



## DEFENSE INFORMATION SYSTEMS AGENCY

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

4 Jan 11

### MEMORANDUM FOR DISTRIBUTION

SUBJECT: Special Interoperability Test Certification of Siemens HiPath 4000 Version 5

References: (a) DoD Directive 4630.05, "Interoperability and Supportability of Information Technology (IT) and National Security Systems (NSS)," 5 May 2004  
(b) CJCSI 6212.01E, "Interoperability and Supportability of Information Technology and National Security Systems," 15 December 2008  
(c) through (h), 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 Siemens HiPath 4000 Version 5 is hereinafter referred to as the system under test (SUT). The SUT meets all of its critical interoperability requirements and is certified as interoperable for joint use within the Defense Information System Network (DISN) for the following switch types: Private Branch Exchange (PBX) 1 and PBX 2. The SUT meets the Voice over Internet Protocol critical interoperability requirements with any certified Assured Services Local Area Network (ASLAN) or ASLAN components on the Unified Capabilities (UC) Approved Products List (APL). The identified test discrepancies shown in the Certification Testing Summary (Enclosure 2) have an overall minor operational impact. No other configurations, features, or functions, except those cited within this report, are certified by the JITC. This certification expires upon changes that could affect interoperability, but no later than three years from the date of Defense Information Assurance (IA)/Security Accreditation Working Group (DSAWG) accreditation.
3. This finding is based on interoperability testing, DISA adjudication of open test discrepancy reports, review of the vendor's Letters of Compliance (LoC), and DSAWG accreditation. Interoperability testing of the SUT was conducted at JITC's Global Information Grid Network Test Facility at Fort Huachuca, Arizona, from 11 May through 2 July 2009. Review of vendor's LoC was completed on 9 September 2009. Regression Testing was conducted from 7 through 18 December 2009. The DISA adjudication of outstanding test discrepancy reports was completed on 21 July 2009. The DSAWG granted accreditation on 4 January 2011 based on the security testing completed by DISA-led IA test teams and published in a separate report, Reference (c). Enclosure 2 documents the test results and describes the tested network and system configurations.

4. The interoperability test summary of the SUT is indicated in Table 1. The PBX 1 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. Defense Switched Network (DSN) services for Network and Applications specified in Reference (d).

b. PBX1 interface and signaling requirements for trunks/lines specified in Reference (e) verified through JITC testing in accordance with Reference (f) and/or vendor submission of LoC.

c. PBX1 CRs/FRs specified in Reference (e) verified through JITC testing in accordance with Reference (f) and/or vendor submission of LoC.

d. Internet Protocol CRs/FRs specified in References (e) and (g) verified through JITC testing in accordance with Reference (f) and/or vendor submission of LoC.

e. Softphone CRs/FRs specified in References (e) and (h) verified through JITC testing in accordance with Reference (f) and/or vendor submission of LoC.

f. The overall system interoperability performance derived from test procedures listed in Reference (f).

**Table 1. SUT Interoperability Test Summary**

<b>DSN Trunk Interfaces</b>			
<b>Interface &amp; Signaling</b>	<b>Critical</b>	<b>Status</b>	<b>Remarks</b>
T1 CAS (DTMF, DP)	No	Certified	Met all critical CRs and FRs with the following minor exception: Wink start recognition is not within the UCR specifications. <sup>1</sup>
E1 CAS (DTMF, DP)	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 with the following exception: The SUT does not support NFAS. <sup>2</sup>
E1 ISDN PRI (ITU-T Q.955.3)	No (Europe only)	Certified	Met all critical CRs and FRs.
<b>DSN Line Interfaces</b>			
<b>Interface &amp; Signaling</b>	<b>Critical</b>	<b>Status</b>	<b>Remarks</b>
2-Wire Analog (GR-506-CORE)	Yes	Certified	Met all critical CRs and FRs with the following exception. Analog phones do not support call waiting or precedence call waiting. <sup>3</sup>
ISDN BRI NI 1/2 (ANSI T1.619a)	No	Certified	The SUT met all critical CRs and FRs for the ISDN BRI S/T interface with the following minor exceptions: The ISDN BRI S/T interface does not support Call Transfer or Three-Way-Calling. <sup>4</sup> The SUT does not support ISDN BRI U interface. ISDN BRI is not a required interface for a PBX 1. There is no risk associated with the SUT not supporting this interface.
2-Wire Proprietary Digital	No	Certified	Met all critical CRs and FRs.
VoIP (Ethernet IEEE 802.3u)	No	Certified	Met all critical CRs and FRs.
<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 exceptions: The SUT does not provide the exact conference disconnect tone in accordance with the UCR. <sup>5</sup> The SUT fails to provide a 0.5 second ring on phone provisioned with Call Forward Variable. <sup>6</sup> Analog phones do not support Call Waiting. <sup>3</sup>
Attendant	No	Not Tested	This feature is supported by the SUT; however it was not tested. The feature is therefore not certified by JITC. This is not a required feature for a PBX 1.

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

<b>DSN Features and Capabilities (continued)</b>				
<b>Features and Capabilities</b>	<b>Critical</b>	<b>Status</b>	<b>Remarks</b>	
Public Safety	Yes	Certified	The SUT met all critical CRs and FRs for Basic 911. Additionally the SUT met the following non-critical CRs and FRs: Tracing of a Terminating Call, Outgoing Call Tracing, and Trace of a Call in Progress.	
Conferencing	No	Not Tested	This feature is supported by the SUT; however it was not tested. This feature is therefore not certified by JITC. This is not a required feature for a PBX 1.	
Nailed-up Connections	No	Not Tested	This feature is not supported by the SUT. This is not a required feature for a PBX1. There is no risk associated with the SUT not supporting this feature.	
DSN Hotline Services	No	Certified	Met all critical CRs and FRs.	
MLPP	Yes	Certified	Met all critical CRs and FRs with the following minor exceptions: Analog phones do not support call waiting or precedence call waiting. <sup>3</sup> The SUT does not support Loss of C2 User announcement. <sup>7</sup>	
Call Processing	Yes	Certified	Met all critical CRs and FRs.	
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.	
Network Management	No	Certified	Met all CRs and FRs with an IEEE 802.3u interface.	
Security	Yes	Certified	See note 8.	
VoIP System	No	Certified	Met all critical CRs and FRs with the following minor exception: The SUT did not meet the IPv6 capability requirements. <sup>9</sup>	
Softphone	No	Certified	Met all critical CRs and FRs.	
<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)	No	Certified	Met all critical CRs and FRs.
	E1 CAS (DTMF, DP)	No (Europe only)	Certified	Met all critical CRs and FRs.
	T1 ISDN PRI NI 1/2 (ANSI T1.607)	No	Certified	Met all critical CRs and FRs.
	E1 ISDN 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.
<b>NOTES:</b>				
1 The SUT T1 CAS wink start recognition is not within specification in accordance with the UCR, section 5.2.4.3.5. The requirement is to recognize a wink start signal from 100 ms to 350 ms. The SUT recognizes a wink start signal from 85 ms to 365 ms. This discrepancy was previously adjudicated by DISA as having minor operational impact.				
2 The SUT does not support NFAS on their ISDN PRI NI2 interface. This was adjudicated by DISA on 17 December 2008 as having a minor operation impact. Furthermore, DISA, in coordination with the Joint Staff, stated their intent to modify the next update of the UCR to change NFAS for a PBX 1 from required to conditional.				
3 The SUT analog end instruments do not support the following required features: Call Waiting or Precedence Call Waiting. This was adjudicated by DISA on 21 July 2009 as having minor operational impact.				
4 The SUT ISDN BRI S/T interface does not support Call Transfer or Three-Way Calling. This was adjudicated by DISA on 21 July 2009 as having minor operational impact.				
5 The SUT does not provide the correct conference disconnect tone in accordance with the UCR, Table 5.2.4-5. This was adjudicated by DISA on 21 July 2009 as having minor operational impact.				
6 The SUT does not provide 'Ping' Ring when CFV is activated. This was adjudicated by DISA on 21 February 2009 as having a minor operational impact. Also, this is not a required feature for a PBX 1. There is no risk associated with the SUT not supporting this feature.				
7 The SUT does not support the Loss of C2 announcement. This announcement is invoked only when a DSN subscriber is automatically routed to a non-MLPP network. DISA adjudicated this anomaly as having a minor operational impact because this announcement would rarely be invoked on a PBX 1. Furthermore, DISA, in coordination with the Joint Staff, stated their intent to modify the next update of the UCR to change the Loss of C2 announcement from required to conditional for a PBX 1.				
8 Security is tested by DISA-led Information Assurance test teams and published in a separate report, Reference (c).				

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

<b>NOTES (continued):</b>			
9	In accordance with UCR, section 5.3.5, all systems submitted for testing must be IPv6 capable. Dual Stack solutions are preferred and tunneling solutions are unacceptable. In accordance with UCR, section 4.3.1.3, IPv6 capable-products, can create or receive, process, and send or forward (as appropriate) IPv6 packets in mixed IPv4/v6 environments. IPv6 capable products shall be able to interoperate with other IPv6 capable products on networks supporting only IPv4, only IPv6, or both IPv4 and IPv6, and shall also:		
	a. Conform to the requirements of the DoD IPv6 Standard Profiles for IPv6 Capable Products document contained in the DISR.		
	b. Possess a migration path and/or written commitment to upgrade from the developer (company Vice President or equivalent) as the IPv6 standard evolves.		
	c. Ensure product developer IPv6 technical support is available.		
	d. Conform to National Security Agency (NSA) and/or Unified Cross Domain Management Office requirements for Information Assurance products.		
The vendor stated in their LoC that the SUT will not be IPv6 compliant until the next software release and requested a waiver from OSD of this requirement until June of 2010. The OSD waived this requirement for the SUT on 12 November 2008 with the stipulation that the vendor submit this new release for testing via the Unified Capabilities Certification Office after June 2010.			
<b>LEGEND:</b>			
802.3u	Standard for carrier sense multiple access with collision detection at 100 Mbps	LoC	Letter of Compliance
ANSI	American National Standards Institute	LSSGR	Local Access and Transport Area (LATA) Switching Systems Generic Requirements
BRI	Basic Rate Interface	Mbps	Megabits per second
C2	Command and Control	MLPP	Multi-Level Precedence and Preemption
CAS	Channel Associated Signaling	ms	milliseconds
CFV	Call Forward Variable	NFAS	Non-Facility Associated Signaling
CRs	Capability Requirements	NI 1/2	National ISDN Standard 1 or 2
DISA	Defense Information Systems Agency	NI2	National ISDN Standard 2
DISR	DoD Information Technology Standards Registry	OSD	Office of the Secretary of Defense
DoD	Department of Defense	PBX 1	Private Branch Exchange 1
DP	Dial Pulse	PRI	Primary Rate Interface
DSN	Defense Switched Network	PSTN	Public Switched Telephone Network
DSS1	Digital Subscriber Signaling 1	Q.931	Signaling Standard for ISDN
DTMF	Dual Tone Multi-Frequency	Q.955.3	ISDN Signaling standard for E1 MLPP
E1	European Basic Multiplex Rate (2.048 Mbps)	S/T	ISDN BRI 4-wire interface
FRs	Feature Requirements	SS7	Signaling System 7
GR	Generic Requirement	SUT	System Under Test
GR-506-CORE	LSSGR: Signaling for Analog Interfaces	T1	Digital Transmission Link Level 1 (1.544 Mbps)
IEEE	Institute of Electrical and Electronics Engineers	T1.607	ISDN Layer 3 Signaling Specification for Circuit Switched Bearer Service for DSS1
IPv4	Internet Protocol version 4		
IPv6	Internet Protocol version 6	T1.619a	SS7 and ISDN MLPP Signaling Standard for T1
ISDN	Integrated Services Digital Network	U	ISDN BRI 2-wire interface
ITU-T	International Telecommunication Union - Telecommunication Standardization Sector	UCR	Unified Capabilities Requirements
JITC	Joint Interoperability Test Command	VoIP	Voice over Internet Protocol

**Table 2. PBX 1 Requirements**

DSN Trunk Interfaces					
Interface	Critical	Requirements Required or Conditional	References		
T1 CAS (MFR1, DTMF, DP)	No	Trunking	<ul style="list-style-type: none"> <li>• Direct Inward Dialing (C)</li> <li>• National ISDN 1/2 Primary Access (R: PRI only)</li> <li>• ISDN ANSI MLPP Service Capability (R: PRI only)</li> <li>• ITU-T ISDN Primary Access (C: E1 PRI only)</li> <li>• ITU-T ISDN Primary Access DSS1 MLPP (C: E1 PRI only)</li> <li>• Trunk Group-Remove from Service (C)</li> <li>• Trunk Group-Restore to Service (C)</li> <li>• Normal Wink Start Operations (C: CAS only)</li> <li>• Glare Operation (C: CAS only)</li> <li>• Abnormal Wink Start (C: CAS only)</li> <li>• Glare Resolution (C: CAS only)</li> <li>• Call for Service Timing (R: CAS only)</li> <li>• Guard Timing (R: CAS only)</li> <li>• Satellite Timing (C: CAS only)</li> <li>• Disconnect Control (C: CAS only)</li> <li>• Reselect and Retrial (C: CAS only)</li> <li>• Off-Hook Supervision Transition (C: CAS only)</li> <li>• Dial-Pulse Signals (C: CAS only)</li> <li>• DTMF Signaling (C: CAS only)</li> <li>• Standard Digit Format for Precedence (C: CAS only)</li> <li>• MFR1 2/6 Signaling (C: CAS only)</li> <li>• Alerting Signals and Tones (R)</li> <li>• DSN ISDN User-to-Network Signaling (R: PRI only)</li> <li>• Application (R: PRI only)</li> <li>• Physical Layer (R: PRI only)</li> <li>• Data Link Layer (R: PRI only)</li> <li>• Data Link Connection (R: PRI only)</li> <li>• Peer-to-Peer Procedures of Data-Link Layer (R: PRI only)</li> <li>• Layer 3 DSN User-to-Network Signaling (R: PRI only)</li> <li>• DSN User-to-Network Signaling for Circuit-Switched Bearer Services (R: PRI only)</li> </ul>	<ul style="list-style-type: none"> <li>• UCR Section 5.2.1.3.2</li> <li>• UCR Section 5.2.1.3.4.1</li> <li>• UCR Section 5.2.1.3.4.1.1</li> <li>• UCR Section 5.2.1.3.4.2</li> <li>• UCR Section 5.2.1.3.4.2.1</li> <li>• UCR Section 5.2.1.5.5</li> <li>• UCR Section 5.2.1.5.5</li> <li>• UCR Section 5.2.4.3.3.1.1</li> <li>• UCR Section 5.2.4.3.3.1.2</li> <li>• UCR Section 5.2.4.3.3.2.1</li> <li>• UCR Section 5.2.4.3.3.2.2</li> <li>• UCR Section 5.2.4.3.5</li> <li>• UCR Section 5.2.4.3.6</li> <li>• UCR Section 5.2.4.3.7</li> <li>• UCR Section 5.2.4.3.8</li> <li>• UCR Section 5.2.4.3.9</li> <li>• UCR Section 5.2.4.3.10</li> <li>• UCR Section 5.2.4.4.1</li> <li>• UCR Section 5.2.4.4.2</li> <li>• UCR Section 5.2.4.4.2.1</li> <li>• UCR Section 5.2.4.4.3</li> <li>• UCR Section 5.2.4.4.5.1</li> <li>• UCR Section 5.2.4.7.1</li> <li>• UCR Section 5.2.4.7.1.1</li> <li>• UCR Section 5.2.4.7.1.2</li> <li>• UCR Section 5.2.4.7.1.3</li> <li>• UCR Section 5.2.4.7.1.3.1</li> <li>• UCR Section 5.2.4.7.1.3.2</li> <li>• UCR Section 5.2.4.7.1.4</li> <li>• UCR Section 5.2.4.7.1.4.2</li> </ul>	
E1 CAS (MFR1, DTMF, DP)	No (Europe only)			<ul style="list-style-type: none"> <li>• Sequence of Messages for DSN Circuit Switched Calls (R: PRI only)</li> <li>• Message Functional Definition and Content (R: PRI only)</li> <li>• General Message Format and Information Elements Coding (R: PRI only)</li> <li>• Supplementary Services (C: PRI only)</li> <li>• DSN Transmission Interface (R)</li> <li>• PCM-24 Digital Trunk Interface (R)</li> <li>• Interface Characteristics (R)</li> <li>• Supervisory Channel Associated Signaling (C: CAS only)</li> <li>• Clear Channel Capability (R)</li> <li>• Alarm and Restoral Requirements (R)</li> <li>• PCM-30 Digital Trunk Interface (Europe only) (C)</li> <li>• Supervisory Channel Associated Signaling (C: E1 only)</li> <li>• Alarm and Restoral Requirements (C: E1 only)</li> <li>• Interoperation of PCM-24 and PCM-30 (C)</li> <li>• Analog Trunk Interface (C)</li> </ul>	<ul style="list-style-type: none"> <li>• UCR Section 5.2.4.7.1.4.3</li> <li>• UCR Section 5.2.4.7.1.4.4</li> <li>• UCR Section 5.2.4.7.1.4.5</li> <li>• UCR Section 5.2.4.7.1.4.6</li> <li>• UCR Section 5.2.5</li> <li>• UCR Section 5.2.6.1</li> <li>• UCR Section 5.2.6.1.1</li> <li>• UCR Section 5.2.6.1.2</li> <li>• UCR Section 5.2.6.1.3</li> <li>• UCR Section 5.2.6.1.4</li> <li>• UCR Section 5.2.6.2</li> <li>• UCR Section 5.2.6.2.1</li> <li>• UCR Section 5.2.6.2.2</li> <li>• UCR Section 5.2.6.3</li> <li>• UCR Section 5.2.6.4</li> </ul>
T1 ISDN PRI NI 1/2 (ANSI T1.619a)	Yes				
E1 ISDN PRI (ITU-T Q.955.3)	No (Europe only)				

