



## DEFENSE INFORMATION SYSTEMS AGENCY

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IN REPLY  
REFER TO: Joint Interoperability Test Command (JTE)

### MEMORANDUM FOR DISTRIBUTION

**26 Jul 11**

**SUBJECT:** Special Interoperability Test Certification of selected models from the Polycom High Definition Experience (HDX) family for the 9000 Series, 8000 High Definition (HD) Series, 7000 Series HD, 6000 HD, and 4000 HD Series with Software Release 2.7.0\_J

**References:** (a) DoD Directive 4630.05, "Interoperability and Supportability of Information Technology (IT) and National Security Systems (NSS)," 5 May 2004  
(b) CJCSI 6212.01E, "Interoperability and Supportability of Information Technology and National Security Systems," 15 December 2008  
(c) through (e), see Enclosure 1

1. References (a) and (b) establish the Defense Information Systems Agency (DISA), Joint Interoperability Test Command (JITC), as the responsible organization for interoperability test certification.

2. The Polycom HDX 9004 and 9006 Rev. B Series, HDX 8000 HD Rev. A and B Series, HDX 7000 Rev. A, B and C Series, HDX 6000 HD, and HDX 4000 HD Rev. C Series with Software Release 2.7.0\_J are hereinafter referred to as the System Under Test (SUT). The SUT meets all of its critical interface and functional interoperability requirements and is certified for joint use within the Defense Information System Network (DISN) as a Video Teleconferencing (VTC) system. The HDX 6000 HD codec (IP only) is also certified, but not with Command and Control (C2) or Special C2 users unless the codec is connected to a certified IP to TDM gateway that interfaces with the Defense Switch Network. The Converged Management Application (CMA) provides remote centralized management of HDX video endpoints using a secure web interface and is certified as an optional management system with the SUT. The Polycom HDX 9002 and 9001 models employ the same software and similar hardware as the Polycom HDX 9004. The Polycom HDX 8006, 8004, and 8002 employ the same software and similar hardware as the Polycom HDX 8000 HD Rev A and B. The Polycom HDX 7002 and 7001 employ the same software and similar hardware as the Polycom HDX 7000 HD Rev A, B, and C. The Polycom HDX 4002 and 4001 employ the same software and similar hardware as the Polycom HDX 4000 HD. The JITC analysis determined these systems to be functionally identical to the SUT for interoperability certification purposes and they are also certified for joint use. A summary of all models certified is provided in Table 1.

The SUT also met the conditional requirements for an Internet Protocol (IP) interface with the International Telecommunication Union – Telecommunication Standardization Sector (ITU-T)

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H.323 protocol; however, Assured Service is not yet defined for an IP interface with ITU-T H.323 protocol. Therefore, C2 VTC users and Special C2 VTC users are not authorized to be served by an IP interface with the ITU-T H.323 protocol. However, the SUT is certified for C2 and Special C2 VTC sessions via the Time Division Multiplexing (TDM) interfaces. The SUT meets the critical interoperability requirements set forth in Reference (c) using test procedures derived from Reference (d). No other configurations, features, or functions, except those cited within this report, are certified by the JITC. This certification expires upon changes that affect interoperability, but no later than three years from the date of Defense Information Assurance (IA) Security Accreditation Working Group (DSAWG) accreditation.

3. This finding is based on interoperability testing conducted by JITC, review of the vendor's Letters of Compliance (LoC), and DISA Certification and Accreditation (CA) Recommendation. Interoperability testing was conducted by JITC at the Global Information Grid Network Test Facility, Fort Huachuca, Arizona, from 7 March through 25 March 2011. Review of the vendor's LoC was completed on 16 May 2011. The DISA CA provided a positive recommendation on 22 June 2011 based on the security testing completed by DISA-led IA test teams and published in a separate report, Reference (e). The Certification Testing Summary (Enclosure 2) documents the test results and describes the test configuration.

4. The SUT tested VTC systems and other VTC systems also certified by similarity are depicted in Table 1. The Functional Requirements used to evaluate the interoperability of the SUT, certified interfaces and the interoperability statuses are indicated in Table 2.

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**Table 1. SUT VTC Systems and other VTC Systems Certified by Similarity**

	Tested VTC System <sup>1</sup>	VTC System Certified by Similarity	Supported Interfaces
<b>SUT</b> Release 2.7.0_J	Polycom HDX 9004, 9006	Polycom HDX 9002	IP (10/100 Mbps with ITU-T H.323 protocol), ISDN BRI, ISDN PRI T1, ISDN PRI E1, and the following Serial interfaces: EIA-366A, EIA-449, EIA-530, ITU-T V.35 <sup>2</sup>
		Polycom HDX 9001	
	Polycom HDX 8000 HD (Rev A and B)	Polycom HDX 8006	IP (10/100 Mbps with ITU-T H.323 protocol), ISDN BRI, ISDN PRI T1, ISDN PRI E1, and the following Serial interfaces: EIA-366A, EIA-449, EIA-530, ITU-T V.35 <sup>2</sup>
		Polycom HDX 8004	
		Polycom HDX 8002	
	Polycom HDX 7000 HD (Rev A, B, and C)	Polycom HDX 7002	IP (10/100 Mbps with ITU-T H.323 protocol), ISDN BRI, ISDN PRI T1, ISDN PRI E1, and the following Serial interfaces: EIA-366A, EIA-449, EIA-530, ITU-T V.35 <sup>2</sup>
		Polycom HDX 7001	
	Polycom HDX 6000 HD <sup>3</sup>	NA	IP (10/100 Mbps with ITU-T H.323 protocol)
	Polycom HDX 4000 HD	Polycom HDX 4002	IP (10/100 Mbps with ITU-T H.323 protocol), ISDN BRI, ISDN PRI T1, ISDN PRI E1, and the following Serial interfaces: EIA-366A, EIA-449, EIA-530, ITU-T V.35 <sup>2</sup>
		Polycom HDX 4001	

**NOTES:**

- 1 These VTC systems were tested by JITC. The other VTC systems in the family series were not tested; however, they utilize the same software and hardware and JITC analysis determined them to be functionally identical for interoperability certification purposes and they are also certified for joint use.
- 2 The electrical physical interface tested was ITU-T V.35 in accordance with ITU-T V.36/V.37.
- 3 The HDX 6000 is an IP only codec and requires the use of an ITU-T H.323 to ITU-T H.320 gateway solution in order to connect to the DSN. In testing, JITC has found minimal risk in certifying this with any ITU-T H.323 to ITU-T H.320 gateways certified and on the UC APL as a component to other certified VTC systems.

