



DEFENSE INFORMATION SYSTEMS AGENCY

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

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

13 Aug 09

MEMORANDUM FOR DISTRIBUTION

SUBJECT: Special Interoperability Test Certification of Veraz I-Gate 4000 Edge with Software Version C 2.8.2.3_ES

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) 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. Veraz I-Gate 4000 Edge with Software Version C 2.8.2.3_ES is hereinafter referred to as the System Under Test (SUT). The SUT meets all of its critical interoperability requirements and is certified as interoperable for joint use within the Defense Switched Network (DSN) as a Strategic and Tactical Network Element. Test discrepancies that remain open are discussed in the Certification Testing Summary (Enclosure 2) and have only minor operational impacts. The SUT is deployed with its mated pair, and both must be loaded with the same certified C 2.8.2.3_ES software release in order to interoperate correctly. The SUT meets the critical interoperability requirements set forth in reference (c), 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 this memorandum.

3. This finding is based on interoperability testing conducted by JITC, comparison of the test data to the requirements in reference (c), review of the vendor's Letters of Compliance (LoC), and Defense Information Assurance (IA)/Security Accreditation Working Group (DSAWG) accreditation. Interoperability testing was conducted by JITC at the Global Information Grid Network Test Facility, Fort Huachuca, Arizona, from 4 through 29 May 2009. Review of the vendor's LoC was completed on 3 August 2009. IPv6 requirements were waived by the Office of the Assistant Secretary of Defense for Networks and Information Integration, and were not tested or evaluated. The DSAWG grants accreditation based on the security testing completed by DISA-led Information Assurance test teams and published in a separate report (reference (e)).

The DSAWG accreditation was granted on 11 August 2009. 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 (CRs) and Feature Requirements (FRs) 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. DSN 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

DSN Access Interfaces			
Interface & Signaling	Critical	Status	Remarks
T1 CAS (AMI/SF) DTMF, MFR1	No ¹	Certified	Met all CRs and FRs.
T1 CAS (B8ZS/ESF) DTMF, MFR1	No ¹	Certified	Met all CRs and FRs.
T1 PRI (ANSI T1.607/T1.619a)	No ¹	Certified	Met all CRs and FRs.
T1 SS7 (ANSI T1.619a)	No ¹	Certified	Met all CRs and FRs.
E1 CAS (HDB3) DTMF, MFR1, DP	No ¹ (Europe only)	Certified	Met all CRs and FRs.
E1 ISDN PRI (ITU-T Q.955.3)	No ¹ (Europe only)	Certified	Met all CRs and FRs.
E1 SS7 (ANSI T1.619a)	No ¹ (Europe only)	Certified	Met all CRs and FRs.
DSN Transport Interfaces			
TRANSPORT LEVEL	Critical	Status	Remarks
E1 (HDB3) Proprietary	No ²	Certified	Met all CRs and FRs.
T1 (B8ZS/ESF) Proprietary	No ²	Certified	Met all CRs and FRs.
100 Mbps Ethernet	No ²	Certified	Met all CRs and FRs.
Features And Capabilities			
Features And Capabilities	Critical	Status	Remarks
Synchronization	Yes	Certified	Met all CRs and FRs.
Network Management	Yes	Certified	Met all CRs and FRs.
Echo Cancellation	No	Certified	Met all CRs and FRs.
Security	Yes	See note 3.	See note 3.
NOTES:			
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 Strategic or Tactical Network Element.			
3 Information assurance testing is accomplished via DISA-led Information Assurance test teams and published in a separate report.			

Table 1. SUT Interoperability Test Summary (continued)

LEGEND:	
AMI	Alternate Mark Inversion
ANSI	American National Standards Institute
B8ZS	Bipolar Eight Zero Substitution
CAS	Channel Associated Signaling
CRs	Capability Requirements
DISA	Defense Information Systems Agency
DP	Dial Pulse
DSN	Defense Switched Network
DSS1	Digital Subscriber Signaling 1
DTMF	Dual Tone Multi-Frequency
E1	European Basic Multiplex Rate (2.048 Mbps)
ESF	Extended Super Frame
FRs	Feature Requirements
HDB3	High Density Bipolar 3
ISDN	Integrated Services Digital Network
ITU-T	International Telecommunication Union – Telecommunication Standardization Sector
Mbps	Megabits per second
MFR1	Multi-Frequency Recommendation 1
MLPP	Multi-Level Precedence and Preemption
PRI	Primary Rate Interface
Q.955.3	ISDN Signaling Standard for E1 MLPP
SF	Super Frame
SS7	Signaling System 7
SUT	System Under Test
T1	Digital Transmission Link Level 1 (1.544 Mbps)
T1.607	ISDN – Layer 3 Signaling Specification for Circuit Switched Bearer Service for DSS1
T1.619a	SS7 and ISDN MLPP Signaling Standard for T1
UCR	Unified Capabilities Requirements