**Table 2. PBX 1 Requirements (continued)**

<b>DSN Trunk Interfaces (continued)</b>				
<b>Interface</b>	<b>Critical</b>	<b>Requirements Required or Conditional</b>		<b>References</b>
T1 CAS (MFR1, DTMF, DP)	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 CAS (MFR1, DTMF, DP)	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 ISDN PRI NI 1/2 (ANSI T1.619a)	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 5.2.2.9.6</li> <li>• UCR Section 5.2.2.9.6</li> <li>• UCR Section 5.2.2.9.6</li> <li>• UCR Section 5.2.2.9.6</li> <li>• CJCSI 6215.01C</li> </ul>
E1 ISDN PRI (ITU-T Q.955.3)	No (Europe only)	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>
<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 (R)</li> <li>• Advanced Line Test Capabilities (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> <li>• VoIP System Requirements (R: VoIP Phones only)</li> </ul>	<ul style="list-style-type: none"> <li>• UCR Section 5.2.1.1.1</li> <li>• UCR Section 5.2.1.3.1</li> <li>• UCR Section 5.2.1.3.3</li> <li>• UCR Section 5.2.1.3.5</li> <li>• UCR Section 5.2.1.5.4.1.1</li> <li>• UCR Section 5.2.1.5.4.1.1</li> <li>• UCR Section 5.2.4.2.1</li> <li>• UCR Section 5.2.4.3.1</li> <li>• UCR Section 5.2.4.5.1</li> <li>• UCR Section 5.2.4.7.1.2.1</li> <li>• UCR Section 5.2.12.8</li> </ul>
ISDN BRI NI 1/2 (ANSI T1.619a)	No			
2-Wire Proprietary Digital	No			
VoIP (Ethernet IEEE 802.3u)	No		Voice	<ul style="list-style-type: none"> <li>• MOS (R)</li> <li>• Secure Calls (R)</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: 2-Wire Analog only)</li> <li>• Secure data (STE/STU-III) (R: 2-Wire Analog only)</li> </ul>	<ul style="list-style-type: none"> <li>• CJCSI 6215.01C</li> <li>• CJCSI 6215.01C</li> </ul>
		VTC	<ul style="list-style-type: none"> <li>• ITU-T H.320 (C: BRI only)</li> </ul>	<ul style="list-style-type: none"> <li>• FTR 1080B-2002</li> </ul>
<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>• Denied originating service (C)</li> <li>• Code restriction and diversion (C)</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 to Fully 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 5.2.1.1.1</li> <li>• UCR Section 5.2.1.1.3</li> <li>• UCR Section 5.2.1.1.4</li> <li>• UCR Section 5.2.1.1.5.1</li> <li>• UCR Section 5.2.1.1.6</li> <li>• UCR Section 5.2.1.1.7</li> <li>• UCR Section 5.2.1.1.7.1</li> <li>• UCR Section 5.2.1.1.7.2</li> <li>• UCR Section 5.2.1.1.7.3</li> <li>• UCR Section 5.2.1.1.7.4</li> <li>• UCR Section 5.2.1.1.7.5</li> <li>• UCR Section 5.2.1.1.7.6</li> <li>• UCR Section 5.2.1.1.7.7</li> <li>• UCR Section 5.2.1.1.7.8</li> <li>• UCR Section 5.2.1.1.8.1</li> <li>• UCR Section 5.2.1.1.8.2</li> <li>• UCR Section 5.2.1.1.8.3</li> <li>• UCR Section 5.2.1.1.8.4</li> <li>• UCR Section 5.2.1.1.9.1</li> <li>• UCR Section 5.2.1.7</li> <li>• UCR Section 5.2.1.9</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 5.2.1.2.2</li> </ul>

**Table 2. PBX 1 Requirements (continued)**

<b>DSN Features &amp; Capabilities</b>			
<b>Feature/ Capability</b>	<b>Critical</b>	<b>Requirements Required or Conditional</b>	<b>References</b>
Public Safety	Yes	<ul style="list-style-type: none"> <li>• Emergency Service (911) Caller (R)</li> <li>• Emergency Service (911) Public Safety Answering Service (C)</li> <li>• Enhanced Emergency Service (E911) (C)</li> <li>• Trace of terminating calls (C)</li> <li>• Outgoing call trace (C)</li> </ul>	<ul style="list-style-type: none"> <li>• UCR Section 5.2.1.4.1.1</li> <li>• UCR Section 5.2.1.4.1.2</li> <li>• UCR Section 5.2.1.4.1.3</li> <li>• UCR Section 5.2.1.4.2</li> <li>• UCR Section 5.2.1.4.3</li> </ul>
Conferencing	No	<ul style="list-style-type: none"> <li>• Preset Conferencing (C)</li> <li>• Meet-Me Conferencing (C)</li> <li>• Progressive Conferencing (C)</li> </ul>	<ul style="list-style-type: none"> <li>• UCR Section 5.2.1.6.1</li> <li>• UCR Section 5.2.1.6.2</li> <li>• UCR Section 5.2.1.6.3</li> </ul>
Nailed-up Connections	No	<ul style="list-style-type: none"> <li>• Nailed-Up Connections (C)</li> </ul>	<ul style="list-style-type: none"> <li>• UCR Section 5.2.1.8</li> </ul>
DSN Hotline Services	No	<ul style="list-style-type: none"> <li>• DSN Analog Hotline Service (C)</li> </ul>	<ul style="list-style-type: none"> <li>• UCR Section 5.2.1.12</li> </ul>
MLPP	Yes	<ul style="list-style-type: none"> <li>• MLPP Overview (R)</li> <li>• Preemption in the Network (R)</li> <li>• Network Facility with Lower Precedence Calls (R)</li> <li>• Network Facility with Equal or Higher Precedence Calls (R)</li> <li>• Precedence Call Diversion (R)</li> <li>• Channel Associated Signaling (C)</li> <li>• Primary Rate Interface (R)</li> <li>• Analog Line MLPP (R)</li> <li>• ISDN MLPP Basic Rate Interface (C)</li> <li>• ISDN Primary Rate Interface (R)</li> <li>• Precedence Call Waiting (R)</li> <li>• Call Forwarding (R)</li> <li>• Call Transfer (R)</li> <li>• Call Hold (R)</li> <li>• Three-Way Calling (R)</li> <li>• Call Pickup (C)</li> <li>• Conferencing (C)</li> <li>• Multiline Hunt Group (C)</li> <li>• Community of Interest (C)</li> <li>• MLPP Interaction with EKTS features (C)</li> </ul>	<ul style="list-style-type: none"> <li>• UCR Section 5.2.2.1.1</li> <li>• UCR Section 5.2.2.2</li> <li>• UCR Section 5.2.2.2.1</li> <li>• UCR Section 5.2.2.2.2</li> <li>• UCR Section 5.2.2.3</li> <li>• UCR Section 5.2.2.4.1</li> <li>• UCR Section 5.2.2.4.2</li> <li>• UCR Section 5.2.2.5</li> <li>• UCR Section 5.2.2.6</li> <li>• UCR Section 5.2.2.7</li> <li>• UCR Section 5.2.2.8.1</li> <li>• UCR Section 5.2.2.8.2</li> <li>• UCR Section 5.2.2.8.3</li> <li>• UCR Section 5.2.2.8.4</li> <li>• UCR Section 5.2.2.8.5</li> <li>• UCR Section 5.2.2.8.6</li> <li>• UCR Section 5.2.2.8.7.1</li> <li>• UCR Section 5.2.2.8.8</li> <li>• UCR Section 5.2.2.8.9</li> <li>• UCR Section 5.2.2.10.1</li> </ul>

**Table 2. PBX 1 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>
Call Processing	Yes	<ul style="list-style-type: none"> <li>• Call Treatments (R)</li> <li>• Primary and Alternate Routing (C)</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 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 (R)</li> <li>• DSN Switch Outputting Digit Formats (C)</li> <li>• Standard Directory Number (R)</li> <li>• Standard Test Numbers (C)</li> <li>• Base Services – Abbreviated Numbers (C)</li> <li>• Digit Reception Requirements (R)</li> <li>• Screening (C)</li> </ul>	<ul style="list-style-type: none"> <li>• UCR Section 5.2.3.1</li> <li>• UCR Section 5.2.3.2</li> <li>• UCR Section 5.2.3.3.1</li> <li>• UCR Section 5.2.3.3.2</li> <li>• UCR Section 5.2.3.3.3</li> <li>• UCR Section 5.2.3.3.4</li> <li>• UCR Section 5.2.3.5.1.1</li> <li>• UCR Section 5.2.3.5.1.1.1</li> <li>• UCR Section 5.3.3.5.2.1</li> <li>• UCR Section 5.2.3.5.2.2</li> <li>• UCR Section 5.2.3.5.1.3</li> <li>• UCR Section 5.2.3.5.1.3.1</li> <li>• UCR Section 5.2.3.5.1.3.2</li> <li>• UCR Section 5.2.3.5.1.3.3</li> <li>• UCR Section 5.2.3.5.1.4</li> <li>• UCR Section 5.2.3.5.1.5</li> <li>• UCR Section 5.2.3.5.1.6</li> <li>• UCR Section 5.2.3.5.1.7</li> <li>• UCR Section 5.2.3.5.1.8.1</li> <li>• UCR Section 5.2.3.5.1.8.2</li> <li>• UCR Section 5.2.3.5.1.9</li> <li>• UCR Section 5.2.3.5.2</li> <li>• UCR Section 5.2.3.5.3</li> <li>• UCR Section 5.2.3.5.4</li> <li>• UCR Section 5.2.3.5.5</li> <li>• UCR Section 5.2.3.5.6</li> <li>• UCR Section 5.2.3.5.8</li> </ul>
ISDN Services	Yes	<ul style="list-style-type: none"> <li>• BRI Access, Call Control and Signaling (C)</li> <li>• Uniform Interface Configuration for BRIs (C)</li> <li>• EKTS (C)</li> <li>• PRI Access, Call Control and Signaling (R)</li> <li>• PRI Features (R)</li> <li>• Packet Data Features and Capabilities (C)</li> </ul>	<ul style="list-style-type: none"> <li>• UCR Section 5.2.9.2, Table 5.2.9-1</li> <li>• UCR Section 5.2.9.2, Table 5.2.9-2</li> <li>• UCR Section 5.2.9.3, Table 5.2.9-3</li> <li>• UCR Section 5.2.9.2, Table 5.2.9-4</li> <li>• UCR Section 5.2.9.2, Table 5.2.9-5</li> <li>• UCR Section 5.2.9.2, Table 5.2.9-6</li> </ul>
Synchronization	Yes	<ul style="list-style-type: none"> <li>• Line timing mode (R)</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 5.2.10.1.1.2</li> <li>• UCR Section 5.2.10.1.1.2.2</li> <li>• UCR Section 5.2.10.2</li> <li>• UCR Section 5.2.10.3</li> <li>• UCR Section 5.2.10.4</li> </ul>
Reliability	Yes	<ul style="list-style-type: none"> <li>• System Availability (R)</li> <li>• Backup Power (R)</li> <li>• Power Components (R)</li> <li>• UPS Requirements (R)</li> <li>• UPS PBX 1 Load Capacity (R)</li> <li>• Backup Power (Environmental) (R)</li> <li>• Alarms (R)</li> </ul>	<ul style="list-style-type: none"> <li>• UCR Section 5.2.11.2</li> <li>• UCR Section 5.2.11.3</li> <li>• UCR Section 5.2.11.3.1</li> <li>• UCR Section 5.2.11.3.2</li> <li>• UCR Section 5.2.11.3.2.1</li> <li>• UCR Section 5.2.11.3.3</li> <li>• UCR Section 5.2.11.3.4</li> </ul>
Network Management	No	<ul style="list-style-type: none"> <li>• Interfaces (R)</li> <li>• Measurements and data generation (C)</li> <li>• Fault management (C)</li> <li>• Configuration management (C)</li> <li>• Accounting management (C)</li> <li>• Performance management (C)</li> <li>• Network Management controls (C)</li> <li>• Remote access (C)</li> </ul>	<ul style="list-style-type: none"> <li>• UCR section 5.2.8.1</li> <li>• UCR section 5.2.8.2</li> <li>• UCR section 5.2.8.3</li> <li>• UCR section 5.2.8.4</li> <li>• UCR section 5.2.8.5</li> <li>• UCR section 5.2.8.6</li> <li>• UCR section 5.2.8.7</li> <li>• UCR section 5.2.8.8</li> </ul>
Security	Yes	<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 Sections 3.2.3, 3.2.5, and 5.4.6.1</li> </ul>

**Table 2. PBX 1 Requirements (continued)**

<b>VoIP</b>				
<b>Feature/ Capability</b>	<b>Critical</b>	<b>Requirements Required or Conditional</b>		<b>References</b>
VoIP System	No	VoIP function is conditional. If VoIP is provided, all 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 (C)</li> <li>• System timing (R)</li> <li>• Latency ≤ 60 milliseconds (R)</li> <li>• IPv6 capable (R)</li> <li>• Service Class Tagging (R)</li> <li>• Softphone Requirements</li> </ul>		<ul style="list-style-type: none"> <li>• UCR section 5.2.12.8.2.1</li> <li>• UCR section 5.2.12.8.2.2</li> <li>• UCR section 5.2.12.8.2.3</li> <li>• UCR section 5.2.12.8.2.4</li> <li>• UCR section 5.2.12.8.2.5</li> <li>• UCR section 5.2.12.8.2.6</li> <li>• UCR section 5.2.12.8.2.7</li> <li>• UCR section 5.2.12.8.2.8</li> <li>• UCR section 5.2.12.8.2.9</li> <li>• DISA Memo Reference (h)</li> </ul>
<b>Network Gateways</b>				
<b>Gateway</b>	<b>Critical</b>	<b>Requirements Required or Conditional</b>		<b>References</b>
PSTN (See note.)	No	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> <li>• Delay Dial (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 5.2.4.2.2</li> <li>• UCR Section 5.2.4.3.2</li> <li>• UCR Section 5.2.4.3.4</li> </ul>
<b>NOTE:</b> Voice, facsimile, data, and VTC service requirements for PSTN are identical to DSN with the exception of MLPP.				

**Table 2. PBX 1 Requirements (continued)**

<b>LEGEND:</b>					
ANSI	American National Standards Institute	FTR	Federal Telecommunications Recommendation	PBX 1	Private Branch Exchange 1
BER	Bit Error Ratio	FTR 1080B-2002	Video Teleconferencing Services	PCM	Pulse Code Modulation
BRI	Basic Rate Interface			PCM-24	Pulse Code Modulation - 24 Channels
C	Conditional	G.711	PCM of voice frequencies	PCM-30	Pulse Code Modulation - 30 Channels
CAS	Channel Associated Signaling	GR	Generic Requirement	PRI	Primary Rate Interface
CJCSI	Chairman of the Joint Chiefs of Staff Instruction	GR-815	Generic Requirements For Network Element/Network System (NE/NS) Security	PSTN	Public Switched Telephone Network
CODEC	Coder/Decoder	H.320	Standard for Narrowband VTC	Q.955.3	ISDN Signaling Standard for E1 MLPP
DIACAP	DoD Information Assurance Certification and Accreditation Process	IEEE	Institute of Electrical and Electronics Engineers	R	Required
DISA	Defense Information Systems Agency	IPv6	Internet Protocol version 6	S/T	ISDN BRI four-wire interface
DISR	DoD IT Standards Registry	ISDN	Integrated Services Digital Network	SS7	Signaling System 7
DoD	Department of Defense	IT	Information Technology	STE	Secure Terminal Equipment
DoDI	DoD Instruction	ITU-T	International Telecommunication Union - Telecommunication	STIGs	Security Technical Implementation Guides
DP	Dial Pulse			STU-III	Secure Telephone Unit -3rd generation
DS0	Digital Signal Level 0 (64 kbps)	kbps	Standardization Sector kilobits per second	T.4	Standardization of Group 3 facsimile terminals for document transmission
DS1	Digital Signal Level 1 (1.544 Mbps) (2.048 Mbps European)	Mbps	Megabits per second	T1	Digital Transmission Link Level 1 (1.544 Mbps)
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	UCR	Unified Capabilities Requirements
DTMF	Dual Tone Multi-Frequency	MOS	Mean Opinion Score	UPS	Uninterruptible Power Supply
E&M	Ear and Mouth	NI 1/2	National ISDN Standard 1 or 2	VBD	Variable bit data
E1	European Basic Multiplex Rate (2.048 Mbps)	NX56	Data format restricted to multiples of 56 kbps	VoIP	Voice over Internet Protocol
EKTS	Electronic Key Telephone System	NX64	Data format restricted to multiples of 64 kbps	VTC	Video Teleconferencing
		PBX	Private Branch Exchange		

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>. Due to the sensitivity of the information, the Information Assurance Accreditation Package (IAAP) that contains the approved configuration and deployment guide must be requested directly through government civilian or uniformed military personnel from the Unified Capabilities Certification Office (UCCO), e-mail: [ucco@disa.mil](mailto:ucco@disa.mil).

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6. The JITC point of contact is Mr. Cary Hogan, DSN 879-2589, commercial (520) 538-2589, FAX DSN 879-4347, or e-mail to [cary.hogan@disa.mil](mailto:cary.hogan@disa.mil). The JITC's mailing address is P.O. Box 12798, Fort Huachuca, AZ 85670-2798. The tracking number for the SUT is 0923002.