**LEGEND:**

APL	Approved Products List	ITU-T	International Telecommunication Union - Telecommunication Standardization Sector
BRI	Basic Rate Interface	JITC	Joint Interoperability Test Command
DCE	Data Circuit-Terminating Equipment	kbps	kilobits per second
DSN	Defense Switched Network	kHz	kilohertz
DTE	Data Terminal Equipment	Mbps	Megabits per second
E1	European Basic Multiplex Rate (2.048 Mbps)	NA	Not Applicable
EIA	Electronic Industries Alliance	PRI	Primary Rate Interface
EIA-366A	Standard for interface between DTE and automatic calling equipment for data communication	Rev	Revision
EIA-449	Standard for 37-position and 9-position interface for DTE and DCE employing serial binary data interchange	SUT	System Under Test
EIA-530	Standard for 25-position interface for DTE and DCE employing serial binary data interchange	T1	Digital Transmission Link Level 1 (1.544 Mbps)
H.320	Standard for narrowband VTC	UC	Unified Capabilities
H.323	Standard for multi-media communications on packet-based networks	V.35	Standard for data transmission at 48 kbps using 60-108 kHz group band circuits
HD	High Definition	V.36	Modems for synchronous data transmission using 60-108 kHz group band circuits
HDX	High Definition Experience	V.37	Synchronous data transmission at a data signaling rate higher than 72 kbps using 60-108 kHz group band circuits
IP	Internet Protocol	VTC	Video Teleconferencing
ISDN	Integrated Services Digital Network		

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**Table 2. SUT Functional Requirements and Interoperability Status**

Interface	Critical	Certified	Requirements Required or Conditional	Status	UCR Reference
IP (10/100 Mbps) ITU-T H.323	No <sup>1</sup>	Yes <sup>2</sup>	The VTC system/endpoints shall meet the requirements of FTR1080B-2002. (R)	Met	5.2.4.2
			ITU-T H.323 in accordance with FTR 1080B-2002. (C)	Met	5.2.4.2
			Layer 3 Differential Service Code Point tagging as specified in the UCR, Section 5.3.1. (C)	Met	5.3.3.3.2
			A loss of any conferee on a multipoint videoconference shall not terminate or degrade the DSN service supporting VTC connections of any of the other conferees on the videoconference. (R)	Met	5.2.4.2
			Audio add-on interface, implemented independently of an IAS, shall be in accordance with the UCR, Section 5.2.3. (C)	Met	5.2.4.2
			Physical, electrical, and software characteristics shall not degrade or impair switch and associated network operations. (R)	Met	5.2.4.2
			VTU IP interface must be IPv6 capable and meet the Simple Server/Network Appliance IPv6 profile (R)	Partial Met <sup>3</sup>	5.3.5.2
ISDN BRI	No <sup>1</sup>	Yes	The VTC system/endpoints shall meet the requirements of FTR1080B-2002. (R)	Met	5.2.4.2
			A loss of any conferee on a multipoint videoconference shall not terminate or degrade the DSN service supporting VTC connections of any of the other conferees on the videoconference. (R)	Met	5.2.4.2
			Audio add-on interface, implemented independently of an IAS, shall be in accordance with the UCR, Section 5.2.3. (C)	Met	5.2.4.2
			Integrated BRI interface shall be in conformance with the requirements associated with a TA as described in the UCR, Section 5.2.3. (C)	Met	5.2.4.2
			Physical, electrical, and software characteristics shall not degrade or impair switch and associated network operations. (R)	Met	5.2.4.2
ISDN PRI T1 ISDN PRI E1	No <sup>1</sup>	Yes	The VTC system/endpoints shall meet the requirements of FTR1080B-2002. (R)	Met	5.2.4.2
			A loss of any conferee on a multipoint videoconference shall not terminate or degrade the DSN service supporting VTC connections of any of the other conferees on the videoconference. (R)	Met	5.2.4.2
			Audio add-on interface, implemented independently of an IAS, shall be in accordance with the UCR, Section 5.2.3. (C)	Met	5.2.4.2
			Integrated PRI interface shall be in conformance with IAS requirements in the UCR, Section 5.2.6. (C)	Met	5.2.4.2
			Physical, electrical, and software characteristics shall not degrade or impair switch and associated network operations. (R)	Met	5.2.4.2
Serial Interfaces: EIA-366A EIA-449 EIA-530 ITU-T V.35 <sup>4</sup>	No <sup>1</sup>	Yes	The VTC system/endpoints shall meet the requirements of FTR1080B-2002. (R)	Met	5.2.4.2
			A loss of any conferee on a multipoint videoconference shall not terminate or degrade the DSN service supporting VTC connections of any of the other conferees on the videoconference. (R)	Met	5.2.4.2
			Audio add-on interface, implemented independently of an IAS, shall be in accordance with the UCR, Section 5.2.3. (C)	Met	5.2.4.2
			Connections shall be in conformance with the requirements for serial interface(s) as described in FTR 1080B-2002. (R)	Met	5.2.4.2
			Physical, electrical, and software characteristics shall not degrade or impair switch and associated network operations. (R)	Met	5.2.4.2
Security	Yes	Certified	GR-815, STIGs, and DoDI 8510.bb (DIACAP) (R)	See note 5.	4.3.1 and 5.4.6.1

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**Table 2. SUT Functional Requirements and Interoperability Status (continued)**

<b>NOTES:</b>			
1	The VTC system interface requirements can be met with ISDN PRI, Serial, or ISDN BRI. In addition the SUT may include an IP ITU-T H.323 conditional interface.		
2	The SUT also met the conditional requirements for an IP interface with the ITU-T H.323 protocol; however, Assured Service is not yet defined for an IP interface with ITU-T H.323 protocol. Therefore, C2 VTC users and Special C2 VTC users are not authorized to be served by an IP interface with the ITU-T H.323 protocol. However, the SUT is certified for C2 and Special C2 VTC sessions via the TDM interfaces. The HDX 6000 HD is certified for C2 and Special C2 VTC sessions via a certified gateway with the TDM interfaces.		
3	The SUT met all of the IPv6 requirements for a VTC system with the following exceptions stipulated in the vendors letter of compliance that were adjudicated by DISA on 31 May 2011 as having a minor operational impact with the vendors delivered Plan of Action and Milestones (PoAM) of December 2011 to resolve:		
	<ul style="list-style-type: none"> <li>• The SUT does not support Duplicate Address Detection.</li> <li>• The SUT does not fully meet the ability to disable or enable Destination Unreachable Messages.</li> <li>• The SUT does not have capability to toggle Messages sent to any-cast or multi-cast.</li> <li>• The SUT only supports LDAP over IPv4 at this time.</li> </ul>		
4	The electrical physical interface tested was ITU-T V.35 in accordance with ITU-T V.36/V.37.		
5	Security is tested by DISA-led Information Assurance test teams and published in a separate report, Reference (f).		
<b>LEGEND:</b>			
ASD/NIJ	Assistant Secretary of Defense for Networks and Information Integration	HD	High Definition
BRI	Basic Rate Interface	HDX	High Definition Experience
C	Conditional	IAS	Integrated Access Switch
C2	Command and Control	IP	Internet Protocol
CPE	Customer Premise Equipment	IPv6	Internet Protocol version 6
DCE	Data Circuit-Terminating Equipment	ISDN	Integrated Services Digital Network
DIACAP	Department of Defense Information Assurance Certification and Accreditation Process	ITU-T	International Telecommunication Union – Telecommunication Standardization Sector
DISA	Defense Information Systems Agency	kbps	kilobits per second
DoDI	Department of Defense Instruction	kHz	kilohertz
DSN	Defense Switched Network	Mbps	Megabits per seconds
DTE	Data Terminal Equipment	MCU	Multipoint Control Unit
E1	European Basic Multiplex Rate (2.048 Mbps)	OSD	Office of the Secretary of Defense
EIA	Electronic Industries Alliance	PRI	Primary Rate Interface
EIA-366A	Standard for interface between DTE and automatic calling equipment for data communication	R	Required
EIA-449	Standard for 37-position and 9-position interface for DTE and DCE employing serial binary data interchange	STIGs	Security Technical Implementation Guides
EIA-530	Standard for 25-position interface for DTE and DCE employing serial binary data interchange	SUT	System Under Test
FTR	Federal Telecommunications Recommendation	T1	Digital Transmission Link Level 1 (1.544 Mbps)
GR	Generic Requirement	TDM	Time Division Multiplexing
GR-815	Generic Requirements For Network Element/Network System (NE/NS) Security	UCR	Unified Capabilities Requirements
H.320	Standard for narrowband VTC	V.35	Standard for data transmission at 48 kbps using 60-108 kHz group band circuits
H.323	Standard for multi-media communications on packet-based networks	V.36	Modems for synchronous data transmission using 60-108 kHz group band circuits
		V.37	Synchronous data transmission at a data signaling rate higher than 72 kbps using 60-108 kHz group band circuits
		VTC	Video Teleconferencing
		VTU	Video Teleconferencing Unit