Table 2. SUT Capability and Feature Interoperability Requirements

DSN Access Interfaces			
Interface	Critical	Requirements Required or Conditional	References
T1 CAS (AM/SF) DTMF, MFR1	No ¹	<ul style="list-style-type: none"> • DS1 Interface Characteristics (R) • E1 Interface Characteristics (R) 	<ul style="list-style-type: none"> • UCR 5.2.12.5.5.1.2.4 • UCR 5.2.12.5.5.1.2.5
T1 CAS (B8ZS/ESF) DTMF, MFR1	No ¹	<ul style="list-style-type: none"> • MOS (R) (S-NE only) • MOS (R) (T-NE only) 	<ul style="list-style-type: none"> • UCR 5.2.12.5.5.1.1 • UCR 6.1.4.1
T1 PRI (ANSI T1.607/T1.619a)	No ¹	<ul style="list-style-type: none"> • BERT (R) (S-NE only) • BERT (R) (T-NE only) 	<ul style="list-style-type: none"> • UCR 5.2.12.5.5.1.1 • UCR 6.1.4.1
T1 SS7 (ANSI T1.619a)	No ¹	<ul style="list-style-type: none"> • Secure Transmission (Voice and Data) (R) • Modem (R) (S-NE only) • Modem (R) (T-NE only) 	<ul style="list-style-type: none"> • UCR 5.2.12.5.5.1.1 • UCR 5.2.12.5.5.1.1 • UCR 6.1.4.1
E1 CAS (HDB3) DTMF, MFR1, DP	No ¹	<ul style="list-style-type: none"> • Facsimile (R) • Call Control Signals (includes MLPP) (R) 	<ul style="list-style-type: none"> • UCR 5.2.12.5.5.1.1 • UCR 5.2.12.5.5.1.1
E1 ISDN PRI (ITU-T Q.955.3)	No ¹	<ul style="list-style-type: none"> • Delay (R) • Alarms • Congestion Control (R) 	<ul style="list-style-type: none"> • UCR 5.2.12.5.5.1.1 • UCR 5.2.12.5.5.1.1.1 • UCR 5.2.12.5.5.1.1.2
E1 SS7 (ANSI T1.619a)	No ¹	<ul style="list-style-type: none"> • Voice Compression (C) 	<ul style="list-style-type: none"> • UCR 5.2.12.5.5.1.1.3
DSN Transport Interfaces			
Interface	Critical	Requirements Required or Conditional	References
T1 (B8ZS/ESF) Proprietary	No ²	<ul style="list-style-type: none"> • DS1 Interface Characteristics (R) • E1 Interface Characteristics (R) • MOS (R) (S-NE only) • MOS (R) (T-NE only) • BERT (R) (S-NE only) • BERT (R) (T-NE only) • Secure Transmission (Voice and Data) (R) • Modem (R) (S-NE only) 	<ul style="list-style-type: none"> • UCR 5.2.12.5.5.1.2.4 • UCR 5.2.12.5.5.1.2.5 • UCR 5.2.12.5.5.1.1 • UCR 6.1.4.1 • UCR 5.2.12.5.5.1.1 • UCR 6.1.4.1 • UCR 5.2.12.5.5.1.1 • UCR 5.2.12.5.5.1.1
E1 (HDB3) Proprietary	No ²	<ul style="list-style-type: none"> • Modem (R) (T-NE only) • Facsimile (R) • Call Control Signals (includes MLPP) (R) 	<ul style="list-style-type: none"> • UCR 6.1.4.1 • UCR 5.2.12.5.5.1.1 • UCR 5.2.12.5.5.1.1
100 Mbps Ethernet	No ²	<ul style="list-style-type: none"> • Congestion Control (R) (TDM interfaces only) • Congestion Control (C) (IP interface only) • Voice Compression (C) • Delay (R) • Alarms • Jitter (R) (IP interface only) • Packet Loss (R) (IP interface only) • IPv6 	<ul style="list-style-type: none"> • UCR 5.2.12.5.5.1.1.2 • UCR 5.2.12.5.5.1.1.2.2 • UCR 5.2.12.5.5.1.1.3 • UCR 5.2.12.5.5.1.1 • UCR 5.2.12.5.5.1.1.1 • UCR 6.1.4.3 • UCR 6.1.4.3 • UCR 5.3.5

