UCR 2008, Change 3, Section 5.3.7, Video Distribution System Requirements

SECTION	CORRECTION	EFFECTIVE DATE
5.3.7.2.2	IPv6 Profile requirements were changed to a conditional clause which states that the IPv6 profile is required for VDS systems that connect to the DISN and optional for VDS systems destined for closed environments.	Immediately

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5.3.7 Video Distribution System (VDS) Requirements

A Video Distribution System (VDS) is a set of components that deliver Audio and/or Video signals in various formats and electrical configurations to multiple displays, speakers, sub-systems, and link to other VDS systems. Signals may be digital or analog in nature or a combination of both.

Sub-Systems may include:

1. Multichannel VDS (MVDS) Hubs: Devices that amplify a video signal and distributes all channels to different locations
2. Analog-to-Digital Converter (ADC)/ Digital-to-Analog Converter (DAC): devices which convert a digital (usually binary) code to an analog signal (current, voltage, or electric charge) and vice versa.
3. VDS Conversion Devices: Devices that convert between different kinds of video display peripheral interfaces.

The VDS Requirement Capabilities will allow military Command Centers to distribute video to the military senior leadership offices and Joint Chiefs whenever Service is available. A typical VDS, also called an Audio/Visual system, includes a switching matrix to allow interconnection of source devices (inputs) to destination devices (outputs). This matrix supports connection of any input to any or all outputs at any time without compromising signal quality.

5.3.7.1 VDS Configuration Requirements

1. **[Required]** The VDS shall provide the ability to transfer the A/V signals in a variety of configurations, including - but not limited to: Seat(console to Seat(console) Seat (console) to display device or processor, Seat (console) to VTC equipment, Seat(console) to other A/V equipment, Other A/V equipment to Other A/V equipment, Other A/V equipment to Seat (console).

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

3. **[Required]** The VDS shall be a closed system; inaccessible from connected networks.

   NOTE: DoDAF baseline for a VDS shall be a closed or "edge" system inaccessible from external network such as NIPR/SIPR. A VDS open "core" system, that has connection to an external network, will be administered under future requirements.

4. **[Required]** The VDS shall provide the ability to display signals from any source device to any compatible destination device, including intermediate display aggregators. (i.e Knowledge Wall)

5. **[Required]** The VDS shall have the ability to be controlled from an "external master control system" this ability shall be via Serial Communications (RS-232), TCP/IP-(Ethernet), Contact Closure, or combinations thereof.

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

7. **[Required]** The VDS needs to 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.

5.3.7.2 VDS IP Network Requirements

1. **[Required]** The VDS System shall support IPv4 and its features as defined in section *5.3.1.3.5 Protocols.*

2. **[Conditional]** If the VDS System interacts or connects with the DISN IP Core, the VDS system shall comply with the DoD's IPv6 profile as described in section *5.3.5 IPv6 Requirements.* Else, if the VDS system is a closed-environment solution, support of the DoD IPv6 profile is optional.

5.3.7.3 VDS Conversion Devices

VDS Conversion Devices are VDS subcomponents that operate and gateway between different types of video display peripheral interfaces.

Conversion devices which accept standard SMPTE compliant transport streams and provide VGA and DVI outputs provide the most flexibility to accommodate legacy equipment as well as today's higher resolution large scale digital displays.

1. **[Required]** The VDS shall scale from High-resolution (1920x1200 WUXGA) computer video to standard viewable SMTPE HD-SDI format and support upwards and downwards standard and custom resolution signal processing.

   NOTE 1: Sources which output non-SMPTE compatible signals (such as high resolution computer workstations) can be supported at the system level with conversion devices. These conversion devices should be capable of converting the non-SMPTE sources with resolutions up to 1920x1200 @ 60 Hz refresh rate into SMPTE compliant transport streams.

2. **[Required]** Conversion devices shall allow the user to specify automatic format conversion or user defined set formats for display resolution and aspect ratio (4:3 or 16:9).