5. No detailed test report was developed in accordance with the Program Manager’s request. JITC distributes interoperability information via the JITC Electronic Report Distribution (ERD) system, which uses Unclassified-But-Sensitive Internet Protocol Router Network (NIPRNet) e-mail. More comprehensive interoperability status information is available via the JITC System Tracking Program (STP). The STP is accessible by .mil/gov users on the NIPRNet at <https://stp.fhu.disa.mil>. Test reports, lessons learned, and related testing documents and references are on the JITC Joint Interoperability Tool (JIT) at <https://jit.fhu.disa.mil> (NIPRNet), or <http://199.208.204.226> (SIPRNet). Information related to Defense Switched Network (DSN)

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testing is on the Telecom Switched Services Interoperability (TSSI) website at <http://jitc.fhu.disa.mil/tssi>. Due to the sensitivity of the information, the Information Assurance Accreditation Package (IAAP) that contains the approved configuration and deployment guide must be requested directly through government civilian or uniformed military personnel from the Unified Capabilities Certification Office (UCCO), e-mail: [ucco@disa.mil](mailto:ucco@disa.mil).

6. The JITC point of contact is Mr. Steven Lesneski, DSN 879-5400, commercial (520) 538-5400, FAX DSN 879-4347, or e-mail to [steven.lesneski@disa.mil](mailto:steven.lesneski@disa.mil). The JITC's mailing address is P.O. Box 12798, Fort Huachuca, AZ 85670-2798. The tracking number for the SUT is 1034102 and 1034105.

FOR THE COMMANDER:

2 Enclosures a/s

  
for BRADLEY A. CLARK  
Chief  
Battlespace Communications Portfolio

Distribution (electronic mail):

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Office of Assistant Secretary of Defense (NII)/DOD CIO

U.S. Joint Forces Command, Net-Centric Integration, Communication, and Capabilities Division, J68

Defense Information Systems Agency, GS23

## **ADDITIONAL REFERENCES**

- (c) Office of the Assistant Secretary of Defense, "Department of Defense Unified Capabilities Requirements 2008, Change 1" 22 January 2010
- (d) Joint Interoperability Test Command, "Defense Switched Network Generic Switch Test Plan (GSTP), Change 2," 2 October 2006
- (e) Joint Interoperability Test Command, "Information Assurance (IA) Assessment of Polycom High Definition Experience (HDX) Release (Rel.) 2.7.0\_J (Tracking Number 1034102)"

## CERTIFICATION TESTING SUMMARY

**1. SYSTEM TITLE.** The Polycom High Definition Experience (HDX) 9000 Series, HDX 8000 Series, HDX 7000 Series, HDX 6000 High Definition (HD), and HDX 4000 HD Series with Software Release 2.7.0\_J and CMA 5000 Release 5.2.0J with patch 1-5 is hereinafter referred to as the System Under Test (SUT).

**2. PROPONENT.** Oklahoma Army National Guard (OKARNG).

**3. PROGRAM MANAGER.** CW4 Welly Gibson, DCSIM-VOC, 3501 Military Circle, Oklahoma City, Oklahoma, 73111, Email: welly.gibson@us.army.mil.

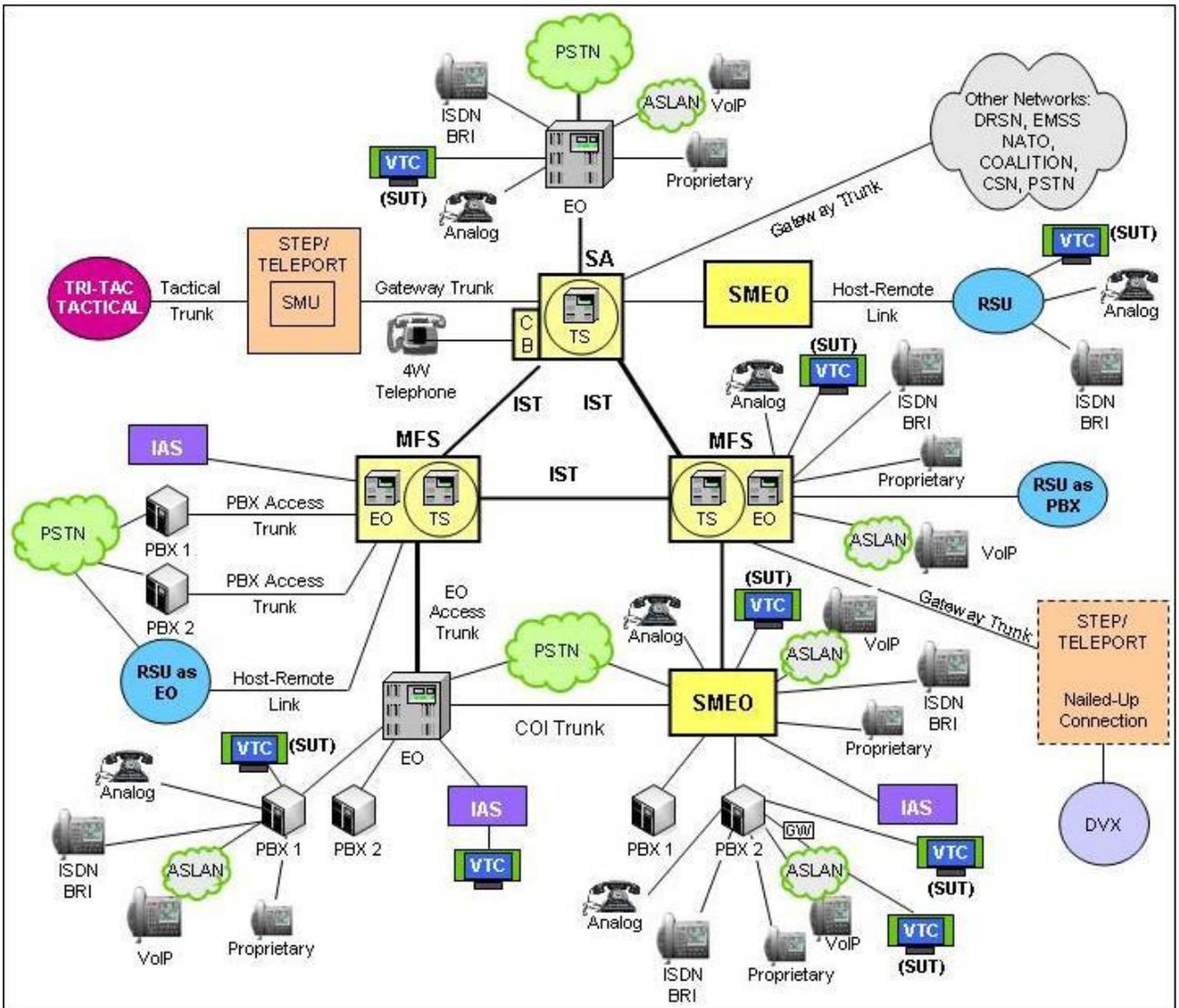
**4. TESTER.** Joint Interoperability Test Command (JITC), Fort Huachuca, Arizona.

