



## 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 June 2008

### MEMORANDUM FOR DISTRIBUTION

**SUBJECT:** Special Interoperability Test Certification of NET Promina 800/400 with Software Release 4.x.2.02 Version 92.45

**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  
(c) and (d), 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 NET Promina 800/400 with Software Release 4.x.2.02 Version 92.45 is hereinafter referred to as the System Under Test (SUT). The SUT met all of the interface and functional requirements and is certified for joint use within the DSN as a Tactical Network Element (T-NE) and Strategic Network Element (S-NE) as set forth in appendices 2 and 9 of reference (c) with the following stipulations: The SUT is certified as a T-NE only with the Symmetric Asymmetric Trunk (SA-TRK) transport interface. The SUT is certified as an S-NE with the SA-TRK, TRK-2, TRK-3, and Asynchronous Transfer Mode (ATM) Optical Carrier Level 3 (OC-3) transport interfaces. The Promina 400 does not support the ATM OC-3 transport interface; therefore, only the Promina 800 is certified with the ATM OC-3 transport interface. The TRK-3 transport interface offers Digital Transmission Link Level 1 (T1) and serial interfaces; however, only the T1 was tested and is covered under this certification. The SUT offers two methods for establishing transport connectivity; permanent mode and on-demand mode. Only the permanent mode was tested and is covered by this certification. On-demand mode does not support Assured Services and was not tested or certified. The SUT meets the critical interoperability requirements set forth in reference (c) and testing was conducted using test procedures derived from reference (d). No other configurations, features, or functions, except those cited within this report, are certified by the JITC, or authorized by the Program Management Office for use within the DSN. This certification expires upon changes that affect interoperability, but no later than three years from the date of this memorandum.

3. This certification is based on interoperability testing of the SUT 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 28 January through 20 March 2008. Review of the vendor's LoC was completed on 18 April 2008.

4. The SUT Interoperability Test Summary is shown in table 1 and the Capability and Feature Requirements used to evaluate the interoperability of the SUT are indicated in table 2.

**Table 1. SUT Interoperability Test Summary**

<b>DSN Access Interfaces</b>																																																																												
<b>Interface &amp; Signaling</b>		<b>Critical</b>	<b>Status</b>	<b>Remarks</b>																																																																								
T1 CAS (AMI/SF) DTMF, MFR1		No <sup>1</sup>	Certified	Met all CRs and FRs.																																																																								
T1 CAS (B8ZS/ESF) DTMF, MFR1		No <sup>1</sup>	Certified	Met all CRs and FRs.																																																																								
T1 ISDN PRI (ANSI T1.607/T1.619a)		No <sup>1</sup>	Certified	Met all CRs and FRs.																																																																								
<b>Serial Data Interfaces</b>																																																																												
Serial EIA-530 (USD, HSD-2)		No <sup>1</sup>	See note 2.	See note 2.																																																																								
<b>DSN S-NE Transport Interfaces</b>																																																																												
<b>Transport Level</b>		<b>Critical</b>	<b>Status</b>	<b>Remarks</b>																																																																								
<b>Trunk Card</b>	<b>Interfaces</b>																																																																											
SA-TRK	Serial EIA-530	No <sup>3</sup>	Certified	Met all CRs and FRs.																																																																								
TRK-2	T1 (B8ZS/ESF)	No <sup>3</sup>	Certified	Met all CRs and FRs.																																																																								
TRK-3	T1 ( B8ZS/ESF)	No <sup>3</sup>	Certified	Met all CRs and FRs.																																																																								
SCLX	OC-3 ATM	No <sup>3</sup>	Certified	Met all CRs and FRs.																																																																								
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Synchronization		Yes	Certified	Met all CRs and FRs.																																																																								
Network Management		Yes	Certified	Met all CRs and FRs.																																																																								
Security		Yes	See note 4.	See note 4.																																																																								
<p><b>LEGEND:</b></p> <table border="0"> <tr> <td>AMI</td> <td>- Alternate Mark Inversion</td> <td>Mbps</td> <td>- Megabits per second</td> </tr> <tr> <td>ANSI</td> <td>- American National Standards Institute</td> <td>MFR1</td> <td>- Multi-Frequency Recommendation 1</td> </tr> <tr> <td>ATM</td> <td>- Asynchronous Transfer Mode</td> <td>MLPP</td> <td>- Multi-Level Precedence and Preemption</td> </tr> <tr> <td>B8ZS</td> <td>- Bipolar Eight Zero Substitution</td> <td>OC-3</td> <td>- Optical Carrier Level 3</td> </tr> <tr> <td>CAS</td> <td>- Channel Associated Signaling</td> <td>PRI</td> <td>- Primary Rate Interface</td> </tr> <tr> <td>CRs</td> <td>- Capability Requirements</td> <td>SA-TRK</td> <td>- Symmetric Asymmetric Trunk</td> </tr> <tr> <td>DCE</td> <td>- Data Circuit-terminating Equipment</td> <td>SCLX</td> <td>- Scream Link eXchange</td> </tr> <tr> <td>DISA</td> <td>- Defense Information Systems Agency</td> <td>S-NE</td> <td>- Strategic Network Element</td> </tr> <tr> <td>DSN</td> <td>- Defense Switched Network</td> <td>SF</td> <td>- Super Frame</td> </tr> <tr> <td>DSS1</td> <td>- Digital Subscriber Signaling 1</td> <td>SS7</td> <td>- Signaling System 7</td> </tr> <tr> <td>DTE</td> <td>- Data Terminal Equipment</td> <td>SUT</td> <td>- System Under Test</td> </tr> <tr> <td>DTMF</td> <td>- Dual Tone Multi-Frequency</td> <td>T1</td> <td>- Digital Transmission Link Level 1 (1.544 Mbps)</td> </tr> <tr> <td>EIA</td> <td>- Electronics Industries Alliance</td> <td>T1.607</td> <td>- ISDN – Layer 3 Signaling Specification for Circuit Switched Bearer Service for DSS1</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> <tr> <td>ESF</td> <td>- Extended Super Frame</td> <td>T-NE</td> <td>- Tactical Network Element</td> </tr> <tr> <td>FRs</td> <td>- Feature Requirements</td> <td>TRK</td> <td>- Trunk</td> </tr> <tr> <td>HSD</td> <td>- High-Speed Synchronous Data</td> <td>UCR</td> <td>- Unified Capabilities Requirements</td> </tr> <tr> <td>ISDN</td> <td>- Integrated Services Digital Network</td> <td>USD</td> <td>- Universal Synchronous Data</td> </tr> </table> <p><b>NOTES:</b></p> <ol style="list-style-type: none"> <li>The UCR does not stipulate a minimum Access interface requirement for a Strategic or Tactical Network Element.</li> <li>The serial data interfaces do not connect directly to the DSN. Data was transmitted across these interfaces during the test to ensure that they did not affect DSN Voice Services.</li> <li>The UCR does not stipulate a minimum Transport interface requirement Strategic or Tactical Network Element.</li> <li>Security is tested by DISA-led Information Assurance test teams and published in a separate report.</li> </ol>					AMI	- Alternate Mark Inversion	Mbps	- Megabits per second	ANSI	- American National Standards Institute	MFR1	- Multi-Frequency Recommendation 1	ATM	- Asynchronous Transfer Mode	MLPP	- Multi-Level Precedence and Preemption	B8ZS	- Bipolar Eight Zero Substitution	OC-3	- Optical Carrier Level 3	CAS	- Channel Associated Signaling	PRI	- Primary Rate Interface	CRs	- Capability Requirements	SA-TRK	- Symmetric Asymmetric Trunk	DCE	- Data Circuit-terminating Equipment	SCLX	- Scream Link eXchange	DISA	- Defense Information Systems Agency	S-NE	- Strategic Network Element	DSN	- Defense Switched Network	SF	- Super Frame	DSS1	- Digital Subscriber Signaling 1	SS7	- Signaling System 7	DTE	- Data Terminal Equipment	SUT	- System Under Test	DTMF	- Dual Tone Multi-Frequency	T1	- Digital Transmission Link Level 1 (1.544 Mbps)	EIA	- Electronics Industries Alliance	T1.607	- ISDN – Layer 3 Signaling Specification for Circuit Switched Bearer Service for DSS1	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	ESF	- Extended Super Frame	T-NE	- Tactical Network Element	FRs	- Feature Requirements	TRK	- Trunk	HSD	- High-Speed Synchronous Data	UCR	- Unified Capabilities Requirements	ISDN	- Integrated Services Digital Network	USD	- Universal Synchronous Data
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**Table 2. SUT Capability and Feature Interoperability Requirements**

