	See Table 12
1	Enter the number of audio channels	BYTE	
2	Input audio sample rate	BYTE	0: 8kHz; 1:22. 05 kHz; 2:44. 1 kHz; 3: 48kHz
3	Input Audio Sample Bits	BYTE	0: 8 bits; 1: 16 bits; 2: 32 bits
4	audio frame length	WORD	Range 1 to 4 294 967 295
6	Whether to support audio output	BYTE	0: Not supported; 1: Supported
7	Video encoding method	BYTE	See Table 19
8	The maximum audio physical channel quantity supported by the terminal	BYTE	
9	The maximum video physical channel quantity supported by the terminal	BYTE	

Table 12 Definition table of audio and video coding types

coding	name	notes
0	reserve	
1	G.721	audio
2	G.722	audio
3	G.723	audio
4	G.728	audio
5	G.729	audio
6	G.711A	audio
7	G.711U	audio
8	G.726	audio
9	G.729A	audio
10	DVI4_3	audio
11	DVI4_4	audio
12	DVI4_8K	audio
13	DVI4_16K	audio
14	LPC	audio
15	S16BE_STEREO	audio
16	S16BE_MONO	audio
17	MPEGAUDIO	audio
18	LPCM	audio
19	AAC	audio
20	WMA9STD	audio
21	HEAAC	audio
22	PCM_VOICE	audio
23	PCM_AUDIO	audio
24	AACLC	audio
25	MP3	audio
26	ADPCMA	audio
27	MP4AUDIO	audio
28	AMR	audio
29 ~ 90	reserved	

coding	name	notes
91	Transparent transmission	system
92 ~ 97	reserved	video
98	H.264	video
99	H.265	video
100	AVS	video
101	SVAC	video
102 ~ 110		reserved
111 ~ 127		customized

5. 4 Video alarm command

5. 4. 1 Video alarm reporting

The video alarm report adopts the method of reporting the position information at the same time, as the additional information of the 0x0200 position information report, and the additional information of the JT/T808-2011 Table 20 is expanded. The extended definition of additional information is shown in Table 13.

Table 13 Additional information definition table extension

Additional Information ID	Additional information length	Description and requirements
0x14	4	Video-related alarm, DWORD, set by bit, the definition of the flag bit is shown in Table 14
0x15	4	Video signal loss alarm state, DWORD, set by bit, bit0 ~ bit31 respectively represent the first 1 to 32 logical channels, if the corresponding bit is 1, it means that the video signal loss occurs in this logical channel
0x16	4	Video signal masking alarm status, DWORD, set by bit, bit0 ~ bit31 respectively represent the first 1 to 32 logical channels, if the corresponding bit is 1, it means that the video signal of the logical channel is blocked
0x17	2	Memory failure alarm status, WORD, set by bit, bit0 ~ bit11 respectively represent the 1st ~ 12th main memories, bit12~bit15 represent the 1st~4th disaster recovery storage devices respectively, and if the corresponding bits is 1, it means that the memory has failed
0x18	2	Detailed description of abnormal driving behavior alarm, WORD, see Table 15 for definitions

Table 14 Definition of video alarm flag bits

bit	definition	Handling instructions
0	Video signal loss alarm	The flag is maintained until the alarm condition is removed
1	Video signal blocking alarm	The flag is maintained until the alarm condition is removed
2	Storage unit failure alarm	The flag is maintained until the alarm condition is removed
3	Other video equipment failure alarm	The flag is maintained until the alarm condition is removed
4	Bus overcrowding alarm	The flag is maintained until the alarm condition is removed
5	Abnormal driving behavior alarm	The flag is maintained until the alarm condition is removed
6	The special alarm for recording reaches the storage threshold	the alarm is cleared after receiving the response
7 ~ 31	reserved	

Table 15 Definition of abnormal driving behavior flags

start byte	field	type of data	Description and requirements
0	Types of abnormal driving behavior	WORD	Set by bit: 0 means no, 1 means yes; bit0: fatigue; bit1: call; bit2: smoking; bit3 ~ bit10: Reserved; bit11 ~ bit15: Custom
2	Fatigue	BYTE	The degree of fatigue is expressed on a scale of 0 to 100, with higher value indicates more fatigue

5. 4. 2 Terminal upload passenger flow

Message ID: 0x1005.

