



## DEFENSE INFORMATION SYSTEMS AGENCY

P. O. BOX 4502  
ARLINGTON, VIRGINIA 22204-4502

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

**4 Feb 09**

### MEMORANDUM FOR DISTRIBUTION

**SUBJECT:** Special Interoperability Test Certification of REDCOM High Density Exchange (HDX) with Software Release 3.0A Revision 3, with Specified Patch Group 0 (3.0A R3P0), certified as a Deployable Voice Exchange (DVX)

**References:** (a) DoD Directive 4630.5, "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 REDCOM HDX with Software Release 3.0A R3P0 is hereinafter referred to as the System Under Test (SUT). The SUT met all of its critical interoperability requirements and is certified as interoperable for joint use within the Defense Switched Network (DSN). The SUT is certified for Voice over Internet Protocol (VoIP) with certified Assured Services Local Area Networks (ASLANs) on the Unified Capabilities (UC) Approved Products List (APL). The listed test discrepancies shown in the Certification Testing Summary (Enclosure 2) have an overall minor operational impact. The SUT was tested and met the critical interoperability requirements for a DVX. The SUT offers a virtual-tactical network element Proprietary Internet Protocol Trunk (PIPT). The PIPT trunk can only be deployed within a tactical DSN environment and is not certified for joint use within the strategic DSN. No other configurations, features, or functions, except those cited within this report, are certified by the JITC, or authorized by the Program Management Office for use within the DSN. This certification expires upon changes that could affect interoperability, but no later than four years from the date of this memorandum.

3. This finding is based on interoperability testing conducted by JITC, review of the vendor's Letters of Compliance (LoC), and Defense Information Assurance (IA)/Security Accreditation Working Group (DSAWG) accreditation. Testing was conducted at JITC's Global Information Grid Network Test Facility at Fort Huachuca, Arizona, from 26 November 2007 through 18 January 2008. Regression testing was conducted from 28 July through 5 September 2008 to test patches developed to fix test discrepancies discovered during initial testing. Review of the vendor's LoC was completed on 14 October 2008. DSAWG grants accreditation based on the security testing completed by DISA-led Information Assurance test

JITC Memo, JTE, Special Interoperability Test Certification of REDCOM High Density Exchange (HDX) with Software Release 3.0A, Revision 3, with Specified Patch Group 0 (3.0A R3P0), certified as a Deployable Voice Exchange (DVX)

teams and published in a separate report (reference (c)). DSAWG accreditation was granted on 13 January 2009. Enclosure 2 documents the test results and describes the tested network and system configurations.

4. The interoperability test summary of the SUT is contained in Table 1. The DVX required and conditional Capability Requirements (CRs) and Feature Requirements (FRs) are listed in Table 2. This interoperability test status is based on the SUT's ability to meet:

- a. DSN services for Network and Applications specified in reference (d).
- b. DVX interface and signaling requirements for trunks/lines specified in reference (e) verified through JITC testing and/or vendor submission of LoC.
- c. DVX CRs/FRs specified in reference (e) verified through JITC testing and/or vendor submission of LoC.
- d. The overall system interoperability performance derived from test procedures listed in reference (f).

**Table 1. SUT Interoperability Test Summary**

DSN Trunk Interfaces			
Interface & Signaling	Critical	Status	Remarks
T1 CAS (DTMF, DP)	Yes	Certified	Met all critical CRs and FRs.
T1 CAS (MFR1)	No	Certified	Met all critical CRs and FRs.
E1 CAS (DTMF, DP)	Yes (Europe only)	Certified	Met all critical CRs and FRs.
E1 CAS (MFR1)	No (Europe only)	Certified	Met all critical CRs and FRs.
T1 ISDN PRI NI 1/2 (ANSI T1.619a)	Yes	Certified	Met all critical CRs and FRs.
E1 PRI (ITU-T Q.955.3)	No (Europe only)	Certified	Met all critical CRs and FRs.
T1 SS7 (ANSI T1.619a)	No	Certified	Met all critical CRs and FRs.
E1 SS7 (ANSI T1.619a)	No	Not Tested	E1 SS7 is not supported by the SUT. This is not a required interface for a DVX. There is no risk associated with the SUT not supporting this interface.
Analog E&M Type I, II, V	Yes	Certified	Met all critical CRs and FRs.
PIPT (Session Initiation Protocol) (IEEE 802.3u)	No	Certified	Met all critical CRs and FRs. See note 1.
DSN Line Interfaces			
Interface & Signaling	Critical	Status	Remarks
2-Wire Analog (GR-506-CORE)	Yes	Certified	Met all critical CRs and FRs with the following minor exception: The conference disconnect tone does not meet the specifications. <sup>2</sup>
ISDN BRI NI 1/2	Yes	Certified	Met all critical CRs and FRs with the following minor exceptions: The precedence above ROUTINE ringing cadence that the SUT applies to BRI phones does not meet the specifications. <sup>3</sup> The conference disconnect tone does not meet the specifications. <sup>2</sup>
2-Wire Proprietary Digital	No	Not Tested	This interface is not supported by the SUT. This is not a required feature for a DVX. There is no risk associated with the SUT not supporting this interface.
VoIP (Session Initiation Protocol)	No	Certified	Met all critical CRs and FRs with the following minor exception: The conference disconnect tone does not meet the specifications. <sup>2</sup>

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**Table 1. SUT Interoperability Test Summary (continued)**

<b>DSN Features and Capabilities</b>				
<b>Features and Capabilities</b>		<b>Critical</b>	<b>Status</b>	<b>Remarks</b>
Common Features		Yes	Certified	Met all critical CRs and FRs with the following minor exception: The SUT does not correctly support the call forwarding variable "ping" ring feature. <sup>4</sup>
Attendant		No	Certified	Met all critical CRs and FRs.
Public Safety		Yes	Certified	Met all critical CRs and FRs with the following minor exception: The SUT does not support tandem call trace. <sup>5</sup>
Conferencing	Preset	Yes	Certified	Met all critical CRs and FRs.
	Conference Notification Recorded Announcement	Yes	Certified	Met all critical CRs and FRs.
	Automatic Retrial and Alternate Address	Yes	Certified	Met all critical CRs and FRs.
	Bridge Release	Yes	Certified	Met all critical CRs and FRs.
	Lost Connection	Yes	Certified	Met all critical CRs and FRs.
	Secondary Conferencing	Yes	Certified	Met all critical CRs and FRs.
	Meet-me	No	Certified	Met all critical CRs and FRs.
Progressive		No	Certified	Met all critical CRs and FRs.
Nailed-up Connections		No	Not Tested	This feature is not supported by the SUT. This is not a required feature for a DVX. There is no risk associated with the SUT not supporting this feature.
DSN Hotline Services		Yes	Certified	Met all critical CRs and FRs with the following minor exceptions: The SUT will not allow the protection of a hotline call originator through the use of a hotline list as required by the UCR. The operational impact is minor. <sup>6</sup> The SUT does not support interswitch protected hotline calling. <sup>7</sup>
MLPP		Yes	Certified	Met all critical CRs and FRs with the following minor exception: The SUT does not support the loss of Command and Control announcement. <sup>8</sup>
Call Processing		Yes	Certified	Met all critical CRs and FRs with the following minor exceptions: The SUT does not support the full complement of CoS tables. <sup>9</sup> The SUT does not support calling number delivery. <sup>8</sup>
Network Management		Yes	Certified	Met all critical CRs and FRs with both serial EIA-232 and Internet Protocol (IP) interfaces.
ISDN Services		Yes	Certified	Met all critical CRs and FRs.
Synchronization		Yes	Certified	Met all critical CRs and FRs.
Reliability		Yes	Certified	Met all critical CRs and FRs. <sup>10</sup>
Security		Yes	Certified	See note 11.
VoIP System		No	Certified	The SUT is certified for VoIP with any certified ASLAN posted on the UC APL. See note 12.
<b>Network Gateways</b>				
<b>Gateway</b>	<b>Interface &amp; Signaling</b>	<b>Critical</b>	<b>Status</b>	<b>Remarks</b>
PSTN	T1 CAS (DTMF, DP, MFR1)	Yes	Certified	Met all critical CRs and FRs.
	E1 CAS (DTMF, DP, MFR1)	Yes (Europe only)	Certified	Met all critical CRs and FRs.
	T1 ISDN PRI NI 1/2 (ANSI T1.607)	Yes	Certified	Met all critical CRs and FRs.
	E1 PRI (ITU-T Q.931)	No (Europe only)	Certified	Met all critical CRs and FRs.
	Ground Start Line	Yes	Certified	Met all critical CRs and FRs.

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**Table 1. SUT Interoperability Test Summary (continued)**

<b>NOTES:</b>					
1	The PIPT trunk can only be deployed within a tactical DSN environment and is not certified for joint use within the strategic DSN.				
2	The conference disconnect tone that is provided by the SUT does not meet the specifications designated in UCR, section 5.5.2. The SUT conference disconnect tone is distinguishable from other DSN tones and cadences; therefore, this anomaly has a minor operational impact.				
3	The precedence above ROUTINE ringing cadence that the SUT applies to BRI phones does not meet the specifications as detailed in the UCR, section 5.5.1. The precedence above ROUTINE cadence is distinct from the ROUTINE cadence when it is configured properly; therefore this anomaly has no operational impact.				
4	When CFV is assigned to any station on the SUT and CFV is invoked by the user, any station with CFV invoked does not receive a “ping” ring when calls are being forwarded. The operational impact is minor.				
5	The SUT cannot perform a tandem call trace of a specified distant office directory number as specified in the UCR. This anomaly was adjudicated by DISA, and determined to have a minor operational impact.				
6	The SUT will not allow the protection of a hotline call originator through the use of a hotline list as required by the UCR. However, this capability can be accomplished with the SUT by classmarking authorized hotline users for receiving only calls from other hotline callers. The operational impact is minor.				
7	This requirement was modified in the UCR 2007 to add clarification regarding interswitch hotline protection. Prior to the UCR 2007 only intraswitch hotline protection was required and tested. The SUT meets the intraswitch hotline protection requirement. The SUT does not support interswitch hotline protection in accordance with the UCR 2007; however, the vendor has 18 months (till June 2009) to develop this new requirement. The operational impact is minor.				
8	This is a new UCR requirement and the vendor has 18 months (until July 2009) to develop this capability.				
9	The SUT does not support the full complement of CoS tables as specified in the UCR. The SUT supports 255 CoS tables for analog lines and does not support CoS tables on access lines, number codes, trunks, or groups of trunks. This limitation has posed a minor operational impact within the DSN when assigning lines and trunks on the SUT.				
10	Backup power, power components, UPS requirements, UPS load capacity and alarms are non-testable requirements. It is the responsibility of the respective base/post/camp/station communication agency to provide this with the SUT when installed.				
11	Security is tested by DISA-led Information Assurance test teams and published in a separate report, reference (c).				
12	An IPv6 capable system or product, as defined in the UCR, paragraph 1.7, shall be capable of receiving, processing, and forwarding IPv6 packets and/or interfacing with other systems and protocols in manner similar to that of IPv4. IPv6 capability is currently satisfied by a vendor Letter of Compliance signed by the Vice President of their respective company. The vendor stated in writing, their intent to return to JITC for testing of their solution with IPv6 enabled earliest date available. In addition they stated in writing, compliance to the following criteria:				
	a. Conformant with IPv6 standards profile contained in the Department of Defense Information Technology Standards Registry (DISR). These standards are delineated in the UCR, appendix 11.				
	b. Maintaining interoperability in heterogeneous environments and with IPv4.				
	c. Commitment to upgrade as the IPv6 standard evolves.				
	d. Availability of contractor/vendor IPv6 technical support.				
<b>LEGEND:</b>					
802.3u	Standard for carrier sense multiple access with collision detection at 100 Mbps	FRs GR GR-506-CORE	Feature Requirements Generic Requirement LSSGR: Signaling for Analog Interfaces	NI 1/2 PIPT	National ISDN Standard 1 or 2 Proprietary Internet Protocol Trunk
ANSI	American National Standards Institute			PRI	Primary Rate Interface
APL	Approved Products List	IEEE	Institute of Electrical and Electronics Engineers	PMO	Program Management Office
ASLAN	Assured Services Local Area Network			PSTN	Public Switched Telephone Network
BRI	Basic Rate Interface	IPv4	Internet Protocol version 4		
CAS	Channel Associated Signaling	IPv6	Internet Protocol version 6	Q.931	Signaling Standard for ISDN
CFV	Call Forwarding Variable	ISDN	Integrated Services Digital Network	Q.955.3	ISDN signaling standard for E1 MLPP
CoS	Class of Service				
CRs	Capability Requirements	ITU-T	International	SS7	Signaling System 7
DISA	Defense Information Systems Agency		Telecommunication	SUT	System Under Test
DP	Dial Pulse		Union -	T1	Digital Transmission Link Level 1 (1.544 Mbps)
DSN	Defense Switched Network		Telecommunication		
DSS1	Digital Subscriber Signaling 1		Standardization Sector	T1.607	ISDN – Layer 3 Signaling Specification for Circuit Switched Bearer Service for DSS1
DTMF	Dual Tone Multi-Frequency	JITC	Joint Interoperability Test Command		
DVX	Deployable Voice Exchange				
E&M	Ear and Mouth	LSSGR	Local Access and Transport Area (LATA)	T1.619a	SS7 and ISDN MLPP Signaling Standard for T1
E1	European Basic Multiplex Rate (2.048 Mbps)		Switching Systems		
EIA	Electronic Industries Alliance		Generic Requirements	UC	Unified Capabilities
EIA-232	Standard for defining the mechanical and electrical characteristics for connecting Data Terminal Equipment (DTE) and Data Circuit-terminating Equipment (DCE) data communications devices	Mbps MFR1	Megabits per second Multi-Frequency Recommendation 1	UCR	Unified Capabilities Requirements
		MLPP	Multi-Level Precedence and Preemption	UPS VoIP	Uninterruptible Power Supply Voice over Internet Protocol

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**Table 2. DVX Requirements**

DSN Trunk Interfaces				
Interface	Critical	Requirements Required or Conditional	References	
T1 SS7 (ANSI T1.619a)	No	Trunking	<ul style="list-style-type: none"> <li>• UCR Section 2.3.2</li> <li>• UCR Section 2.3.4.1</li> <li>• UCR Section 2.3.4.1.1</li> <li>• UCR Section 2.3.4.2</li> <li>• UCR Section 2.3.4.2.1</li> </ul>	
E1 SS7 (ITU-T Q.735.3)	No (Europe only)		<ul style="list-style-type: none"> <li>• Direct Inward Dialing (C)</li> <li>• National ISDN 1/2 Primary Access (R)</li> <li>• ISDN ANSI MLPP Service Capability (R)</li> <li>• ITU-T ISDN Primary Access (Europe only) (C)</li> <li>• ITU-T ISDN Primary Access Digital Subscriber Signaling System Number 1 MLPP (Europe only) (C)</li> <li>• Normal Wink Start Operations (R)</li> <li>• Glare Operation (R)</li> <li>• Abnormal Wink Start (R)</li> <li>• Glare Resolution (R)</li> <li>• Call for Service Timing (R)</li> <li>• Guard Timing (R)</li> <li>• Satellite Timing (R)</li> <li>• Disconnect Control (R)</li> <li>• Reselect and Retrial (R)</li> <li>• Off-Hook Supervision Transition (R)</li> <li>• Dial-Pulse Signals (R)</li> <li>• DTMF Signaling (R)</li> <li>• Standard Digit Format for Precedence (C)</li> <li>• MFR1 2/6 Signaling (R)</li> <li>• Alerting Signals and Tones (R)</li> <li>• Common Channel Signaling 7 (C)</li> <li>• DSN ISDN User-to-Network Signaling (R)</li> <li>• Application (R)</li> <li>• Physical Layer (R)</li> <li>• Data Link Layer (R)</li> <li>• Data Link Connection (R)</li> <li>• Peer-to-Peer Procedures of Data-Link Layer (R)</li> <li>• Layer 3 DSN User-to-Network Signaling (R)</li> <li>• DSN User-to-Network Signaling for Circuit-Switched Bearer Services (R)</li> </ul>	<ul style="list-style-type: none"> <li>• UCR Section 5.3.3.1.1</li> <li>• UCR Section 5.3.3.1.2</li> <li>• UCR Section 5.3.3.2.1</li> <li>• UCR Section 5.3.3.2.2</li> <li>• UCR Section 5.3.5</li> <li>• UCR Section 5.3.6</li> <li>• UCR Section 5.3.7</li> <li>• UCR Section 5.3.8</li> <li>• UCR Section 5.3.9</li> <li>• UCR Section 5.3.10</li> <li>• UCR Section 5.4.1</li> <li>• UCR Section 5.4.2</li> <li>• UCR Section 5.4.2.1</li> <li>• UCR Section 5.4.3</li> <li>• UCR Section 5.5</li> <li>• UCR Section 5.6</li> <li>• UCR Section 5.7.1</li> <li>• UCR Section 5.7.1.1</li> <li>• UCR Section 5.7.1.2</li> <li>• UCR Section 5.7.1.3</li> <li>• UCR Section 5.7.1.3.1</li> <li>• UCR Section 5.7.1.3.2</li> <li>• UCR Section 5.7.1.4</li> <li>• UCR Section 5.7.1.4.2</li> </ul>
T1 CAS (MFR1, DTMF, DP)	Yes		<ul style="list-style-type: none"> <li>• Sequence of Messages for DSN Circuit-Switched Calls (R)</li> <li>• Message Functional Definition and Content (R)</li> <li>• General Message Format and Information Elements Coding (R)</li> <li>• Supplementary Services (C)</li> <li>• PCM-24 Digital Trunk Interface (R)</li> <li>• PCM-30 Digital Trunk Interface (Europe only) (R)</li> <li>• Interoperation of PCM-24 and PCM-30 (C)</li> <li>• Analog Trunk Interface (C)</li> <li>• Integrated Digital Loop Carrier (C)</li> <li>• Local Office Test Line (C)</li> <li>• Outside Plant Test Lines (C)</li> <li>• Test Incoming Trunks Tandem or Local State (C)</li> <li>• Manual Test of Trunks (R)</li> <li>• Trunk Group-Remove from Service (R)</li> <li>• Trunk Group-Restore to Service (R)</li> <li>• Carrier Group Alarm (R)</li> <li>• Software Carrier Group Alarm (C)</li> </ul>	<ul style="list-style-type: none"> <li>• UCR Section 5.7.1.4.3</li> <li>• UCR Section 5.7.1.4.4</li> <li>• UCR Section 5.7.1.4.5</li> <li>• UCR Section 5.7.1.4.6</li> </ul>
E1 CAS (MFR1, DTMF, DP)	Yes (Europe only)			
T1 ISDN PRI NI 1/2 (ANSI T1.619a)	Yes			
E1 ISDN PRI (ITU-T Q.955.3)	No (Europe Only)			
Analog E&M Type I, II, V	Yes			

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**Table 2. DVX Requirements (continued)**

DSN Trunk Interfaces							
Interface	Critical	Requirements Required or Conditional		References			
T1 SS7 (ANSI T1.619a)	No	Voice	<ul style="list-style-type: none"> <li>• MOS (R)</li> <li>• Secure calls (R)</li> </ul>	<ul style="list-style-type: none"> <li>• CJCSI 6215.01C</li> <li>• CJCSI 6215.01C</li> </ul>			
E1 SS7 (ITU-T Q.735.3)	No (Europe only)	Facsimile	<ul style="list-style-type: none"> <li>• Analog: ITU-T T.4 (R)</li> </ul>	<ul style="list-style-type: none"> <li>• DISR</li> </ul>			
T1 CAS (MFR1, DTMF, DP)	Yes	Data	<ul style="list-style-type: none"> <li>• Modem (VBD) (R)</li> <li>• 56 kbps switched data (R: PRI only)</li> <li>• 64 kbps switched data (R: PRI only)</li> <li>• NX56 synchronous BER (R: PRI only)</li> <li>• NX64 synchronous BER (R: PRI only)</li> <li>• Secure data (STE/STU-III) (R)</li> </ul>	<ul style="list-style-type: none"> <li>• CJCSI 6215.01C</li> <li>• UCR Section 3.10</li> <li>• UCR Section 3.10</li> <li>• UCR Section 3.10</li> <li>• UCR Section 3.10</li> <li>• CJCSI 6215.01C</li> </ul>			
E1 CAS (MFR1, DTMF, DP)	Yes (Europe only)						
T1 ISDN PRI NI 1/2 (ANSI T1.619a)	Yes	VTC	<ul style="list-style-type: none"> <li>• ITU-T H.320 (R: PRI only)</li> </ul>	<ul style="list-style-type: none"> <li>• FTR 1080B-2002</li> </ul>			
E1 ISDN PRI (ITU-T Q.955.3)	No (Europe Only)						
Analog E&M Type I, II, V	Yes						
PIPT (Session Initiation Protocol) IEEE 802.3u	No	Trunking	<ul style="list-style-type: none"> <li>• Tactical Network Element TDM Requirements (C)</li> <li>• Tactical Network Element IP Requirements (C)</li> <li>• Encapsulated TDM Requirements (C)</li> <li>• Proprietary IP Trunk Requirements (C)</li> </ul>	<ul style="list-style-type: none"> <li>• UCR App. 2, para. A2.4.2</li> <li>• UCR App. 2, para. A2.4.3</li> <li>• UCR App. 2, para. A2.4.4</li> <li>• UCR App. 2, para. A2.4.6</li> </ul>			
DSN Line Interfaces							
2-Wire Analog	Yes	Access	<ul style="list-style-type: none"> <li>• Directory Number Identification (R)</li> <li>• PBX Line (C)</li> <li>• National ISDN 1/2 Basic Access (C)</li> <li>• Analog Line (R)</li> <li>• Basic Line Test Capabilities (C)</li> <li>• Advanced Line Test Capabilities (C)</li> <li>• Network Power Systems for External Interfaces (C)</li> <li>• Loop Start Line (R: 2-Wire Analog only)</li> <li>• Reverse Battery (R)</li> <li>• Alerting Signals and Tones (R)</li> <li>• S/T Reference Point (ISDN BRI) (C)</li> </ul>	<ul style="list-style-type: none"> <li>• UCR Section 2.1.1</li> <li>• UCR Section 2.3.1</li> <li>• UCR Section 2.3.3</li> <li>• UCR Section 2.3.5</li> <li>• UCR Section 2.5.4.1.1</li> <li>• UCR Section 2.5.4.1.2</li> <li>• UCR Section 5.1</li> <li>• UCR Section 5.2.1</li> <li>• UCR Section 5.3.1</li> <li>• UCR Section 5.5</li> <li>• UCR Section 5.7.1.2.1</li> </ul>			
ISDN BRI NI 1/2 (ANSI T1.619a)	Yes						
2W Digital Proprietary	No				Voice	<ul style="list-style-type: none"> <li>• MOS (R)</li> <li>• Secure Calls (R)</li> </ul>	<ul style="list-style-type: none"> <li>• CJCSI 6215.01C</li> <li>• CJCSI 6215.01C</li> </ul>
VoIP	No				Facsimile	<ul style="list-style-type: none"> <li>• Analog: ITU-T T.4 (R)</li> </ul>	<ul style="list-style-type: none"> <li>• DISR</li> </ul>
		Data	<ul style="list-style-type: none"> <li>• Modem (VBD) (R)</li> <li>• 56 kbps switched data (R)</li> <li>• 64 kbps switched data (R: BRI only)</li> <li>• NX56 synchronous BER (R: BRI only)</li> <li>• NX64 synchronous BER (R: BRI only)</li> <li>• Secure data (STE/STU-III) (R)</li> </ul>	<ul style="list-style-type: none"> <li>• CJCSI 6215.01C</li> <li>• UCR Section 3.10</li> <li>• UCR Section 3.10</li> <li>• UCR Section 3.10</li> <li>• UCR Section 3.10</li> <li>• CJCSI 6215.01C</li> </ul>			
		VTC	<ul style="list-style-type: none"> <li>• ITU-T H.320 (R: BRI only)</li> </ul>	<ul style="list-style-type: none"> <li>• FTR 1080B-2002</li> </ul>			