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

SUT Features And Capabilities																																																																																																											
Feature/Capability	Critical	Requirements Required or Conditional	References																																																																																																								
Synchronization	Yes	• Timing (R)	• UCR 5.2.12.5.5.1.2.7																																																																																																								
Network Management	Yes	• Management Option (R) Local Management (Front Panel and/or External Console) (C) ADIMSS (C) • Fault Management (C) • Loop Back Capability (C) • Operational Configuration Restoral (R)	• UCR 5.2.12.5.5.2.1 • UCR 5.2.12.5.5.2.2 • UCR 5.2.12.5.5.2.3 • UCR 5.2.12.5.5.2.4																																																																																																								
Echo Cancellation	No	• Echo Canceller Functionality • 2100-Hertz EC Disabling Tone Capability • Echo Canceller Hardware • Echo Canceller on PCM Circuits	• UCR 5.2.12.1.5.1 • UCR 5.2.12.1.5.2 • UCR 5.2.12.1.5.3 • UCR 5.2.12.1.5.4																																																																																																								
Security	Yes	• IA/DIACAP (R)	• UCR 3.2.3																																																																																																								
<p>NOTES:</p> <p>1 The UCR does not stipulate a minimum required DSN access interfaces. It can be met with any one of the following interfaces: Analog, BRI, Proprietary, serial, IP, T1, E1, DS3, or OC-3.</p> <p>2 The UCR does not stipulate a minimum required DSN transport interface. It can be met with any one of the following interfaces: Proprietary, T1, E1, DS3, OC-3 OC-12, OC-48, OC-192, IP, DWDM or serial</p> <p>LEGEND:</p> <table border="0"> <tr> <td>2W</td> <td>2-Wire Analog</td> <td>ITU-T</td> <td>International Telecommunications Union – Telecommunication Standardization Sector</td> </tr> <tr> <td>ADIMSS</td> <td>Advanced DSN Integrated Management Support System</td> <td>LSSGR</td> <td>Local Access and Transport Area (LATA) Switching Systems Generic Requirements</td> </tr> <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>B8ZS</td> <td>Bipolar with 8-Zero Substitution</td> <td>MLPP</td> <td>Multi-Level Precedence and Preemption</td> </tr> <tr> <td>BERT</td> <td>Bit Error Rate Test</td> <td>MOS</td> <td>Mean Opinion Score</td> </tr> <tr> <td>BRI</td> <td>Basic Rate Interface</td> <td>NE</td> <td>Network Element</td> </tr> <tr> <td>C</td> <td>Conditional</td> <td>NI 1/2</td> <td>National ISDN standard 1 or 2</td> </tr> <tr> <td>CAS</td> <td>Channel Associated Signaling</td> <td>OC-12</td> <td>Optical Carrier Level 12 (622 Mbps)</td> </tr> <tr> <td>DIACAP</td> <td>Department of Defense Information Assurance Certification and Accreditation Process</td> <td>OC-192</td> <td>Optical Carrier Level 192 (10 Gbps)</td> </tr> <tr> <td>DP</td> <td>Dial Pulse</td> <td>OC-3</td> <td>Optical Carrier Level 3 (155 Mbps)</td> </tr> <tr> <td>DS1</td> <td>Digital Signal Level 1</td> <td>OC-48</td> <td>Optical Carrier Level 48 (2.448 Gbps)</td> </tr> <tr> <td>DS3</td> <td>Digital Signal Level 3</td> <td>PRI</td> <td>Primary Rate Interface</td> </tr> <tr> <td>DSN</td> <td>Defense Switched Network</td> <td>Q.955.3</td> <td>ISDN Signaling Standard for E1 MLPP</td> </tr> <tr> <td>DSS1</td> <td>Digital Subscriber Signaling 1</td> <td>R</td> <td>Required</td> </tr> <tr> <td>DTMF</td> <td>Dual Tone Multi-Frequency</td> <td>SF</td> <td>Single Frequency</td> </tr> <tr> <td>DWDM</td> <td>Dense Wavelength Division Multiplexing</td> <td>SNE</td> <td>Strategic Network Element</td> </tr> <tr> <td>E1</td> <td>European Basic Multiplex Rate (2.048 Mbps)</td> <td>SS7</td> <td>Signaling System 7</td> </tr> <tr> <td>ESF</td> <td>Extended Super Frame</td> <td>SUT</td> <td>System Under Test</td> </tr> <tr> <td>Gbps</td> <td>Gigabits per second</td> <td>T1</td> <td>Digital Transmission Link Level 1 (1.544 Mbps)</td> </tr> <tr> <td>GR</td> <td>Generic Requirement</td> <td>T1.607</td> <td>ISDN – Layer 3 Signaling Specification for Circuit Switched Bearer Service for DSS1</td> </tr> <tr> <td>GR-506-CORE</td> <td>LSSGR: Signaling for Analog Interfaces</td> <td>T1.619a</td> <td>SS7 and ISDN MLPP Signaling Standard for T1</td> </tr> <tr> <td>HDB3</td> <td>High Density Bipolar Three</td> <td>TN</td> <td>Tactical Network Element</td> </tr> <tr> <td>IA</td> <td>Information Assurance</td> <td>UCR</td> <td>Unified Capabilities Requirements</td> </tr> <tr> <td>IPv6</td> <td>Internet Protocol Version 6</td> <td></td> <td></td> </tr> <tr> <td>ISDN</td> <td>Integrated Services Digital Network</td> <td></td> <td></td> </tr> </table>				2W	2-Wire Analog	ITU-T	International Telecommunications Union – Telecommunication Standardization Sector	ADIMSS	Advanced DSN Integrated Management Support System	LSSGR	Local Access and Transport Area (LATA) Switching Systems Generic Requirements	AMI	Alternate Mark Inversion	Mbps	Megabits per second	ANSI	American National Standards Institute	MFR1	Multi-Frequency Recommendation 1	B8ZS	Bipolar with 8-Zero Substitution	MLPP	Multi-Level Precedence and Preemption	BERT	Bit Error Rate Test	MOS	Mean Opinion Score	BRI	Basic Rate Interface	NE	Network Element	C	Conditional	NI 1/2	National ISDN standard 1 or 2	CAS	Channel Associated Signaling	OC-12	Optical Carrier Level 12 (622 Mbps)	DIACAP	Department of Defense Information Assurance Certification and Accreditation Process	OC-192	Optical Carrier Level 192 (10 Gbps)	DP	Dial Pulse	OC-3	Optical Carrier Level 3 (155 Mbps)	DS1	Digital Signal Level 1	OC-48	Optical Carrier Level 48 (2.448 Gbps)	DS3	Digital Signal Level 3	PRI	Primary Rate Interface	DSN	Defense Switched Network	Q.955.3	ISDN Signaling Standard for E1 MLPP	DSS1	Digital Subscriber Signaling 1	R	Required	DTMF	Dual Tone Multi-Frequency	SF	Single Frequency	DWDM	Dense Wavelength Division Multiplexing	SNE	Strategic Network Element	E1	European Basic Multiplex Rate (2.048 Mbps)	SS7	Signaling System 7	ESF	Extended Super Frame	SUT	System Under Test	Gbps	Gigabits per second	T1	Digital Transmission Link Level 1 (1.544 Mbps)	GR	Generic Requirement	T1.607	ISDN – Layer 3 Signaling Specification for Circuit Switched Bearer Service for DSS1	GR-506-CORE	LSSGR: Signaling for Analog Interfaces	T1.619a	SS7 and ISDN MLPP Signaling Standard for T1	HDB3	High Density Bipolar Three	TN	Tactical Network Element	IA	Information Assurance	UCR	Unified Capabilities Requirements	IPv6	Internet Protocol Version 6			ISDN	Integrated Services Digital Network		
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IPv6	Internet Protocol Version 6																																																																																																										
ISDN	Integrated Services Digital Network																																																																																																										

5. No detailed test report was developed, in accordance with the Program Manager’s request. The 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

JITC, Memo, JTE, Special Interoperability Test Certification of Veraz I-Gate 4000 Edge with Software Version C 2.8.2.3_ES

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://jitic.fhu.disa.mil/tssi>.

6. The JITC point of contact is Mr. Joseph Roby, DSN 879-0507, commercial (520) 538-0507, FAX DSN 879-4347, or e-mail to joseph.robby@disa.mil. The JITC's mailing address is P.O. Box 12798, Fort Huachuca, AZ 85670-2798. The tracking number for the SUT is 0831503.