Message type: signaling data message.

The terminal device counts passengers getting on and off the bus through video analysis, and sends the counting results to the platform. The message body data format is shown in Table 16.

Table 16 Terminal upload passenger flow data format

start byte	field	type of data	Description and requirements
0	Start time	BCD[6]	YY-M-M-DD-HH-MM-SS (GMT+8 time, All subsequent times in the standard use this time zone)
6	End Time	BCD[6]	YY-MM-DD-HH-MM-SS
12	Number of people on board	WORD	Number of boarders from start time to end time
14	Number of people getting off	WORD	The number of people getting off from the start time to the end time

5. 5. Real-time audio and video transmission instructions

5. 5. 1 Real-time audio and video transmission request

 Message ID: 0x9101.

Message type: signaling data message.

The platform requests real-time audio and video transmission from the terminal equipment, including real-time video transmission, actively initiating two-way voice intercom, one-way monitoring, and sending broadcast voice and specific transparent transmission, etc. The message body data format is shown in Table 17. After receiving this message, the terminal replies to the video terminal general answer, and then establish a transmission link through the corresponding server IP address and port number, and then transmit the corresponding audio and video data according to the audio and video stream transmission protocol.

Table 17 Real-time audio and video transmission request data format

start byte	field	type of data	Description and requirements
0	Server IP address length	BYTE	length n
1	server IP address	STRING	
1 + n	Server video channel monitoring port number (TCP)	WORD	Live video server IP address
3 + n	Server video channel monitoring port number (UDP)	WORD	Real-time video server TCP port number
5 + n	logical channel number	BYTE	Real-time video server UDP port number
6 + n	type of data	BYTE	According to Table 2 in JT/T 1076-2016
7 + n	stream type	BYTE	0: audio and video, 1: video, 2: two-way intercom, 3: monitoring, 4: Central broadcasting, 5: Transparent transmission

After the platform receives a special alarm from the video terminal, it should issue this command without waiting for manual confirmation to start real-time audio and video transmission.

5. 5. 2 Audio and video real-time transmission control

 Message ID: 0x9102.

Message type: signaling data message.

The platform sends audio and video real-time transmission control commands, which are used to switch code streams, pause code stream transmission, close audio and video transmission channels, etc.. The data format of the message body is shown in Table 18.

Table 18 Audio and video real-time transmission control data format

start byte	field	type of data	Description and requirements
0	logical channel number	BYTE	According to Table 2 in JT/T 1076-2016
1	Control instruction	BYTE	The platform can use this command to control the real-time audio and video of the device: 0: Close the audio and video transmission command; 1: Switch code stream (add pause and continue); 2: Suspend the sending of all streams of this channel; 3: Resume the sending of the flow before the suspension, and the flow type before the suspension consistent type; 4: Close the two-way intercom
2	Close audio and video type	BYTE	0: Close the audio and video data related to this channel; 1: Only close the audio related to this channel, keep this channel related video; 2: Only close the video related to this channel, keep this channel related audio
3	Switch stream type	BYTE	Switch the previously applied code stream to the newly applied code stream, audio remains the same as it was before the switch. The code stream for the new application is: 0: main stream; 1: sub stream

5. 5. 3 Real-time audio and video streaming and transparent data transmission

 Message type: code stream data message.

The transmission of real-time audio and video stream data refers to the RTP protocol, which is carried by UDP or TCP. The payload packet format is specified in IETF RFC 3550 On the basis of the definition of RTP, fields such as message serial number, SIM card number, audio and video channel number are supplemented, and the definition of the payload packet format is shown in Table 19.

The bits defined in the table are filled in the big-endian mode.

Table 19 Definition table of payload packet format of audio and video stream and transparent data transmission protocol

