



## DEFENSE INFORMATION SYSTEMS AGENCY

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

**10 Feb 12**

### MEMORANDUM FOR DISTRIBUTION

**SUBJECT:** Special Interoperability Test Certification of the Network Equipment Technologies (NET) Promina NX1000 with Software Release 4.x5.03, Version 95.55

**References:** (a) DOD Directive 4630.05, "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) through (e), see Enclosure 1

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

2. The NET Promina NX1000 with Software Release 4.x5.03, Version 95.55 is hereinafter referred to as the System Under Test (SUT). The SUT meets all of its critical interoperability requirements and is certified as interoperable for joint use within the Defense Information Switched Network (DISN) as a Fixed Network Element (F-NE) and Deployable Network Element (D-NE). The SUT is deployed as a mated pair, but can also be connected to a Promina 800 Version 95.55 or Promina 400 Version 105.55 providing both SUTs are loaded with the same certified Software Release 4.x5.03 in order to interoperate correctly. The SUT has the following access interfaces that are certified for joint use within the DISN: Digital Transmission Link Level 1 (T1) Channel Associated Signaling (CAS), Primary Rate Interface (PRI), Signaling System 7 (SS7); European Basic Multiplex Rate (E1) CAS, PRI, SS7; and Electronic Industries Alliance (EIA)-530 Serial, as depicted in Table 1. The SUT also has three transport interfaces that are certified for joint use within the DISN, EIA-530 Serial, Trunk 3 (T1 only), and Internet Protocol. The T1 CAS access interface over the Trunk 3 transport interface is certified for clearmode only with the Primary Voice Secure (PVS) card. Additionally, the T1 CAS access interface is certified with clearmode and 9.6 Kilobits per second compression with the PVS-enhanced card. 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. This certification expires upon changes that affect interoperability, but no later than three years from the date of the Unified Capabilities (UC) Approved Products List (APL) memorandum.

3. This finding is based on interoperability testing, review of the vendor's Letters of Compliance (LoC), and DISA Certifying Authority (CA) accreditation. Interoperability testing was conducted by JITC at the Global Information Grid Network Test Facility, Fort Huachuca,

Arizona, from 12 September through 10 November 2011. Review of the vendor’s LoC was completed on 29 November 2011. DISA CA granted accreditation on 9 February 2012 based on the security testing completed by DISA-led Information Assurance (IA) test teams and published in a separate report, Reference (e). The Certification Testing Summary (Enclosure 2) documents the test results and describes the test network.

4. The overall interoperability status of the SUT is indicated in Table 1. The interfaces and associated Capability Requirements (CR) and Feature Requirements (FR) critical used to evaluate the interoperability status are listed in Table 2. The interoperability test status is based on the SUT’s ability to meet:

- a. DISN services for Network and Applications specified in Reference (c).
- b. The overall system interoperability performance derived from test procedures listed in Reference (d).

**Table 1. SUT Interoperability Test Summary**

<b>DISN 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 PRI (ANSI T1.607/T1.619a)	No <sup>1</sup>	Certified	Met all CRs and FRs.
T1 SS7 (ANSI T1.619a)	No <sup>1</sup>	Certified	Met all CRs and FRs.
E1 CAS (HDB3) DTMF, MFR1	No <sup>1</sup> (Europe only)	Certified	Met all CRs and FRs.
E1 ISDN PRI (ITU-T Q931/Q.955.3)	No <sup>1</sup> (Europe only)	Certified	Met all CRs and FRs.
E1 SS7 (ANSI T1.619a)	No <sup>1</sup> (Europe only)	Certified	Met all CRs and FRs.
Serial (EIA-530)	No <sup>1</sup>	Certified	Met all CRs and FRs.
<b>DISN Transport Interfaces</b>			
<b>Transport Level</b>	<b>Critical</b>	<b>Status</b>	<b>Remarks</b>
Fast Ethernet (IEEE 802.3u)	No <sup>2</sup>	Certified	Met all CRs and FRs.
Serial (EIA-530) SA-TRK	No <sup>2</sup>	Certified	Met all CRs and FRs.
T1 TRK- 3	No <sup>2</sup>	Certified <sup>3</sup>	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	Certified	Met all CRs and FRs <sup>4</sup> .
<b>NOTES:</b>			
1 The UCR does not stipulate a minimum Access interface requirement for a F-NE or D-NE.			
2 The UCR does not stipulate a minimum Transport interface requirement for a F-NE or D-NE.			
3 The TRK-3 Transport offers T1, E1, and Serial back plane interfaces; however, only the T1 interfaces were tested and are certified for joint use within the DISN.			
4 Information assurance testing is accomplished via DISA-led Information Assurance test teams and published in a separate report, Reference (e).			

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

<b>LEGEND:</b>			
802.3u	Standard for carrier sense multiple access with collision detection at 100 Mbps	IEEE	Institute of Electrical and Electronics Engineers
AMI	Alternate Mark Inversion	ISDN	Integrated Services Digital Network
ANSI	American National Standards Institute	ITU-T	International Telecommunication Union – Telecommunication Standardization Sector
B8ZS	Bipolar Eight Zero Substitution	Mbps	Megabits per second
CAS	Channel Associated Signaling	MFR1	Multi-Frequency Recommendation 1
CR	Capability Requirements	MLPP	Multi-Level Precedence and Preemption
D-NE	Deployable Network Element	PRI	Primary Rate Interface
DCE	Data Circuit-terminating Equipment	Q.931	Signaling Standard for ISDN
DISA	Defense Information Systems Agency	Q.955.3	ISDN Signaling Standard for E1 MLPP
DISN	Defense Information System Network	SA -TRK	Symmetric Asymmetric-Trunk
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
E1	European Basic Multiplex Rate (2.048 Mbps)	T1	Digital Transmission Link Level 1 (1.544 Mbps)
EIA	Electronic 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	TRK-3	Trunk-3
F-NE	Fixed Network Element	UCR	Unified Capabilities Requirements
FR	Feature Requirements		

**Table 2. SUT CR and FR Interoperability Requirements**

<b>DISN Access Interfaces</b>			
<b>Interface</b>	<b>Critical</b>	<b>Requirements Required or Conditional</b>	<b>References</b>
T1 CAS (AMI/SF) DTMF, MFR1	No <sup>1</sup>	• DS1 Interface Characteristics (C)	• UCR Section 5.9.2.3.4
T1 CAS (B8ZS/ESF) DTMF, MFR1		• DS1 Supervisory Channel Associated Signaling (C)	• UCR Section 5.9.2.3.4
T1 PRI (ANSI T1.607/T1.619a)		• DS1 Clear Channel Capability (C)	• UCR Section 5.9.2.3.4
T1 SS7 (ANSI T1.619a)		• DS1 Alarm and Restoral Requirements (C)	• UCR Section 5.9.2.3.4
E1 CAS (HDB3) DTMF, MFR1		• E1 Interface Characteristics (C)	• UCR Section 5.9.2.3.5
E1 ISDN PRI (ITU-T Q.931/Q.955.3)		• E1 Supervisory Channel Associated Signaling (C)	• UCR Section 5.9.2.3.5
E1 SS7 (ANSI T1.619a)		• E1 Clear Channel Capability (C)	• UCR Section 5.9.2.3.5
Serial (EIA-530)		• E1 Alarm and Restoral Requirements (C)	• UCR Section 5.9.2.3.5
		• MOS (R) (F-NE Only)	• UCR Section 5.9.2.1
		• MOS (R) (D-NE Only)	• UCR Section 5.9.3.1
	• BERT (R) (F-NE Only)	• UCR Section 5.9.2.1	
	• BERT (R) (D-NE Only)	• UCR Section 5.9.3.1	
	• Secure Transmission (Voice and Data) (R) (F-NE Only)	• UCR Section 5.9.3.8	
	• Secure Transmission (Voice and Data) (R) (D-NE Only)	• UCR Section 5.9.2.1	
	• Modem (R)	• UCR Section 5.9.2.1	
	• Facsimile (R)	• UCR Section 5.9.2.1	
	• Call Control Signals (R)	• UCR Section 5.9.2.1	
	• Alarms (R) (F-NE Only)	• UCR Section 5.9.2.1.1	
	• Alarms (R) (D-NE Only)	• UCR Section 5.9.3.5	
	• Call Congestion Control (R) (F-NE Only)	• UCR Section 5.9.2.1	
	• Call Congestion Control (R) (D-NE Only)	• UCR Section 5.9.3.1	
	• Call Congestion for TDM Transport (R) (D-NE Only)	• UCR Section 5.9.3.4	
	• Voice Compression (C) (F-NE Only)	• UCR Section 5.9.2.2	
	• Voice Compression (C) (D-NE Only)	• UCR Section 5.9.3.1	
	• EIA-530 (R)	• UCR Section 5.5.3.6.10	

**Table 2. SUT CR and FR Interoperability Requirements (continued)**

<b>DISN Transport Interfaces</b>			
<b>Interface</b>	<b>Critical</b>	<b>Requirements Required or Conditional</b>	<b>References</b>
Serial (EIA-530) SA-TRK	No <sup>2</sup>	<ul style="list-style-type: none"> <li>• MOS (R) (F-NE Only)</li> <li>• MOS (R) (D-NE Only)</li> <li>• BERT (R) (F-NE Only)</li> <li>• BERT (R) (D-NE Only)</li> <li>• Secure Transmission (Voice and Data) (R) (F-NE Only)</li> <li>• Secure Transmission (Voice and Data) (R) (D-NE Only)</li> <li>• Modem (R)</li> <li>• Facsimile (R)</li> <li>• Call Control Signals (R)</li> <li>• Alarms (R) (F-NE Only)</li> <li>• Alarms (R) (D-NE Only)</li> <li>• Call Congestion Control (R) (F-NE Only)</li> <li>• Call Congestion Control (R) (D-NE Only)</li> <li>• Call Congestion for TDM Transport (R) (D-NE Only)</li> <li>• Voice Compression (C) (F-NE Only)</li> <li>• Voice Compression (C) (D-NE Only)</li> <li>• Delay (R) (F-NE Only)</li> <li>• Delay (R) (D-NE Only)</li> </ul>	<ul style="list-style-type: none"> <li>• UCR Section 5.9.2.1</li> <li>• UCR Section 5.9.3.1</li> <li>• UCR Section 5.9.2.1</li> <li>• UCR Section 5.9.3.1</li> <li>• UCR Section 5.9.2.1</li> <li>• UCR Section 5.9.3.8</li> <li>• UCR Section 5.9.2.1</li> <li>• UCR Section 5.9.2.1</li> <li>• UCR Section 5.9.2.1</li> <li>• UCR Section 5.9.2.1.1</li> <li>• UCR Section 5.9.3.5</li> <li>• UCR Section 5.9.2.1</li> <li>• UCR Section 5.9.3.1</li> <li>• UCR Section 5.9.3.4</li> <li>• UCR Section 5.9.2.2</li> <li>• UCR Section 5.9.3.1</li> <li>• UCR Section 5.9.2.3.9</li> <li>• UCR Section 5.9.3.3</li> </ul>
T1 TRK-3	No <sup>2</sup>	<ul style="list-style-type: none"> <li>• DS1 Interface Characteristics (R)</li> <li>• MOS (R) (F-NE Only)</li> <li>• MOS (R) (D-NE Only)</li> <li>• BERT (R) (F-NE Only)</li> <li>• BERT (R) (D-NE Only)</li> <li>• Secure Transmission (Voice and Data) (R) (F-NE Only)</li> <li>• Secure Transmission (Voice and Data) (R) (D-NE Only)</li> <li>• Modem (R)</li> <li>• Facsimile (R)</li> <li>• Call Control Signals (R)</li> <li>• Alarms (R) (F-NE Only)</li> <li>• Alarms (R) (D-NE Only)</li> <li>• Call Congestion Control (R) (F-NE Only)</li> <li>• Call Congestion Control (R) (D-NE Only)</li> <li>• Call Congestion for TDM Transport (R) (D-NE Only)</li> <li>• Voice Compression (C) (F-NE Only)</li> <li>• Voice Compression (C) (D-NE Only)</li> <li>• Delay (R) (F-NE Only)</li> <li>• Delay (R) (D-NE Only)</li> </ul>	<ul style="list-style-type: none"> <li>• UCR Section 5.9.2.3.4</li> <li>• UCR Section 5.9.2.1</li> <li>• UCR Section 5.9.3.1</li> <li>• UCR Section 5.9.2.1</li> <li>• UCR Section 5.9.3.1</li> <li>• UCR Section 5.9.2.1</li> <li>• UCR Section 5.9.3.8</li> <li>• UCR Section 5.9.2.1</li> <li>• UCR Section 5.9.2.1</li> <li>• UCR Section 5.9.2.1</li> <li>• UCR Section 5.9.2.1.1</li> <li>• UCR Section 5.9.3.5</li> <li>• UCR Section 5.9.2.1</li> <li>• UCR Section 5.9.3.1</li> <li>• UCR Section 5.9.3.4</li> <li>• UCR Section 5.9.2.2</li> <li>• UCR Section 5.9.3.1</li> <li>• UCR Section 5.9.2.3.9</li> <li>• UCR Section 5.9.3.3</li> </ul>