FOR THE COMMANDER:

2 Enclosures a/s


for RICHARD A. MEADOR
Chief
Battlespace Communications Portfolio

Distribution (electronic mail):

Joint Staff J-6

Joint Interoperability Test Command, Liaison, TE3/JT1

Office of Chief of Naval Operations, CNO N6F2

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

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

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

DOT&E, Net-Centric Systems and Naval Warfare

U.S. Coast Guard, CG-64

Defense Intelligence Agency

National Security Agency, DT

Defense Information Systems Agency, TEMC

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

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

Defense Information Systems Agency, GS23

ADDITIONAL REFERENCES

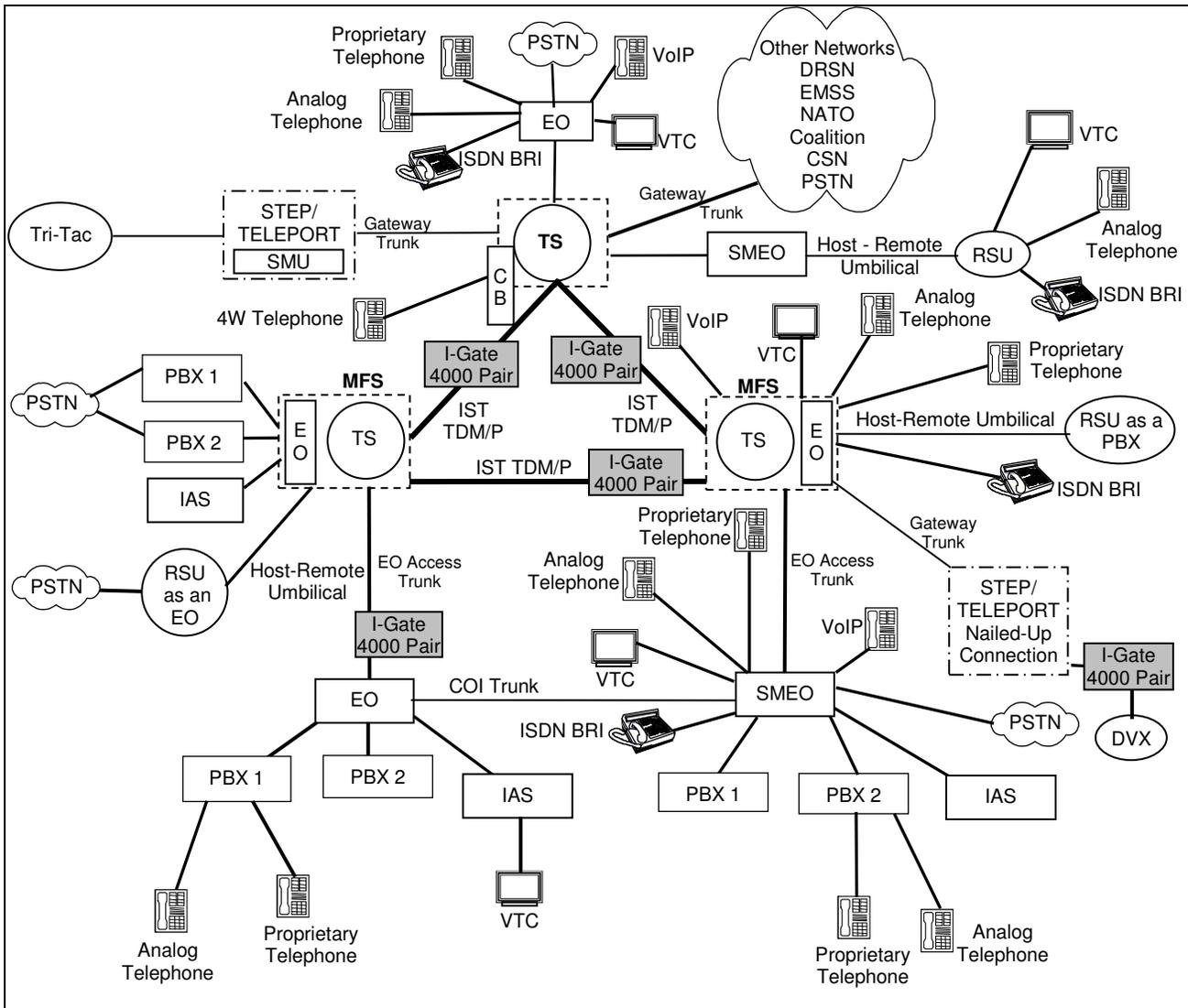
- (c) Defense Information Systems Agency (DISA), "Department of Defense Networks Unified Capabilities Requirements," 22 January 2009
- (d) Joint Interoperability Test Command, "Defense Switched Network Generic Switch Test Plan (GSTP), Change 2," 2 October 2006
- (e) Joint Interoperability Test Command, "Information Assurance (IA) Assessment of Veraz I-Gate 4000 Edge with Software Version C2.8.2.3_ES (Tracking Number 0831503)," 11 August 2009

CERTIFICATION TESTING SUMMARY

- 1. SYSTEM TITLE.** Veraz I-Gate 4000 Edge with Software Version C 2.8.2.3_ES hereinafter referred to as the System Under Test (SUT).
- 2. PROPONENT.** Defense Information Systems Agency (DISA).
- 3. PROGRAM MANAGER.** Mr. Louis Schmuckler, GS23, Room 5W23, 5275 Leesburg Pike, Falls Church, Virginia, 22041, E-mail: Louis.Schmuckler@disa.mil.
- 4. TESTER.** Joint Interoperability Test Command (JITC), Fort Huachuca, Arizona.
- 5. SYSTEM UNDER TEST DESCRIPTION.** The Veraz's I-Gate 4000 series of media gateway and bandwidth optimization systems include the I-Gate 4000 EDGE Network Element (NE), designed for small port density and network edge applications, xMS Client/Server, running the VerazView-xMS management system, and a closed DSN management network. The I-Gate 4000 EDGE NE provides compression algorithms from various network edge devices.