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

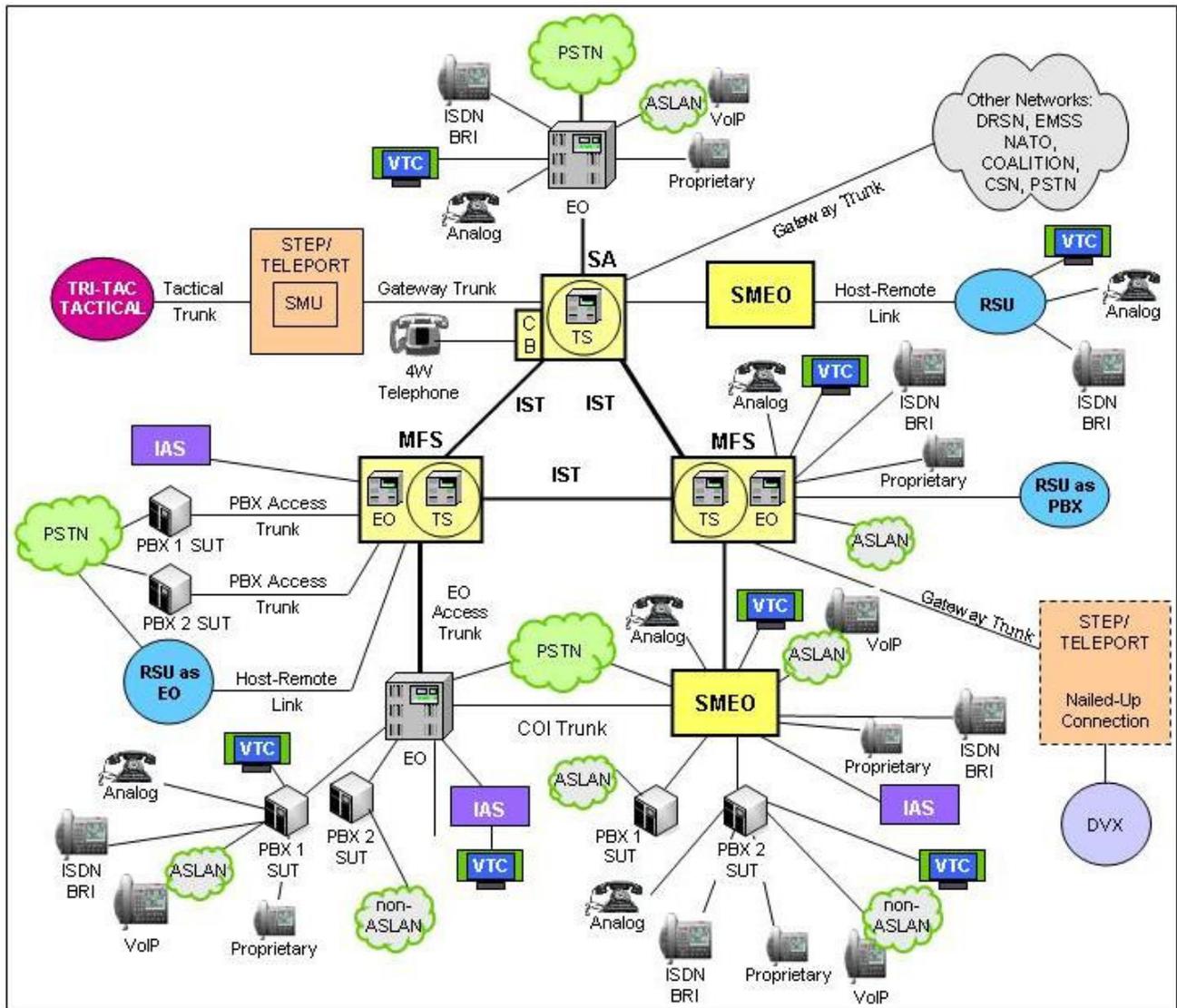
Defense Information Systems Agency, GS23

## ADDITIONAL REFERENCES

- (c) Joint Interoperability Test Command, "Information Assurance (IA) Assessment of Siemens HiPath 4000 Version 5 (TN0923002)," 4 January 2011
- (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) Office of the Assistant Secretary of Defense, "Department of Defense Unified Capabilities Requirements 2008," 22 January 2009
- (f) Joint Interoperability Test Command, "Defense Switched Network Generic Switch Test Plan (GSTP), Change 2," 2 October 2006
- (g) Office of the Secretary of Defense, "Interim Unified Capabilities (UC) IPv6 Rules of Engagement (ROE)," 31 July 2009
- (h) Defense Information Systems Agency NS3 Memorandum, "Softphone Certification" 20 April 2009

## CERTIFICATION TESTING SUMMARY

- 1. SYSTEM TITLE.** Siemens HiPath 4000 Version 5.0; hereinafter referred to as the System Under Test (SUT).
- 2. PROPONENT.** United States Army Information Systems Engineering Command (USAISEC).
- 3. PROGRAM MANAGER.** Mr. Steve Pursell, ELIE-ISE-ES, Building 53301, Fort Huachuca, Arizona, 85613, E-mail: [steve.pursell@us.army.mil](mailto:steve.pursell@us.army.mil).
- 4. TESTER.** Joint Interoperability Test Command (JITC), Fort Huachuca, Arizona.
- 5. SYSTEM UNDER TEST DESCRIPTION.** The SUT is an Internet Protocol (IP) system that combines IP-based communication with circuit-switched communication system functions in a Private Branch Exchange (PBX) 1. Peripheral interface boards and HiPath Gateways (HG) provide service to analog, Time Division Multiplexing (TDM), and Voice of Internet Protocol (VoIP) interfaces. The boards reside in shelves that are interconnected either by TDM or VoIP lines. The HiPath 4000 is controlled by a Common Controller (CC) consisting of fully redundant controller boards (CC-A and CC-B) that create high availability. Shelves containing peripheral interface boards can be controlled by an Emergency Processor (EP) when IP connection to the main location is lost. The SUT supports the following trunk interfaces: Digital Transmission Link Level 1 (T1) Channel Associated Signaling (CAS) Dual Tone Multifrequency (DTMF) and Dial Pulse (DP), European Basic Multiplex Rate (E1) CAS DTMF and DP, T1 Integrated Services Digital Network (ISDN) Primary Rate Interface (PRI), and E1 ISDN PRI. The SUT supports the following line interfaces: 2-wire loop start analog, 2-wire proprietary digital, 4-wire ISDN Basic Rate Interface (BRI), and VoIP. The SUT is certified with any Assured Services Local Area Network (ASLAN) or ASLAN components on the Unified Capabilities (UC) Approved Products List (APL).
- 6. OPERATIONAL ARCHITECTURE.** The Defense Switched Network (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 PBXs. The Unified Capabilities Requirements (UCR) operational DSN Architecture is depicted in Figure 2-1. The architecture depicts the relationship of Military Department PBX 1s 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	SA	Standalone
DSN	Defense Switched Network	SMEO	Small End Office
DVX	Deployable Voice Exchange	SMU	Switched Multiplex Unit
EMSS	Enhanced Mobile Satellite System	STEP	Standardized Tactical Entry Point
EO	End Office	SUT	System Under Test
IAS	Integrated Access Switch	Tri-Tac	Tri-Service Tactical Communications Program
ISDN	Integrated Services Digital Network	TS	Tandem Switch
IST	Interswitch Trunk	VoIP	Voice over Internet Protocol
MFS	Multifunction Switch	VTC	Video Teleconferencing

**Figure 2-1. DSN Architecture**

**7. REQUIRED SYSTEM INTERFACES.** Requirements specific to PBX 1s 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 with Real Time Services (RTS)", Reference (d).

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

c. UCR PBX 1 Capability Requirements (CRs) and Feature Requirements (FRs) verified through JITC testing and/or vendor submission of LoC, Reference (e).

d. The IPv6 requirements specified in References (e) and (g).

e. The softphone requirements specified in References (e) and (h).

**Table 2-1. PBX 1 Requirements**

<b>DSN Trunk Interfaces</b>					
<b>Interface</b>	<b>Critical</b>	<b>Requirements Required or Conditional</b>		<b>References</b>	
T1 CAS (MFR1, DTMF, DP)	No	Trunking	<ul style="list-style-type: none"> <li>• Direct Inward Dialing (C)</li> <li>• National ISDN 1/2 Primary Access (R: PRI only)</li> <li>• ISDN ANSI MLPP Service Capability (R: PRI only)</li> <li>• ITU-T ISDN Primary Access (C: E1 PRI only)</li> <li>• ITU-T ISDN Primary Access DSS1 MLPP (C: E1 PRI only)</li> <li>• Trunk Group-Remove from Service (C)</li> <li>• Trunk Group-Restore to Service (C)</li> <li>• Normal Wink Start Operations (C: CAS only)</li> <li>• Glare Operation (C: CAS only)</li> <li>• Abnormal Wink Start (C: CAS only)</li> <li>• Glare Resolution (C: CAS only)</li> <li>• Call for Service Timing (R: CAS only)</li> <li>• Guard Timing (R: CAS only)</li> <li>• Satellite Timing (C: CAS only)</li> <li>• Disconnect Control (C: CAS only)</li> <li>• Reselect and Retrial (C: CAS only)</li> <li>• Off-Hook Supervision Transition (C: CAS only)</li> <li>• Dial-Pulse Signals (C: CAS only)</li> <li>• DTMF Signaling (C: CAS only)</li> <li>• Standard Digit Format for Precedence (C: CAS only)</li> <li>• MFR1 2/6 Signaling (C: CAS only)</li> <li>• Alerting Signals and Tones (R)</li> <li>• DSN ISDN User-to-Network Signaling (R: PRI only)</li> <li>• Application (R: PRI only)</li> <li>• Physical Layer (R: PRI only)</li> <li>• Data Link Layer (R: PRI only)</li> <li>• Data Link Connection (R: PRI only)</li> <li>• Peer-to-Peer Procedures of Data-Link Layer (R: PRI only)</li> </ul>	<ul style="list-style-type: none"> <li>• UCR Section 5.2.1.3.2</li> <li>• UCR Section 5.2.1.3.4.1</li> <li>• UCR Section 5.2.1.3.4.1.1</li> <li>• UCR Section 5.2.1.3.4.2</li> <li>• UCR Section 5.2.1.3.4.2.1</li> <li>• UCR Section 5.2.1.5.5</li> <li>• UCR Section 5.2.1.5.5</li> <li>• UCR Section 5.2.4.3.3.1.1</li> <li>• UCR Section 5.2.4.3.3.1.2</li> <li>• UCR Section 5.2.4.3.3.2.1</li> <li>• UCR Section 5.2.4.3.3.2.2</li> <li>• UCR Section 5.2.4.3.5</li> <li>• UCR Section 5.2.4.3.6</li> <li>• UCR Section 5.2.4.3.7</li> <li>• UCR Section 5.2.4.3.8</li> <li>• UCR Section 5.2.4.3.9</li> <li>• UCR Section 5.2.4.3.10</li> <li>• UCR Section 5.2.4.4.1</li> <li>• UCR Section 5.2.4.4.2</li> <li>• UCR Section 5.2.4.4.2.1</li> <li>• UCR Section 5.2.4.4.3</li> <li>• UCR Section 5.2.4.5.1</li> <li>• UCR Section 5.2.4.7.1</li> <li>• UCR Section 5.2.4.7.1.1</li> <li>• UCR Section 5.2.4.7.1.2</li> <li>• UCR Section 5.2.4.7.1.3</li> <li>• UCR Section 5.2.4.7.1.3.1</li> <li>• UCR Section 5.2.4.7.1.3.2</li> </ul>	
E1 CAS (MFR1, DTMF, DP)	No (Europe only)			<ul style="list-style-type: none"> <li>• Layer 3 DSN User-to-Network Signaling (R: PRI only)</li> <li>• DSN User-to-Network Signaling for Circuit-Switched Bearer Services (R: PRI only)</li> <li>• Sequence of Messages for DSN Circuit Switched Calls (R: PRI only)</li> <li>• Message Functional Definition and Content (R: PRI only)</li> <li>• General Message Format and Information Elements Coding (R: PRI only)</li> <li>• Supplementary Services (C: PRI only)</li> <li>• DSN Transmission Interface (R)</li> <li>• PCM-24 Digital Trunk Interface (R)</li> <li>• Interface Characteristics (R)</li> <li>• Supervisory Channel Associated Signaling (C: CAS only)</li> <li>• Clear Channel Capability (R)</li> <li>• Alarm and Restoral Requirements (R)</li> <li>• PCM-30 Digital Trunk Interface (Europe only) (C)</li> <li>• Supervisory Channel Associated Signaling (C: E1 only)</li> <li>• Alarm and Restoral Requirements (C: E1 only)</li> <li>• Interoperation of PCM-24 and PCM-30 (C)</li> <li>• Analog Trunk Interface (C)</li> </ul>	<ul style="list-style-type: none"> <li>• UCR Section 5.2.4.7.1.4</li> <li>• UCR Section 5.2.4.7.1.4.2</li> <li>• UCR Section 5.2.4.7.1.4.3</li> <li>• UCR Section 5.2.4.7.1.4.4</li> <li>• UCR Section 5.2.4.7.1.4.5</li> <li>• UCR Section 5.2.4.7.1.4.6</li> <li>• UCR Section 5.2.5</li> <li>• UCR Section 5.2.6.1</li> <li>• UCR Section 5.2.6.1.1</li> <li>• UCR Section 5.2.6.1.2</li> <li>• UCR Section 5.2.6.1.3</li> <li>• UCR Section 5.2.6.1.4</li> <li>• UCR Section 5.2.6.2</li> <li>• UCR Section 5.2.6.2.1</li> <li>• UCR Section 5.2.6.2.2</li> <li>• UCR Section 5.2.6.3</li> <li>• UCR Section 5.2.6.4</li> </ul>
T1 ISDN PRI NI 1/2 (ANSI T1.619a)	Yes			<ul style="list-style-type: none"> <li>• DSN Transmission Interface (R)</li> <li>• PCM-24 Digital Trunk Interface (R)</li> <li>• Interface Characteristics (R)</li> <li>• Supervisory Channel Associated Signaling (C: CAS only)</li> <li>• Clear Channel Capability (R)</li> <li>• Alarm and Restoral Requirements (R)</li> <li>• PCM-30 Digital Trunk Interface (Europe only) (C)</li> <li>• Supervisory Channel Associated Signaling (C: E1 only)</li> <li>• Alarm and Restoral Requirements (C: E1 only)</li> <li>• Interoperation of PCM-24 and PCM-30 (C)</li> <li>• Analog Trunk Interface (C)</li> </ul>	<ul style="list-style-type: none"> <li>• UCR Section 5.2.4.7.1.4</li> <li>• UCR Section 5.2.4.7.1.4.2</li> <li>• UCR Section 5.2.4.7.1.4.3</li> <li>• UCR Section 5.2.4.7.1.4.4</li> <li>• UCR Section 5.2.4.7.1.4.5</li> <li>• UCR Section 5.2.4.7.1.4.6</li> <li>• UCR Section 5.2.5</li> <li>• UCR Section 5.2.6.1</li> <li>• UCR Section 5.2.6.1.1</li> <li>• UCR Section 5.2.6.1.2</li> <li>• UCR Section 5.2.6.1.3</li> <li>• UCR Section 5.2.6.1.4</li> <li>• UCR Section 5.2.6.2</li> <li>• UCR Section 5.2.6.2.1</li> <li>• UCR Section 5.2.6.2.2</li> <li>• UCR Section 5.2.6.3</li> <li>• UCR Section 5.2.6.4</li> </ul>
E1 ISDN PRI (ITU-T Q.955.3)	No (Europe only)			<ul style="list-style-type: none"> <li>• DSN Transmission Interface (R)</li> <li>• PCM-24 Digital Trunk Interface (R)</li> <li>• Interface Characteristics (R)</li> <li>• Supervisory Channel Associated Signaling (C: CAS only)</li> <li>• Clear Channel Capability (R)</li> <li>• Alarm and Restoral Requirements (R)</li> <li>• PCM-30 Digital Trunk Interface (Europe only) (C)</li> <li>• Supervisory Channel Associated Signaling (C: E1 only)</li> <li>• Alarm and Restoral Requirements (C: E1 only)</li> <li>• Interoperation of PCM-24 and PCM-30 (C)</li> <li>• Analog Trunk Interface (C)</li> </ul>	<ul style="list-style-type: none"> <li>• UCR Section 5.2.4.7.1.4</li> <li>• UCR Section 5.2.4.7.1.4.2</li> <li>• UCR Section 5.2.4.7.1.4.3</li> <li>• UCR Section 5.2.4.7.1.4.4</li> <li>• UCR Section 5.2.4.7.1.4.5</li> <li>• UCR Section 5.2.4.7.1.4.6</li> <li>• UCR Section 5.2.5</li> <li>• UCR Section 5.2.6.1</li> <li>• UCR Section 5.2.6.1.1</li> <li>• UCR Section 5.2.6.1.2</li> <li>• UCR Section 5.2.6.1.3</li> <li>• UCR Section 5.2.6.1.4</li> <li>• UCR Section 5.2.6.2</li> <li>• UCR Section 5.2.6.2.1</li> <li>• UCR Section 5.2.6.2.2</li> <li>• UCR Section 5.2.6.3</li> <li>• UCR Section 5.2.6.4</li> </ul>

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

<b>DSN Trunk Interfaces (continued)</b>					
<b>Interface</b>	<b>Critical</b>	<b>Requirements Required or Conditional</b>		<b>References</b>	
T1 CAS (MFR1, DTMF, DP)	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 CAS (MFR1, DTMF, DP)	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 ISDN PRI NI 1/2 (ANSI T1.619a)	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 5.2.2.9.6</li> <li>• UCR Section 5.2.2.9.6</li> <li>• UCR Section 5.2.2.9.6</li> <li>• UCR Section 5.2.2.9.6</li> <li>• CJCSI 6215.01C</li> </ul>	
E1 ISDN PRI (ITU-T Q.955.3)	No (Europe only)	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>	
<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 (R)</li> <li>• Advanced Line Test Capabilities (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> <li>• VoIP System Requirements (R: VoIP Phones only)</li> </ul>	<ul style="list-style-type: none"> <li>• UCR Section 5.2.1.1.1</li> <li>• UCR Section 5.2.1.3.1</li> <li>• UCR Section 5.2.1.3.3</li> <li>• UCR Section 5.2.1.3.5</li> <li>• UCR Section 5.2.1.5.4.1.1</li> <li>• UCR Section 5.2.1.5.4.1.1</li> <li>• UCR Section 5.2.4.2.1</li> <li>• UCR Section 5.2.4.3.1</li> <li>• UCR Section 5.2.4.5.1</li> <li>• UCR Section 5.2.4.7.1.2.1</li> <li>• UCR Section 5.2.12.8</li> </ul>	
ISDN BRI NI 1/2 (ANSI T1.619a)	No				
2-Wire Proprietary Digital	No				
VoIP (Ethernet IEEE 802.3u)	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: 2-Wire Analog only)</li> <li>• Secure data (STE/STU-III) (R: 2-Wire Analog only)</li> </ul>	<ul style="list-style-type: none"> <li>• CJCSI 6215.01C</li> <li>• CJCSI 6215.01C</li> </ul>	
		VTC	<ul style="list-style-type: none"> <li>• ITU-T H.320 (C: BRI only)</li> </ul>	<ul style="list-style-type: none"> <li>• FTR 1080B-2002</li> </ul>	
<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>• Denied originating service (C)</li> <li>• Code restriction and diversion (C)</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 to Fully 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 5.2.1.1.1</li> <li>• UCR Section 5.2.1.1.3</li> <li>• UCR Section 5.2.1.1.4</li> <li>• UCR Section 5.2.1.1.5.1</li> <li>• UCR Section 5.2.1.1.6</li> <li>• UCR Section 5.2.1.1.7</li> <li>• UCR Section 5.2.1.1.7.1</li> <li>• UCR Section 5.2.1.1.7.2</li> <li>• UCR Section 5.2.1.1.7.3</li> <li>• UCR Section 5.2.1.1.7.4</li> <li>• UCR Section 5.2.1.1.7.5</li> <li>• UCR Section 5.2.1.1.7.6</li> <li>• UCR Section 5.2.1.1.7.7</li> <li>• UCR Section 5.2.1.1.7.8</li> <li>• UCR Section 5.2.1.1.8.1</li> <li>• UCR Section 5.2.1.1.8.2</li> <li>• UCR Section 5.2.1.1.8.3</li> <li>• UCR Section 5.2.1.1.8.4</li> <li>• UCR Section 5.2.1.1.9.1</li> <li>• UCR Section 5.2.1.7</li> <li>• UCR Section 5.2.1.9</li> </ul>	