**Table 2. SUT CR and FR Interoperability Requirements (continued)**

<b>NOTES:</b>			
1	The UCR does not stipulate a minimum required DISN access interface.		
2	The UCR does not stipulate a minimum required DISN transport interface.		
<b>LEGEND:</b>			
ADIMSS	Advanced DSN Integrated Management Support System	F-NE	Fixed Network Element
AMI	Alternate Mark Inversion	HDB3	High Density Bipolar Three
ANSI	American National Standards Institute	IP	Internet Protocol
B8ZS	Bipolar Eight Zero Substitution	ISDN	Integrated Services Digital Network
BERT	Bit Error Rate Test	ITU-T	International Telecommunication Union – Telecommunication Standardization Sector
C	Conditional	MFR1	Multi-Frequency Recommendation 1
CAS	Channel Associated Signaling	MLPP	Multi-Level Precedence and Preemption
D-NE	Deployable Network Element	MOS	Mean Opinion Score
DIACAP	Department of Defense Information Assurance Certification and Accreditation Process	PRI	Primary Rate Interface
DoDI	Department of Defense Instruction	Q.931	Signaling Standard for ISDN
DP	Dial Pulse	Q.955.3	ISDN Signaling Standard for E1 MLPP
DS1	Digital Signal Level 1	R	Required
DSS1	Digital Subscriber Signaling 1	SA-TRK	Symmetric Asymmetric-Trunk
DISN	Defense Information System Network	SF	Super Frame
DTMF	Dual Tone Multi-Frequency	SS7	Signaling System 7
E1	European Basic Multiplex Rate (2.048 Mbps)	STIGs	Security Technical Implementation Guides
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	T1.607	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
		TDM	Time Division Multiplexing
		TRK-3	Trunk-3
		UCR	Unified Capabilities Requirements

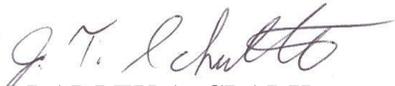
5. No detailed test report was developed in accordance with the Program Manager’s request. JITC distributes interoperability information via the JITC Electronic Report Distribution (ERD) system, which uses Unclassified-But-Sensitive Internet Protocol Router Network (NIPRNet) e-mail. More comprehensive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

JITC, Memo, JTE, Special Interoperability Test Certification of the Network Equipment Technologies (NET) Promina NX1000 with Software Release 4.x5.03 Version 95.55

6. The JITC point of contact is Mr. Khoa Hoang, DSN 879-4376, commercial (520) 538-4376, FAX DSN 879-4347, or e-mail to [khoa.hoang@disa.mil](mailto:khoa.hoang@disa.mil). JITC's mailing address is P.O. Box 12798, Fort Huachuca, AZ 85670-2798. The tracking number for the SUT is 1014701.

FOR THE COMMANDER:

2 Enclosures a/s

  
for BRADLEY A. CLARK  
Chief  
Battlespace Communications Portfolio

Distribution (electronic mail):

Joint Staff J-6

Joint Interoperability Test Command, Liaison, TE3/JT1

Office of Chief of Naval Operations, CNO N6F2

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

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DOT&E, Net-Centric Systems and Naval Warfare

U.S. Coast Guard, CG-64

Defense Intelligence Agency

National Security Agency, DT

Defense Information Systems Agency, TEMC

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

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

Defense Information Systems Agency, GS23

## **ADDITIONAL REFERENCES**

- (c) Defense Information Systems Agency (DISA), "Department of Defense Unified Capabilities Requirements 2008, Change 2," 31 December 2010
- (d) Joint Interoperability Test Command, "Defense Switched Network Generic Switch Test Plan (GSTP), Change 2," 2 October 2006
- (e) Joint Interoperability Test Command, "Information Assurance (IA) Assessment of NET Promina NX1000 with Software Release 4.x5.03 (Tracking Number 1014701)," 9 February 2012

## CERTIFICATION TESTING SUMMARY

- 1. SYSTEM TITLE.** Network Equipment Technologies (NET) Promina NX1000 with Software Release 4.x5.03, Version 95.55; hereinafter referred to as the System Under Test (SUT).
- 2. SPONSOR.** United States Army (USA) US Army 4b. Organization PEO-C3T SFAE-C3T-WIN-INC1.
- 3. SYSTEM POC.** Mr. Cesar Mencia, Deputy INC 1 Tech Managment, Murphy Road Building 906, Fort Monmouth NJ, 07703. E-mail: Cesar.mencia@us.army.mil.
- 4. TESTER.** Joint Interoperability Test Command (JITC), Fort Huachuca, Arizona.
- 5. SYSTEM UNDER TEST DESCRIPTION.** The SUT is certified as a Deployed Network Element (D-NE) or Fixed Network Element (F-NE), that uses Time Division Multiplexing (TDM) and various communication trunk mediums to aggregate voice and data traffic. The NX1000 uses the low-bandwidth Signal Channel Link Protocol, to route (and re-route in case of trunk failure) port traffic through the Promina network. The NET Promina network is formed by configuring and linking several NX1000s and/or Promina 400 version 105.55 or the Promina 800 version 95.55 nodes together with the same Software Release 4.x5.03. To support Defense Information System Network (DISN) traffic the NX1000 uses a Primary Rate Card (PRC) and PrimeVoice Secure - Enhanced (PVS-E) module to interface with Transmission Carrier 1 channels from a DISN switch, and compresses these channels for more efficient transport through the Promina network. These compressed voice channels are then automatically routed across the Promina network to whichever destination is specified by the originating side. The SUT nodes are managed by serial or Ethernet connectivity from any location where network connections to the nodes are available. The SUT has the following access interfaces that are certified for joint use within the DISN: Digital Transmission Link Level 1 (T1) Channel Associated Signaling (CAS), Primary Rate Interface (PRI), Signaling System 7 (SS7); European Basic Multiplex Rate (E1) CAS, PRI, SS7; and Electronic Industries Alliance (EIA)-530 Serial. The SUT also has three transport interfaces that are certified for joint use within the DISN: EIA-530 Serial, Trunk 3 (T1 only), and Internet Protocol. The T1 CAS access interface over the Trunk 3 transport interface is certified for clearmode only with the PVS card. Additionally, the T1 CAS access interface is certified with clearmode and 9.6 Kilobits per second compression with the PVS-enhanced card. Management workstations use the Public Key Infrastructure/Common Access Card (CAC) enabled Putty-CAC Secure Shell (SSH) version (v)2 protocol terminal client emulator, and Pageant CAC interface application, to provide an encrypted communication session. The NX1000 is a Internet Protocol version 4 (IPv4)/IPv6 dual stacked configuration of the NX1000. Specific features of the NX1000 include:
  - (a) Support for connecting two NX1000 chassis to provide double the processing capacity of a single chassis (up to 256 megabits per second).

(b) Integrated rear interface supporting EIA-530 serial interfaces.

(c) Integrated rear interface supporting four EIA-530 Data Circuit-Terminating Equipment interfaces.

(d) Support for up to eight selectable clock reference sources.

The SUT supports a variety of transport and access interfaces, which include the following:

### **Transport Interfaces:**

**Trunk 3 (TRK-3).** The TRK-3 trunk module interfaces a sub-rated facility to support full or fractional T1/E1 service or Serial with a separate backplane card for each interface. Only the T1 interface was tested and is certified for joint use with the DISN.

- **TRK-3 Front Card.** The TRK-3 Front Card contains two similar Digital Signal Processor (DSP) engines, one to process proprietary bundle data in the transmit path, and another for the receive path. A host processor provides support to the DSPs and controls the interfaces to the system software and interface card.

- **T1-Digital Subscriber (DS)X Interface Card.** The T1-DSX Interface Card provides a channelized 1.544 Mbps DS1 signal, which is compatible with carrier Direct Access and Cross-Connect System equipment at the DS0 level. It uses programmable signal equalization to meet the DSX-1 pulse template requirements at distances from 0 to 655 feet. The T1-DSX interface requires the use of an external Channel Service Unit for connection to the network interface, which must use the Binary 8 Zero Suppression (B8ZS) method. The T1-DSX signal operates in either the D4 Super Frame (SF) format, or the Extended Super Frame (ESF) format. Fractional T1 services are fully supported. The T1-DSX parameters are configured through the operator interface. The signal received from the span can be used as a nodal clock reference source.

**Symmetric Asymmetric-TRK (SA-TRK).** The SA-TRK module provides asymmetric trunking capability. Asymmetric trunking means that the transmit and receive trunk rates do not have to be the same. It provides symmetric and asymmetric trunking rates of 16 kilobits per second (kbps) – 16.384 megabits per second (Mbps).