DSN Interfaces					
DSN Access Interfaces		Requirements Required or Conditional	References		
Interface	Critical	<ul style="list-style-type: none"> <li>• DS1 Interface Characteristics (C)</li> <li>• DS1 Supervisory Channel Associated Signaling (C)</li> <li>• DS1 Clear Channel Capability (C)</li> <li>• DS1 Alarm and Restoral Requirements (C)</li> <li>• Latency (C)</li> <li>• MOS (R): S-NE Only</li> <li>• BERT (R): S-NE Only</li> <li>• Secure Transmission (Voice and Data) (R)</li> <li>• Modem (R): S-NE Only</li> <li>• Facsimile (R)</li> <li>• Call Control Signals (R)</li> <li>• Call Congestion (R)</li> <li>• Voice Compression (C)</li> <li>• MOS (R): T-NE Only</li> <li>• BERT (R): T-NE Only</li> <li>• Modem (R): T-NE Only</li> <li>• Testing in Simulated Tactical Environment (R) T-NE only</li> <li>• MLPP (R)</li> </ul>	<ul style="list-style-type: none"> <li>• UCR para. A9.5.1.2.4</li> <li>• UCR para. A9.5.1.2.4</li> <li>• UCR para. A9.5.1.2.4</li> <li>• UCR para. A9.5.1.2.4</li> <li>• UCR para. A9.5.1.2.9</li> <li>• UCR para. A9.5.1.1</li> <li>• UCR para. A9.5.1.1.2</li> <li>• UCR para. A9.5.1.1.4</li> <li>• UCR para. A2.4.1</li> <li>• UCR para. A2.4.1</li> <li>• UCR para. A2.4.1</li> <li>• UCR para. A2.4</li> <li>• UCR para. A9.1</li> </ul>		
T1 CAS (AMI/SF) DTMF, MFR1	No <sup>1</sup>				
T1 CAS (B8ZS/ESF) DTMF, MFR1	No <sup>1</sup>				
T1 ISDN PRI (ANSI T1.607/T1.619a)	No <sup>1</sup>				
Serial EIA-232, EIA-530, and EIA-449 (USD and HSD cards only)	No <sup>1</sup>				
DSN S-NE Transport Interfaces					
TRK Interface	Critical				
SA- TRK Serial EIA-530, EIA-449	No <sup>2</sup>				
TRK-2 T1 (B8ZS/ESF)	No <sup>2</sup>				
TRK-3 (B8ZS/ESF)	No <sup>2</sup>				
DSN T-NE Transport Interface					
TRK Interface	Critical				
SA- TRK Serial EIA-530, EIA-449	No <sup>2</sup>				
SUT Features And Capabilities					
Feature/Capability	Critical	Requirements Required or Conditional	References		
Synchronization	Yes	• Timing (R)	• UCR para. A9.5.1.2.7		
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>• UCR para. A9.5.2.1</li> <li>• UCR para. A9.5.2.2</li> <li>• UCR para. A9.5.2.3</li> <li>• UCR para. A9.5.3</li> </ul>		
Security	Yes	• DIACAP (R)	• UCR para. A9.6		
<b>LEGEND:</b>					
<table style="width: 100%; border: none;"> <tr> <td style="width: 50%; vertical-align: top;"> <ul style="list-style-type: none"> <li>A - Appendix</li> <li>ADIMSS - Advanced DSN Integrated Management Support System</li> <li>AMI - Alternate Mark Inversion</li> <li>ANSI - American National Standards Institute</li> <li>B8ZS - Bipolar Eight Zero Substitution</li> <li>BERT - Bit Error Rate Test</li> <li>C - Conditional</li> <li>CAS - Channel Associated Signaling</li> <li>DCE - Data Circuit-terminating Equipment</li> <li>DIACAP - DoD Information Assurance Certification and Accreditation Process</li> <li>DoD - Department of Defense</li> <li>DS1 - Digital Signal Level 1</li> <li>DSN - Defense Switched Network</li> <li>DSS1 - Digital Subscriber Signaling 1</li> <li>DTE - Data Terminal Equipment</li> <li>DTMF - Dual Tone Multi-Frequency</li> <li>EIA - Electronics Industries Alliance</li> <li>EIA-232 - Standard for defining the mechanical and electrical characteristics for connecting DTE and DCE data communications devices</li> <li>EIA-499 - Standard for 37-position and 9-position interface for DTE and DCE employing serial binary data interchange</li> <li>EIA-530 - Standard for 25-position interface for DTE and DCE employing serial binary data interchange</li> </ul> </td> <td style="width: 50%; vertical-align: top;"> <ul style="list-style-type: none"> <li>ESF - Extended Super Frame</li> <li>HSD - High-Speed Synchronous Data</li> <li>ISDN - Integrated Services Digital Network</li> <li>Mbps - Megabits per second</li> <li>MFR1 - Multi-Frequency Recommendation 1</li> <li>MLPP - Multi-Level Precedence and Preemption</li> <li>MOS - Mean Opinion Score</li> <li>para - paragraph</li> <li>PRI - Primary Rate Interface</li> <li>R - Required</li> <li>S-NE - Strategic Network Element</li> <li>SA-TRK - Symmetrical Asymmetrical Trunk</li> <li>SF - Super Frame</li> <li>SS7 - Signaling System 7</li> <li>SUT - System Under Test</li> <li>T1 - Digital Transmission Link Level 1 (1,544 Mbps)</li> <li>T1.607 - ISDN - Layer 3 Signaling Specification for Circuit Switched Bearer Service for DSS1</li> <li>T1.619a - SS7 and ISDN MLPP Signaling Standard for T1</li> <li>T-NE - Tactical Network Element</li> <li>TRK - Trunk</li> <li>UCR - Unified Capabilities Requirements</li> <li>USD - Universal Synchronous Data</li> </ul> </td> </tr> </table>				<ul style="list-style-type: none"> <li>A - Appendix</li> <li>ADIMSS - Advanced DSN Integrated Management Support System</li> <li>AMI - Alternate Mark Inversion</li> <li>ANSI - American National Standards Institute</li> <li>B8ZS - Bipolar Eight Zero Substitution</li> <li>BERT - Bit Error Rate Test</li> <li>C - Conditional</li> <li>CAS - Channel Associated Signaling</li> <li>DCE - Data Circuit-terminating Equipment</li> <li>DIACAP - DoD Information Assurance Certification and Accreditation Process</li> <li>DoD - Department of Defense</li> <li>DS1 - Digital Signal Level 1</li> <li>DSN - Defense Switched Network</li> <li>DSS1 - Digital Subscriber Signaling 1</li> <li>DTE - Data Terminal Equipment</li> <li>DTMF - Dual Tone Multi-Frequency</li> <li>EIA - Electronics Industries Alliance</li> <li>EIA-232 - Standard for defining the mechanical and electrical characteristics for connecting DTE and DCE data communications devices</li> <li>EIA-499 - Standard for 37-position and 9-position interface for DTE and DCE employing serial binary data interchange</li> <li>EIA-530 - Standard for 25-position interface for DTE and DCE employing serial binary data interchange</li> </ul>	<ul style="list-style-type: none"> <li>ESF - Extended Super Frame</li> <li>HSD - High-Speed Synchronous Data</li> <li>ISDN - Integrated Services Digital Network</li> <li>Mbps - Megabits per second</li> <li>MFR1 - Multi-Frequency Recommendation 1</li> <li>MLPP - Multi-Level Precedence and Preemption</li> <li>MOS - Mean Opinion Score</li> <li>para - paragraph</li> <li>PRI - Primary Rate Interface</li> <li>R - Required</li> <li>S-NE - Strategic Network Element</li> <li>SA-TRK - Symmetrical Asymmetrical Trunk</li> <li>SF - Super Frame</li> <li>SS7 - Signaling System 7</li> <li>SUT - System Under Test</li> <li>T1 - Digital Transmission Link Level 1 (1,544 Mbps)</li> <li>T1.607 - ISDN - Layer 3 Signaling Specification for Circuit Switched Bearer Service for DSS1</li> <li>T1.619a - SS7 and ISDN MLPP Signaling Standard for T1</li> <li>T-NE - Tactical Network Element</li> <li>TRK - Trunk</li> <li>UCR - Unified Capabilities Requirements</li> <li>USD - Universal Synchronous Data</li> </ul>
<ul style="list-style-type: none"> <li>A - Appendix</li> <li>ADIMSS - Advanced DSN Integrated Management Support System</li> <li>AMI - Alternate Mark Inversion</li> <li>ANSI - American National Standards Institute</li> <li>B8ZS - Bipolar Eight Zero Substitution</li> <li>BERT - Bit Error Rate Test</li> <li>C - Conditional</li> <li>CAS - Channel Associated Signaling</li> <li>DCE - Data Circuit-terminating Equipment</li> <li>DIACAP - DoD Information Assurance Certification and Accreditation Process</li> <li>DoD - Department of Defense</li> <li>DS1 - Digital Signal Level 1</li> <li>DSN - Defense Switched Network</li> <li>DSS1 - Digital Subscriber Signaling 1</li> <li>DTE - Data Terminal Equipment</li> <li>DTMF - Dual Tone Multi-Frequency</li> <li>EIA - Electronics Industries Alliance</li> <li>EIA-232 - Standard for defining the mechanical and electrical characteristics for connecting DTE and DCE data communications devices</li> <li>EIA-499 - Standard for 37-position and 9-position interface for DTE and DCE employing serial binary data interchange</li> <li>EIA-530 - Standard for 25-position interface for DTE and DCE employing serial binary data interchange</li> </ul>	<ul style="list-style-type: none"> <li>ESF - Extended Super Frame</li> <li>HSD - High-Speed Synchronous Data</li> <li>ISDN - Integrated Services Digital Network</li> <li>Mbps - Megabits per second</li> <li>MFR1 - Multi-Frequency Recommendation 1</li> <li>MLPP - Multi-Level Precedence and Preemption</li> <li>MOS - Mean Opinion Score</li> <li>para - paragraph</li> <li>PRI - Primary Rate Interface</li> <li>R - Required</li> <li>S-NE - Strategic Network Element</li> <li>SA-TRK - Symmetrical Asymmetrical Trunk</li> <li>SF - Super Frame</li> <li>SS7 - Signaling System 7</li> <li>SUT - System Under Test</li> <li>T1 - Digital Transmission Link Level 1 (1,544 Mbps)</li> <li>T1.607 - ISDN - Layer 3 Signaling Specification for Circuit Switched Bearer Service for DSS1</li> <li>T1.619a - SS7 and ISDN MLPP Signaling Standard for T1</li> <li>T-NE - Tactical Network Element</li> <li>TRK - Trunk</li> <li>UCR - Unified Capabilities Requirements</li> <li>USD - Universal Synchronous Data</li> </ul>				
<b>NOTES:</b>					
1 The UCR does not stipulate a minimum Access interface requirement for a Strategic or Tactical Network Element.					
2 The UCR does not stipulate a minimum Transport interface requirement for a Strategic or Tactical Network Element.					