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

<b>DSN Features &amp; Capabilities</b>			
<b>Feature/ Capability</b>	<b>Critical</b>	<b>Requirements Required or Conditional</b>	<b>References</b>
Attendant	No	<ul style="list-style-type: none"> <li>• Attendant Features (C)</li> </ul>	<ul style="list-style-type: none"> <li>• UCR Section 5.2.1.2.2</li> </ul>
Public Safety	Yes	<ul style="list-style-type: none"> <li>• Emergency Service (911) Caller (R)</li> <li>• Emergency Service (911) Public Safety Answering Service (C)</li> <li>• Enhanced Emergency Service (E911) (C)</li> <li>• Trace of terminating calls (C)</li> <li>• Outgoing call trace (C)</li> </ul>	<ul style="list-style-type: none"> <li>• UCR Section 5.2.1.4.1.1</li> <li>• UCR Section 5.2.1.4.1.2</li> <li>• UCR Section 5.2.1.4.1.3</li> <li>• UCR Section 5.2.1.4.2</li> <li>• UCR Section 5.2.1.4.3</li> </ul>
Conferencing	No	<ul style="list-style-type: none"> <li>• Preset Conferencing (C)</li> <li>• Meet-Me Conferencing (C)</li> <li>• Progressive Conferencing (C)</li> </ul>	<ul style="list-style-type: none"> <li>• UCR Section 5.2.1.6.1</li> <li>• UCR Section 5.2.1.6.2</li> <li>• UCR Section 5.2.1.6.3</li> </ul>
Nailed-up Connections	No	<ul style="list-style-type: none"> <li>• Nailed-Up Connections (C)</li> </ul>	<ul style="list-style-type: none"> <li>• UCR Section 5.2.1.8</li> </ul>
DSN Hotline Services	No	<ul style="list-style-type: none"> <li>• DSN Analog Hotline Service (C)</li> </ul>	<ul style="list-style-type: none"> <li>• UCR Section 5.2.1.12</li> </ul>
MLPP	Yes	<ul style="list-style-type: none"> <li>• MLPP Overview (R)</li> <li>• Preemption in the Network (R)</li> <li>• Network Facility with Lower Precedence Calls (R)</li> <li>• Network Facility with Equal or Higher Precedence Calls (R)</li> <li>• Precedence Call Diversion (R)</li> <li>• Channel Associated Signaling (C)</li> <li>• Primary Rate Interface (R)</li> <li>• Analog Line MLPP (R)</li> <li>• ISDN MLPP Basic Rate Interface (C)</li> <li>• ISDN Primary Rate Interface (R)</li> <li>• Precedence Call Waiting (R)</li> <li>• Call Forwarding (R)</li> <li>• Call Transfer (R)</li> <li>• Call Hold (R)</li> <li>• Three-Way Calling (R)</li> <li>• Call Pickup (C)</li> <li>• Conferencing (C)</li> <li>• Multiline Hunt Group (C)</li> <li>• Community of Interest (C)</li> <li>• MLPP Interaction with EKTS features (C)</li> </ul>	<ul style="list-style-type: none"> <li>• UCR Section 5.2.2.1.1</li> <li>• UCR Section 5.2.2.2</li> <li>• UCR Section 5.2.2.2.1</li> <li>• UCR Section 5.2.2.2.2</li> <li>• UCR Section 5.2.2.3</li> <li>• UCR Section 5.2.2.4.1</li> <li>• UCR Section 5.2.2.4.2</li> <li>• UCR Section 5.2.2.5</li> <li>• UCR Section 5.2.2.6</li> <li>• UCR Section 5.2.2.7</li> <li>• UCR Section 5.2.2.8.1</li> <li>• UCR Section 5.2.2.8.2</li> <li>• UCR Section 5.2.2.8.3</li> <li>• UCR Section 5.2.2.8.4</li> <li>• UCR Section 5.2.2.8.5</li> <li>• UCR Section 5.2.2.8.6</li> <li>• UCR Section 5.2.2.8.7.1</li> <li>• UCR Section 5.2.2.8.8</li> <li>• UCR Section 5.2.2.8.9</li> <li>• UCR Section 5.2.2.10.1</li> </ul>

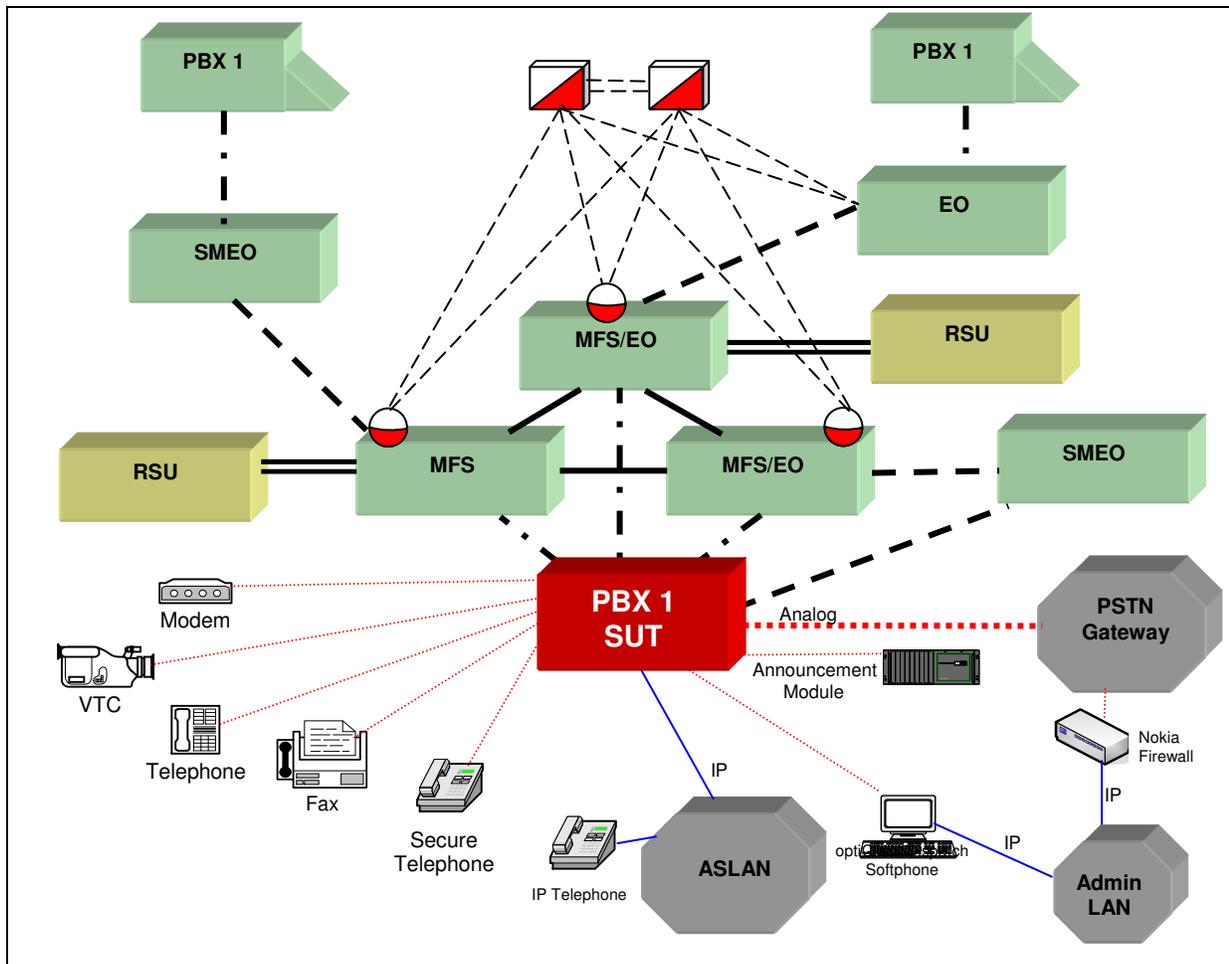
**Table 2-1. PBX 1 Requirements (continued)**

<b>DSN Features &amp; Capabilities (continued)</b>			
<b>Feature/ Capability</b>	<b>Critical</b>	<b>Requirements Required or Conditional</b>	<b>References</b>
Call Processing	Yes	<ul style="list-style-type: none"> <li>• Call Treatments (R)</li> <li>• Primary and Alternate Routing (C)</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 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 (R)</li> <li>• DSN Switch Outpulsing Digit Formats (C)</li> <li>• Standard Directory Number (R)</li> <li>• Standard Test Numbers (C)</li> <li>• Base Services – Abbreviated Numbers (C)</li> <li>• Digit Reception Requirements (R)</li> <li>• Screening (C)</li> </ul>	<ul style="list-style-type: none"> <li>• UCR Section 5.2.3.1</li> <li>• UCR Section 5.2.3.2</li> <li>• UCR Section 5.2.3.3.1</li> <li>• UCR Section 5.2.3.3.2</li> <li>• UCR Section 5.2.3.3.3</li> <li>• UCR Section 5.2.3.3.4</li> <li>• UCR Section 5.2.3.5.1.1</li> <li>• UCR Section 5.2.3.5.1.1.1</li> <li>• UCR Section 5.3.3.5.2.1</li> <li>• UCR Section 5.2.3.5.2.2</li> <li>• UCR Section 5.2.3.5.1.3</li> <li>• UCR Section 5.2.3.5.1.3.1</li> <li>• UCR Section 5.2.3.5.1.3.2</li> <li>• UCR Section 5.2.3.5.1.3.3</li> <li>• UCR Section 5.2.3.5.1.4</li> <li>• UCR Section 5.2.3.5.1.5</li> <li>• UCR Section 5.2.3.5.1.6</li> <li>• UCR Section 5.2.3.5.1.7</li> <li>• UCR Section 5.2.3.5.1.8.1</li> <li>• UCR Section 5.2.3.5.1.8.2</li> <li>• UCR Section 5.2.3.5.1.9</li> <li>• UCR Section 5.2.3.5.2</li> <li>• UCR Section 5.2.3.5.3</li> <li>• UCR Section 5.2.3.5.4</li> <li>• UCR Section 5.2.3.5.5</li> <li>• UCR Section 5.2.3.5.6</li> <li>• UCR Section 5.2.3.5.8</li> </ul>
ISDN Services	Yes	<ul style="list-style-type: none"> <li>• BRI Access, Call Control and Signaling (C)</li> <li>• Uniform Interface Configuration for BRIs (C)</li> <li>• EKTS (C)</li> <li>• PRI Access, Call Control and Signaling (R)</li> <li>• PRI Features (R)</li> <li>• Packet Data Features and Capabilities (C)</li> </ul>	<ul style="list-style-type: none"> <li>• UCR Section 5.2.9.2, Table 5.2.9-1</li> <li>• UCR Section 5.2.9.2, Table 5.2.9-2</li> <li>• UCR Section 5.2.9.3, Table 5.2.9-3</li> <li>• UCR Section 5.2.9.2, Table 5.2.9-4</li> <li>• UCR Section 5.2.9.2, Table 5.2.9-5</li> <li>• UCR Section 5.2.9.2, Table 5.2.9-6</li> </ul>
Synchronization	Yes	<ul style="list-style-type: none"> <li>• Line timing mode (R)</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 5.2.10.1.1.2</li> <li>• UCR Section 5.2.10.1.1.2.2</li> <li>• UCR Section 5.2.10.2</li> <li>• UCR Section 5.2.10.3</li> <li>• UCR Section 5.2.10.4</li> </ul>
Reliability	Yes	<ul style="list-style-type: none"> <li>• System Availability (R)</li> <li>• Backup Power (R)</li> <li>• Power Components (R)</li> <li>• UPS Requirements (R)</li> <li>• UPS PBX 1 Load Capacity (R)</li> <li>• Backup Power (Environmental) (R)</li> <li>• Alarms (R)</li> </ul>	<ul style="list-style-type: none"> <li>• UCR Section 5.2.11.2</li> <li>• UCR Section 5.2.11.3</li> <li>• UCR Section 5.2.11.3.1</li> <li>• UCR Section 5.2.11.3.2</li> <li>• UCR Section 5.2.11.3.2.1</li> <li>• UCR Section 5.2.11.3.3</li> <li>• UCR Section 5.2.11.3.4</li> </ul>
Network Management	No	<ul style="list-style-type: none"> <li>• Interfaces (R)</li> <li>• Measurements and data generation (C)</li> <li>• Fault management (C)</li> <li>• Configuration management (C)</li> <li>• Accounting management (C)</li> <li>• Performance management (C)</li> <li>• Network Management controls (C)</li> <li>• Remote access (C)</li> </ul>	<ul style="list-style-type: none"> <li>• UCR section 5.2.8.1</li> <li>• UCR section 5.2.8.2</li> <li>• UCR section 5.2.8.3</li> <li>• UCR section 5.2.8.4</li> <li>• UCR section 5.2.8.5</li> <li>• UCR section 5.2.8.6</li> <li>• UCR section 5.2.8.7</li> <li>• UCR section 5.2.8.8</li> </ul>
Security	Yes	<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 Sections 3.2.3, 3.2.5, and 5.4.6.1</li> </ul>