**NX-Internet Protocol Trunk (NX-IPTRK).** The NX-IPTRK module allows the connectivity of two Promina NX1000 nodes over an Internet Protocol (IP) network using a pseudo-wire-based, point-to-point connection, and TDM-based data and voice traffic transferred across established trunks using Structure-Agnostic TDM over Packet protocol. The key features and limitations of the NX-IPTRK module are:

## Access Interfaces:

**Primary Rate Card (PRC).** The PRC voice module is a two-digroup, clear-channel interface. The PRC module consists of a PRC front card and a DS-1 interface card that supports the T1 digital voice interface used primarily in North America. The PRC module provides a T1 link with either D3/D4 SF or ESF, zero suppression for transparent operation, aggregate circuits, and clear channel operation.

**PVS-Enhanced (PVS-E).** The PVS-E provides local T1/E1 digital interfaces as well as Echo Canceller engines, and is designed to interwork with most of the existing Promina voice products. The PVS-E module uses the Network Voice Exchange (NVX) Interface T1/E1 rear interface card to provide a four-port T1/E1 interface. The PVS-E supports the following features:

- The PVS-E/NVX module is interoperable with PrimeVoice products including the PVS.
- Up to 96 calls in T1 mode and 120 calls in E1 mode are supported using G.711 with or without echo cancellation.
- Up to 75 Department of Defense (DoD) Secure Communication Device calls are supported.
- The PVS-E provides Primary Rate Interface (PRI) interface support similar to the PRI support provided by the PRC.

**High Density T1/E1 (HD T1/E1).** The HD T1/E1 module is a four-port T1/E1 card that works in any Promina NX1000 or Promina 1000 expansion shelf slot. The HD T1/E1 module has the following features:

- Four Registered Jack-45 rear interface ports.
- Ports can be configured as T1/E1 interface.
- T1 Line Build Out.
- Transparent data mode.
- Line encoding for T1/E1.
- Rear interface: HD T1/E1-Interface.
- Span status monitoring.

**High Speed Synchronous Data.** The integrated HSSD module supports the following:

- Transmit and receive timing
- Quad EIA-530 DCE rear interface at data rates from 1.2 kbps to 1.544 Mbps.

Although the HSD module is offered, it was not tested and is therefore not covered under this certification.

**High Density Data-four port (HDD4).** The HDD4 module supports four data ports with the following features:

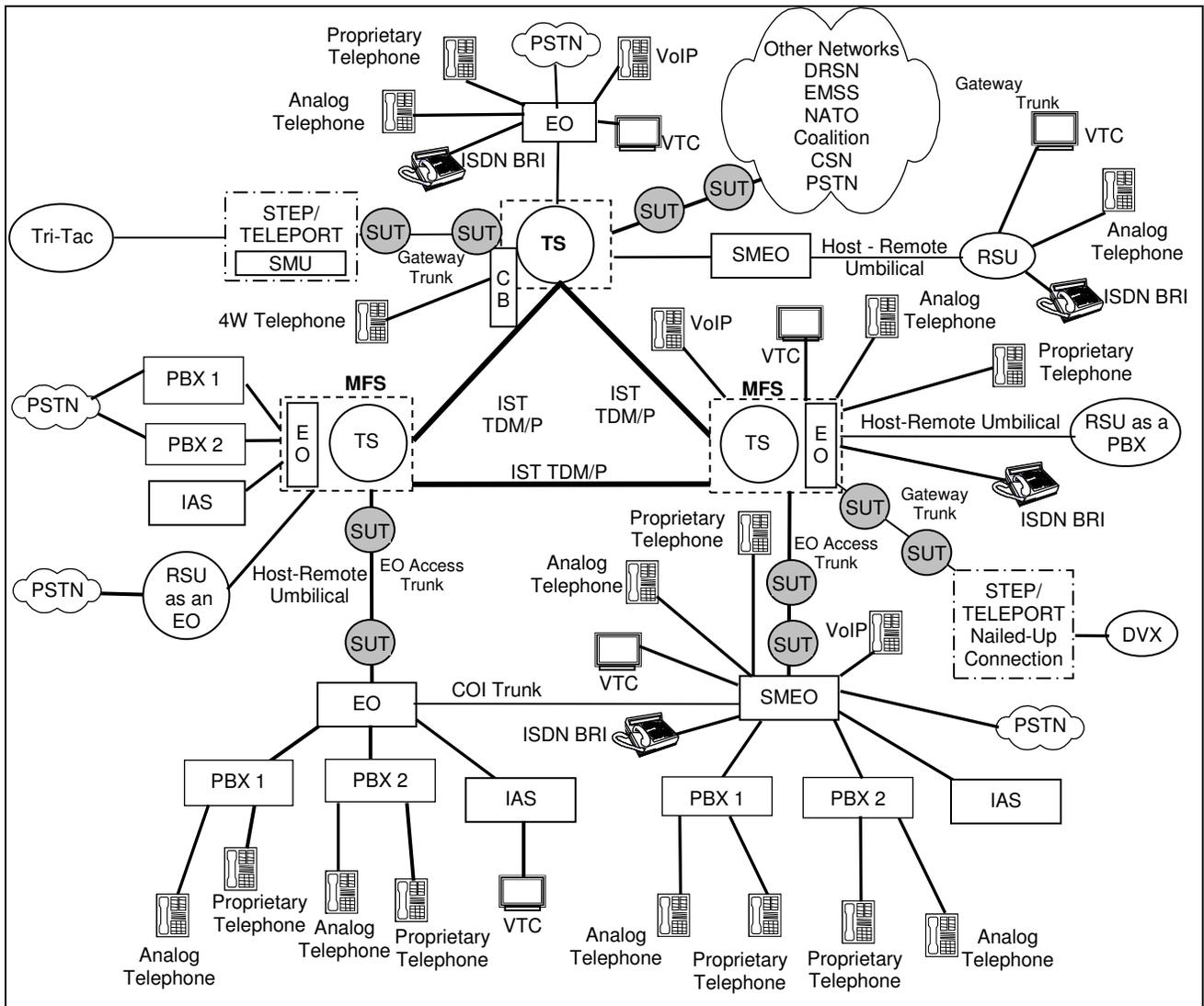
- In 1 bps mode, any rate from 75 bps to 2.048 Mbps is supported. When using 1bps mode, both synchronous and asynchronous rates may be selected.
- In asynchronous mode, only 9.6 kbps data rate is explicitly supported HDD4 supports Normal (default), 56/64 kbps formats.

**Shared Resources:**

**PVS.** All Promina PrimeVoice cards act as server modules to provide voice compression to any voice channel configured accordingly. The PVS card is the version of the Promina Series 12-channel card that supports transmission of DoD Secure Communications Devices (DSCD) encrypted voice and facsimile, in addition to the normal modem, fax, and voice compression capabilities of standard PrimeVoice compression cards.

**PrimeVoice Echo Canceller (PVEC).** The PVEC-32 module provides background noise control for the Promina digital voice ports. Unlike voice compression, echo cancellation can be single-ended: one site can be using PVEC echo cancellation while the other site uses an external canceller or no cancellation. The PVEC module is designed to comply with International Telecommunications Union (ITU) - Telecommunication Standardization Sector recommendations G.165 and G.168.

**6. OPERATIONAL ARCHITECTURE.** The Unified Capabilities Requirements (UCR) DISN operational architecture is depicted in Figure 2-1. The NET Promina NX1000 are point-to-point devices that are fielded in pairs either with another NX1000 or Promina 800 Version 95.55 or Promina 400 Version 105.55 providing both SUTs are loaded with the same certified Software Release 4.x5.03 in order to interoperate correctly. The SUT pairs will be employed as a F-NE or D-NE in the DISN backbone as depicted in Figure 2-1.



**LEGEND:**

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

**Figure 2-1. DISN 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. The SUT met all requirements through testing and submission of Letters of Compliance (LoC).

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

<b>DISN 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 PRI (ANSI T1.607/T1.619a)	No <sup>1</sup>	Certified	Met all CRs and FRs.
T1 SS7 (ANSI T1.619a)	No <sup>1</sup>	Certified	Met all CRs and FRs.
E1 CAS (HDB3) DTMF, MFR1	No <sup>1</sup> (Europe only)	Certified	Met all CRs and FRs.
E1 ISDN PRI (ITU-T Q.931/Q.955.3)	No <sup>1</sup> (Europe only)	Certified	Met all CRs and FRs.
E1 SS7 (ANSI T1.619a)	No <sup>1</sup> (Europe only)	Certified	Met all CRs and FRs.
Serial (EIA-530)	No <sup>1</sup>	Certified	Met all CRs and FRs.
<b>DISN Transport Interfaces</b>			
<b>Transport Level</b>	<b>Critical</b>	<b>Status</b>	<b>Remarks</b>
Fast Ethernet (IEEE 802.3u)	No <sup>2</sup>	Certified	Met all CRs and FRs.
Serial (EIA-530) SA-TRK	No <sup>2</sup>	Certified	Met all CRs and FRs.
T1 TRK- 3	No <sup>2</sup>	Certified <sup>3</sup>	Met all CRs and FRs <sup>3</sup> .
<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	Certified	Met all CRs and FRs. <sup>4</sup>
<b>NOTES:</b>			
1 The UCR does not stipulate a minimum Access interface requirement for a F-NE or D-NE.			
2 The UCR does not stipulate a minimum Transport interface requirement for a F-NE or D-NE.			
3 The TRK-3 Transport offers T1, E1, and serial backplane interfaces; however only the T1 interfaces were tested and are certified for joint use within the DISN.			
4 Information assurance testing is accomplished via DISA-led Information Assurance test teams and published in a separate report, Reference (e).			

