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SECTION 9
VIDEO DISTRIBUTION SYSTEM

A Video Distribution System (VDS) is a complement of audio and video equipment designed for interfacing, switching/bridging, and distributing digital and/or analog audio and video signals sourced from multiple devices and destined to multiple devices. Unlike a Video Teleconferencing (VTC) Multipoint Conferencing Unit (MCU), which performs solely many-to-one audio and video signal bridging, the VDS can perform many-to-one, one-to-many, and many-to-many bridging. The VDS can distribute signal feeds to geographically dispersed locations and may include types of "METADATA" that might include intelligence about the feed (e.g., signal feed coordinates, Predator target) or industry standard information such as Extended Display Identification Data (EDID), which is a data structure that provides additional information about the intended display devices.

VDS architectures are composed of sub-systems that may include the following:

1. VDS Distribution Devices (One-to-Many). Includes systems that receive signals sourced from one device which are then repeated to multiple destination devices or video displays.
2. VDS Switching Devices (Many-to-One). Includes systems that receive signals sourced from multiple devices which are then repeated to one destination device or video display. Sources are connected to a common central device that can actively select (switch) between any one of the sourced signals.
3. VDS Matrix Switching Devices (Many-to-Many). Includes systems that receive signals sourced from multiple devices which are then repeated to multiple destination devices or video displays. Sources are connected to a common central matrix device that can actively select (switch) from any source device(s) to one or multiple destination devices simultaneously without compromising signal quality.
4. VDS Peripherals. Normally devices that enable users to interact with the VDS system. They include the following:
    a. Source Devices. Computer workstations, laptop computers, VTC codecs, video playback devices (DVD, Blu-ray, and media players), cable television tuners, and live video camera feeds.
    b. Destination Devices. Desktop monitors, television monitors, video projectors, video signal processors, video recording devices, and video wall signal processor systems.
    c. Control Devices. Keyboards, mice, and other user interface components that enable control of the VDS.
5. VDS Peripheral Connectors. Modular standard components that provide different options for interfacing VDS peripheral devices; they include Multiformat Serial Digital Interface (SDI), Digital Visual Interface (DVI), Video Graphics Array (VGA), High Definition Multimedia Interface (HDMI), and Component HD.

6. VDS Peripheral Connector Conversion Devices. Devices that convert between different types of peripheral connector standards (e.g., HDMI to VGA).
7. VDS Cabling. Includes common copper and optical cabling for passing the electrical signals that enable audio and video, from source devices to destination devices.
8. Analog-to-Digital Converter (ADC) and Digital-to-Analog Converter (DAC). Devices that convert a digital (e.g., binary) code to an analog signal (e.g., current, voltage, or electric charge), and vice versa.

9.1 GENERAL VDS SYSTEM

General VDS configuration requirements apply to all VDS devices in both the Closed VDS system configuration as described in Section 9.2, VDS System, and VDS over Internet protocol (IP) configurations as described in Section 9.3, VDS over IP (VDS-IP).

VDS-000010 [**Required**] The VDS system shall fall into one of two categories:

a. Closed VDS System. These are VDS systems that are inaccessible from Department of Defense (DoD) IP-routed networks. Closed VDS systems shall follow the requirements as specified in Section 9.2, VDS System.

b. VDS over IP (VDS-IP) System. These are VDS systems that are accessible and interface with DoD IP-routed networks. VDS-IP systems shall follow the requirements as specified in Section 9.3, VDS over IP (VDS-IP).

NOTE: This section leverages the DoD Architecture Framework (DoDAF) baseline for a Closed System; therefore, the VDS shall be Closed if the system is inaccessible from external networks such as Non-Secure Internet Protocol Router (NIPR) or Secure Internet Protocol Router (SIPR).

VDS-000020 [Conditional] If the Closed VDS System requires IP-routed control of its Matrix Switch, then the system shall utilize Out-of-Band Management (OBM) in accordance with the Security Technical Implementation Guidelines (STIGs).

VDS-000030 [**Optional**] The VDS system shall have the ability to be controlled from an external master control system.

VDS-000040 [**Optional**] The VDS system shall provide at least one sub-control position with System Administrator permission access control.