3. **[Required]** Conversion devices compatible with standard SMPTE signal formats shall be tested independently of the switch matrix and verified for proper operation without the need for proprietary test equipment.

4. **[Required]** VDS interfaces and media conversion devices shall support local HDSDI/VGA/DVI loop-through outputs (as needed for the video source format) for local monitoring.

5. **[Required]** Conversion devices shall support both legacy analog VGA and digital DVI equipped devices.

6. **[Required]** Conversion devices shall also auto-detect which type signal is present and convert as required to provide compatibility with the VDS switch matrix.

7. **[Required]** Video conversion devices shall support all current cabling standards.

8. **[Required]** Conversion devices shall support Ethernet (copper-fiber) access to diagnostic information and control, including the following:
    a. Complete information about the device.
    b. Physical identification of hardware and system error log

5.3.7.4 VDS Peripheral Interfaces Requirements

A VDS peripheral is an appliance that connects or interfaces with a hosting device, but is not part of it, and is more or less dependent on the host. It expands the hosting device capabilities, but does not form part of the core VDS architecture.

1. **[Required]** The VDS equipment shall be configured with hot swappable peripherals for critical components to reduce disruptions of services.

2. **[Conditional]** Allow for future input and output expansion beyond initial deployment capacity.

3. **[Required]** All VDS solutions shall have the ability to display High-Definition Video and Applications.

4. **[Required]** VDS peripherals shall support analog component and VGA computer interfaces with internal scaling capability to allow the end user to specify different input or output resolutions as required matching the configuration of existing installed equipment.

   NOTE: The ability to support both analog and digital inputs provides interface flexibility to support both legacy analog sources and today's high-resolution display signals.

5. **[Required]** All input, output and matrix cards shall be hot-swappable without disrupting other signal paths currently in use in the active VDS router.

6. **[Required]** The VDS shall support the following interfaces:
   a. DVI-I
   b. DVI
   c. Multi-Rate SDI
   d. VGA

7. **[Conditional]** Redundant Power supplies shall be hot-swappable to allow for service and repairs while an active VDS router is in use. However, single power supply systems can still be procured.

5.3.7.4.1 VDS Video Tape Recording (VTR) Standards

By supporting Society of Motion Picture and Television Engineers (SMTPE) formats, a well designed VDS switching system ensures interoperability and compatibility with a widely available array of audio and video capture, transport and display equipment, as well as readily available signal test equipment for verification and validation of proper system operation. This allows independent verification and validation of signal integrity into or out of the switch matrix.

1. **[Required]** The VDS shall accept and route digital standard definition video in the following SMTPE formats:

   a. SMPTE 259M: the Serial Digital Interface (SD-SDI)
   b. SMPTE 344M: Enhanced Serial Digital Interface (ED-SDI)
   c. SMPTE 292M: High Definition Serial Digital Interface (HD-SDI)
   d. SMPTE 372M: High Definition Serial Digital Interface HD-SDI (DL HD-SDI)
   e. SMPTE 424M: 3 Gbit/s Serial Digital Interface (3G-SDI)
   f. SMPTE 291M: Ancillary Data Packet and Space Formatting
   g. Digital Picture Exchange

NOTE: The Society of Motion Picture and Television Engineers (SMTPE) defines the standard for many Video Tape Recording (VTR) protocols.

5.3.7.5 VDS Network Interfaces Requirements

1. **[Required]** The VDS switch and associated signal conversion equipment shall support fiber optical interconnects for security and signal integrity to extend equipment interconnection distances.

2. **[Conditional]** The VDS switch and associated signal conversion equipment shall support Coaxial interconnects.

5.3.7.6 VDS Capacity Requirements

1. **[Required]** All VDS solutions AV shall allow the user to add inputs independently of adding outputs. Similarly, the VDS solution shall allow end users to add outputs independently of inputs.

   NOTE: This flexibility provides system expansion to add additional sources (inputs) as mission requirements increase without the addition of more outputs, thus reducing the cost of system expansion and providing a matrix which can support a system with more inputs than outputs or more outputs than inputs.