**Table 2. PBX 1 Requirements (continued)**

VoIP																																																																																																																																														
Feature/ Capability	Critical	Requirements Required or Conditional		References																																																																																																																																										
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 (C)</li> <li>• System timing (R)</li> <li>• Latency ≤ 60 milliseconds (R)</li> <li>• IPv6 capable (R)</li> <li>• Service Class Tagging (R)</li> <li>• Softphone Requirements</li> </ul>		<ul style="list-style-type: none"> <li>• UCR section 5.2.12.8.2.1</li> <li>• UCR section 5.2.12.8.2.2</li> <li>• UCR section 5.2.12.8.2.3</li> <li>• UCR section 5.2.12.8.2.4</li> <li>• UCR section 5.2.12.8.2.5</li> <li>• UCR section 5.2.12.8.2.6</li> <li>• UCR section 5.2.12.8.2.7</li> <li>• UCR section 5.2.12.8.2.8</li> <li>• UCR section 5.2.12.8.2.9</li> <li>• DISA Memo Reference (h)</li> </ul>																																																																																																																																										
Network Gateways																																																																																																																																														
Gateway	Critical	Requirements Required or Conditional		References																																																																																																																																										
PSTN (See note.)	No	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> <li>• Delay Dial (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 5.2.4.2.2</li> <li>• UCR Section 5.2.4.3.2</li> <li>• UCR Section 5.2.4.3.4</li> </ul>																																																																																																																																										
<p><b>NOTE:</b> Voice, facsimile, data, and VTC service requirements for PSTN are identical to DSN with the exception of MLPP.</p> <p><b>LEGEND:</b></p> <table border="0"> <tr> <td>ANSI</td> <td>American National Standards Institute</td> <td>FTR</td> <td>Federal Telecommunications Recommendation</td> <td>PBX 1</td> <td>Private Branch Exchange 1</td> </tr> <tr> <td>BER</td> <td>Bit Error Ratio</td> <td>FTR 1080B-2002</td> <td>Video Teleconferencing Services</td> <td>PCM</td> <td>Pulse Code Modulation</td> </tr> <tr> <td>BRI</td> <td>Basic Rate Interface</td> <td></td> <td></td> <td>PCM-24</td> <td>Pulse Code Modulation - 24 Channels</td> </tr> <tr> <td>C</td> <td>Conditional</td> <td>G.711</td> <td>PCM of voice frequencies</td> <td>PCM-30</td> <td>Pulse Code Modulation - 30 Channels</td> </tr> <tr> <td>CAS</td> <td>Channel Associated Signaling</td> <td>GR</td> <td>Generic Requirement</td> <td></td> <td></td> </tr> <tr> <td>CJCSI</td> <td>Chairman of the Joint Chiefs of Staff Instruction</td> <td>GR-815</td> <td>Generic Requirements For Network Element/Network System (NE/NS) Security</td> <td>PRI</td> <td>Primary Rate Interface</td> </tr> <tr> <td>CODEC</td> <td>Coder/Decoder</td> <td>H.320</td> <td>Standard for Narrowband VTC</td> <td>PSTN</td> <td>Public Switched Telephone Network</td> </tr> <tr> <td>DIACAP</td> <td>DoD Information Assurance Certification and Accreditation Process</td> <td>IEEE</td> <td>Institute of Electrical and Electronics Engineers</td> <td>Q.955.3</td> <td>ISDN Signaling Standard for E1 MLPP</td> </tr> <tr> <td>DISA</td> <td>Defense Information Systems Agency</td> <td>IPV6</td> <td>Internet Protocol version 6</td> <td>R</td> <td>Required</td> </tr> <tr> <td>DISR</td> <td>DoD IT Standards Registry</td> <td>ISDN</td> <td>Integrated Services Digital Network</td> <td>S/T</td> <td>ISDN BRI four-wire interface</td> </tr> <tr> <td>DoD</td> <td>Department of Defense</td> <td>IT</td> <td>Information Technology</td> <td>SS7</td> <td>Signaling System 7</td> </tr> <tr> <td>DoDI</td> <td>DoD Instruction</td> <td>ITU-T</td> <td>International Telecommunication Union - Telecommunication Sector</td> <td>STE</td> <td>Secure Terminal Equipment</td> </tr> <tr> <td>DP</td> <td>Dial Pulse</td> <td></td> <td></td> <td>STIGs</td> <td>Security Technical Implementation Guides</td> </tr> <tr> <td>DS0</td> <td>Digital Signal Level 0 (64 kbps)</td> <td></td> <td></td> <td>STU-III</td> <td>Secure Telephone Unit -3rd generation</td> </tr> <tr> <td>DS1</td> <td>Digital Signal Level 1 (1.544 Mbps) (2.048 Mbps European)</td> <td>kbps</td> <td>kilobits per second</td> <td>T.4</td> <td>Standardization of Group 3 facsimile terminals for document transmission</td> </tr> <tr> <td></td> <td></td> <td>Mbps</td> <td>Megabits per second</td> <td>T1</td> <td>Digital Transmission Link Level 1 (1.544 Mbps)</td> </tr> <tr> <td></td> <td></td> <td>MFR1</td> <td>Multi-Frequency</td> <td>T1.619a</td> <td>SS7 and ISDN MLPP Signaling Standard for T1</td> </tr> <tr> <td>DSN</td> <td>Defense Switched Network</td> <td>MLPP</td> <td>Multi-Level Precedence and Preemption</td> <td>UCR</td> <td>Unified Capabilities Requirements</td> </tr> <tr> <td>DSS1</td> <td>Digital Subscriber Signaling 1</td> <td>MOS</td> <td>Mean Opinion Score</td> <td>UPS</td> <td>Uninterruptible Power Supply</td> </tr> <tr> <td>DTMF</td> <td>Dual Tone Multi-Frequency</td> <td>NI 1/2</td> <td>National ISDN Standard 1 or 2</td> <td>VBD</td> <td>Variable bit data</td> </tr> <tr> <td>E&amp;M</td> <td>Ear and Mouth</td> <td>NX56</td> <td>Data format restricted to multiples of 56 kbps</td> <td>VoIP</td> <td>Voice over Internet Protocol</td> </tr> <tr> <td>E1</td> <td>European Basic Multiplex Rate (2.048 Mbps)</td> <td>NX64</td> <td>Data format restricted to multiples of 64 kbps</td> <td>VTC</td> <td>Video Teleconferencing</td> </tr> <tr> <td>EKTS</td> <td>Electronic Key Telephone System</td> <td>PBX</td> <td>Private Branch Exchange</td> <td></td> <td></td> </tr> </table>					ANSI	American National Standards Institute	FTR	Federal Telecommunications Recommendation	PBX 1	Private Branch Exchange 1	BER	Bit Error Ratio	FTR 1080B-2002	Video Teleconferencing Services	PCM	Pulse Code Modulation	BRI	Basic Rate Interface			PCM-24	Pulse Code Modulation - 24 Channels	C	Conditional	G.711	PCM of voice frequencies	PCM-30	Pulse Code Modulation - 30 Channels	CAS	Channel Associated Signaling	GR	Generic Requirement			CJCSI	Chairman of the Joint Chiefs of Staff Instruction	GR-815	Generic Requirements For Network Element/Network System (NE/NS) Security	PRI	Primary Rate Interface	CODEC	Coder/Decoder	H.320	Standard for Narrowband VTC	PSTN	Public Switched Telephone Network	DIACAP	DoD Information Assurance Certification and Accreditation Process	IEEE	Institute of Electrical and Electronics Engineers	Q.955.3	ISDN Signaling Standard for E1 MLPP	DISA	Defense Information Systems Agency	IPV6	Internet Protocol version 6	R	Required	DISR	DoD IT Standards Registry	ISDN	Integrated Services Digital Network	S/T	ISDN BRI four-wire interface	DoD	Department of Defense	IT	Information Technology	SS7	Signaling System 7	DoDI	DoD Instruction	ITU-T	International Telecommunication Union - Telecommunication Sector	STE	Secure Terminal Equipment	DP	Dial Pulse			STIGs	Security Technical Implementation Guides	DS0	Digital Signal Level 0 (64 kbps)			STU-III	Secure Telephone Unit -3rd generation	DS1	Digital Signal Level 1 (1.544 Mbps) (2.048 Mbps European)	kbps	kilobits per second	T.4	Standardization of Group 3 facsimile terminals for document transmission			Mbps	Megabits per second	T1	Digital Transmission Link Level 1 (1.544 Mbps)			MFR1	Multi-Frequency	T1.619a	SS7 and ISDN MLPP Signaling Standard for T1	DSN	Defense Switched Network	MLPP	Multi-Level Precedence and Preemption	UCR	Unified Capabilities Requirements	DSS1	Digital Subscriber Signaling 1	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	E&M	Ear and Mouth	NX56	Data format restricted to multiples of 56 kbps	VoIP	Voice over Internet Protocol	E1	European Basic Multiplex Rate (2.048 Mbps)	NX64	Data format restricted to multiples of 64 kbps	VTC	Video Teleconferencing	EKTS	Electronic Key Telephone System	PBX	Private Branch Exchange		
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**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 notional test configuration depicted in Figure 2-2. The SUT test configuration is depicted in Figure 2-3. The SUT was tested as the end-point in relation to the other switches.

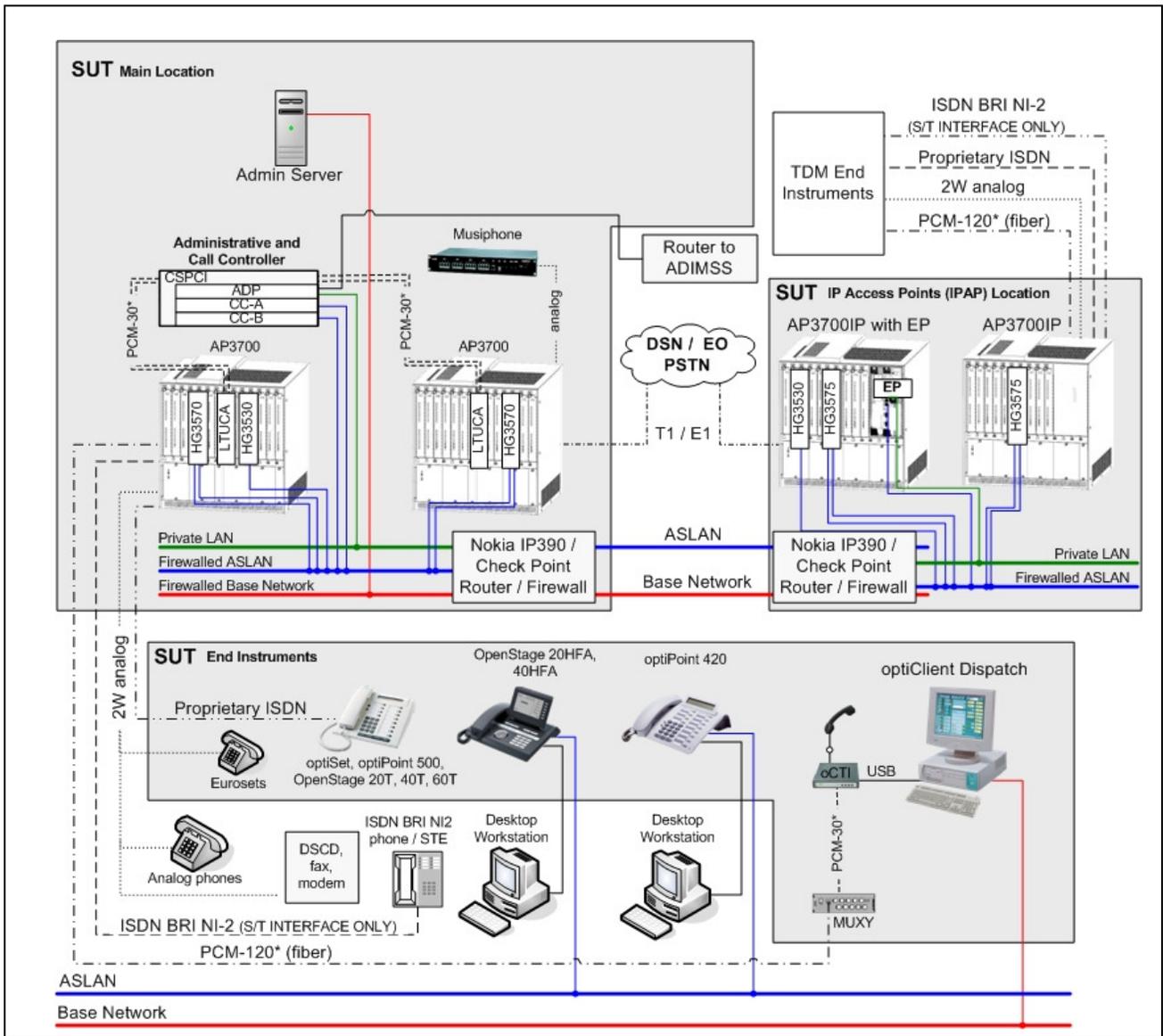


**LEGEND:**

- 2W 2-Wire
- A-Link Access Link (SS7)
- B-Link Bridge Link (SS7)
- C-Link Cross Link (SS7)
- Admin Administrative
- ASLAN Assured Services Local Area Network
- BRI Basic Rate Interface
- CAS Channel Associated Signaling
- DSN Defense Switched Network
- E1 European Basic Multiplex Rate (2.048 Mbps)
- EO End Office
- IP Internet Protocol
- ISDN Integrated Services Digital Network
- LAN Local Area Network
- Mbps Megabits per second
- MFS Multifunction Switch
- PBX Private Branch Exchange
- PBX 1 Private Branch Exchange 1
- PRI Primary Rate Interface
- PSTN Public Switched Telephone Network
- RSU Remote Switching Unit
- SMEO Small End Office
- SS7 Signaling System 7
- SUT System Under Test
- T1 Digital Transmission Link Level 1 (1.544 Mbps)
- 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 (2W Analog, ISDN BRI, Digital Proprietary)
-  SS7 Links (A-Link, B-Link or C-Link)
-  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
-  100 Mbps Ethernet

**Figure 2-2. Notional Test Configuration**



**NOTE:** The PCM interfaces depicted are proprietary Siemens TDM interfaces. The PCM-30 interface supports 30 timeslots. The PCM-120 interface supports 120 timeslots.

**LEGEND:**

- |        |  |      |  |
|--------|--|------|--|
| 2W     | Two-wire Analog                                    | IP   | Internet Protocol                              |
| ADIMSS | Advanced DSN Integrated Management Support System  | ISDN | Integrated Services Digital Network            |
| ADP    | Administrative Data Processor                      | LAN  | Local Area Network                             |
| AP     | Access Point                                       | Mbps | Megabits per second                            |
| ASLAN  | Assured Services Local Area Network                | MUXY | Multiplexer Trading                            |
| BRI    | Basic Rate Interface                               | oCTI | Optical Trading Interface                      |
| CC     | Call Controller                                    | PCM  | Pulse Code Modulation                          |
| CSPCI  | compact Shelf Peripheral Component Interconnect    | PSTN | Public Switched Telephone Network              |
| DSCD   | Department of Defense Secure Communications Device | S/T  | ISDN BRI 4-wire interface                      |
| DSN    | Defense Switched Network                           | STE  | Secure Terminal Equipment                      |
| E1     | European Basic Multiplex Rate (2.048 Mbps)         | SUT  | System Under Test                              |
| EO     | End Office   | T1   | Digital Transmission Link Level 1 (1.544 Mbps) |
| EP     | Emergency Processor                                | TDM  | Time Division Multiplexing                     |
| HG     | HiPath Gateway                                     | USB  | Universal Serial Bus                           |

**Figure 2-3. SUT 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**

System Name		Software Release	
Avaya CS2100		Succession Enterprise (SE) 09.1	
Nokia-Siemens EWSD		19d with Patch Set 46	
Avaya S8720		Communication Manager (CM) 4.0 (R014x.00.2.732.1: Super Patch 16538)	
System Name	Hardware/Software Release		
HiPath 4000 Version 5 (SUT)	Hardware	Card Name Part Number/Name	Application/Software
	Admin Server	NA	Windows Server 2003 SP2
			HiPath Dispatch System Manager V3
			HiPath 4000 Assistant V5
			HiPath 4000 ComWin CLI V5
			DAKS Admin R7
	Administrative and Call Controller	SF2X8	UnixWare R7.1.4
		DSCXL (ADP)	Assistant V5
		DSCXL (CC-A)	RMX x2
		DSCXL (CC-B)	SWU x2
	Musiphone	NA	2004 Model
	AP3700 #1	RG	HiPath 4000 V5 (HG3570/HG3575 requires patch V5 R5.8.5) (VoIP Gateway STMI4 requires patch pzksti40)
		SLMA24 x2	
		SLMOP	
		STMI4/HG3570	
		SLMA24	
		LTUCA	Siemens proprietary embedded
		STMI4/HG3530	HiPath 4000 V5 (DIU2U requires patch pzfdu nbk) (VoIP Gateway STMI4 requires patch pzksti40)
		DIU2U x2	
		SLMAE	
		DIU2U	
		TMOM2 x2	
		SLMY	
	STMD3		
	AP3700 #2	DIU2U x2	Siemens proprietary embedded
		TMDNH	
		SICO	
		LTUCA	
SICO			
SICO			
AP3700 #18	DIU-N2 x4	HiPath 4000 V5 (HG3570/HG3575 requires patch V5 R5.8.5) (DIU-N2 requires patch pzfda20) (VoIP Gateway STMI4 requires patch pzksti40)	
	SICO		
	STMI4/HG3570		
	SLMY		
	NCUI4/HG3575		
TMEMUS	HiPath 4000 V5 (HG3570/HG3575 requires patch V5 R5.8.5)		

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

System Name		Hardware/Software Release		
		Hardware	Card Name	Application/Software
HiPath 4000 Version 5 (SUT)	AP3700 #17		RG	HiPath 4000 V5 (HG3570/HG3575 requires patch V5 R5.8.5) (DIU2U requires patch pzfndnbk) (NCUI4 requires patch pzknci40) (VoIP Gateway STMI4 requires patch pzksti40)
			SLMA24	
			SLMO	
			STMI4/HG3530	
			STMD3	
			NCUI4/HG3575	
			DIU2U x4	
			HDMO/EP	
			DSCXL/EP	UnixWare R7.1.4
				Assistant V5
		RMX		
		SWU V5		
		PSU/EP x2	NA	
<b>SUT Software Patches</b>				
ps50225	ps50607	ps50505	ps50561	ps50680
ps50723	ps50084	ps50561	ps50542	ps50552
ps50553	ps50508	ps50543	ps50559	ps50633
ps50610	ps50499	ps50583	ps50674	ps50624
ps50615	ps50595	ps50600	ps50622	ps50640
ps50626	ps50636	sipco	cgwb	stmib
sdatt	wabe			
<b>SUT Telephone Instruments</b>				
Telephone type	Model (s)		Software/Firmware	
Analog	Eurosets		NA	
Digital	optiPoint 500		Siemens proprietary OS	
	OpenStage 20T/40T/60T			
BRI	Optiset 1200S		Siemens proprietary OS	
IP	OpenStage 20HFA/40HFA		Linux V2.4 with patch V1 R3.15.11	
	optiPoint 420		VxWorks V5.4	
Soft Client	optiClient Dispatch		Windows XP SP3	
			HiPath Trading Client V3	
	Soft Client Adjunct Devices	oCTI	HiPath Trading V3	
		MUXY	HiPath Trading V3	
<b>LEGEND:</b>				
Admin	Administrative	R	Revision	
ADP	Administrative Data Processor	RG	Ring Generator	
AP	Access Point	RMX	Real-time Multitasking eXecutive	
BRI	Basic Rate Interface	SF2X8	Switch Fabric 2x8 ports	
CC	Call Controller	SICO	Signal Converter	
CLI	Command Line Interface	SLMA24	Subscriber Line Module Analog (24 Ports)	
ComWin	Command Window	SLMAE	Subscriber Line Module Analog Enhanced	
CS	Communication Server	SLMO	Subscriber Line Module Optiset	
DAKS	Digital Announcement and Conference Server	SLMOP	Subscriber Line Module Optiset Peripheral	
DIU2U	Digital Interface Unit 2 Universa	SLMY	Subscriber Line Module Trading/Dispatch (Siemens identifier "Y")	
DIU-N2	Digital Interface Unit -Network 2	SQL	Structured Query Language	
DSCXL	Data and Switch Controller Extended Level	STMI4	Subscriber/Trunk Module Interface 4	
EP	Emergency Processor	STMD3	Subscriber & Trunk Module 3	
EWSD	Elektronisches Wählsystem Digital	SP	Service Pack	
HG	HiPath Gateway	SUT	System Under Test	
HDMO	Hard Disk and Magneto Optical	SWU	Switching Unit	
IP	Internet Protocol	TDM	Time Division Multiplexing	
LTUCA	Line Trunk Unit Controller Advanced	TMOM2	Trunk Module Outgoing Multipurpose 2	
MS	Microsoft	TMDNH	Trunk Module Digital Network HiPath	
MUXY	Multiplexer (Siemens identifier "Y")	TMEMUS	Trunk Module Ear and Mouth (E & M) United States	
NA	Not Applicable	V	Version	
NCUI4	Network Communication Unit Interface 4	VoIP	Voice over Internet Protocol	
oCTI	Opti Client Trading Interface	XP	Experience	
OS	Operating System			
PSU	Power Supply Unit			

## 10. TESTING LIMITATIONS. None

## 11. TEST RESULTS

### a. Discussion

(1) DSN Trunk Interfaces. The SUT met all critical CRs and FRs for T1 CAS (DTMF and DP), E1 CAS (DTMF and DP), T1 ISDN PRI National ISDN (NI) 1/2 (American National Standards Institute [ANSI] T1.619a), and E1 ISDN PRI (International Telecommunication Union - Telecommunication Standardization Sector [ITU-T] 955.3) interfaces with the following minor exceptions:

(a) The SUT does not support Non Facility Associated Signaling (NFAS) on their T1 ISDN PRI NI2. This was adjudicated by the Defense Information Systems Agency (DISA) on 17 December 2008 as having a minor operation impact. Furthermore, DISA, in coordination with the Joint Staff, stated their intent to modify the next update of the UCR to change NFAS for a PBX 1 from required to conditional.