The xMS Client/Server is a web-based management system for the I-Gate 4000 EDGE. The xMS is a modular, PC-based Windows Server management application designed to provide the operator with a management tool. The xMS I-Gate's manager access control software serves as the communication link between the managing VerazView-xMS Server and the network element. The xMS Client/Server covers all the functions required to configure and monitor multiple terminals, using Simple Network Management Protocol (SNMP) locally and from any remote authorized location. It provides the network operator with enhanced fault, configuration, performance, and security management within I-Gate systems. The VerazView-xMS integrates an event browser, which shows a summary of events originating from the equipment sites, as well as events related to certain user operations. It also supports configuration validation levels.

6. OPERATIONAL ARCHITECTURE. The Unified Capabilities Requirements (UCR) Defense Switched Network (DSN) operational architecture is depicted in Figure 2-1. The I-Gate 4000s are point-to-point devices that are fielded in pairs. The SUT pairs will be employed as a Strategic Network Element (SNE) or Tactical Network Element (TNE) in the DSN backbone between tandem switches Multifunction Switches (MFS), End Office (EO) switches, Private Branch Exchange (PBX) switches, or deployed Voice Exchange Switches. In long haul circuits that have a high cost (e.g. international circuits), the I-Gate 4000s will be deployed between MFS and EO switches.



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
DSN	Defense Switched 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. 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. The SUT met these requirements through testing and submission of Letters of Compliance (LoC).

Table 2-1. SUT Interoperability Test Summary

DSN Access Interfaces			
Interface & Signaling	Critical	Status	Remarks
T1 CAS (AMI/SF) DTMF, MFR1	No ¹	Certified	Met all CRs and FRs.
T1 CAS (B8ZS/ESF) DTMF, MFR1	No ¹	Certified	Met all CRs and FRs.
T1 PRI (ANSI T1.607/T1.619a)	No ¹	Certified	Met all CRs and FRs.
T1 SS7 (ANSI T1.619a)	No ¹	Certified	Met all CRs and FRs.
E1 CAS (HDB3) DTMF, MFR1, DP	No ¹ (Europe only)	Certified	Met all CRs and FRs.
E1 ISDN PRI (ITU-T Q.955.3)	No ¹ (Europe only)	Certified	Met all CRs and FRs.
E1 SS7 (ANSI T1.619a)	No ¹ (Europe only)	Certified	Met all CRs and FRs.
DSN Transport Interfaces			
TRANSPORT LEVEL	Critical	Status	Remarks
E1 (HDB3) Proprietary	No ²	Certified	Met all CRs and FRs.
T1 (B8ZS/ESF) Proprietary	No ²	Certified	Met all CRs and FRs.
100 Mbps Ethernet	No ²	Certified	Met all CRs and FRs.
Features And Capabilities			
Features And Capabilities	Critical	Status	Remarks
Synchronization	Yes	Certified	Met all CRs and FRs.
Network Management	Yes	Certified	Met all CRs and FRs.
Echo Cancellation	No	Certified	Met all CRs and FRs.
Security	Yes	See note 3.	See note 3.
NOTES:			
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 Strategic or Tactical Network Element.			
3 Information assurance testing is accomplished via DISA-led Information Assurance test teams and published in a separate report.			
LEGEND:			
AMI	Alternate Mark Inversion	ITU-T	International Telecommunication Union – Telecommunication Standardization Sector
ANSI	American National Standards Institute	Mbps	Megabits per second
B8ZS	Bipolar Eight Zero Substitution	MFR1	Multi-Frequency Recommendation 1
CAS	Channel Associated Signaling	MLPP	Multi-Level Precedence and Preemption
CRs	Capability Requirements	PRI	Primary Rate Interface
DISA	Defense Information Systems Agency	Q.955.3	ISDN Signaling Standard for E1 MLPP
DP	Dial Pulse	SF	Super Frame
DSN	Defense Switched Network	SS7	Signaling System 7
DSS1	Digital Subscriber Signaling 1	SUT	System Under Test
DTMF	Dual Tone Multi-Frequency	T1	Digital Transmission Link Level 1 (1.544 Mbps)
E1	European Basic Multiplex Rate (2.048 Mbps)	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		
HDB3	High Density Bipolar 3		
ISDN	Integrated Services Digital Network		

Table 2-2. SUT Capability and Feature Interoperability Requirements

DSN Access Interfaces			
Interface	Critical	Requirements Required or Conditional	References
T1 CAS (AMI/SF) DTMF, MFR1	No ¹	<ul style="list-style-type: none"> • DS1 Interface Characteristics (R) • E1 Interface Characteristics (R) • MOS (R) (S-NE only) • MOS (R) (T-NE only) • BERT (R) (S-NE only) • BERT (R) (T-NE only) • Secure Transmission (Voice and Data) (R) • Modem (R) (S-NE only) • Modem (R) (T-NE only) • Facsimile (R) • Call Control Signals (includes MLPP) (R) • Congestion Control (R) • Voice Compression (C) • Delay (R) • Alarms 	<ul style="list-style-type: none"> • UCR 5.2.12.5.5.1.2.4 • UCR 5.2.12.5.5.1.2.5 • UCR 5.2.12.5.5.1.1 • UCR 6.1.4.1 • UCR 5.2.12.5.5.1.1 • UCR 6.1.4.1 • UCR 5.2.12.5.5.1.1 • UCR 5.2.12.5.5.1.1 • UCR 6.1.4.1 • UCR 5.2.12.5.5.1.1 • UCR 5.2.12.5.5.1.1 • UCR 5.2.12.5.5.1.1.1 • UCR 5.2.12.5.5.1.1.2 • UCR 5.2.12.5.5.1.1.3
T1 CAS (B8ZS/ESF) DTMF, MFR1	No ¹		
T1 PRI (ANSI T1.607/T1.619a)	No ¹		
T1 SS7 (ANSI T1.619a)	No ¹		
E1 CAS (HDB3) DTMF, MFR1, DP	No ¹		
E1 ISDN PRI (ITU-T Q.955.3)	No ¹		
E1 SS7 (ANSI T1.619a)	No ¹		
DSN Transport Interfaces			
Interface	Critical	Requirements Required or Conditional	References
T1 (B8ZS/ESF) Proprietary	No ²	<ul style="list-style-type: none"> • DS1 Interface Characteristics (R) • E1 Interface Characteristics (R) • MOS (R) (S-NE only) • MOS (R) (T-NE only) • BERT (R) (S-NE only) • BERT (R) (T-NE only) • Secure Transmission (Voice and Data) (R) • Modem (R) (S-NE only) • Modem (R) (T-NE only) • Facsimile (R) • Call Control Signals (includes MLPP) (R) • Congestion Control (R) (TDM interfaces only) • Congestion Control (C) (IP interface only) • Voice Compression (C) • Delay (R) • Jitter (R) (IP interface only) • Packet Loss (R) (IP interface only) • Alarms • • IPv6 	<ul style="list-style-type: none"> • UCR 5.2.12.5.5.1.2.4 • UCR 5.2.12.5.5.1.2.5 • UCR 5.2.12.5.5.1.1 • UCR 6.1.4.1 • UCR 5.2.12.5.5.1.1 • UCR 6.1.4.1 • UCR 5.2.12.5.5.1.1 • UCR 5.2.12.5.5.1.1 • UCR 6.1.4.1 • UCR 5.2.12.5.5.1.1 • UCR 5.2.12.5.5.1.1.2 • UCR 5.2.12.5.5.1.1.2.2 • UCR 5.2.12.5.5.1.1.3 • UCR 5.2.12.5.5.1.1 • UCR 5.2.12.5.5.1.1.1 • UCR 6.1.4.3 • UCR 6.1.4.3 • UCR 5.3.5
E1 (HDB3) Proprietary	No ²		
100 Mbps Ethernet	No ²		

