



## DEFENSE INFORMATION SYSTEMS AGENCY

JOINT INTEROPERABILITY TEST COMMAND

P.O. BOX 12798

FORT HUACHUCA, ARIZONA 85670-2798

IN REPLY  
REFER TO:

Battlespace Communications Portfolio (JTE)

3 May 2007

### MEMORANDUM FOR DISTRIBUTION

**SUBJECT:** Special Interoperability Test Certification of the Juniper Networks Circuit to Packet (CTP) 1000 Series and CTP2000 Series with Software Release 4.3R2 and CTPView Version 2.2, Release 2

**References:** (a) DoD Directive 4630.5, "Interoperability and Supportability of Information Technology (IT) and National Security Systems (NSS)," 5 May 2004  
(b) CJCSI 6212.01D, "Interoperability and Supportability of Information Technology and National Security Systems," 8 March 2006

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. Additional references are provided in enclosure 1.
2. The Juniper Networks CTP 1000 Series and CTP2000 Series with Software Release 4.3R2 and CTPView Version 2.2, Release 2 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 Switched Network (DSN). The CTP1004 and CTP2024 were tested by JITC. The other products in the series were developed for scalability purposes and JITC analysis found them to be functionally identical for interoperability certification purposes. The following models are also certified for joint use: CTP1002, CTP1008, CTP2008, and CTP2056. The SUT supports 100BaseT, 100/1000BaseT, 100BaseFX, and 1000BaseFX transport interfaces. The 100BaseT was the only interface tested during this certification and is the only interface certified for use in the DSN. The 100/1000BaseT, 100BaseFX, and 1000BaseFX transport interfaces are not authorized or approved for joint use in the DSN. The SUT is certified to support DSN assured services over Internet Protocol with any Assured Services Voice Application Local Area Network (ASVALAN) on the Telecom Switched Services Interoperability (TSSI) Approved Products List (APL). The SUT is also certified for joint use with any Voice Application Local Area Network (VALAN) on the TSSI APL. However, since VALANs do not support the Assured Services Requirements detailed in reference (c), Command and Control (C2) users and Special C2 users are not authorized to be served by the SUT connected to a VALAN. This certification expires upon changes that could affect interoperability, but no later than three years from the date of this memorandum.
3. This certification is based on interoperability testing and review of the vendor's Letters of Compliance (LoC). Interoperability testing was conducted by JITC at the Global Information Grid Network Test Facility, Fort Huachuca, Arizona from 19 March through 6 April 2007.

JITC Memo, JTE, Special Interoperability Test Certification of the Juniper Networks Circuit to Packet (CTP) 1000 Series and CTP2000 Series with Software Release 4.3R2 and CTPView Version 2.2, Release 2

Review of the vendor's LoC was completed on 17 April 2007. The Certification Testing Summary (enclosure 2) documents the test results and describes the test network. Users should verify interoperability before deploying the SUT in an environment that varies significantly from that described.

4. The overall interoperability status of the SUT is indicated in table 1. The SUT Interoperability Test Summary is shown in table 2. The Capability and Feature Requirements used to evaluate the interoperability of the SUT are indicated in table 3. This interoperability test status is based on the SUT's ability to meet:

a. Network Element requirements specified in reference (d) verified through JITC testing and/or vendor submission of LoC.

b. The overall system interoperability performance derived from test procedures listed in reference (e).

c. Assured services as defined in reference (c).

d. Internet Protocol version 6 requirements specified in reference (d), paragraph 1.7, table 1-3, by 30 June 2008 in accordance with reference (f) verified through vendor submission of LoC signed by the Vice President of the company.

**Table 1. SUT Interoperability Status**

<b>System Interoperability Status</b>			
<b>Components (See note.)</b>	<b>Subcomponents (See note.)</b>	<b>Release</b>	<b>Status</b>
CTP1002	<b><u>CTP1000 IM-4P-T1</u></b>	4.3R2	Certified
<b><u>CTP1004</u></b>			
CTP1012			
CTP2008	<b><u>CTP2000 IM-8P-T1</u></b>		
<b><u>CTP2024</u></b>			
CTP2056			
<b><u>CTPView</u></b>		CTPView Rel. 2.2R2	
<b>LEGEND:</b> CTP - Circuit to Packet IM - Interface Module JITC - Joint Interoperability Test Command Mbps - Megabits per second P - Port Rel - Release SUT - System Under Test T1 - Digital Transmission Link Level 1 (1.544 Mbps)			
<b>NOTE:</b> Components bolded and underlined were tested by JITC. The other components in the family series were not tested; however, they utilize the same software and hardware and JITC analysis determined them to be functionally identical for interoperability certification purposes and they are also certified for joint use.			

JITC Memo, JTE, Special Interoperability Test Certification of the Juniper Networks Circuit to Packet (CTP) 1000 Series and CTP2000 Series with Software Release 4.3R2 and CTPView Version 2.2, Release 2

**Table 2. SUT Interoperability Test Summary**

DSN Switch Access Interfaces	Critical	Status	Remarks																																								
T1 CAS (AMI/SF) DTMF, DP, MFR1	No <sup>1</sup>	Certified	Met all CRs and FRs.																																								
T1 CAS (B8ZS/ESF) DTMF, DP, MFR1	No <sup>1</sup>	Certified	Met all CRs and FRs.																																								
E1 CAS (HDB3) DTMF, MFR1, DP	No <sup>1</sup> (Europe only)	Certified	Met all CRs and FRs.																																								
T1 SS7 (ANSI T1.619a)	No <sup>1</sup>	Certified	Met all CRs and FRs.																																								
E1 SS7 (ANSI T1.619a)	No <sup>1</sup> (Europe only)	Certified	Met all CRs and FRs.																																								
T1 ISDN PRI (ANSI T1.619a)	No <sup>1</sup>	Certified	Met all CRs and FRs.																																								
E1 PRI (ITU-T Q.955.3)	No <sup>1</sup> (Europe only)	Certified	Met all CRs and FRs.																																								
EIA-232	No <sup>1</sup>	Certified	Met all CRs and FRs.																																								
EIA-530	No <sup>1</sup>	Certified	Met all CRs and FRs.																																								
DSN Transport Interface																																											
DSN Transport Interface	Critical	Status	Remarks																																								
Fast Ethernet 100BaseT	No <sup>2</sup>	Certified	Met all CRs and FRs.																																								
Features and Capabilities																																											
Features and Capabilities	Critical	Status	Remarks																																								
Synchronization	Yes	Certified	Met all CRs and FRs.																																								
Network Management	Yes	Certified	Met all CRs and FRs with an IEEE 802.3 interface.																																								
IPv6	Yes	Certified	See note 3.																																								
Security	Yes	See note 4.	See note 4.																																								
<p><b>LEGEND:</b></p> <table border="0"> <tr> <td>100BaseFX - 100 Mbps Ethernet over Fiber</td> <td>ESF - Extended Super Frame</td> </tr> <tr> <td>100BaseT - 100 Mbps (Baseband Operation, Twisted Pair) Ethernet</td> <td>FR - Feature Requirements</td> </tr> <tr> <td>1000BaseFX - 1000 Mbps Ethernet over Fiber</td> <td>GSCR - Generic Switching Center Requirements</td> </tr> <tr> <td>1000BaseT - 1000 Mbps (Baseband Operation, Twisted Pair) Ethernet</td> <td>HDB3 - High Density Bipolar 3</td> </tr> <tr> <td>802.3 - Standard for carrier sense multiple access with collision detection at 10 Mbps</td> <td>IEEE - Institute of Electrical and Electronics Engineers, Inc.</td> </tr> <tr> <td>AMI - Alternate Mark Inversion</td> <td>IP4 - Internet Protocol version 4</td> </tr> <tr> <td>ANSI - American National Standards Institute</td> <td>IP6 - Internet Protocol version 6</td> </tr> <tr> <td>B8ZS - Bipolar Eight Zero Substitution</td> <td>ISDN - Integrated Services Digital Network</td> </tr> <tr> <td>CAS - Channel Associated Signaling</td> <td>ITU-T - International Telecommunication Union - Telecommunication Standardization Sector</td> </tr> <tr> <td>CR - Capability Requirements</td> <td>Mbps - Megabits per second</td> </tr> <tr> <td>DCE - Data Circuit-Terminating Equipment</td> <td>MFR1 - Multi-Frequency Recommendation 1</td> </tr> <tr> <td>DISA - Defense Information Systems Agency</td> <td>MLPP - Multi-Level Precedence and Preemption</td> </tr> <tr> <td>DP - Dial Pulse</td> <td>NE - Network Element</td> </tr> <tr> <td>DSN - Defense Switched Network</td> <td>PRI - Primary Rate Interface</td> </tr> <tr> <td>DTE - Data Terminal Equipment</td> <td>Q.955.3 - ISDN Signaling Standard for E1 MLPP</td> </tr> <tr> <td>DTMF - Dual Tone Multi-Frequency</td> <td>SF - Super Frame</td> </tr> <tr> <td>E1 - European Basic Multiplex Rate (2.048 Mbps)</td> <td>SS7 - Signaling System 7</td> </tr> <tr> <td>EIA - Electronic Industries Alliance</td> <td>SUT - System Under Test</td> </tr> <tr> <td>EIA-232 - Standard for defining the mechanical and electrical characteristics for connecting DTE and DCE data communications devices</td> <td>T1 - Digital Transmission Link Level 1 (1.544 Mbps)</td> </tr> <tr> <td>EIA-530 - Standard for 25-position interface for DTE and DCE employing serial binary data interchange</td> <td>T1.619a - SS7 and ISDN MLPP Signaling Standard for T1</td> </tr> </table>				100BaseFX - 100 Mbps Ethernet over Fiber	ESF - Extended Super Frame	100BaseT - 100 Mbps (Baseband Operation, Twisted Pair) Ethernet	FR - Feature Requirements	1000BaseFX - 1000 Mbps Ethernet over Fiber	GSCR - Generic Switching Center Requirements	1000BaseT - 1000 Mbps (Baseband Operation, Twisted Pair) Ethernet	HDB3 - High Density Bipolar 3	802.3 - Standard for carrier sense multiple access with collision detection at 10 Mbps	IEEE - Institute of Electrical and Electronics Engineers, Inc.	AMI - Alternate Mark Inversion	IP4 - Internet Protocol version 4	ANSI - American National Standards Institute	IP6 - Internet Protocol version 6	B8ZS - Bipolar Eight Zero Substitution	ISDN - Integrated Services Digital Network	CAS - Channel Associated Signaling	ITU-T - International Telecommunication Union - Telecommunication Standardization Sector	CR - Capability Requirements	Mbps - Megabits per second	DCE - Data Circuit-Terminating Equipment	MFR1 - Multi-Frequency Recommendation 1	DISA - Defense Information Systems Agency	MLPP - Multi-Level Precedence and Preemption	DP - Dial Pulse	NE - Network Element	DSN - Defense Switched Network	PRI - Primary Rate Interface	DTE - Data Terminal Equipment	Q.955.3 - ISDN Signaling Standard for E1 MLPP	DTMF - Dual Tone Multi-Frequency	SF - Super Frame	E1 - European Basic Multiplex Rate (2.048 Mbps)	SS7 - Signaling System 7	EIA - Electronic Industries Alliance	SUT - System Under Test	EIA-232 - Standard for defining the mechanical and electrical characteristics for connecting DTE and DCE data communications devices	T1 - Digital Transmission Link Level 1 (1.544 Mbps)	EIA-530 - Standard for 25-position interface for DTE and DCE employing serial binary data interchange	T1.619a - SS7 and ISDN MLPP Signaling Standard for T1
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<p><b>NOTES:</b></p> <p>1 The NE DSN Access Interface can be met with any one of the following interfaces: Analog, T1, E1, or Serial.</p> <p>2 The SUT supports 100BaseT, 100/1000BaseT, 100BaseFX, and 1000BaseFX transport interfaces. The 100BaseT was the only interface tested during this certification and is the only interface certified for use in the DSN. The 100/1000BaseT, 100BaseFX, and 1000BaseFX transport interfaces are not authorized or approved for joint use in the DSN.</p> <p>3 An IPv6 capable system or product, as defined in the GSCR, paragraph 1.7, shall be capable of receiving, processing, and forwarding IPv6 packets and/or interfacing with other systems and protocols in a manner similar to that of IPv4. IPv6 capability is currently satisfied by a vendor Letter of Compliance signed by the Vice President of the company. The vendor must state, in writing, compliance to the following criteria by 30 June 2008:</p> <ol style="list-style-type: none"> <li>Conformant with IPv6 standards profile contained in the Department of Defense Information Technology Standards Registry (DISR).</li> <li>Maintaining interoperability in heterogeneous environments and with IPv4.</li> <li>Commitment to upgrade as the IPv6 standard evolves.</li> <li>Availability of contractor/vendor IPv6 technical support.</li> </ol> <p>4 Security is tested by DISA-led Information Assurance test teams and published in a separate report.</p>																																											