(b) The SUT T1 CAS wink start recognition is not within specification in accordance with the UCR, section 5.2.4.3.5. The requirement is to recognize a wink start signal from 100 milliseconds (ms) to 350 ms. The SUT recognizes a wink start signal from 85 ms to 365 ms. This discrepancy was previously adjudicated by DISA as having minor operational impact.

(2) DSN Line Interfaces. The SUT met all critical interoperability certification requirements for 2-Wire Loop Start Analog (GR-506-CORE), ISDN BRI S/T (4-Wire) NI1/2 ANSI T1.619a, 2-Wire Proprietary Digital, and VoIP DSN line interfaces with the minor exceptions listed in paragraphs 11.a.(3)(a)1, 11.a.(3)(a)2, and 11.a.(3)(g)1.

### (3) Features and Capabilities

(a) Common Features. The SUT met all critical interoperability certification requirements for Common Features with the following minor exceptions:

1. The SUT analog phones do not support Call Waiting. This was adjudicated by DISA on 21 July 2009 as having minor operational impact.

2. The SUT ISDN BRI S/T interface does not support Call Transfer or Three-Way Calling. This was adjudicated by DISA on 21 July 2009 as having minor operational impact.

3. The SUT does not provide the correct conference disconnect tone in accordance with the UCR, Table 5.2.4-5. This was adjudicated by DISA on 21 July 2009 as having minor operational impact.

4. The SUT does not provide 'Ping' Ring when Call Forward Variable (CFV) is activated. This was adjudicated by DISA on 21 February 2009 as having a minor operational impact. Also, this is not a required feature for a PBX 1. There is no risk associated with the SUT not supporting this feature.

(b) Attendant. This feature is supported by the SUT; however, it was not tested. The feature is therefore not certified by JITC. This is not a required feature for a PBX 1.

(c) Public Safety. The SUT met all critical CRs and FRs for Basic 911. Additionally the SUT met the following non-critical CRs and FRs: Tracing of a Terminating Call, Outgoing Call Tracing, and Trace of a Call in Progress.

(d) Conferencing. The SUT supports both Preset Conferencing and Meet-Me Conferencing utilizing a Digitale Alarm-und Kommunikationsserver (DAKs). However, this was not tested. The conferencing feature through the DAKS is therefore not certified by JITC. This is not a required feature for a PBX 1.

(e) Nailed-up Connections. This feature is not supported by the SUT. This is not a required feature for a PBX1. There is no risk associated with the SUT not supporting this feature.

(f) DSN Hotline Services. The SUT met all critical CRs and FRs.

(g) Multi-Level Precedence and Preemption (MLPP). The SUT met all critical CRs and FRs with the following minor exceptions:

1. The SUT Analog phones do not support Precedence Call Waiting. This was adjudicated by DISA on 21 July 2009 as having minor operational impact.

2. The SUT does not support the Loss of C2 announcement. This announcement is invoked only when a DSN subscriber is automatically routed to a non-MLPP network. DISA adjudicated this anomaly as having a minor operational impact because this announcement would rarely be invoked on a PBX 1. Furthermore, DISA, in coordination with the Joint Staff, stated their intent to modify the next update of the UCR to change the Loss of C2 announcement from required to conditional for a PBX 1.

(h) Call Processing. The SUT met all critical CRs and FRs.

(i) ISDN Services. The SUT met all critical CRs and FRs.

(j) Synchronization. The SUT met all critical CRs and FRs. The SUT supports line timing mode and Internal Stratum 4 for synchronization.

(k) Reliability. The SUT met all critical CRs and FRs.

(l) Network Management. The SUT met all critical CRs and FRs with an Institute of Electrical and Electronics Engineers (IEEE) 802.3u interface.

(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 Assured Services Local Area Network (ASLAN) on the UC APL.

(a) VoIP System. The UCR, paragraph 5.2.12.8.2, 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, paragraph 5.2.12.8.2.1, 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. The SUT meets MOS requirements with an average of 4.34 for 297 test calls conducted for 701 hours of active call time.

2. Codec. In accordance with the UCR, paragraph 5.2.12.8.2.2, 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. MLPP. In accordance with the UCR, paragraph 5.2.12.8.2.3, the VoIP system shall meet all MLPP requirements identified in UCR, Section 5.2.2. All critical MLPP features and functions were met by the SUT.

4. Security. Security requirements in accordance with the UCR, paragraph 5.2.12.8.2.4, 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, paragraph 5.2.12.8.2.5, 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. The SUT is certified with any ASLAN or ASLAN components on the UC APL. The ASLAN management system is covered under the ASLAN report.

6. Synchronization. In accordance with the UCR, paragraph 5.2.12.8.2.6, the VoIP system shall meet all synchronization requirements identified in UCR, paragraph 5.2.10. The SUT derived synchronization with line timing mode via traditional T1 TDM-based interfaces.

7. Latency. The UCR, paragraph 5.2.12.8.2.7, 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. The SUT meets this requirement with a measured average delay of 52.17 ms. The dynamic jitter buffer in the OpenStage 60HFA VoIP phone causes periodic latency failures in 25 percent of the tests that were measured as large as 63.2 ms during a five-minute period of time. Therefore, the OpenStage 60HFA VoIP phone is not certified for use with the SUT.

8. Internet Protocol version 6 (IPv6). In accordance with UCR, section 5.3.5, all systems submitted for testing must be IPv6 capable. Dual Stack solutions are preferred and tunneling solutions are unacceptable. IPv6 Capable-products, in accordance with UCR, section 4.3.1.3, can create or receive, process, and send or forward (as appropriate) IPv6 packets in mixed Internet Protocol version 4 (IPv4)/IPv6 environments. IPv6 capable products shall be able to interoperate with other IPv6 capable products on networks supporting only IPv4, only IPv6, or both IPv4 and IPv6, and shall also:

a. Conform to the requirements of the Department of Defense (DoD) IPv6 Standard Profiles for IPv6 Capable Products document contained in the DoD Information Technology Standards Registry (DISR).

b. Possess a migration path and/or written commitment to upgrade from the developer (company Vice President or equivalent) as the IPv6 standard evolves.

c. Ensure product developer IPv6 technical support is available.

d. Conform to National Security Agency (NSA) and/or Unified Cross Domain Management Office requirements for Information Assurance products.

The vendor stated in their LoC that the SUT will not be IPv6 compliant until the next software release and requested a waiver from the Office of the Secretary of Defense (OSD) of this requirement until June of 2010. The OSD waived this requirement for the SUT on 12 November 2008 with the stipulation that the vendor submit this new release for testing via the Unified Capabilities Certification Office after June 2010.

9. In accordance with the UCR, section 5.2.12.8.2.9, the VoIP session control components (i.e. Media Gateway and Session Control Agent) shall meet the following requirements:

a. All components shall be capable of implementing Service Class tagging using the 6-bit traffic class in the IPv6 header and DSCPs field in the IPv4 header. The SUT session control components used 6-bit service class tagging in the IP header, which meets the requirement.

b. All session control components shall be capable of assigning DSCP (0-63) to any distinct service class for traffic that traverses the device in accordance with UCR, Table 5.3.1-3. In accordance with the UCR, the DSCP field of the IP traffic associated with the distinct service classes of the session control components can be assigned a unique value by the SUT which meets this requirement.

c. For VoIP, video, and data end products, any end system that supports convergence (i.e., more than one media) the end-system must preassign the virtual LAN (VLAN) using Institute of Electrical and Electronics Engineers (IEEE) 802.1Q tags prior to the frames entering the ASLAN in accordance with UCR, section 5.3.1.7.4. For end-systems that support just one media (i.e., voice or video or data), the LAN can assign the VLAN based on port-based VLAN assignment. The SUT VoIP session control components provide IEEE 802.1Q 2-byte TGI VID, which meets the requirement. In addition, although the SUT is not required to support the IEEE 802.1Q Priority header information, the SUT session control components have arbitrary values coded in them. DISA adjudicated this as minor on 2 September 2009.

10. In accordance with the UCR, section 5.2.12.8.2.9, the VoIP system end user devices shall meet the following requirements:

a. All end instrument components shall be capable of assigning DSCP (0-63) to any distinct service class for traffic that traverses the device in accordance with UCR, Table 5.3.1-3. The DSCPs may be assigned by either having the end instrument itself assign the traffic class and DSCP tag to the distinct service class or having the call control portion of the VoIP system tell the end instrument what distinct service class to assign. The SUT end instruments have the capability to be assigned any DSCP value of 0-63. However, the OpenStage series IP phones have Real Time Control Protocol (RTCP) traffic from the phone tagged at 0, and it cannot be changed. DISA adjudicated this as minor on 2 September 2009.

b. All end instruments shall be capable of implementing Service Class tagging using the 6-bit traffic class in the IPv6 header and DSCPs field in the IPv4 header. The SUT end instruments that support IPv6 dual stack used 6-bit service class tagging in the respective IP headers for IPv4 and IPv6, which meets the requirement.

c. For VoIP, video, and data end products, any end system that supports convergence (i.e., more than one media) the end-system must preassign the VLAN using IEEE 802.1Q tags prior to the frames entering the ASLAN in accordance with UCR, section 5.3.1.7.4. For end-systems that support just one media (i.e., voice or video or data), the LAN can assign the VLAN based on port-based VLAN assignment. The SUT end instruments that met all the critical interoperability requirements were the optiPoint 420 series and OpenStage series IP phones. These end instruments are certified for 10/100 Mbps shared access (i.e., same switch port is shared by PC and IP phone) except for the optiPoint 420 Economy IP phone which does not support shared access.

(b) Scalability. The SUT can support up to 15 directly connected access points plus 83 IP-distributed access points. A maximum of 12,000 subscribers can be supported in this configuration for each HiPath 4000 V5 communication server. In a HiPath 4000 V5 networked system, up to 100,000 users can be implemented; however, this capability was not tested. The recommendation is to consult an engineer to determine the appropriate configurations. JITC only tested the SUT with one HiPath 4000 and one IP-distributed access point. The SUT is certified with any certified ASLAN or ASLAN components on the UC APL.

(5) Softphone. Reference (h) is a DISA memo that stipulates interim softphone requirements that supersede the current UCR 2008 requirements until they are implemented in Change 1. The SUT Siemens optiClient Dispatch met all of the critical requirements in accordance with this memorandum as listed below. The Siemens optiClient Dispatch is supported on a DoD-approved personal computer (PC) or laptop running Windows XP. The following paragraphs detail the softphone requirements.

(a) The DISA, Softphone Certification Memo, Reference (h), states the softphone shall be functionally identical to a traditional Internet Protocol (IP) "Hard" telephone and will be required to provide voice features and functionality in accordance with UCR. The softphone met all critical CRs and FRs for the following features and functions.

- Directory Number Identification (R)
- Basic Line Test Capabilities (R)
- Alerting Signals and Tones (R)
- MOS (R)
- MLPP (R)
- Call Waiting (R)
- Three Way Calling (R)
- Call Transfer (R)
- Call Hold (R)
- Call Forwarding (R)

(b) The UCR, paragraph 5.2.12.8.3.1, states the Softphone application shall support the following interface capabilities provided by the general-purpose computer hosting the Softphone, which were met by the softphone:

- Microphone and speaker or headphone, or any other audio input/output device
- Ethernet interface(s)
- Mouse (Point and click) interaction

In addition the softphone minimum requirements are as follows:

- Customer provided laptop or PC with applicable Security Technical Implementation Guides (STIGs)
- 555 MegaHertz (MHz) Pentium-III or better processor
- Windows XP SP3 or Windows Server 2003

- Microphone and full duplex sound card
- 48 megabyte (MB) free Random Access Memory (RAM) (This requirement is in addition to the memory requirements of the Operating System and other concurrent applications.)
- 75 MB free hard disk space
- 640x480 @8bpp (256 colors) VGA graphics card
- Network Interface Card (NIC) capable of supporting IEEE 802.1Q VLAN Tagging

(c) The UCR, paragraph 5.2.12.8.3.2, states the Softphone shall provide audible and visual alerting to the end user of an incoming call, even if the application is running in the background. The softphone met this requirement.

(6) Network Gateways. The SUT met all critical interoperability certification requirements for the Public Switched Telephone Network (PSTN) Network Gateways with the following interfaces: T1 CAS (DTMF and DP), E1 CAS (DTMF and DP), T1 ISDN PRI NI 1/2 (ANSI T1.607), E1 ISDN PRI (ITU-T Q.931), and Ground Start Line.

**b. System Interoperability Results.** The SUT is certified for joint use in the Defense Information System Network (DISN) as a PBX 1 and PBX 2 in accordance with the requirements set forth in the UCR. The interoperability test summary is shown in Table 2-3. The SUT 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)	No	Certified	Met all critical CRs and FRs with the following minor exception: Wink start recognition is not within the UCR specifications. <sup>1</sup>
E1 CAS (DTMF, DP)	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 with the following exception: The SUT does not support NFAS. <sup>2</sup>
E1 ISDN PRI (ITU-T Q.955.3)	No (Europe only)	Certified	Met all critical CRs and FRs.
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 exception. Analog phones do not support call waiting or precedence call waiting. <sup>3</sup>
ISDN BRI NI 1/2 (ANSI T1.619a)	No	Certified	The SUT met all critical CRs and FRs for the ISDN BRI S/T interface with the following minor exceptions: The ISDN BRI S/T interface does not support Call Transfer or Three-Way-Calling. <sup>4</sup> The SUT does not support ISDN BRI U interface. ISDN BRI is not a required interface for a PBX 1. There is no risk associated with the SUT not supporting this interface.
2-Wire Proprietary Digital VoIP	No	Certified	Met all critical CRs and FRs.
(Ethernet IEEE 802.3u)	No	Certified	Met all critical CRs and FRs.

**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 exceptions: The SUT does not provide the exact conference disconnect tone in accordance with the UCR. <sup>5</sup> The SUT fails to provide a 0.5 second ring on phone provisioned with Call Forward Variable. <sup>6</sup> Analog phones do not support Call Waiting. <sup>3</sup>	
Attendant	No	Not Tested	This feature is supported by the SUT; however it was not tested. The feature is therefore not certified by JITC. This is not a required feature for a PBX 1.	
Public Safety	Yes	Certified	The SUT met all critical CRs and FRs for Basic 911. Additionally the SUT met the following non-critical CRs and FRs: Tracing of a Terminating Call, Outgoing Call Tracing, and Trace of a Call in Progress.	
Conferencing	No	Not Tested	This feature is supported by the SUT; however it was not tested. This feature is therefore not certified by JITC. This is not a required feature for a PBX 1.	
Nailed-up Connections	No	Not Tested	This feature is not supported by the SUT. This is not a required feature for a PBX1. There is no risk associated with the SUT not supporting this feature.	
DSN Hotline Services	No	Certified	Met all critical CRs and FRs.	
MLPP	Yes	Certified	Met all critical CRs and FRs with the following minor exceptions: Analog phones do not support call waiting or precedence call waiting. <sup>3</sup> The SUT does not support Loss of C2 User announcement. <sup>7</sup>	
Call Processing	Yes	Certified	Met all critical CRs and FRs.	
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.	
Network Management	No	Certified	Met all CRs and FRs with an IEEE 802.3u interface.	
Security	Yes	Certified	See note 8.	
VoIP System	No	Certified	Met all critical CRs and FRs with the following minor exception: The SUT did not meet the IPv6 capability requirements. <sup>9</sup>	
Softphone	No	Certified	Met all critical CRs and FRs.	
Network Gateways				
Gateway	Interface & Signaling	Critical	Status	Remarks
PSTN	T1 CAS (DTMF, DP)	No	Certified	Met all critical CRs and FRs.
	E1 CAS (DTMF, DP)	No (Europe only)	Certified	Met all critical CRs and FRs.
	T1 ISDN PRI NI 1/2 (ANSI T1.607)	No	Certified	Met all critical CRs and FRs.
	E1 ISDN 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.
<b>NOTES:</b>				
1 The SUT T1 CAS wink start recognition is not within specification in accordance with the UCR, section 5.2.4.3.5. The requirement is to recognize a wink start signal from 100 ms to 350 ms. The SUT recognizes a wink start signal from 85 ms to 365 ms. This discrepancy was previously adjudicated by DISA as having minor operational impact.				
2 The SUT does not support NFAS on their ISDN PRI NI2 interface. This was adjudicated by DISA on 17 December 2008 as having a minor operation impact. Furthermore, DISA, in coordination with the Joint Staff, stated their intent to modify the next update of the UCR to change NFAS for a PBX 1 from required to conditional.				
3 The SUT analog end instruments do not support the following required features: Call Waiting or Precedence Call Waiting. This was adjudicated by DISA on 21 July 2009 as having minor operational impact.				
4 The SUT ISDN BRI S/T interface does not support Call Transfer or Three-Way Calling. This was adjudicated by DISA on 21 July 2009 as having minor operational impact.				
5 The SUT does not provide the correct conference disconnect tone in accordance with the UCR, Table 5.2.4-5. This was adjudicated by DISA on 21 July 2009 as having minor operational impact.				

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

**NOTES (continued):**

- 6 The SUT does not provide 'Ping' Ring when CFV is activated. This was adjudicated by DISA on 21 February 2009 as having a minor operational impact. Also, this is not a required feature for a PBX 1. There is no risk associated with the SUT not supporting this feature.
- 7 The SUT does not support the Loss of C2 announcement. This announcement is invoked only when a DSN subscriber is automatically routed to a non-MLPP network. DISA adjudicated this anomaly as having a minor operational impact because this announcement would rarely be invoked on a PBX 1. Furthermore, DISA, in coordination with the Joint Staff, stated their intent to modify the next update of the UCR to change the Loss of C2 announcement from required to conditional for a PBX 1.
- 8 Security is tested by DISA-led Information Assurance test teams and published in a separate report, Reference (c).
- 9 In accordance with UCR, section 5.3.5, all systems submitted for testing must be IPv6 capable. Dual Stack solutions are preferred and tunneling solutions are unacceptable. In accordance with UCR, section 4.3.1.3, IPv6 capable-products, can create or receive, process, and send or forward (as appropriate) IPv6 packets in mixed IPv4/v6 environments. IPv6 capable products shall be able to interoperate with other IPv6 capable products on networks supporting only IPv4, only IPv6, or both IPv4 and IPv6, and shall also:
  - a. Conform to the requirements of the DoD IPv6 Standard Profiles for IPv6 Capable Products document contained in the DISR.
  - b. Possess a migration path and/or written commitment to upgrade from the developer (company Vice President or equivalent) as the IPv6 standard evolves.
  - c. Ensure product developer IPv6 technical support is available.
  - d. Conform to National Security Agency (NSA) and/or Unified Cross Domain Management Office requirements for Information Assurance products.