**Table 2-1. SUT Interoperability Test Summary (Continued)**

<b>LEGEND:</b>			
802.3u	Standard for carrier sense multiple access with collision detection at 100 Mbps	IEEE	Institute of Electrical and Electronics Engineers
AMI	Alternate Mark Inversion	ISDN	Integrated Services Digital Network
ANSI	American National Standards Institute	ITU-T	International Telecommunication Union – Telecommunication Standardization Sector
B8ZS	Bipolar Eight Zero Substitution	Mbps	Megabits per second
CAS	Channel Associated Signaling	MFR1	Multi-Frequency Recommendation 1
CR	Capability Requirements	MLPP	Multi-Level Precedence and Preemption
D-NE	Deployable Network Element	PRI	Primary Rate Interface
DCE	Data Circuit-terminating Equipment	Q.931	Signaling Standard for ISDN
DISA	Defense Information Systems Agency	Q.955.3	ISDN Signaling Standard for E1 MLPP
DISN	Defense Information System Network	SA -TRK	Symmetric Asymmetric-Trunk
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
E1	European Basic Multiplex Rate (2.048 Mbps)	T1	Digital Transmission Link Level 1 (1.544 Mbps)
EIA	Electronic 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	TRK-3	Trunk-3
F-NE	Fixed Network Element	UCR	Unified Capabilities Requirements
FR	Feature Requirements		

**Table 2-2. SUT CR and FR Interoperability Requirements**

<b>DISN Access Interfaces</b>			
<b>Interface</b>	<b>Critical</b>	<b>Requirements Required or Conditional</b>	<b>References</b>
T1 CAS (AMI/SF) DTMF, MFR1	No <sup>1</sup>	• DS1 Interface Characteristics (C)	• UCR Section 5.9.2.3.4
T1 CAS (B8ZS/ESF) DTMF, MFR1		• DS1 Supervisory Channel Associated Signaling (C)	• UCR Section 5.9.2.3.4
T1 PRI (ANSI T1.607/T1.619a)		• DS1 Clear Channel Capability (C)	• UCR Section 5.9.2.3.4
T1 SS7 (ANSI T1.619a)		• DS1 Alarm and Restoral Requirements (C)	• UCR Section 5.9.2.3.4
E1 CAS (HDB3) DTMF, MFR1		• E1 Interface Characteristics (C)	• UCR Section 5.9.2.3.5
E1 ISDN PRI (ITU-T Q.931/Q.955.3)		• E1 Supervisory Channel Associated Signaling (C)	• UCR Section 5.9.2.3.5
E1 SS7 (ANSI T1.619a)		• E1 Clear Channel Capability (C)	• UCR Section 5.9.2.3.5
Serial (EIA-530)		• E1 Alarm and Restoral Requirements (C)	• UCR Section 5.9.2.3.5
		• MOS (R) (F-NE Only)	• UCR Section 5.9.2.1
		• MOS (R) (D-NE Only)	• UCR Section 5.9.3.1
	• BERT (R) (F-NE Only)	• UCR Section 5.9.2.1	
	• BERT (R) (D-NE Only)	• UCR Section 5.9.3.1	
	• Secure Transmission (Voice and Data) (R) (F-NE Only)	• UCR Section 5.9.3.8	
	• Secure Transmission (Voice and Data) (R) (D-NE Only)	• UCR Section 5.9.2.1	
	• Modem (R)	• UCR Section 5.9.2.1	
	• Facsimile (R)	• UCR Section 5.9.2.1	
	• Call Control Signals (R)	• UCR Section 5.9.2.1	
	• Alarms (R) (F-NE Only)	• UCR Section 5.9.2.1.1	
	• Alarms (R) (D-NE Only)	• UCR Section 5.9.3.5	
	• Call Congestion Control (R) (F-NE Only)	• UCR Section 5.9.2.1	
	• Call Congestion Control (R) (D-NE Only)	• UCR Section 5.9.3.1	
	• Call Congestion for TDM Transport (R) (D-NE Only)	• UCR Section 5.9.3.4	
	• Voice Compression (C) (F-NE Only)	• UCR Section 5.9.2.2	
	• Voice Compression (C) (D-NE Only)	• UCR Section 5.9.3.1	
	• TIA/EIA-232, TIA-EIA-530 (R)	• UCR Section 5.5.3.6.10	

**Table 2-2. SUT CR and FR Interoperability Requirements (continued)**

<b>DISN Transport Interfaces</b>			
<b>Interface</b>	<b>Critical</b>	<b>Requirements Required or Conditional</b>	<b>References</b>
Serial (EIA-530) SA-TRK	No <sup>2</sup>	<ul style="list-style-type: none"> <li>• DS1 Interface Characteristics (R)</li> <li>• E1 Interface Characteristics (R)</li> <li>• MOS (R) (F-NE Only)</li> <li>• MOS (R) (D-NE Only)</li> <li>• BERT (R) (F-NE Only)</li> <li>• BERT (R) (D-NE Only)</li> <li>• Secure Transmission (Voice and Data) (R) (F-NE Only)</li> <li>• Secure Transmission (Voice and Data) (R) (D-NE Only)</li> <li>• Modem (R)</li> <li>• Facsimile (R)</li> <li>• Call Control Signals (R)</li> <li>• Alarms (R) (F-NE Only)</li> <li>• Alarms (R) (D-NE Only)</li> <li>• Call Congestion Control (R) (F-NE Only)</li> <li>• Call Congestion Control (R) (D-NE Only)</li> <li>• Call Congestion for TDM Transport (R) (D-NE Only)</li> <li>• Voice Compression (C) (F-NE Only)</li> <li>• Voice Compression (C) (D-NE Only)</li> <li>• Delay (R) (F-NE Only)</li> <li>• Delay (R) (D-NE Only)</li> <li>• Jitter (R) (F-NE Only)</li> </ul>	<ul style="list-style-type: none"> <li>• UCR Section 5.9.2.3.4</li> <li>• UCR Section 5.9.2.3.5</li> <li>• UCR Section 5.9.2.1</li> <li>• UCR Section 5.9.3.1</li> <li>• UCR Section 5.9.2.1</li> <li>• UCR Section 5.9.3.1</li> <li>• UCR Section 5.9.2.1</li> <li>• UCR Section 5.9.3.8</li> <li>• UCR Section 5.9.2.1</li> <li>• UCR Section 5.9.2.1</li> <li>• UCR Section 5.9.2.1</li> <li>• UCR Section 5.9.2.1.1</li> <li>• UCR Section 5.9.3.5</li> <li>• UCR Section 5.9.2.1</li> <li>• UCR Section 5.9.3.1</li> <li>• UCR Section 5.9.3.4</li> <li>• UCR Section 5.9.2.2</li> <li>• UCR Section 5.9.3.1</li> <li>• UCR Section 5.9.2.3.9</li> <li>• UCR Section 5.9.3.3</li> <li>• UCR Section 5.9.2.3.9</li> </ul>
T1 TRK-3	No <sup>2</sup>	<ul style="list-style-type: none"> <li>• DS1 Interface Characteristics (R)</li> <li>• E1 Interface Characteristics (R)</li> <li>• MOS (R) (F-NE Only)</li> <li>• MOS (R) (D-NE Only)</li> <li>• BERT (R) (F-NE Only)</li> <li>• BERT (R) (D-NE Only)</li> <li>• Secure Transmission (Voice and Data) (R) (F-NE Only)</li> <li>• Secure Transmission (Voice and Data) (R) (D-NE Only)</li> <li>• Modem (R)</li> <li>• Facsimile (R)</li> <li>• Call Control Signals (R)</li> <li>• Alarms (R) (F-NE Only)</li> <li>• Alarms (R) (D-NE Only)</li> <li>• Call Congestion Control (R) (F-NE Only)</li> <li>• Call Congestion Control (R) (D-NE Only)</li> <li>• Call Congestion for TDM Transport (R) (D-NE Only)</li> <li>• Voice Compression (C) (F-NE Only)</li> <li>• Voice Compression (C) (D-NE Only)</li> <li>• Delay (R) (F-NE Only)</li> <li>• Delay (R) (D-NE Only)</li> </ul>	<ul style="list-style-type: none"> <li>• UCR Section 5.9.2.3.4</li> <li>• UCR Section 5.9.2.3.5</li> <li>• UCR Section 5.9.2.1</li> <li>• UCR Section 5.9.3.1</li> <li>• UCR Section 5.9.2.1</li> <li>• UCR Section 5.9.3.1</li> <li>• UCR Section 5.9.2.1</li> <li>• UCR Section 5.9.3.8</li> <li>• UCR Section 5.9.2.1</li> <li>• UCR Section 5.9.2.1</li> <li>• UCR Section 5.9.2.1</li> <li>• UCR Section 5.9.2.1.1</li> <li>• UCR Section 5.9.3.5</li> <li>• UCR Section 5.9.2.1</li> <li>• UCR Section 5.9.3.1</li> <li>• UCR Section 5.9.3.4</li> <li>• UCR Section 5.9.2.2</li> <li>• UCR Section 5.9.3.1</li> <li>• UCR Section 5.9.2.3.9</li> <li>• UCR Section 5.9.3.3</li> </ul>

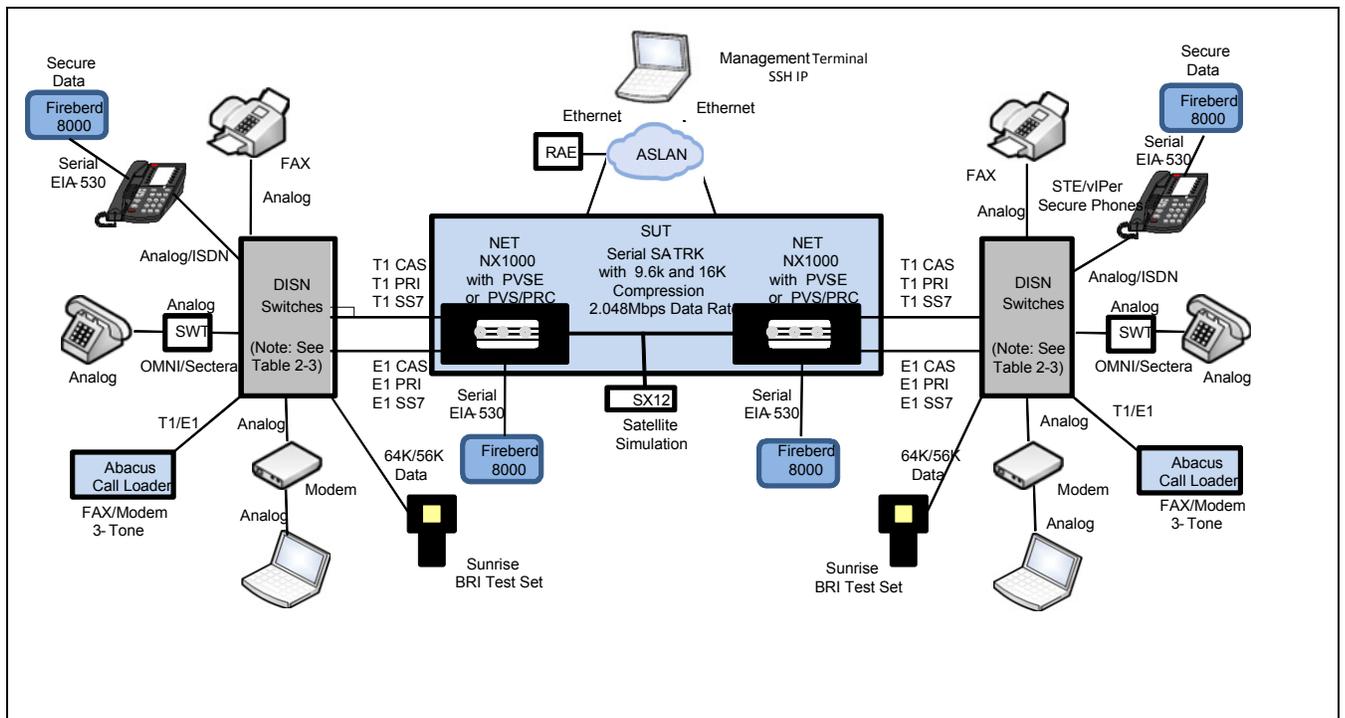
**Table 2-2. SUT CR and FR Interoperability Requirements (continued)**