5. JITC distributes interoperability information via the JITC Electronic Report Distribution (ERD) system, which uses Unclassified-But-Sensitive Internet Protocol Router Network

JITC Memo, JTE, Special Interoperability Test Certification of NET Promina 800/400 with Software Release 4.x.2.02 Version 92.45

(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>.

6. The JITC point of contact is Mr. Michael Napier, DSN 879-6787, commercial (520) 538-6787, FAX DSN 879-4347, or e-mail to [Michael.Napier@disa.mil](mailto:Michael.Napier@disa.mil). The tracking number for the SUT is 0712801.

FOR THE COMMANDER:

2 Enclosures a/s

  
RICHARD A. MEADOR  
Chief  
Battlespace Communications Portfolio

Distribution:

Joint Staff J6I, Room 1E596, Pentagon, Washington, DC 20318-6000

Joint Interoperability Test Command, Liaison, ATTN: TED/JT1, 2W24-8C, P.O. Box 4502, Falls Church, VA 22204-4502

Defense Information Systems Agency, Net-Centricity Requirements and Assessment Branch, ATTN: GE333, Room 244, P.O. Box 4502, Falls Church, VA 22204-4502

Office of Chief of Naval Operations (N71CC2), CNO N6/N7, 2000 Navy Pentagon, Washington, DC 20350

Headquarters U.S. Air Force, AF/XICF, 1800 Pentagon, Washington, DC 20330-1800

Department of the Army, Office of the Secretary of the Army, CIO/G6, ATTN: SAIS-IOQ, 107 Army Pentagon, Washington, DC 20310-0107

U.S. Marine Corps (C4ISR), MARCORSSYSCOM, 2200 Lester St., Quantico, VA 22134-5010  
DOT&E, Net-Centric Systems and Naval Warfare, 1700 Defense Pentagon, Washington, DC 20301-1700

U.S. Coast Guard, CG-64, 2100 2nd St. SW, Washington, DC 20593

Defense Intelligence Agency, 2000 MacDill Blvd., Bldg 6000, Bolling AFB, Washington, DC 20340-3342

National Security Agency, ATTN: DT, Suite 6496, 9800 Savage Road, Fort Meade, MD 20755-6496

Director, Defense Information Systems Agency, ATTN: GS235, Room 5W24-8A, P.O. Box 4502, Falls Church, VA 22204-4502

Office of Assistant Secretary of Defense (NII)/DoD CIO, Crystal Mall 3, 7th Floor, Suite 7000, 1851 S. Bell St., Arlington, VA 22202

Office of Under Secretary of Defense, AT&L, Room 3E144, 3070 Defense Pentagon, Washington, DC 20301

U.S. Joint Forces Command, J68, Net-Centric Integration, Communications, and Capabilities Division, 1562 Mitscher Ave., Norfolk, VA 23551-2488

Defense Information Systems Agency (DISA), ATTN: GS23 (Mr. McLaughlin), Room 5W23, 5275 Leesburg Pike (RTE 7), Falls Church, VA 22041

## **ADDITIONAL REFERENCES**

- (c) Defense Information Systems Agency, Department of Defense Networks, Unified Capabilities Requirements, 21 December 2007
- (d) Joint Interoperability Test Command, "Defense Switched Network Generic Switch Test Plan (GSTP), Change 2," 2 October 2006

## CERTIFICATION TESTING SUMMARY

**1. SYSTEM TITLE.** NET Promina 800/400, Software Release 4.x.2.02 Version 92.45; hereinafter referred to as the System Under Test (SUT).

