UHD World Association
世界超高清视频产业联盟

Technical requirements of professional decoder of UHD video and audio broadcasting system for "Bai Cheng Qian Ping"

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Contents

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1 Scope

This document specifies the technical requirements for the function, performance, management and control of the professional decoder of UHD video and audio broadcasting system for 'Bai Cheng Qian Ping'.
This document is applicable to the research, development, production, testing and application of the professional decoder of UHD video and audio broadcasting system for 'Bai Cheng Qian Ping'.

2 Normative References

The contents in the following documents, through normative references in the text, constitute indispensable provisions of this document. Among them, the dated reference documents are only applicable to the version corresponding to that date; For undated references, the latest version (including all amendments) is applicable to this document.
GB 8898-2011 Safety Requirements for Audio, Video and Similar Electronic Equipment
GB 17625.1-2016 Electromagnetic Compatibility Limits Harmonic Current Emission Limits
GB/T 13837-2012 Limits and Methods of Measurement of Radio Disturbance Characteristics of Sound and Television Broadcasting Receivers and Related Equipment
GB/T 17975.1-2010 Information Technology - Generic Coding of Moving Images and Associated Audio Information - Part 1: Systems
GB/T 33475.2 Information Technology - Efficient Multimedia Coding - Part 2: Video
SJ/T 11326 Environmental Test Methods for Digital Television Receiving and Display Equipment
T/AI 109.2 Information technology - Intelligent media coding - Part 2: Video
T/UWA 005.1-2022 High Dynamic Range (HDR) Video Technology Part 1: Metadata and Adaptation
T/UWA 012.2-2023 Coding of UHD video and audio broadcasting system for “Bai Cheng Qian Ping”: system

3 Terms and Definitions

The following terms and definitions are applicable to this document.

3.1 HDR Vivid

HDR technical specifications and supporting derivative technologies specified in T/UWA 005.1.

3.2 Audio vivid

The 3D Audio technology specifications and supporting derivative technologies specified in T/UWA 009.1.

4 Abbreviations

The following abbreviations are applicable to this document.

HDR High Dynamic Range
HLG Hybrid Log Gamma
NTP Network Time Protocol
RTP Real time Transport Protocol
S/PDIF Sony/Philips Digital InterFace
TS Transport Stream
UDP User Datagram Protocol

5 Functional requirements

5.1 Basic functional requirements

The basic functions of professional decoder shall meet the requirements in Table 1.

Table 1 **Basic functional requirements**

NO.	Item	Technical requirement
1	Clock synchronization	It shall support NTP protocol and have NTP client
2	Main/backup switch	It shall support dual channel video stream reception and intelligent switching between main and backup channels. When it is detected that the main and backup channel video streams are interrupted at the same time, the local pre-stored test screen should be automatically output.
3	Source	Dual power module, supporting hot plug power supply
4	Indicator light	It shall be equipped with power indicator light, main circuit network status light and standby circuit network status light.
5	Network interface	At least two RJ45 1000Mbps network interfaces shall be provided as the main and standby network ports for receiving video and audio data, and shall be provided with graphic identification.

5.2 Video and audio decoding requirements

The 4K professional decoder shall have the video and audio decoding capability specified in Table 2, and support the decoding of 4K video and audio streams and video and audio files.

Table 2 **Video and audio decoding requirements of 4K professional decoder**

NO.	Item		Technical requirement	Mandatory /Optional
1	Supported input transport stream(ts) type		TS conforming to GB/T 17975.1-2010.	Mandatory
2	Supported Video streaming protocol		UDP and RTP transmission modes specified in T/UWA012.2-2022	Mandatory
3	Supported the input TS packet length		188 byte packet length or 204 byte packet length.	Mandatory
4	File format		TS file	Mandatory
5	Single channel video decoding	Class and level	AVS2 basic 10 bit class (profile_id: 0x22), 8.0.60 level	Mandatory
6		Frame rate	50Hz (Progressive)	Mandatory
7			100Hz (Progressive)	Optional
8		Aspect ratio	16: 9	Mandatory
9		Chroma format	4: 2:0	Mandatory
10		Quantization bits	10 bit	Mandatory
11			12bit	Optional
12		Resolution	Support 3840 ×2160	Mandatory

13		Gamut	According to ITU-R BT.2020	Mandatory
14		HDR	Non linear conversion curve in accordance with GY/T 315	Mandatory
			Support HDR Vivid, support HDR adaptation and output	Optional
15	Audio output		Stereo Out	Mandatory
			5.1 Surround coded signal passthrough, supporting downmix stereo output	Optional
16	Audio interface		HDMI embedded audio, S/PDIF (optical or coaxial) output; L/R RCA analog audio output	Mandatory
17	Video interface		HDMI2.0b or above	Mandatory

The 8K professional decoder shall have the video and audio decoding capability specified in Table 3, and support the decoding of 8K video and audio streams and video and audio files.