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

SUT Features And Capabilities			
Feature/Capability	Critical	Requirements Required or Conditional	References
Synchronization	Yes	• Timing (R)	• UCR 5.2.12.5.5.1.2.7
Network Management	Yes	• Management Option (R) Local Management (Front Panel and/or External Console) (C) ADIMSS (C) • Fault Management (C) • Loop Back Capability (C) • Operational Configuration Restoral (R)	• UCR 5.2.12.5.5.2.1 • UCR 5.2.12.5.5.2.2 • UCR 5.2.12.5.5.2.3 • UCR 5.2.12.5.5.2.4
Echo Cancellation	No	• Echo Canceller Functionality • 2100-Hertz EC Disabling Tone Capability • Echo Canceller Hardware • Echo Canceller on PCM Circuits	• UCR 5.2.12.1.5.1 • UCR 5.2.12.1.5.2 • UCR 5.2.12.1.5.3 • UCR 5.2.12.1.5.4
Security	Yes	• IA/DIACAP (R)	• UCR 3.2.3

NOTES:

- The UCR does not stipulate a minimum required DSN access interfaces. It can be met with any one of the following interfaces: Analog, BRI, Proprietary, serial, IP, T1, E1, DS3, or OC-3.
- The UCR does not stipulate a minimum required DSN transport interface. It can be met with any one of the following interfaces: Proprietary, T1, E1, DS3, OC-3 OC-12, OC-48, OC-192, IP, DWDM or serial

LEGEND:

2W	2-Wire Analog	ITU-T	International Telecommunications Union – Telecommunication Standardization Sector
ADIMSS	Advanced DSN Integrated Management Support System	LSSGR	Local Access and Transport Area (LATA) Switching Systems Generic Requirements
AMI	Alternate Mark Inversion	Mbps	Megabits per second
ANSI	American National Standards Institute	MFR1	Multi-Frequency Recommendation 1
B8ZS	Bipolar with 8-Zero Substitution	MLPP	Multi-Level Precedence and Preemption
BERT	Bit Error Rate Test	MOS	Mean Opinion Score
BRI	Basic Rate Interface	NE	Network Element
C	Conditional	NI 1/2	National ISDN standard 1 or 2
CAS	Channel Associated Signaling	OC-12	Optical Carrier Level 12 (622 Mbps)
DIACAP	Department of Defense Information Assurance Certification and Accreditation Process	OC-192	Optical Carrier Level 192 (10 Gbps)
DP	Dial Pulse	OC-3	Optical Carrier Level 3 (155 Mbps)
DS1	Digital Signal Level 1	OC-48	Optical Carrier Level 48 (2.448 Gbps)
DS3	Digital Signal Level 3	PRI	Primary Rate Interface
DSN	Defense Switched Network	Q.955.3	ISDN Signaling Standard for E1 MLPP
DSS1	Digital Subscriber Signaling 1	R	Required
DTMF	Dual Tone Multi-Frequency	SF	Single Frequency
DWDM	Dense Wavelength Division Multiplexing	SNE	Strategic Network Element
E1	European Basic Multiplex Rate (2.048 Mbps)	SS7	Signaling System 7
ESF	Extended Super Frame	SUT	System Under Test
Gbps	Gigabits per second	T1	Digital Transmission Link Level 1 (1.544 Mbps)
GR	Generic Requirement	T1.607	ISDN – Layer 3 Signaling Specification for Circuit Switched Bearer Service for DSS1
GR-506-CORE	LSSGR: Signaling for Analog Interfaces	T1.619a	SS7 and ISDN MLPP Signaling Standard for T1
HDB3	High Density Bipolar Three	TN	Tactical Network Element
IA	Information Assurance	UCR	Unified Capabilities Requirements
IPv6	Internet Protocol Version 6		
ISDN	Integrated Services Digital Network		

8. TEST NETWORK DESCRIPTION. The SUT was tested at JITC’s Global Information Grid Network Test Facility in a manner and configuration similar to that of the DSN operational environment. This test was conducted using the test configuration shown in Figure 2-2.