<b>DISN Transport Interfaces</b>			
<b>Interface</b>	<b>Critical</b>	<b>Requirements Required or Conditional</b>	<b>References</b>
IP	No <sup>2</sup>	<ul style="list-style-type: none"> <li>• DS1 Interface Characteristics (R)</li> <li>• E1 Interface Characteristics (R)</li> <li>• MOS (R) (F-NE Only)</li> <li>• MOS (R) (D-NE Only)</li> <li>• BERT (R) (F-NE Only)</li> <li>• BERT (R) (D-NE Only)</li> <li>• Secure Transmission (Voice and Data) (R) (F-NE Only)</li> <li>• Secure Transmission (Voice and Data) (R) (D-NE Only)</li> <li>• Modem (R)</li> <li>• Facsimile (R)</li> <li>• Call Control Signals (R)</li> <li>• Alarms (R) (F-NE Only)</li> <li>• Alarms (R) (D-NE Only)</li> <li>• Call Congestion Control (R) (F-NE Only)</li> <li>• Call Congestion Control (R) (D-NE Only)</li> <li>• Call Congestion for TDM Transport (R) (D-NE Only)</li> <li>• Voice Compression (C) (F-NE Only)</li> <li>• Voice Compression (C) (D-NE Only)</li> <li>• Delay (R) (F-NE Only)</li> <li>• Delay (R) (D-NE Only)</li> <li>• Jitter (R) (F-NE Only)</li> <li>• Jitter (R) (D-NE Only)</li> <li>• Packet Loss (R) (F-NE Only)</li> <li>• Packet Loss (R) (D-NE Only)</li> <li>• IPv6 (R)</li> </ul>	<ul style="list-style-type: none"> <li>• UCR Section 5.9.2.3.4</li> <li>• UCR Section 5.9.2.3.5</li> <li>• UCR Section 5.9.2.1</li> <li>• UCR Section 5.9.3.1</li> <li>• UCR Section 5.9.2.1</li> <li>• UCR Section 5.9.3.1</li> <li>• UCR Section 5.9.2.1</li> <li>• UCR Section 5.9.3.8</li> <li>• UCR Section 5.9.2.1</li> <li>• UCR Section 5.9.2.1</li> <li>• UCR Section 5.9.2.1</li> <li>• UCR Section 5.9.2.1.1</li> <li>• UCR Section 5.9.3.5</li> <li>• UCR Section 5.9.2.1</li> <li>• UCR Section 5.9.3.1</li> <li>• UCR Section 5.9.3.4</li> <li>• UCR Section 5.9.2.2</li> <li>• UCR Section 5.9.3.1</li> <li>• UCR Section 5.9.2.3.9</li> <li>• UCR Section 5.9.3.3</li> <li>• UCR Section 5.9.2.3.9</li> <li>• UCR Section 5.9.3.3</li> <li>• UCR Section 5.9.2.3.9</li> <li>• UCR Section 5.9.3.3</li> <li>• UCR Section 5.3.5.4</li> </ul>
<b>SUT Features And Capabilities</b>			
<b>Feature/Capability</b>	<b>Critical</b>	<b>Requirements Required or Conditional</b>	<b>References</b>
Synchronization	Yes	<ul style="list-style-type: none"> <li>• Timing (R)</li> </ul>	<ul style="list-style-type: none"> <li>• UCR Section 5.9.2.3.7</li> </ul>
Network Management	Yes	<ul style="list-style-type: none"> <li>• Management Option (R) Local Management (Front Panel and/or External Console) (C) ADIMSS (C)</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 Section 5.9.2.4.1</li> <li>• UCR Section 5.9.2.4.2</li> <li>• UCR Section 5.9.2.4.3</li> <li>• UCR Section 5.9.2.4.4</li> </ul>
Security	Yes	<ul style="list-style-type: none"> <li>• STIGs and DoDI 8510.01 (DIACAP) (R)</li> </ul>	<ul style="list-style-type: none"> <li>• UCR Section 5.9.2.6</li> </ul>

**Table 2-2. SUT CR and FR Interoperability Requirements (continued)**

<b>NOTES:</b>			
1	The UCR does not stipulate a minimum required DISN access interface.		
2	The UCR does not stipulate a minimum required DISN transport interface.		
<b>LEGEND:</b>			
ADIMSS	Advanced DSN Integrated Management Support System	HDB3	High Density Bipolar Three
AMI	Alternate Mark Inversion	IP	Internet Protocol
ANSI	American National Standards Institute	ISDN	Integrated Services Digital Network
B8ZS	Bipolar Eight Zero Substitution	ITU-T	International Telecommunication Union – Telecommunication Standardization Sector
BERT	Bit Error Rate Test	MFR1	Multi-Frequency Recommendation 1
C	Conditional	MLPP	Multi-Level Precedence and Preemption
CAS	Channel Associated Signaling	MOS	Mean Opinion Score
DIACAP	Department of Defense Information Assurance Certification and Accreditation Process	PRI	Primary Rate Interface
DoDI	Department of Defense Instruction	Q.931	Signaling Standard for ISDN
DP	Dial Pulse	Q.955.3	ISDN Signaling Standard for E1 MLPP
DS1	Digital Signal Level 1	R	Required
DSS1	Digital Subscriber Signaling 1	SA-TRK	Symmetric Asymmetric-Trunk
DISN	Defense Information System Network	SF	Super Frame
DTMF	Dual Tone Multi-Frequency	SS7	Signaling System 7
E1	European Basic Multiplex Rate (2.048 Mbps)	STIGs	Security Technical Implementation Guides
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	T1.607	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
		TDM	Time Division Multiplexing
		TRK-3	Trunk-3
		UCR	Unified Capabilities Requirements

**8. TEST NETWORK DESCRIPTION.** The SUT was tested at JITC's Global Information Grid Network Test Facility, Fort Huachuca, Arizona in a manner and configuration similar to that of the DISN operational environment. Testing of the system's required functions and features were conducted using the test configurations as shown in Figures 2-2 through 2-6.

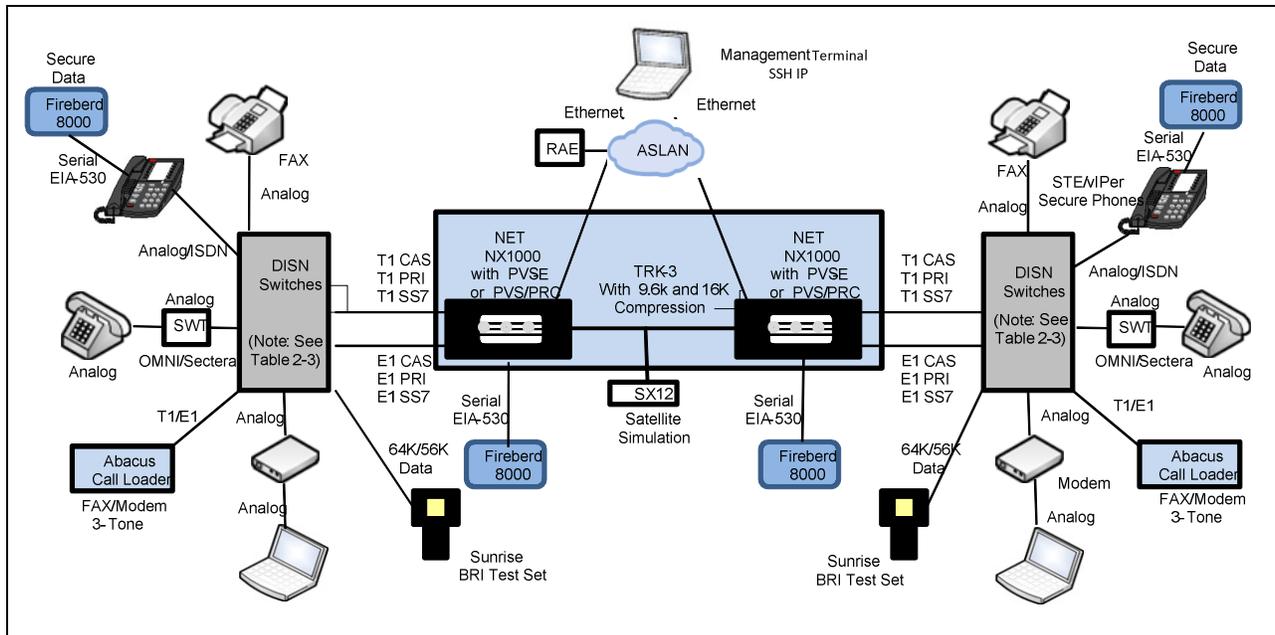


**NOTE:** The required ancillary equipment that is not shown is a condition of fielding for Information Assurance, which is covered under a separate report, Reference (e).

**LEGEND:**

ASLAN	Assured-Service Local Area Network	Mbps	Megabits per second
BRI	Basic Rate Interface	PRC	Primary Rate Card
CAS	Channel Associated Signaling	PRI	Primary Rate Interface
DCE	Data Circuit-terminating Equipment	PVS	Prime Voice Secure
DISN	Defense Information System Network	PVS-E	Prime Voice Secure-Enhanced
DTE	Data Terminal Equipment	RAE	Required Ancillary Equipment
E1	European Basic Multiplex Rate (2.048 Mbps)	SA -TRK	Symmetric Asymmetric-Trunk
EIA	Electronic Industries Alliance	SSH	Secure Shell
EIA-530	Standard for 25-position interface for DTE and DCE employing serial binary data interchange	SS7	Signaling System 7
FAX	Facsimile	STE	Secure Terminal Equipment
ISDN	Integrated Services Digital Network	SUT	System Under Test
IP	Internet Protocol	SWT	Secure Wireline Terminal
K	Kilobits per second	SX-12	Simulator, Data Link
		T1	Digital Transmission Link Level 1 (1.544 Mbps)

**Figure 2-2. SUT Test Configuration with SA-TRK between NET NX1000 and NET NX1000**

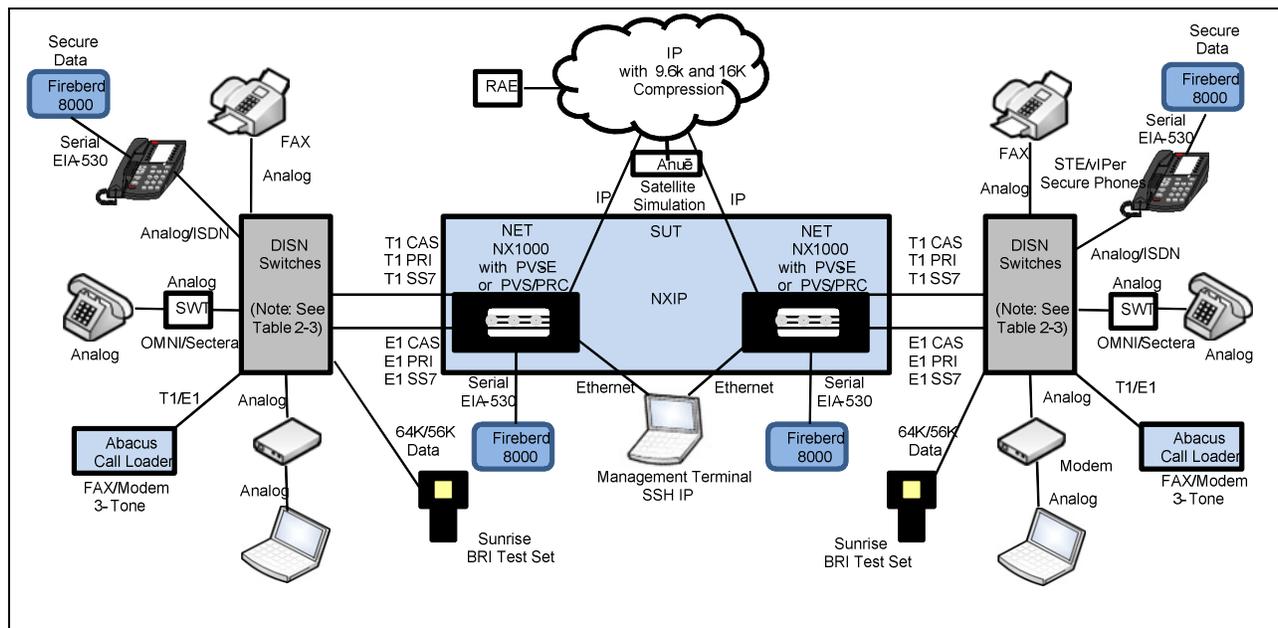


**NOTE:** The required ancillary equipment that is not shown is a condition of fielding for Information Assurance, which is covered under a separate report, Reference (e).