9.1.1 IP Requirements for VDS Systems

VDS-000050 [**Optional**] If the VDS system is inaccessible from DoD IP-routed networks, then the VDS system is considered a Closed VDS System, and support of the IPv4 profile as defined in Section 7.2.1.5, Protocols, and of the IPv6 profile as described in Section 5, IPv6, is optional. Otherwise, if the VDS systems connect to IP-routed networks, then the VDS system is

considered a VDS over IP System, and support of the IPv4 profile as defined in Section 5, IPv6, and of the IPv6 profile as described in Section 5, IPv6, is required.

9.1.2 VDS System Signal

VDS-000060 [**Required**] The VDS system shall provide the ability to transfer audio and video signals in a variety of configurations, including, but not limited to, seat console to seat console, seat console to destination display device, seat console to video conversion device, seat console to VTC, and source devices to seat console.

VDS-000070 [**Required**] The VDS system shall be scalable for distributing incoming signal feeds from multiple video sources and shall route to multiple video display receivers as needed by operational requirements.

VDS-000080 [**Required**] The VDS system shall be dynamic, transparent, and capable of understanding the capabilities of the display based on the input source, to provide the necessary equipment resolutions and information required by the peripheral equipment connected.

VDS-000090 [**Required**] The VDS system shall support both analog and digital input signals. This provides the flexibility to support both legacy analog sources and digital displays.

VDS-000100 [**Required**] The VDS system shall provide the ability to display signals from any source device to any compatible destination device, including intermediate display aggregators (e.g., Wall Controllers, Multi-View display processors).

VDS-000110 [**Required**] The VDS system shall maintain native audio and video signals from input interface to output interface without signal degradation, loss of data compression, color sub-sampling, frame rate conversion, auxiliary data loss or signal resolution formatting.

VDS-000120 [**Required**] Any type of signal processing to modify the original audio or video signal information shall be documented and verified by maintenance and/or operator inquiry.

VDS-000130 [**Required**] The VDS system shall be capable of processing and maintaining a minimum of 4:2:2 chroma subsampling in color space, preserving single pixel detail through the encoding, streaming, and decoding processes.

VDS-000140 [**Required**] The VDS system shall support internal scaling to allow the end user to specify different input or output resolutions as required, matching the configuration of installed equipment.

VDS-000150 [**Required**] The VDS system shall utilize VDS Peripheral Connector Conversion (VPCC) devices (Section 9.1.3, VDS System Peripheral) to modify audio and video signals to a single common interface standard for use in the VDS system.

NOTE: Possible applications of this method would convert high-resolution computer graphics DVI interfaces to production television HD-SDI interface formats for switching and distribution. These HD-SDI signaling interface formats are then

typically converted back to DVI or HDMI interfaces for use with common display devices.

VDS-000160 [**Optional**] The VDS system shall provide methods to modify or customize EDID information reported to source devices in order to allow proper configuration of video source devices to match the overall capabilities of the VDS core switching, VDS destination devices, and display devices connected to the VDS system.

VDS-000170 [**Optional**] The VDS system shall provide EDID signaling standard in accordance with the Video Electronics Standards Association (VESA) Enhanced Extended Display Identification, Version 1.3.

9.1.3 VDS System Peripheral

VDS-000180 [**Optional**] VDS Peripherals shall fall into one of two categories:

a. Source Devices. Signal generators that output video, audio and other waveforms which are used in the communication and synchronization of VDS subcomponents, using a signal type that is processed by the VDS Switch system. Examples include computer workstations, laptop computers, VTC codecs, video playback devices (DVD, Blu-ray, and media players), cable television tuners, and live video camera feeds.

b. Destination Devices. Signal receivers that accept the signal from the VDS Switching system; process the video, audio, and other waveforms; and provide the necessary feedback that enables VDS. Examples include Desktop monitors, television monitors, video projectors, video signal processors, video recording devices, and video wall signal processor systems.

NOTE: Some devices, such as VTC codecs and recording devices, may serve as a source and/or destination device.

VDS-000190 [**Optional**] Destination devices shall support scan rates between 23.95 and 85 Hz.