The vendor stated in their LoC that the SUT will not be IPv6 compliant until the next software release and requested a waiver from OSD of this requirement until June of 2010. The OSD waived this requirement for the SUT on 12 November 2008 with the stipulation that the vendor submit this new release for testing via the Unified Capabilities Certification Office after June 2010.

**LEGEND:**

802.3u	Standard for carrier sense multiple access with collision detection at 100 Mbps	JITC	Joint Interoperability Test Command
		LoC	Letter of Compliance
ANSI	American National Standards Institute	LSSGR	Local Access and Transport Area (LATA) Switching Systems Generic Requirements
BRI	Basic Rate Interface		
C2	Command and Control	Mbps	Megabits per second
CAS	Channel Associated Signaling	MLPP	Multi-Level Precedence and Preemption
CFV	Call Forward Variable	ms	milliseconds
CRs	Capability Requirements	NFAS	Non-Facility Associated Signaling
DISA	Defense Information Systems Agency	NI 1/2	National ISDN Standard 1 or 2
DISR	DoD Information Technology Standards Registry	NI2	National ISDN Standard 2
DoD	Department of Defense	OSD	Office of the Secretary of Defense
DP	Dial Pulse	PBX 1	Private Branch Exchange 1
DSN	Defense Switched Network	PRI	Primary Rate Interface
DSS1	Digital Subscriber Signaling 1	PSTN	Public Switched Telephone Network
DTMF	Dual Tone Multi-Frequency	Q.931	Signaling Standard for ISDN
E1	European Basic Multiplex Rate (2.048 Mbps)	Q.955.3	ISDN Signaling standard for E1 MLPP
FRs	Feature Requirements	S/T	ISDN BRI 4-wire interface
GR	Generic Requirement	SS7	Signaling System 7
GR-506-CORE	LSSGR: Signaling for Analog Interfaces	SUT	System Under Test
IEEE	Institute of Electrical and Electronics Engineers	T1	Digital Transmission Link Level 1 (1.544 Mbps)
IPv4	Internet Protocol version 4	T1.607	ISDN Layer 3 Signaling Specification for Circuit Switched Bearer Service for DSS1
IPv6	Internet Protocol version 6	T1.619a	SS7 and ISDN MLPP Signaling Standard for T1
ISDN	Integrated Services Digital Network	U	ISDN BRI 2-wire interface
ITU-T	International Telecommunication Union - Telecommunication Standardization Sector	UCR	Unified Capabilities Requirements
		VoIP	Voice over Internet Protocol

**12. TEST AND ANALYSIS REPORT.** No detailed test report was developed in accordance with the Program Manager's request. JITC distributes interoperability information via the JITC Electronic Report Distribution (ERD) system, which uses Unclassified-But-Sensitive Internet Protocol Router Network (NIPRNet) e-mail. More comprehensive interoperability status information is available via the JITC System Tracking Program (STP). The STP is accessible by .mil/gov users on the NIPRNet at

<https://stp.fhu.disa.mil>. Test reports, lessons learned, and related testing documents and references are on the JITC Joint Interoperability Tool (JIT) at <http://jit.fhu.disa.mil> (NIPRNet), or <http://199.208.204.125> (SIPRNet). Information related to DSN testing is on the Telecom Switched Services Interoperability (TSSI) website at <http://jitc.fhu.disa.mil/tssi>. Due to the sensitivity of the information, the Information Assurance Accreditation Package (IAAP) that contains the approved configuration and deployment guide must be requested directly through government civilian or uniformed military personnel from the Unified Capabilities Certification Office (UCCO), e-mail: [ucco@disa.mil](mailto:ucco@disa.mil).

**Table 2-5. SUT Interoperability Requirements/Status**

DSN Trunk Interfaces							
Interface	Critical	Interface Status	UCR Requirement		Reference	Test Results	Remarks
T1 CAS (DTMF, DP)	No	Certified	Trunking	Direct Inward Dialing (C)	UCR Section 5.2.1.3.2	Met	
				Trunk Group-Remove from Service (C)	UCR Section 5.2.1.5.5	Met	
				Trunk Group-Restore to Service (C)	UCR Section 5.2.1.5.5	Met	
				Normal Wink Start Operations (C)	UCR Section 5.2.4.3.3.1.1	Met	See note 1.
				Glare Operation (C)	UCR Section 5.2.4.3.3.1.2	Met	
				Abnormal Wink Start (C)	UCR Section 5.2.4.3.3.2.1	Met	
				Glare Resolution (C)	UCR Section 5.2.4.3.3.2.2	Met	
				Call for Service Timing (R)	UCR Section 5.2.4.3.5	Met	
				Guard Timing (R)	UCR Section 5.2.4.3.6	Met	
				Satellite Timing (C)	UCR Section 5.2.4.3.7	Met	
				Disconnect Control (C)	UCR Section 5.2.4.3.8	Met	
				Reselect and Retrial (C)	UCR Section 5.2.4.3.9	Not Tested	See note 2.
				Off-Hook Supervision Transition (C)	UCR Section 5.2.4.3.10	Met	
				Dial-Pulse Signals (C)	UCR Section 5.2.4.4.1	Met	
				DTMF Signaling (C)	UCR Section 5.2.4.4.2	Met	
				Standard Digit Format for Precedence (C)	UCR Section 5.2.4.4.2.1	Met	
				MFR1 2/6 Signaling (C)	UCR Section 5.2.4.4.3	Met	
				Alerting Signals and Tones (R)	UCR Section 5.2.4.5.1	Met	
				DSN Transmission Interface (R)	UCR Section 5.2.5	Met	
				PCM-24 Digital Trunk Interface (R)	UCR Section 5.2.6.1	Met	
				Interface Characteristics (R)	UCR Section 5.2.6.1.1	Met	
				Supervisory Channel Associated Signaling (C)	UCR Section 5.2.6.1.2	Met	
				Clear Channel Capability (R)	UCR Section 5.2.6.1.3	Met	
				Alarm and Restoral Requirements (R)	UCR Section 5.2.6.1.4	Met	
				Interoperation of PCM-24 and PCM-30 (C)	UCR Section 5.2.6.3	Met	
				Integrated Digital Loop Carrier (C)	UCR Section 5.2.6.5	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					

**Table 2-5. SUT Interoperability Requirements/Status (continued)**

DSN Trunk Interfaces							
Interface	Critical	Interface Status	UCR Requirement		Reference	Test Results	Remarks
E1 CAS (DTMF, DP)	No (Europe only)	Certified	Trunking	Direct Inward Dialing (C)	UCR Section 5.2.1.3.1	Met	
				Trunk Group-Remove from Service (C)	UCR Section 5.2.1.5.5	Met	
				Trunk Group-Restore to Service (C)	UCR Section 5.2.1.5.5	Met	
				Normal Wink Start Operations (C)	UCR Section 5.2.4.3.3.1.1	Met	
				Glare Operation (C)	UCR Section 5.2.4.3.3.1.2	Met	
				Abnormal Wink Start (C)	UCR Section 5.2.4.3.3.2.1	Met	
				Glare Resolution (C)	UCR Section 5.2.4.3.3.2.2	Met	
				Call for Service Timing (R)	UCR Section 5.2.4.3.5	Met	
				Guard Timing (R)	UCR Section 5.2.4.3.6	Met	
				Satellite Timing (C)	UCR Section 5.2.4.3.7	Met	
				Disconnect Control (C)	UCR Section 5.2.4.3.8	Met	
				Reselect and Retrial (C)	UCR Section 5.2.4.3.9	Met	
				Off-Hook Supervision Transition (C)	UCR Section 5.2.4.3.10	Met	
				Dial-Pulse Signals (C)	UCR Section 5.2.4.4.1	Met	
				DTMF Signaling (C)	UCR Section 5.2.4.4.2	Met	
				Standard Digit Format for Precedence (C)	UCR Section 5.2.4.4.2.1	Met	
				MFR1 2/6 Signaling (C)	UCR Section 5.2.4.4.3	Not Tested	See note 3.
				Alerting Signals and Tones (R)	UCR Section 5.2.4.5.1	Met	
				DSN Transmission Interface (R)	UCR Section 5.2.5	Met	
			PCM-30 Digital Trunk Interface (C)	UCR Section 5.2.6.2	Met		
			Interoperation of PCM-24 and PCM-30 (C)	UCR Section 5.2.6.3	Met		
			Integrated Digital Loop Carrier (C)	UCR Section 5.2.6.5	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					

**Table 2-5. 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)	Yes	Certified	Trunking	Direct Inward Dialing (C)	UCR Section 5.2.1.3.2	Met	
				National ISDN 1/2 Primary Access (R)	UCR Section 5.2.1.3.4.1	Met	See note 4.
				ISDN ANSI MLPP Service Capability (R)	UCR Section 5.2.1.3.4.1.1	Met	
				Trunk Group-Remove from Service (C)	UCR Section 5.2.1.5.5	Met	
				Trunk Group-Restore to Service (C)	UCR Section 5.2.1.5.5	Met	
				Call for Service Timing (R)	UCR Section 5.2.4.3.5	Met	
				Alerting Signals and Tones (R)	UCR Section 5.2.4.5.1	Met	
				DSN ISDN User-to-Network Signaling (R)	UCR Section 5.2.4.7.1.4.2	Met	
				Application (R)	UCR Section 5.2.4.7.1.1	Met	
				Physical Layer (R)	UCR Section 5.2.4.7.1.2	Met	
				Data Link Layer (R)	UCR Section 5.2.4.7.1.3	Met	
				Data Link Connection (R)	UCR Section 5.2.4.7.1.3.1	Met	
				Peer-to-Peer Procedures of Data-Link Layer (R)	UCR Section 5.2.4.7.1.3.2	Met	
				Layer 3 DSN User-to-Network Signaling (R)	UCR Section 5.2.4.7.1.4	Met	
				DSN User-to-Network Signaling for Circuit-Switched Bearer Services (R)	UCR Section 5.2.4.7.1.4.2	Met	
				Sequence of Messages for DSN Circuit-Switched Calls (R)	UCR Section 5.2.4.7.1.4.3	Met	
				Message Functional Definition and Content (R)	UCR Section 5.2.4.7.1.4.4	Met	
				General Message Format and Information Elements Coding (R)	UCR Section 5.2.4.7.1.4.5	Met	
				Supplementary Services (C)	UCR Section 5.2.4.7.1.4.6	Not Tested	See note 2.
				DSN Transmission Interface (R)	UCR Section 5.2.5	Met	
				PCM-24 Digital Trunk Interface (R)	UCR Section 5.2.6.1	Met	
				Interface Characteristics (R)	UCR Section 5.2.6.1.1	Met	
				Clear Channel Capability (R)	UCR Section 5.2.6.1.3	Met	
			Alarm and Restoral Requirements (R)	UCR Section 5.2.6.1.4	Met		
			Interoperation of PCM-24 and PCM-30 (C)	UCR Section 5.2.6.3	Met		
			Integrated Digital Loop Carrier (C)	UCR Section 5.2.6.5	Met		
			Voice	MOS (R)	CJCSI 6215.01C	Met	
				Secure calls (R)	CJCSI 6215.01C	Met	
Facsimile	Analog: ITU-T T.4 (R)	DISR	Met				

**Table 2-5. 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)	Yes	Certified	Data	Modem (VBD) (R)	CJCSI 6215.01C	Met	
				56 kbps switched data (R: PRI only)	UCR Section 5.2.2.9.6	Met	
				64 kbps switched data (R: PRI only)	UCR Section 5.2.2.9.6	Met	
				NX56 synchronous BER (R: PRI only)	UCR Section 5.2.2.9.6	Met	
				NX64 synchronous BER (R: PRI only)	UCR Section 5.2.2.9.6	Met	
				Secure data (STE/STU-III) (R)	CJCSI 6215.01C	Met	
			VTC	ITU-T H.320 (R: PRI only)	FTR 1080B-2002	Met	

**Table 2-5. 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 (Europe only)	Certified	Trunking	Direct Inward Dialing (C)	UCR Section 5.2.1.3.2	Met	
				ITU-T ISDN Primary Access (C)	UCR Section 5.2.1.3.4.2	Met	
				ITU-T ISDN Primary Access Digital Subscriber Signaling System Number 1 MLPP (C)	UCR Section 5.2.1.3.4.2.1	Met	
				Trunk Group-Remove from Service (C)	UCR Section 5.2.1.5.5	Met	
				Trunk Group-Restore to Service (C)	UCR Section 5.2.1.5.5	Met	
				Call for Service Timing (R)	UCR Section 5.2.4.3.5	Met	
				Disconnect Control (C)	UCR Section 5.2.4.3.8	Met	
				Off-Hook Supervision Transition (C)	UCR Section 5.2.4.3.10	Met	
				DSN ISDN User-to-Network Signaling (R)	UCR Section 5.2.4.7.1.4.2	Met	
				Application (R)	UCR Section 5.2.4.7.1.1	Met	
				Physical Layer (R)	UCR Section 5.2.4.7.1.2	Met	
				Data Link Layer (R)	UCR Section 5.2.4.7.1.3	Met	
				Data Link Connection (R)	UCR Section 5.2.4.7.1.3.1	Met	
				Peer-to-Peer Procedures of Data-Link Layer (R)	UCR Section 5.2.4.7.1.3.2	Met	
				Layer 3 DSN User-to-Network Signaling (R)	UCR Section 5.2.4.7.1.4	Met	
				DSN User-to-Network Signaling for Circuit-Switched Bearer Services (R)	UCR Section 5.2.4.7.1.4.2	Met	
				Sequence of Messages for DSN Circuit-Switched Calls (R)	UCR Section 5.2.4.7.1.4.3	Met	
				Message Functional Definition and Content (R)	UCR Section 5.2.4.7.1.4.4	Met	
				General Message Format and Information Elements Coding (R)	UCR Section 5.2.4.7.1.4.5	Met	
			PCM-30 Digital Trunk Interface (C)	UCR Section 5.2.6.2	Met		
Interoperation of PCM-24 and PCM-30 (C)	UCR Section 5.2.6.3	Met					
Integrated Digital Loop Carrier (C)	UCR Section 5.2.6.5	Not Tested	See note 2.				
Voice			MOS (R)	CJCSI 6215.01C	Met		
			Secure calls (R)	CJCSI 6215.01C	Met		

**Table 2-5. 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 (Europe only)	Not Certified (See note 5.)	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 5.2.2.9.6	Met	
				64 kbps switched data (R: PRI only)	UCR Section 5.2.2.9.6	Met	
				NX56 synchronous BER (R: PRI only)	UCR Section 5.2.2.9.6	Met	
				NX64 synchronous BER (R: PRI only)	UCR Section 5.2.2.9.6	Met	
				Secure data (STE/STU-III) (R)	CJCSI 6215.01C	Met	
			VTC	ITU-T H.320 (R: PRI only)	FTR 1080B-2002	Met	

**Table 2-5. SUT Interoperability Requirements/Status (continued)**

DSN Line Interfaces							
Interface	Critical	Interface Status	UCR Requirement		Reference	Test Results	Remarks
2-Wire Loop Start Analog	Yes	Certified	Access	Directory Number Identification (R)	UCR Section 5.2.1.1.1	Met	
				PBX Line (C)	UCR Section 5.2.1.3.1	Met	
				Analog Line (R)	UCR Section 5.2.1.3.5	Met	
				Basic Line Test Capabilities (R)	UCR Section 5.2.1.5.4.1.1	Met	
				Advanced Line Test Capabilities (C)	UCR Section 5.2.1.5.4.1.1	Not Tested	See note 2.
				Loop Start Line (R: 2-Wire Analog only)	UCR Section 5.2.4.2.1	Met	
				Reverse Battery (R)	UCR Section 5.2.4.3.1	Met	
				Alerting Signals and Tones (R)	UCR Section 5.2.4.5.1	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					
ISDN BRI NI 1/2 (ANSI T1.619a)	No	Certified (See note 5.)	Access	Directory Number Identification (R)	UCR Section 5.2.1.1.1	Met	
				National ISDN 1/2 Basic Access (C)	UCR Section 5.2.1.3.3	Met	
				Alerting Signals and Tones (R)	UCR Section 5.2.4.5.1	Met	
				S/T Reference Point (R)	UCR Section 5.2.4.7.1.2.1	Met	
			Voice	MOS (R)	CJCSI 6215.01C	Met	
				Secure calls (R)	CJCSI 6215.01C	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	Certified	Access	Directory Number Identification (R)	UCR Section 5.2.1.1.1	Met	
				Alerting Signals and Tones (R)	UCR Section 5.2.4.5.1	Met	
			Voice	MOS (R)	CJCSI 6215.01C	Met	
				Secure calls (R)	CJCSI 6215.01C	Not Tested	