**Table 3. SUT Capability and Feature Interoperability Requirements**

<b>DSN Access Interfaces</b>			
<b>DSN Switch Access Interfaces</b>	<b>Critical</b>	<b>Requirements Required or Conditional</b>	<b>References</b>
T1 CAS	No <sup>1</sup>	<ul style="list-style-type: none"> <li>• DS1 Supervisory Channel Associated Signaling (R)</li> <li>• DS1 Clear Channel Capability (R)</li> <li>• DS1 Alarm and Restoral Requirements (R)</li> <li>• MLPP (R)</li> <li>• MOS (R)</li> <li>• BERT (R)</li> <li>• Secure Transmission (Voice and Data) (R)</li> <li>• Modem (R)</li> <li>• Facsimile (R)</li> <li>• Call Control Signals (R)</li> <li>• Call Congestion (R)</li> <li>• Voice Compression (C)</li> </ul>	<ul style="list-style-type: none"> <li>• GSCR App. A9.5.1.2.4</li> <li>• GSCR App. A9.5.1.2.4</li> <li>• GSCR App. A9.5.1.2.4</li> <li>• GSCR Section 3</li> <li>• GSCR App. A9.5.1.1</li> <li>• GSCR App. A9.5.1.1.3</li> <li>• GSCR App. A9.5.1.1.4</li> </ul>
T1 SS7 (ANSI T1.619a)	No <sup>1</sup>		
T1 ISDN PRI (ANSI T1.619a)	No <sup>1</sup>		
E1 CAS	No <sup>1</sup>	<ul style="list-style-type: none"> <li>• E1 Supervisory Channel Associated Signaling (R)</li> <li>• E1 Clear Channel Capability (R)</li> <li>• E1 Alarm and Restoral Requirements (R)</li> <li>• MLPP (R)</li> <li>• MOS (R)</li> <li>• BERT (R)</li> <li>• Secure Transmission (Voice and Data) (R)</li> <li>• Modem (R)</li> <li>• Facsimile (R)</li> <li>• Call Control Signals (R)</li> <li>• Call Congestion (R)</li> <li>• Voice Compression (C)</li> </ul>	<ul style="list-style-type: none"> <li>• GSCR App. A9.5.1.2.5</li> <li>• GSCR App. A9.5.1.2.5</li> <li>• GSCR App. A9.5.1.2.5</li> <li>• GSCR Section 3</li> <li>• GSCR App. A9.5.1.1</li> <li>• GSCR App. A9.5.1.1.3</li> <li>• GSCR App. A9.5.1.1.4</li> </ul>
E1 SS7 (ANSI T1.619a)	No <sup>1</sup>		
E1 PRI (ITU-T Q.955.3)	No <sup>1</sup>		
EIA-232	No <sup>1</sup>	• EIA/TIA-232-F (R)	• GSCR App. A9.5.1.2.2
EIA-530	No <sup>1</sup>	• EIA/TIA-530-A (R)	• GSCR App. A9.5.1.2.2
<b>DSN Transport Interface</b>			
<b>Interface</b>	<b>Critical</b>	<b>Requirements Required or Conditional</b>	<b>References</b>
Fast Ethernet 100BaseT	Yes	<ul style="list-style-type: none"> <li>• Call Congestion Control - At least one of the following four methods shall be used:                             <ul style="list-style-type: none"> <li>- Differential Services (C)                                     <ul style="list-style-type: none"> <li>o CoS: IEEE 802.1p priority bit or Differential Services Code Point</li> <li>o QoS: NE that supports converged services shall have a minimum of four Queues</li> <li>o Signaling (Network Control, user signaling) (Highest)</li> <li>o Inelastic RTS (Command &amp; Telemetry, Circuit Emulation, Voice, Interactive VTC Video, Streaming Video)</li> <li>o Preferred Elastic (Interactive Transaction, File Transfer)</li> <li>o Elastic (Default, Scavenger)</li> </ul> </li> <li>- Integrated Services – Bandwidth reservation for IP traffic (C)</li> <li>- Congestion is not possible (C)</li> <li>- Software Capability to limit provisioning of input and output interfaces such that congestion is not possible under worst conditions (C)</li> </ul> </li> <li>• Delay: Not to exceed 5 ms average over 5 min period</li> <li>• Jitter: Not to exceed 5 ms average over 5 min period</li> <li>• Packet Loss: Not to exceed .05% average over 5 min period</li> </ul>	<ul style="list-style-type: none"> <li>• GSCR App. A9.5.1.1.3.2b</li> <li>• GSCR App A9.5.1.2.9</li> <li>• GSCR App A9.5.1.2.9</li> <li>• GSCR App A9.5.1.2.9</li> </ul>