VDS-000200 [**Optional**] Destination devices shall support video input resolutions of: 480i, 525i, 625i, 1080i, 480p, 720p, and 1080p for 50 Hz and 60 Hz progressive and interlaced scan formats.

VDS-000210 [**Optional**] Destination devices shall support video and picture graphics in their native resolution (without any visual artifacts), without additional processing and decoding, to maintain the original native resolution without use of image processing to resize or scale the original signal feed.

9.1.4 VDS Signal Extenders

VDS source and destination devices may be physically separated by long geographical distances that exceed the maximum specifications of the original audio and video signal format. In these

scenarios, the VDS system can utilize signal extenders to convert or condition the original signal for transmission over longer cabling distances.

VDS-000220 [**Required**] VDS Signal Extenders shall condition, amplify, and provide physical media conversion (i.e., copper to fiber optic or coaxial video to video over twisted pair) for audio and video signals to extend the maximum cabling distances from source devices to destination device.

VDS-000230 [**Required**] VDS Signal Extenders shall support, at a minimum, one of the following interconnects: coaxial, twisted pair, or fiber optical.

9.1.5 VDS System Peripheral Connectors

VDS subcomponents interface with one another using peripheral connectors, which are simply modular components that provide different options for interfacing audio and video interface formats and VDS subcomponents. Table 9.1-1, Summary of Connector Types, lists the various connector types.

Table 9.1-1. Summary of Connector Types

CONNECTORS
BNC
DVI
VGA
HDMI
RCA
Fiber (LC, SC, etc.)
Modular Connectors (RJ11, RJ45, 8P8C, etc.)

VDS-000240 [**Conditional**] If the VDS system supports analog VGA and DVI computer connectors, then the following formats shall be supported:

a. High resolution [up to 1920x1200 pixels Wide Ultra eXtended Graphics Array (WUXGA)] computer video resolutions operating at up to 60 Hz vertical refresh rate, or up to165 MHz total un-compressed pixel clock bandwidth.

b. Analog VGA connectors with RGBHV, RGBS, or RGsB coaxial high definition video formats through use of RGBHV to VGA cabling adaptors.

c. DVI connectors compatible with the Digital Display Working Group (DDWG) DVI 1.0 Specification, April 2, 1999.

VDS-000250 [**Conditional**] If the VDS system supports Multi-Rate SDI connectors, then the following Society of Motion Picture and Television Engineers (SMPTE) formats shall be supported:

a. SMPTE 259M: Standard Definition SDI (SD-SDI).

b. SMPTE 344M: Enhanced Definition SDI (ED-SDI).

c. SMPTE 292M: High Definition SDI (HD-SDI).

d. SMPTE 424M: 3-Gbps SDI (3G-SDI).

e. SMPTE 291M: Ancillary Data Packet and Space Formatting.

VDS-000260 [**Conditional**] If the VDS system supports HDMI video connectors and provides support for digital video sources with and without High-Bandwidth Digital Content Protection (HDCP) copy protection, then the following HDMI features shall be supported:

a. High-resolution (up to 1920x1200 pixels WUXGA) computer video resolutions operating at up to 60 Hz vertical refresh rate, or up to165 MHz total un-compressed pixel clock bandwidth.

b. 24-bit color pixel depth and RGB and YCbCr color space.

c. Embedded 2 CH Stereo Uncompressed Pulse Code Modulation (PCM) audio signaling over HDMI interface connections.

VDS-000270 [**Optional**] The VDS system shall support EDID for VGA, DVI, and HDMI connectors. EDID support shall be provided by a VDS connector to describe the capabilities of the VDS system interface to a connected video source device. EDID interface signaling provided by the VDS to the source video device shall include the following:

a. VDS Manufacturer ID.

b. VDS Product Identification.

c. Digital or analog capability of VDS Interface.

d. Supported video resolutions and video timing modes of the VDS system.

e. Preferred video resolution and video timing mode of the VDS system.

9.1.6 VDS Peripheral Connector Conversion Devices

VPCC devices are system appliances that operate and provide gateway like capabilities and allow for different types of VDS subcomponents to interoperate by coupling unlike peripherals.