**Table 2-5. 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 5.2.1.1.1	Met	
			Denied originating service (C)	UCR Section 5.2.1.1.3	Met	
			Code restriction and diversion (C)	UCR Section 5.2.1.1.4	Met	
			Call waiting (R)	UCR Section 5.2.1.1.5.1	Met	See note 6.
			Three-way calling (R)	UCR Section 5.2.1.1.6	Met	See note 7.
			Add-on transfer, conference calling, and call hold (C)	UCR Section 5.2.1.1.7	Met	
			Call Transfer Individual - All calls (R)	UCR Section 5.2.1.1.7.1	Met	
			Call Transfer - Internal Only (R)	UCR Section 5.2.1.1.7.2	Met	
			Call Transfer - Individual - Incoming Only/Add-On Consultation Hold - Incoming Call (R)	UCR Section 5.2.1.1.7.3	Met	
			Call Transfer - Outside (R)	UCR Section 5.2.1.1.7.4	Met	
			Call Transfer - Add-On Restricted Station (C)	UCR Section 5.2.1.1.7.5	Not Tested	See note 2.
			Call Transfer - Attendant (C)	UCR Section 5.2.1.1.7.6	Not Tested	See note 2.
			Call Hold (R)	UCR Section 5.2.1.1.7.7	Met	
			Conference Calling - Six Way Station Controlled (C)	UCR Section 5.2.1.1.7.8	Met	See note 8.
			Call Forwarding Variable (R)	UCR Section 5.2.1.1.8.1	Met	See note 9.
			Call Forward Busy Line (R)	UCR Section 5.2.1.1.8.2	Met	
			Call Forwarding – Don't Answer – All Calls (R)	UCR Section 5.2.1.1.8.3	Met	
			Selective Call Forwarding (C)	UCR Section 5.2.1.1.8.4	Not Tested	
			Call pick-up (C)	UCR Section 5.2.1.1.9.1	Met	
			Address Translation (C)	UCR Section 5.2.1.7	Met	
Assured Dial Tone (C)	UCR Section 5.2.1.9	Met				
Attendant	No	Not Tested	Attendant Features (C)	UCR Section 5.2.1.2.2	Not Tested	See note 10.
Public Safety	Yes	Certified	Emergency Service (911) Caller (R)	UCR Section 5.2.1.4.1.1	Met	
			Emergency Service (911) Public Safety Answering Service (C)	UCR Section 5.2.1.4.1.2	Not Tested	See note 2.
			Enhanced Emergency Service (E911) (C)	UCR Section 5.2.1.4.1.3	Not Tested	See note 2.
			Trace of terminating calls (C)	UCR Section 5.2.1.4.2	Met	
			Outgoing call trace (C)	UCR Section 5.2.1.4.3	Met	

**Table 2-5. SUT Interoperability Requirements/Status (continued)**

DSN Features and Capabilities						
Feature/ Capability	Critical	Feature Status	UCR Requirement	Reference	Test Results	Remarks
Conferencing	No	Not Tested	Preset Conferencing (C)	UCR Section 5.2.1.6.1	Not Tested	See note 2.
			Meet-Me Conferencing (C)	UCR Section 5.2.1.6.2	Not tested	See note 2.
			Progressive Conferencing (C)	UCR Section 5.2.1.6.3	Not Tested	See note 2.
Nailed-up Connections	No	Not Tested	Nailed-Up Connections (C)	UCR Section 5.2.1.8	Not Tested	See note 2.
DSN Hotline Services	No	Certified	DSN Analog Hotline Service (C)	UCR Section 5.2.1.12	Met	
MLPP	Yes	Certified	MLPP Overview (R)	UCR Section 5.2.2.1.1	Met	See note 11.
			Preemption in the Network (R)	UCR Section 5.2.2.2	Met	
			Network Facility with Lower Precedence Calls (R)	UCR Section 5.2.2.2.1	Met	
			Network Facility with Equal or Higher Precedence Calls (R)	UCR Section 5.2.2.2.2	Met	
			Precedence Call Diversion (R)	UCR Section 5.2.2.3	Met	
			Channel Associated Signaling (C)	UCR Section 5.2.2.4.1	Met	
			Primary Rate Interface (R)	UCR Section 5.2.2.4.2	Met	
			Analog Line MLPP (R)	UCR Section 5.2.2.5	Met	
			ISDN MLPP Basic Rate Interface (C)	UCR Section 5.2.2.6	Met	
			ISDN Primary Rate Interface (R)	UCR Section 5.2.2.7	Met	
			Precedence Call Waiting (R)	UCR Section 5.2.2.8.1	Met	See note 6.
			Call Forwarding (R)	UCR Section 5.2.2.8.2	Met	
			Call Transfer (R)	UCR Section 5.2.2.8.3	Met	
			Call Hold (R)	UCR Section 5.2.2.8.4	Met	
			Three-Way Calling (R)	UCR Section 5.2.2.8.5	Met	
			Call Pickup (C)	UCR Section 5.2.2.8.6	Met	
			Conferencing (C)	UCR Section 5.2.2.8.7.1	Met	
			Multiline Hunt Group (C)	UCR Section 5.2.2.8.8	Met	
Community of Interest (C)	UCR Section 5.2.2.8.9	Not Tested	See note 2.			
MLPP Interaction with EKTS features (C)	UCR Section 5.2.2.10.1	Not Tested	See note 2.			

**Table 2-5. 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 5.2.3.1	Met	
			Primary and Alternate Routing (C)	UCR Section 5.2.3.2	Met	
			E&M Lead Signaling States (C)	UCR Section 5.2.3.3.1	Not Tested	See note 3.
			4-Wire Analog User Access Lines (C)	UCR Section 5.2.3.3.2	Not Tested	See note 3.
			2-Wire User Access Lines (R)	UCR Section 5.2.3.3.3	Met	
			Termination of Analog Lines (R)	UCR Section 5.2.3.3.4	Met	
			DSN User Dialing (R)	UCR Section 5.2.3.5.1.1	Met	
			Interswitch and Intraswitch Dialing (R)	UCR Section 5.2.3.5.1.1	Met	
			Seven-Digit Dialing (R)	UCR Section 5.3.3.5.2.1	Met	
			Ten-Digit Dialing (R)	UCR Section 5.2.3.5.2.2	Met	
			Access Code (R)	UCR Section 5.2.3.5.1.3	Met	
			Access Digit (R)	UCR Section 5.2.3.5.1.3.1	Met	
			Precedence Digit (R)	UCR Section 5.2.3.5.1.3.2	Met	
			Service Digit (R)	UCR Section 5.2.3.5.1.3.3	Met	
			Route Code (R)	UCR Section 5.2.3.5.1.4	Met	
			Area Code (R)	UCR Section 5.2.3.5.1.5	Met	
			Switch Code (R)	UCR Section 5.2.3.5.1.6	Met	
			Line Number (R)	UCR Section 5.2.3.5.1.7	Met	
			Calling Name Delivery (C)	UCR Section 5.2.3.5.1.8.1	Not Tested	See note 2.
			Calling Number Delivery (R)	UCR Section 5.2.3.5.1.8.2	Met	
			Emergency Service 911 Conflict Resolution (R)	UCR Section 5.2.3.5.1.9	Met	
			DSN Switch Outpulsing Digit Formats (C)	UCR Section 5.2.3.5.2	Met	
			Standard Directory Number (R)	UCR Section 5.2.3.5.3	Met	
			Standard Test Numbers (C)	UCR Section 5.2.3.5.4	Not Tested	See note 2.
Base Services – Abbreviated Numbers (C)	UCR Section 5.2.3.5.5	Not Tested	See note 2.			
Digit Reception Requirements (R)	UCR Section 5.2.3.5.6	Met				
Screening (C)	UCR Section 5.2.3.5.8	Met				
ISDN Services	Yes	Certified	BRI Access, Call Control and Signaling (C)	UCR Section 5.2.9.2, Table 5.2.9-1	Not Tested	See note 2.
			Uniform Interface Configuration for BRIs (C)	UCR Section 5.2.9.2, Table 5.2.9-2	Not Tested	See note 2.
			EKTS (C)	UCR Section 5.2.9.2, Table 5.2.9-3	Not Tested	See note 2.
			PRI Access, Call Control and Signaling (R)	UCR Section 5.2.9.2, Table 5.2.9-4	Met	
			PRI Features (R)	UCR Section 5.2.9.2, Table 5.2.9-5	Met	
Packet Data Features and Capabilities (C)	UCR Section 5.2.9.2, Table 5.2.9-6	Not Tested	See note 2.			

**Table 2-5. SUT Interoperability Requirements/Status (continued)**

DSN Features and Capabilities						
Feature/Capability	Critical	Feature Status	UCR Requirement	Reference	Test Results	Remarks
Synchroniza-tion	Yes	Certified	Line timing mode (R)	UCR Section 5.2.11.2	Met	
			Internal Stratum 4 (R)	UCR Section 5.2.10.1.1.2.2	Met	
			Synchronization Performance Monitoring Criteria (C)	UCR Section 5.2.10.2	Not Tested	See note 2.
			DS1 Traffic Interfaces (C)	UCR Section 5.2.10.3	Not Tested	See note 2.
			DS0 Traffic Interconnects (C)	UCR Section 5.2.10.4	Not Tested	See note 2.
Reliability	Yes	Certified	System Availability (R)	UCR Section 5.2.11.2	Met	
			Backup Power (R)	UCR Section 5.2.11.3	Not Tested	See note 12.
			Power Components (R)	UCR Section 5.2.11.3.1	Not Tested	See note 12.
			UPS Requirements (R)	UCR Section 5.2.11.3.2	Not Tested	See note 12.
			UPS PBX 1 Load Capacity (R)	UCR Section 5.2.11.3.2.1	Not Tested	See note 12.
			Backup Power (Environmental) (R)	UCR Section 5.2.11.3.3	Not Tested	See note 12.
Network Management	No	Certified	Alarms (R)	UCR Section 5.2.11.3.4	Not Tested	See note 12.
			Interfaces (R)	UCR section 5.2.8.1	Met	
			Measurements and data generation (C)	UCR section 5.2.8.2	Met	
			Fault management (C)	UCR section 5.2.8.3	Met	
			Configuration management (C)	UCR section 5.2.8.4	Met	
			Accounting management (C)	UCR section 5.2.8.5	Met	
			Performance management (C)	UCR section 5.2.8.6	Met	
			Network Management controls (C)	UCR section 5.2.8.7	Met	
Remote access (C)	UCR section 5.2.8.8	Met				
Security	Yes	Certified	GR-815, STIGs, and DoDI 8510.bb (DIACAP) (R)	UCR Sections 3.2.3, 3.2.5, and 5.4.6.1	Met	See note 13.
VoIP						
Feature/Capability	Critical	Feature Status	UCR Requirement	Reference	Test Results	Remarks
VoIP System	No	Certified See note 14.	Voice Quality with MOS of 4.0 or better (R)	UCR Section 5.2.12.8.2.1	Met	
			ITU-T G.711 PCM CODEC (R)	UCR Section 5.2.12.8.2.2	Met	
			MLPP (R)	UCR Section 5.2.12.8.2.3	Met	
			Security (R)	UCR Section 5.2.12.8.2.4	Met	
			Network management (C)	UCR Section 5.2.12.8.2.5	Met	
			System timing (R)	UCR Section 5.2.12.8.2.6	Met	
			Latency ≤ 60 milliseconds (R)	UCR Section 5.2.12.8.2.7	Met	
			IPv6 capable (R)	UCR Section 5.2.12.8.2.8	Not Tested	See note 15.
			Service Class Tagging (R)	UCR Section 5.2.12.8.2.9	Met	
Softphone Requirements (R)	DISA Memo (Reference h)	Met				

**Table 2-5. SUT Interoperability Requirements/Status (continued)**

Network Gateways							
Interface	Critical	Interface Status	UCR Requirement		Reference	Test Results	Remarks
PSTN	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 5.2.4.2.2	Met	
				Immediate Start (C)	UCR Section 5.2.4.3.2	Met	
				Delay Dial (C)	UCR Section 5.2.4.3.4	Met	

**NOTES:**

- 1 The SUT T1 CAS wink start recognition is not within specification in accordance with the UCR, section 5.2.4.3.5. The requirement is to recognize a wink start signal from 100 ms to 350 ms. The SUT recognizes a wink start signal from 85 ms to 365 ms. This discrepancy was previously adjudicated by DISA as having minor operational impact.
  - 2 This feature/capability is not supported by the SUT. This is not a required feature for a PBX 1. There is no risk associated with the SUT not supporting this feature.
  - 3 This interface is not supported by the SUT. This is not a required interface for a PBX 1. There is no risk associated with the SUT not supporting this interface.
  - 4 The SUT does not support NFAS on their ISDN PRI NI2 interface. This was adjudicated by DISA on 17 December 2008 as having a minor operation impact. Furthermore, DISA, in coordination with the Joint Staff, stated their intent to modify the next update of the UCR to change NFAS for a PBX 1 from required to conditional.
  - 5 The SUT does not support ISDN BRI U interface. ISDN BRI is not a required interface for a PBX 1. There is no risk associated with the SUT not supporting this interface.
  - 6 The SUT analog end instruments do not support the following required features: Call Waiting or Precedence Call Waiting. This was adjudicated by DISA on 21 July 2009 as having minor operational impact.
  - 7 The SUT ISDN BRI S/T interface does not support Call Transfer or Three-Way Calling. This was adjudicated by DISA on 21 July 2009 as having minor operational impact.
  - 8 The SUT does not provide the correct conference disconnect tone in accordance with the UCR, Table 5.2.4-5. This feature was adjudicated by DISA on 21 July 2009 as having minor operational impact.
  - 9 The SUT does not provide 'Ping' Ring when CFV is activated. This feature was adjudicated by DISA on 21 February 2009 as having a minor operational impact. Also, this is not a required feature for a PBX 1. There is no risk associated with the SUT not supporting this feature.
  - 10 This feature is supported by the SUT; however, it was not tested. This feature is therefore not certified by JITC. This is not a required feature for a PBX 1.
  - 11 The SUT does not support the Loss of C2 announcement. This announcement is invoked only when a DSN subscriber is automatically routed to a non-MLPP network. DISA adjudicated this anomaly as having a minor operational impact because this announcement would rarely be invoked on a PBX 1. Furthermore, DISA, in coordination with the Joint Staff, stated their intent to modify the next update of the UCR to change the Loss of C2 announcement from required to conditional for a PBX 1.
  - 12 This requirement is a non-testable requirement. It is the responsibility of the respective base/post/camp/station communications 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 The SUT is certified with any ASLAN or ASLAN components on the UC APL.
  - 15 In accordance with UCR, section 5.3.5, all systems submitted for testing must be IPv6 capable. Dual Stack solutions are preferred and tunneling solutions are unacceptable. IPv6 Capable-products, in accordance with UCR, section 4.3.1.3, can create or receive, process, and send or forward (as appropriate) IPv6 packets in mixed IPv4/v6 environments. IPv6 capable products shall be able to interoperate with other IPv6 capable products on networks supporting only IPv4, only IPv6, or both IPv4 and IPv6, and shall also:
    - a. Conform to the requirements of the DoD IPv6 Standard Profiles for IPv6 Capable Products document contained in the DISR.
    - b. Possess a migration path and/or written commitment to upgrade from the developer (company Vice President or equivalent) as the IPv6 standard evolves.
    - c. Ensure product developer IPv6 technical support is available.
    - d. Conform to National Security Agency (NSA) and/or Unified Cross Domain Management Office requirements for Information Assurance products.
- The vendor stated in their LoC that the SUT will not be IPv6 compliant until the next software release and requested a waiver from OSD of this requirement until June of 2010. The OSD waived this requirement for the SUT on 12 November 2008 with the stipulation that the vendor submit this new release for testing via the Unified Capabilities Certification Office after June 2010.

**Table 2-5. SUT Interoperability Requirements/Status (continued)**

<b>LEGEND:</b>			
ANSI	American National Standards Institute	FTR 1080B-2002	Video Teleconferencing Services
APL	Approved Products List	G.711	PCM of voice frequencies
ASLAN	Assured Services Local Area Network	GR	Generic Requirement
BER	Bit Error Ratio	GR-815	Generic Requirements For Network Element/Network System (NE/NS) Security
BRI	Basic Rate Interface	H.320	Standard for Narrowband VTC
C	Conditional	IPv4	Internet Protocol version 4
C2	Command and Control	IPv6	Internet Protocol version 6
CAS	Channel Associated Signaling	ISDN	Integrated Services Digital Network
CFV	Call Forward Variable	IT	Information Technology
CJCSI	Chairman of the Joint Chiefs of Staff Instruction	ITU-T	International Telecommunication Union - Telecommunication Standardization Sector
CODEC	Coder/Decoder	JITC	Joint Interoperability Test Command
DIACAP	DoD Information Assurance Certification and Accreditation Process	kbps	kilobits per second
DISA	Defense Information Systems Agency	LoC	Letters of Compliance
DISR	DoD IT Standards Registry	Mbps	Megabits per second
DoD	Department of Defense	MFR1	Multi-Frequency Recommendation 1
DoDI	Department of Defense Instruction	MLPP	Multi-Level Precedence and Preemption
DP	Dial Pulse	MOS	Mean Opinion Score
DS0	Digital Signal Level 0 (64 kbps)	ms	millisecond
DS1	Digital Signal Level 1 (1.544 Mbps) (2.048 Mbps European)	NFAS	Non Facility Associated Signaling
DSN	Defense Switched Network	NI 1/2	National ISDN Standard 1 or 2
DTMF	Dual Tone Multi-Frequency	NI2	National ISDN Standard 2
E&M	Ear and Mouth	NX56	Data format restricted to multiples of 56 kbps
E1	European Basic Multiplex Rate (2.048 Mbps)	NX64	Data format restricted to multiples of 64 kbps
EKTS	Electronic Key Telephone System	OSD	Office of the Secretary of Defense
FTR	Federal Telecommunications Recommendation	PBX	Private Branch Exchange
		PBX 1	Private Branch Exchange 1
		PCM	Pulse Code Modulation
		PCM-24	Pulse Code Modulation - 24 Channels
		PCM-30	Pulse Code Modulation - 30 Channels
		PRI	Primary Rate Interface
		PSTN	Public Switched Telephone Network
		Q.955.3	ISDN Signaling Standard for E1 MLPP
		R	Required
		S/T	ISDN BRI 4-wire interface
		SS7	Signaling System 7
		STE	Secure Terminal Equipment
		STIGs	Security Technical Implementation Guides
		STU-III	Secure Telephone Unit -3rd generation
		SUT	System Under Test
		T1	Digital Transmission Link Level 1 (1.544 Mbps)
		T1.619a	SS7 and ISDN MLPP Signaling Standard for T1
		T.4	Standardization of Group 3 facsimile terminals for document transmission
		U	ISDN BRI 2-wire interface
		UC	Unified Capabilities
		UCR	Unified Capabilities Requirements
		UPS	Uninterruptible Power Supply
		VBD	Variable bit data
		VoIP	Voice over Internet Protocol
		VTC	Video Teleconferencing