**Table 3. SUT Capability and Feature Interoperability Requirements (continued)**

SUT Features And Capabilities																																																																																																							
Feature/Capability	Critical	Requirements Required or Conditional	References																																																																																																				
Synchronization	Yes	<ul style="list-style-type: none"> <li>• Timing (R)</li> </ul>	<ul style="list-style-type: none"> <li>• GSCR App. A9.5.1.7</li> </ul>																																																																																																				
Network Management	Yes	<ul style="list-style-type: none"> <li>• Management Option (R)                             <ul style="list-style-type: none"> <li>- Local Management (Front Panel and/or External Console) (C)</li> <li>- ADIMSS (C)</li> </ul> </li> <li>• Fault Management (C)</li> <li>• Loop Back Capability (C)</li> <li>• Operational Configuration Restoral (R)</li> </ul>	<ul style="list-style-type: none"> <li>• GSCR App. A9.5.2.1</li> <li>• GSCR App. A9.5.2.2</li> <li>• GSCR App. A9.5.2.3</li> <li>• GSCR App. A9.5.3</li> </ul>																																																																																																				
IPv6	Yes <sup>2</sup>	<ul style="list-style-type: none"> <li>• An IPv6 capable system or product shall be capable of receiving, processing, and forwarding IPv6 packets and/or interfacing with other systems and protocols in a manner similar to that of IPv4. (R)</li> </ul>	<ul style="list-style-type: none"> <li>• GSCR paragraph 1.7</li> </ul>																																																																																																				
Security	Yes	<ul style="list-style-type: none"> <li>• GR-815, STIGs, and DIACAP (replacement for DITSCAP) (R)</li> </ul>	<ul style="list-style-type: none"> <li>• GSCR App. A9.6</li> </ul>																																																																																																				
<p><b>LEGEND:</b></p> <table border="0"> <tr> <td>802.1p</td> <td>- LAN Layer 2 QoS/CoS Protocol for Traffic Prioritization</td> <td>GSCR</td> <td>- Generic Switching Center Requirements</td> </tr> <tr> <td>100BaseT</td> <td>- 100 Mbps (Baseband Operation, Twisted Pair) Ethernet</td> <td>IEEE</td> <td>- Institute of Electrical and Electronics Engineers, Inc.</td> </tr> <tr> <td>ADIMSS</td> <td>- Advanced DSN Integrated Management Support System</td> <td>IP</td> <td>- Internet Protocol</td> </tr> <tr> <td>ANSI</td> <td>- American National Standards Institute</td> <td>IPv4</td> <td>- Internet Protocol version 4</td> </tr> <tr> <td>App.</td> <td>- Appendix</td> <td>IPv6</td> <td>- Internet Protocol version 6</td> </tr> <tr> <td>BERT</td> <td>- Bit Error Rate Test</td> <td>ISDN</td> <td>- Integrated Services Digital Network</td> </tr> <tr> <td>C</td> <td>- Conditional</td> <td>ITU-T</td> <td>- International Telecommunication Union – Telecommunication Standardization Sector</td> </tr> <tr> <td>CAS</td> <td>- Channel Associated Signaling</td> <td>LAN</td> <td>- Local Area Network</td> </tr> <tr> <td>CoS</td> <td>- Class of Service</td> <td>Mbps</td> <td>- Megabits per second</td> </tr> <tr> <td>DCE</td> <td>- Data Circuit-Terminating Equipment</td> <td>min</td> <td>- minute</td> </tr> <tr> <td>DIACAP</td> <td>- DoD Information Assurance Certification and Accreditation Process</td> <td>MLPP</td> <td>- Multi-Level Precedence and Preemption</td> </tr> <tr> <td>DITSCAP</td> <td>- DoD Information Technology Security Certification and Accreditation Policy</td> <td>MOS</td> <td>- Mean Opinion Score</td> </tr> <tr> <td>DoD</td> <td>- Department of Defense</td> <td>ms</td> <td>- millisecond</td> </tr> <tr> <td>DS1</td> <td>- Digital Signal Level 1</td> <td>NE</td> <td>- Network Element</td> </tr> <tr> <td>DSN</td> <td>- Defense Switched Network</td> <td>PRI</td> <td>- Primary Rate Interface</td> </tr> <tr> <td>DTE</td> <td>- Data Terminal Equipment</td> <td>Q.955.3</td> <td>- ISDN Signaling Standard for E1 MLPP</td> </tr> <tr> <td>E1</td> <td>- European Basic Multiplex Rate (2.048 Mbps)</td> <td>QoS</td> <td>- Quality of Service</td> </tr> <tr> <td>EIA</td> <td>- Electronic Industries Alliance</td> <td>R</td> <td>- Required</td> </tr> <tr> <td>EIA-232</td> <td>- Standard for defining the mechanical and electrical characteristics for connecting DTE and DCE data communications devices</td> <td>RTS</td> <td>- Real Time Services</td> </tr> <tr> <td>EIA-530</td> <td>- Standard for 25-position interface for DTE and DCE employing serial binary data interchange</td> <td>SS7</td> <td>- Signaling System 7</td> </tr> <tr> <td>GR</td> <td>- Generic Requirement</td> <td>STIGs</td> <td>- Security Technical Implementation Guides</td> </tr> <tr> <td>GR-815</td> <td>- Generic Requirement for Network Element/Network System (NE/NS) Security</td> <td>SUT</td> <td>- System Under Test</td> </tr> <tr> <td></td> <td></td> <td>T1</td> <td>- Digital Transmission Link Level 1 (1.544 Mbps)</td> </tr> <tr> <td></td> <td></td> <td>T1.619a</td> <td>- SS7 and ISDN MLPP Signaling Standard for T1</td> </tr> <tr> <td></td> <td></td> <td>VTC</td> <td>- Video Teleconferencing</td> </tr> </table> <p><b>NOTES:</b></p> <p>1 The NE DSN Access Interface can be met with any one of the following interfaces: Analog, T1, E1, or Serial.</p> <p>2 An IPv6 capable system or product, as defined in the GSCR, paragraph 1.7, shall be capable of receiving, processing, and forwarding IPv6 packets and/or interfacing with other systems and protocols in a manner similar to that of IPv4. IPv6 capability is currently satisfied by a vendor Letter of Compliance signed by the Vice President of the company. The vendor must state, in writing, compliance to the following criteria by 30 June 2008:</p> <ol style="list-style-type: none"> <li>Conformant with IPv6 standards profile contained in the DoD Information Technology Standards Registry (DISR).</li> <li>Maintaining interoperability in heterogeneous environments and with IPv4.</li> <li>Commitment to upgrade as the IPv6 standard evolves.</li> <li>Availability of contractor/vendor IPv6 technical support.</li> </ol>				802.1p	- LAN Layer 2 QoS/CoS Protocol for Traffic Prioritization	GSCR	- Generic Switching Center Requirements	100BaseT	- 100 Mbps (Baseband Operation, Twisted Pair) Ethernet	IEEE	- Institute of Electrical and Electronics Engineers, Inc.	ADIMSS	- Advanced DSN Integrated Management Support System	IP	- Internet Protocol	ANSI	- American National Standards Institute	IPv4	- Internet Protocol version 4	App.	- Appendix	IPv6	- Internet Protocol version 6	BERT	- Bit Error Rate Test	ISDN	- Integrated Services Digital Network	C	- Conditional	ITU-T	- International Telecommunication Union – Telecommunication Standardization Sector	CAS	- Channel Associated Signaling	LAN	- Local Area Network	CoS	- Class of Service	Mbps	- Megabits per second	DCE	- Data Circuit-Terminating Equipment	min	- minute	DIACAP	- DoD Information Assurance Certification and Accreditation Process	MLPP	- Multi-Level Precedence and Preemption	DITSCAP	- DoD Information Technology Security Certification and Accreditation Policy	MOS	- Mean Opinion Score	DoD	- Department of Defense	ms	- millisecond	DS1	- Digital Signal Level 1	NE	- Network Element	DSN	- Defense Switched Network	PRI	- Primary Rate Interface	DTE	- Data Terminal Equipment	Q.955.3	- ISDN Signaling Standard for E1 MLPP	E1	- European Basic Multiplex Rate (2.048 Mbps)	QoS	- Quality of Service	EIA	- Electronic Industries Alliance	R	- Required	EIA-232	- Standard for defining the mechanical and electrical characteristics for connecting DTE and DCE data communications devices	RTS	- Real Time Services	EIA-530	- Standard for 25-position interface for DTE and DCE employing serial binary data interchange	SS7	- Signaling System 7	GR	- Generic Requirement	STIGs	- Security Technical Implementation Guides	GR-815	- Generic Requirement for Network Element/Network System (NE/NS) Security	SUT	- System Under Test			T1	- Digital Transmission Link Level 1 (1.544 Mbps)			T1.619a	- SS7 and ISDN MLPP Signaling Standard for T1			VTC	- Video Teleconferencing
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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 TSSI website at <http://jitc.fhu.disa.mil/tssi>.

JITC Memo, JTE, Special Interoperability Test Certification of the Juniper Networks Circuit to Packet (CTP) 1000 Series and CTP2000 Series with Software Release 4.3R2 and CTPView Version 2.2, Release 2

6. The JITC point of contact is Mr. Edward Mellon, DSN 879-5159, commercial (520) 538-5159, FAX DSN 879-4347, or e-mail to edward.mellon@disa.mil. The tracking number for the SUT is 0632501.

FOR THE COMMANDER:



MANUEL H. GARCIA, JR.  
Chief  
Battlespace Communications Portfolio

2 Enclosures a/s

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Headquarters U.S. Air Force, AF/XICF, 1800 Pentagon, Washington, DC 20330-1800  
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Defense Intelligence Agency, 2000 MacDill Blvd., Bldg 6000, Bolling AFB, Washington, DC 20340-3342  
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Defense Information Systems Agency (DISA), ATTN: GS23 (Mr. Osman), Room 5w23, 5275 Leesburg Pike (RTE 7), Falls Church, VA 22041

## **ADDITIONAL REFERENCES**

- (c) Chairman of the Joint Chiefs of Staff Instruction (CJCSI) 6215.01B, "Policy for Department of Defense Voice Services," 23 September 2001
- (d) Defense Information Systems Agency (DISA), "Defense Switched Network (DSN) Generic Switching Center Requirements (GSCR), Errata Change 2," 14 December 2006
- (e) Joint Interoperability Test Command, "Juniper Networks Circuit to Packet (CTP) Network Element Test Plan," 4 October 2006
- (f) Executive Office of the President, "Transition Planning for Internet Protocol version 6 (IPv6)," 2 August 2005

## CERTIFICATION TESTING SUMMARY

**1. SYSTEM TITLE.** Juniper Networks Circuit to Packet (CTP) 1000 Series and CTP2000 Series with Software Release 4.3R2 and CTPView Version 2.2, Release 2, is hereinafter referred to as the System Under Test (SUT).

**2. PROPONENTS.** Defense Information Systems Agency

**3. PROGRAM MANAGER.** Mr. Howard Osman, GS23, Room 5W23, 5275 Leesburg Pike, Falls Church, VA, 22041, E-mail: Howard.Osman@disa.mil.