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**Table 2. DVX Requirements (continued)**

DSN Features & Capabilities			
Feature/ Capability	Critical	Requirements Required or Conditional	References
Common Features	Yes	<ul style="list-style-type: none"> <li>• Individual Lines (R)</li> <li>• Selective call rejection (C)</li> <li>• Denied originating service (C)</li> <li>• Code restriction and diversion (R)</li> <li>• Call waiting (R)</li> <li>• Three-way calling (R)</li> <li>• Add-on transfer, conference calling, and call hold (C)</li> <li>• Call Transfer Individual – All calls (R)</li> <li>• Call Transfer - Internal Only (R)</li> <li>• Call Transfer – Individual – Incoming Only/Add-On Consultation Hold – Incoming Call (R)</li> <li>• Call Transfer – Outside (R)</li> <li>• Call Transfer – Add-On Restricted Station (C)</li> <li>• Call Transfer – Attendant (C)</li> <li>• Call Hold (R)</li> <li>• Conference Calling – Six Way Station Controlled (C)</li> <li>• Call Forwarding Variable (R)</li> <li>• Call Forward Busy Line (R)</li> <li>• Call Forwarding – Don't Answer – All Calls (R)</li> <li>• Selective Call Forwarding (C)</li> <li>• Call pick-up (C)</li> <li>• Address Translation (C)</li> <li>• Assured Dial Tone (R)</li> </ul>	<ul style="list-style-type: none"> <li>• UCR Section 2.1</li> <li>• UCR Section 2.1.2</li> <li>• UCR Section 2.1.3</li> <li>• UCR Section 2.1.4</li> <li>• UCR Section 2.1.5</li> <li>• UCR Section 2.1.6</li> <li>• UCR Section 2.1.7</li> <li>• UCR Section 2.1.7.1</li> <li>• UCR Section 2.1.7.2</li>   <li>• UCR Section 2.1.7.3</li> <li>• UCR Section 2.1.7.4</li> <li>• UCR Section 2.1.7.5</li> <li>• UCR Section 2.1.7.6</li> <li>• UCR Section 2.1.7.7</li> <li>• UCR Section 2.1.7.8</li> <li>• UCR Section 2.1.8.1</li> <li>• UCR Section 2.1.8.2</li> <li>• UCR Section 2.1.8.3</li> <li>• UCR Section 2.1.8.4</li> <li>• UCR Section 2.1.9</li> <li>• UCR Section 2.7</li> <li>• UCR Section 2.9</li> </ul>
Attendant	No	<ul style="list-style-type: none"> <li>• Attendant Features (C)</li> </ul>	<ul style="list-style-type: none"> <li>• UCR Section 2.2</li> </ul>
Public Safety	Yes	<ul style="list-style-type: none"> <li>• Basic Emergency Service (911) Caller (C)</li> <li>• Emergency Service (911) Public Safety Answering Point (C)</li> <li>• Enhanced Emergency Service (E911) (C)</li> <li>• Trace of terminating calls (R)</li> <li>• Outgoing call trace (R)</li> <li>• Tandem call trace (R)</li> <li>• Trace of a call in progress (R)</li> </ul>	<ul style="list-style-type: none"> <li>• UCR Section 2.4.1.1</li> <li>• UCR Section 2.4.1.2</li> <li>• UCR Section 2.4.1.3</li> <li>• UCR Section 2.4.2</li> <li>• UCR Section 2.4.3</li> <li>• UCR Section 2.4.4</li> <li>• UCR Section 2.4.5</li> </ul>
Conferencing	Yes	<ul style="list-style-type: none"> <li>• Preset Conferencing (R)</li> <li>• Conference Notification Recorded Announcement (R)</li> <li>• Automatic Retrial and Alternate Address (R)</li> <li>• Bridge Release (R)</li> <li>• Lost Connection to Conferee or Originator (R)</li> <li>• Secondary Conferencing (R)</li> <li>• Meet-Me Conferencing (C)</li> <li>• Progressive Conferencing (C)</li> </ul>	<ul style="list-style-type: none"> <li>• UCR Section A2.3.3</li> <li>• UCR Section 2.6.2</li> <li>• UCR Section 2.6.3</li> </ul>
Nailed-up Connections	No	<ul style="list-style-type: none"> <li>• Nailed-Up Connection (C)</li> </ul>	<ul style="list-style-type: none"> <li>• UCR Section 2.8</li> </ul>
DSN Hotline Services	Yes	<ul style="list-style-type: none"> <li>• DSN Analog Hotline Service (R)</li> <li>• DSN ISDN Hotline Service (R)</li> <li>• Classmarking (R)</li> <li>• Protected Hotline Calling (R)</li> <li>• Hotline Service Protection (R)</li> <li>• Non-Pair Protected Hotline Calling (R)</li> <li>• Pair Protected Hotline Calling (R)</li> </ul>	<ul style="list-style-type: none"> <li>• UCR Section 2.12</li> <li>• UCR Section 2.12</li> <li>• UCR Section 2.12</li> <li>• UCR Section 2.12.1</li> <li>• UCR Section 2.12.2</li> <li>• UCR Section 2.12.3</li> <li>• UCR Section 2.12.4</li> </ul>

JITC Memo, JTE, Special Interoperability Test Certification of REDCOM High Density Exchange (HDX) with Software Release 3.0A, Revision 3, with Specified Patch Group 0 (3.0A R3P0), certified as a Deployable Voice Exchange (DVX)

**Table 2. DVX Requirements (continued)**

DSN Features & Capabilities			
Feature/ Capability	Critical	Requirements Required or Conditional	References
MLPP	Yes	<ul style="list-style-type: none"> <li>• MLPP Overview (R)</li> <li>• Precedence Levels (R)</li> <li>• Announcements (R)</li> <li>• Attendant Queue Announcement (C)</li> <li>• Loss of C2 Announcement (C)</li> <li>• Invocation and Operation (R)</li> <li>• Preemption in the Network (R)</li> <li>• Network Facility with Lower Precedence Calls (R)</li> <li>• Cancel to / Cancel from (C)</li> <li>• Network Facility with Equal or Higher Precedence Calls (R)</li> <li>• MLPP Trunk Selection (R)</li> <li>• Hunt Sequence for Trunks (R)</li> <li>• ROUTINE Precedence Calls (R)</li> <li>• Precedence Calls Above ROUTINE Precedence (R)</li> <li>• Method 1 (R)</li> <li>• Method 2 (C)</li> <li>• MLPP Interworking with Other Networks (R)</li> <li>• Precedence Call Diversion (R)</li> <li>• Channel Associated Signaling (R)</li> <li>• Primary Rate Interface (R)</li> <li>• Common Channel Signaling Number 7 (C)</li> <li>• Analog Line MLPP (R)</li> <li>• ISDN MLPP Basic Rate Interface General Description (C)</li> <li>• Single B Channel, Single Appearance, Single DN (C)</li> <li>• Line Active with a Lower Precedence Call (C)</li> <li>• Line Active with a Equal or Higher Precedence Call (C)</li> <li>• Single B Channel, Multiple Appearances, Single DN (C)</li> <li>• Two B Channels, Multiple Appearances, Single DN (C)</li> <li>• Two B Channel, Two DN (Data Mode Only) (C)</li> <li>• ISDN Primary Rate Interface (R)</li> <li>• Precedence Call Waiting (C)</li> <li>• Call Forwarding (C)</li> <li>• Call Transfer (C)</li> <li>• Call Hold (C)</li> <li>• Three-Way Calling (C)</li> <li>• Call Pickup (C)</li> <li>• Conferencing (C)</li> <li>• Multiline Hunt Group (C)</li> <li>• Community of Interest (C)</li> <li>• MLPP Common Channel Signaling Number 7 (C)</li> <li>• CAS to CCS Trunk Network in a Mixed Media Network (C)</li> <li>• MLPP Interaction with EKTS features (C)</li> <li>• Network Management Manual Controls (C)</li> <li>• Data Collection (R)</li> </ul>	<ul style="list-style-type: none"> <li>• UCR Section 3.1</li> <li>• UCR Section 3.1.2</li> <li>• UCR Section 3.1.3</li> <li>• UCR Section 3.1.3</li> <li>• UCR Section 3.1.3</li> <li>• UCR Section 3.1.4</li> <li>• UCR Section 3.1.4</li> <li>• UCR Section 3.2</li> <li>• UCR Section 3.2.1</li> <li>• UCR Section 3.2.1.1</li> <li>• UCR Section 3.2.2</li> <li>• UCR Section 3.2.3</li> <li>• UCR Section 3.2.3.1</li> <li>• UCR Section 3.2.3.1.1</li> <li>• UCR Section 3.2.3.1.2</li> <li>• UCR Section 3.2.3.1.2.1</li> <li>• UCR Section 3.2.3.1.2.2</li> <li>• UCR Section 3.2.4</li> <li>• UCR Section 3.3</li> <li>• UCR Section 3.4.1</li> <li>• UCR Section 3.4.2</li> <li>• UCR Section 3.4.3</li> <li>• UCR Section 3.5</li> <li>• UCR Section 3.6.1</li> <li>• UCR Section 3.6.2</li> <li>• UCR Section 3.6.2.1</li> <li>• UCR Section 3.6.2.2</li> <li>• UCR Section 3.6.3</li> <li>• UCR Section 3.6.4</li> <li>• UCR Section 3.6.5</li> <li>• UCR Section 3.7</li> <li>• UCR Section 3.8.1</li> <li>• UCR Section 3.8.2</li> <li>• UCR Section 3.8.3</li> <li>• UCR Section 3.8.4</li> <li>• UCR Section 3.8.5</li> <li>• UCR Section 3.8.6</li> <li>• UCR Section 3.8.7</li> <li>• UCR Section 3.8.8</li> <li>• UCR Section 3.8.9</li> <li>• UCR Section 3.9</li> <li>• UCR Section 3.10</li> <li>• UCR Section 3.11</li> <li>• UCR Section 3.13</li> <li>• UCR Section 3.14</li> </ul>

JITC Memo, JTE, Special Interoperability Test Certification of REDCOM High Density Exchange (HDX) with Software Release 3.0A, Revision 3, with Specified Patch Group 0 (3.0A R3P0), certified as a Deployable Voice Exchange (DVX)

**Table 2. DVX Requirements (continued)**

DSN Features & Capabilities			
Feature/ Capability	Critical	Requirements Required or Conditional	References
Call Processing	Yes	<ul style="list-style-type: none"> <li>• Call Treatments (R)</li> <li>• Primary and Alternate Routing (R)</li> <li>• E&amp;M Lead Signaling States (C)</li> <li>• 4-Wire Analog User Access Lines (C)</li> <li>• 2-Wire User Access Lines (R)</li> <li>• Termination of Analog Lines (R)</li> <li>• DSN Interswitch Trunk Call Processing (non-CCS/ISDN) (R)</li> <li>• DSN User Dialing (R)</li> <li>• Interswitch and Intraswitch Dialing (R)</li> <li>• Seven-Digit Dialing (R)</li> <li>• Ten-Digit Dialing (R)</li> <li>• Access Code (R)</li> <li>• Access Digit (R)</li> <li>• Precedence Digit (R)</li> <li>• Service Digit (R)</li> <li>• Route Code (R)</li> <li>• Area Code (R)</li> <li>• Switch Code (R)</li> <li>• Line Number (R)</li> <li>• Calling Name Delivery (C)</li> <li>• Calling Number Delivery (R)</li> <li>• Emergency Service 911 Conflict Resolution (C)</li> <li>• DSN Switch Outpulsing Digit Formats (R)</li> <li>• Standard Directory Number (R)</li> <li>• Standard Test Numbers (C)</li> <li>• Base Services – Abbreviated Numbers (R)</li> <li>• Digit Reception Requirements (R)</li> <li>• Digit Registration Capacity (R)</li> <li>• Screening (R)</li> <li>• Additional Dialing format for Coalition Forces (R)</li> </ul>	<ul style="list-style-type: none"> <li>• UCR Section 4.1</li> <li>• UCR Section 4.2</li> <li>• UCR Section 4.3.1</li> <li>• UCR Section 4.3.2</li> <li>• UCR Section 4.3.3</li> <li>• UCR Section 4.3.4</li> <li>• UCR Section 4.4</li> <li>• UCR Section A2.3.4</li> <li>• UCR Section 4.5.1.2</li> <li>• UCR Section 4.5.1.2.1</li> <li>• UCR Section 4.5.1.2.2</li> <li>• UCR Section 4.5.1.3</li> <li>• UCR Section 4.5.1.3.1</li> <li>• UCR Section 4.5.1.3.2</li> <li>• UCR Section 4.5.1.3.3</li> <li>• UCR Section 4.5.1.4</li> <li>• UCR Section 4.5.1.5</li> <li>• UCR Section 4.5.1.6</li> <li>• UCR Section 4.5.1.7</li> <li>• UCR Section 4.5.1.8.1</li> <li>• UCR Section 4.5.1.8.2</li> <li>• UCR Section 4.5.1.9</li> <li>• UCR Section 4.5.2</li> <li>• UCR Section 4.5.3</li> <li>• UCR Section 4.5.4</li> <li>• UCR Section 4.5.5</li> <li>• UCR Section 4.5.6</li> <li>• UCR Section 4.5.7</li> <li>• UCR Section 4.5.8</li> <li>• UCR App. 2, para A2.3.4</li> </ul>
Network Management	Yes	<ul style="list-style-type: none"> <li>• Interfaces (R)</li> <li>• Data Quality (R)</li> <li>• Traffic Measurements (R)</li> <li>• Reference Data (C)</li> <li>• Line Servicing (C)</li> <li>• Trunk Groups (C)</li> <li>• Call Processors (C)</li> <li>• Switch Services (C)</li> <li>• Special Studies (C)</li> <li>• Remote Switching Studies (C)</li> <li>• Features (C)</li> <li>• Common Channel Signaling Network Measurements (C)</li> <li>• ISDN Measurements (C)</li> <li>• Traffic Capacity (R)</li> <li>• Fault management (R)</li> <li>• Configuration management (R)</li> <li>• Call Detail Recording Data Retention (C)</li> <li>• Network Management controls (C)</li> <li>• Remote access (R)</li> </ul>	<ul style="list-style-type: none"> <li>• UCR Section A2.3.6</li> <li>• UCR Section 9.2.1</li> <li>• UCR Section 9.2.2.1.1</li> <li>• UCR Section 9.2.2.1.2</li> <li>• UCR Section 9.2.2.2</li> <li>• UCR Section 9.2.2.3</li> <li>• UCR Section 9.2.2.4</li> <li>• UCR Section 9.2.2.5</li> <li>• UCR Section 9.2.2.6</li> <li>• UCR Section 9.2.2.7</li> <li>• UCR Section 9.2.2.8</li> <li>• UCR Section 9.2.3</li> <li>• UCR Section 9.2.4</li> <li>• UCR Section 9.2.5</li> <li>• UCR Section 9.3</li> <li>• UCR Section 9.4</li> <li>• UCR Section 9.5.2</li> <li>• UCR Section 9.7</li> <li>• UCR Section 9.8</li> </ul>

JITC Memo, JTE, Special Interoperability Test Certification of REDCOM High Density Exchange (HDX) with Software Release 3.0A, Revision 3, with Specified Patch Group 0 (3.0A R3P0), certified as a Deployable Voice Exchange (DVX)

**Table 2. DVX Requirements (continued)**

DSN Features & Capabilities (continued)			
Feature/ Capability	Critical	Requirements Required or Conditional	References
ISDN Services	Yes	<ul style="list-style-type: none"> <li>• ISDN BRI signaling (C)</li> <li>• BRI Access, Call Control and Signaling (C)</li> <li>• Uniform Interface Configuration for BRIs (C)</li> <li>• Electronic Key Telephone Systems (EKTS) (C)</li> <li>• PRI Access, Call Control and Signaling (R)</li> <li>• PRI Features (C)</li> <li>• Packet Data Features and Capabilities (C)</li> </ul>	<ul style="list-style-type: none"> <li>• UCR App. 2, para. A2.3.4</li> <li>• UCR Section 10, Table 10-1</li> <li>• UCR Section 10, Table 10-2</li> <li>• UCR Section 10, Table 10-3</li> <li>• UCR Section 10, Table 10-4</li> <li>• UCR Section 10, Table 10-5</li> <li>• UCR Section 10, Table 10-6</li> </ul>
Synchronization	Yes	<ul style="list-style-type: none"> <li>• External Timing Mode (C)</li> <li>• Line timing mode (R)</li> <li>• General (C)</li> <li>• Internal Stratum 4 (R)</li> <li>• Synchronization Performance Monitoring Criteria (C)</li> <li>• DS1 Traffic Interfaces (C)</li> <li>• DS0 Traffic Interconnects (C)</li> </ul>	<ul style="list-style-type: none"> <li>• UCR Section 11.1.1.1</li> <li>• UCR Section A2.3.9</li> <li>• UCR Section 11.1.2.1</li> <li>• UCR Section 11.1.2.2</li> <li>• UCR Section 11.2</li> <li>• UCR Section 11.3</li> <li>• UCR Section 11.4</li> </ul>
Reliability (See note 1.)	No	<ul style="list-style-type: none"> <li>• Reliability Requirements (C)</li> </ul>	<ul style="list-style-type: none"> <li>• UCR Section 12.1</li> </ul>
Security	No	<ul style="list-style-type: none"> <li>• GR-815, STIGs, and DoDI 8510.bb (DIACAP) (R)</li> </ul>	<ul style="list-style-type: none"> <li>• UCR Section 13</li> </ul>
VoIP			
VoIP System	No	<p>VoIP function is conditional. If VoIP is provided, <b>all</b> of the following requirements must be met:</p> <ul style="list-style-type: none"> <li>• Voice Quality with MOS of 4.0 or better (R)</li> <li>• ITU-T G.711 PCM CODEC (R)</li> <li>• MLPP (R)</li> <li>• Security (R)</li> <li>• Network management (R)</li> <li>• System timing (R)</li> <li>• Latency ≤ 60 milliseconds (R)</li> <li>• IPv6 capable (R)</li> <li>• Service Class Tagging (R)</li> <li>• VoIP System Downtime (IP network 35 min/yr Subscriber 12 min/yr) (C)</li> </ul>	<ul style="list-style-type: none"> <li>• UCR App. 3, para. A3.2.1</li> <li>• UCR App. 3, para. A3.2.2</li> <li>• UCR App. 3, para. A3.2.3</li> <li>• UCR App. 3, para. A3.2.4</li> <li>• UCR App. 3, para. A3.2.5</li> <li>• UCR App. 3, para. A3.2.6</li> <li>• UCR App. 3, para. A3.2.7</li> <li>• UCR App. 3, para. A3.2.8</li> <li>• UCR App. 3, para. A3.2.9</li> <li>• UCR App. 3, para. A3.2.10</li> </ul>
Network Gateways			
Interface	Critical	Requirements Required or Conditional	References
PSTN (See note 2.)	Yes	<p>Trunking</p> <ul style="list-style-type: none"> <li>• Positive Identification Control (C)</li> <li>• On-Netting (C)</li> <li>• Off-Netting (C)</li> <li>• Ground Start Line (R)</li> <li>• Immediate Start (C)</li> </ul>	<ul style="list-style-type: none"> <li>• CJCSI 6215.01C</li> <li>• CJCSI 6215.01C</li> <li>• CJCSI 6215.01C</li> <li>• UCR Section 5.2.2</li> <li>• UCR Section 5.3.2</li> </ul>
<b>NOTES:</b>			
1 Backup power, power components, UPS requirements, UPS load capacity and alarms are non-testable requirements. It is the responsibility of the respective base/post/camp/station communication agency to provide this with the SUT when installed.			
2 Voice, facsimile, data, and VTC service requirements for PSTN are identical to DSN with the exception of MLPP.			