start byte	field	type of data	Description and requirements
0	Frame header identification	DWORD	Fixed to 0x30 0x31 0x63 0x64
4	V	2 BITS	Fixed to 2
	P	1 BIT	Fixed to 0
	X	1 BIT	Whether the RTP header needs an extension bit, fixed to 0
	CC	4 BITS	Fixed to 1
5	M	1 BIT	Flag bit to determine if it is the boundary of a complete data frame
	PT	7 BITS	load type, see table 19
6	package serial number	WORD	Initially 0, each time an RTP packet is sent, the sequence number plus 1
8	SIM card number	BCD[6]	Terminal SIM card number
14	logical channel number	BYTE	According to Table 2 in JT/T 1076-2016
15	type of data	4 BITS	0000: Video I frame; 0001: Video P frame; 0010: Video B frame; 0011: audio frame; 0100: Transparently transmit data
	subcontract processing flag	4 BITS	0000: atomic package, cannot be split; 0001: the first packet in subpackage processing; 0010: The last packet in subpackage processing; 0011: Intermediate package during subcontract processing
16	timestamp	BYTE[8]	Identifies the relative time of the current frame of this RTP packet, single Bit milliseconds (ms). When the data type is 0100, there is no this field
24	Last I Frame Interval	WORD	The time interval between this frame and the previous keyframe, single Bit milliseconds (ms), when the data type is non-video frame, then no this field
26	Last Frame Interval	WORD	The time interval between this frame and the previous frame, in milliseconds (ms), when the data type is not video frame, there is no this field

start byte	field	type of data	Description and requirements
28	data body length	WORD	Subsequent data body length, excluding this field
30	data body	BYTE[n]	Audio and video data or transparent transmission data, the length should not exceed 950 bytes

5. 5. 4 Real-time audio and video transmission status notification

Message ID: 0x9105.

Message type: signaling data message.

The platform sends a notification packet to the terminal according to the set time interval during the process of receiving the audio and video data uploaded by the terminal, and the message body data format

is in Table 20.

Table 20 Real-time audio and video transmission status notification data format

start byte	field	type of data	Description and requirements
0	logical channel number	BYTE	According to Table 2 in JT/T 1076-2016
1	Packet loss rate	BYTE	The packet loss rate of the current transmission channel, the value multiplied by 100 and then truncate the integer part.

5. 6 Historical audio and video query, playback and download commands

5. 6. 1 Query resource list

Message ID: 0x9205.

Message type: signaling data message.

The platform queries the video file list from the terminal according to the combined conditions such as audio and video type, channel number, alarm type, and start and end time.

The data format is shown in Table 21.

Table 21 Query video file list data format

start byte	field	type of data	Description and requirements
0	logical channel number	BYTE	According to Table 2 in JT/T 1076-2016, 0 means all channels
1	Starting time	BCD[6]	YY-MM-DD-HH-MM-SS, all 0 means no start time condition
7	End Time	BCD[6]	YY-MM-DD-HH-MM-SS, all 0 means no end time condition
13	alarm flag	64 BITS	bit0 ~ bit31: see JT/T 808-2011 Table 18 Alarm flag definition; See Table 13 for bit32 ~ bit63; All 0 means no alarm type condition
21	Audio and video resource type	BYTE	0: audio and video, 1: audio, 2: video, 3: video or audio&video
22	stream type	BYTE	0: All streams, 1: Main stream, 2: Sub stream
23	memory type	BYTE	0: All storage, 1: Main storage, 2: Disaster recovery storage

5. 6. 2 Terminal upload audio and video resource list

 Message ID: 0x1205.

Message type: signaling data message.

The terminal responds to the platform's command to query the audio and video resource list, and responds with the terminal uploading the audio and video resource list message. If the list is too large to subcontract transmission, use the subcontracting mechanism defined in JT/T 808-2011 4. 4. 3 to process, the platform should reply a general response for each individual subcontracting. The message body data format is shown in Table 22.

Table 22 Data format of terminal uploaded audio and video resource list

start byte	field	type of data	Description and requirements
0	serial number	WORD	Corresponding to the serial number of the query audio and video resource list command
2	Total audio and video resources	DWORD	If there is no audio and video resource that meets the conditions, set it to 0
6	List of audio and video resources		See Table 23

Table 23 The format of the list of audio and video resources uploaded by the terminal

start byte	field	type of data	Description and requirements
0	logical channel number	BYTE	According to Table 2 in JT/T 1076-2016
1	Starting time	BCD[6]	YY-MM-DD-HH-MM-SS
7	End Time	BCD[6]	YY-MM-DD-HH-MM-SS
13	alarm flag	64BITS	bit0 ~ bit31 according to Table 18 of JT/T 808-2011 Alarm flag definition; bit32 ~ bit63 see Table 13
21	Audio and video resource type	BYTE	0: audio and video, 1: audio, 2: video
22	stream type	BYTE	1: main stream, 2: sub stream
23	memory type	BYTE	1: main memory, 2: disaster recovery memory
24	File size	DWORD	Unit byte (BYTE)

5. 6. 3 The platform sends a remote video playback request

Message ID: 0x9201.