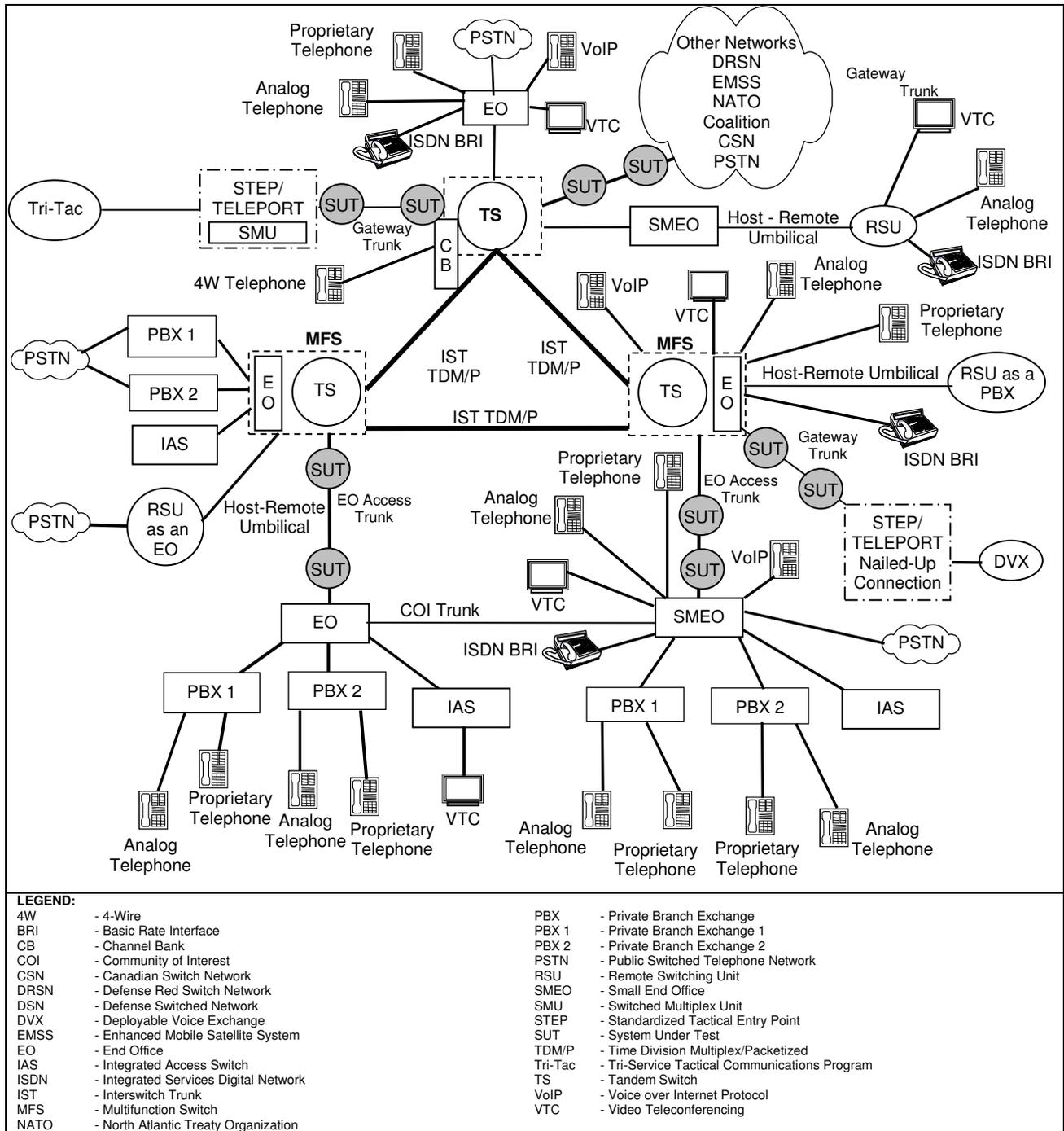
**2. PROPONENT.** Defense Information Systems Agency (DISA).

**3. PROGRAM MANAGER.** Mr. John Wilson, DISA, 7 Skyline Place, 5275 Leesburg Pike, Falls Church, Virginia, 22041, email: john.wilson@disa.mil.

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

**5. SYSTEM UNDER TEST DESCRIPTION.** The NET Promina 800/400 platform is a Time-Division Multiplexer (TDM) that aggregates voice and data traffic across trunks of various mediums, to include Digital Transmission Link Level 1 (T1), European Basic Multiplex Rate (E1), Asynchronous Transfer Mode (ATM), and serial trunks. The Promina nodes are linked together via trunks to form a Promina network. The SUT offers an access and transport E1 interface; however, these interfaces were not tested and are therefore not covered under this certification. The ATM Optical Carrier Level 3 (OC-3) transport interface is only supported by the Promina 800. Promina uses low-bandwidth, efficient in-band signaling channels, call Signaling Channel Link Protocol (SCLP) channels, to intelligently and without user intervention, route (and re-route in case of trunk failure) port traffic through the Promina network. To support Defense Switch Network (DSN) traffic, Promina uses a Primary Rate Card (PRC) to interface T1 Channel Associated Signaling (CAS) and Integrated Services Digital Network (ISDN) Primary Rate Interface (PRI) interface trunk channels from a DSN switch, and then compresses these channels using the Prime Voice Secure (PVS) card. These compressed voice channels are then automatically routed across the Promina network to the destination specified at the originating side. The SUT offers two methods for establishing transport connectivity; permanent mode, and on-demand mode. Only the permanent mode was tested and is covered by this certification and authorized for use within the DSN.

**6. OPERATIONAL ARCHITECTURE.** The Unified Capabilities Requirements (UCR) DSN 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.

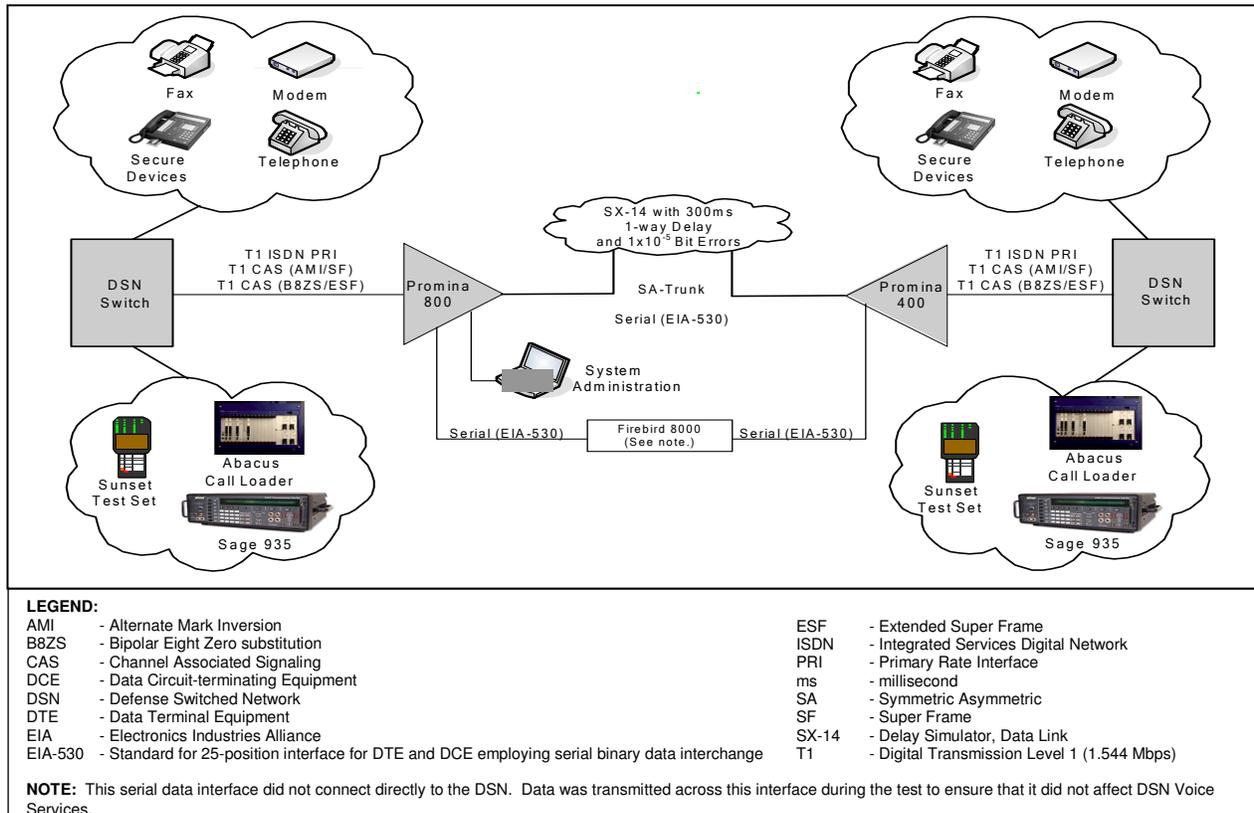
**Table 2-1. SUT Interoperability Test Summary**