JITC Memo, JTE, Special Interoperability Test Certification of REDCOM High Density Exchange (HDX) with Software Release 3.0A, Revision 3, with Specified Patch Group 0 (3.0A R3P0), certified as a Deployable Voice Exchange (DVX)

**Table 2. DVX Requirements (continued)**

<b>LEGEND:</b>						
2W	2-Wire	EKTS	Electronic Key Telephone System	PCM-24	Pulse Code Modulation - 24 Channels	
802.3u	Standard for carrier sense multiple access with collision detection at 100 Mbps	FTR	Federal Telecommunications Recommendation	PCM-30	Pulse Code Modulation - 30 Channels	
ANSI	American National Standards Institute	FTR 1080B-2002 G.711	Video Teleconferencing Services Standard for PCM of Voice Frequencies	PIPT	Proprietary Internet Protocol Trunk	
App	Appendix	GR	Generic Requirement (Telcordia)	PRI	Primary Rate Interface	
BER	Bit Error Ratio	GR-815	Generic Requirements For Network Element/Network System (NE/NS) Security	PSTN	Public Switched Telephone Network	
BRI	Basic Rate Interface		Standard for Narrowband VTC	Q.735.3	SS7 Signaling Standard for E1 MLPP	
C	Conditional			Q.955.3	ISDN Signaling Standard for E1 MLPP	
C2	Command and Control	H.320	Institute of Electrical and Electronics Engineers	R	Required	
CAS	Channel Associated Signaling	IEEE	Internet Protocol	SS7	Signaling System 7	
CCS	Common Channel Signaling	IP	Internet Protocol version 6	STE	Secure Terminal Equipment	
CJCSI	Chairman of the Joint Chiefs of Staff Instruction	IPv6	Integrated Services Digital Network	STIGs	Security Technical Implementation Guides	
DIACAP	DoD Information Assurance Certification and Accreditation Process	ISDN	Information Technology	STU-III	Secure Telephone Unit – 3 <sup>rd</sup> Generation	
DISR	DoD IT Standards Registry	IT	International Telecommunication Union - Telecommunication Standardization Sector	S/T	ISDN BRI 4-wire interface	
DoD	Department of Defense	ITU-T		T1	Digital Transmission Link Level 1 (1.544 Mbps)	
DoDI	Department of Defense Instruction		kilobits per second	T.4	Standardization of Group 3 facsimile terminals for document transmission	
DP	Dial Pulse	kbps	Megabits per second		SS7 and ISDN MLPP Signaling Standard for T1	
DN	Directory Number	Mbps	Multi-Frequency Recommendation 1	TIA	Telecommunications Industry Association	
DS0	Digital Signal Level 0 (64 kbps)	MFR1	minute	T1.619a	Time Division Multiplexing Requirements	
DS1	Digital Signal Level 1 (1.544 Mbps) (2.048 Mbps European)	min	Multi-Level Precedence and Preemption	UCR	Unified Capabilities Requirements	
DSN	Defense Switched Network	MOS	Mean Opinion Score	UPS	Uninterruptible Power Supply	
DTMF	Dual Tone Multi-Frequency	NI 1/2	National ISDN Standard 1 or 2	VBD	Variable bit data	
DVX	Deployable Voice Exchange	NX56	Data format restricted to multiples of 56 kbps	VoIP	Voice over Internet Protocol	
E&M	Ear and Mouth	NX64	Data format restricted to multiples of 64 kbps	VTC	Video Teleconferencing	
E1	European Basic Multiplex Rate (2.048 Mbps)	para	paragraph	yr	year	
		PBX	Private Branch Exchange			
		PCM	Pulse Code Modulation			

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 <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>.

JITC Memo, JTE, Special Interoperability Test Certification of REDCOM High Density Exchange (HDX) with Software Release 3.0A, Revision 3, with Specified Patch Group 0 (3.0A R3P0), certified as a Deployable Voice Exchange (DVX)

6. The JITC point of contact is Capt Oskar Widecki, DSN 879-5269, commercial (520) 538-5269, FAX DSN 879-4347, or e-mail to [oskar.widecki@disa.mil](mailto:oskar.widecki@disa.mil). The JITC's mailing address is P.O. Box 12798, Fort Huachuca, AZ 85670-2798. The tracking number for the SUT is 0807201.

FOR THE COMMANDER:

2 Enclosures a/s

  
for RICHARD A. MEADOR  
Chief  
Battlespace Communications Portfolio

Distribution (electronic mail):

Joint Staff J-6

Joint Interoperability Test Command, Liaison, TE3/JT1

Office of Chief of Naval Operations, CNO N6F2

Headquarters U.S. Air Force, Office of Warfighting Integration & CIO, AF/XCIN (A6N)

Department of the Army, Office of the Secretary of the Army, DA-OSA CIO/G-6 ASA (ALT), SAIS-IOQ

U.S. Marine Corps MARCORSSYSCOM, SIAT, MJI Division I

DOT&E, Net-Centric Systems and Naval Warfare

U.S. Coast Guard, CG-64

Defense Intelligence Agency

National Security Agency, DT

Defense Information Systems Agency, TEMC

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) Joint Interoperability Test Command, "Information Assurance (IA) Assessment of REDCOM High Density Exchange (HDX) with Software Release 3.0A Revision 3, with Specified Patch Group 0 (3.0A R3P0) (Tracking Number 0807201)," 13 January 2009
- (d) Chairman of the Joint Chiefs of Staff Instruction (CJCSI) 6215.01C, "Policy for Department of Defense Voice Services with Real Time Services (RTS)," 9 November 2007
- (e) Defense Information Systems Agency, "Department of Defense Networks Unified Capabilities Requirements," 21 December 2007
- (f) Joint Interoperability Test Command, "Defense Switched Network Generic Switch Test Plan (GSTP), Change 2," 2 October 2006

## CERTIFICATION TESTING SUMMARY

**1. SYSTEM TITLE.** Special Interoperability Test Certification of REDCOM High Density Exchange (HDX) with Software Release 3.0A Revision 3, with Specified Patch Group 0 (3.0A R3P0), certified as a Deployable Voice Exchange (DVX); hereinafter referred to as the System Under Test (SUT).

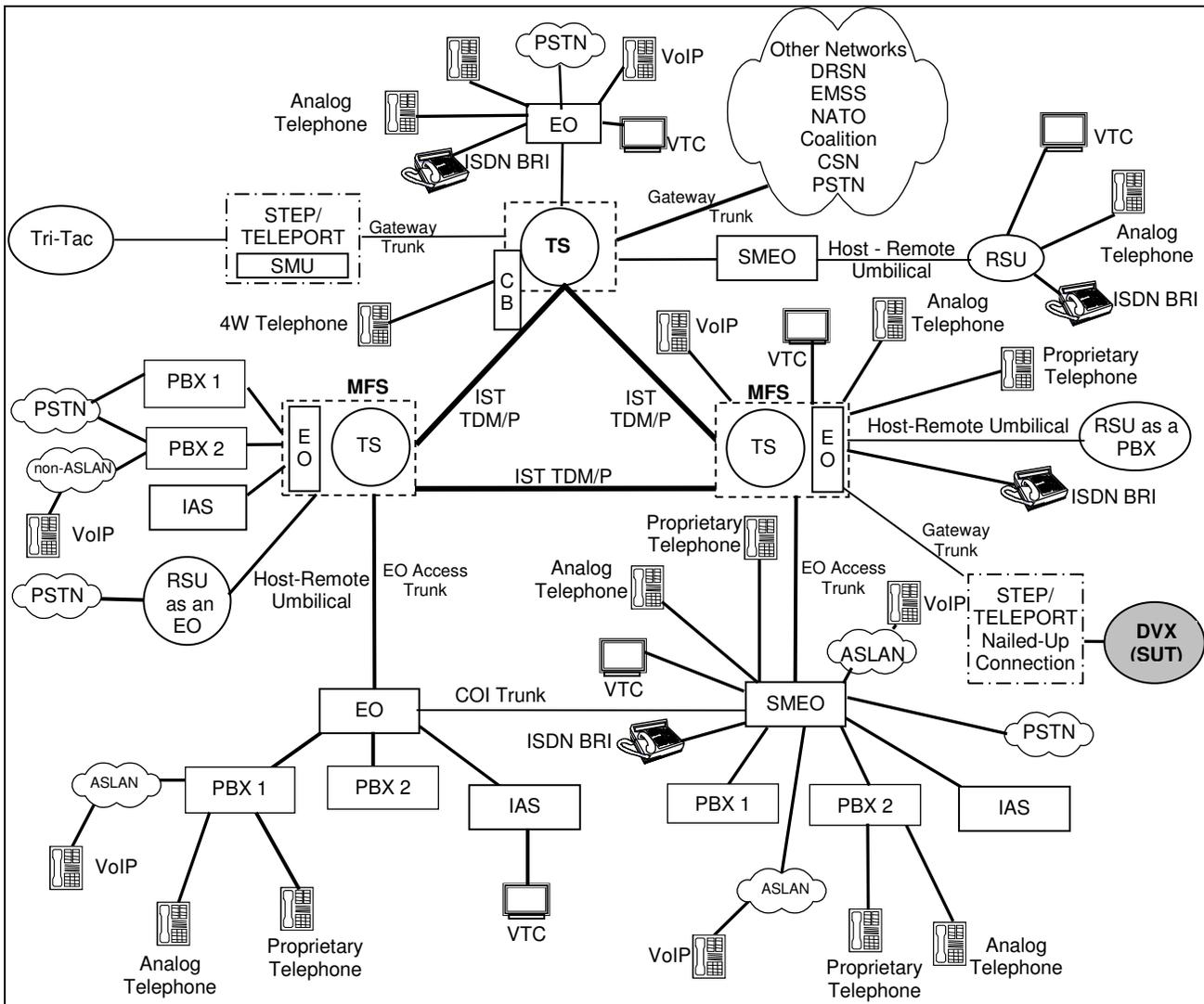
**2. PROPONENT.** United States Marine Corps (USMC), Marine Corps Systems Command (MARCORSYSCOM), Communications, Intelligence, & Networking Systems (CINS), Program Group 12 (PG12).

**3. PROGRAM MANAGER.** CWO4 Jeffery Gardner, MARCORSYSCOM PG12, 2200 Lester Street, Building 2200, Quantico, Virginia, 22134, e-mail: Jeffery.a.gardner@usmc.mil.

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

**5. SYSTEM UNDER TEST DESCRIPTION.** The SUT is a digital telecommunications switching system that supports the following line interfaces: analog, Session Initiation Protocol (SIP)-based Voice over Internet Protocol (VoIP), International Telecommunication Union – Telecommunication Standardization Sector (ITU-T) V.150.1 Modem over Internet Protocol (MoIP) protocol, and digital Integrated Services Digital Network (ISDN) Basic Rate Interface (BRI). The SUT supports the following trunk interfaces: Digital Transmission Link Level 1 (T1) ISDN Primary Rate Interface (PRI), European Basic Multiplex Rate (E1) PRI, T1 Signaling System 7 (SS7), T1 Channel Associated Signaling (CAS), E1 CAS, 2-wire/4-wire Ear and Mouth (E&M), and 4-wire Single Frequency (SF). In addition, the SUT offers a virtual-tactical network element Proprietary Internet Protocol Trunk (PIPT). The PIPT trunk can only be deployed within a tactical DSN environment and is not certified for joint use within the strategic DSN. The SUT offers the following features: scalable, distributed platform for growth of up to a maximum of 16,000 ports, 8000 Time Division Multiplex (TDM) and 2048 Internet Protocol (IP) subscribers, modular client/server architecture for flexibility, scalability, and a redundant call processing core for extra reliability in mission-critical enterprises. The SUT is certified for VoIP with any certified Assured Services Local Area Networks (ASLANs) posted on the Unified Communications (UC) Approved Products List (APL).

**6. OPERATIONAL ARCHITECTURE.** The DSN architecture is a two-level network hierarchy consisting of DSN backbone switches and Service/Agency installation switches. Joint Staff policy and subscriber mission requirements determine which type of switch can be used at a particular location. The DSN architecture, therefore, consists of several categories of switches including DVXs. The Unified Capabilities Requirements (UCR) operational DSN Architecture is depicted in Figure 2-1. This architecture depicts the relationship of Military Department DVXs to the other DSN switch types.



**LEGEND:**

- |       |                                     |         |   |
|-------|-------------------------------------|---------|---|
| 4W    | 4-Wire                              | NATO    | North Atlantic Treaty Organization          |
| ASLAN | Assured Services Local Area Network | PBX     | Private Branch Exchange                     |
| BRI   | Basic Rate Interface                | PBX 1   | Private Branch Exchange 1                   |
| CB    | Channel Bank                        | PBX 2   | Private Branch Exchange 2                   |
| COI   | Community of Interest               | PSTN    | Public Switched Telephone Network           |
| CSN   | Canadian Switch Network             | RSU     | Remote Switching Unit                       |
| DRSN  | Defense Red Switch Network          | SMEO    | Small End Office                            |
| DSN   | Defense Switched Network            | SMU     | Switched Multiplex Unit                     |
| DVX   | Deployable Voice Exchange           | STEP    | Standardized Tactical Entry Point           |
| EMSS  | Enhanced Mobile Satellite System    | TDM/P   | Time Division Multiplex/Packetized          |
| EO    | End Office                          | Tri-Tac | Tri-Service Tactical Communications Program |
| IAS   | Integrated Access Switch            | TS      | Tandem Switch                               |
| ISDN  | Integrated Services Digital Network | VoIP    | Voice over Internet Protocol                |
| IST   | Inter-switch Trunk                  | VTC     | Video Teleconferencing                      |
| MFS   | Multifunction Switch                |         |   |

**Figure 2-1. DSN Architecture**

**7. REQUIRED SYSTEM INTERFACES.** Requirements specific to DVXs are listed in Table 2-1. These requirements are derived from:

a. DSN services for Network and Applications specified in Chairman of the Joint Chiefs of Staff Instruction (CJCSI) 6215.01C, “Policy for Department of Defense Voice Services for Real Time Services (RTS).”

b. UCR interface and signaling requirements for trunks/lines verified through JITC testing and/or vendor submission of Letters of Compliance (LoC).

c. UCR DVX Capability Requirements (CRs) and Feature Requirements (FRs) verified through JITC testing and/or vendor submission of LoC.

**Table 2-1. DVX Requirements**

DSN Trunk Interfaces			
Interface	Critical	Requirements Required or Conditional	References
T1 SS7 (ANSI T1.619a)	No	Trunking	<ul style="list-style-type: none"> <li>• Direct Inward Dialing (C)</li> <li>• National ISDN 1/2 Primary Access (R)</li> <li>• ISDN ANSI MLPP Service Capability (R)</li> <li>• ITU-T ISDN Primary Access (Europe only) (C)</li> <li>• ITU-T ISDN Primary Access Digital Subscriber Signaling System Number 1 MLPP (Europe only) (C)</li> </ul>
E1 SS7 (ITU-T Q.735.3)	No (Europe only)		<ul style="list-style-type: none"> <li>• Normal Wink Start Operations (R)</li> <li>• Glare Operation (R)</li> <li>• Abnormal Wink Start (R)</li> <li>• Glare Resolution (R)</li> <li>• Call for Service Timing (R)</li> <li>• Guard Timing (R)</li> <li>• Satellite Timing (R)</li> </ul>
T1 CAS (MFR1, DTMF, DP)	Yes		<ul style="list-style-type: none"> <li>• Disconnect Control (R)</li> <li>• Reselect and Retrial (R)</li> <li>• Off-Hook Supervision Transition (R)</li> <li>• Dial-Pulse Signals (R)</li> <li>• DTMF Signaling (R)</li> </ul>
E1 CAS (MFR1, DTMF, DP)	Yes (Europe only)		<ul style="list-style-type: none"> <li>• Standard Digit Format for Precedence (C)</li> <li>• MFR1 2/6 Signaling (R)</li> <li>• Alerting Signals and Tones (R)</li> <li>• Common Channel Signaling 7 (C)</li> <li>• DSN ISDN User-to-Network Signaling (R)</li> </ul>
T1 ISDN PRI NI 1/2 (ANSI T1.619a)	Yes		<ul style="list-style-type: none"> <li>• Application (R)</li> <li>• Physical Layer (R)</li> <li>• Data Link Layer (R)</li> <li>• Data Link Connection (R)</li> <li>• Peer-to-Peer Procedures of Data-Link Layer (R)</li> <li>• Layer 3 DSN User-to-Network Signaling (R)</li> </ul>
E1 ISDN PRI (ITU-T Q.955.3)	No (Europe Only)		<ul style="list-style-type: none"> <li>• DSN User-to-Network Signaling for Circuit-Switched Bearer Services (R)</li> <li>• Sequence of Messages for DSN Circuit-Switched Calls (R)</li> </ul>
Analog E&M Type I, II, V	Yes		<ul style="list-style-type: none"> <li>• Message Functional Definition and Content (R)</li> <li>• General Message Format and Information Elements Coding (R)</li> <li>• Supplementary Services (C)</li> </ul>

**Table 2-1. DVX Requirements (continued)**

<b>DSN Trunk Interfaces</b>					
<b>Interface</b>	<b>Critical</b>	<b>Requirements Required or Conditional</b>		<b>References</b>	
T1 SS7 (ANSI T1.619a)	No	Trunking (continued)	<ul style="list-style-type: none"> <li>• PCM-24 Digital Trunk Interface (R)</li> <li>• PCM-30 Digital Trunk Interface (Europe only) (R)</li> <li>• Interoperation of PCM-24 and PCM-30 (C)</li> <li>• Analog Trunk Interface (C)</li> <li>• Integrated Digital Loop Carrier (C)</li> <li>• Local Office Test Line (C)</li> <li>• Outside Plant Test Lines (C)</li> <li>• Test Incoming Trunks Tandem or Local State (C)</li> <li>• Manual Test of Trunks (R)</li> <li>• Trunk Group-Remove from Service (R)</li> <li>• Trunk Group-Restore to Service (R)</li> <li>• Carrier Group Alarm (R)</li> <li>• Software Carrier Group Alarm (C)</li> </ul>	<ul style="list-style-type: none"> <li>• UCR Section 7.1</li> <li>• UCR Section 7.2</li> <li>• UCR Section 7.3</li> <li>• UCR Section 7.4</li> <li>• UCR Section 7.5</li> <li>• UCR Section 2.5.1</li> <li>• UCR Section 2.5.2</li> <li>• UCR Section 2.5.3</li> <li>• UCR Section 2.5.4.2</li> <li>• UCR Section 2.5.5</li> <li>• UCR Section 2.5.6</li> <li>• UCR Section 2.5.7</li> <li>• UCR Section 2.5.7.1</li> </ul>	
E1 SS7 (ITU-T Q.735.3)	No (Europe only)				
T1 CAS (MFR1, DTMF, DP)	Yes				
E1 CAS (MFR1, DTMF, DP)	Yes (Europe only)				
T1 ISDN PRI NI 1/2 (ANSI T1.619a)	Yes				
E1 ISDN PRI (ITU-T Q.955.3)	No (Europe Only)		Voice	<ul style="list-style-type: none"> <li>• MOS (R)</li> <li>• Secure calls (R)</li> </ul>	<ul style="list-style-type: none"> <li>• CJCSI 6215.01C</li> <li>• CJCSI 6215.01C</li> </ul>
Analog E&M Type I, II, V	Yes	Facsimile	<ul style="list-style-type: none"> <li>• Analog: ITU-T T.4 (R)</li> </ul>	<ul style="list-style-type: none"> <li>• DISR</li> </ul>	
		Data	<ul style="list-style-type: none"> <li>• Modem (VBD) (R)</li> <li>• 56 kbps switched data (R: PRI only)</li> <li>• 64 kbps switched data (R: PRI only)</li> <li>• NX56 synchronous BER (R: PRI only)</li> <li>• NX64 synchronous BER (R: PRI only)</li> <li>• Secure data (STE/STU-III) (R)</li> </ul>	<ul style="list-style-type: none"> <li>• CJCSI 6215.01C</li> <li>• UCR Section 3.10</li> <li>• UCR Section 3.10</li> <li>• UCR Section 3.10</li> <li>• UCR Section 3.10</li> <li>• CJCSI 6215.01C</li> </ul>	
		VTC	<ul style="list-style-type: none"> <li>• ITU-T H.320 (R: PRI only)</li> </ul>	<ul style="list-style-type: none"> <li>• FTR 1080B-2002</li> </ul>	
PIPT (Session Initiation Protocol) IEEE 802.3u	No	Trunking	<ul style="list-style-type: none"> <li>• Tactical Network Element TDM Requirements (C)</li> <li>• Tactical Network Element IP Requirements (C)</li> <li>• Encapsulated TDM Requirements (C)</li> <li>• Proprietary IP Trunk Requirements (C)</li> </ul>	<ul style="list-style-type: none"> <li>• UCR App. 2, para. A2.4.2</li> <li>• UCR App. 2, para. A2.4.3</li> <li>• UCR App. 2, para. A2.4.4</li> <li>• UCR App. 2, para. A2.4.6</li> </ul>	
<b>Interface</b>	<b>Critical</b>	<b>Requirements Required or Conditional</b>		<b>References</b>	
<b>DSN Line Interfaces</b>					
2-Wire Analog	Yes	Access	<ul style="list-style-type: none"> <li>• Directory Number Identification (R)</li> <li>• PBX Line (C)</li> <li>• National ISDN 1/2 Basic Access (C)</li> <li>• Analog Line (R)</li> <li>• Basic Line Test Capabilities (C)</li> <li>• Advanced Line Test Capabilities (C)</li> <li>• Network Power Systems for External Interfaces (C)</li> <li>• Loop Start Line (R: 2-Wire Analog only)</li> <li>• Reverse Battery (R)</li> <li>• Alerting Signals and Tones (R)</li> <li>• S/T Reference Point (ISDN BRI) (C)</li> </ul>	<ul style="list-style-type: none"> <li>• UCR Section 2.1.1</li> <li>• UCR Section 2.3.1</li> <li>• UCR Section 2.3.3</li> <li>• UCR Section 2.3.5</li> <li>• UCR Section 2.5.4.1.1</li> <li>• UCR Section 2.5.4.1.2</li> <li>• UCR Section 5.1</li> <li>• UCR Section 5.2.1</li> <li>• UCR Section 5.3.1</li> <li>• UCR Section 5.5</li> <li>• UCR Section 5.7.1.2.1</li> </ul>	
ISDN BRI NI 1/2 (ANSI T1.619a)	Yes				
2W Digital Proprietary	No		Voice	<ul style="list-style-type: none"> <li>• MOS (R)</li> <li>• Secure Calls (R)</li> </ul>	<ul style="list-style-type: none"> <li>• CJCSI 6215.01C</li> <li>• CJCSI 6215.01C</li> </ul>
			Facsimile	<ul style="list-style-type: none"> <li>• Analog: ITU-T T.4 (R)</li> </ul>	<ul style="list-style-type: none"> <li>• DISR</li> </ul>
			Data	<ul style="list-style-type: none"> <li>• Modem (VBD) (R)</li> <li>• 56 kbps switched data (R)</li> <li>• 64 kbps switched data (R: BRI only)</li> <li>• NX56 synchronous BER (R: BRI only)</li> <li>• NX64 synchronous BER (R: BRI only)</li> <li>• Secure data (STE/STU-III) (R)</li> </ul>	<ul style="list-style-type: none"> <li>• CJCSI 6215.01C</li> <li>• UCR Section 3.10</li> <li>• UCR Section 3.10</li> <li>• UCR Section 3.10</li> <li>• UCR Section 3.10</li> <li>• CJCSI 6215.01C</li> </ul>
VoIP	No	VTC	<ul style="list-style-type: none"> <li>• ITU-T H.320 (R: BRI only)</li> </ul>	<ul style="list-style-type: none"> <li>• FTR 1080B-2002</li> </ul>	