Message type: signaling data message.

The platform requests audio and video recording playback from the terminal device, and the terminal should respond with the command 0x1205 (upload the list of video files by the terminal), and then the transmission video data adopts the real-time audio and video stream data transmission RTP protocol payload packet format defined in Table 18. See Table 24 for the data format.

Table 24 Data format of remote video playback request issued by the platform

start byte	field	type of data	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 (TCP)	WORD	Real-time audio and video server port number, Set to 0 when not using TCP transmission
3 + n	Server audio and video channel (UDP)	WORD	Real-time audio and video server port number, Set to 0 when not using UDP transmission
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&video
7 + n	stream type	BYTE	0: main stream or sub stream, 1: main stream, 2: sub stream; If this channel only transmits audio, this field is set to 0
8 + n	memory type	BYTE	0: main storage or disaster recovery storage, 1: main storage, 2: disaster recovery storage
9 + n	playback method	BYTE	0: normal playback; 1: fast forward playback; 2: Key frame rewind playback; 3: Key frame playback; 4: Single frame upload
10 + n	Fast forward or rewind multiples	BYTE	When the playback mode is 1 and 2, the content of this field is valid, otherwise set to 0. 0: invalid; 1: 1 times; 2: 2 times
10 + n	Fast forward or rewind multiples	BYTE	3: 4 times; 4: 8 times; 5: 16 times
11 + n	Start time	BCD[6]	YY-MM-DD-HH-MM-SS, if playback mode is 4, then this field indicates the upload time of a single frame
17 + n	End Time	BCD[6]	YY-MM-DD-HH-MM-SS, if it is 0, it means always playback, when the playback mode is 4, this field is invalid

5. 6. 4 The platform issues remote video playback control

Message ID: 0x9202.

Message type: signaling data message.

During the audio and video playback process of the terminal device, the platform can issue playback control commands to control the playback process.

See Table 25 for the data format.

Table 25 Remote video playback control data format issued by the platform

start byte	field	type of data	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 4: Key frame rewind playback; 5: Drag and playback; 6: Key frame playback
2	Fast forward or rewind multiples	BYTE	When the playback control is 3 and 4, the content of this field is valid, otherwise set to 0. 0: invalid; 1: 1 times; 2: 2 times; 3: 4 times; 4: 8 times; 5: 16 times
3	drag playback position	BCD[6]	YY-MM-DD-HH-MM-SS, when playback control is 5, This field is valid

5. 6. 5 File upload command

Message ID: 0x9206.

Message type: signaling data message.

The platform issues a file upload command to the terminal, and the terminal replies with a general response and uploads the file to the target FTP server with a specified path. The message body data format is shown in Table 26.

Table 26 File upload instruction data format

start byte	field	type of data	Description and requirements
0	server address length	BYTE	length k
1	server address	STRING	FTP server address
1+k	port	WORD	FTP server port number
3+k	username length	BYTE	length l
4+k	username	STRING	FTP username
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	See Table 2 in JT/T 1076-2016
7 + k + l + m + n	start time	BCD[6]	YY-MM-DD-HH-MM-SS
13 + k + l + m + n	end time	BCD[6]	YY-MM-DD-HH-MM-SS
19 + k + l + m + n	Alarm flag	64 BITS	bit0 ~ bit31 see JT/T 808-2011 Table 18 Alarm flag definition; See Table 12 for bit32 ~ bit63; All 0 means do not specify whether there is an alarm
27 + k + l + m + n	audio and video resource type	BYTE	0: audio and video, 1: audio, 2: video, 3: video or audio
28 + k + l + m + n	stream type	BYTE	0: main stream or sub stream, 1: main stream, 2: sub stream
29 + k + l + m + n	storage location	BYTE	0: main storage or disaster recovery storage, 1: main storage, 2: disaster recovery storage

start byte	field	type of data	Description and requirements
30 + k + l + m + n	task execution conditions	BYTE	Expressed in bits: bit0: WIFI, when it is 1, it means that it can be downloaded under WI-FI; bit1: LAN, when it is 1, it means that it can be downloaded when LAN is connected; bit2: 3G/4G, when it is 1, it means that it can be download under 3G/4G connection.