<b>DSN Access Interfaces</b>					
<b>Interface &amp; Signaling</b>		<b>Critical</b>	<b>Status</b>	<b>Remarks</b>	
T1 CAS (AMI/SF) DTMF, MFR1 (PRC)		No <sup>1</sup>	Certified	Met all CRs and FRs.	
T1 CAS (B8ZS/ESF) DTMF, MFR1 (PRC)		No <sup>1</sup>	Certified	Met all CRs and FRs.	
T1 ISDN PRI (ANSI T1.607/T1.619a) (PRC)		No <sup>1</sup>	Certified	Met all CRs and FRs.	
<b>Serial Data Interfaces</b>					
Serial EIA-530 (USD, HSD-2)		No <sup>1</sup>	See note 2	See note 2.	
<b>DSN S-NE Transport Interfaces</b>					
<b>Transport Level</b>		<b>Critical</b>	<b>Status</b>	<b>Remarks</b>	
<b>Trunk Card</b>	<b>Interfaces</b>				
SA-TRK	Serial EIA-530	No <sup>3</sup>	Certified	Met all CRs and FRs.	
TRK-2	T1 (B8ZS/ESF)	No <sup>3</sup>	Certified	Met all CRs and FRs.	
TRK-3	T1 ( B8ZS/ESF)	No <sup>3</sup>	Certified	Met all CRs and FRs.	
SCLX	OC-3 ATM	No <sup>3</sup>	Certified	Met all CRs and FRs.	
<b>DSN T-NE Transport interfaces</b>					
<b>Transport Level</b>		<b>Critical</b>	<b>Status</b>	<b>Remarks</b>	
<b>Trunk Card</b>	<b>Interface</b>				
SA-TRK	Serial EIA-530	No <sup>3</sup>	Certified	Met all CRs and FRs.	
<b>Features and Capabilities</b>					
<b>Features and Capabilities</b>		<b>Critical</b>	<b>Status</b>	<b>Remarks</b>	
Synchronization		Yes	Certified	Met all CRs and FRs.	
Network Management		Yes	Certified	Met all CRs and FRs.	
Security		Yes	See note 4.	See note 4.	
<b>LEGEND:</b>					
AMI	- Alternate Mark Inversion	Mbps	- Megabits per second		
ANSI	- American National Standards Institute	MFR1	- Multi-Frequency Recommendation 1		
ATM	- Asynchronous Transfer Mode	MLPP	- Multi-Level Precedence and Preemption		
B8ZS	- Bipolar Eight Zero Substitution	OC-3	- Optical Carrier Level 3		
CAS	- Channel Associated Signaling	PRC	- Primary Rate Card		
CRs	- Capability Requirements	PRI	- Primary Rate Interface		
DCE	- Data Circuit-terminating Equipment	SA-Trk	- Symmetric Asymmetric Trunk		
DISA	- Defense Information Systems Agency	SCLX	- Scream Link eXchange		
DSN	- Defense Switched Network	S-NE	- Strategic Network Element		
DSS1	- Digital Subscriber Signaling 1	SF	- Super Frame		
DTE	- Data Terminal Equipment	SS7	- Signaling System 7		
DTMF	- Dual Tone Multi-Frequency	SUT	- System Under Test		
EIA	- Electronics Industries Alliance	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	T1.607	- ISDN – Layer 3 Signaling Specification for Circuit Switched Bearer Service for DSS1		
ESF	- Extended Super Frame	T1.619a	- SS7 and ISDN MLPP Signaling Standard for T1		
FRs	- Feature Requirements	T-NE	- Tactical Network Element		
HSD	- High-Speed Synchronous Data	TRK	- Trunk		
ISDN	- Integrated Services Digital Network	UCR	- Unified Capabilities Requirements		
		USD	- Universal Synchronous Data		
<b>NOTES:</b>					
1 The UCR does not stipulate a minimum Access interface requirement for a Strategic or Tactical Network Element.					
2 The serial data interfaces do not connect directly to the DSN. Data was transmitted across these interfaces during the test to ensure that they did not affect DSN Voice Services.					
3 The UCR does not stipulate a minimum Transport interface requirement Strategic or Tactical Network Element.					
4 Security is tested by DISA-led Information Assurance test teams and published in a separate report.					

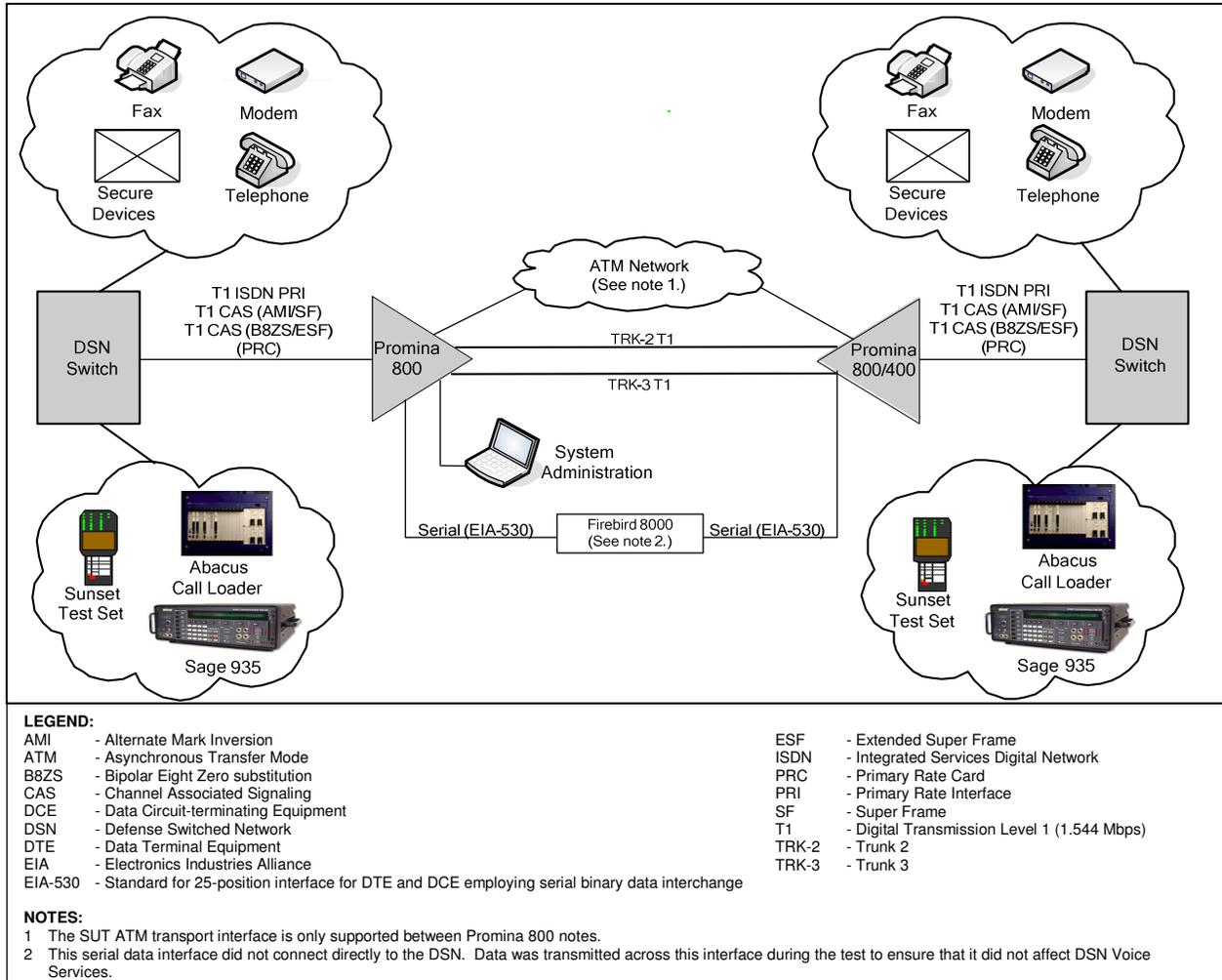
**Table 2-2. SUT Capability and Feature Interoperability Requirements**