**Table 2-1. DVX Requirements (continued)**

<b>DSN Features &amp; Capabilities</b>			
<b>Feature/ Capability</b>	<b>Critical</b>	<b>Requirements Required or Conditional</b>	<b>References</b>
Common Features	Yes	<ul style="list-style-type: none"> <li>• Individual Lines (R)</li> <li>• Selective call rejection (C)</li> <li>• Denied originating service (C)</li> <li>• Code restriction and diversion (R)</li> <li>• Call waiting (R)</li> <li>• Three-way calling (R)</li> <li>• Add-on transfer, conference calling, and call hold (C)</li> <li>• Call Transfer Individual – All calls (R)</li> <li>• Call Transfer - Internal Only (R)</li> <li>• Call Transfer – Individual – Incoming Only/Add-On Consultation Hold – Incoming Call (R)</li> <li>• Call Transfer – Outside (R)</li> <li>• Call Transfer – Add-On Restricted Station (C)</li> <li>• Call Transfer – Attendant (C)</li> <li>• Call Hold (R)</li> <li>• Conference Calling – Six Way Station Controlled (C)</li> <li>• Call Forwarding Variable (R)</li> <li>• Call Forward Busy Line (R)</li> <li>• Call Forwarding – Don't Answer – All Calls (R)</li> <li>• Selective Call Forwarding (C)</li> <li>• Call pick-up (C)</li> <li>• Address Translation (C)</li> <li>• Assured Dial Tone (R)</li> </ul>	<ul style="list-style-type: none"> <li>• UCR Section 2.1</li> <li>• UCR Section 2.1.2</li> <li>• UCR Section 2.1.3</li> <li>• UCR Section 2.1.4</li> <li>• UCR Section 2.1.5</li> <li>• UCR Section 2.1.6</li> <li>• UCR Section 2.1.7</li> <li>• UCR Section 2.1.7.1</li> <li>• UCR Section 2.1.7.2</li>   <li>• UCR Section 2.1.7.3</li> <li>• UCR Section 2.1.7.4</li> <li>• UCR Section 2.1.7.5</li> <li>• UCR Section 2.1.7.6</li> <li>• UCR Section 2.1.7.7</li> <li>• UCR Section 2.1.7.8</li> <li>• UCR Section 2.1.8.1</li> <li>• UCR Section 2.1.8.2</li> <li>• UCR Section 2.1.8.3</li> <li>• UCR Section 2.1.8.4</li> <li>• UCR Section 2.1.9</li> <li>• UCR Section 2.7</li> <li>• UCR Section 2.9</li> </ul>
Attendant	No	<ul style="list-style-type: none"> <li>• Attendant Features (C)</li> </ul>	<ul style="list-style-type: none"> <li>• UCR Section 2.2</li> </ul>
Public Safety	Yes	<ul style="list-style-type: none"> <li>• Basic Emergency Service (911) Caller (C)</li> <li>• Emergency Service (911) Public Safety Answering Point (C)</li> <li>• Enhanced Emergency Service (E911) (C)</li> <li>• Trace of terminating calls (R)</li> <li>• Outgoing call trace (R)</li> <li>• Tandem call trace (R)</li> <li>• Trace of a call in progress (R)</li> </ul>	<ul style="list-style-type: none"> <li>• UCR Section 2.4.1.1</li> <li>• UCR Section 2.4.1.2</li> <li>• UCR Section 2.4.1.3</li> <li>• UCR Section 2.4.2</li> <li>• UCR Section 2.4.3</li> <li>• UCR Section 2.4.4</li> <li>• UCR Section 2.4.5</li> </ul>
Conferencing	Yes	<ul style="list-style-type: none"> <li>• Preset Conferencing (R)</li> <li>• Conference Notification Recorded Announcement (R)</li> <li>• Automatic Retrial and Alternate Address (R)</li> <li>• Bridge Release (R)</li> <li>• Lost Connection to Conferee or Originator (R)</li> <li>• Secondary Conferencing (R)</li> <li>• Meet-Me Conferencing (C)</li> <li>• Progressive Conferencing (C)</li> </ul>	<ul style="list-style-type: none"> <li>• UCR Section A2.3.3</li> <li>• UCR Section 2.6.2</li> <li>• UCR Section 2.6.3</li> </ul>
Nailed-up Connections	No	<ul style="list-style-type: none"> <li>• Nailed-Up Connection (C)</li> </ul>	<ul style="list-style-type: none"> <li>• UCR Section 2.8</li> </ul>
DSN Hotline Services	Yes	<ul style="list-style-type: none"> <li>• DSN Analog Hotline Service (R)</li> <li>• DSN ISDN Hotline Service (R)</li> <li>• Classmarking (R)</li> <li>• Protected Hotline Calling (R)</li> <li>• Hotline Service Protection (R)</li> <li>• Non-Pair Protected Hotline Calling (R)</li> <li>• Pair Protected Hotline Calling (R)</li> </ul>	<ul style="list-style-type: none"> <li>• UCR Section 2.12</li> <li>• UCR Section 2.12</li> <li>• UCR Section 2.12</li> <li>• UCR Section 2.12.1</li> <li>• UCR Section 2.12.2</li> <li>• UCR Section 2.12.3</li> <li>• UCR Section 2.12.4</li> </ul>

**Table 2-1. DVX Requirements (continued)**

<b>DSN Features &amp; Capabilities</b>			
<b>Feature/ Capability</b>	<b>Critical</b>	<b>Requirements Required or Conditional</b>	<b>References</b>
MLPP	Yes	<ul style="list-style-type: none"> <li>• MLPP Overview (R)</li> <li>• Precedence Levels (R)</li> <li>• Announcements (R)</li> <li>• Attendant Queue Announcement (C)</li> <li>• Loss of C2 Announcement (C)</li> <li>• Invocation and Operation (R)</li> <li>• Preemption in the Network (R)</li> <li>• Network Facility with Lower Precedence Calls (R)</li> <li>• Cancel to / Cancel from (C)</li> <li>• Network Facility with Equal or Higher Precedence Calls (R)</li> <li>• MLPP Trunk Selection (R)</li> <li>• Hunt Sequence for Trunks (R)</li> <li>• ROUTINE Precedence Calls (R)</li> <li>• Precedence Calls Above ROUTINE Precedence (R)</li> <li>• Method 1 (R)</li> <li>• Method 2 (C)</li> <li>• MLPP Interworking with Other Networks (R)</li> <li>• Precedence Call Diversion (R)</li> <li>• Channel Associated Signaling (R)</li> <li>• Primary Rate Interface (R)</li> <li>• Common Channel Signaling Number 7 (C)</li> <li>• Analog Line MLPP (R)</li> <li>• ISDN MLPP Basic Rate Interface General Description (C)</li> <li>• Single B Channel, Single Appearance, Single DN (C)</li> <li>• Line Active with a Lower Precedence Call (C)</li> <li>• Line Active with a Equal or Higher Precedence Call (C)</li> <li>• Single B Channel, Multiple Appearances, Single DN (C)</li> <li>• Two B Channels, Multiple Appearances, Single DN (C)</li> <li>• Two B Channel, Two DN (Data Mode Only) (C)</li> <li>• ISDN Primary Rate Interface (R)</li> <li>• Precedence Call Waiting (C)</li> <li>• Call Forwarding (C)</li> <li>• Call Transfer (C)</li> <li>• Call Hold (C)</li> <li>• Three-Way Calling (C)</li> <li>• Call Pickup (C)</li> <li>• Conferencing (C)</li> <li>• Multiline Hunt Group (C)</li> <li>• Community of Interest (C)</li> <li>• MLPP Common Channel Signaling Number 7 (C)</li> <li>• CAS to CCS Trunk Network in a Mixed Media Network (C)</li> <li>• MLPP Interaction with EKTS features (C)</li> <li>• Network Management Manual Controls (C)</li> <li>• Data Collection (R)</li> </ul>	<ul style="list-style-type: none"> <li>• UCR Section 3.1</li> <li>• UCR Section 3.1.2</li> <li>• UCR Section 3.1.3</li> <li>• UCR Section 3.1.3</li> <li>• UCR Section 3.1.3</li> <li>• UCR Section 3.1.4</li> <li>• UCR Section 3.2</li> <li>• UCR Section 3.2.1</li> <li>• UCR Section 3.2.1.1</li> <li>• UCR Section 3.2.2</li> <li>• UCR Section 3.2.3</li> <li>• UCR Section 3.2.3.1</li> <li>• UCR Section 3.2.3.1.1</li> <li>• UCR Section 3.2.3.1.2</li> <li>• UCR Section 3.2.3.1.2.1</li> <li>• UCR Section 3.2.3.1.2.2</li> <li>• UCR Section 3.2.4</li> <li>• UCR Section 3.3</li> <li>• UCR Section 3.4.1</li> <li>• UCR Section 3.4.2</li> <li>• UCR Section 3.4.3</li> <li>• UCR Section 3.5</li> <li>• UCR Section 3.6.1</li> <li>• UCR Section 3.6.2</li> <li>• UCR Section 3.6.2.1</li> <li>• UCR Section 3.6.2.2</li> <li>• UCR Section 3.6.3</li> <li>• UCR Section 3.6.4</li> <li>• UCR Section 3.6.5</li> <li>• UCR Section 3.7</li> <li>• UCR Section 3.8.1</li> <li>• UCR Section 3.8.2</li> <li>• UCR Section 3.8.3</li> <li>• UCR Section 3.8.4</li> <li>• UCR Section 3.8.5</li> <li>• UCR Section 3.8.6</li> <li>• UCR Section 3.8.7</li> <li>• UCR Section 3.8.8</li> <li>• UCR Section 3.8.9</li> <li>• UCR Section 3.9</li> <li>• UCR Section 3.10</li> <li>• UCR Section 3.11</li> <li>• UCR Section 3.13</li> <li>• UCR Section 3.14</li> </ul>

**Table 2-1. DVX Requirements (continued)**

<b>DSN Features &amp; Capabilities</b>			
<b>Feature/ Capability</b>	<b>Critical</b>	<b>Requirements Required or Conditional</b>	<b>References</b>
Call Processing	Yes	<ul style="list-style-type: none"> <li>• Call Treatments (R)</li> <li>• Primary and Alternate Routing (R)</li> <li>• E&amp;M Lead Signaling States (C)</li> <li>• 4-Wire Analog User Access Lines (C)</li> <li>• 2-Wire User Access Lines (R)</li> <li>• Termination of Analog Lines (R)</li> <li>• DSN Interswitch Trunk Call Processing (non-CCS/ISDN) (R)</li> <li>• DSN User Dialing (R)</li> <li>• Interswitch and Intraswitch Dialing (R)</li> <li>• Seven-Digit Dialing (R)</li> <li>• Ten-Digit Dialing (R)</li> <li>• Access Code (R)</li> <li>• Access Digit (R)</li> <li>• Precedence Digit (R)</li> <li>• Service Digit (R)</li> <li>• Route Code (R)</li> <li>• Area Code (R)</li> <li>• Switch Code (R)</li> <li>• Line Number (R)</li> <li>• Calling Name Delivery (C)</li> <li>• Calling Number Delivery (R)</li> <li>• Emergency Service 911 Conflict Resolution (C)</li> <li>• DSN Switch Outputting Digit Formats (R)</li> <li>• Standard Directory Number (R)</li> <li>• Standard Test Numbers (C)</li> <li>• Base Services – Abbreviated Numbers (R)</li> <li>• Digit Reception Requirements (R)</li> <li>• Digit Registration Capacity (R)</li> <li>• Screening (R)</li> <li>• Additional Dialing format for Coalition Forces (R)</li> </ul>	<ul style="list-style-type: none"> <li>• UCR Section 4.1</li> <li>• UCR Section 4.2</li> <li>• UCR Section 4.3.1</li> <li>• UCR Section 4.3.2</li> <li>• UCR Section 4.3.3</li> <li>• UCR Section 4.3.4</li> <li>• UCR Section 4.4</li> <li>• UCR Section A2.3.4</li> <li>• UCR Section 4.5.1.2</li> <li>• UCR Section 4.5.1.2.1</li> <li>• UCR Section 4.5.1.2.2</li> <li>• UCR Section 4.5.1.3</li> <li>• UCR Section 4.5.1.3.1</li> <li>• UCR Section 4.5.1.3.2</li> <li>• UCR Section 4.5.1.3.3</li> <li>• UCR Section 4.5.1.4</li> <li>• UCR Section 4.5.1.5</li> <li>• UCR Section 4.5.1.6</li> <li>• UCR Section 4.5.1.7</li> <li>• UCR Section 4.5.1.8.1</li> <li>• UCR Section 4.5.1.8.2</li> <li>• UCR Section 4.5.1.9</li> <li>• UCR Section 4.5.2</li> <li>• UCR Section 4.5.3</li> <li>• UCR Section 4.5.4</li> <li>• UCR Section 4.5.5</li> <li>• UCR Section 4.5.6</li> <li>• UCR Section 4.5.7</li> <li>• UCR Section 4.5.8</li> <li>• UCR App. 2 para A2.3.4</li> </ul>
Network Management	Yes	<ul style="list-style-type: none"> <li>• Interfaces (R)</li> <li>• Data Quality (R)</li> <li>• Traffic Measurements (R)</li> <li>• Reference Data (C)</li> <li>• Line Servicing (C)</li> <li>• Trunk Groups (C)</li> <li>• Call Processors (C)</li> <li>• Switch Services (C)</li> <li>• Special Studies (C)</li> <li>• Remote Switching Studies (C)</li> <li>• Features (C)</li> <li>• Common Channel Signaling Network Measurements (C)</li> <li>• ISDN Measurements (C)</li> <li>• Traffic Capacity (R)</li> <li>• Fault management (R)</li> <li>• Configuration management (R)</li> <li>• Call Detail Recording Data Retention (C)</li> <li>• Network Management controls (C)</li> <li>• Remote access (R)</li> </ul>	<ul style="list-style-type: none"> <li>• UCR Section A2.3.6</li> <li>• UCR Section 9.2.1</li> <li>• UCR Section 9.2.2.1.1</li> <li>• UCR Section 9.2.2.1.2</li> <li>• UCR Section 9.2.2.2</li> <li>• UCR Section 9.2.2.3</li> <li>• UCR Section 9.2.2.4</li> <li>• UCR Section 9.2.2.5</li> <li>• UCR Section 9.2.2.6</li> <li>• UCR Section 9.2.2.7</li> <li>• UCR Section 9.2.2.8</li> <li>• UCR Section 9.2.3</li> <li>• UCR Section 9.2.4</li> <li>• UCR Section 9.2.5</li> <li>• UCR Section 9.3</li> <li>• UCR Section 9.4</li> <li>• UCR Section 9.5.2</li> <li>• UCR Section 9.7</li> <li>• UCR Section 9.8</li> </ul>

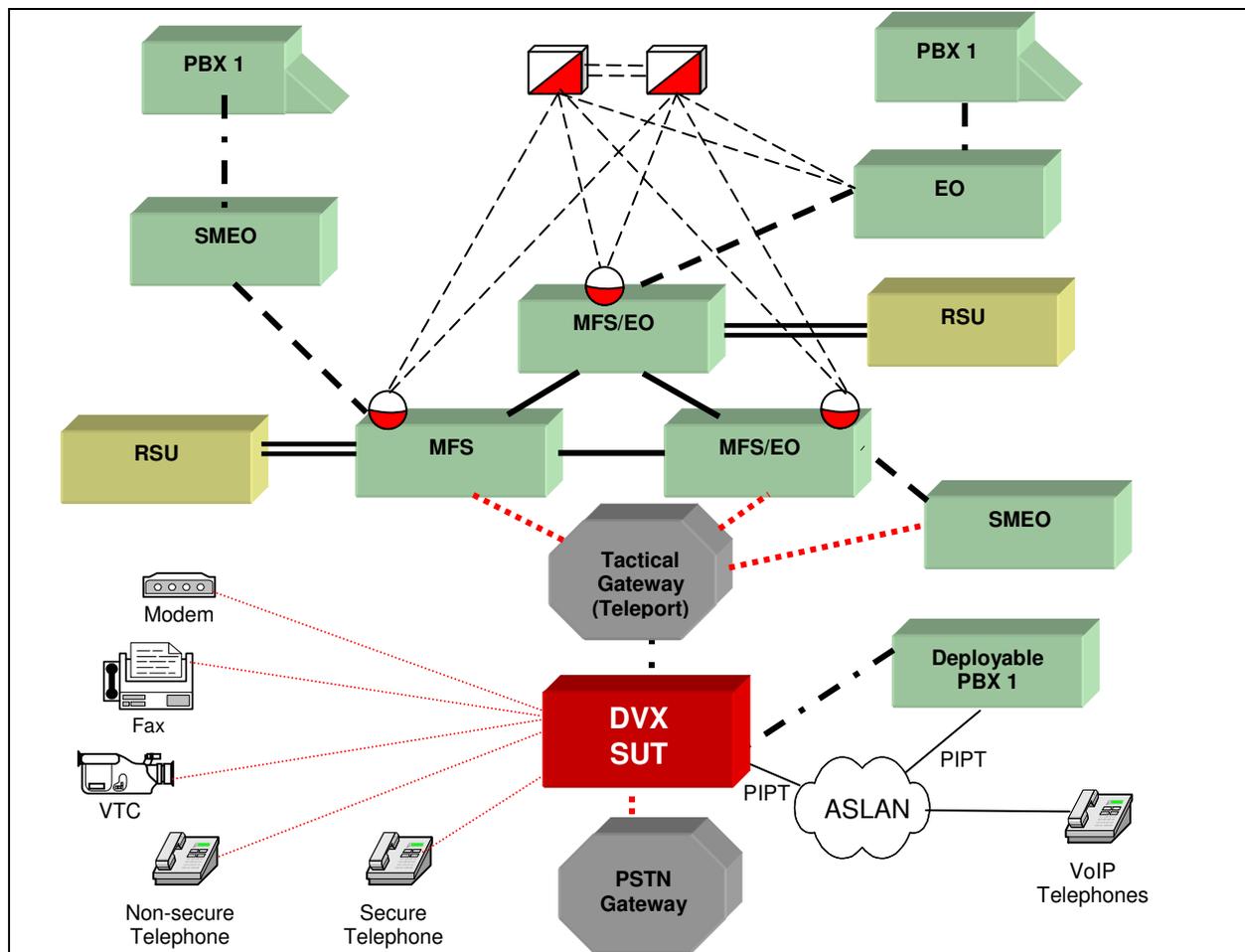
**Table 2-1. DVX Requirements (continued)**