**5. SYSTEM UNDER TEST DESCRIPTION.** The SUT is a family of Video Teleconferencing (VTC) systems. These VTC systems set on top of a monitor and are designed for medium and large-sized videoconferencing sessions. The SUT offers up to 1920 x 1080 (1080p) resolution video. The CMA 5000 provides remote centralized management of HDX video endpoints using secure web interface but is not required for HDX operations. The SUT supports the following features which were met through testing or vendor submission of Letters of Compliance (LoC) unless otherwise noted:

- Digital Transmission Link Level 1 (T1) or European Basic Multiplex Rate (E1) Integrated Services Digital Network (ISDN) Primary Rate Interface (PRI), ISDN Basic Rate Interface (BRI), and International Telecommunication Union – Telecommunication Standardization Sector (ITU-T) H.320 Internet Protocol (IP)
- Network Interfaces: ISDN Quad BRI, ISDN PRI T1 or E1, 10/100/1000 auto Network Interface Card (NIC)
- Serial support: ITU-T V.35, Electronic Industries Alliance (EIA)-530, and EIA-449 with EIA-366 dialing
- Supported Standards: ITU-T H.320 up to 2 Megabits per second (Mbps)
- Supports ITU-T H.323 up to 6 Mbps point-to-point, Session Initiation Protocol (SIP) up to 6 Mbps (not tested and not certified)
- SUT is IPv4 & IPv6 (dual-stack) capable and was tested.
- Audio standards: ITU-T G.711, ITU-T G.722, ITU-T G.722.1, ITU-T G.728
- Video standards: ITU-T H.261, ITU-T H.263, ITU-T H.263++, ITU-T H.264, ITU-T H.239
- Multi-Control Point compatibility ITU-T H.243, ITU-T H.231, ITU-T H.221, ITU-T H.224/H.281
- Inverse Multiplexing ITU-T H.244
- Up to three monitors, wireless remote control, camera, microphone
- Microphones provide a 360 degree range, mute button, and up to two microphones in a daisy-chain configuration
- Echo Cancellation, Adaptive Post Filtering, Automatic Gain Control, Automatic Noise Suppression

- Video formats supported: National Television Standards Committee, Phase Alternate Line, Video Graphics Array, Super Video Graphics Array, Extended Graphics Array

**6. OPERATIONAL ARCHITECTURE.** The Unified Capabilities Requirements (UCR) Defense Switched Network (DSN) architecture in Figure 2-1 depicts the relationship of the SUT to the DSN switches.



**LEGEND:**

4W 4-Wire  
 ASLAN Assured Services Local Area Network  
 BRI Basic Rate Interface  
 CB Channel Bank  
 COI Community of Interest  
 CSN Canadian Switch Network  
 DRSN Defense Red Switch Network  
 DSN Defense Switched Network  
 DVX Deployable Voice Exchange  
 EMSS Enhanced Mobile Satellite System  
 EO End Office  
 IAS Integrated Access Switch  
 ISDN Integrated Services Digital Network  
 IST Interswitch Trunk  
 MFS Multifunction Switch

NATO North Atlantic Treaty Organization  
 PBX Private Branch Exchange  
 PBX 1 Private Branch Exchange 1  
 PBX 2 Private Branch Exchange 2  
 PSTN Public Switched Telephone Network  
 RSU Remote Switching Unit  
 SA Standalone  
 SMEO Small End Office  
 SMU Switched Multiplex Unit  
 STEP Standardized Tactical Entry Point  
 SUT System Under Test  
 Tri-Tac Tri-Service Tactical Communications Program  
 TS Tandem Switch  
 VoIP Voice over Internet Protocol  
 VTC Video Teleconferencing

**Figure 2-1. DSN Architecture**

**7. REQUIRED SYSTEM INTERFACES.** Requirements specific to the SUT and interoperability results are listed in Table 2-1. These requirements are derived from UCR Interface and Functional Requirements and verified through JITC testing and review of vendor's LoC.

**Table 2-1. SUT Functional Requirements and Interoperability Status**

Interface	Critical	Certified	Requirements Required or Conditional	Status	UCR Reference
IP (10/100 Mbps) ITU-T H.323	No <sup>1</sup>	Yes <sup>2</sup>	The VTC system/endpoints shall meet the requirements of FTR1080B-2002. (R)	Met	5.2.4.2
			ITU-T H.323 in accordance with FTR 1080B-2002. (C)	Met	5.2.4.2
			Layer 3 Differential Service Code Point tagging as specified in the UCR, Section 5.3.1. (C)	Met	5.3.3.3.2
			A loss of any conferee on a multipoint videoconference shall not terminate or degrade the DSN service supporting VTC connections of any of the other conferees on the videoconference. (R)	Met	5.2.4.2
			Audio add-on interface, implemented independently of an IAS, shall be in accordance with the UCR, Section 5.2.3. (C)	Met	5.2.4.2
			Physical, electrical, and software characteristics shall not degrade or impair switch and associated network operations. (R)	Met	5.2.4.2
			VTU IP interface must be IPv6 capable and meet the Simple Server/Network Appliance IPv6 profile (R)	Partial Met <sup>3</sup>	5.3.5.2
ISDN BRI	No <sup>1</sup>	Yes	The VTC system/endpoints shall meet the requirements of FTR1080B-2002. (R)	Met	5.2.4.2
			A loss of any conferee on a multipoint videoconference shall not terminate or degrade the DSN service supporting VTC connections of any of the other conferees on the videoconference. (R)	Met	5.2.4.2
			Audio add-on interface, implemented independently of an IAS, shall be in accordance with the UCR, Section 5.2.3. (C)	Met	5.2.4.2
			Integrated BRI interface shall be in conformance with the requirements associated with a TA as described in the UCR, Section 5.2.3. (C)	Met	5.2.12.4.5
			Physical, electrical, and software characteristics shall not degrade or impair switch and associated network operations. (R)	Met	5.2.4.2
ISDN PRI T1 ISDN PRI E1	No <sup>1</sup>	Yes	The VTC system/endpoints shall meet the requirements of FTR1080B-2002. (R)	Met	5.2.4.2
			A loss of any conferee on a multipoint videoconference shall not terminate or degrade the DSN service supporting VTC connections of any of the other conferees on the videoconference. (R)	Met	5.2.4.2
			Audio add-on interface, implemented independently of an IAS, shall be in accordance with the UCR, Section 5.2.3. (C)	Met	5.2.4.2
			Integrated PRI interface shall be in conformance with IAS requirements in the UCR, Section 5.2.6. (C)	Met	5.2.4.2
			Physical, electrical, and software characteristics shall not degrade or impair switch and associated network operations. (R)	Met	5.2.4.2

**Table 2-1. SUT Functional Requirements and Interoperability Status (continued)**

Interface	Critical	Certified	Requirements Required or Conditional	Status	UCR Reference
Serial Interfaces: EIA-366A EIA-449 EIA-530 ITU-T V.35 <sup>4</sup>	No <sup>1</sup>	Yes	The VTC system/endpoints shall meet the requirements of FTR1080B-2002. (R)	Met	5.2.4.2
			A loss of any conferee on a multipoint videoconference shall not terminate or degrade the DSN service supporting VTC connections of any of the other conferees on the videoconference. (R)	Met	5.2.4.2
			Audio add-on interface, implemented independently of an IAS, shall be in accordance with the UCR, Section 5.2.3. (C)	Met	5.2.4.2
			Connections shall be in conformance with the requirements for serial interface(s) as described in FTR 1080B-2002. (R)	Met	5.2.4.2
			Physical, electrical, and software characteristics shall not degrade or impair switch and associated network operations. (R)	Met	5.2.4.2
Security	Yes	Certified	GR-815, STIGs, and DoDI 8510.bb (DIACAP) (R)	See note 5.	4.3.1 and 5.4.6.1