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

**5. SYSTEM UNDER TEST DESCRIPTION.** The SUT is a Network Element (NE) transport that provides reliable transport of bit-synchronous circuits across Internet Protocol (IP) networks. The SUT is rack mountable and designed to both create an IP packet flow from a serial data or analog voice connection at one end and provide the necessary processing to recreate the serial bit stream or analog signal from the received IP packet flow at the other end. The SUT provides separately configurable serial data interfaces on all its CTP products. Dedicated Digital Transmission Link Level 1 (T1) and European Basic Multiplex Rate (E1) Time Division Multiplexing (TDM) trunks can easily be migrated onto existing IP infrastructure for transport. Additionally, the SUT provides numerous system and circuit clocking options necessary to migrate TDM and circuit applications to an all IP infrastructure.

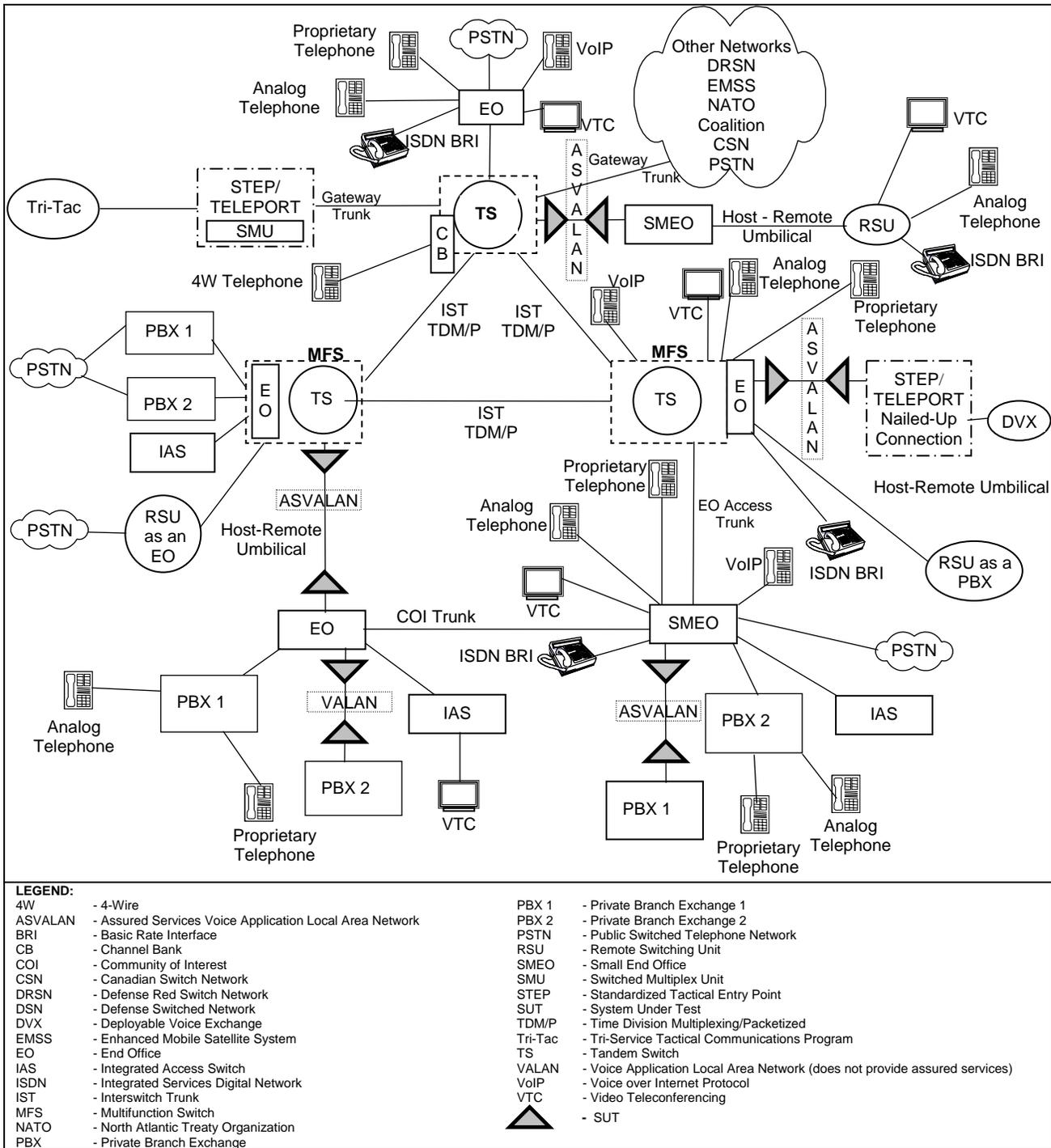
The system tested consisted of the CTP1004, the CTP2024, and a Dell server used for management. The CTPView software on the Dell server provides a Graphical User Interface (GUI) used to monitor, manage, and maintain CTP systems and to produce reports on the IP network performance. A Command Line Interface (CLI) to the Dell server can also be used to monitor, manage, and maintain the CTP systems. The CTP1000/2000 series units both use a proprietary CTP operating system to configure the CTP units. The CTP1004 and CTP2024 were tested by JITC. The other products in the series were developed for scalability purposes and JITC analysis found them to be functionally identical for interoperability certification purposes. The following models are also certified for joint use: CTP1002, CTP1008, CTP2008, and CTP2056.

The management and operation of the SUT is achieved with either CTPView GUI or CLI. This is a secure multi-user network management system which provides network monitoring, circuit provisioning, IP performance reporting, and circuit troubleshooting tools. IP performance reports provide detailed information on IP network jitter, delay and packet loss.

All Juniper CTP products operate using software release 4.3R2 and are only distinguishable by the number of ports the CTP product provides. The CTP1000 series utilizes the CTP1000 (IM)-4P-T1 card and the CTP2000 series utilizes the CTP2000 IM-8P T1 interface card as the TDM interface to the DSN. Both of these interfaces are

software selectable and are configurable for T1, E1, Electronic Industries Alliance (EIA)-530, and EIA-232. The SUT also supports International Telecommunication Union - Telecommunication Standardization Sector (ITU-T) V.35, but this interface was not tested and is not covered in this certification.

**6. OPERATIONAL ARCHITECTURE.** The Generic Switching Center Requirements (GSCR) Defense Switched Network (DSN) operational architecture in figure 2-1 depicts the relationship of the SUT to the DSN switches.



**Figure 2-1. DSN Architecture**

**7. REQUIRED SYSTEM INTERFACES.** The SUT Interoperability Test Summary is shown in table 2-1 and the Capability and Feature Requirements used to evaluate the interoperability of the SUT are indicated in table 2-2.