VDS-000280 [**Required**] VPCCs shall accept, couple, and convert from input to output for connector peripherals as described in Table 9.1-1, Summary of Connector Types.

VDS-000290 [**Required**] VPCCs shall accept high-resolution, up to 1920x1200 pixels WUXGA computer video resolutions, operating at up to 60 Hz vertical refresh rate, or up to165 MHz total un-compressed pixel clock bandwidth.

VDS-000300 [**Required**] VPCCs shall support upwards and downwards video resolution and frame rate signal processing.

VDS-000310 [**Required**] VPCCs shall use video scaling or signal processing to convert between different connector peripherals as described in Table 9.1-1, Summary of Connector Types.

VDS-000320 [**Required**] VPCCs shall allow for dynamic conversion or for user defined conversions to support display resolution formats with varying aspect ratios (4:3, 16:9, and 16:10).

VDS-000330 [**Conditional**] If VPCCs require local monitoring, then VPCCs shall support local HD-SDI/VGA/DVI/HDMI loop-through outputs (as needed for the video source format) for local monitoring.

VDS-000340 [**Required**] VPCCs shall auto-detect the type of peripheral present and provide video peripheral conversion and processing as needed to match the selected video peripheral of the attached video display or VDS subcomponent.

VDS-000350 [**Required**] VPCCs shall support Ethernet management interfaces for diagnostic information and control, including the following:

a. Complete information about the device.

b. Physical identification of hardware and a system error log.

9.1.7 VDS Master Control Switch

VDS-000360 [**Required**] The VDS Master Control switch shall allow the end user to select and verify the processing of any signal displayed.

VDS-000370 [**Required**] The VDS Master Control switch shall be able to perform the following functions on the VDS Matrix Switch:

a. Switch Single Input to Single Output.

b. Switch Single Input to Multiple Outputs.

c. Allow the user to “record” and “recall” presets of crosspoint routings over both the entire switch matrix and selected groupings of inputs and outputs.

VDS-000380 [Optional] The VDS Master Control shall be able to perform the following functions on the VDS Matrix Switch:

a. Switch Single Input to Single Output.

b. Switch Single Input to Multiple Outputs.

c. Enquire the status of any current configuration, by individual output, resulting in the current routed input information; by individual input, resulting in a listing of all current outputs; a master listing of all input names (if stored within the device); and a master listing of all current output assignments.

d. Clear the switching or crosspoint (route "0") based on input, where any output with the selected input will be automatically cleared, or based on output, where only the selected output crosspoints are cleared. Clearing must result in NO INPUT selected rather than using a "blank" or "un-assigned" input.

9.1.8 VDS Matrix Switch

VDS systems connect via a VDS Matrix Switch, which is a device capable of accepting multiple inputs from source devices and selectively distributing any one of these inputs to one or many destination devices.

VDS-000390 [**Required**] The VDS Matrix Switch shall accept original audio and video signals as defined in Section 9.1.2, VDS System Signal, and shall accept multiple connectors as defined in Section 9.1.4, VDS Signal Extenders, to interface to other VDS Matrix Switching Devices, VDS Distribution Devices, VDS Switching Devices, VDS Conversion Devices, and other VDS subcomponents.

VDS-000400 [**Required**] The VDS Matrix Switch shall support hot-swappable expansion modules.

VDS-000410 [**Required**] The VDS Matrix Switch shall support local and remote control management and control.

VDS-000420 [**Required**] The VDS Matrix Switch shall include a local primary control mode that supports a secondary external control mode as needed for redundancy.

NOTE: Best practices indicate a need for backup distributed control systems (dual processors) in any large-scale VDS installation.

VDS-000430 [**Optional**] If the VDS Matrix Switch is slated for specialized missions, the VDS Matrix Switch shall use custom rack mounts (e.g., Ship board operations). Otherwise, the VDS Matrix Switch shall support the industry standard 19-inch wide equipment racks.

VDS-000440 [**Optional**] If the VDS Matrix Switch is slated for mission-critical C2 operations, then the VDS Matrix Switch shall include two or more hot-swappable power supplies with two independent power cords for redundancy.