<b>DSN Interfaces</b>					
<b>DSN Access Interfaces</b>		<b>Requirements Required or Conditional</b>	<b>References</b>		
<b>Interface</b>	<b>Critical</b>	<ul style="list-style-type: none"> <li>• DS1 Interface Characteristics (C)</li> <li>• DS1 Supervisory Channel Associated Signaling (C)</li> <li>• DS1 Clear Channel Capability (C)</li> <li>• DS1 Alarm and Restoral Requirements (C)</li> <li>• Latency (C)</li> <li>• MOS (R): S-NE Only</li> <li>• BERT (R): S-NE Only</li> <li>• Secure Transmission (Voice and Data) (R)</li> <li>• Modem (R): S-NE Only</li> <li>• Facsimile (R)</li> <li>• Call Control Signals (R)</li> <li>• Call Congestion (R)</li> <li>• Voice Compression (C)</li> <li>• MOS (R): T-NE Only</li> <li>• BERT (R): T-NE Only</li> <li>• Modem (R): T-NE Only</li> <li>• Testing in Simulated Tactical Environment (R) T-NE only</li> <li>• MLPP (R)</li> </ul>	<ul style="list-style-type: none"> <li>• UCR para. A9.5.1.2.4</li> <li>• UCR para. A9.5.1.2.4</li> <li>• UCR para. A9.5.1.2.4</li> <li>• UCR para. A9.5.1.2.4</li> <li>• UCR para. A9.5.1.2.9</li> <li>• UCR para. A9.5.1.1</li> <li>• UCR para. A9.5.1.1.2</li> <li>• UCR para. A9.5.1.1.4</li> <li>• UCR para. A2.4.1</li> <li>• UCR para. A2.4.1</li> <li>• UCR para. A2.4.1</li> <li>• UCR para. A2.4</li> <li>• UCR para A9.1</li> </ul>		
T1 CAS (AMI/SF) DTMF, MFR1 (PRC)	No <sup>1</sup>				
T1 CAS (B8ZS/ESF) DTMF, MFR1 (PRC)	No <sup>1</sup>				
T1 ISDN PRI (ANSI T1.607/T1.619a) (PRC)	No <sup>1</sup>				
Serial EIA-232, EIA-530, and EIA-449 (USD and HSD cards only)	No <sup>1</sup>				
<b>DSN S-NE Transport Interfaces</b>					
<b>TRK Interface</b>	<b>Critical</b>				
SA- TRK Serial EIA-530, EIA-449	No <sup>2</sup>				
TRK-2 T1 (B8ZS/ESF)	No <sup>2</sup>				
TRK-3 (B8ZS/ESF)	No <sup>2</sup>				
<b>DSN T-NE Transport Interface</b>					
<b>TRK Interface</b>	<b>Critical</b>				
SA- TRK Serial EIA-530, EIA-449	No <sup>2</sup>				
<b>SUT Features And Capabilities</b>					
<b>Feature/Capability</b>	<b>Critical</b>	<b>Requirements Required or Conditional</b>	<b>References</b>		
Synchronization	Yes	• Timing (R)	• UCR para. A9.5.1.2.7		
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>• UCR para. A9.5.2.1</li> <li>• UCR para. A9.5.2.2</li> <li>• UCR para. A9.5.2.3</li> <li>• UCR para. A9.5.3</li> </ul>		
Security	Yes	• DIACAP (R)	• UCR para. A9.6		
<b>LEGEND:</b>					
<table style="width: 100%; border: none;"> <tr> <td style="width: 50%; vertical-align: top;"> <ul style="list-style-type: none"> <li>A - Appendix</li> <li>ADIMSS - Advanced DSN Integrated Management Support System</li> <li>AMI - Alternate Mark Inversion</li> <li>ANSI - American National Standards Institute</li> <li>B8ZS - Bipolar Eight Zero Substitution</li> <li>BERT - Bit Error Rate Test</li> <li>C - Conditional</li> <li>CAS - Channel Associated Signaling</li> <li>DCE - Data Circuit-terminating Equipment</li> <li>DIACAP - DoD Information Assurance Certification and Accreditation Process</li> <li>DoD - Department of Defense</li> <li>DS1 - Digital Signal Level 1</li> <li>DSN - Defense Switched Network</li> <li>DSS1 - Digital Subscriber Signaling 1</li> <li>DTE - Data Terminal Equipment</li> <li>DTMF - Dual Tone Multi-Frequency</li> <li>EIA - Electronics Industries Alliance</li> <li>EIA-232 - Standard for defining the mechanical and electrical characteristics for connecting DTE and DCE data communications devices</li> <li>EIA-499 - Standard for 37-position and 9-position interface for DTE and DCE employing serial binary data interchange</li> <li>EIA-530 - Standard for 25-position interface for DTE and DCE employing serial binary data interchange</li> </ul> </td> <td style="width: 50%; vertical-align: top;"> <ul style="list-style-type: none"> <li>ESF - Extended Super Frame</li> <li>HSD - High-Speed Synchronous Data</li> <li>ISDN - Integrated Services Digital Network</li> <li>Mbps - Megabits per second</li> <li>MFR1 - Multi-Frequency Recommendation 1</li> <li>MLPP - Multi-Level Precedence and Preemption</li> <li>MOS - Mean Opinion Score</li> <li>para - paragraph</li> <li>PRC - Primary Rate Card</li> <li>PRI - Primary Rate Interface</li> <li>R - Required</li> <li>S-NE - Strategic Network Element</li> <li>SA-TRK - Symmetrical Asymmetrical Trunk</li> <li>SF - Super Frame</li> <li>SS7 - Signaling System 7</li> <li>SUT - System Under Test</li> <li>T1 - Digital Transmission Link Level 1 (1,544 Mbps)</li> <li>T1.607 - ISDN – Layer 3 Signaling Specification for Circuit Switched Bearer Service for DSS1</li> <li>T1.619a - SS7 and ISDN MLPP Signaling Standard for T1</li> <li>T-NE - Tactical Network Element</li> <li>TRK - Trunk</li> <li>UCR - Unified Capabilities Requirements</li> <li>USD - Universal Synchronous Data</li> </ul> </td> </tr> </table>				<ul style="list-style-type: none"> <li>A - Appendix</li> <li>ADIMSS - Advanced DSN Integrated Management Support System</li> <li>AMI - Alternate Mark Inversion</li> <li>ANSI - American National Standards Institute</li> <li>B8ZS - Bipolar Eight Zero Substitution</li> <li>BERT - Bit Error Rate Test</li> <li>C - Conditional</li> <li>CAS - Channel Associated Signaling</li> <li>DCE - Data Circuit-terminating Equipment</li> <li>DIACAP - DoD Information Assurance Certification and Accreditation Process</li> <li>DoD - Department of Defense</li> <li>DS1 - Digital Signal Level 1</li> <li>DSN - Defense Switched Network</li> <li>DSS1 - Digital Subscriber Signaling 1</li> <li>DTE - Data Terminal Equipment</li> <li>DTMF - Dual Tone Multi-Frequency</li> <li>EIA - Electronics Industries Alliance</li> <li>EIA-232 - Standard for defining the mechanical and electrical characteristics for connecting DTE and DCE data communications devices</li> <li>EIA-499 - Standard for 37-position and 9-position interface for DTE and DCE employing serial binary data interchange</li> <li>EIA-530 - Standard for 25-position interface for DTE and DCE employing serial binary data interchange</li> </ul>	<ul style="list-style-type: none"> <li>ESF - Extended Super Frame</li> <li>HSD - High-Speed Synchronous Data</li> <li>ISDN - Integrated Services Digital Network</li> <li>Mbps - Megabits per second</li> <li>MFR1 - Multi-Frequency Recommendation 1</li> <li>MLPP - Multi-Level Precedence and Preemption</li> <li>MOS - Mean Opinion Score</li> <li>para - paragraph</li> <li>PRC - Primary Rate Card</li> <li>PRI - Primary Rate Interface</li> <li>R - Required</li> <li>S-NE - Strategic Network Element</li> <li>SA-TRK - Symmetrical Asymmetrical Trunk</li> <li>SF - Super Frame</li> <li>SS7 - Signaling System 7</li> <li>SUT - System Under Test</li> <li>T1 - Digital Transmission Link Level 1 (1,544 Mbps)</li> <li>T1.607 - ISDN – Layer 3 Signaling Specification for Circuit Switched Bearer Service for DSS1</li> <li>T1.619a - SS7 and ISDN MLPP Signaling Standard for T1</li> <li>T-NE - Tactical Network Element</li> <li>TRK - Trunk</li> <li>UCR - Unified Capabilities Requirements</li> <li>USD - Universal Synchronous Data</li> </ul>
<ul style="list-style-type: none"> <li>A - Appendix</li> <li>ADIMSS - Advanced DSN Integrated Management Support System</li> <li>AMI - Alternate Mark Inversion</li> <li>ANSI - American National Standards Institute</li> <li>B8ZS - Bipolar Eight Zero Substitution</li> <li>BERT - Bit Error Rate Test</li> <li>C - Conditional</li> <li>CAS - Channel Associated Signaling</li> <li>DCE - Data Circuit-terminating Equipment</li> <li>DIACAP - DoD Information Assurance Certification and Accreditation Process</li> <li>DoD - Department of Defense</li> <li>DS1 - Digital Signal Level 1</li> <li>DSN - Defense Switched Network</li> <li>DSS1 - Digital Subscriber Signaling 1</li> <li>DTE - Data Terminal Equipment</li> <li>DTMF - Dual Tone Multi-Frequency</li> <li>EIA - Electronics Industries Alliance</li> <li>EIA-232 - Standard for defining the mechanical and electrical characteristics for connecting DTE and DCE data communications devices</li> <li>EIA-499 - Standard for 37-position and 9-position interface for DTE and DCE employing serial binary data interchange</li> <li>EIA-530 - Standard for 25-position interface for DTE and DCE employing serial binary data interchange</li> </ul>	<ul style="list-style-type: none"> <li>ESF - Extended Super Frame</li> <li>HSD - High-Speed Synchronous Data</li> <li>ISDN - Integrated Services Digital Network</li> <li>Mbps - Megabits per second</li> <li>MFR1 - Multi-Frequency Recommendation 1</li> <li>MLPP - Multi-Level Precedence and Preemption</li> <li>MOS - Mean Opinion Score</li> <li>para - paragraph</li> <li>PRC - Primary Rate Card</li> <li>PRI - Primary Rate Interface</li> <li>R - Required</li> <li>S-NE - Strategic Network Element</li> <li>SA-TRK - Symmetrical Asymmetrical Trunk</li> <li>SF - Super Frame</li> <li>SS7 - Signaling System 7</li> <li>SUT - System Under Test</li> <li>T1 - Digital Transmission Link Level 1 (1,544 Mbps)</li> <li>T1.607 - ISDN – Layer 3 Signaling Specification for Circuit Switched Bearer Service for DSS1</li> <li>T1.619a - SS7 and ISDN MLPP Signaling Standard for T1</li> <li>T-NE - Tactical Network Element</li> <li>TRK - Trunk</li> <li>UCR - Unified Capabilities Requirements</li> <li>USD - Universal Synchronous Data</li> </ul>				
<b>NOTES:</b>					
1 The UCR does not stipulate a minimum Access interface requirement for a Strategic or Tactical Network Element.					
2 The UCR does not stipulate a minimum Transport interface requirement for a Strategic or Tactical Network Element.					