2. **[Required]** The VDS switch matrix shall support a minimum of 50% expansion capability on inputs and outputs by installing additional plug-in input cards, output cards, matrix cards and power supplies without disrupting existing signal paths.

3. **[Required]** Technical solution shall be deployed in industry standard equipment racks.

   NOTE: VDS footprint primarily supports standard racks or stand-alone configurations. However, some VDS are deployed on ship board operations in custom rack mounts.

5.3.7.7 VDS Security Requirements

1. **[Required]** The VDS shall adhere to all appropriate STIGs.

2. **[Required]** The VDS shall meet all appropriate PPSM guidelines, vulnerability and risk assessments to achieve compliance for all information systems, applications, and services connected to the Global Information Grid (GIG).

3. **[Required]** The VDS shall meet all appropriate IAVA and NIST/NIAP standards.

5.3.7.8 VDS Availability Requirements

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.

1. **[Required]** For mission critical applications redundancy for power shall include two hot-swappable power supplies with individual power cords.

2. **[Required]** The switch control 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 a distributed Master Control System in any large scale VDS installation.

3. **[Required]** Equipment shall operate 24/7/365 with the exception of scheduled maintenance.

4. **[Required]** The number of Unscheduled Interruption (UI) events shall be no more than 4.38 events per year.

   NOTE: UI is any condition identified by a user making the system not operational. Table 5.3.7-1. Unscheduled Interruption depicts the number of events per system uptime.

Table 5.3.7-1. Unscheduled Interruption Table

% operational	% 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

5. **[Required]** The Duration of Unscheduled Interruption events shall be no more than 2 Hours per event. Table 5.3.7-1. Duration of Unscheduled Interruption 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 5.3.7-2. Duration of Unscheduled Interruption Table

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

6. **[Required]** The duration of scheduled outages shall be no longer than 0.5 hrs per month and 6 hours a year.

   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 5.3.7-3. Schedule Maintenance Table

Hr / Month	Month / Year	Hr / Year
1	12	12
0.75	12	9
0.5	12	6
0.25	12	3

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

5.3.7.9 VDS System Diagnostics Requirements

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

1. **[Required]** Both the VDS switch matrix and the signal conversion devices shall provide an extensive set of system diagnostics to verify and validate proper system operation and system status information.

2. **[Required]** The VDS Master Switch shall provide complete information about the device, including all software and firmware revisions, type of device, model number, IP address, serial number, MAC address, input signal resolution, original signal resolution,

the physical location of the unit (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.

3. **[Required]** To aid in diagnostics, each unit shall be able to output an internally generated signal in place of the input signal and /or an audio tone in place of the incoming audio. To ease identification of units, there shall be a choice of at least 15 different internal video sources.

4. **[Required]** The VDS system shall have the capability to monitor power level information from a centralized monitoring and diagnostic VDS control location. Signal presence and strength will be available in a fiber circuit and presence only in a coaxial circuit. This will help in system troubleshooting when signal paths are disconnected and for security purposes to monitor signal emissions against the baseline when deployed.

5. **[Required]** The VDS switch and associated signal conversion equipment shall provide signal presence status (active/inactive) feedback for system diagnostics.

6. **[Required]** The VDS fiber optic launch power levels and optical power received levels shall be monitored and available for centralized monitoring to help in system troubleshooting when signal paths are disconnected.

7. **[Required]** The VDS will provide robust Error Logging of video power and signaling forensics.

8. **[Required]** The following information shall be readily available to the user via remote access or computer GUI: power supply loading, fan operation, operating temperatures, input / output / matrix card presence, signal format and signal presence.

9. **[Required]** The VDS switch matrix and conversion units shall support network connectivity as DISA compliant devices to allow monitoring and control from a central location without requiring direct connection to a DSN / DISN network.

10. **[Required]** The VDS switch matrix shall support local control monitoring and remote control monitoring to a third-party interface.