**LEGEND:**

ASLAN	Assured-Service Local Area Network	Mbps	Megabits per second
BRI	Basic Rate Interface	PRC	Primary Rate Card
CAS	Channel Associated Signaling	PRI	Primary Rate Interface
DCE	Data Circuit-terminating Equipment	PVS	Prime Voice Secure
DISN	Defense Information System Network	PVS-E	Prime Voice Secure-Enhanced
DTE	Data Terminal Equipment	RAE	Required Ancillary Equipment
E1	European Basic Multiplex Rate (2.048 Mbps)	SA -TRK	Symmetric Asymmetric-Trunk
EIA	Electronic Industries Alliance	SSH	Secure Shell
EIA-530	Standard for 25-position interface for DTE and DCE employing serial binary data interchange	SS7	Signaling System 7
FAX	Facsimile	STE	Secure Terminal Equipment
ISDN	Integrated Services Digital Network	SUT	System Under Test
IP	Internet Protocol	SWT	Secure Wireline Terminal
K	Kilobits per second	SX-12	Simulator, Data Link
		T1	Digital Transmission Link Level 1 (1.544 Mbps)

**Figure 2-3. SUT Test Configuration with TRK-3 between NET NX1000 and NET NX1000**

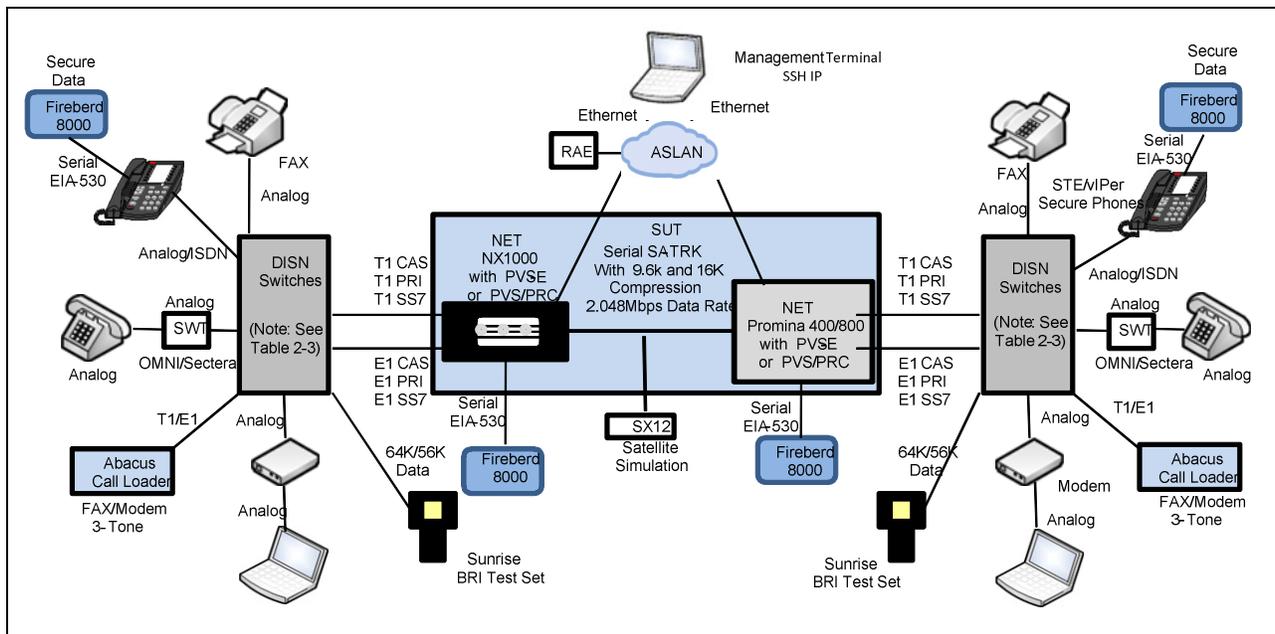


**NOTE:** The required ancillary equipment that is not shown is a condition of fielding for Information Assurance, which is covered under a separate report, Reference (e).

**LEGEND:**

BRI	Basic Rate Interface	Mbps	Megabits per second
CAS	Channel Associated Signaling	PRC	Primary Rate Card
DCE	Data Circuit-terminating Equipment	PRI	Primary Rate Interface
DISN	Defense Information System Network	PVS	Prime Voice Secure
DTE	Data Terminal Equipment	PVS-E	Prime Voice Secure-Enhanced
E1	European Basic Multiplex Rate (2.048 Mbps)	RAE	Required Ancillary Equipment
EIA	Electronic Industries Alliance	SA -TRK	Symmetric Asymmetric-Trunk
EIA-530	Standard for 25-position interface for DTE and DCE employing serial binary data interchange	SSH	Secure Shell
FAX	Facsimile	SS7	Signaling System 7
ISDN	Integrated Services Digital Network	STE	Secure Terminal Equipment
IP	Internet Protocol	SUT	System Under Test
K	Kilobits per second	SWT	Secure Wireline Terminal
		SX-12	Simulator, Data Link
		T1	Digital Transmission Link Level 1 (1.544 Mbps)

**Figure 2-4. SUT Test Configuration with NXIP between NET NX1000 and NET NX1000**

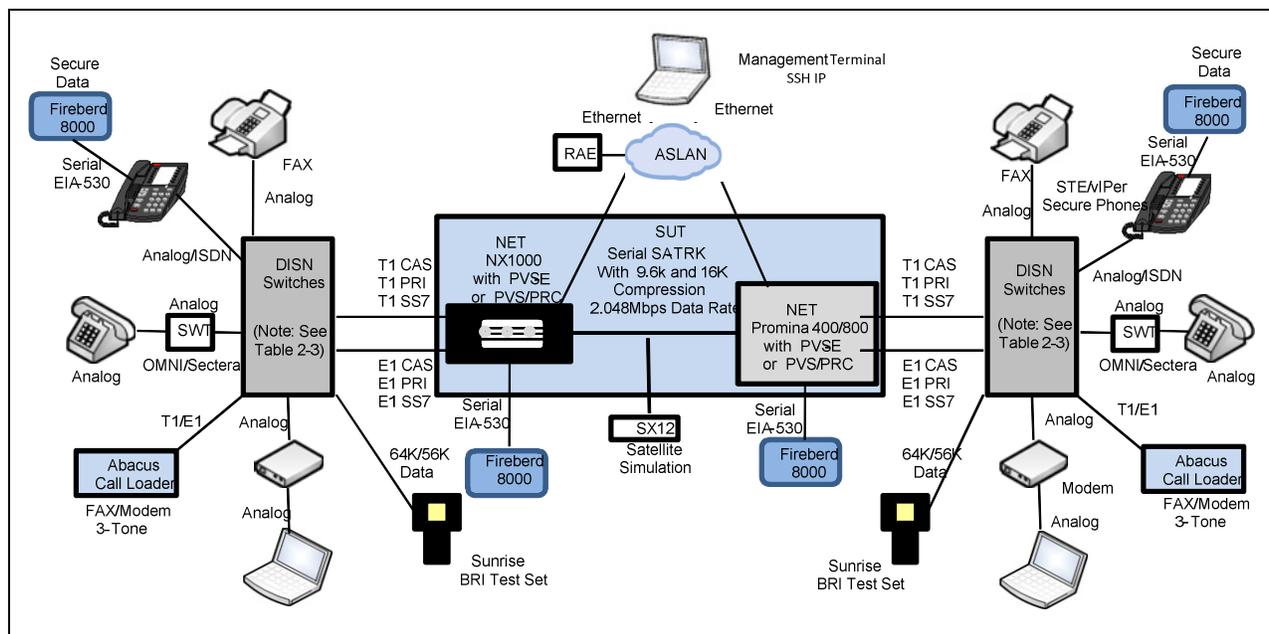


**NOTE:** The required ancillary equipment that is not shown is a condition of fielding for Information Assurance, which is covered under a separate report, Reference (e).

**LEGEND:**

ASLAN	Assured-Service Local Area Network	Mbps	Megabits per second
BRI	Basic Rate Interface	PRC	Primary Rate Card
CAS	Channel Associated Signaling	PRI	Primary Rate Interface
DCE	Data Circuit-terminating Equipment	PVS	Prime Voice Secure
DISN	Defense Information System Network	PVS-E	Prime Voice Secure-Enhanced
DTE	Data Terminal Equipment	RAE	Required Ancillary Equipment
E1	European Basic Multiplex Rate (2.048 Mbps)	SA -TRK	Symmetric Asymmetric-Trunk
EIA	Electronic Industries Alliance	SSH	Secure Shell
EIA-530	Standard for 25-position interface for DTE and DCE employing serial binary data interchange	SS7	Signaling System 7
FAX	Facsimile	STE	Secure Terminal Equipment
ISDN	Integrated Services Digital Network	SUT	System Under Test
IP	Internet Protocol	SWT	Secure Wireline Terminal
K	Kilobits per second	SX-12	Simulator, Data Link
		T1	Digital Transmission Link Level 1 (1.544 Mbps)

**Figure 2-5. SUT Test Configuration with SA-TRK between NET NX1000 and NET Promina 400/800**



**NOTE:** The required ancillary equipment not shown is a condition of fielding for Information Assurance, which is covered under a separate report, Reference (e).