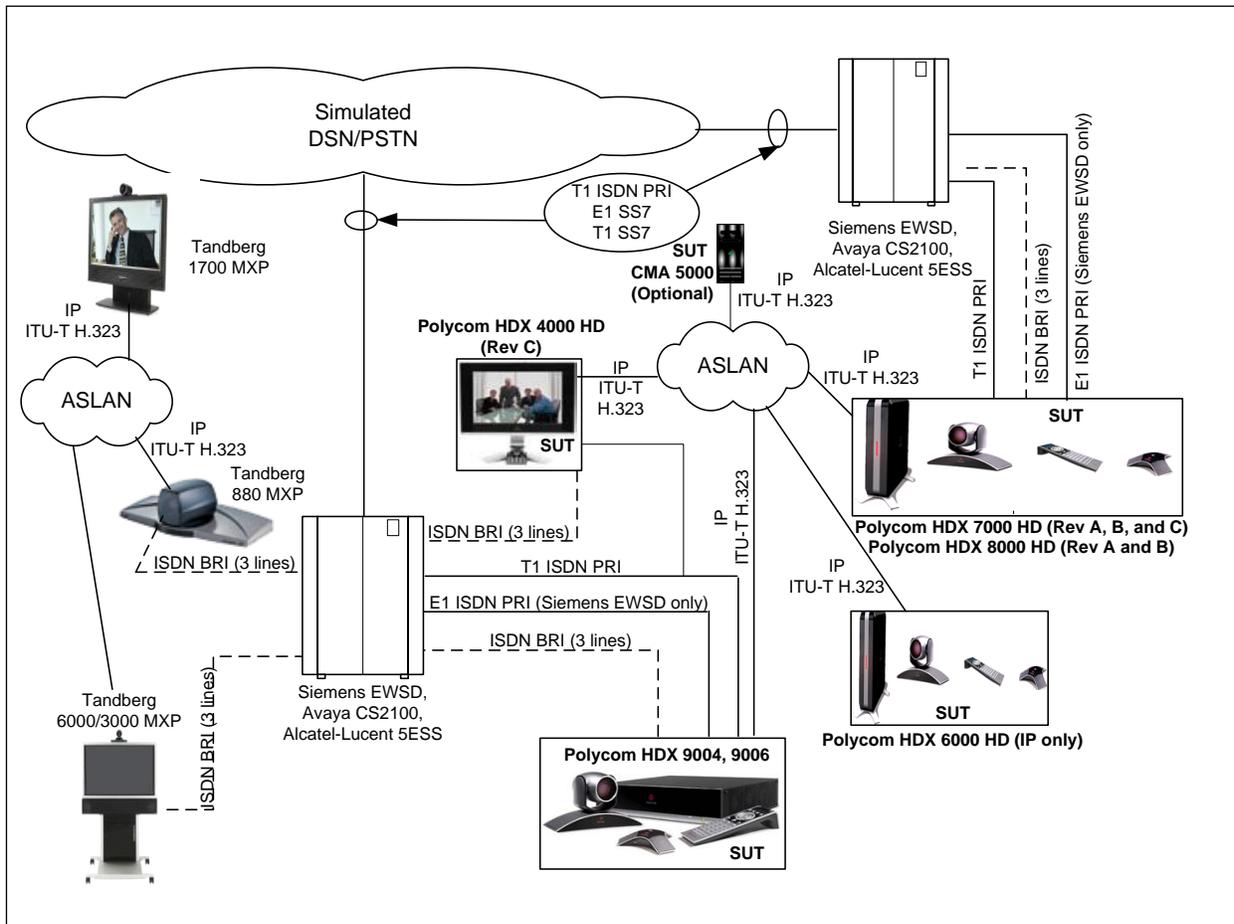
**NOTES:**

- The VTC system interface requirements can be met with ISDN PRI, Serial, or ISDN BRI. In addition the SUT may include an IP ITU-T H.323 conditional interface.
- The SUT also met the conditional requirements for an IP interface with the ITU-T H.323 protocol; however, Assured Service is not yet defined for an IP interface with ITU-T H.323 protocol. Therefore, C2 VTC users and Special C2 VTC users are not authorized to be served by an IP interface with the ITU-T H.323 protocol. However, the SUT is certified for C2 and Special C2 VTC sessions via the TDM interfaces. The HDX 6000 HD is certified for C2 and Special C2 VTC sessions via a certified gateway with the TDM interfaces.
- The SUT met all of the IPv6 requirements for a VTC system with the following exceptions stipulated in the vendors letter of compliance that were adjudicated by DISA on 31 May 2011 as having a minor operational impact with the vendors delivered Plan of Action and Milestones (PoAM) of December 2011 to resolve:
  - The SUT does not support Duplicate Address Detection.
  - The SUT CMA does not fully meet the ability to disable or enable Destination Unreachable Messages.
  - The SUT CMA does not have capability to toggle Messages sent to any-cast or multi-cast.
  - The SUT CMA only supports LDAP over IPv4 at this time.
- The electrical physical interface tested was ITU-T V.35 in accordance with ITU-T V.36/V.37.
- Security is tested by DISA-led Information Assurance test teams and published in a separate report, Reference (f).

**LEGEND:**

ASD/NII	Assistant Secretary of Defense for Networks and Information Integration	HD	High Definition
BRI	Basic Rate Interface	HDX	High Definition Experience
C	Conditional	IAS	Integrated Access Switch
C2	Command and Control	IP	Internet Protocol
CPE	Customer Premise Equipment	IPv6	Internet Protocol version 6
DCE	Data Circuit-Terminating Equipment	ISDN	Integrated Services Digital Network
DIACAP	Department of Defense Information Assurance Certification and Accreditation Process	ITU-T	International Telecommunication Union – Telecommunication Standardization Sector
DISA	Defense Information Systems Agency	kbps	kilobits per second
DoDI	Department of Defense Instruction	kHz	kiloHertz
DSN	Defense Switched Network	Mbps	Megabits per seconds
DTE	Data Terminal Equipment	MCU	Multipoint Control Unit
E1	European Basic Multiplex Rate (2.048 Mbps)	OSD	Office of the Secretary of Defense
EIA	Electronic Industries Alliance	PRI	Primary Rate Interface
EIA-366A	Standard for interface between DTE and automatic calling equipment for data communication	R	Required
EIA-449	Standard for 37-position and 9-position interface for DTE and DCE employing serial binary data interchange	STIGs	Security Technical Implementation Guides
EIA-530	Standard for 25-position interface for DTE and DCE employing serial binary data interchange	SUT	System Under Test
FTR	Federal Telecommunications Recommendation	T1	Digital Transmission Link Level 1 (1.544 Mbps)
GR	Generic Requirement	TDM	Time Division Multiplexing
GR-815	Generic Requirements For Network Element/Network System (NE/NS) Security	UCR	Unified Capabilities Requirements
H.320	Standard for narrowband VTC	V.35	Standard for data transmission at 48 kbps using 60-108 kHz group band circuits
H.323	Standard for multi-media communications on packet-based networks	V.36	Modems for synchronous data transmission using 60-108 kHz group band circuits
		V.37	Synchronous data transmission at a data signaling rate higher than 72 kbps using 60-108 kHz group band circuits
		VTC	Video Teleconferencing
		VTU	Video Teleconferencing Unit