<b>DSN Features &amp; Capabilities (continued)</b>				
<b>Feature/ Capability</b>	<b>Critical</b>	<b>Requirements Required or Conditional</b>		<b>References</b>
ISDN Services	Yes	<ul style="list-style-type: none"> <li>• ISDN BRI signaling (C)</li> <li>• BRI Access, Call Control and Signaling (C)</li> <li>• Uniform Interface Configuration for BRIs (C)</li> <li>• Electronic Key Telephone Systems (EKTS) (C)</li> <li>• PRI Access, Call Control and Signaling (R)</li> <li>• PRI Features (C)</li> <li>• Packet Data Features and Capabilities (C)</li> </ul>		<ul style="list-style-type: none"> <li>• UCR App. 2, para. A2.3.4</li> <li>• UCR Section 10, Table 10-1</li> <li>• UCR Section 10, Table 10-2</li> <li>• UCR Section 10, Table 10-3</li> <li>• UCR Section 10, Table 10-4</li> <li>• UCR Section 10, Table 10-5</li> <li>• UCR Section 10, Table 10-6</li> </ul>
Synchronization	Yes	<ul style="list-style-type: none"> <li>• External Timing Mode (C)</li> <li>• Line timing mode (R)</li> <li>• General (C)</li> <li>• Internal Stratum 4 (R)</li> <li>• Synchronization Performance Monitoring Criteria (C)</li> <li>• DS1 Traffic Interfaces (C)</li> <li>• DS0 Traffic Interconnects (C)</li> </ul>		<ul style="list-style-type: none"> <li>• UCR Section 11.1.1.1</li> <li>• UCR Section A2.3.9</li> <li>• UCR Section 11.1.2.1</li> <li>• UCR Section 11.1.2.2</li> <li>• UCR Section 11.2</li> <li>• UCR Section 11.3</li> <li>• UCR Section 11.4</li> </ul>
Reliability (See note 1.)	No	<ul style="list-style-type: none"> <li>• Reliability Requirements (C)</li> </ul>		<ul style="list-style-type: none"> <li>• UCR Section 12.1</li> </ul>
Security	No	<ul style="list-style-type: none"> <li>• GR-815, STIGs, and DoDI 8510.bb (DIACAP) (R)</li> </ul>		<ul style="list-style-type: none"> <li>• UCR Section 13</li> </ul>
<b>VoIP</b>				
VoIP System	No	VoIP function is conditional. If VoIP is provided, <b>all</b> of the following requirements must be met: <ul style="list-style-type: none"> <li>• Voice Quality with MOS of 4.0 or better (R)</li> <li>• ITU-T G.711 PCM CODEC (R)</li> <li>• MLPP (R)</li> <li>• Security (R)</li> <li>• Network management (R)</li> <li>• System timing (R)</li> <li>• Latency ≤ 60 milliseconds (R)</li> <li>• IPv6 capable (R)</li> <li>• Service Class Tagging (R)</li> <li>• VoIP System Downtime (IP network 35 min/yr Subscriber 12 min/yr) (C)</li> </ul>		<ul style="list-style-type: none"> <li>• UCR App. 3, para. A3.2.1</li> <li>• UCR App. 3, para. A3.2.2</li> <li>• UCR App. 3, para. A3.2.3</li> <li>• UCR App. 3, para. A3.2.4</li> <li>• UCR App. 3, para. A3.2.5</li> <li>• UCR App. 3, para. A3.2.6</li> <li>• UCR App. 3, para. A3.2.7</li> <li>• UCR App. 3, para. A3.2.8</li> <li>• UCR App. 3, para. A3.2.9</li> <li>• UCR App. 3, para. A3.2.10</li> </ul>
<b>Network Gateways</b>				
<b>Interface</b>	<b>Critical</b>	<b>Requirements Required or Conditional</b>		<b>References</b>
PSTN (See note 2.)	Yes	Trunking	<ul style="list-style-type: none"> <li>• Positive Identification Control (C)</li> <li>• On-Netting (C)</li> <li>• Off-Netting (C)</li> <li>• Ground Start Line (R)</li> <li>• Immediate Start (C)</li> </ul>	<ul style="list-style-type: none"> <li>• CJCSI 6215.01C</li> <li>• CJCSI 6215.01C</li> <li>• CJCSI 6215.01C</li> <li>• UCR Section 5.2.2</li> <li>• UCR Section 5.3.2</li> </ul>
<b>NOTES:</b>				
1 Backup power, power components, UPS requirements, UPS load capacity and alarms are non-testable requirements. It is the responsibility of the respective base/post/camp/station communication agency to provide this with the SUT when installed.				
2 Voice, facsimile, data, and VTC service requirements for PSTN are identical to DSN with the exception of MLPP.				

**Table 2-1. DVX Requirements (continued)**

<b>LEGEND:</b>						
2W	2-Wire	EKTS	Electronic Key Telephone System	para	paragraph	
802.3u	Standard for carrier sense multiple access with collision detection at 100 Mbps	FTR	Federal Telecommunications Recommendation	PBX	Private Branch Exchange	
ANSI	American National Standards Institute	FTR 1080B-2002	Video Teleconferencing Services	PCM	Pulse Code Modulation	
App	Appendix	G.711	Standard for PCM of Voice Frequencies	PCM-24	Pulse Code Modulation - 24 Channels	
BER	Bit Error Ratio			PCM-30	Pulse Code Modulation - 30 Channels	
BRI	Basic Rate Interface	GR	Generic Requirement (Telcordia)	PIPT	Proprietary Internet Protocol Trunk	
C	Conditional			PRI	Primary Rate Interface	
C2	Command and Control	GR-815	Generic Requirements For Network Element/Network System (NE/NS) Security	PSTN	Public Switched Telephone Network	
CAS	Channel Associated Signaling			Q.735.3	SS7 Signaling Standard for E1 MLPP	
CCS	Common Channel Signaling	H.320	Standard for Narrowband VTC	Q.955.3	ISDN Signaling Standard for E1 MLPP	
CJCSI	Chairman of the Joint Chiefs of Staff Instruction	IEEE	Institute of Electrical and Electronics Engineers	R	Required	
DIACAP	DoD Information Assurance Certification and Accreditation Process	IP	Internet Protocol	SS7	Signaling System 7	
		IPv6	Internet Protocol version 6	STE	Secure Terminal Equipment	
DISR	DoD IT Standards Registry	ISDN	Integrated Services Digital Network	STIGs	Security Technical Implementation Guides	
		IT	Information Technology	STU-III	Secure Telephone Unit – 3 <sup>rd</sup> Generation	
DoD	Department of Defense	ITU-T	International Telecommunication Union - Telecommunication Standardization Sector	S/T	ISDN BRI 4-wire interface	
DoDI	Department of Defense Instruction			T1	Digital Transmission Link Level 1 (1.544 Mbps)	
DP	Dial Pulse			T.4	Standardization of Group 3 facsimile terminals for document transmission	
DN	Directory Number	kbps	kilobits per second	T.1.619a	SS7 and ISDN MLPP Signaling Standard for T1	
DS0	Digital Signal Level 0 (64 kbps)	Mbps	Megabits per second		Telecommunications Industry Association	
		MFR1	Multi-Frequency Recommendation 1	TDM	Time Division Multiplexing	
DS1	Digital Signal Level 1 (1.544 Mbps) (2.048 Mbps European)	min	minute	UCR	Unified Capabilities Requirements	
		MLPP	Multi-Level Precedence and Preemption	UPS	Uninterruptible Power Supply	
DSN	Defense Switched Network	MOS	Mean Opinion Score	VBD	Variable bit data	
DTMF	Dual Tone Multi-Frequency	NI 1/2	National ISDN Standard 1 or 2	VoIP	Voice over Internet Protocol	
DVX	Deployable Voice Exchange	NX56	Data format restricted to multiples of 56 kbps	VTC	Video Teleconferencing	
E&M	Ear and Mouth	NX64	Data format restricted to multiples of 64 kbps	yr	year	
E1	European Basic Multiplex Rate (2.048 Mbps)					

**8. TEST NETWORK DESCRIPTION.** The SUT was tested at JITC's Global Information Grid Network Test Facility in a manner and configuration similar to that of the DSN operational environment. Testing of the system's required functions and features was conducted using the test configuration depicted in Figure 2-2. The SUT was tested as the end-point in relation to the other switches. Figure 2-3 depicts the VoIP configuration.

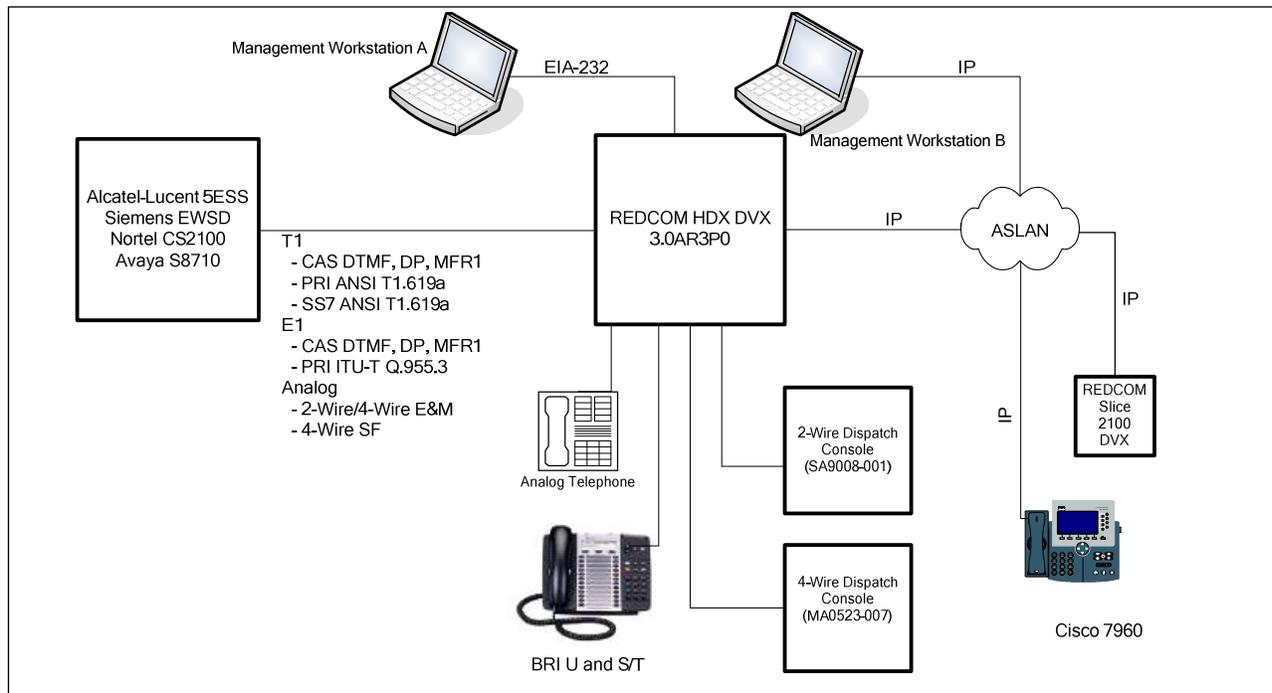


**LEGEND:**

A-Link Access Link (SS7)  
 ASLAN Assured Services Voice Application Local Area Network  
 B-Link Bridge Link (SS7)  
 BRI Basic Rate Interface  
 C-Link Cross Link (SS7)  
 CAS Channel Associated Signaling  
 DRSN Defense Red Switch Network  
 DSN Defense Switched Network  
 DVX Deployable Voice Exchange  
 E1 European Basic Multiplex Rate (2.048 Mbps)  
 EO End Office  
 FAX facsimile  
 ISDN Integrated Services Digital Network  
 Mbps Megabits per second  
 MFS Multifunction Switch  
 PBX Private Branch Exchange  
 PBX 1 Private Branch Exchange Type 1  
 PIPT Proprietary Internet Protocol Trunk  
 PRI Primary Rate Interface  
 PSTN Public Switched Telephone Network  
 RSU Remote Switching Unit  
 SMEO Small End Office  
 SMU Switch Multiplexer Unit  
 SS7 Signaling System 7  
 SUT System Under Test  
 T1 Digital Transmission Link Level 1 (1.544 Mbps)  
 TCP/IP Transmission Control Protocol/Internet Protocol  
 VoIP Voice over Internet Protocol  
 VTC Video Teleconferencing

 SS7 Service Switching Point (SSP)  
 SS7 Signal Transfer Point (STP)  
 DSN Gateway Trunk  
 DSN Interswitch Trunk (T1/E1 SS7, T1/E1 CAS, T1/E1 ISDN PRI)  
 DSN Line (2-Wire Analog, ISDN BRI, Digital Proprietary)  
 SS7 Links (A-Link, B-Link, or C-Link)  
 TCP/IP  
 DSN End Office Access Trunk (T1/E1 SS7, T1/E1 CAS, T1/E1 ISDN PRI)  
 DSN PBX Access Trunk (T1/E1 SS7, T1/E1 CAS, T1/E1 ISDN PRI)  
 RSU-Host Umbilical Link

**Figure 2-2. Test Configuration**



**LEGEND:**

5ESS	Class 5 Electronic Switching System	HDX	High Density Exchange
ANSI	American National Standards Institute	IP	Internet Protocol
ASLAN	Assured Services Local Area Network	ISDN	Integrated Services Digital Network
BRI	Basic Rate Interface	ITU-T	International Telecommunication Union - Telecommunication Standardization Sector
CAS	Channel Associated Signaling	Mbps	Megabits per second
CS	Communication Server	MFR1	Multi-Frequency Recommendation 1
DP	Dial Pulse	MLPP	Multi-Level Precedence and Preemption
DTMF	Dual Tone Multi-Frequency	PRI	Primary Rate Interface
DVX	Deployable Voice Exchange	Q.955.3	ISDN Signaling standard for E1 MLPP
E&M	Ear and Mouth	SF	Single Frequency
E1	European Basic Multiplex Rate (2.048 Mbps)	SS7	Signaling System 7
EIA	Electronic Industries Alliance	S/T	ISDN BRI 4-wire interface
EIA-232	Standard for defining the mechanical and electrical characteristics for connecting Data Terminal Equipment (DTE) and Data Circuit-terminating Equipment (DCE) data communications devices	T1	Digital Transmission Link Level 1 (1.544 Mbps)
EWSD	Elektronisches Wählsystem Digital	T1.619a	SS7 and ISDN MLPP Signaling Standard for T1
		U	ISDN BRI 2-wire interface
		VoIP	Voice over Internet Protocol

**Figure 2-2. VoIP 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 UC APL that offer the same certified interfaces.

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

<b>DSN Switches</b>	
<b>System Name</b>	<b>Software Release</b>
Nortel CS2100	Succession Enterprise (SE)09.1
Avaya S8710	Communication Manager (CM) 4.0 (R014x.00.2.731.7: Super Patch 14419)
Siemens EWSD	19d with Patch Set 46
Alcatel-Lucent 5ESS	5E16.2 Broadcast Warning Message (BWM) 08-0002
REDCOM Slice	3.0A Revision 3, with Specified Patch Group 0 (3.0A R3P0)
<b>SUT Components</b>	
<b>MSU 2</b>	
<b>Part Number</b>	<b>Part Description</b>
MA0656-002	Controller
MA0656-002	Redundant Controller
MA0648-002	TSI
MA0317-904	Analog Line Circuit
MA0703-004	USC
MA0683-144	MET Board 2
MA0688-101	S3P
MA0732-001	MSC
MA0368-101	Attendant Interface 4-wire (ATI)
MA0647-002	Announcer Board
MA0308-101	MF Digits Send and Receiver
MA0504-011	Ring Generator
<b>MSU 1</b>	
MA0656-002	Controller
MA0656-002	Redundant Controller
MA0648-002	TSI
MA0708-115	Analog Line Circuit
MA0317-904	Analog Line Circuit
MA0732-001	MSC
MA0688-101	S3P
MA0337-002	E1 Interface
MA0531-322	BRI
MA0530-322	BRI
MA0520-102	R2 Send and Receiver
MA0629-114	Single Frequency Interface
MA0656-002	DSP
MA0060-005	Ring Generator
<b>MSU 0</b>	
MA0656-002	Controller
MA0656-002	Redundant Controller
MA0648-002	TSI
MA0653-115	Analog Line Circuit
MA0702-302	Analog Line Circuit
MA0602-201	Analog Line Circuit
MA0683-144	MET Board
MA0473-163	UCS

**Table 2-2. Tested System Configurations (continued)**

<b>MSU 0 (continued)</b>			
MA0697-013	T1 Interface		
MA0531-322	BRI		
MA0530-322	BRI		
MA0366-101	ATI 2-wire		
MA0670-001	BR8 Circuit Interface		
MA0079-113	E&M Interface		
MA0463-101	MTI		
MA0732-001	MSC		
MA0504-011	Ring Generator		
<b>Attendant Consoles</b>			
SA9008-001	2-Wire Attendant Console		
MA0523-007	4-Wire Attendant Console		
<b>Local Management Terminals</b>			
<b>Hardware</b>	<b>Software</b>		
Management Workstation A	Windows XP SP2, SecureCRT 5.5.2		
Management Workstation B	Windows XP SP2, MAUI 3.2.2, LCS 3.1.2, SecureCRT 5.5.2		
<b>Telephone Instruments</b>			
<b>Interface Type</b>	<b>Model/Release</b>		
2-Wire Analog	Panasonic KX-TS15-W		
ISDN BRI S/T and U	Tone Commander 7220-B/ Command Set MA0531-P01		
VoIP	Cisco 7940G/3-08-4-00		
VoIP	Cisco 7960/3-08-4-00		
<b>LEGEND:</b>			
5ESS	Class 5 Electronic Switching System	MSU	Modular Switching Unit
ATI	Attendant Interface	MTI	Message Traffic Interface
BR8	Basic Rate 8	R2	Register signaling, type 2
BRI	Basic Rate Interface	Rel.	Release
CS	Communication Server	S3P	SS7 Interface
DSN	Defense Switched Network	SP2	Service Pack 2
DSP	Digital Signal Processing	SS7	Signaling System 7
E&M	Ear and Mouth	SUT	System Under Test
E1	European Basic Multiplex Rate (2.048 Mbps)	S/T	ISDN BRI 4-wire interface
EWSD	Elektronisches Wählsystem Digital	TSI	Time Slot Interchange
ISDN	Integrated Services Digital Network	T1	Digital Transmission Link Level 1 (1.544 Mbps)
LCS	Link Command System	U	ISDN BRI 2-wire interface
MAUI	Maintenance Administration and User Interface	UCS	Universal Clock Synchronizer
Mbps	Megabits per second	USC	Universal Service Circuit
MET	Multi E1/T1	VoIP	Voice over Internet Protocol
MF	Multi Frequency	XP	Experience
MSC	Media Service Circuit		

**10. TESTING LIMITATIONS. NONE.**

**11. TEST RESULTS**

**a. Discussion**

(1) DSN Trunk Interfaces. The SUT met all critical CRs and FRs for the following interfaces: 2-wire/4-wire E&M; 4-wire SF, T1 CAS with Dual Tone Multi-Frequency (DTMF), Dial Pulse (DP), and Multi-Frequency Recommendation 1 (MFR1) signaling; E1 CAS with DTMF, DP, and MFR1 signaling; T1 ISDN PRI National ISDN Standard 1 or 2 (NI 1/2) American National Standards Institute (ANSI) T1.619a; T1 SS7 ANSI T1.619a; and E1 PRI ITU-T Q.955.3. The SUT virtual-tactical network element

PIPT met all CRs and FRs and can only be deployed within a tactical DSN environment. The SUT PIPT is not certified for joint use within the strategic DSN.

(2) DSN Line Interfaces. The SUT met all critical interoperability certification requirements for the following DSN line interfaces with the exceptions noted in the subparagraphs below: 2-wire analog, ISDN BRI National ISDN Standard 1 or 2 (NI1/2), 2-wire digital proprietary, and VoIP.

The precedence above ROUTINE ringing cadence that the SUT applies to BRI phones does not meet the specifications as detailed in the UCR, section 5.5.1. The precedence above ROUTINE cadence is distinct from the ROUTINE cadence when it is configured properly; therefore this anomaly has no operational impact.

The conference disconnect tone that is provided by the SUT does not meet the specifications designated in UCR, section 5.5.2. The SUT conference disconnect tone is distinguishable from other DSN tones and cadences; therefore, this anomaly has a minor operational impact.

(3) Features and Capabilities. The SUT met all critical interoperability certification requirements for Features and Capabilities.

(a) Common Features. The SUT met all critical CRs and FRs with the following minor exception: When Call Forwarding Variable (CFV) is assigned to any station on the SUT and CFV is invoked by the user, any station with CFV invoked does not receive a “ping” ring when calls are being forwarded. The operational impact is minor.

(b) Attendant. The SUT met all critical CRs and FRs on both a hard and soft attendant console.

(c) Public Safety. The SUT met all critical CRs and FRs for Emergency Service (911) Caller, trace of a terminating call, outgoing call trace, and trace of a call in progress with the following minor exception: The SUT cannot perform a tandem call trace of a specified distant office directory number as specified in the UCR. This anomaly was adjudicated by the Defense Information Systems Agency (DISA), and determined to have a minor operational impact. The SUT does not support the following features: Emergency Service (911) Public Safety Answering Point or Enhanced Emergency Service (E911). These are not required features for a DVX, therefore there is no risk associated with the SUT not supporting these features.

(d) Conferencing. The SUT met all critical CRs and FRs for the following conferencing types: Preset Conferencing, Secondary Conferencing, Meet-Me Conferencing, Progressive Conferencing.

(e) Nailed-up Connections. This feature is not supported by the SUT. This is not a required feature for a DVX. There is no risk associated with the SUT not supporting this feature.

(f) DSN Hotline Services. Met all critical CRs and FRs with the following minor exceptions: The SUT will not allow the protection of a hotline call originator through the use of a hotline list as required by the UCR. However, this capability can be accomplished with the SUT by classmarking authorized hotline users for receiving only calls from other hotline callers. Furthermore, the SUT does not support interswitch hotline protection. This requirement was modified in the UCR 2007 to add clarification regarding interswitch hotline protection. Prior to the UCR 2007, only intraswitch hotline protection was required and tested. The SUT meets the intraswitch hotline protection requirement. The SUT does not support interswitch hotline protection in accordance with the UCR 2007; however, the vendor has 18 months (till June 2009) to develop this new requirement. The operational impact is minor.

(g) MLPP. The SUT met all critical CRs and FRs with the following exception: The SUT does not support the loss of Command and Control announcement. This is a new UCR requirement and the vendor has 18 months to develop this capability. The SUT met all critical CRs and FRs for the following preemption types: Preempt for reuse-answered, Preempt for reuse-unanswered, Preempt not for reuse-answered, and preempt not for reuse-unanswered.