**Table 2-1. SUT Interoperability Test Summary**

DSN Switch Access Interfaces	Critical	Status	Remarks																																																																																
T1 CAS (AMI/SF) DTMF, DP, MFR1	No <sup>1</sup>	Certified	Met all CRs and FRs.																																																																																
T1 CAS (B8ZS/ESF) DTMF, DP, MFR1	No <sup>1</sup>	Certified	Met all CRs and FRs.																																																																																
E1 CAS (HDB3) DTMF, MFR1, DP	No <sup>1</sup> (Europe only)	Certified	Met all CRs and FRs.																																																																																
T1 SS7 (ANSI T1.619a)	No <sup>1</sup>	Certified	Met all CRs and FRs.																																																																																
E1 SS7 (ANSI T1.619a)	No <sup>1</sup> (Europe only)	Certified	Met all CRs and FRs.																																																																																
T1 ISDN PRI (ANSI T1.619a)	No <sup>1</sup>	Certified	Met all CRs and FRs.																																																																																
E1 PRI (ITU-T Q.955.3)	No <sup>1</sup> (Europe only)	Certified	Met all CRs and FRs.																																																																																
EIA-232	No <sup>1</sup>	Certified	Met all CRs and FRs.																																																																																
EIA-530	No <sup>1</sup>	Certified	Met all CRs and FRs.																																																																																
DSN Transport Interface																																																																																			
DSN Transport Interface	Critical	Status	Remarks																																																																																
Fast Ethernet 100BaseT	No <sup>2</sup>	Certified	Met all CRs and FRs.																																																																																
Features and Capabilities																																																																																			
Features and Capabilities	Critical	Status	Remarks																																																																																
Synchronization	Yes	Certified	Met all CRs and FRs.																																																																																
Network Management	Yes	Certified	Met all CRs and FRs with an IEEE 802.3 interface.																																																																																
IPv6	Yes	Certified	See note 3.																																																																																
Security	Yes	See note 4.	See note 4.																																																																																
<p><b>LEGEND:</b></p> <table> <tr> <td>100BaseFX</td> <td>- 100 Mbps Ethernet over Fiber</td> <td>ESF</td> <td>- Extended Super Frame</td> </tr> <tr> <td>100BaseT</td> <td>- 100 Mbps (Baseband Operation, Twisted Pair) Ethernet</td> <td>FR</td> <td>- Feature Requirements</td> </tr> <tr> <td>1000BaseFX</td> <td>- 1000 Mbps Ethernet over Fiber</td> <td>GSCR</td> <td>- Generic Switching Center Requirements</td> </tr> <tr> <td>1000BaseT</td> <td>- 1000 Mbps (Baseband Operation, Twisted Pair) Ethernet</td> <td>HDB3</td> <td>- High Density Bipolar 3</td> </tr> <tr> <td>802.3</td> <td>- Standard for carrier sense multiple access with collision detection at 10 Mbps</td> <td>IEEE</td> <td>- Institute of Electrical and Electronics Engineers, Inc.</td> </tr> <tr> <td>AMI</td> <td>- Alternate Mark Inversion</td> <td>IPV4</td> <td>- Internet Protocol version 4</td> </tr> <tr> <td>ANSI</td> <td>- American National Standards Institute</td> <td>IPV6</td> <td>- Internet Protocol version 6</td> </tr> <tr> <td>B8ZS</td> <td>- Bipolar Eight Zero Substitution</td> <td>ISDN</td> <td>- Integrated Services Digital Network</td> </tr> <tr> <td>CAS</td> <td>- Channel Associated Signaling</td> <td>ITU-T</td> <td>- International Telecommunication Union - Telecommunication Standardization Sector</td> </tr> <tr> <td>CR</td> <td>- Capability Requirements</td> <td>Mbps</td> <td>- Megabits per second</td> </tr> <tr> <td>DCE</td> <td>- Data Circuit-Terminating Equipment</td> <td>MFR1</td> <td>- Multi-Frequency Recommendation 1</td> </tr> <tr> <td>DISA</td> <td>- Defense Information Systems Agency</td> <td>MLPP</td> <td>- Multi-Level Precedence and Preemption</td> </tr> <tr> <td>DP</td> <td>- Dial Pulse</td> <td>NE</td> <td>- Network Element</td> </tr> <tr> <td>DSN</td> <td>- Defense Switched Network</td> <td>PRI</td> <td>- Primary Rate Interface</td> </tr> <tr> <td>DTE</td> <td>- Data Terminal Equipment</td> <td>Q.955.3</td> <td>- ISDN Signaling Standard for E1 MLPP</td> </tr> <tr> <td>DTMF</td> <td>- Dual Tone Multi-Frequency</td> <td>SF</td> <td>- Super Frame</td> </tr> <tr> <td>E1</td> <td>- European Basic Multiplex Rate (2.048 Mbps)</td> <td>SS7</td> <td>- Signaling System 7</td> </tr> <tr> <td>EIA</td> <td>- Electronic Industries Alliance</td> <td>SUT</td> <td>- System Under Test</td> </tr> <tr> <td>EIA-232</td> <td>- Standard for defining the mechanical and electrical characteristics for connecting DTE and DCE data communications devices</td> <td>T1</td> <td>- Digital Transmission Link Level 1 (1.544 Mbps)</td> </tr> <tr> <td>EIA-530</td> <td>- Standard for 25-position interface for DTE and DCE employing serial binary data interchange</td> <td>T1.619a</td> <td>- SS7 and ISDN MLPP Signaling Standard for T1</td> </tr> </table> <p><b>NOTES:</b></p> <ol style="list-style-type: none"> <li>The NE DSN Access Interface can be met with any one of the following interfaces: Analog, T1, E1, or Serial.</li> <li>The SUT supports 100BaseT, 100/1000BaseT, 100BaseFX, and 1000BaseFX transport interfaces. The 100BaseT was the only interface tested during this certification and is the only interface certified for use in the DSN. The 100/1000BaseT, 100BaseFX, and 1000BaseFX transport interfaces are not authorized or approved for joint use in the DSN.</li> <li>An IPv6 capable system or product, as defined in the GSCR, paragraph 1.7, shall be capable of receiving, processing, and forwarding IPv6 packets and/or interfacing with other systems and protocols in a manner similar to that of IPv4. IPv6 capability is currently satisfied by a vendor Letter of Compliance signed by the Vice President of the company. The vendor must state, in writing, compliance to the following criteria by 30 June 2008:             <ol style="list-style-type: none"> <li>Conformant with IPv6 standards profile contained in the Department of Defense Information Technology Standards Registry (DISR).</li> <li>Maintaining interoperability in heterogeneous environments and with IPv4.</li> <li>Commitment to upgrade as the IPv6 standard evolves.</li> <li>Availability of contractor/vendor IPv6 technical support.</li> </ol> </li> <li>Security is tested by DISA-led Information Assurance test teams and published in a separate report.</li> </ol>				100BaseFX	- 100 Mbps Ethernet over Fiber	ESF	- Extended Super Frame	100BaseT	- 100 Mbps (Baseband Operation, Twisted Pair) Ethernet	FR	- Feature Requirements	1000BaseFX	- 1000 Mbps Ethernet over Fiber	GSCR	- Generic Switching Center Requirements	1000BaseT	- 1000 Mbps (Baseband Operation, Twisted Pair) Ethernet	HDB3	- High Density Bipolar 3	802.3	- Standard for carrier sense multiple access with collision detection at 10 Mbps	IEEE	- Institute of Electrical and Electronics Engineers, Inc.	AMI	- Alternate Mark Inversion	IPV4	- Internet Protocol version 4	ANSI	- American National Standards Institute	IPV6	- Internet Protocol version 6	B8ZS	- Bipolar Eight Zero Substitution	ISDN	- Integrated Services Digital Network	CAS	- Channel Associated Signaling	ITU-T	- International Telecommunication Union - Telecommunication Standardization Sector	CR	- Capability Requirements	Mbps	- Megabits per second	DCE	- Data Circuit-Terminating Equipment	MFR1	- Multi-Frequency Recommendation 1	DISA	- Defense Information Systems Agency	MLPP	- Multi-Level Precedence and Preemption	DP	- Dial Pulse	NE	- Network Element	DSN	- Defense Switched Network	PRI	- Primary Rate Interface	DTE	- Data Terminal Equipment	Q.955.3	- ISDN Signaling Standard for E1 MLPP	DTMF	- Dual Tone Multi-Frequency	SF	- Super Frame	E1	- European Basic Multiplex Rate (2.048 Mbps)	SS7	- Signaling System 7	EIA	- Electronic Industries Alliance	SUT	- System Under Test	EIA-232	- Standard for defining the mechanical and electrical characteristics for connecting DTE and DCE data communications devices	T1	- Digital Transmission Link Level 1 (1.544 Mbps)	EIA-530	- Standard for 25-position interface for DTE and DCE employing serial binary data interchange	T1.619a	- SS7 and ISDN MLPP Signaling Standard for T1
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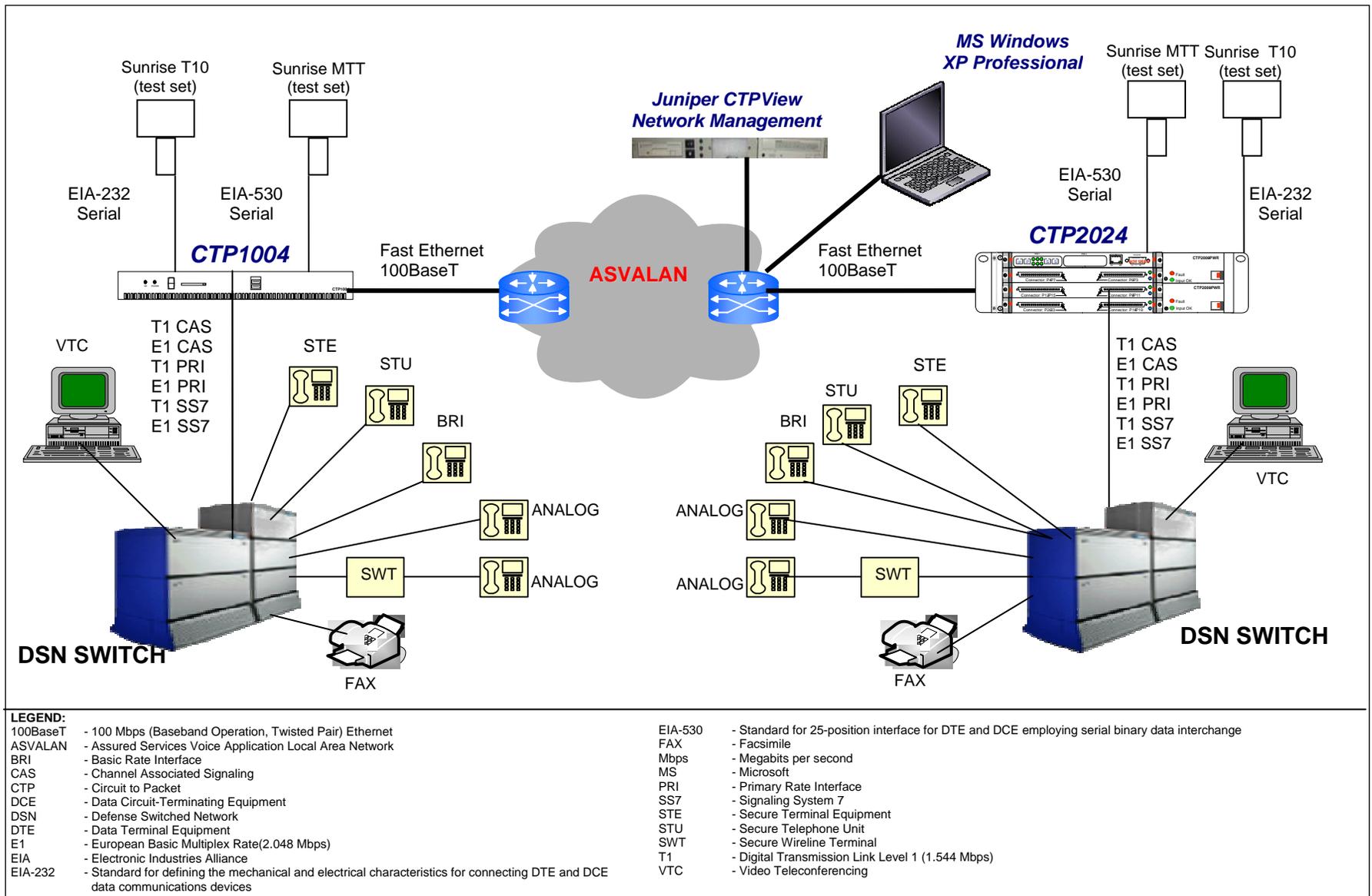
**Table 2-2. SUT Capability and Feature Interoperability Requirements**