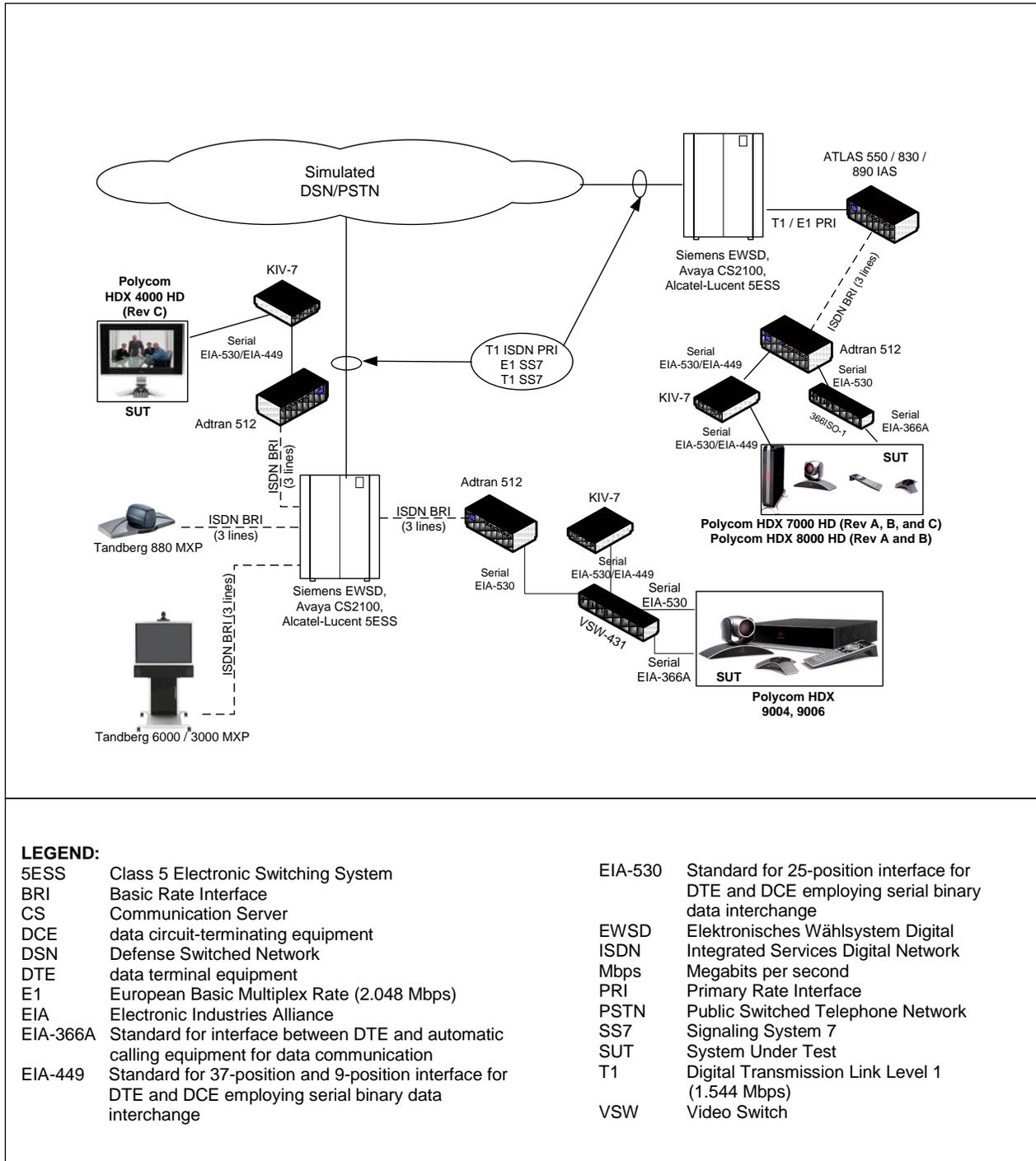
**8. TEST NETWORK DESCRIPTION.** The SUT was tested at JITC's Global Information Grid Network Test Facility (GNTF) in a manner and configuration similar to that of the DSN operational environment. Testing the system's required functions and features was conducted using the test configuration depicted in Figures 2-2 through 2-4. Figure 2-2 depicts the SUT ISDN (PRI and BRI) and ITU-T H.323 IP test configuration. Figure 2-3 depicts the SUT serial with encryption test configuration. Figure 2-4 depicts the ITU-T V.35 serial test configuration.



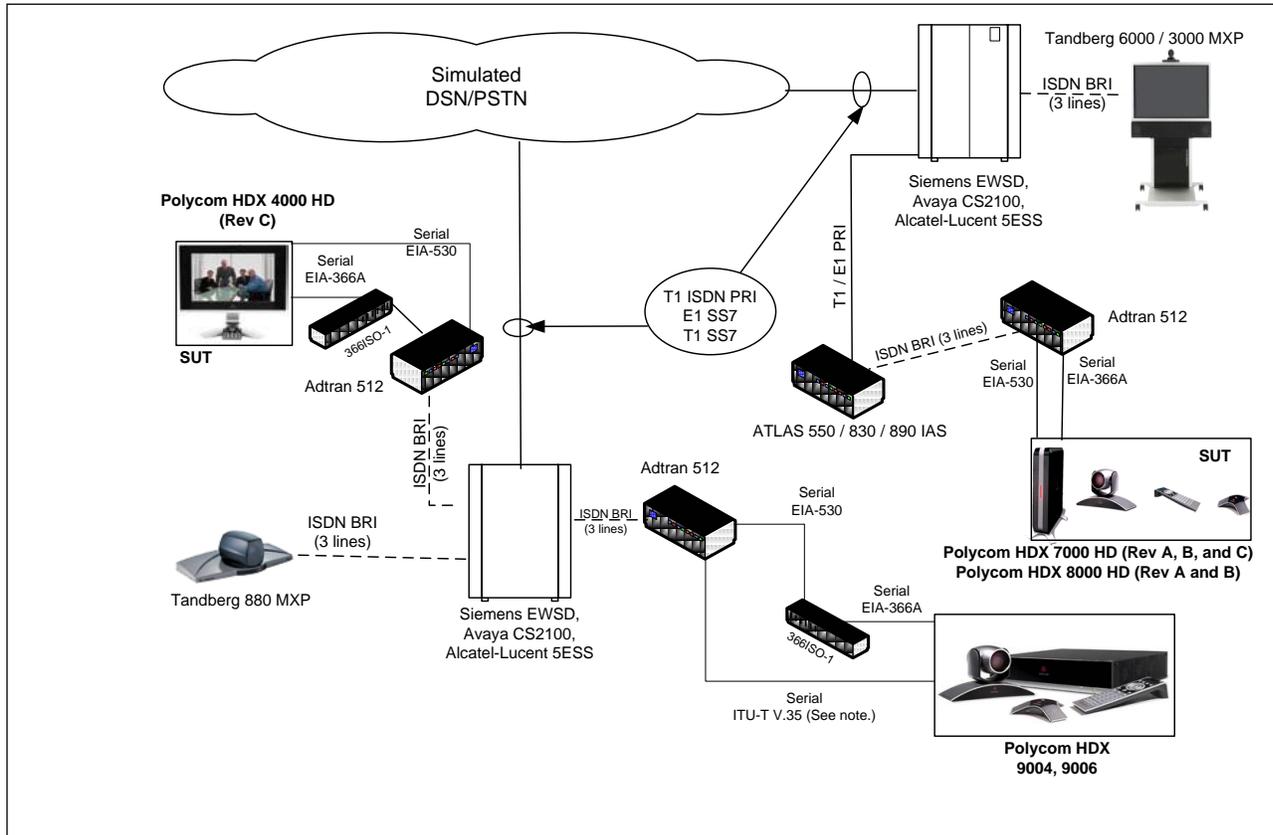
**LEGEND:**

5ESS	Class 5 Electronic Switching System	ISDN	Integrated Services Digital Network
ASLAN	Assured Services Local Area Network	ITU-T	International Telecommunication Union – Telecommunication Standardization Sector
BRI	Basic Rate Interface	Mbps	Megabits per second
CS	Communication Server	PRI	Primary Rate Interface
CMA	Converged Management Application	PSTN	Public Switched Telephone Network
DSN	Defense Switched Network	SS7	Signaling System 7
E1	European Basic Multiplex Rate (2.048 Mbps)	SUT	System Under Test
EWSD	Elektronisches Wählsystem Digital	T1	Digital Transmission Link Level 1 (1.544 Mbps)
H.323	Standard for multi-media communications on packet-based networks		