(h) Call Processing. Met all critical CRs and FRs with the following minor exceptions:

1. The SUT does not support the full complement of CoS tables as specified in the UCR. The SUT supports 255 CoS tables for analog lines and does not support CoS tables on access lines, number codes, trunks, or groups of trunks. This limitation has posed a minor operational impact within the DSN when assigning lines and trunks on the SUT.

2. The SUT does not support calling number delivery. This is a new UCR requirement and the vendor has 18 months to develop this capability.

(i) Network Management. Met all critical CRs and FRs with both serial EIA-232 and IP interfaces.

(j) ISDN Services. Met all critical CRs and FRs with the following minor exception: the SUT does not support Electronic Key Telephone System, the operational impact is minor. This is not a required feature for a DVX. There is no risk associated with the SUT not supporting this feature.

(k) Synchronization. Met all critical CRs and FRs. The SUT meets the requirement with line timing mode and an internal stratum 4 level clock.

(l) Reliability. Met all critical CRs and FRs. This was verified through the vendor's LoC. Backup power, power components, Uninterruptible Power Supply (UPS) requirements, UPS load capacity, and alarms are non-testable requirements. It is the responsibility of the respective base/post/camp/station communication agency to provide this with the SUT when installed.

(m) Security. Security is tested by DISA-led Information Assurance test teams and published in a separate report, reference (c).

(4) VoIP. The SUT is certified with any certified ASLAN listed on the UC APL.

(a) VoIP System. The UCR, Appendix 3, section A3.2, outlines the requirements for the VoIP system. The VoIP system requirements encompass end-to-end VoIP requirements. The following paragraphs detail the results of the SUT VoIP solution.

1. Voice Quality. In accordance with the UCR, Appendix 3, section A3.2.1, VoIP calls shall have an average Mean Opinion Score (MOS) of at least 4.0 as measured in accordance with ITU-T P.800 voice quality standards. This applies from handset to handset and from handset to gateway trunk in the DSN. For intra-switch calls, the SUT VoIP solution had an average MOS of 4.18 with a minimum measured MOS value of 4.05. The average inter-switch MOS was 4.19 with a minimum measured MOS value of 4.10. This average was based on a total of 160 calls. Additionally, VoIP systems shall not lose more than 150 milliseconds (ms) of voice media in any five-minute period. This applies from handset to handset and from handset to gateway trunk to the DSN. The SUT met this requirement with a loss of no more than 56 ms of voice media packets in any five-minute period.

2. Codec. In accordance with the UCR, Appendix 3, section A3.2.2, the ITU-T G.711 Pulse Code Modulation (PCM) CODEC with a 20 ms packet fill was required and was met by the SUT VoIP solution.

3. Multi-Level Precedence and Preemption (MLPP). In accordance with the UCR, Appendix 3, section A3.2.3, the VoIP system shall meet all MLPP requirements identified in UCR, section 3. All critical MLPP features and functions were met by the SUT.

4. Security. Security requirements in accordance with the UCR, Appendix 3, section A3.2.4, are verified using the Information Assurance Test Plan. Results of the security testing are reported in a separate test report generated by the DISA Information Assurance test personnel, reference (c).

5. Network Management (NM). In accordance with the UCR, Appendix 3, section A3.2.5, the vendor is required to provide a management system to monitor the performance of the ASLAN portion of the VoIP system. This requirement

was verified via a LoC because of the numerous third party systems and applications capable of performing this function. This was not a part of the SUT.

6. Synchronization. In accordance with the UCR, Appendix 3, section A3.2.6, the VoIP system shall meet all synchronization requirements identified in UCR, section 11. The SUT derived synchronization with line timing mode via traditional T1 or E1 TDM-based interfaces.

7. Latency. The UCR, Appendix 3, section A3.2.7, states that one-way system latency for the VoIP system must be 60 ms or less as averaged over any five-minute period. The latency requirement is measured from IP handset to the egress trunk and did not exceed 60 ms. The SUT average latency over 160 calls, with a minimum duration of 5 minutes for each call, was measured to be 54.5 ms.

8. IPv6. An IPv6 capable system or product, as defined in the UCR, paragraph 1.7, shall be capable of receiving, processing, and forwarding IPv6 packets and/or interfacing with other systems and protocols in a manner similar to that of IPv4. IPv6 capability is currently satisfied by a vendor LoC signed by the Vice President of their respective company. The vendor stated in writing, their intent to return to JITC for testing of their solution with IPv6 enabled earliest date available. In addition they stated in writing, compliance to the following criteria:

a. Conformant with IPv6 standards profile contained in the Department of Defense Information Technology Standards Registry (DISR). These standards are delineated in the UCR, appendix 11.

b. Maintaining interoperability in heterogeneous environments and with IPv4.

c. Commitment to upgrade as the IPv6 standard evolves.

d. Availability of contractor/vendor IPv6 technical support.

9. In accordance with the UCR, Appendix 3, section A3.2.9.1, the VoIP system components shall meet the following requirements:

a. All components shall be capable of implementing Service Class tagging using the 6-bit Differentiated Services Code Points (DSCPs) field in the IP header. The SUT end instruments used 6-bit service class tagging in the IP header, which meets the requirement.

b. All components shall be capable of assigning DSCP (0-63) to any distinct service class for traffic that traverses the device in accordance with UCR, Tables A3-1 and A3-2. The VoIP SUT solution can assign any DSCP value (0-63), which meets the requirement. During testing the VoIP SUT solution assigned 48 for signaling and 46 for voice media.

c. Any component that supports Real Time traffic and data shall be capable of tagging all Real Time traffic with an Institute of Electrical and Electronics Engineers (IEEE) 802.1Q 2-byte Tag Control Information (TCI) field 12-bit virtual LAN (VLAN) Identification (VID). The VoIP SUT solution supports and was tested with Real Time traffic only without shared data access. Therefore, VLAN tagging was not tested nor required.

10. In accordance with the UCR, Appendix 3, section A3.2.9.2, the VoIP system end user devices shall meet the following requirements:

a. All end instrument components shall be capable of implementing Service Class tagging using the 6-bit DSCPs field in the IP header. The SUT end instruments used 6-bit service class tagging in the IP header, which meets the requirement.

b. The DSCPs shall be assigned to any distinct service class that originates or traverses the end instrument. The DSCPs may be assigned by either having the end instrument itself assign the DSCP to the distinct service class or having the call control portion of the VoIP system tell the end instrument what DSCP to insert to the distinct service class. The SUT end instrument assigned a DSCP value of 48 for voice signaling and 46 for voice media, which meets the requirement.

c. Any end instrument that supports Real Time traffic shall be capable of tagging all Real Time traffic with an IEEE 802.1Q 2-byte TCI field 12-bit VID. Data was not mixed with Real Time traffic, so tagging was conditional. The SUT was tested with third party IP phones as part of their solution. The IP phones that were tested with the SUT were the Cisco 7960G, Polycom 301SIP, and the Snom 320. The Polycom 301SIP did not meet the maximum allowed latency requirements and is therefore not certified for use within the DSN. The Snom 320 could only be configured as auto-negotiate. As a result, the Snom 320 would automatically revert to 100 Megabits per second half duplex resulting unacceptable packet loss. The Snom 320 is therefore not certified for joint use within the DSN. The Cisco 7940G IP phone employs the same firmware as the 7960G. Analysis by JITC determined that the Cisco 7940G is functionally identical to the 7960G for interoperability certification purposes, and it is also certified for joint use within the DSN. Shared access (i.e., same switch port is shared by Personal Computer [PC] and IP phone) was not tested with this configuration. The IP phones were connected to a 100 Mbps full duplex access switch via the 10/100 Mbps switch port. This system is not certified for shared access.

11. In accordance with the UCR, Appendix 3, section A3.2.10, the VoIP system shall meet the maximum downtime of 35 minutes per year for the system and 12 minutes per year for the subscriber. This requirement was verified via a LoC.

12. In accordance with the UCR, Appendix 2, section A2.4.3, the maximum latency for a PIPT without transcoding shall not exceed 50 ms end to end

average in any five -minute period. The SUT PIPT was tested utilizing the Sage 935A test sets. Both Packet Voice Impairments Test (PVIT) and MOS testing were applied to Inter-switch calls from the HDX/DVX across the PIPT to the Slice/DVX. A total of 300 inter-switch calls were completed for this test using both analog and IP phones. The MOS for any five-minute period had a low of 33.45 ms and a high of 47.89 ms with an over all average of 41.95 ms, which met the requirement.

13. In accordance with the UCR, Appendix 2, section A2.4.3, the SUT PIPT shall not cause the jitter measurement from ingress to egress to increase by more than 5 ms average over any five-minute period. The jitter over the PIPT interface was measured between the SUT and the Redcom Slice 2100 DVX. The jitter was measured from 0 ms to 2 ms with an average of 1 ms using the Ixia Chariot test program which met the requirement.

14. In accordance with the UCR, Appendix 2, section A2.4.3, the SUT PIPT shall not cause packet loss measure from ingress to egress to increase by more than .05 percent average over any five-minute period. The packet loss over the PIPT interface was measured between the SUT and the Redcom Slice 2100 DVX. The packet loss was measured at 0.00 percent averaged over a 5-minute period using the Sage 935AT PVIT test which met the requirement.

15. In accordance with the UCR, Appendix 2, section A2.4.4, the SUT PIPT shall use differential services or integrated services to provide preferential treatment over IP. The SUT met this requirement with differential services.

16. In accordance with the UCR, Appendix 2, section A2.4.4, the SUT PIPT shall provide an IP bandwidth reservation/allocation mechanism to allow for the user-specified allocation of bandwidth to support the full non-blocking voice services requirement. The SUT met this requirement.

17. In accordance with the UCR, Appendix 2, section A2.4.4, the SUT PIPT shall be able to propagate the proper Carrier Group Alarms (CGAs) upon physical loss of the TDM ingress, and voice switching shall receive the appropriate CGA upon loss of the PIPT interface. Since the SUT solution is a virtual Tactical Network Element, this requirement is not applicable. When a loss of the PIPT physical connection occurs, the SUT properly marks the respective trunks out of service.

18. In accordance with the UCR, Appendix 2, section A2.4.6, the SUT PIPT shall support end-to-end ANSI T1.619a features and functions, and complete MLPP functionality as described in UCR section 3.7. The SUT PIPT was tested and accurately emulated a TDM ANSI T1.619a ISDN PRI trunkgroup. In addition the SUT PIPT was tested with the full compliment of MLPP features and functions meeting this requirement.

(b) Scalability. The REDCOM HDX can support up to 32 shelves in a standalone system. The SUT was set up with two MA0656 SIP Call Manager Modules

and one MSC Media Gateway Controller Module, in a single shelf, to support a hard set maximum of 64 IP phone users per shelf. Therefore, this solution is certified for a maximum of 2048 IP phone subscribers. This configuration meets the traffic engineering constraints contained in the UCR, Appendix 3.

(5) Network Gateways. This configuration met all critical interoperability certification requirements for the Public Switched Telephone Network (PSTN) with no exceptions. The SUT is certified for use with the PSTN with the following interfaces: T1 CAS (DTMF, DP, MFR1), E1 CAS (DTMF, DP, MFR1), T1 ISDN PRI, E1 PRI, and Ground Start Line.

**b. System Interoperability Results.** The SUT is certified for joint use in the DSN as a DVX with or without VoIP in accordance with the requirements set forth in the UCR. The identified test discrepancies shown that remained open after software patches were applied and regression testing was completed have an overall minor operational impact. The interoperability test summary is shown in Table 2-3. The interoperability requirements/status is shown in Table 2-4.

**Table 2-3. SUT Interoperability Test Summary**

DSN Trunk Interfaces			
Interface & Signaling	Critical	Status	Remarks
T1 CAS (DTMF, DP)	Yes	Certified	Met all critical CRs and FRs.
T1 CAS (MFR1)	No	Certified	Met all critical CRs and FRs.
E1 CAS (DTMF, DP)	Yes (Europe only)	Certified	Met all critical CRs and FRs.
E1 CAS (MFR1)	No (Europe only)	Certified	Met all critical CRs and FRs.
T1 ISDN PRI NI 1/2 (ANSI T1.619a)	Yes	Certified	Met all critical CRs and FRs.
E1 PRI (ITU-T Q.955.3)	No (Europe only)	Certified	Met all critical CRs and FRs.
T1 SS7 (ANSI T1.619a)	No	Certified	Met all critical CRs and FRs.
E1 SS7 (ANSI T1.619a)	No	Not Tested	E1 SS7 is not supported by the SUT. This is not a required interface for a DVX. There is no risk associated with the SUT not supporting this interface.
Analog E&M Type I, II, V	Yes	Certified	Met all critical CRs and FRs.
PIPT (Session Initiation Protocol) (IEEE 802.3u)	No	Certified	Met all critical CRs and FRs. See note 1.
DSN Line Interfaces			
Interface & Signaling	Critical	Status	Remarks
2-Wire Analog (GR-506-CORE)	Yes	Certified	Met all critical CRs and FRs with the following minor exception: The conference disconnect tone does not meet the specifications. <sup>2</sup>
ISDN BRI NI 1/2	Yes	Certified	Met all critical CRs and FRs with the following minor exceptions: The precedence above ROUTINE ringing cadence that the SUT applies to BRI phones does not meet the specifications. <sup>3</sup> The conference disconnect tone does not meet the specifications. <sup>2</sup>
2-Wire Proprietary Digital	No	Not Tested	This feature is not supported by the SUT. This is not a required feature for a DVX. There is no risk associated with the SUT not supporting this feature.
VoIP (Session Initiation Protocol)	No	Certified	Met all critical CRs and FRs with the following minor exception: The conference disconnect tone does not meet the specifications. <sup>2</sup>

**Table 2-3. SUT Interoperability Test Summary (continued)**

DSN Features and Capabilities				
Features and Capabilities		Critical	Status	Remarks
Common Features		Yes	Certified	Met all critical CRs and FRs with the following minor exception: The SUT does not correctly support the call forwarding variable "ping" ring feature. <sup>4</sup>
Attendant		No	Certified	Met all critical CRs and FRs.
Public Safety		Yes	Certified	Met all critical CRs and FRs with the following minor exception: The SUT does not support tandem call trace. <sup>5</sup>
Conferencing	Preset	Yes	Certified	Met all critical CRs and FRs.
	Conference Notification Recorded Announcement	Yes	Certified	Met all critical CRs and FRs.
	Automatic Retrial and Alternate Address	Yes	Certified	Met all critical CRs and FRs.
	Bridge Release	Yes	Certified	Met all critical CRs and FRs.
	Lost Connection	Yes	Certified	Met all critical CRs and FRs.
	Secondary Conferencing	Yes	Certified	Met all critical CRs and FRs.
	Meet-me	No	Certified	Met all critical CRs and FRs.
	Progressive	No	Certified	Met all critical CRs and FRs.
Nailed-up Connections		No	Not Tested	This feature is not supported by the SUT. This is not a required feature for a DVX. There is no risk associated with the SUT not supporting this feature.
DSN Hotline Services		Yes	Certified	Met all critical CRs and FRs with the following minor exceptions: The SUT will not allow the protection of a hotline call originator through the use of a hotline list as required by the UCR. The operational impact is minor. <sup>6</sup> The SUT does not support interswitch protected hotline calling. <sup>7</sup>
MLPP		Yes	Certified	Met all critical CRs and FRs with the following minor exception: The SUT does not support the loss of Command and Control announcement. <sup>8</sup>
Call Processing		Yes	Certified	Met all critical CRs and FRs with the following minor exceptions: The SUT does not support the full complement of CoS tables. <sup>9</sup> The SUT does not support calling number delivery. <sup>8</sup>
Network Management		Yes	Certified	Met all critical CRs and FRs with both serial EIA-232 and Internet Protocol (IP) interfaces.
ISDN Services		Yes	Certified	Met all critical CRs and FRs.
Synchronization		Yes	Certified	Met all critical CRs and FRs.
Reliability		Yes	Certified	Met all critical CRs and FRs. <sup>10</sup>
Security		Yes	Certified	See note 11.
VoIP System		No	Certified	The SUT is certified for VoIP with any certified ASLAN posted on the UC APL. See note 12.
Network Gateways				
Gateway	Interface & Signaling	Critical	Status	Remarks
PSTN	T1 CAS (DTMF, DP, MFR1)	Yes	Certified	Met all critical CRs and FRs.
	E1 CAS (DTMF, DP, MFR1)	Yes (Europe only)	Certified	Met all critical CRs and FRs.
	T1 ISDN PRI NI 1/2 (ANSI T1.607)	Yes	Certified	Met all critical CRs and FRs.
	E1 PRI (ITU-T Q.931)	No (Europe only)	Certified	Met all critical CRs and FRs.
	Ground Start Line	Yes	Certified	Met all critical CRs and FRs.

**Table 2-3. SUT Interoperability Test Summary (continued)**

**NOTES:**

- 1 The PIPT trunk can only be deployed within a tactical DSN environment and is not certified for joint use within the strategic DSN.
- 2 The conference disconnect tone that is provided by the SUT does not meet the specifications designated in UCR, section 5.5.2. The SUT conference disconnect tone is distinguishable from other DSN tones and cadences; therefore, this anomaly has a minor operational impact.
- 3 The precedence above ROUTINE ringing cadence that the SUT applies to BRI phones does not meet the specifications as detailed in the UCR, section 5.5.1. The precedence above ROUTINE cadence is distinct from the ROUTINE cadence when it is configured properly; therefore this anomaly has no operational impact.
- 4 When CFV is assigned to any station on the SUT and CFV is invoked by the user, any station with CFV invoked does not receive a "ping" ring when calls are being forwarded. The operational impact is minor.
- 5 The SUT cannot perform a tandem call trace of a specified distant office directory number as specified in the UCR. This anomaly was adjudicated by DISA, and determined to have a minor operational impact.
- 6 The SUT will not allow the protection of a hotline call originator through the use of a hotline list as required by the UCR. However, this capability can be accomplished with the SUT by classmarking authorized hotline users for receiving only calls from other hotline callers. The operational impact is minor.
- 7 This requirement was modified in the UCR 2007 to add clarification regarding interswitch hotline protection. Prior to the UCR 2007 only intraswitch hotline protection was required and tested. The SUT meets the intraswitch hotline protection requirement. The SUT does not support interswitch hotline protection in accordance with the UCR 2007; however, the vendor has 18 months (till June 2009) to develop this new requirement. The operational impact is minor.
- 8 This is a new UCR requirement and the vendor has 18 months (until July 2009) to develop this capability.
- 9 The SUT does not support the full complement of CoS tables as specified in the UCR. The SUT supports 255 CoS tables for analog lines and does not support CoS tables on access lines, number codes, trunks, or groups of trunks. This limitation has posed a minor operational impact within the DSN when assigning lines and trunks on the SUT.
- 10 Backup power, power components, UPS requirements, UPS load capacity and alarms are non-testable requirements. It is the responsibility of the respective base/post/camp/station communication agency to provide this with the SUT when installed.
- 11 Security is tested by DISA-led Information Assurance test teams and published in a separate report, reference (c).
- 12 An IPv6 capable system or product, as defined in the UCR, paragraph 1.7, shall be capable of receiving, processing, and forwarding IPv6 packets and/or interfacing with other systems and protocols in manner similar to that of IPv4. IPv6 capability is currently satisfied by a vendor Letter of Compliance signed by the Vice President of their respective company. The vendor stated in writing, their intent to return to JITC for testing of their solution with IPv6 enabled earliest date available. In addition they stated in writing, compliance to the following criteria:
  - a. Conformant with IPv6 standards profile contained in the Department of Defense Information Technology Standards Registry (DISR). These standards are delineated in the UCR, appendix 11.
  - b. Maintaining interoperability in heterogeneous environments and with IPv4.
  - c. Commitment to upgrade as the IPv6 standard evolves.
  - d. Availability of contractor/vendor IPv6 technical support.