<b>DSN Access Interfaces</b>			
<b>DSN Switch Access Interfaces</b>	<b>Critical</b>	<b>Requirements Required or Conditional</b>	<b>References</b>
T1 CAS	No <sup>1</sup>	<ul style="list-style-type: none"> <li>• DS1 Supervisory Channel Associated Signaling (R)</li> <li>• DS1 Clear Channel Capability (R)</li> <li>• DS1 Alarm and Restoral Requirements (R)</li> <li>• MLPP (R)</li> <li>• MOS (R)</li> <li>• BERT (R)</li> </ul>	<ul style="list-style-type: none"> <li>• GSCR App. A9.5.1.2.4</li> <li>• GSCR App. A9.5.1.2.4</li> <li>• GSCR App. A9.5.1.2.4</li> <li>• GSCR Section 3</li> <li>• GSCR App. A9.5.1.1</li> <li>• GSCR App. A9.5.1.1</li> </ul>
T1 SS7 (ANSI T1.619a)	No <sup>1</sup>	<ul style="list-style-type: none"> <li>• Secure Transmission (Voice and Data) (R)</li> <li>• Modem (R)</li> <li>• Facsimile (R)</li> <li>• Call Control Signals (R)</li> <li>• Call Congestion (R)</li> <li>• Voice Compression (C)</li> </ul>	<ul style="list-style-type: none"> <li>• GSCR App. A9.5.1.1</li> <li>• GSCR App. A9.5.1.1.3</li> <li>• GSCR App. A9.5.1.1.4</li> </ul>
T1 ISDN PRI (ANSI T1.619a)	No <sup>1</sup>	<ul style="list-style-type: none"> <li>• E1 Supervisory Channel Associated Signaling (R)</li> <li>• E1 Clear Channel Capability (R)</li> <li>• E1 Alarm and Restoral Requirements (R)</li> <li>• MLPP (R)</li> <li>• MOS (R)</li> <li>• BERT (R)</li> <li>• Secure Transmission (Voice and Data) (R)</li> <li>• Modem (R)</li> <li>• Facsimile (R)</li> <li>• Call Control Signals (R)</li> <li>• Call Congestion (R)</li> <li>• Voice Compression (C)</li> </ul>	<ul style="list-style-type: none"> <li>• GSCR App. A9.5.1.2.5</li> <li>• GSCR App. A9.5.1.2.5</li> <li>• GSCR App. A9.5.1.2.5</li> <li>• GSCR Section 3</li> <li>• GSCR App. A9.5.1.1</li> <li>• GSCR App. A9.5.1.1.3</li> <li>• GSCR App. A9.5.1.1.4</li> </ul>
E1 CAS	No <sup>1</sup>	<ul style="list-style-type: none"> <li>• E1 Supervisory Channel Associated Signaling (R)</li> <li>• E1 Clear Channel Capability (R)</li> <li>• E1 Alarm and Restoral Requirements (R)</li> <li>• MLPP (R)</li> <li>• MOS (R)</li> <li>• BERT (R)</li> <li>• Secure Transmission (Voice and Data) (R)</li> <li>• Modem (R)</li> <li>• Facsimile (R)</li> <li>• Call Control Signals (R)</li> <li>• Call Congestion (R)</li> <li>• Voice Compression (C)</li> </ul>	<ul style="list-style-type: none"> <li>• GSCR App. A9.5.1.2.5</li> <li>• GSCR App. A9.5.1.2.5</li> <li>• GSCR App. A9.5.1.2.5</li> <li>• GSCR Section 3</li> <li>• GSCR App. A9.5.1.1</li> <li>• GSCR App. A9.5.1.1.3</li> <li>• GSCR App. A9.5.1.1.4</li> </ul>
E1 SS7 (ANSI T1.619a)	No <sup>1</sup>	<ul style="list-style-type: none"> <li>• Secure Transmission (Voice and Data) (R)</li> <li>• Modem (R)</li> <li>• Facsimile (R)</li> <li>• Call Control Signals (R)</li> <li>• Call Congestion (R)</li> <li>• Voice Compression (C)</li> </ul>	<ul style="list-style-type: none"> <li>• GSCR App. A9.5.1.1</li> <li>• GSCR App. A9.5.1.1.3</li> <li>• GSCR App. A9.5.1.1.4</li> </ul>
E1 PRI (ITU-T Q.955.3)	No <sup>1</sup>	<ul style="list-style-type: none"> <li>• Facsimile (R)</li> <li>• Call Control Signals (R)</li> <li>• Call Congestion (R)</li> <li>• Voice Compression (C)</li> </ul>	<ul style="list-style-type: none"> <li>• GSCR App. A9.5.1.1</li> <li>• GSCR App. A9.5.1.1</li> <li>• GSCR App. A9.5.1.1</li> <li>• GSCR App. A9.5.1.1.3</li> <li>• GSCR App. A9.5.1.1.4</li> </ul>
EIA-232	No <sup>1</sup>	<ul style="list-style-type: none"> <li>• EIA/TIA-232-F (R)</li> </ul>	<ul style="list-style-type: none"> <li>• GSCR App. A9.5.1.2.2</li> </ul>
EIA-530	No <sup>1</sup>	<ul style="list-style-type: none"> <li>• EIA/TIA-530-A (R)</li> </ul>	<ul style="list-style-type: none"> <li>• GSCR App. A9.5.1.2.2</li> </ul>
<b>DSN Transport Interface</b>			
<b>Interface</b>	<b>Critical</b>	<b>Requirements Required or Conditional</b>	<b>References</b>
Fast Ethernet 100BaseT	Yes	<ul style="list-style-type: none"> <li>• Call Congestion Control - At least one of the following four methods shall be used: <ul style="list-style-type: none"> <li>- Differential Services (C) <ul style="list-style-type: none"> <li>o CoS: IEEE 802.1p priority bit or Differential Services Code Point</li> <li>o QoS: NE that supports converged services shall have a minimum of four Queues</li> <li>o Signaling (Network Control, user signaling) (Highest)</li> <li>o Inelastic RTS (Command &amp; Telemetry, Circuit Emulation, Voice, Interactive VTC Video, Streaming Video)</li> <li>o Preferred Elastic (Interactive Transaction, File Transfer)</li> <li>o Elastic (Default, Scavenger)</li> </ul> </li> <li>- Integrated Services – Bandwidth reservation for IP traffic (C)</li> <li>- Congestion is not possible (C)</li> <li>- Software Capability to limit provisioning of input and output interfaces such that congestion is not possible under worst conditions (C)</li> </ul> </li> <li>• Delay: Not to exceed 5 ms average over 5 min period</li> <li>• Jitter: Not to exceed 5 ms average over 5 min period</li> <li>• Packet Loss: Not to exceed .05% average over 5 min period</li> </ul>	<ul style="list-style-type: none"> <li>• GSCR App. A9.5.1.1.3.2b</li> <li>• GSCR App A9.5.1.2.9</li> <li>• GSCR App A9.5.1.2.9</li> <li>• GSCR App A9.5.1.2.9</li> </ul>