**Figure 2-2. SUT ISDN (PRI and BRI) and ITU-T H.323 IP Test Configuration**



**Figure 2-3. SUT Serial with Encryption Test Configuration**



**NOTE:** The electrical physical interface tested was ITU-T V.35 in accordance with ITU-T V.36/V.37.

**LEGEND:**

5ESS Class 5 Electronic Switching System  
 BRI Basic Rate Interface  
 CS Communication Server  
 DCE data circuit-terminating equipment  
 DSN Defense Switched Network  
 DTE data terminal equipment  
 E1 European Basic Multiplex Rate (2.048 Mbps)  
 EIA Electronic Industries Alliance  
 EIA-366A Standard for interface between DTE and automatic calling equipment for data communication  
 EIA-530 Standard for 25-position interface for DTE and DCE employing serial binary data interchange  
 EWSD Elektronisches Wählsystem Digital  
 ISDN Integrated Services Digital Network

ITU-T International Telecommunication Union - Telecommunication Standardization Sector  
 kbps kilobits per second  
 kHz kiloHertz  
 Mbps Megabits per second  
 MXP Media XPerience  
 PRI Primary Rate Interface  
 PSTN Public Switched Telephone Network  
 SS7 Signaling System 7  
 SUT System Under Test  
 T1 Digital Transmission Link Level 1 (1.544 Mbps)  
 V.35 Standard for data transmission at 48 kbps using 60-108 kHz group band circuits  
 V.36 Modems for synchronous data transmission using 60-108 kHz group band circuits  
 V.37 Synchronous data transmission at a data signaling rate higher than 72 kbps using 60-108 kHz group band circuits

**Figure 2-4. SUT ITU-T V.35 Serial Test Configuration**

**9. SYSTEM CONFIGURATIONS.** Table 2-2 provides the system configurations, hardware, and software components tested with the SUT. The SUT was tested in an operationally realistic environment to determine interoperability with a complement of DSN switches noted in Table 2-2. Table 2-2 lists the DSN switches which depict the tested configuration and is not intended to identify the only switches that are certified with the SUT. The SUT is certified with switching systems listed on the Unified Capabilities (UC) Approved Products List (APL) that offer the same certified interfaces.

**Table 2-2. Tested System Configurations**

<b>System Name</b>	<b>Software Release</b>		
Siemens EWSD	19d with Patch Set 46		
Avaya CS2100	Succession Enterprise (SE)09.1		
Alcatel-Lucent 5ESS	5E16.2, Broadcast Warning Message (BWM) 09-0002		
Adtran 512 IMUX	Firmware Version CS.0, Cksum10b2		
Adtran 512 IMUX	Firmware Version F.00, Cksum2d44		
Adtran ATLAS 550 IAS	Firmware Version C09.04		
Tandberg 6000 MXP, 3000 MXP	F7.3.1 NTSC		
Tandberg 1700 MXP	F7.3.1 PAL		
Tandberg 880 MXP	F2.3 NTSC		
Polycom HDX 7000 HD Rev C	Release 2.5.0.7_J		
KIV-7HSB	N/A		
<b>System Under Test</b>			
<b><u>Polycom HDX 4000 HD, HDX 4000 HD Rev. C, HDX 4002 XL, HDX 4001</u></b>	2.7.0_J		
<b><u>Polycom HDX 6000 HD<sup>2</sup></u></b>			
<b><u>Polycom HDX 7000 Rev. A, B and C</u></b> HDX 7001, HDX 7002			
<b><u>Polycom HDX 8000 HD Rev. A and B</u></b> , HDX 8002, HDX 8004			
<b><u>Polycom HDX 9004, HDX 9006 Rev. B</u></b> , HDX 9001, HDX 9002			
<b><u>CMA 5000</u></b>	Rel 5.2.0J with patches 1-5		
<b>NOTES:</b>			
<p>1 The VTC systems bolded and underlined were tested by JITC. The other VTC systems in the family series were not tested; however, they utilize the same software and hardware and JITC analysis determined them to be functionally identical for interoperability certification purposes and they are also certified for joint use.</p> <p>2 The HDX 6000 HD is an IP only codec and requires the use of an ITU-T H.323 to ITU-T H.320 gateway solution in order to connect to the DSN. In testing, JITC has found minimal risk in certifying this with any ITU-T H.323 to ITU-T H.320 gateway certified and on the UC APL.</p>			
<b>LEGEND:</b>			
5ESS	Class 5 Electronic Switching System	IMUX	Inverse Multiplexer
APL	Approved Products List	IP	Internet Protocol
ATLAS	Adtran Total Access System	ITU-T	International Telecommunication Union - Telecommunication Standardization Sector
BRI	Basic Rate Interface	JITC	Joint Interoperability Test Command
CODEC	coder/decoder	Mbps	Megabits per second
CS	Communication Server	MPTZ	Motorized Pan Tilt Zoom
DSN	Defense Switched Network	MXP	Media XPerience
E1	European Basic Multiplex Rate (2.048 Mbps)	NTSC	National Television Standards Committee
EWSD	Elektronisches Wählsystem Digital	PAL	Phase Alternate Line
H.320	Standard for narrowband VTC	PRI	Primary Rate Interface
H.323	Standard for multi-media communications on packet-based networks	Rev.	Revision
HD	High Definition	T1	Digital Transmission Link Level 1 (1.544 Mbps)
HDMI	High Definition Multimedia Interface	UC	Unified Capabilities
HDX	High Definition Experience	VTC	Video Teleconferencing
IAS	Integrated Access Switch		

**10. TEST LIMITATIONS.** None.

**11. TEST RESULTS**

**a. Discussion.** The VTC system interface requirements can be met with an ISDN BRI, ISDN PRI, Serial, or ITU-T H.323 interface. Although each interface is conditional, if the SUT offers an interface, it must meet the critical requirements for that interface. The SUT minimum critical interoperability interface and functional requirements were met through both interoperability certification testing conducted at the JITC GNTF and review of the vendor's LoC. Bonding mode 1 was tested to requirements defined in UCR, 5.2.12.4.5 and Federal Telecommunications Recommendation (FTR) 1080B-2002. Bonding, often referred to as channel aggregation, takes place through inverse multiplexing. Inverse multiplexing takes a high-bandwidth signal and splits it for transport through the network over multiple lower-bandwidth channels. At the receiving end, the multiple, lower-bandwidth signals are recombined into the original high-bandwidth signal. A passed test result was based on 100 percent of the calls receiving a score of four or better on the subjective quality scale as defined in Table 2-3. Furthermore, the SUT has the capability of connecting multiple sites at different bandwidth rates. None of the conferences that are connected to the SUT were reduced in video quality due to one conferee being at a lower restricted bandwidth. The CMA 5000 remote centralized management of HDX video endpoints using secure web interface was tested using its' provisioning and registration functionality of HDX endpoints. System firmware updating of an HDX endpoint was demonstrated as well during testing with no impact of SUT operations.