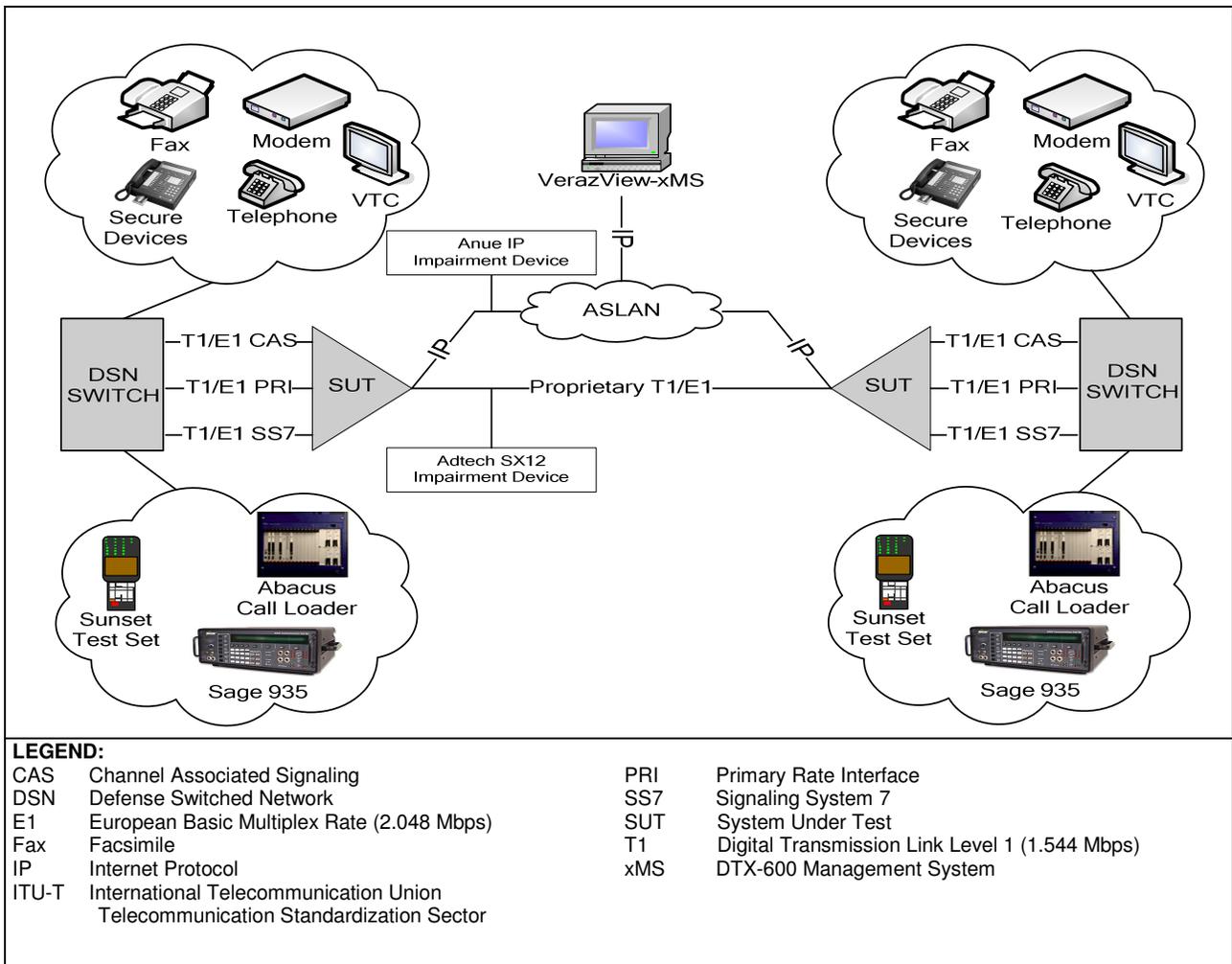


Figure 2-3. SUT Test Network

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 DSN switches noted in Table 2-3. Table 2-3 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 Unified Capabilities (UC) Approved Products List (APL) that offer the same certified access interfaces as the SUT. The SUT is fielded in pairs and each pair must have the same software release.

Table 2-3. Tested System Configurations

System Name		Software Release	
Nortel CS2100		Succession Enterprise (SE) 09.1	
Nokia Siemens EWSD		19d with Patch Set 46	
Avaya S8710		Communication Manager (CM) 4.0 (R014x.00.2.731.7: Super Patch 14419)	
Alcatel-Lucent		5E15.2 BWM 08-0003	
System Under Test			
Veraz EDGE I-Gate Rel. 2.2.8.2.3_ES	Hardware	Cards/Hardware	Software/Firmware
	I-Gate 4000 EDGE	IC8P	IBM xSeries 206m
XPSM(x2)		VxWorks 5.5.1	
EFTM			
EDCM(x2)			
xMS Client/Server			Windows 2003 Server SP2
			MS SQL Server 2005 SP2
			IIS 6.0
			JRE 1.5.0_17
			VerazView-xMS Client/Server 5.0.0
LEGEND:			
EDCM	Direct Current Module	RAM	Random Access Memory
EFTM	Fan Tray Module	RDP	Remote Desktop Protocol
HTTPS	Hyper Text Transfer Protocol Secure	SP	Service Pack
IBM	International Business Machines	SP2	Service Pack 2
IC8P	Interface Card 8 Port	SQL	Structured Query Language
IIS	Internet Information Server	SSH	Secure Shell
ISDN	Integrated Services Digital Network	SUT	System Under Test
NA	Not Applicable	Xms	Product Name
JRE	Java Runtime Environment	XPSM	Expanded Interface Processing and Switching Module
PC	Personal Computer		

10. TESTING LIMITATIONS. None.

11. TEST RESULTS

a. Discussion

(1) DSN Access/Transport Interfaces. The SUT supports the following access interfaces: Digital Transmission Link Level 1: 1.544 Megabits per second (T1), Channel Associated Signaling (CAS), Primary Rate Interface (PRI), and Signaling System Number 7 (SS7). European Basic Multiplex Rate: 2.048 Megabits per second (E1) CAS, PRI and SS7 access interfaces. The SUT supports the following transport interfaces: T1 proprietary, E1 proprietary, and 100 BASE T Ethernet Internet Protocol. The specific requirements and test results tested over all the SUT DSN access and transport interfaces are described below.