5. 6. 6 Notification of file upload completion

Message ID: 0x1206.

Message type: signaling data message.

When all files are uploaded through FTP, the terminal will report this command to notify the platform. The message body data format is shown in Table 27.

Table 27 File upload completion notification data format

start byte	field	type of data	Description and requirements
0	Response serial number	WORD	Corresponding to the serial number of the platform file upload message
2	result	BYTE	0: success; 1: failure

5. 6. 7 File upload control

Message ID: 0x9207.

Message type: signaling data message.

The platform notifies the terminal to suspend, continue or cancel all files being transferred. The message body data format is shown in Table 28.

Table 28 File upload control data format

start byte	field	type of data	Description and requirements
0	Response serial number	WORD	Corresponding to the serial number of the platform file upload message
2	upload control	BYTE	0: pause; 1: continue; 2: cancel

5. 7 PTZ control command

5. 7. 1 PTZ rotation

Message ID: 0x9301.

Message type: signaling data message.

The platform requests the terminal to rotate the camera. The message body data format is shown in Table 29.

Table 29 PTZ rotation data format

start byte	field	type of data	Description and requirements
0	logical channel number	BYTE	According to Table 2 in JT/T 1076-2016
1	direction	BYTE	0: stop; 1: up; 2: down; 3: left; 4: Right
2	speed	BYTE	0 ~ 255

5. 7. 2 PTZ adjustment focus control

Message ID: 0x9302.

Message type: signaling data message.

The platform requests the terminal to adjust the focal length of the lens. The message body data format is shown in Table 30.

Table 30 The data format of pan/tilt adjustment lens focal length control

start byte	field	type of data	Description and requirements
0	logical channel number	BYTE	According to Table 2 in JT/T 1076-2016
1	focal adjustment direction	BYTE	0: increase the focal length; 1: Reduce the focal length

5. 7. 3 PTZ adjustment aperture control

Message ID: 0x9303.

Message type: signaling data message.

The platform requests the terminal to adjust the lens aperture. The message body data format is shown in Table 31.

Table 31 Data format of pan/tilt adjustment lens aperture control

start byte	field	type of data	Description and requirements
0	logical channel number	BYTE	According to Table 2 in JT/T 1076-2016
1	Aperture adjustment method	BYTE	0: turn up; 1: turn down

5. 7. 4 PTZ wiper control

 Message ID: 0x9304.

Message type: signaling data message.

The platform requests to control the wiper of the terminal. The message body data format is shown in Table 32.

Table 32 PTZ wiper control data format

start byte	field	type of data	Description and requirements
0	logical channel number	BYTE	According to Table 2 in JT/T 1076-2016
1	Start and stop flag	BYTE	0: stop; 1: start

5. 7. 5 Infrared fill light control

Message ID: 0x9305.

Message type: signaling data message.

The platform requests the infrared fill light control from the terminal. The message body data format is shown in Table 33.

Table 33 Infrared fill light control data format

start byte	field	type of data	Description and requirements
0	logical channel number	BYTE	According to Table 2 in JT/T 1076-2016
1	Start and stop flag	BYTE	0: stop; 1: start

5. 7. 6 PTZ zoom control

Message ID: 0x9306.

Message type: signaling data message.

The platform requests zoom control of the terminal. The message body data format is shown in Table 34.

Table 34 PTZ zoom control data format

start byte	field	type of data	Description and requirements
0	logical channel number	BYTE	According to Table 2 in JT/T 1076-2016
1	Zoom control	BYTE	0: zoom in; 1: zoom out

5. 8 Terminal sleep wake-up command

The platform wakes up the dormant terminal to start working by sending a wake-up message. The content of the message is "WAKEUPXX", where XX represents the wake-up time, the unit is minute (min), and the value range is 0-65536. If it is 0, it means that it has been in the wake-up state until the terminal ACC ON or lower than rated voltage.

6 Code stream communication between audio and video stream server and client player software

6. 1 Audio and video stream and transparent data encapsulation format

See Table 18 for the definition of audio and video streams and transparent data encapsulation formats between the video platform and the client playback software.