VDS-000450 [**Optional**] The VDS Matrix Switch shall provide at least one sub-control position with System Administrator permission access control.

9.1.9 VDS IA Security

VDS-000460 [**Required**] All VDS components shall adhere to the appropriate STIGs.

VDS-000470 [**Required**] All VDS components shall meet all appropriate Ports, Protocols, and Services Management (PPSM) guidelines and vulnerability and risk assessments to achieve

compliance for all information systems, applications, and services connected to the Global Information Grid (GIG).

VDS-000480 [**Required**] The VDS shall meet all appropriate Information Assurance (IA) and Vulnerability Assessment (IAVA) and National Institute of Standards and Technology (NIST)/National Information Assurance Partnership (NIAP) standards.

9.1.10 VDS Availability

Availability refers to the ability for the users to access the system, ensuring a prearranged level of operational performance, during a pre-determined contractual measurement period. Generally, the term downtime is used to refer to periods when a system is unavailable.

VDS-000490 [**Required**] The number of UI events shall be no more than 4.38 events per year.

NOTE: UI events are critical service affecting events impairing critical components (i.e., a Matrix Switch as opposed to a Peripheral Device). A UI is any condition identified by a user making the system not operational. Table 9.1-2, Unscheduled Interruption Event Counts, depicts the number of events per system uptime.

Table 9.1-2. Unscheduled Interruption Event Counts

PERCENT OPERATIONAL	PERCENT NON-OPERATIONAL	UI EVENTS/YEAR
99.000	1.000	87.6
99.900	0.100	8.76
99.950	0.050	4.38
99.990	0.010	0.876

VDS-000500 [**Required**] The duration of unscheduled interruption (DUI) events shall be no more than 2 hours per event. Table 9.1-3, Duration of Unscheduled Interruption Events, depicts the number of hours per event per year.

NOTE: An entire system integrity check must be performed for outages lasting longer than 2 hours.

Table 9.1-3. Duration of Unscheduled Interruption Events

UI/YEAR	HR/UI	DUI HRS/YEAR
87.6	4	350.4
8.76	3	26.28
4.38	2	8.76
0.876	1	0.876

VDS-000510 [**Required**] The duration of scheduled outages shall be no longer than 0.5 hours per month and 6 hours per year. Table 9.1-4, Scheduled Maintenance Event Durations, depicts the allowable hourly/yearly durations for scheduled outages.

NOTE 1: Scheduled maintenance is the duration of performing planned maintenance operations in which the system is not available to the user.

NOTE 2: An entire system integrity check must be performed for outages lasting longer than 0.5 hours.

Table 9.1-4. Scheduled Maintenance Event Durations

UI/YEAR	HR/UI	DUI HRS/YEAR
87.6	4	350.4
8.76	3	26.28
4.38	2	8.76
0.876	1	0.876

VDS-000520 [**Required**] All outages or service disruptions to the system shall be correctable within 2 hours using normal maintenance procedures.

9.1.11 VDS Diagnostics

System diagnostics verify and validate proper system operation and system status information.

VDS-000530 [**Required**] The VDS Matrix Switch, VPCCs, and VDS signal Extenders shall provide system diagnostics to verify and validate proper system operation and status.

VDS-000540 [**Required**] The VDS Matrix Switch shall provide complete information about the device, including all software and firmware revisions; type of device; model number; IP address; serial number; Move, Add, Change (MAC) address; input signal resolution; original signal resolution; physical location of the unit (based on customer input at time of installation); internal temperatures of the unit; fan speed and status of each fan associated with the unit; and an error log pertaining to the unit.

VDS-000550 [**Required**] VPCCs and VDS signal Extenders shall be able to output an internally generated video signal in place of the input signal and an audio tone in place of the incoming audio.

VDS-000560 [**Required**] The VDS Matrix Switch, VPCCs, and VDS signal Extenders shall provide an interface capability to be monitored from a centralized monitoring and diagnostic VDS control location. At a minimum, feedback information shall include signal presence (e.g., connected/disconnected) for coaxial cable, signal format, signal strength (fiber cable only), input/output/matrix card presence and status, power supply status information, fan operation,

internal operating temperatures, equipment error logging, and power received levels for all VDS cabling (fiber only) and audio/video signals supported by the equipment.