**LEGEND:**

ASLAN	Assured-Service Local Area Network	Mbps	Megabits per second
BRI	Basic Rate Interface	PRC	Primary Rate Card
CAS	Channel Associated Signaling	PRI	Primary Rate Interface
DCE	Data Circuit-terminating Equipment	PVS	Prime Voice Secure
DISN	Defense Information System Network	PVS-E	Prime Voice Secure-Enhanced
DTE	Data Terminal Equipment	RAE	Required Ancillary Equipment
E1	European Basic Multiplex Rate (2.048 Mbps)	SA -TRK	Symmetric Asymmetric-Trunk
EIA	Electronic Industries Alliance	SSH	Secure Shell
EIA-530	Standard for 25-position interface for DTE and DCE employing serial binary data interchange	SS7	Signaling System 7
FAX	Facsimile	STE	Secure Terminal Equipment
ISDN	Integrated Services Digital Network	SUT	System Under Test
IP	Internet Protocol	SWT	Secure Wireline Terminal
K	Kilobits per second	SX-12	Simulator, Data Link
		T1	Digital Transmission Link Level 1 (1.544 Mbps)

**Figure 2-6. SUT Test Configuration with TRK-3 between NET NX1000 and NET Promina 400/800**

**9. SYSTEM CONFIGURATIONS.** Table 2-3 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 DISN switches noted in Table 2-3. Table 2-3 lists the DISN switches, which depict the tested configuration, and is not intended to identify the only switches that are certified with the SUT. The SUT is certified with switching systems listed on the Unified Capabilities Approved Products List that offer the same certified access interfaces as the SUT.

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

System Name		Software			
Avaya CS2100		SE 09.1			
Alcatel-Lucent 5ESS		5E16 BWM 09-0002			
Nokia-Siemens Networks EWSD		19d Patch Set 46			
Avaya S8720		CM 4.0 (R014X.00.2.731.7 Super Patch 14419)			
System Name		Equipment			
Required Ancillary Equipment		Public Key Infrastructure			
Site-Provided	Management Workstation	Windows XP SP 3			
		Putty-CAC 06.33.10			
		Pageant 06.33.10			
Hardware		Cards	Software/Firmware		
NET Promina NX1000 Rel. 4.x5.03	NET Promina NX1000 Node 28	Primary	Front	TRK-3 (20)	rev. R
			Back	PVS-E (19)	Boot ver. 2.14 Kernel ver. 2.11 Root FS ver. 4.39 STU DSP ver. 2.4.13 rev. A
				SA TRK (18)	ver. 1.5 rev. S
				SA TRK (17)	ver. 1.5 rev. S
				T1 DSX (20)	
				NVX T1E1 (19)	rev. B
		SACD 530 (18)		rev. F	
		Internal	SACD 530 (17)	rev. F	
			NX-IPTRK (32)	SW ver. 5.19 FW ver. 3.9 rev. B	
			NX-HSD (21)	ver. 1.4 rev. B	
			NX-SX (0)	CPLD ver. 2.8 rev. A	
			NX-PPM (3)	Code 4.95.55 PBus CPLD ver. 1.10 Enet CPLD ver. 1.2 Boot CPLD ver. 1.1 rev. A	
	NX-PSM (29)		Kernel ver. 5.19 Boot ver. 5.13 Root FS ver. 5.20		
	NET Promina NX1000 Node 27	Secondary	Front	NX-BX (30)	ver. 1.0 rev. A
				NX-BX (46)	ver. 1.0 rev. A
				NX-URD (48)	ver. 2.29 rev. A
			Back	NX-BX (62)	ver. 1.0 rev. A
				HDD4 (84)	ver. 1.7 rev. A
PVEC (83)				AD rev. L	
		PVS/12 (82)	AI/ver. 3.06 rev. B		
		PRC (81)	rev. N		
		530 DCE (84)	rev. A		
		DS-1 (81)	rev. D		
		NX-HSD (85)	ver. 1.4 rev. B		

**Table 2-3. Tested System Configurations (Continued)**

System Name	Hardware		Cards	Software/Firmware		
NET Promina NX1000 Rel. 4.x5.03 (continued)	NET Promina NX1000 Node 27 (continued)	Primary	Internal	NX-PPM (67)	Code 4.95.55 PBus CPLD ver. 1.10 Enet CPLD ver. 1.2 Boot CPLD ver. 1.1 rev. A	
				NX-PSM (93)	Kernel ver. 5.19 Boot ver. 5.13 Root FS ver. 5.20	
				NX-BX (94)	ver. 1.0 rev. A	
				NX-BX (110)	ver. 1.0 rev. A	
				NX-URD (112)	ver. 2.29 rev. A	
				NX-BX (126)	ver. 1.0 rev. A	
			Front	PVS-E (20)	Boot ver. 2.14 Kernel ver. 2.11 Root FS ver. 4.39 STU DSP ver. 2.4.13 rev. A	
				HD T1E1 (19)	ver. 1.7 rev. B	
				SA TRK (18)	ver. 1.5 rev. S	
				SA TRK (17)	ver. 1.5 rev. S	
				Back	NVX T1E1 (20)	rev. B
					HD T1E1 (19)	rev. A
			SACD 530 (18)		rev. F	
			SACD 530 (17)		rev. F	
			Internal	IPTRK (32)	SW ver. 5.19 FW ver. 3.9 rev.	
				NX-SX (0)	CPLD ver. 2.8 rev. A	
				NX-SX (1)	CPLD ver. 2.8 rev. A	
				NX-PPM (3)	Code 4.95.55 PBus CPLD ver. 1.10 Enet CPLD ver. 1.2 Boot CPLD ver. 1.1 rev. A	
				NX-PSM (29)	Kernel ver. 5.19 Boot ver. 5.13 Root FS ver. 5.20	
				NX-BX (30)	ver. 1.0 rev. A	
NX-BX (46)	ver. 1.0 rev. A					
NX-URD (48)	ver. 2.29 rev. A					
NX-BX (62)	ver. 1.0 rev. A					

**LEGEND:**

(x)	card slot number	NVX	Network Voice Exchange
AD	Product Version	PBus	Promina Bus
AI	Product Version	PPM	Promina Processing Module
BX	Bus Extender	PRC	Primary Rate Card
CPLD	Complex Programmable Logic Device	PSM	Promina Server Module
DCE	Data Circuit-Terminating Equipment	PVEC	PrimeVoice Echo Canceller
DS	Digital Subscriber	PVS	PrimeVoice Secure
DSP	Digital Signal Processor	Rel.	Release
DSX	Digital Subscriber X	rev.	revision
E	Enhanced	SA	Symmetric Asymmetric
E1	European Carrier 1	SACD	Symmetric Asymmetric Carrier Data
Enet	Ethernet	STU	Secure Telephone Unit
FS	File System	SX	Switching Exchange
HD	High Density	T1	Transmission Carrier 1
HDD	High Density Data	TRK	Trunk
HSD	High-Speed Data	URD	Universal Rate Data
IPTRK	Internet Protocol Trunk	ver.	version
NET	Network Equipment Technologies	XP	experience
NX	Network Exchange		

**10. TESTING LIMITATIONS.** None.

## **11. TEST RESULTS**

### **a. Discussion**

**(1) DISN Access/Transport Interfaces.** The SUT supports the following access interfaces: T1 CAS, PRI, SS7; E1 CAS, PRI, SS7; and Serial EIA-530. The SUT supports the following Internet Protocol (IP) transport interfaces: Serial EIA-530, T1, and IP. The specific requirements and test results tested over all the SUT DISN access and transport interfaces are described in the subparagraphs below:

**(a) T1 Interface Characteristics.** The UCR 2008, Change 2, paragraph 5.9.2.3, states that the T1 interface shall meet the requirements in accordance with UCR 2008, Change 2, paragraph 5.9.2.3.4. The Sunrise T10 test set was used to measure the SUT DS1 pulse mask to verify compliance to this requirement. The SUT met the International Telecommunication Union-Telecommunication Standardization Sector (ITU-T) G.711 and American National Standard Institute T.102 pulse mask characteristics, which met this requirement. The SUT T1 interface supports both Alternate Mark Inversion (AMI) and Bipolar Eight Zero Substitution (B8ZS) line coding as required in the UCR 2008, Change 2, paragraph 5.9.2.3.4, which met this requirement.

**(b) T1 Supervisory Channel Associated Signaling.** The UCR 2008, Change 2, paragraph 5.9.2.3.4, states that the T1 supervisory channel associated signaling interface shall check the On-hook and off-hook status of each channel is transmitted and derived from the coding of the “A” and “B” signaling bits. 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 2008, Change 2, paragraph 5.9.2.3.4. The SUT met all the requirements with the following exception: It was documented that secure calls placed over the T1 TRK-3 transport interface when compressed at LDCELP 9.6K or G.728 (16K) occasionally stop processing calls on some of the ports. This was adjudicated by DISA on 29 November 2011 with the following condition of fielding: The T1 CAS access interface over the T1 TRK-3 transport interface is certified for clearmode only with the PVS card and clearmode and 9.6 kbps compression with the PVS-enhanced card.

**(c) T1 Clear Channel Capability.** The UCR 2008 Change 2, paragraph 5.3.4.7.7, states that the T1 interface shall meet the clear channel capability requirements in accordance with UCR, paragraph 5.9.2.3.4. The SUT is capable of transmitting and receiving B8ZS line coding in accordance with UCR 2008, Change 2, paragraph 5.9.2.3.4 which met this requirement.

**(d) E1 Interface Characteristics.** The UCR 2008 Change 2, paragraph 5.9.2.3.5, states that the E1 interface shall meet the requirements in accordance with UCR, paragraph 5.9.2.3.5-1. Furthermore, the E1 interface shall meet the requirements of ITU-T Recommendation G.703 and ITU-T Recommendation G.732. Voice signals in the PCM-30 framing format shall utilize the A-law encoding technique in accordance with ITU-T Recommendation G.772 (REV), "*Protected Monitoring Points on Digital Transmission Systems.*" The Sunrise E10 test set was used to measure the SUT E1 pulse mask to verify compliance to this requirement. The SUT supports E1 access via the HD T1/E1 card, but does not support any compression rate with this interface which is not a requirement. The SUT E1 interface characteristics in accordance with the UCR were met with both testing and vendor's LoC.

**(e) Mean Opinion Score (MOS).** The UCR 2008 Change 2, paragraph 5.9.2.1, states that the introduction of F-NEs shall not cause the end-to-end (E2E) average MOS to fall below 4.0 over any five-minute time interval and the D-NE shall not cause the E2E MOS to fall below 3.6 over any 5 minute time interval. The Sage 960B Multi-Channel Test Set was used to measure the Enhanced Mean Opinion Score (EMOS) of the NX100 T1/E1 interfaces supported by the SUT. The average EMOS over all T1 and E1 access interfaces was 4.24 non-compressed. The average EMOS over all T1 access interfaces was 4.00 compressed at either 9.6K and 16K. These results include both the PVS and PVS-E compression cards. The 9.6K and 16K compression rates were tested on PVS to PVS cards, PVS to PVS-E cards, PVS to PVS-E cards. The SUT met this requirement in tests conducted on these cards.