6. 2 Audio and video stream request URL instruction format

The government video monitoring platform sends a real-time preview or remote playback request command to the enterprise video monitoring platform and obtains the IP address and port number of the audio and video streaming server after receiving a successful response. The client of the government video monitoring platform directly sends the URL command to the enterprise audio and video streaming server. After the link is established, the audio and video streaming data is obtained.

request URL should not be displayed in the user interface, and the instruction format is defined as follows: http:// [server IP address]: [port number] / [license plate number]. [License plate color]. [Logical channel number]. [Audio and video logo]. [Time-limited password]

See Table 35 for the definition of each data item of the audio and video stream request URL command.

Table 35 Audio and video stream request URL instruction data item definition table

field		Description and requirements
Address attribute information	Server IP address	Audio and video streaming
	The port number	Audio and video streaming service port number
	License plate number	UTF-8 encoding should be adopted, and uniformly transformed into application/x- in IETF RFC 2854 www-form-URLencoded MIME format
	license plate color	According to JT/T 415-2006 5.4.12 regulations
	logical channel number	According to Table 2 in JT/T 1076-2016, 0 means all channels
	audio and video flag	0: audio and video; 1:audio; 2: video
Additional Information	time-limited password	Generated by the server of the enterprise platform, the time-limited password of the client of the regional government platform is different from the time-limited password of the cross-domain regional government platform. The Time-limited password should only consist of English letters (including uppercase and lowercase) and Arabic numerals, with a length of 64 ASCII characters, and should be updated every 24h.
	location identification	The satellite positioning time and latitude and longitude of the vehicle at any time within 5 minutes are used for verification when accessing the cross-domain regional government platform, and the client access of the regional government platform can be empty. ASCII character representation, the format is: YYYYMMDD-HHMMSS-NXX.XXXXXX-EXXX.XXXXXX

7 Communication protocol basis between video platforms

The communication methods, data types, security authentication methods and protocol message formats between different video platforms are in accordance with the requirements of Chapter 4 of JT/T 809-2011.

The data transmission between different video platforms does not need to be authenticated, and the transmission channel should use the links that have been established between the positioning platforms, and no new links will be added.

8 Communication protocol flow between video platforms

8. 1 Time-limited password report and request business class

The time-limited password is automatically generated by the enterprise video surveillance platform every day, and is actively uploaded to the video supervision platform of the local government. When the cross-domain regional government video supervision platform needs to access the audio and video information of cross-domain vehicles, it should request the cross-domain time-limited password of the day to the higher-level government video supervision platform.

8. 2 Real-time audio and video services

8. 2. 1 The enterprise video monitoring platform uploads audio and video data to the government video monitoring platform in real time

The government video monitoring platform sends a real-time audio and video upload request to the enterprise video monitoring platform. After receiving the request, the enterprise video monitoring platform should respond to the government video monitoring platform. If the answer is successful, the government video monitoring platform will request real-time audio and video data from the video server IP and port specified by the enterprise video monitoring platform.

8. 2. 2 Enterprise video surveillance platforms stop uploading audio and video data to government video surveillance platforms in real time

The government video surveillance platform sends a request to stop real-time audio and video uploads to the enterprise video surveillance platform. After receiving the request, the enterprise video surveillance platform should respond to the government video surveillance platform. If the answer is successful, the enterprise video monitoring platform stops sending real-time audio and video data to the government video monitoring platform.

8. 3 Remote Video Retrieval Service

8. 3. 1 The government video monitoring platform obtains the audio and video resource catalog from the enterprise video monitoring platform

The government video monitoring platform sends a request to the enterprise video monitoring platform to obtain the audio and video resource directory. After receiving the request, the enterprise video monitoring platform should immediately retrieve the latest audio and video resource directory from the terminal, update the local directory, and respond to the government video monitoring platform. If the answer is successful, the enterprise video monitoring platform sends the audio and video resource directory data to the government video monitoring platform.

8. 3. 2 The enterprise video monitoring platform actively uploads the audio and video resource catalog to the government video monitoring platform

After the enterprise video monitoring platform receives the special alarm information uploaded by the terminal, after waiting for the complete record of the video information, it should retrieve the latest audio and video resource directory with the special alarm logo from the terminal, update the local directory, and then actively upload the audio and video resource directory to the government video monitoring platform.