**8. TEST NETWORK DESCRIPTION.** The SUT was tested at JITC's Global Information Grid Network Test Facility (GNTF) in a manner and configuration similar to that of its DSN operational environment. Testing the system's required functions and features was conducted using the test configuration depicted in figures 2-2 and 2-3.



**Figure 2-2. Tactical Network Element Test Configuration**



**Figure 2-3. Strategic Network Element 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 DSN Approved Products List (APL) that offer the same certified interfaces.

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

System Name		Hardware/Software Release		
Nortel CS2100		Succession Enterprise (SE)09.1		
Siemens EWSD		19d with Patch Set 46		
Alcatel-Lucent 5ESS		5E16.2 Broadcast Warning Message (BWM) 07-0003		
Avaya S8710		Communication Manager (CM) 4.0 (R014x.00.2.731.7: Super Patch 14419)		
Fore Systems ASX-200		Version 6.2		
Component	Shelves	Sub-Components (See note.)	Firmware/Software	
SUT	Promina 800 Software Release 4.x2.02 Version 92.45	Main Shelf	BX	Revision H
			TRK-3 Serial/DSX Card	Revision R, Firmware 4.4.99
			QASD	Firmware 1.3
			HSD-2+	Revision G
			PVEC	Revision K
			SA-TRK	Revision K
			PSM	Revision C, Boot Version 92.16
			SX-2	Revision H, Firmware D
			PRC	Revision M
			TRK-2 Card	Revision A
			PVS 12 Channels	Revision B, Firmware AE (3.06) PVS Code
			USD	Revision F
	250W DC power Supply (x2)	Not Applicable		
	PPM	Revision C, Boot Version 92.24		
	SCLX	Revision D0, Firmware 3.64		
	Promina 400 Software Release 4.x2.02 Version 92.45	VXWorks 5.3.1 Promina 4.0.5	SX-2	Revision H
			PPM	Revision B
			SCLX	Revision D
			PLM	Revision A, Version 102.16
			USD	Revision G
TRK-2A			Revision G	
System Administration Computer	MS Windows XP Version 5.1.2600	SA-TRK	Revision K	
		PRC	Revision M	
		PVS 12	Revision B, Firmware AE (3.06) PVS Code	
		PVEC	Revision K	
		HSD-2B	Revision V	
250W DC Power Supply (x2)	Not Applicable			
<b>LEGEND:</b> 5ESS - Class 5 Electronic Switching System BX - Bus Extender CS - Communication Server DC - Direct Current DSX - Digital Cross Connect EWSD - Elektronisches Wähler-system Digital HSD - High Speed Data MS - Microsoft PLM - Promina Logic Module PPM - Promina Processor Module PRC - Primary Rate Card PSM - Promina Server Module PVEC - Primary Voice Echo Canceller PVS - Prime Voice Secure QASD - Quad Asynchronous Synchronous Data SA - Symmetrical Asymmetrical SCLX - Scream Link eXchange SUT - System Under Test SX - Switching Exchange TRK - trunk USD - Universal Synchronous Data W - watt <b>NOTE:</b> All cards are interchangeable between the Promina 800 and Promina 400 with the following exceptions: The PPM, SCLX, BX, and SX-2 are strictly for the Promina 800.				

**10. TEST LIMITATIONS.** None.

**11. TEST RESULTS**

**a. Discussion.**

**(1) DSN Interfaces.** The SUT supports T1 CAS and T1 ISDN PRI access interfaces. The SUT supports T1, ATM, OC-3 and serial transport interfaces. All of the

access interface types were mapped through the test network over all of the supported transport interfaces. The specific requirements and test results of the DSN Interface testing are described below.

**(a) Access Interface Characteristics.** The SUT interface access characteristics were tested according to UCR, appendix 9, paragraph A9.5.1.2.4. The T1 interface supports both Alternate Mark Inversion (AMI) and Bipolar Eight Zero Substitution (B8ZS) line coding with Extended Super-Frame (ESF), Super-Frame (SF), and EIA-530 serial interfaces. Serial interfaces are for data only and do not directly connect to the DSN. The SUT offers a serial TRK-3 interface; however, it was not tested and is therefore not covered under this certification. The Firebird 8000 test diagnostic measurement equipment was used to generate data traffic via the EIA-530 serial interface simultaneously during testing to ensure it did not have an adverse affect on DSN traffic. The SUT T1 access interface supports ISDN PRI CAS, Dual Tone Multi-frequency (DTMF), and Multi-Frequency R1 (MFR1) signaling. All access interface characteristics were verified through vendor Letter of Compliance (LoC) and testing.

**(b) DSN Transport Interfaces.** The SUT S-NE transport interfaces include: DS1 (TRK-2, TRK-3), Serial (SA-TRK), and ATM OC-3 (SCLX). The SUT, T-NE transport interface includes only the Serial (SA-Trunk). The DS1 transport interface uses proprietary signaling with B8ZS line coding and ESF framing.

**(c) DSN Supervisory CAS.** Trunk seizure, answer supervision, preemption signals and all other trunk supervisory information sent and received on a per channel basis was passed transparently through the SUT as required in the UCR, appendix 9, paragraph A9.5.1.2.5.

**(d) Clear Channel Capability.** The SUT is capable of transmitting and receiving B8ZS line coding as required in the UCR, appendix 9, paragraph A9.5.1.2.5 for Clear Channel Capability.

**(e) Alarm and Restoral Requirements.** The UCR appendix 9, paragraph A9.5.1.1.1, states that the NE shall be able to propagate Carrier Group Alarms (CGAs) in accordance with UCR, section 7, upon physical loss of the TDM interface. Voice switching systems shall receive the proper CGAs from the NE upon loss of the transport link between NEs, regardless of whether it is TDM or Internet Protocol (IP). The SUT is capable of transparently passing the alarm and restoral features of the DSN switch's digital interface unit, which meets the requirement.