**(f) Bit Error Rate Test (BERT).** The UCR 2008, Change 2, paragraph 5.9.2.1, states that the introduction of an NE shall not exceed the E2E digital BERT requirement of less than 1 error in  $1 \times 10^{-9}$  (averaged over a 9 hour period). The UCR 2008, Change 2, paragraph 5.9.3.1 for D-NE, states the introduction of a D-NE shall not cause the E2E digital BER to degrade the Tactical BER below  $1 \times 10^{-5}$  by more than 0.03 percent as measured over a 9 hour period. Testing was conducted on T1, E1, and all supported serial interfaces. The SUT met this requirement for all interfaces with a recorded bit error ratio of  $1 \times 10^{-9}$  and  $1 \times 10^{-5}$  over an 8 to 15 hour period with multiple tests spanning a 48 hour period with no errors.

**(g) Secure Transmission (Voice and Data).** The UCR 2008, Change 2, paragraph 5.9.2.1, states that the introduction of NE(s) shall not degrade secure transmission for secure end devices as defined by UCR, Section 5.2.2. The UCR 2008, Change 2, paragraph 5.9.3.8 for D-NE, states the secure call shall complete successfully as a minimum equal to or better than 85 percent of the time when used in the Deployed environment. There were 4,912 secure calls placed between Secure Terminal Equipment (STE), which included the vIPer, STE and Secure Wireline Terminals Omini and Sectera. Every combination of secure call placed over certified access and transport interfaces exceeded the UCR requirement of 85 percent completion. These tests included secure voice, data, fax, and crypto rekey. The SUT secure call test results are shown in Table 2-4. Of all the secure calls placed, 98 percent of them completed successfully which met this requirement.

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

DSN Access Interfaces	DISN Transport Interfaces	Secure Call Matrix (307 calls placed per combination with a 98% completion rate)				
		From To	STE (SCIP mode)	STE (STU mode)	STE (ISDN mode)	SWT
T1 CAS, E1 CAS, T1 ISDN PRI, E1 ISDN PRI, T1 SS7	Serial SA-TRK T1 TRK-3 IP	STE (SCIP mode)	Completed	Completed	Completed	Completed
		STE (STU mode)	Completed	Completed	Completed	Completed
		STE (ISDN mode)	Completed	Completed	Completed	Completed
		SWT	Completed	Completed	Completed	Completed

**LEGEND:**

CAS	Channel Associated Signaling	SCIP	Secure Communications Internet Protocol
DISN	Defense Information System Network	SS7	Signaling System 7
E1	European Basic Multiplex Rate (2.048 Mbps)	STE	Secure Terminal Equipment
IP	Internet Protocol	STU	Secure Telephone Unit
ISDN	Integrated Services Digital Network	SUT	System Under Test
Mbps	Megabits per second	SWT	Secure Wireline Terminal
PRI	Primary Rate Interface	T1	Digital Transmission Link Level (1.544 Mbps)

(h) **Modem.** The UCR 2008, Change 2, paragraph 5.9.2.1 states that the F-NE(s) shall support a minimum modem transmission speed of 9.6 kbps across the associated pair of F-NE(s) and D-NE(s). There were approximately 46,800 T1 modem calls placed through the SUT using the Abacus call loader. All modem calls had a transmission rate of at least the minimum 9.6 kbps, which met this requirement.

(i) **Facsimile.** The UCR 2008, Change 2, paragraph 5.9.2.1, states that both F-NE(s) and D-NE(s) shall support a minimum facsimile transmission speed of 9.6 kbps across the associated NE(s). There were approximately 46,800, T1 facsimile calls placed through the SUT using the Abacus call loader. All facsimile calls had a transmission rate of 14.4 kbps, which met this requirement.

(j) **Call Control Signals.** The UCR 2008, Change 2, paragraph 5.9.2.1, states that the F-NE shall transport all call control signals transparently on an E2E basis. This requirement was verified via testing and the vendor's LoC. The SUT transparently transported CAS supervision, and Common Channel Signaling protocol to include Multi-Level Precedence and Preemption call control signals, which met this requirement.

(k) **Delay.** Delay occurs when packets take more time than expected to reach their destination. The UCR 2008, Change 2, paragraph 5.9.2.1.2.1, states that the addition of a NE shall not increase the one-way packet delay for each NE used, when measured from ingress to egress and averaged over any five-minute period more than that which is specified under the following conditions:

1. TDM Ingress G.711 (Non-secure calls) to Non-Transcoding ITU-T G.711 IP Egress shall not increase delay more than 10 milliseconds (ms) per NE pair as measured E2E.

2. TDM Ingress ITU-T G.711 (Non-secure calls) to Transcoding IP Egress with compression codec's (paragraph 5.9.2.1.2.3) shall not increase delay by more than 100 ms per NE pair as measured E2E.

3. TDM Ingress ITU-T G.711 (Secure calls) to Non-Transcoding G.711 IP Egress shall not increase delay by more than 50 ms per NE pair as measured E2E.

4. TDM Ingress ITU-T G.711 (Secure calls) to Transcoding IP Egress with compression codec's (paragraph 5.9.2.1.2.3) shall not increase delay by more than 250 ms per NE pair as measured E2E.

One-Way Delay of the SUT was tested using the Sage 960B Multi-Channel Test Unit for the supported access and transport interfaces. The SUT met all requirements per the UCR 2008, Change 2.

**(l) Jitter (Transport IP Interface).** The UCR 2008, Change 2, paragraph 5.9.3.3, states that the insertion of a NE shall not cause jitter measured from ingress to egress to increase by more than 5 ms averaged over any 5 minute period. The SUT jitter measurement averaged over a 5 minute period was 0.002 ms, which met this requirement.

**(m) Packet Loss (Transport IP Interface).** The UCR 2008, Change 2 paragraph 5.9.3.3, states that the insertion of a NE shall not cause packet loss measured from ingress to egress to increase by more than 0.05 percent averaged over any 5 minute period. The packet loss for the SUT was measured at 0.00 percent for a 5 minute period, which met this requirement.

**(n) Differential Services Code Point (DSCP) Layer 3 Quality of Service (Transport IP Interface).** The NE shall implement IP congestion control. Congestion may be controlled by using Differentiated Services which shall be capable of providing preferential treatment for call congestion over other media types in accordance with UCR 2008, Change 2, paragraph 5.3.3.3.2, and a capability to limit the provisioning of input and output interfaces such that congestion is impossible under the worst transport congestion scenario. The SUT sends the media and signaling sessions in the same packet stream and in accordance with the UCR, the sessions can be tagged with the same DSCP value. The requirement per the UCR is to be able to configure the DSCP (IPv4) and Traffic Class (IPv6) values between 0 and 63. The SUT only has 20 selectable values. This discrepancy was adjudicated by DISA on 29 November 2011 with a minor operational impact with the vendors plan of action and milestone to fix by February 2012.

**(o) Alarm and Restoral Requirements.** The UCR 2008, Change 2, paragraph 5.9.3.5, states that the D-NE shall be able to propagate Carrier Group Alarms, in accordance with UCR 2008, Change 2, paragraph 5.9.2.1.1, upon physical loss of either the access or transport interfaces. This was verified by capturing the alarm status between the DSN switches and the SUT with the Sage 375A, Ultra-T1 and Ultra E1 test equipment. The SUT is capable of transparently passing the appropriate alarms, which met this requirement.

**(p) Call Congestion.** The UCR 2008, Change 2, paragraph 5.9.3.1, states that the D-NE shall assure that congestion between NEs does not impact DSN calls in progress or subsequent calls. Call congestion handling shall be met in one or more 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 in the SUT is met because congestion is not possible due to the fact that the TDM cannot saturate the transport link on the SUT.

**(q) Voice Compression.** The UCR 2008, Change 2, paragraph 5.9.2.2, states that the NE may include voice compression and if so must support at least one of the following standards:

- ITU-T Recommendation G.726, 32 kbps Adaptive Differential Pulse Code Modulation
- ITU-T Recommendation G.728, 16 kbps Low-Delay Code Excited Linear Prediction
- ITU-T Recommendation G.729.1, 9.6 kbps Conjugate-Structure Algebraic-Code-Excited Linear-Prediction

The SUT supports G.728 (16K) and Proprietary LDCELP (9.6K) Codecs.

**(r) IPv6.** The UCR 2008 Change 2, section 5.3.5.4 states that the SUT shall support dual IPv4 and IPv6 stacks. The SUT met all the requirements for Network Appliance/Simple Server (NA/SS) as applicable. Requirements were met through IO testing and the vendor LOC. The SUTs IP transport supports IPv4 and IPv6 packets that can be routed over a LAN or WAN but only between SUT pairs. The SUT transports TDM traffic over the IP transport utilizing the circuit to packet protocol SATOP (Structure-Agnostic Time Division Multiplexing over Packet) encapsulation algorithm.

## **(2) Device Management**

**(a) Management Option.** The UCR Change 2, paragraph 5.9.2.4, states that the NE devices must 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 which shall be provided for local management. The NE may be able to be centrally monitored and managed by the Advanced DISN Integrated Management Support System in accordance with UCR 2008, Change 2, paragraph 5.9.2.4.1. The SUT is managed from a remote client, which can be used to monitor multiple units. The SUT is

monitored by a management workstation. The workstation connects to the modules via Ethernet connection and uses Secure Shell (SSH) version (v)2 preshared keys. Administrative tasks are performed via SSH. The SSH interface allows an administrator to configure general settings, monitor operations, create or edit services, and perform maintenance. The NX1000 is managed by a Management workstation via IP which met this requirement.

**(b) Fault Management.** The UCR 2008, Change 2, paragraph 5.9.2.4.2, states that 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 supports fault management using a secure management workstation which met this requirement.

**(c) Loop Back Capability.** The UCR 2008, Change 2, paragraph 5.9.2.4.3, states that NE shall provide loop back capability on each of the trunk side interfaces in accordance with ITU-T Recommendation V.54, "Loop Test Devices For Modems." This requirement was verified via testing and the vendor's LoC.

**(d) Operational Configuration Restoral.** The UCR 2008, Change 2, paragraph 5.9.2.4.4, states that 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 and the SUT returned to the last customer configured state prior to the power failure, which met this requirement.

**(3) Security.** The UCR 2008, Change 2, paragraph 5.9.2.6, states that the NE shall conform to the requirements outlined in DoD Instruction 8510.01, "DoD Information Assurance Certification and Accreditation Process (DIACAP)". Security is tested as part of the Information Assurance testing and is covered under a separate report, Reference (e).

**b. System Interoperability Results.** The SUT meets all of its critical interoperability requirements and is certified as interoperable for joint use within the DISN D-NE and F-NE as set forth in reference (c) with the following stipulations: The SUT has the following access interfaces that are certified for joint use within the DISN: T1 CAS, PRI, SS7; E1 CAS, PRI, SS7; and EIA-530 Serial. The T1 CAS access interface over the T1 TRK-3 transport interface is certified for clearmode only with the PVS card and clearmode and 9.6 kbps per second compression with the PVS-enhanced card. The SUT also has three transport interfaces that are certified for joint use within the DISN: EIA-530 Serial, T1, and IP. The SUT is also interoperable in mated pairs with the Promina 800 Version 95.55 or Promina 400 Version 105.55 providing both SUTs are loaded with the same certified Software Release 4.x5.03 in order to interoperate correctly. 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 JITC.

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