8. 4 Remote video download business

8. 4. 1 The government video monitoring platform downloads video data to the enterprise video monitoring platform

The government video monitoring platform sends a request to obtain video data to the enterprise video monitoring platform. After receiving the request, the enterprise video monitoring platform should respond to the government video monitoring platform. If the answer is successful, the government video surveillance platform can request video recording data from the FTP server IP and port specified by the enterprise video surveillance platform.

8. 4. 2 The enterprise video monitoring platform sends a download completion notification to the government video monitoring platform

The enterprise video monitoring platform sends a download completion notification to the government video monitoring platform. After receiving the notification, the government video monitoring platform indicates that the video data has been downloaded from the terminal. The government video monitoring platform can send the video FTP server IP and port specified by the enterprise video monitoring platform Request recording data.

8. 4. 3 The government video monitoring platform sends download control instructions to the enterprise video monitoring platform

The government video monitoring platform sends download control instructions to the enterprise video monitoring platform. After receiving the instruction, the enterprise video monitoring platform should respond to the corresponding control actions in a timely manner and give the answer to the government video monitoring platform.

8. 5 Remote video playback business

8. 5. 1. The government video monitoring platform requests video playback from the enterprise video monitoring platform

The government video monitoring platform sends a video playback request to the enterprise video monitoring platform, and the enterprise video monitoring platform should respond to the government video monitoring platform after receiving the request. If the answer is successful, the government video monitoring platform will request historical audio and video streaming data from the IP and port of the audio and video streaming server designated by the enterprise video monitoring platform.

8. 5. 2 The government video monitoring platform stops requesting video playback from the enterprise video monitoring platform

The government video monitoring platform sends a request to the enterprise video monitoring platform to stop playback of videos. After receiving the request, the enterprise video monitoring platform should respond to the government video monitoring platform and stop sending historical audio and video stream data to the government video monitoring platform.

9 Definition of communication protocol constants between video platforms

9. 1 Service data type identification

See Table 36 for the Service datatype name and identification specified in the audio and video data exchange protocol.

Table 36 Service data type name and identification comparison table

Message Type	Service data Type Name	message link	Service data type identification	value
Time-limited password service	Master link Time-limited password interaction message	Master link	UP_AUTHORIZE_MSG	0x1700
Time-limited password service	Slave link Time-limited password interaction message	Slave link	DOWN_AUTHORIZE_MSG	0x9700
Real-time audio and video service	Master link real-time audio and video interaction message	Master link	UP_REALVIDEO_MSG	0x1800
Real-time audio and video service	Slave link real-time audio and video interaction message	Slave link	DOWN_REALVIDEO_MSG	0x9800
Remote Video Retrieval	Master link remote video retrieval interaction message	Master link	UP_SEARCH_MSG	0x1900
Remote Video Retrieval	Slave link remote video retrieval interaction message	Slave link	DOWN_SEARCH_MSG	0x9900
Remote video playback	Master link remote video playback interaction message	Master link	UP_PLAYBACK_MSG	0x1A00
Remote video playback	Slave link remote video playback interaction message	Slave link	DOWN_PLAYBACK_MSG	0x9A00
Remote video download	Master link remote video download interaction message	Master link	UP_DOWNLOAD_MSG	0x1B00
Remote video download	Slave link remote video playback interaction message	Slave link	DOWN_DOWNLOAD_MSG	0x9B00

9. 2 Identification of sub-service types

See Table 37 for the name and identification of sub-service types specified in the data exchange protocol.