**Table 2-3. SUT Interoperability Test Summary (continued)**

<b>LEGEND:</b>					
802.3u	Standard for carrier sense multiple access with collision detection at 100 Mbps	FRs	Feature Requirements	NI 1/2	National ISDN Standard 1 or 2
ANSI	American National Standards Institute	GR	Generic Requirement	PIPT	Proprietary Internet Protocol Trunk
APL	Approved Products List	GR-506-CORE	LSSGR: Signaling for Analog Interfaces	PRI	Primary Rate Interface
ASLAN	Assured Services Local Area Network	IEEE	Institute of Electrical and Electronics Engineers	PMO	Program Management Office
BRI	Basic Rate Interface	IPv4	Internet Protocol version 4	PSTN	Public Switched Telephone Network
CAS	Channel Associated Signaling	IPv6	Internet Protocol version 6	Q.931	Signaling Standard for ISDN
CFV	Call Forwarding Variable	ISDN	Integrated Services Digital Network	Q.955.3	ISDN signaling standard for E1 MLPP
CoS	Class of Service	ITU-T	International Telecommunication Union - Telecommunication Standardization Sector	SS7	Signaling System 7
CRs	Capability Requirements	JITC	Joint Interoperability Test Command	SUT	System Under Test
DISA	Defense Information Systems Agency	LSSGR	Local Access and Transport Area (LATA) Switching Systems	T1	Digital Transmission Link Level 1 (1.544 Mbps)
DP	Dial Pulse	Mbps	Megabits per second	T1.607	ISDN – Layer 3 Signaling Specification for Circuit Switched Bearer Service for DSS1
DSN	Defense Switched Network	MFR1	Multi-Frequency Recommendation 1	T1.619a	SS7 and ISDN MLPP Signaling Standard for T1
DSS1	Digital Subscriber Signaling 1	MLPP	Multi-Level Precedence and Preemption	UC	Unified Capabilities
DTMF	Dual Tone Multi-Frequency			UCR	Unified Capabilities Requirements
DVX	Deployable Voice Exchange			UPS	Uninterruptible Power Supply
E&M	Ear and Mouth			VoIP	Voice over Internet Protocol
E1	European Basic Multiplex Rate (2.048 Mbps)				
EIA	Electronic Industries Alliance				
EIA-232	Standard for defining the mechanical and electrical characteristics for connecting Data Terminal Equipment (DTE) and Data Circuit-terminating Equipment (DCE) data communications devices				

**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>.

**Table 2-4. SUT Interoperability Requirements/Status**

DSN Trunk Interfaces							
Interface	Critical	Interface Status	UCR Requirement		Reference	Test Results	Remarks
T1 CAS (MFR1, DTMF, DP)	No	Certified	Trunking	Direct Inward Dialing (C)	UCR Section 2.3.2	Met	
				Normal Wink Start Operations (R)	UCR Section 5.3.3.1.1	Met	
				Glare Operation (R)	UCR Section 5.3.3.1.2	Met	
				Abnormal Wink Start (R)	UCR Section 5.3.3.2.1	Met	
				Glare Resolution (R)	UCR Section 5.3.3.2.2	Met	
				Call for Service Timing (R)	UCR Section 5.3.5	Met	
				Guard Timing (R)	UCR Section 5.3.6	Met	
				Satellite Timing (R)	UCR Section 5.3.7	Met	
				Disconnect Control (R)	UCR Section 5.3.8	Met	
				Reselect and Retrial (R)	UCR Section 5.3.9	Met	
				Off-Hook Supervision Transition (R)	UCR Section 5.3.10	Met	
				Dial-Pulse Signals (R)	UCR Section 5.4.1	Met	
				DTMF Signaling (R)	UCR Section 5.4.2	Met	
				Standard Digit Format for Precedence (C)	UCR Section 5.4.2.1	Met	
				MFR1 2/6 Signaling (R)	UCR Section 5.4.3	Met	
				Alerting Signals and Tones (R)	UCR Section 5.5	Met	
				PCM-24 Digital Trunk Interface (R)	UCR Section 7.1	Met	
				Interface Characteristics (R)	UCR Section 7.1.1	Met	
				Supervisory Channel Associated Signaling (R)	UCR Section 7.1.2	Met	
				Clear Channel Capability (R)	UCR Section 7.1.3	Met	
				Alarm and Restoral Requirements (R)	UCR Section 7.1.4	Met	
				Interoperation of PCM-24 and PCM-30 (R)	UCR Section 7.3	Met	
				Integrated Digital Loop Carrier (C)	UCR Section 7.5	Not Tested	See note 1.
				Local Office Test Line (C)	UCR Section 2.5.1	Not Tested	See note 1.
				Outside Plant Test Lines (C)	UCR Section 2.5.2	Not Tested	See note 1.
				Test Incoming Trunks Tandem or Local State (C)	UCR Section 2.5.3	Not Tested	See note 1.
				Manual Test of Trunks (R)	UCR Section 2.5.4.2	Met	
				Trunk Group-Remove from Service (R)	UCR Section 2.5.5	Met	
Trunk Group-Restore to Service (R)	UCR Section 2.5.6	Met					
Carrier Group Alarm (R)	UCR Section 2.5.7	Met					
Software Carrier Group Alarm (C)	UCR Section 2.5.7.1	Not Tested	See note 1.				

**Table 2-4. SUT Interoperability Requirements/Status (continued)**

DSN Trunk Interfaces							
Interface	Critical	Interface Status	UCR Requirement		Reference	Test Results	Remarks
T1 CAS (MFR1, DTMF, DP) (continued)	No	Certified	Voice	MOS (R)	CJCSI 6215.01C	Met	
				Secure calls (R)	CJCSI 6215.01C	Met	
			Facsimile	Analog: ITU-T T.4 (R)	DISR	Met	
				Modem (VBD) (R)	CJCSI 6215.01C	Met	
			Data	56 kbps switched data (R: PRI only)	UCR Section 3.10	Met	
				NX56 synchronous BER (R: PRI only)	UCR Section 3.10	Met	
				Secure data (STE/STU-III) (R)	CJCSI 6215.01C	Met	

**Table 2-4. SUT Interoperability Requirements/Status (continued)**

DSN Trunk Interfaces							
Interface	Critical	Interface Status	UCR Requirement		Reference	Test Results	Remarks
E1 CAS (MFR1, DTMF, DP)	Yes (Europe only)	Certified	Trunking	Direct Inward Dialing (C)	UCR Section 2.3.2	Met	
				Normal Wink Start Operations (R)	UCR Section 5.3.3.1.1	Met	
				Glare Operation (R)	UCR Section 5.3.3.1.2	Met	
				Abnormal Wink Start (R)	UCR Section 5.3.3.2.1	Met	
				Glare Resolution (R)	UCR Section 5.3.3.2.2	Met	
				Call for Service Timing (R)	UCR Section 5.3.5	Met	
				Guard Timing (R)	UCR Section 5.3.6	Met	
				Satellite Timing (R)	UCR Section 5.3.7	Met	
				Disconnect Control (R)	UCR Section 5.3.8	Met	
				Reselect and Retrial (R)	UCR Section 5.3.9	Met	
				Off-Hook Supervision Transition (R)	UCR Section 5.3.10	Met	
				Dial-Pulse Signals (R)	UCR Section 5.4.1	Met	
				DTMF Signaling (R)	UCR Section 5.4.2	Met	
				Standard Digit Format for Precedence (C)	UCR Section 5.4.2.1	Met	
				MFR1 2/6 Signaling (R)	UCR Section 5.4.3	Met	
				Alerting Signals and Tones (R)	UCR Section 5.5	Met	
				PCM-30 Digital Trunk Interface (R)	UCR Section 7.2	Met	
				Interoperation of PCM-24 and PCM-30 (R)	UCR Section 7.3	Met	
				Integrated Digital Loop Carrier (C)	UCR Section 7.5	Not Tested	See note 1.
				Local Office Test Line (C)	UCR Section 2.5.1	Not Tested	See note 1.
			Outside Plant Test Lines (C)	UCR Section 2.5.2	Not Tested	See note 1.	
			Test Incoming Trunks Tandem or Local State (C)	UCR Section 2.5.3	Not Tested	See note 1.	
			Manual Test of Trunks (R)	UCR Section 2.5.4.2	Met		
			Trunk Group-Remove from Service (R)	UCR Section 2.5.5	Met		
			Trunk Group-Restore to Service (R)	UCR Section 2.5.6	Met		
			Carrier Group Alarm (R)	UCR Section 2.5.7	Met		
Software Carrier Group Alarm (C)	UCR Section 2.5.7.1	Not Tested	See note 1.				
Voice			MOS (R)	CJCSI 6215.01C	Met		
			Secure calls (R)	CJCSI 6215.01C	Met		

**Table 2-4. SUT Interoperability Requirements/Status (continued)**

DSN Trunk Interfaces							
Interface	Critical	Interface Status	UCR Requirement		Reference	Test Results	Remarks
E1 CAS (MFR1, DTMF, DP) (continued)	Yes (Europe only)	Certified	Facsimile	Analog: ITU-T T.4 (R)	DISR	Met	
			Data	Modem (VBD) (R)	CJCSI 6215.01C	Met	
				56 kbps switched data (R: PRI only)	UCR Section 3.10	Met	
				64 kbps switched data (R: PRI only)	UCR Section 3.10	Met	
				NX56 synchronous BER (R: PRI only)	UCR Section 3.10	Met	
				NX64 synchronous BER (R: PRI only)	UCR Section 3.10	Met	
				Secure data (STE/STU-III) (R)	CJCSI 6215.01C	Met	

**Table 2-4. SUT Interoperability Requirements/Status (continued)**

DSN Trunk Interfaces							
Interface	Critical	Interface Status	UCR Requirement		Reference	Test Results	Remarks
T1 ISDN PRI NI 1/2 (ANSI T1.619a)	No	Certified	Trunking	Direct Inward Dialing (C)	UCR Section 2.3.2	Met	
				National ISDN 1/2 Primary Access (R)	UCR Section 2.3.4.1	Met	
				ISDN ANSI MLPP Service Capability (R)	UCR Section 2.3.4.1.1	Met	
				Alerting Signals and Tones (R)	UCR Section 5.5	Met	
				DSN ISDN User-to-Network Signaling (R)	UCR Section 5.7.1	Met	
				Application (R)	UCR Section 5.7.1.1	Met	
				Physical Layer (R)	UCR Section 5.7.1.2	Met	
				Data Link Layer (R)	UCR Section 5.7.1.3	Met	
				Data Link Connection (R)	UCR Section 5.7.1.3.1	Met	
				Peer-to-Peer Procedures of Data-Link Layer (R)	UCR Section 5.7.1.3.2	Met	
				Layer 3 DSN User-to-Network Signaling (R)	UCR Section 5.7.1.4	Met	
				DSN User-to-Network Signaling for Circuit-Switched Bearer Services (R)	UCR Section 5.7.1.4.2	Met	
				Sequence of Messages for DSN Circuit-Switched Calls (R)	UCR Section 5.7.1.4.3	Met	
				Message Functional Definition and Content (R)	UCR Section 5.7.1.4.4	Met	
				General Message Format and Information Elements Coding (R)	UCR Section 5.7.1.4.5	Met	
				Supplementary Services (C)	UCR Section 5.7.1.4.6	Not Tested	See note 1.
				PCM-24 Digital Trunk Interface (R)	UCR Section 7.1	Met	
				Interface Characteristics (R)	UCR Section 7.1.1	Met	
				Clear Channel Capability (R)	UCR Section 7.1.3	Met	
				Alarm and Restoral Requirements (R)	UCR Section 7.1.4	Met	
				Interoperation of PCM-24 and PCM-30 (R)	UCR Section 7.3	Met	
				Integrated Digital Loop Carrier (C)	UCR Section 7.5	Not Tested	See note 1.
				Local Office Test Line (C)	UCR Section 2.5.1	Not Tested	See note 1.
				Outside Plant Test Lines (C)	UCR Section 2.5.2	Not Tested	See note 1.
				Test Incoming Trunks Tandem or Local State (C)	UCR Section 2.5.3	Not Tested	See note 1.
				Manual Test of Trunks (R)	UCR Section 2.5.4.2	Met	
Trunk Group-Remove from Service (R)	UCR Section 2.5.5	Met					
Trunk Group-Restore to Service (R)	UCR Section 2.5.6	Met					
Carrier Group Alarm (R)	UCR Section 2.5.7	Met					
Software Carrier Group Alarm (C)	UCR Section 2.5.7.1	Not Tested	See note 1.				

**Table 2-4. SUT Interoperability Requirements/Status (continued)**

DSN Trunk Interfaces							
Interface	Critical	Interface Status	UCR Requirement		Reference	Test Results	Remarks
T1 ISDN PRI NI 1/2 (ANSI T1.619a) (continued)	No	Certified	Voice	MOS (R)	CJCSI 6215.01C	Met	
				Secure calls (R)	CJCSI 6215.01C	Met	
			Facsimile	Analog: ITU-T T.4 (R)	DISR	Met	
			Data	Modem (VBD) (R)	CJCSI 6215.01C	Met	
				56 kbps switched data (R: PRI only)	UCR Section 3.10	Met	
				64 kbps switched data (R: PRI only)	UCR Section 3.10	Met	
				NX56 synchronous BER (R: PRI only)	UCR Section 3.10	Met	
				NX64 synchronous BER (R: PRI only)	UCR Section 3.10	Met	
				Secure data (STE/STU-III) (R)	CJCSI 6215.01C	Met	
			VTC	ITU-T H.320 (R: PRI only)	FTR 1080B-2002	Met	

**Table 2-4. SUT Interoperability Requirements/Status (continued)**

DSN Trunk Interfaces							
Interface	Critical	Interface Status	UCR Requirement		Reference	Test Results	Remarks
T1 SS7 (ANSI T1.619a)	No	Certified	Trunking	Common Channel Signaling Number 7 (C)	UCR Section 5.6	Met	
				PCM-24 Digital Trunk Interface (R)	UCR Section 7.1	Met	
				Interface Characteristics (R)	UCR Section 7.1.1	Met	
				Clear Channel Capability (R)	UCR Section 7.1.3	Met	
				Alarm and Restoral Requirements (R)	UCR Section 7.1.4	Met	
				Interoperation of PCM-24 and PCM-30 (C)	UCR Section 7.3	Met	
				Integrated Digital Loop Carrier (C)	UCR Section 7.5	Not Tested	See note 1.
				Local Office Test Line (C)	UCR Section 2.5.1	Not Tested	See note 1.
				Outside Plant Test Lines (C)	UCR Section 2.5.2	Not Tested	See note 1.
				Test Incoming Trunks Tandem or Local State (C)	UCR Section 2.5.3	Not Tested	See note 1.
				Manual Test of Trunks (R)	UCR Section 2.5.4.2	Met	
				Trunk Group-Remove from Service (R)	UCR Section 2.5.5	Met	
				Trunk Group-Restore to Service (R)	UCR Section 2.5.6	Met	
			Carrier Group Alarm (R)	UCR Section 2.5.7	Met		
			Software Carrier Group Alarm (C)	UCR Section 2.5.7.1	Met		
			Voice	MOS (R)	CJCSI 6215.01C	Met	
				Secure calls (R)	CJCSI 6215.01C	Met	
			Facsimile	Analog: ITU-T T.4 (R)	DISR	Met	
				Modem (VBD) (R)	CJCSI 6215.01C	Met	
			Data	56 kbps switched data (R: PRI only)	UCR Section 3.10	Met	
				64 kbps switched data (R: PRI only)	UCR Section 3.10	Met	
				NX56 synchronous BER (R: PRI only)	UCR Section 3.10	Met	
				NX64 synchronous BER (R: PRI only)	UCR Section 3.10	Met	
Secure data (STE/STU-III) (R)	CJCSI 6215.01C	Met					
VTC	ITU-T H.320 (R: PRI only)	FTR 1080B-2002	Met				

**Table 2-4. SUT Interoperability Requirements/Status (continued)**

DSN Trunk Interfaces							
Interface	Critical	Interface Status	UCR Requirement		Reference	Test Results	Remarks
E1 ISDN PRI (ITU-T Q.955.3)	No	Certified	Trunking	Direct Inward Dialing (C)	UCR Section 2.3.2	Met	
				ITU-T ISDN Primary Access (C)	UCR Section 2.3.4.2	Met	
				ITU-T ISDN Primary Access Digital Subscriber Signaling System Number 1 MLPP (C)	UCR Section 2.3.4.2.1	Met	
				DSN ISDN User-to-Network Signaling (R)	UCR Section 5.7.1	Met	
				Application (R)	UCR Section 5.7.1.1	Met	
				Physical Layer (R)	UCR Section 5.7.1.2	Met	
				Data Link Layer (R)	UCR Section 5.7.1.3	Met	
				Data Link Connection (R)	UCR Section 5.7.1.3.1	Met	
				Peer-to-Peer Procedures of Data-Link Layer (R)	UCR Section 5.7.1.3.2	Met	
				Layer 3 DSN User-to-Network Signaling (R)	UCR Section 5.7.1.4	Met	
				DSN User-to-Network Signaling for Circuit-Switched Bearer Services (R)	UCR Section 5.7.1.4.2	Met	
				Sequence of Messages for DSN Circuit-Switched Calls (R)	UCR Section 5.7.1.4.3	Met	
				Message Functional Definition and Content (R)	UCR Section 5.7.1.4.4	Met	
				General Message Format and Information Elements Coding (R)	UCR Section 5.7.1.4.5	Met	
				Supplementary Services (C)	UCR Section 5.7.1.4.6	Not Tested	See note 1.
				PCM-30 Digital Trunk Interface (R)	UCR Section 7.2	Met	
				Interoperation of PCM-24 and PCM-30 (C)	UCR Section 7.3	Met	
				Integrated Digital Loop Carrier (C)	UCR Section 7.5	Not Tested	See note 1.
				Local Office Test Line (C)	UCR Section 2.5.1	Not Tested	See note 1.
				Outside Plant Test Lines (C)	UCR Section 2.5.2	Not Tested	See note 1.
				Test Incoming Trunks Tandem or Local State (C)	UCR Section 2.5.3	Not Tested	See note 1.
Manual Test of Trunks (R)	UCR Section 2.5.4.2	Met					
Trunk Group-Remove from Service (R)	UCR Section 2.5.5	Met					
Trunk Group-Restore to Service (R)	UCR Section 2.5.6	Met					
Carrier Group Alarm (R)	UCR Section 2.5.7	Met					
Software Carrier Group Alarm (C)	UCR Section 2.5.7.1	Not Tested	See note 1.				

**Table 2-4. SUT Interoperability Requirements/Status (continued)**

DSN Trunk Interfaces							
Interface	Critical	Interface Status	UCR Requirement		Reference	Test Results	Remarks
E1 ISDN PRI (ITU-T Q.955.3) (continued)	No	Certified	Voice	MOS (R)	CJCSI 6215.01C	Met	
				Secure calls (R)	CJCSI 6215.01C	Met	
			Facsimile	Analog: ITU-T T.4 (R)	DISR	Met	
			Data	Modem (VBD) (R)	CJCSI 6215.01C	Met	
				56 kbps switched data (R: PRI only)	UCR Section 3.10	Met	
				64 kbps switched data (R: PRI only)	UCR Section 3.10	Met	
				NX56 synchronous BER (R: PRI only)	UCR Section 3.10	Met	
				NX64 synchronous BER (R: PRI only)	UCR Section 3.10	Met	
				Secure data (STE/STU-III) (R)	CJCSI 6215.01C	Met	
			VTC	ITU-T H.320 (R: PRI only)	FTR 1080B-2002	Met	

**Table 2-4. SUT Interoperability Requirements/Status (continued)**

DSN Line Interfaces							
Interface	Critical	Interface Status	UCR Requirement		Reference	Test Results	Remarks
2-Wire Analog	Yes	Certified	Access	Directory Number Identification (R)	UCR Section 2.1.1	Met	
				PBX Line (C)	UCR Section 2.3.1	Met	
				Analog Line (R)	UCR Section 2.3.5	Met	
				Basic Line Test Capabilities (C)	UCR Section 2.5.4.1.1	Met	
				Advanced Line Test Capabilities (C)	UCR Section 2.5.4.1.2	Not Tested	See note 1.
				Network Power Systems for External Interfaces (C)	UCR Section 5.1	Met	
				Loop Start Line (R: 2-Wire Analog only)	UCR Section 5.2.1	Met	
				Reverse Battery (R)	UCR Section 5.3.1	Met	
				Alerting Signals and Tones (R)	UCR Section 5.5	Met	See note 2.
			Voice	MOS (R)	CJCSI 6215.01C	Met	
				Secure calls (R)	CJCSI 6215.01C	Met	
			Facsimile	Analog: ITU-T T.4 (R)	DISR	Met	
				Data	Modem (VBD) (R)	CJCSI 6215.01C	Met
					Secure data (STE/STU-III) (R)	CJCSI 6215.01C	Met
ISDN BRI NI 1/2 (ANSI T1.619a)	No	Certified	Access	Directory Number Identification (R)	UCR Section 2.1.1	Met	
				National ISDN 1/2 Basic Access (C)	UCR Section 2.3.3	Met	
				Alerting Signals and Tones (R)	UCR Section 5.5	Partially Met	See notes 2 and 3.
				S/T Reference Point (C)	UCR Section 5.7.1.2.1	Met	
			Voice	MOS (R)	CJCSI 6215.01C	Met	
				Secure calls (R)	CJCSI 6215.01C	Met	
			Facsimile	Analog: ITU-T T.4 (R)	DISR	Met	
				Data	Modem (VBD) (R)	CJCSI 6215.01C	Met
					Secure data (STE/STU-III) (R)	CJCSI 6215.01C	Met
VTC	ITU-T H.320 (R: BRI only)	FTR 1080B-2002	Met				
2-Wire Proprietary Digital	No	Not Certified	Access	Directory Number Identification (R)	UCR Section 2.1.1	Not Tested	See note 1.
				Alerting Signals and Tones (R)	UCR Section 5.5	Not Tested	See note 1.
			Voice	MOS (R)	CJCSI 6215.01C	Not Tested	See note 1.