**Table 2-3. Video and Voice Subjective Quality Scale**

Rating	Reference	Definition
1	<i>Unusable</i>	<u>Quality is unusable.</u> Voice and video may be heard and seen but is unrecognizable.
2	<i>Poor</i>	<u>Quality is unusable.</u> Words and phrases are not fully understandable or video cannot be properly identified.
3	<i>Fair</i>	<u>Quality is seriously affected by distortion.</u> Repeating words and phrases are required to convey speech or video is seriously impacted and barely recognizable.
4	<b>Good</b>	<b><u>Quality is usable. Audio or video is not impaired but some distortion is noticeable</u></b>
5	<i>Excellent</i>	<u>Quality is unaffected.</u> No discernable problems with either audio or video.

**NOTE:** Audio and video quality during a conference will receive a subjective rating on the Data Collection Form. A rating of lower than 4 on this reference scale is considered a failure.

Seven- and ten-digit calls were placed to verify that the SUT met the capability to support both the North American Numbering Plan and the DSN World Wide Numbering and Dialing Plan (WWNDP) defined in UCR, Section 5.2.12.4.5 (5.2.12.7.4). Multilevel precedence video calls were placed from the SUT and established within the DSN at the respective precedence level dialing the DSN WWNDP access code (e.g. 93: Priority, 92: Immediate, 91: Flash, etc.). Table 2-4 depicts the tested audio and video codecs. The SUT has the ability to prefix any DSN 7 or 10 digit number with a 9X access code which meets this requirement.

**Table 2-4. Video and Voice Protocols**

<b>Audio</b>	<b>Tested</b>
G.711 (48, 56, 64 Kbps)	Yes
G.722.1 (24, 32 Kbps)	Yes
G.722 (48, 56, 64 Kbps)	Yes
G.728 (16 Kbps)	Yes
<b>Video</b>	<b>Tested</b>
H.261	Yes
H.263	Yes
H.263+	Yes
H.264	Yes
H.239 (dual video)	Yes

**NOTE:** Dual Video functionality was exercised during H.320, H.323, and combination of both during Point-to Point and Multipoint conference calls.

Multiple IPv4 and IPv6 two-way 112 – 4096 kilobits per second (kbps) Multipoint and Point-to-Point test calls at different bandwidth rates and different durations were placed over the test network shown in Figure 2-2 via all the combinations depicted in Table 2-1. Numerous multipoint conference calls were conducted using both IPv4 and IPv6 protocols simultaneously.

The SUT was also tested with secure video sessions using a KIV-7 Communications Security (COMSEC) device as shown in Figure 2-3.

**b. Test Conduct.** Multiple two-way 112 – 384 kilobits per second (kbps) bonding mode 1 Multipoint and Point-to-Point test calls at different durations (15-minutes, 30-minutes, 1-hour, 24-hours, and 48-hours) and different precedence levels were placed over the test network shown in Figures 2-2 through 2-4 via all the combinations depicted in Table 2-1.

(1) The UCR, 5.2.4.2 requirements state that the VTC system/endpoints shall meet the requirements of FTR 1080B-2002. The SUT met this requirement through testing and the vendor’s LoC.

(2) The UCR, 5.2.4.2 requirements state that a VTC features and functions used in conjunction with Internet Protocol (IP) network services shall meet the requirements of ITU-T H.323 in accordance with FTR 1080B-2002. Additionally, ITU-T H.323 video end instruments must meet the tagging requirements as specified in UCR 2008, section 5.2.12.8.2.9. This requirement was met by the SUT with testing and the vendors LoC. The SUT has the ability to apply a Service Class Tag for signaling and video media at any value from 0 to 63, which met the requirement. This was verified through testing by capturing traffic from and to the SUT with a packet capture utility. These captures were analyzed to verify proper tagging requirements were met.

(3) UCR paragraph 5.3.5.2 Table 5.3.5-1 states that VTU IP interface must be IPv6 capable. The SUT supports IPv6 and was fully tested using its dual-stack

capability for IPv4 and IPv6 IP video calls. Multiple IPv4 and IPv6 two-way 112 – 4096 kilobits per second (kbps) Multipoint and Point-to-Point test calls at different durations (15-minutes, 30-minutes, 1-hour, 24-hours, and 48-hours) were placed over the test network shown in Figure 2-2 via all the combinations depicted in Table 2-1.

(4) The UCR, 5.2.4.2 requirements state that a loss of any conferee on a multipoint videoconference shall not terminate or degrade the DSN service supporting VTC connections of any of the other conferees on the videoconference. This was tested during each multipoint session established with the SUT by disconnecting single and multiple conferees. This was done by hanging up and simulating a failure by disconnecting the physical interface. The remaining conferees on the multipoint conference were not affected and remained in the conference 100 percent of the time, which met this requirement.

(5) The UCR, 5.2.4.2 requirements state that an audio add-on interface, implemented independently of an Integrated Access Switch (IAS), shall be in accordance with the UCR, 5.2.12.3. The SUT met this requirement through testing and the vendor's LoC.

(6) The physical, electrical, and software characteristics of VTU system(s)/ endpoint(s) that are used in the DSN network shall not degrade or impair the serving DSN switch and its associated network operations. This was tested by conducting other tests on the serving DSN switch to include bulk call loading while point-to-point and multipoint video sessions were established. The SUT physical, electrical, and software characteristics did not impair the serving DSN switch and its associated operations, which met the requirement.

(7) A VTC system/endpoint that uses an integrated BRI interface to connect to the DSN shall be in conformance with the requirements associated with a Terminal Adaptor as described in the UCR, Section 5.2.4.2. This requirement was verified through testing and the vendor's LoC.

(8) A VTC system/endpoint that uses an integrated PRI interface to connect to the DSN shall be in conformance with the requirements associated with an IAS as described in the UCR, 5.2.4.2. The SUT met this requirement through testing and the vendor's LoC.

(9) The UCR, Section 5.4 states the Information Assurance requirements for the SUT. Security is tested by DISA-led Information Assurance test teams and published in a separate report, Reference (f).

**c. Test Summary.** The SUT met the critical interface and functional requirements for a VTC system with the interfaces depicted in Table 2-1 and is certified for joint use within the Defense Information System Network (DISN). The SUT meets the critical interoperability requirements for T1 and E1 ISDN PRI, ISDN BRI, and serial interfaces. The SUT met the requirements for an IP interface with the ITU-T H.323

protocol; however, Assured Service is not yet defined for an IP interface with the ITU-T H.323 protocol. Since the IP interface with the ITU-T H.323 protocol does not provide Assured Services during a crisis or contingency, users' access to the DISN will be on a best effort basis. Therefore, Command and Control (C2) VTC users and Special C2 VTC users are not authorized to be served by an IP interface with the ITU-T H.323 protocol.

**12. TEST AND ANALYSIS REPORT.** No detailed test report was developed in accordance with the Program Manager's request. JITC distributes interoperability information via the JITC Electronic Report Distribution (ERD) system, which uses Unclassified-But-Sensitive Internet Protocol Router Network (NIPRNet) e-mail. More comprehensive interoperability status information is available via the JITC System Tracking Program (STP). The STP is accessible by .mil/gov users on the NIPRNet at <https://stp.fhu.disa.mil>. Test reports, lessons learned, and related testing documents and references are on the JITC Joint Interoperability Tool (JIT) at <http://jit.fhu.disa.mil> (NIPRNet), or <http://199.208.204.125> (SIPRNet). Information related to DSN testing is on the Telecom Switched Services Interoperability (TSSI) website at <http://jitc.fhu.disa.mil/tssi>. Due to the sensitivity of the information, the Information Assurance Accreditation Package (IAAP) that contains the approved configuration and deployment guide must be requested directly through government civilian or uniformed military personnel from the Unified Capabilities Certification Office (UCCO), e-mail: [ucco@disa.mil](mailto:ucco@disa.mil).