Table 37 Sub-service type name and identification comparison table

Service datatype	Sub-service type name	Sub-service data type identification	value
Master link Time-limited password service class message UP_AUTHORIZE_MSG	Time-limited password report message	UP_AUTHORIZE_MSG_STARTUP	0x1701
UP_AUTHORIZE_MSG	Time-limited password request message	UP_AUTHORIZE_MSG_STARTUP_REQ	0x1702
Slave link Time-limited password service class Message DOWN_BASE_DATA_MSG	Time-limited Password Request Response Message	DOWN_AUTHORIZE_MSG_STARTUP_REQ_ACK	0x9702
Master link real-time audio and video interaction Message UP_REALVIDEO_MSG	request to startup real-time transmission ACK	UP_REALVIDEO_MSG_STARTUP_ACK	0x1801
UP_REALVIDEO_MSG	request to end real-time transmission ACK	UP_REALVIDEO_MSG_END_ACK	0x1802
Slave link real-time audio and video interaction Message DOWN_REALVIDEO_MSG	request to startup real-time transmission	DOWN_REALVIDEO_MSG_STARTUP	0x9801
DOWN_REALVIDEO_MSG	request to end real-time transmission	DOWN_REALVIDEO_MSG_END	0x9802
Master link remote record search interaction Message UP_SEARCH_MSG	upload audio and video resource list	UP_FILELIST_MSG	0x1901
UP_SEARCH_MSG	Query audio and video resource list ACK	UP_REALVIDEO_FILELIST_REQ_ACK	0x1902
Slave link remote record search interaction Message DOWN_SEARCH_MSG	upload audio and video resource list ACK	DOWN_FILELIST_MSG_ACK	0x9901
DOWN_SEARCH_MSG	Query audio and video resource list	DOWN_REALVIDEO_FILELIST_REQ	0x9902
Master link remote video playback interaction message UP_PLAYBACK_MSG	remote video playback ACK	UP_PLAYBACK_MSG_STARTUP_ACK	0x1A01
UP_PLAYBACK_MSG	remote video playback control ACK	UP_PLAYBACK_MSG_CONTROL_ACK	0x1A02
Slave link remote video playback interaction message DOWN_PLAYBACK_MSG	remote video playback	DOWN_PLAYBACK_MSG_STARTUP	0x9A01
DOWN_PLAYBACK_MSG	remote video playback control	DOWN_PLAYBACK_MSG_CONTROL	0x9A02
Master link remote video download interaction message UP_DOWNLOAD_MSG	remote video download ACK	UP_DOWNLOAD_MSG_STARTUP_ACK	0x1B01
UP_DOWNLOAD_MSG	remote video download END INFORM	UP_DOWNLOAD_MSG_END_INFORM	0x1B02

Service datatype	Sub-service type name	Sub-service data type identification	value
UP_DOWNLOAD_MSG	remote video download control ACK	UP_DOWNLOAD_MSG_CONTROL_ACK	0x1B03
Slave link remote video download interaction message DOWN_DOWNLOAD_MSG	remote video download	DOWN_DOWNLOAD_MSG_STARTUP	0x9B01
DOWN_DOWNLOAD_MSG	remote video download END INFORM ACK	UP_DOWNLOAD_MSG_END_INFORM_ACK	0x9B02
DOWN_DOWNLOAD_MSG	remote video download control	DOWN_DOWNLOAD_MSG_CONTROL	0x9B03

9. 3 Video alarm type coding

See Table 38 for the coding of video alarm types reported through the platform.

Table 38 Coding list of vehicle video alarm types

the code	name	Description and requirements
0x0101	Video signal loss alarm	
0x0102	Video signal blocking alarm	
0x0103	Storage unit failure alarm	
0x0104	Other video equipment failure alarm	
0x0105	Bus overcrowding alarm	
0x0106	Abnormal driving behavior alarm	
0x0107	Special alarm recording reaches the storage threshold alarm	

Appendix A

(Normative appendix)

Message comparison table between video terminal and video platform

Table A. 1 Message comparison table between video terminal and video platform

serial number	message body name	message ID
1	Query the audio and video properties of the terminal	0x9003
2	Terminal upload audio and video attributes	0x1003
3	Real-time audio and video transmission request	0x9101
4	Terminal upload passenger flow	0x1005
5	Audio and video real-time transmission control	0x9102
6	Real-time audio and video streaming and transparent data transmission	
7	Real-time audio and video transmission status notification	0x9105
8	Query resource list	0x9205
9	Terminal upload audio and video resource list	0x1205
10	The platform sends a remote video playback request	0x9201
11	The platform issues remote video playback control	0x9202
12	File upload command	0x9206
13	Notification of file upload completion	0x1206
14	File upload control	0x9207
15	PTZ rotation	0x9301
16	PTZ adjustment focus control	0x9302
17	PTZ adjustment aperture control	0x9303
18	PTZ wiper control	0x9304
19	Infrared fill light control	0x9305
20	PTZ zoom control	0x9306
21	Platform manual wakeup request (short message)	WAKEUPXX