Table 3 **Video and audio decoding requirements of 8K professional decoder**

NO.	Item		technical requirement	Mandatory /Optional
1	Supported input ts type		TS conforming to GB/T 17975.1-2010.	Mandatory
2	Supported Video streaming protocol		UDP and RTP transmission modes specified in T/UWA012.2-2022	Mandatory
3	Supported the input TS packet length		188 byte packet length or 204 byte packet length.	Mandatory
4	File format		TS file	Mandatory
5	Single channel video decoding support	Class and level	AVS3 basic 10 bit class (profile_id: 0x22), 10.0.60 level	Mandatory
6		Frame rate	50Hz (Progressive)	Mandatory
7			100Hz (Progressive)	Optional
8		Aspect ratio	16: 9	Mandatory
9		Chroma format	4: 2:0	Mandatory
10		Quantization bits	10 bit	Mandatory
11			12bit	Optional
12		Resolution	Support 7680 × 4320	Mandatory
13		Gamut	Color gamut according to ITU-R BT.2020	Mandatory
14		HDR	Non linear conversion curve in accordance with GY/T 315	Mandatory
			Support HDR Vivid, complete HDR adaptation and output	Mandatory
15	Audio output		Stereo Out	Mandatory
			5.1 Surround coding signal transmission and output	Optional
16	Audio interface		HDMI interface embedded audio, optical fiber S/PDIF interface output; L/R RCA analog audio interface output	Mandatory
17	Video interface		HDMI2.1	Mandatory[N]
			HDMI2.0b × 4, and support the SQD image segmentation	
[Note]: Two interfaces are not required to output at the same time, When outputs in HDMI2.0 × 4, it is recommended to embed audio into the first HDMI2.0b interface for output.				

5.3 **Terminal management and control requirements**

The control function of professional decoder should meet the requirements in Table 4.

Table 4 **Control function requirements**

NO.	Item	Technical requirement
1	Remote control	It shall support remote power on, power off and restart operations as well as planned power on, power off and restart operations.
2	Operation data return	It shall support the return of real-time operation data of the machine. Real time operation data includes but is not limited to: system version information, playing video stream information, network delay, primary/standby link status, network interface bandwidth, CPU utilization, memory utilization, storage utilization, HDMI interface connection status, dual power supply operation status, whether to receive and execute planned tasks, and local cache. Support regular reporting and active query mechanism.
3	Timestamp analysis and return	The terminal shall support the timestamp analysis and return function specified in T/UWA 012.2-2022.
4	Safety certification	It shall support security authentication query and send back security authentication information. Security authentication information includes but is not limited to: local IP address, local MAC address, local serial number, etc.
5	Log management	The local operation log, alarm log and error log can be stored in the terminal flash memory, and relevant log files can be returned to files. The operation log includes but is not limited to: system operation status record, system switch on record, system resource use record, and operation record of various business applications. The number of days to roll back shall be at least 30 days. The alarm log includes but is not limited to: system exception record, system resource usage threshold record, and exception record of each business application. The number of days shall be rolled back for at least 30 days. The error log includes but is not limited to: system error record, network interface and HDMI interface interruption log, system power interruption log, and days rollback for at least 30 days.
6	System upgrade	It shall support LAN upgrade or remote upgrade through network. All and partial upgrades of the operating system shall be supported. In the process of software upgrade, the change of upgrade progress status shall be displayed on the graphical interface in the form of graphics and text and dynamic progress bar, which shall at least include several statuses: version check, software download, software installation, etc. LAN upgrade: upgrade the professional decoder operating system through computers or special tools within the LAN; Remote upgrade: through the connection with the terminal management system, automatic upgrade after power on or forced upgrade remotely controlled by the terminal management system can be realized.
7	Application upgrade	It shall support LAN upgrade or remote upgrade of business applications through network. The business application upgrade process shall provide visual status and progress display, which shall at least include several statuses: version check, software download, software installation, etc. LAN upgrade: upgrade business applications through computers or special tools within the LAN;

		Remote upgrade: through the connection with the terminal management system, the automatic upgrade of business applications or the forced upgrade remotely controlled by the terminal management system can be realized.

6 Performance requirement

The performance of professional decoder shall meet the requirements in Table 5.

Table 5 **Performance requirement**

NO.	Item	Technical requirement
1	Power on time	The time from equipment power on to normal image output shall not exceed 1min.
2	Automatic recovery of decoding after disconnection	Under the normal decoding state of the professional decoder, the main and standby input video and audio streams are disconnected for 1 min and then connected again (the video and audio stream parameters remain unchanged). The professional decoder should automatically resume decoding within 5 s.
3	Reliability	Professional decoder supports 24h normal operation. During normal operation of professional decoder, images shall be continuous without interruption and abnormality.
4	Play control interface	Control video and audio playback, including playback, pause, stop, volume adjustment, and mute functions; The response time shall be ≤ 200ms.
5	Play permission authentication interface	Authenticate the playback permission of the device; Response time ≤ 5s.

7 Environment and safety

The environmental test requirements of professional decoder shall comply with the relevant requirements of SJ/T 11326.

The safety and electromagnetic compatibility of professional decoder shall meet the requirements of GB8898, GB 13837-2012 and GB 17625.1-2016.

Professional decoder shall support 180V-242V AC voltage.

The reliability of professional decoder should meet that the Mean Time between Failures is more than 20000h.