VDS-000570 [**Required**] The VDS Matrix Switch, VPCCs, and VDS signal Extenders shall support local control monitoring and remote control monitoring to a third-party interface, to include, at a minimum, feedback information that includes signal presence (e.g., connected/disconnected) for coaxial cable, signal format, signal strength (fiber cable only), input/output/matrix card presence and status, power supply status information, fan operation, internal operating temperatures, equipment error logging, and power received levels for all VDS cabling (fiber only) and audio/video signals supported by the equipment.

9.2 CLOSED VDS SYSTEM

A Closed VDS System is considered to be a traditional VDS that enables video distribution over non IP-based networks but can from time to time support IP capabilities in a closed environment. Closed VDS systems can leverage legacy standards, and, by definition, the Unified Capabilities Requirements (UCR) 2013 stipulates that Closed VDS Systems are inaccessible from DoD IP-routed networks.

VDS-000580 [**Required**] Closed VDS Systems shall comply with the General VDS System Requirements as outlined in Section 9.1, General VDS System.

VDS-000590 [**Optional**] Closed VDS Systems shall support the IPv4 profile as defined in Section 7.2.1.5, Protocols, and the IPv6 profile as described in Section 5, IPv6.

VDS-000600 [**Required**] Closed VDS Systems shall interface with a VDS Matrix Switch controller.

VDS-000610 [**Required**] Closed VDS Systems shall support serial RS-232, RS-422, or RS-485 interfaces as required by the system.

VDS-000620 [**Optional**] Closed VDS Systems shall support USB and Ethernet interfaces.

VDS-000630 [**Optional**] Closed VDS Systems shall support a web-based configuration and control.

9.3 VDS OVER IP (VDS-IP)

A VDS-IP is an extension of traditional VDS that enables added features such as enhanced compression procedures that allow for very low latency distribution over an IP transport. VDS-IP leverages standards based Moving Picture Compression Algorithms (MPCAs) and/or Picture Compression Algorithms (PCAs) to enable performance-driven features and advantages over traditional VDS. This approach allows for VDS-IP systems to extend and reach across networking infrastructures where Closed VDS systems have physical and architectural limitations. By definition, the UCR stipulates that VDS-IP systems are accessible from and interface with DoD IP-routed networks.

VDS-000640 [**Required**] VDS-IP Systems shall comply with the General VDS System Requirements as outlined in Section 9.1, General VDS System.

VDS-000650 [**Required**] VDS-IP Systems shall support the IPv4 profile as defined in Section 7.2.1.5, Protocols, and the IPv6 profile as described in Section 5, IPv6.

VDS-000660 [**Optional**] If the VDS-IP system uses standards-based video or picture conversion, compression, and encoding methods, then the VDS system shall be categorized as an Open Distribution VDS System. Otherwise, the system is a Proprietary Distribution VDS System.

a. Open Distribution. This type of VDS-IP system shall use standards-based video or picture conversion, compression, and encoding methods coupled with a STIG and PPSM approved IP transport mechanisms. Audio and video shall be viewable in hardware or software interfaces.

b. Proprietary Distribution. This type of VDS-IP system shall use STIG and PPSM-approved IP transport mechanisms, but is not required to use standards based video or picture conversion, compression and encoding methods.

VDS-000670 [**Optional**] VDS-IP Codecs shall use MPCA and/or PCA formats based on mission objectives.

NOTE: MPCA standards are defined in Section 3.4, UC Audio and Video Conference System.

VDS-000680 [**Required**] Open Distribution VDS-IP systems shall comply with all Unified Capabilities (UC) Audio and Video Conference System Requirements as defined in Section 3.4, UC Audio and Video Conference System.

VDS-000690 [**Required**] Proprietary Distribution VDS-IP systems shall comply with all IP Transport and Proprietary Codec requirements as defined in the UC Audio and Video Conference System Requirements as defined in Section 2.6, SC and SS Failover.