**(f) Latency.** The UCR appendix 9, paragraph A9.5.1, states that the addition of a NE (non-compressed clear channel links) shall not increase the one-way delay measured from ingress to egress (per node) more than 5 milliseconds (ms). In addition, paragraph A9.5.1.2.9, states that the addition of a NE shall not increase the one-way packet delay for each NE used with compression codecs as follows: TDM Ingress to Transcoding Packet Egress shall not increase delay by more than 100 ms as measured from end-to-end as a pair. The SUT one-way packet delay at 9.6 kilobits per

second (kbps) compression rate was measured at 67.8 ms from end-to-end as a pair. At 16 kbps compression, the latency was measured at 58.5 ms and Clear Channel was measured at 10 ms. Although the UCR requirement for latency only addresses TDM to IP packet transcoding and non transcoding, the measured results for the SUT TDM to TDM transcoding and non-transcoding were within the allowed range for an IP transport, therefore there is no operational impact.

**(g) Mean Opinion Score (MOS).** The UCR appendix 9, paragraph A9.5.1.1, states that the introduction of S-NEs shall not cause the end-to-end average MOS to fall below 4.0 as measured over any 5-minute time interval. The introduction of T-NEs shall not cause the end-to-end average MOS to fall below 3.6 as measured over any 5-minute time interval in accordance with UCR, appendix A2.4.1. The Spirent Communications call loader was used for conducting MOS tests.

1. For the S-NE MOS requirement, there were 12,000 calls placed through the test network, over all supported interfaces and all having an MOS of 4.0 or greater, which meets the requirement.

2. For the T-NE requirement, there were 12,125 calls placed through the test network, over all supported interfaces and all having an MOS of 4.0 or greater, which meets the requirement.

#### **(h) Bit Error Rate Tests (BERTs)**

1. The S-NE requirements in the UCR, appendix 9, paragraph A9.5.1.1, state that the introduction of an S-NE shall not cause the end-to-end digital bit error rate to exceed the requirement of less than 1 error in  $1 \times 10^9$  (averaged over a nine-hour period). The S-NE met the requirement when tested across the serial, TRK-2, TRK-3, and ATM access interfaces.

2. The T-NE requirements in the UCR appendix 2, paragraph A2.4.1, states the introduction of a T-NE shall not cause the end-to-end digital bit error rate to degrade by more than 0.03 percent over an 8-hour period. The SUT met the requirement across the SA-TRK with a recorded bit error ratio of less than 1 error in  $1 \times 10^5$ , in the T-NE configuration.

**(i) Secure Transmission (Voice and Data).** UCR appendix 9, paragraph A9.5.1.1, states that the introduction of NEs shall not degrade secure transmission for secure end devices as defined by Appendix 10. There were 280 secure calls placed between Secure Terminal Equipment and Secure Wireline Terminals without degrading transmissions between end devices, which meet the requirement. These tests included secure voice, data, fax, and crypto rekey.

## **(j) Modem**

1. The S-NE requirements in UCR appendix 9, paragraph A9.5.1.1, state that the NEs shall support a minimum modem transmission speed of 9.6 kbps. The Spirent Communications call loader was used to place 964 modem calls through the S-NE configuration and all modem calls had a transmission rate of equal to or greater than 9.6 kbps, which meets the requirements.

2. The T-NE requirements in the UCR appendix 2, paragraph A2.4.1, state that the T-NE shall allow a minimum modem transmission speed of 2.4 kbps across the associated network elements. The T-NE had a 1581 calls placed with a transmission rate equal to or greater that 2.4 kbps of which meets the requirement.

**(k) Facsimile.** UCR appendix 9, paragraph A9.5.1.1, states that NEs shall support a minimum facsimile transmission speed of 9.6 kbps across the associated NEs. There were 4,760 successful facsimile calls placed through the SUT using the Abacus call loader at a minimum transmission speed of 9.6 kbps, which meets the requirement.

**(l) Call Control Signals.** UCR appendix 9, paragraph A9.5.1.1, states that the NE shall transport all call control signals transparently on an end-to-end basis. The SUT transparently transported all Multi-Level Precedence and Preemption (MLPP) call control signals, which meets the requirement.

**(m) Call Congestion.** UCR appendix 9, paragraph A9.5.1.1.3, states that the call congestion handling can be met one of the following three ways: dynamic load control signal; software capability which makes congestion impossible; or congestion is not possible in the SUT. Call congestion is not possible in the SUT with the permanent mode configuration.

**(n) Voice Compression.** UCR appendix 9, paragraph A9.5.1.1.4, states that the NE may include voice compression and if so must support at least one of the following standards:

- International Telecommunication Union - Telecommunication Standardization Sector (ITU-T) Recommendation G.726, 32 kbps Adaptive Differential Pulse Code Modulation (ADPCM).
- ITU-T Recommendation G.728, 16 kbps Low-Delay Code Excited Linear Prediction (LD-CELP).
- ITU-T Recommendation G.729, 9.6 kbps Conjugate-Structure Algebraic-Code-Excited Linear-Prediction (CS-A CELP).

The SUT PVS cards are used as server modules to provide voice compression at 9.6 kbps and 16 kbps to any voice channel configured accordingly. The S-NE and T-NE configured SUTs met the requirements in accordance with the UCR, appendices 2 and appendix 9.

**(o) Military Unique Features.** The SUT supports the full complement of Military Unique Features as required in the UCR, section 3. The following types of MLPP calls were placed over all the SUT transport and access interfaces between the switching systems listed in table 2-3. All calls were completed successfully and met the MLPP interactions as required by the UCR, section 3.

1. Circuit for Reuse; Answered Call
2. Circuit for Reuse; Unanswered Call
3. Circuit not for Reuse; Answered Call
4. Circuit not for Reuse; Unanswered Call

**(p)** UCR appendix 2, paragraph A2.1.1 states that the T-NEs shall be tested under a simulated tactical environment using the Operational Area Network (OAN) architecture framework, the inclusion of satellite transmission for inter-nodal links and a random bit error rate (BER) of  $1 \times 10^{-5}$ . Only the T-NE met the requirements.

**(2) Synchronization.** UCR appendix 9, paragraph A9.5.1.2.7, states that the NE shall be able to derive timing signal from an internal source, an incoming digital signal, or an external source in accordance with UCR Section 11.1. The SUT can derive timing from an external T1 or E1 link. During this test, the timing for both S-NE and T-NE was derived from a dedicated T1 source, which meets the requirement.

### **(3) Device Management**

**(a) Management Option.** UCR appendix 9, paragraph A9.5.2.1, states that the NE devices are to be managed by at least one of the following: The device may be managed locally by a front or back panel and/or external console control capability shall be provided for local management. NE devices in the DSN may be monitored and managed by the Advanced DSN Integrated Management Support System (ADIMSS) as described in the UCR, section 9. The SUT meets this requirement with an external console which is locally managed via serial or Ethernet.

**(b) Fault Management.** UCR appendix 9, paragraph A9.5.2.2, states that the NEs may be capable of performing a self-test diagnostic function on non-active and active channels on a noninterference basis and report any failures to the assigned network management system. The SUT provides alarms for active channels of the access and transport links that do not interfere with the operation of the monitored circuit, which meets the requirement.

**(c) Loop Back Capability.** UCR appendix 9, paragraph A9.5.2.3, states that the NEs shall provide loop back capability on each of the trunk side interfaces in accordance with ITU-T Recommendation V.54. The SUT does not provide ITU-T V.54 loop back capability. Since this is a conditional requirement for a NE, there is no operational impact.

**(4) Operational Configuration Restoral.** UCR appendix 9, paragraph A9.5.3, states that the loss of power should not remove configuration settings. The unit should be restored to the last customer configured state prior to the power loss, without intervention when power is restored. The SUT was placed into a power failure condition then power was restored. The SUT returned to the last customer configured state prior to the power failure, which meets the requirement.

**(5) Security.** Security is tested as part of the Information Assurance testing and is covered under a separate report.

**b. Summary.** The SUT met all of the interface and functional requirements and is certified for joint use within the DSN as a T-NE and S-NE as set forth in appendices 2 and 9 of reference (c) with the following stipulations: The SUT is certified as a T-NE only with the SA-TRK transport interface. The SUT is certified as an S-NE with the SA-TRK, TRK-2, TRK-3, and ATM transport interfaces. The SUT offers two methods for establishing transport connectivity. The two methods are permanent mode, and on-demand mode. Only the permanent mode was tested and is covered by this certification and authorized for use within the DSN.

**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>.