**Table 2-2. SUT Capability and Feature Interoperability Requirements (continued)**

SUT Features And Capabilities																																																																																																							
Feature/Capability	Critical	Requirements Required or Conditional	References																																																																																																				
Synchronization	Yes	<ul style="list-style-type: none"> <li>• Timing (R)</li> </ul>	<ul style="list-style-type: none"> <li>• GSCR App. A9.5.1.7</li> </ul>																																																																																																				
Network Management	Yes	<ul style="list-style-type: none"> <li>• Management Option (R)                             <ul style="list-style-type: none"> <li>- Local Management (Front Panel and/or External Console) (C)</li> <li>- ADIMSS (C)</li> </ul> </li> <li>• Fault Management (C)</li> <li>• Loop Back Capability (C)</li> <li>• Operational Configuration Restoral (R)</li> </ul>	<ul style="list-style-type: none"> <li>• GSCR App. A9.5.2.2</li> <li>• GSCR App. A9.5.2.3</li> <li>• GSCR App. A9.5.3</li> </ul>																																																																																																				
IPv6	Yes <sup>2</sup>	<ul style="list-style-type: none"> <li>• An IPv6 capable system or product shall be capable of receiving, processing, and forwarding IPv6 packets and/or interfacing with other systems and protocols in a manner similar to that of IPv4. (R)</li> </ul>	<ul style="list-style-type: none"> <li>• GSCR paragraph 1.7</li> </ul>																																																																																																				
Security	Yes	<ul style="list-style-type: none"> <li>• GR-815, STIGs, and DIACAP (replacement for DITSCAP) (R)</li> </ul>	<ul style="list-style-type: none"> <li>• GSCR App. A9.6</li> </ul>																																																																																																				
<p><b>LEGEND:</b></p> <table border="0"> <tr> <td>802.1p</td> <td>- LAN Layer 2 QoS/CoS Protocol for Traffic Prioritization</td> <td>GSCR</td> <td>- Generic Switching Center Requirements</td> </tr> <tr> <td>100BaseT</td> <td>- 100 Mbps (Baseband Operation, Twisted Pair) Ethernet</td> <td>IEEE</td> <td>- Institute of Electrical and Electronics Engineers, Inc.</td> </tr> <tr> <td>ADIMSS</td> <td>- Advanced DSN Integrated Management Support System</td> <td>IP</td> <td>- Internet Protocol</td> </tr> <tr> <td>ANSI</td> <td>- American National Standards Institute</td> <td>IPv4</td> <td>- Internet Protocol version 4</td> </tr> <tr> <td>App.</td> <td>- Appendix</td> <td>IPv6</td> <td>- Internet Protocol version 6</td> </tr> <tr> <td>BERT</td> <td>- Bit Error Rate Test</td> <td>ISDN</td> <td>- Integrated Services Digital Network</td> </tr> <tr> <td>C</td> <td>- Conditional</td> <td>ITU-T</td> <td>- International Telecommunication Union – Telecommunication Standardization Sector</td> </tr> <tr> <td>CAS</td> <td>- Channel Associated Signaling</td> <td>LAN</td> <td>- Local Area Network</td> </tr> <tr> <td>CoS</td> <td>- Class of Service</td> <td>Mbps</td> <td>- Megabits per second</td> </tr> <tr> <td>DCE</td> <td>- Data Circuit-Terminating Equipment</td> <td>min</td> <td>- minute</td> </tr> <tr> <td>DIACAP</td> <td>- DoD Information Assurance Certification and Accreditation Process</td> <td>MLPP</td> <td>- Multi-Level Precedence and Preemption</td> </tr> <tr> <td>DITSCAP</td> <td>- DoD Information Technology Security Certification and Accreditation Policy</td> <td>MOS</td> <td>- Mean Opinion Score</td> </tr> <tr> <td>DoD</td> <td>- Department of Defense</td> <td>ms</td> <td>- millisecond</td> </tr> <tr> <td>DS1</td> <td>- Digital Signal Level 1</td> <td>NE</td> <td>- Network Element</td> </tr> <tr> <td>DSN</td> <td>- Defense Switched Network</td> <td>PRI</td> <td>- Primary Rate Interface</td> </tr> <tr> <td>DTE</td> <td>- Data Terminal Equipment</td> <td>Q.955.3</td> <td>- ISDN Signaling Standard for E1 MLPP</td> </tr> <tr> <td>E1</td> <td>- European Basic Multiplex Rate (2.048 Mbps)</td> <td>QoS</td> <td>- Quality of Service</td> </tr> <tr> <td>EIA</td> <td>- Electronic Industries Alliance</td> <td>R</td> <td>- Required</td> </tr> <tr> <td>EIA-232</td> <td>- Standard for defining the mechanical and electrical characteristics for connecting DTE and DCE data communications devices</td> <td>RTS</td> <td>- Real Time Services</td> </tr> <tr> <td>EIA-530</td> <td>- Standard for 25-position interface for DTE and DCE employing serial binary data interchange</td> <td>SS7</td> <td>- Signaling System 7</td> </tr> <tr> <td>GR</td> <td>- Generic Requirement</td> <td>STIGs</td> <td>- Security Technical Implementation Guides</td> </tr> <tr> <td>GR-815</td> <td>- Generic Requirement for Network Element/Network System (NE/NS) Security</td> <td>SUT</td> <td>- System Under Test</td> </tr> <tr> <td></td> <td></td> <td>T1</td> <td>- Digital Transmission Link Level 1 (1.544 Mbps)</td> </tr> <tr> <td></td> <td></td> <td>T1.619a</td> <td>- SS7 and ISDN MLPP Signaling Standard for T1</td> </tr> <tr> <td></td> <td></td> <td>VTC</td> <td>- Video Teleconferencing</td> </tr> </table> <p><b>NOTES:</b></p> <p>2 The NE DSN Access Interface can be met with any one of the following interfaces: Analog, T1, E1, or Serial.</p> <p>2 An IPv6 capable system or product, as defined in the GSCR, paragraph 1.7, shall be capable of receiving, processing, and forwarding IPv6 packets and/or interfacing with other systems and protocols in a manner similar to that of IPv4. IPv6 capability is currently satisfied by a vendor Letter of Compliance signed by the Vice President of the company. The vendor must state, in writing, compliance to the following criteria by 30 June 2008:</p> <ol style="list-style-type: none"> <li>Conformant with IPv6 standards profile contained in the DoD Information Technology Standards Registry (DISR).</li> <li>Maintaining interoperability in heterogeneous environments and with IPv4.</li> <li>Commitment to upgrade as the IPv6 standard evolves.</li> <li>Availability of contractor/vendor IPv6 technical support.</li> </ol>				802.1p	- LAN Layer 2 QoS/CoS Protocol for Traffic Prioritization	GSCR	- Generic Switching Center Requirements	100BaseT	- 100 Mbps (Baseband Operation, Twisted Pair) Ethernet	IEEE	- Institute of Electrical and Electronics Engineers, Inc.	ADIMSS	- Advanced DSN Integrated Management Support System	IP	- Internet Protocol	ANSI	- American National Standards Institute	IPv4	- Internet Protocol version 4	App.	- Appendix	IPv6	- Internet Protocol version 6	BERT	- Bit Error Rate Test	ISDN	- Integrated Services Digital Network	C	- Conditional	ITU-T	- International Telecommunication Union – Telecommunication Standardization Sector	CAS	- Channel Associated Signaling	LAN	- Local Area Network	CoS	- Class of Service	Mbps	- Megabits per second	DCE	- Data Circuit-Terminating Equipment	min	- minute	DIACAP	- DoD Information Assurance Certification and Accreditation Process	MLPP	- Multi-Level Precedence and Preemption	DITSCAP	- DoD Information Technology Security Certification and Accreditation Policy	MOS	- Mean Opinion Score	DoD	- Department of Defense	ms	- millisecond	DS1	- Digital Signal Level 1	NE	- Network Element	DSN	- Defense Switched Network	PRI	- Primary Rate Interface	DTE	- Data Terminal Equipment	Q.955.3	- ISDN Signaling Standard for E1 MLPP	E1	- European Basic Multiplex Rate (2.048 Mbps)	QoS	- Quality of Service	EIA	- Electronic Industries Alliance	R	- Required	EIA-232	- Standard for defining the mechanical and electrical characteristics for connecting DTE and DCE data communications devices	RTS	- Real Time Services	EIA-530	- Standard for 25-position interface for DTE and DCE employing serial binary data interchange	SS7	- Signaling System 7	GR	- Generic Requirement	STIGs	- Security Technical Implementation Guides	GR-815	- Generic Requirement for Network Element/Network System (NE/NS) Security	SUT	- System Under Test			T1	- Digital Transmission Link Level 1 (1.544 Mbps)			T1.619a	- SS7 and ISDN MLPP Signaling Standard for T1			VTC	- Video Teleconferencing
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		VTC	- Video Teleconferencing																																																																																																				

**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. This test was conducted using the test configuration shown in figure 2-2.



**Figure 2-2. DSN Test Configuration**

**9. SYSTEM CONFIGURATIONS.** Table 2-3 lists the system configurations used in the test.

**Table 2-3. Tested System Configurations**

System Name		Software Release		
Nortel CS 2100		SE08		
Siemens EWSD		19d with Patch Set 46		
Lucent 5ESS		5E16.2 SU 06-0002		
CS1000M Cabinet		Succession 4.5w		
CS1000M Single Group		Succession 4.5w		
REDCOM HDX		2.0A R3P0		
REDCOM IGX		6.1A R1P8		
REDCOM Slice		2.0A R3P0		
ASVALAN <sup>1</sup>	Component	Release	Sub-component	Function
	3Com 8807	V3.01.21s168rec	3C17508	Core Processor
			<u>3C17516</u>	24-port Access switch 10/100/1000 Mbps, RJ-45, with Inline Power
			<u>3C17514</u>	24-port 1000 Mbps optical interface
Super Stack 4 Switch 5500-EI PWR 28 port/5500-EI PWR 52	V3.01.12s168		Access switch 10/100 Mbps	
<b>System Under Test</b>	<b>Product<sup>2</sup></b>	<b>Interface Card</b>	<b>Release/Software</b>	
	CTP1002, <u>CTP1004</u> , CTP1012	CTP1000 IM-4P-T1	4.3R2	
	CTP2008, <u>CTP2024</u> , CTP2056	CTP2000 IM-8P-T1		
	<b>Product</b>	<b>Hardware</b>	<b>Release/Software</b>	
	<u>CTPView</u>	Dell Poweredge 850 with an Intel Celeron D processor	CTPView Rel. 2.2R2 Fedora Core 4 Version 2.6.17-1.2142_FC4 PHP 5.0.4 Perl 5.8.6 Expect 5.43.0 MySQL Database Version 14.7 Distribution 4.1.20 Apache Web Server Version 2.0.54	
<b>LEGEND:</b>				
5ESS	- Class 5 Electronic Switching System	P	- Port	
APL	- Approved Products List	PHP	- Hypertext Preprocessor	
ASVALAN	- Assured Services Voice Application Local Area Network	PWR	- Power over Ethernet	
CS	- Communications Server	rec	- redundant extended code	
CTP	- Circuit to Packet	RJ	- Registered Jack	
EI	- Enhanced Image	SE08	- Succession Enterprise Version 08	
EWSD	- Elektronisches Wahlsystem Digital	SQL	- Structured Query Language	
HDX	- High Density Exchange	SU	- Software Update	
IGX	- Integrated Digital Services Network (ISDN) Gateway Exchange	SUT	- System Under Test	
IM	- Interface Module	T1	- Digital Transmission Link Level 1 (1.544 Mbps)	
JITC	- Joint Interoperability Test Command	TSSI	- Telecom Switched Services Interoperability	
M	- Meridian	V	- Version	
Mbps	- Megabits per second			
<b>NOTES:</b>				
1 The SUT is certified to support Assured Services when used in conjunction with any ASVALAN found on the TSSI APL.				
2 Components bolded and underlined were tested by JITC. The other components in the family series were not tested; however, they utilize the same software and hardware and JITC analysis determined them to be functionally identical for interoperability certification purposes and they are also certified for joint use.				