VDS-000700 [**Required**] VDS-IP Systems shall comply with the following PCA formats:

a. JPEG, JPEG2000, VC-1, Dirac, VP8 or other compression codecs based on Discrete Cosine Transform (DCT) or Discrete Wavelet Transform (DWT).

b. PNG.

VDS-000710 [**Required**] VDS-IP subcomponents shall support serial RS-232, USB, or Ethernet.

VDS-000720 [**Required**] VDS-IP systems shall support a web-based configuration and control.

VDS-000730 [**Required**] VDS-IP systems shall interface with a VDS Matrix Switch controller.

9.3.1 VDS-IP Codec

VDS-000740 [**Optional**] VDS-IP shall fall into one of two categories: VDS-IP Hardware Codec or VDS-IP Software Codec.

VDS-000750 [**Required**] VDS-IP Hardware Codecs shall accept computer graphic input resolutions to include VGA, SVGA, XGA, SXGA, SXGA+, UXGA, WUXGA, 1920x1080, and custom computer graphic resolutions and input modes.

VDS-000760 [**Required**] VDS-IP Hardware Codecs shall provide reliable decoding during live configuration changes or selection of new active audio and video data streams (e.g., decoding device does not require restart, resync, or reboot to acquire newly selected data stream).

9.4 VDS RECORDING

VDS recording relates to the capturing and archiving of video and audio, analog or digital signals that are stored for later retrieval in optical disc recording technologies (e.g., DVD, CDs), magnetic storage (e.g., hard drives), flash memory (e.g., memory cards, USB flash drives, solid state drives) or magnetic tape (e.g., video tape, compact cassette).

VDS-000770 [**Required**] VDS Recording Devices shall fall into one of two categories:

a. Video Tape Recorder (VTR). A device that captures and archives video and/or audio material on a magnetic tape (e.g., video tape, compact cassette).

b. Digital Video Recorder (DVR). A device or application software that captures and archives video and/or audio in a digital format to a disk drive, USB flash drive, Standard Definition (SD) memory card, or other local or networked mass storage device.

VDS-000780 [**Required**] VTR Recording Devices shall adhere to the requirements specified in Section 9.4.1, VDS Video Tape Recording (VTR).

VDS-000790 [**Required**] DVR Recording Devices shall adhere to the requirements specified in Section 9.4.2, VDS Digital Video Recording (DVR).

9.4.1 VDS Video Tape Recording (VTR)

VDS-000800 [**Required**] VTR devices shall accept standard and high-definition video using the following SMPTE formats:

a. SMPTE 259M: SD-SDI.

b. SMPTE 344M: ED-SDI.

c. SMPTE 292M: HD-SDI.

d. SMPTE 424M: 3G-SDI.

e. SMPTE 291M: Ancillary Data Packet and Space Formatting.

VDS-000810 [**Optional**] VTR devices shall accept standard and high-definition video using the following SMPTE formats:

a. SMPTE 372M: Dual-Link (DL) HD-SDI.

b. Digital Picture Exchange.

NOTE: The SMPTE defines the standard for many video tape recording (VTR) protocols.

9.4.2 VDS Digital Video Recording (DVR)

VDS-000820 [**Required**] DVR devices shall be capable of recording and replaying video and audio using MPCA and Audio Compression Algorithms (ACAs) as defined in Section 3.4, UC Audio and Video Conference System, and shall be able to capture Picture Compression Algorithms (JPEG and PNG).

VDS-000830 [**Optional**] DVR devices shall be capable of recording and replaying video using MPEG-4 Part 2, MPEG-2 .mpg, MPEG-2 .TS, VOB, and International Organization for Standardization (ISO) video.

VDS-000840 [**Optional**] DVR devices shall be capable of recording and replaying audio using MP3, AC3, and Ogg.

VDS-000850 [**Optional**] DVR devices shall integrate with the monitor and/or TV set.

VDS-000860 [**Optional**] DVR devices shall be VESA compatible.

VDS-000870 [**Optional**] DVR devices shall be able to interface with PC-based compatible devices running Microsoft Windows, Linux, or Mac OS.