**Table 2-4. SUT Interoperability Requirements/Status (continued)**

DSN Features and Capabilities						
Feature/ Capability	Critical	Feature Status	UCR Requirement	Reference	Test Results	Remarks
Common Features	Yes	Certified	Individual Lines (R)	UCR Section 2.1	Met	
			Selective call rejection (C)	UCR Section 2.1.2	Met	
			Denied originating service (C)	UCR Section 2.1.3	Met	
			Code restriction and diversion (R)	UCR Section 2.1.4	Met	
			Call waiting (R)	UCR Section 2.1.5	Met	
			Three-way calling (R)	UCR Section 2.1.6	Met	
			Add-on transfer, conference calling, and call hold (C)	UCR Section 2.1.7	Met	
			Call Transfer Individual – All calls (R)	UCR Section 2.1.7.1	Met	
			Call Transfer - Internal Only (R)	UCR Section 2.1.7.2	Met	
			Call Transfer – Individual – Incoming Only/Add-On Consultation Hold – Incoming Call (R)	UCR Section 2.1.7.3	Met	
			Call Transfer – Outside (R)	UCR Section 2.1.7.4	Met	
			Call Transfer – Add-On Restricted Station (C)	UCR Section 2.1.7.5	Met	
			Call Transfer – Attendant (C)	UCR Section 2.1.7.6	Met	
			Call Hold (R)	UCR Section 2.1.7.7	Met	
			Conference Calling – Six Way Station Controlled (C)	UCR Section 2.1.7.8	Met	
			Call Forwarding Variable (R)	UCR Section 2.1.8.1	Partially Met	See note 4.
			Call Forward Busy Line (R)	UCR Section 2.1.8.2	Met	
			Call Forwarding – Don't Answer – All Calls (R)	UCR Section 2.1.8.3	Met	
			Selective Call Forwarding (C)	UCR Section 2.1.8.4	Not Tested	See note 1.
			Call pick-up (C)	UCR Section 2.1.9	Met	
Address Translation (C)	UCR Section 2.7	Met				
Assured Dial Tone (R)	UCR Section 2.9	Met				
Attendant	No	Certified	Attendant Features (C)	UCR Section 2.2	Met	
Public Safety	Yes	Certified	Emergency Service (911) Caller (C)	UCR Section 2.4.1.1	Met	
			Emergency Service (911) Public Safety Answering Point (C)	UCR Section 2.4.1.2	Not Tested	See note 1.
			Enhanced Emergency Service (E911) (R)	UCR Section 2.4.1.3	Not Tested	See note 1.
			Trace of terminating calls (R)	UCR Section 2.4.2	Met	
			Outgoing call trace (R)	UCR Section 2.4.3	Met	
			Tandem call trace (R)	UCR Section 2.4.4	Not Met	See note 5.
Trace of a call in progress (R)	UCR Section 2.4.5	Met				

**Table 2-4. SUT Interoperability Requirements/Status (continued)**

DSN Features and Capabilities						
Feature/ Capability	Critical	Feature Status	UCR Requirement	Reference	Test Results	Remarks
Conferencing	Yes	Certified	Preset Conferencing (R)	UCR Section A2.3.3	Met	
			Conference Notification Recorded Announcement (R)	UCR Section A2.3.3	Met	
			Automatic Retrial and Alternate Address (R)	UCR Section A2.3.3	Met	
			Bridge Release (R)	UCR Section A2.3.3	Met	
			Lost Connection to Conferee or Originator (R)	UCR Section A2.3.3	Met	
			Secondary Conferencing (R)	UCR Section A2.3.3	Met	
			Meet-Me Conferencing (R)	UCR Section 2.6.2	Met	
			Progressive Conferencing (C)	UCR Section 2.6.3	Met	
Nailed-up	No	Not Tested	Nailed-Up Connections (C)	UCR Section 2.8	Not Tested	See note 1.
DSN Hotline Services	Yes	Certified	DSN Analog Hotline Service (R)	UCR Section 2.12	Partially Met	See note 6.
			DSN ISDN Hotline Service (R)	UCR Section 2.12	Met	
			Classmarking (R)	UCR Section 2.12	Met	
			Protected Hotline calling (R)	UCR Section 2.12.1	Not Met	See note 7.
			Hotline Service Protection (R)	UCR Section 2.12.2	Met	
			Non-Pair Protected Hotline Calling (R)	UCR Section 2.12.3	Met	
			Pair Protected Hotline Calling (R)	UCR Section 2.12.4	Met	
MLPP	Yes	Certified	MLPP Overview (R)	UCR Section 3.1	Met	See note 8.
			Preemption in the Network (R)	UCR Section 3.2	Met	
			Network Facility with Lower Precedence Calls (R)	UCR Section 3.2.1	Met	
			Cancel to / Cancel from (C)	UCR Section 3.2.1.1	Not Tested	See note 1.
			Network Facility with Equal or Higher Precedence Calls (R)	UCR Section 3.2.2	Met	
			MLPP Trunk Selection (R)	UCR Section 3.2.3	Met	
			Hunt Sequence for Trunks (R)	UCR Section 3.2.3.1	Met	
			ROUTINE Precedence Calls (R)	UCR Section 3.2.3.1.1	Met	
			Precedence Calls Above ROUTINE Precedence (R)	UCR Section 3.2.3.1.2	Met	
			Method 1 (R)	UCR Section 3.2.3.1.2.1	Met	
			Method 2 (C)	UCR Section 3.2.3.1.2.2	Met	
			MLPP Interworking with Other Networks (R)	UCR Section 3.2.4	Met	
			Precedence Call Diversion (R)	UCR Section 3.3	Met	
			Channel Associated Signaling (R)	UCR Section 3.4.1	Met	
			Primary Rate Interface (R)	UCR Section 3.4.2	Met	
Analog Line MLPP (R)	UCR Section 3.5	Met				

**Table 2-4. SUT Interoperability Requirements/Status (continued)**

DSN Features and Capabilities						
Feature/ Capability	Critical	Feature Status	UCR Requirement	Reference	Test Results	Remarks
MLPP (continued)	Yes	Certified	ISDN MLPP Basic Rate Interface (R)	UCR Section 3.6.1	Met	
			Single B Channel, Single Appearance, Single DN (C)	UCR Section 3.6.2	Met	
			Line Active with a Lower Precedence Call (C)	UCR Section 3.6.2.1	Met	
			Line Active with a Equal or Higher Precedence Call (C)	UCR Section 3.6.2.2	Met	
			Single B Channel, Multiple Appearances, Single DN (C)	UCR Section 3.6.3	Met	
			Two B Channels, Multiple Appearances, Single DN (C)	UCR Section 3.6.4	Not Tested	See note 1.
			Two B Channel, Two DN (Data Mode Only) (C)	UCR Section 3.6.5	Met	
			ISDN Primary Rate Interface (R)	UCR Section 3.7	Met	
			Precedence Call Waiting (C)	UCR Section 3.8.1	Met	
			Call Forwarding (C)	UCR Section 3.8.2	Met	
			Call Transfer (C)	UCR Section 3.8.3	Met	
			Call Hold (C)	UCR Section 3.8.4	Met	
			Three-Way Calling (C)	UCR Section 3.8.5	Met	
			Call Pickup (C)	UCR Section 3.8.6	Met	
			Conferencing (C)	UCR Section 3.8.7	Met	
			Multiline Hunt Group (C)	UCR Section 3.8.8	Met	
			Community of Interest (C)	UCR Section 3.8.9	Not Tested	See note 1.
			MLPP Common Channel Signaling Number 7 (C)	UCR Section 3.9	Met	
			CAS to CCS Trunk Network in a Mixed Media Network (C)	UCR Section 3.10	Met	
MLPP Interaction with EKTS features (C)	UCR Section 3.11	Not Tested	See note 1.			
Network Management Manual Controls (C)	UCR Section 3.13	Not Tested	See note 1.			
Data Collection (R)	UCR Section 3.14	Met				

**Table 2-4. SUT Interoperability Requirements/Status (continued)**

DSN Features and Capabilities						
Feature/ Capability	Critical	Feature Status	UCR Requirement	Reference	Test Results	Remarks
Call Processing	Yes	Certified	Call Treatments (R)	UCR Section 4.1	Met	See note 9.
			Primary and Alternate Routing (R)	UCR Section 4.2	Met	
			E&M Lead Signaling States (C)	UCR Section 4.3.1	Met	
			4-Wire Analog User Access Lines (C)	UCR Section 4.3.2	Met	
			2-Wire User Access Lines (R)	UCR Section 4.3.3	Met	
			Termination of Analog Lines (R)	UCR Section 4.3.4	Met	
			DSN Interswitch Trunk Call Processing (non-CCS/ISDN) (R)	UCR Section 4.4	Met	
			DSN User Dialing (R)	UCR Section 4.5.1.1	Met	
			Interswitch and Intraswitch Dialing (R)	UCR Section 4.5.1.2	Met	
			Seven-Digit Dialing (R)	UCR Section 4.5.1.2.1	Met	
			Ten-Digit Dialing (R)	UCR Section 4.5.1.2.2	Met	
			Access Code (R)	UCR Section 4.5.1.3	Met	
			Access Digit (R)	UCR Section 4.5.1.3.1	Met	
			Precedence Digit (R)	UCR Section 4.5.1.3.2	Met	
			Service Digit (R)	UCR Section 4.5.1.3.3	Met	
			Route Code (R)	UCR Section 4.5.1.4	Met	
			Area Code (R)	UCR Section 4.5.1.5	Met	
			Switch Code (R)	UCR Section 4.5.1.6	Met	
			Line Number (R)	UCR Section 4.5.1.7	Met	
			Calling Name Delivery (C)	UCR Section 4.5.1.8.1	Not Tested	See note 1.
			Calling Number Delivery (R)	UCR Section 4.5.1.8.2	Met	See note 10.
			Emergency Service 911 Conflict Resolution (C)	UCR Section 4.5.1.9	Met	
			DSN Switch Outpulsing Digit Formats (R)	UCR Section 4.5.2	Met	
			Standard Directory Number (R)	UCR Section 4.5.3	Met	
			Standard Test Numbers (C)	UCR Section 4.5.4	Not Tested	See note 1.
			Base Services – Abbreviated Numbers (R)	UCR Section 4.5.5	Met	
			Digit Reception Requirements (R)	UCR Section 4.5.6	Met	
Digit Registration Capacity (R)	UCR Section 4.5.7	Met				
Screening (R)	UCR Section 4.5.8					
Additional Dialing format for Coalition Forces (R)	UCR App. 2, para. A2.3.4	Met				

**Table 2-4. SUT Interoperability Requirements/Status (continued)**

DSN Features and Capabilities						
Feature/ Capability	Critical	Feature Status	UCR Requirement	Reference	Test Results	Remarks
Network Management	Yes	Certified	Interfaces (R)	UCR Section 9.1	Met	See note 11.
			Data Quality (R)	UCR Section 9.2.1	Met	
			Traffic Measurements (R)	UCR Section 9.2.2.1.1	Met	
			Reference Data (C)	UCR Section 9.2.2.1.2	Not Tested	See note 1.
			Line Servicing (C)	UCR Section 9.2.2.2	Not Tested	See note 1.
			Trunk Groups (C)	UCR Section 9.2.2.3	Not Tested	See note 1.
			Call Processors (C)	UCR Section 9.2.2.4	Not Tested	See note 1.
			Switch Services (C)	UCR Section 9.2.2.5	Not Tested	See note 1.
			Special Studies (C)	UCR Section 9.2.2.6	Not Tested	See note 1.
			Remote Switching Studies (C)	UCR Section 9.2.2.7	Not Tested	See note 1.
			Features (C)	UCR Section 9.2.2.8	Not Tested	See note 1.
			Common Channel Signaling Network Measurements (C)	UCR Section 9.2.3	Not Tested	See note 1.
			ISDN Measurements (C)	UCR Section 9.2.4	Not Tested	See note 1.
			Traffic Capacity (R)	UCR Section 9.2.5	Met	
			Fault Management (R)	UCR Section 9.3	Met	
			Configuration Management (R)	UCR Section 9.4	Met	
Call Detail Recording Data Retention (C)	UCR Section 9.5.2	Not Tested	See note 1.			
Network Management controls (C)	UCR Section 9.7	Not Tested	See note 1.			
Remote access (R)	UCR Section 9.8	Met				
ISDN Services	Yes	Certified	ISDN BRI signaling (C)	UCR App. 2, para. A2.3.4	Met	
			BRI Access, Call Control and Signaling (C)	UCR Section 10, table 10-1	Met	
			Uniform Interface Configuration for BRIs (C)	UCR Section 10, table 10-2	Met	
			Electronic Key Telephone Systems (EKTS) (C)	UCR Section 10, table 10-3	Not Tested	See note 1.
			PRI Access, Call Control and Signaling (R)	UCR Section 10, table 10-4	Met	
			PRI Features (C)	UCR Section 10, table 10-5	Met	
Packet Data Features and Capabilities (C)	UCR Section 10, table 10-6	Not Tested	See note 1.			
Synchroniz- ation	Yes	Certified	External Timing Mode (C)	UCR Section 11.1.1.1	Not Tested	See note 1.
			Line timing mode (R)	UCR Section 11.1.1.2	Met	
			General (C)	UCR Section 11.1.2.1	Not Tested	See note 1.
			Internal Stratum 4 (R)	UCR Section 11.1.2.2	Met	
			Synchronization Performance Monitoring Criteria (C)	UCR Section 11.2	Not Tested	See note 1.
			DS1 Traffic Interfaces (C)	UCR Section 11.3	Met	
			DS0 Traffic Interconnects (C)	UCR Section 11.4	Not Tested	See note 1.

**Table 2-4. SUT Interoperability Requirements/Status (continued)**

DSN Features and Capabilities								
Feature/ Capability	Critical	Feature Status	UCR Requirement		Reference	Test Results	Remarks	
Reliability	Yes	Certified	Reliability Requirements (R)		UCR Section 12.1	Met		
			Backup Power (R)		UCR Section 12.3	Not Tested	See note 12.	
			Power Components (R)		UCR Section 12.3.1	Not Tested	See note 12.	
			UPS Requirements (R)		UCR Section 12.3.2	Not Tested	See note 12.	
			UPS Load Capacity (R)		UCR Section 12.3.2.1	Not Tested	See note 12.	
			Backup Power (Environmental) (R)		UCR Section 12.3.3	Not Tested	See note 12.	
			Alarms (R)		UCR Section 12.3.4	Not Tested	See note 12.	
Security	Yes	Certified	GR-815, STIGs, and DoDI 8510.bb (DIACAP) (R)		UCR Section 13	See note 13.	See note 13.	
VoIP								
Feature/ Capability	Critical	Feature Status	UCR Requirement		Reference	Test Results	Remarks	
VoIP System	No	Certified	Voice Quality with MOS of 4.0 or better (R)		UCR App. 3, para. A3.2.1	Met		
			ITU-T G.711 PCM CODEC (R)		UCR App. 3, para. A3.2.2	Met		
			MLPP (R)		UCR App. 3, para. A3.2.3	Met		
			Security (R)		UCR App. 3, para. A3.2.4	Met		
			Network management (C)		UCR App. 3, para. A3.2.5	Met		
			System timing (R)		UCR App. 3, para. A3.2.6	Met		
			Latency ≤ 60 milliseconds (R)		UCR App. 3, para. A3.2.7	Met		
			IPv6 capable (R)		UCR App. 3, para. A3.2.8	Not Tested	See note 14.	
			Service Class Tagging (R)		UCR App. 3, para. A3.2.9	Met		
VoIP System Downtime (IP network 35 min/yr Subscriber 12 min/yr) (C)		UCR App. 3, para. A3.2.10	Met					
Network Gateways								
Gateway	Critical	Status	UCR Requirement		Reference	Test Results	Remarks	
PSTN (See note 15.)	No	Certified	Trunking	Positive Identification Control (C)		CJCSI 6215.01C	Met	
				On-Netting (C)		CJCSI 6215.01C	Met	
				Off-Netting (C)		CJCSI 6215.01C	Met	
				Ground Start Line (R)		UCR Section 5.2.2	Met	
				Immediate Start (C)		UCR Section 5.3.2	Met	
				Delay Dial (C)		UCR Section 5.3.4	Met	
Tactical (See note 16.)	No	Certified	Trunking	Trunk Groups (C)		UCR Section 2.5.5 & 2.5.6	Met	
				Call Processing (C)		UCR Section 4	Met	
			Voice	MLPP (C)		UCR Section 3	Met	
				Secure calls (C)		CJCSI 6215.01C	Met	
			Facsimile	Analog: ITU-T T.4 (C)		DISR	Met	

**Table 2-4. SUT Interoperability Requirements/Status (continued)**

**NOTES:**

- 1 This feature is not supported by the SUT. This is not a required feature for a DVX. There is no risk associated with the SUT not supporting this feature.
- 2 The conference disconnect tone that is provided by the SUT does not meet the specifications designated in UCR, section 5.5.2. The SUT conference disconnect tone is distinguishable from other DSN tones and cadences; therefore, this anomaly has a minor operational impact.
- 3 The precedence above ROUTINE ringing cadence that the SUT applies to BRI phones does not meet the specifications as detailed in the UCR, section 5.5.1. The precedence above ROUTINE cadence is distinct from the ROUTINE cadence when it is configured properly; therefore this anomaly has no operational impact.
- 4 When CFV is assigned to any station on the SUT (except BRI, which does not support CFV) and CFV is invoked by the user, all precedence calls placed to that instrument are forwarded to the DSN or PSTN. Additionally, any station with CFV invoked does not receive a "ping" ring when calls are being forwarded. The operational impact is minor.
- 5 The SUT cannot perform a tandem call trace of a specified distant office directory number as specified in the UCR. This anomaly was adjudicated by DISA, and determined to have a minor operational impact.
- 6 The SUT will not allow the protection of a hotline call originator through the use of a hotline list as required by the UCR. However, this capability can be accomplished with the SUT by classmarking authorized hotline users for receiving only calls from other hotline callers. The operational impact is minor.
- 7 This requirement was modified in the UCR 2007 to add clarification regarding interswitch hotline protection. Prior to the UCR 2007 only intraswitch hotline protection was required. The SUT meets the intraswitch hotline protection requirement. The SUT does not support interswitch hotline protection in accordance with the UCR 2007, however the vendor has 18 months (till June 2009) to develop this new requirement.
- 8 The SUT does not support the Loss of Command and Control announcement. This is a new UCR requirement and the vendor has 18 months (until July 2009) to develop this capability.
- 9 The SUT does not support the full complement of CoS tables as specified in the UCR. The SUT supports 255 CoS tables for analog lines and does not support CoS tables on access lines, number codes, trunks, or groups of trunks. This limitation has posed a minor operational impact within the DSN when assigning lines and trunks on the SUT. .
- 10 This is a new UCR requirement and the vendor has 18 months (until July 2009) to develop this capability.
- 11 Met all critical CRs and FRs with both serial EIA-232 and Internet Protocol (IP) interfaces.
- 12 This requirement is a non-testable requirement. It is the responsibility of the respective base/post/camp/station communication agency to provide this with the SUT when installed.
- 13 Security is tested by DISA-led Information Assurance test teams and published in a separate report, reference (c).
- 14 An IPv6 capable system or product, as defined in the UCR, paragraph 1.7, shall be capable of receiving, processing, and forwarding IPv6 packets and/or interfacing with other systems and protocols in manner similar to that of IPv4. IPv6 capability is currently satisfied by a vendor Letter of Compliance signed by the Vice President of their respective company. The vendor stated in writing, their intent to return to JITC for testing of their solution with IPv6 enabled earliest date available. In addition they stated in writing, compliance to the following criteria:
  - a. Conformance with IPv6 standards profile contained in the Department of Defense Information Technology Standards Registry (DISR). These standards are delineated in the UCR, appendix 11.
  - b. Maintaining interoperability in heterogeneous environments and with IPv4.
  - c. Commitment to upgrade as the IPv6 standard evolves.
  - d. Availability of contractor/vendor IPv6 technical support.
- 15 Voice, facsimile, data, and VTC service requirements for PSTN are identical to DSN with the exception of MLPP.
- 16 Data and VTC services are not provided via the DSN to tactical interface.

**Table 2-4. SUT Interoperability Requirements/Status (continued)**

<b>LEGEND:</b>					
ANSI	American National Standards Institute	EIA	Electronic Industries Alliance	NI 1/2	National ISDN Standard 1 or 2
App.	Appendix	EIA-232	Standard for defining the mechanical and electrical characteristics for connecting Data Terminal Equipment (DTE) and Data Circuit-terminating Equipment (DCE) data communications devices	NX56	Data format restricted to multiples of 56 kbps
BER	Bit Error Ratio			NX64	Data format restricted to multiples of 64 kbps
BRI	Basic Rate Interface			para.	paragraph
C	Conditional			PBX	Private Branch Exchange
CAS	Channel Associated Signaling			PCM	Pulse Code Modulation
CCS	Common Channel Signaling	EKTS	Electronic Key Telephone System	PCM-24	Pulse Code Modulation - 24 Channels
CFV	Call Forwarding Variable	FTR	Federal Telecommunications Recommendation	PCM-30	Pulse Code Modulation - 30 Channels
CJCSI	Chairman of the Joint Chiefs of Staff Instruction	FTR 1080B-2002	Video Teleconferencing Services	PMO	Program Management Office
CODEC	coder/decoder	G.711	PCM of voice frequencies	PRI	Primary Rate Interface
CoS	Class of Service	GR	Generic Requirement	PSTN	Public Switched Telephone Network
DIACAP	DoD Information Assurance Certification and Accreditation Process	GR-815	Generic Requirements For Network Element/Network System (NE/NS) Security Standard for Narrowband VTC	Q.955.3	ISDN Signaling Standard for E1 MLPP
DISA	Defense Information Systems Agency	H.320	Internet Protocol	R	Required
DISR	DoD IT Standards Registry	IP	Internet Protocol version 4	S/T	ISDN BRI four-wire interface
DN	Directory Number	IPv4	Internet Protocol version 6	SS7	Signaling System 7
DoD	Department of Defense	IPv6	Integrated Services Digital Network	STE	Secure Terminal Equipment
DoDI	DoD Instruction	ISDN	Information Technology	STIGs	Security Technical Implementation Guides
DP	Dial Pulse	ITU-T	International Telecommunication Union-Telecommunication Standardization Sector	STU-III	Secure Telephone Unit -3rd generation
DS0	Digital Signal Level 0 (64 kbps)			SUT	System Under Test
DS1	Digital Signal Level 1 (1.544 Mbps) (2.048 Mbps European)	JITC	Joint Interoperability Test Command	T1	Digital Transmission Link Level 1 (1.544 Mbps)
DSN	Defense Switched Network	kbps	kilobits per second	T1.619a	SS7 and ISDN MLPP Signaling Standard for T1
DTMF	Dual Tone Multi-Frequency	Mbps	Megabits per second	T.4	Standardization of Group 3 facsimile terminals for document transmission
DVX	Deployable Voice Exchange	MFR1	Multi-Frequency Recommendation 1	UCR	Unified Capabilities Requirements
E&M	Ear and Mouth	MFS	Multifunction Switch	UPS	Uninterruptible Power Supply
E1	European Basic Multiplex Rate (2.048 Mbps)	min	minute	VBD	Variable bit data
		MLPP	Multi-Level Precedence and Preemption	VTC	Video Teleconferencing
		MOS	Mean Opinion Score	VoIP	Voice over Internet Protocol
				yr	year