**10. TEST LIMITATIONS.** None.

## 11. TEST RESULTS

### a. Discussion

**(1) Synchronization.** In accordance with the GSCR, section 9, the SUT is required to support either line timing or external timing mode. The SUT has the ability to provide timing using a number of different methods. The only synchronization methods tested with the SUT were line timing mode and external line timing mode with either T1 or E1 channelized interfaces. The SUT supports 32 kilobits per second (kbps) and NX64 kbps external timing interfaces; however, these were not tested and are not covered under this certification.

### **(2) Network Management**

**(a) Management Option.** Via the CTPView server, the SUT has the capability of performing network management. This is a secure connection that allows provisioning and monitoring of all CTP systems and circuits.

**(b) Fault Management.** Via the CTPView server, the SUT has the capability of performing self-test diagnostics on all ports. The CTPView also provides performance reporting and troubleshooting capabilities.

**(c) Operational Configuration Restoral.** The SUT was placed into a power failure condition. The SUT returned to the last customer configured state prior to the power failure as required in the GSCR, appendix 9.

**(3) Security.** Security is tested by DISA-led Information Assurance test teams and published under a separate report.

**(4) DSN Access Interfaces.** The SUT supports T1, E1, EIA-232 and EIA-530 interfaces. Channel Associated Signaling and Common Channel Signaling trunks were provisioned and tested. All trunk types were provisioned and tested on CTP1000 IM-4P-T1 and CTP2000 IM-8P-T1 cards. A Sunset MTT with an EIA-530 interface was used to test the Multiple Bit Rate (MBR) of the EIA-530 High Speed Serial Interface (HSSI). A Sunset T10 with an EIA-232 interface was used to test the EIA-232 capabilities of the SUT. All of the trunk types were connected and tested through the SUT traversing the Assured Services Voice Local Area Network (ASVALAN) test network. The specific requirements and test results of the DSN Access Interface testing are described below.

**(a) Interface Characteristics.** The DS1 and E1 interface characteristics were tested according to GSCR, appendix 9. All DS1 and E1 interface characteristics were found to be within tolerances.

**(b) Supervisory Channel Associated Signaling.** Trunk seizure, answer supervision, preemption signals and all other trunk supervisory information sent and

received on a per channel basis were passed transparently through the SUT as required in the GSCR, appendix 9.

**(c) Clear Channel Capability.** The SUT is capable of transmitting and receiving Bipolar Eights Zero Substitution line coding as required in the GSCR, appendix 9.

**(d) Alarm and Restoral Requirements.** The SUT is capable of transparently passing the alarm and restoral features of the DSN switch's digital interface unit as required in the GSCR, appendix 9.

**(e) Mean Opinion Score (MOS).** The Abacus call loader was used to generate voice traffic across the DS1 and E1 links to the SUT traversing the ASVALAN network as depicted in figure 2-2. There were 273,233 calls placed over the T1 and E1 interfaces, with 100 percent of all calls placed having an MOS of at least 4.3. The GSCR, appendix 9, (A9.5.1) states that a Network Element shall have a MOS of 4.0 or better as measured over any five-minute period.

**(f) Bit Error Rate Tests (BERTs).** BERTs were conducted across T1 and E1 trunk type interfaces as well as the EIA-530 and EIA-232 interfaces, which were mapped through the ASVALAN network. The GSCR, appendix 9, requires that the SUT, when inserted in to the test network, will not exceed an end-to-end bit error rate of less than one error in  $1 \times 10^9$  (averaged over a nine hour period). The SUT met this requirement for all interfaces with a recorded bit error ratio of  $1 \times 10^{-10}$ .

**(g) Secure Transmission (Voice and Data).** There were 168 secure calls placed between Secure Telephone Unit – 3<sup>rd</sup> Generation, Secure Terminal Equipment, and Secure Wireline Terminals without degrading transmissions between end devices. This satisfies the GSCR, appendix 9, requirement for degraded transmissions. The SUT secure call test results are shown in table 2-4.

**Table 2-4. SUT Secure Call Test Results**

DSN Access Interfaces	SUT Transport Interface	Secure Call Matrix (2 calls placed per combination)				
		From To	STU	STE (Analog)	STE (ISDN)	SWT
<b>T1 CAS</b> <b>E1 CAS</b> <b>T1 PRI (ANSI T1.619a)</b> <b>E1 PRI (ITU-T Q.955.3)</b> <b>T1 SS7 (ANSI T1.619a)</b> <b>E1 SS7 (ANSI T1.619a)</b>	<b>Fast Ethernet</b> <b>100BaseT</b>	STU	Completed	Completed	Completed	<b>Not Applicable</b>
		STE (Analog)	Completed	Completed	Completed	Completed
		STE (ISDN)	Completed	Completed	Completed	Completed
		SWT	<b>Not Applicable</b>	Completed	Completed	Completed

**LEGEND:**  
100BaseT - 100 Mbps (Baseband Operation, Twisted Pair) Ethernet  
ANSI - American National Standards Institute  
CAS - Channel Associated Signaling  
DSN - Defense Switched Network  
E1 - European Basic Multiplex Rate (2.048 Mbps)  
ISDN - Integrated Services Digital Network  
ITU-T - International Telecommunication Union-Telecommunication Standardization Sector  
Mbps - Megabits per second  
MLPP - Multi-Level Precedence and Preemption  
PRI - Primary Rate Interface  
Q.955.3 - ISDN Signaling Standard for E1 MLPP  
SS7 - Signaling System 7  
STE - Secure Terminal Equipment  
STU - Secure Telephone Unit  
SUT - System Under Test  
SWT - Secure Wireline Terminal  
T1 - Digital Transmission Link Level (1.544 Mbps)  
T1.619a - SS7 and ISDN MLPP Signaling Standard for T1

**(h) Modem.** There were 27,223 modem calls placed through the SUT using the Abacus call loader. All modem calls had a transmission rate of 26.4 kbps. The SUT supports the minimum modem transmission speed of 9.6 kbps as required in the GSCR, appendix 9.

**(i) Facsimile.** There were 17,216 facsimile calls were placed through the SUT using the Abacus call loader. All facsimile calls had a transmission rate of 14.4 kbps. The SUT supports the minimum modem transmission speed of 9.6 kbps as required in the GSCR, appendix 9.

**(j) Call Control Signals.** The SUT transparently transported all MLPP call control signals as required in the GSCR, appendix 9.

**(5) DSN Transport Interfaces.** The SUT supports 100BaseT, 100/1000BaseT, 100BaseFX, and 1000BaseFX transport interfaces. The 100BaseT was the only interface tested during this certification and is the only interface certified for use in the DSN. The 100/1000BaseT, 100BaseFX, and 1000BaseFX transport interfaces are not authorized or approved for use in the DSN. The 100BaseT interface was tested in a direct connect configuration to the ASVALAN running a data test load to insure the voice media was prioritized properly. The transport interface testing is described below.

**(a) IP Transport Call Congestion.** In accordance with the GSCR, appendix 9, IP Transport call congestion handling can be met with one of the following four methods:

- Differential Services: Institute of Electrical and Electronics Engineers, Inc. (IEEE) 802.1p priority bit or Differential Services Code Point (DSCP)
- Integrated Services – Bandwidth reservation for IP traffic
- Congestion is not possible.
- Software capability to limit provisioning of input and output interfaces such that congestion is not possible under worst conditions.

The SUT meets this requirement with Differential Services using layer 3 DSCP. Furthermore, the SUT is also capable of limiting provisioning of input and output interfaces such that congestion is not possible, however since the SUT transport interface is certified to traverse a converged ASVALAN or Voice Application Local Area Network (VALAN), Differential Services prioritization is required. The SUT sends the media and signaling sessions in the same packet stream and in accordance with the GSCR they can be tagged with the same DSCP priority value. The SUT has the capability to set the DSCP value on a port by port basis. This allows the voice media and signaling to be set at one value (e.g. 46) and the serial ports for data traffic at another value (e.g. 0). This will allow the proper prioritization to protect voice and signaling media with a higher prioritization than data within the converged Local Area Network.

**(b) Delay.** In accordance with the GSCR, appendix 9, the Network Element (NE) shall not impact the one-way delay of the network by more than 5 milliseconds (ms) per NE. The SUT passed with an average one-way delay of 4 ms per NE running a latency test over 100 calls.

**(c) Jitter.** With a 100% bandwidth load applied to the ASVALAN, jitter was measured to be .2 ms over a five-minute period. This met the 5 ms requirement as required in appendix 9 of the GSCR.

**(d) Packet Loss.** The GSCR, appendix 9, states that an IP Transport shall not cause packet loss measured from ingress to egress to increase by more than 0.05% averaged over any five-minute period. With 100% bandwidth load applied to the ASVALAN, the measured packet loss was measured at 0.00% over a 24-hour period.

**b. Summary.** The SUT is certified for joint use within the DSN as a NE Device in accordance with the requirements set forth in reference (c). When connected to the interfaces certified in this letter, the SUT and its associated applications met all the critical interoperability requirements and were transparent to the DSN switching systems interfaced causing no degradation of service. The SUT is certified to support DSN assured services over IP with any ASVALAN on the TSSI APL. The SUT is also certified for joint use with any VALAN on the TSSI APL. However, since VALANs do not support the Assured Services Requirements detailed in reference (c), Command and Control (C2) users and Special C2 users are not authorized to be served by the SUT connected to a VALAN.

**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 TSSI website at <http://jitc.fhu.disa.mil/tssi>.