(a) T1 Interface Characteristics. The UCR, 5.2.12.5.5.1.2.4, states that the T1 interface shall meet the requirements in accordance with UCR, Section 5.2.6.1. 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.730 and American National Standard Institute T.102 pulse mask characteristics which meets 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, 5.2.6.1.1.

(b) T1 Supervisory Channel Associated Signaling. The UCR, 5.2.12.5.5.1.2.4, states that the T1 supervisory channel associated signaling interface shall meet the requirements in accordance with UCR, Section 5.2.6.1.2. 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, 5.2.6.1.2.

(c) T1 Clear Channel Capability. The UCR, 5.2.12.5.5.1.2.4, states that the T1 interface shall meet the clear channel capability requirements in accordance with UCR, Section 5.2.6.1.3. The SUT is capable of transmitting and receiving B8ZS line coding in accordance with UCR, Section 5.2.6.1.3.

(e) E1 Interface Characteristics. The UCR, 5.2.12.5.5.1.2.5, states that the E1 interface shall meet the requirements in accordance with UCR, Section 5.2.6.2. 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 E1 interface characteristics per the UCR were met with both testing and vendors Letter of Compliance.

(f) Mean Opinion Score (MOS). The UCR, 5.2.12.5.5.1.1, states that the introduction of a Strategic Network Element(s) (S-NEs) shall not cause the end-to-end average MOS to fall below 4.0 over any five-minute time interval. The UCR 6.1.4.1 states that a Tactical Network Element(s) (T-NEs) shall support a minimum of 3.6 MOS or better over any five-minute time interval. The Abacus call loader was used to generate 106,671 voice calls across the T1 interfaces, with 100 percent of all calls having an MOS of at least 4.0. The SUT had a minimum MOS of 4.17 with an average MOS of 4.29, which met the requirement for both S-NE and T-NE.

(g) Bit Error Rate Test (BERT). The UCR, 5.2.12.5.5.1.1, states that the introduction of a S-NE shall not cause to exceed more than .03 percent of the end-to-end digital bit error rate requirement of less than 1 error in 1×10^9 (averaged over a 9-hour period). The UCR 6.1.4.1 states that T-NEs 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 this requirement for all interfaces with a recorded bit error ratio of 1×10^{-9} over an eight hour period.

(h) Secure Transmission (Voice and Data). The UCR, 5.2.12.5.5.1.1, states that the introduction of NE(s) shall not degrade secure transmission for secure end devices as defined by UCR, 5.2.12.6.6. The SUT when tested as a T-NE included the insertion of a satellite simulator with 250 ms of delay, and 1×10^{-5} of random bit errors between the T-NE pairs on the transport interfaces as stipulated in the UCR 6.1.4. There were 480 secure calls placed between Secure Terminal Equipment (STEs), and Secure Wireline Terminal (SWTs) in without degrading transmissions

between end devices, which met the requirement with a secure call completion rate of 95 percent. The SUT secure call test results are shown in Table 2-4.

Table 2-4. SUT Secure Call Test Results

DSN Access Interfaces	DSN Transport Interfaces	Secure Call Matrix (2 calls placed per combination with a 95% 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	T1 Proprietary, E1 Proprietary, 100 BaseT Ethernet	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	SS7	Signaling System 7
DSN	Defense Switched Network	STE	Secure Terminal Equipment
E1	European Basic Multiplex Rate (2.048 Mbps)	STU	Secure Telephone Unit
ISDN	Integrated Services Digital Network	SUT	System Under Test
PRI	Primary Rate Interface	SWT	Secure Wireline Terminal
SCIP	Secure Communications Internet Protocol	T1	Digital Transmission Link Level (1.544 Mbps)

(i) Modem. The UCR, 5.2.12.5.5.1.1 states that the S-NE(s) shall support a minimum modem transmission speed of 9.6 kilobits per second (kbps) across the associated pair of S-NE(s). The UCR 6.1.4.1 states that the T-NE(s) shall support a minimum modem transmission speed of 2.4 kbps across associated T-NE(s). There were 11,952 modem calls placed through the SUT using the Abacus call loader. All modem calls had a transmission rate of 9.6 kbps, which met the requirement.

(j) Facsimile. The UCR, 5.2.12.5.5.1.1, states that the S-NE(s), and T-NE(s) shall support a minimum facsimile transmission speed of 9.6 kbps across the associated NE(s). There were 49,275 facsimile calls placed through the SUT using the Abacus call loader. All facsimile calls had a transmission rate of 14.4 kbps, which met the requirement.

(k) Call Control Signals. The UCR, 5.2.12.5.5.1.1, states that the S-NE and T-NE shall transport all call control signals transparently on an end-to-end 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 MLPP call control signals, which met the requirement.

(l) Delay. The UCR 2007 for S-NE delay requirements which includes transcoding between TDM and IP interfaces were omitted in the UCR 2008, section 5.2.12.5.5.1.1 requirements. As a result, an interim approved update which will be included in the UCR 2008 change 1 was provided to JITC by DISA. This interim change includes the following S-NE requirements for delay:

- TDM Ingress G.711 (Non-secure calls) to Non-Transcoding ITU-T G.711 IP Egress shall not increase delay to more than 50 milliseconds (ms) per NE pair as measured end-to-end. The SUT met this requirement with a measured delay of 35 ms per pair as shown in table 2-5.

- TDM Ingress ITU-T G.711 (Non-secure calls) to Non-Transcoding G.711 TDM Egress shall not increase delay to more than 10 milliseconds (ms) per NE pair as measured end-to-end. The SUT met this requirement with a measured delay of 5 ms per pair when configured in the “cross-connect” mode as shown in table 2-5.

- TDM Ingress ITU-T G.711 (Non-secure calls) to Transcoding IP or TDM Egress with compression codec’s shall not increase delay to more than 100 ms per NE pair as measured end-to-end. The SUT met this requirement with a measured delay of 42 ms per pair for TDM to TDM, and 57 ms for TDM to IP as shown in table 2-5.

- TDM Ingress ITU-T G.711 (Secure calls) to Transcoding IP or TDM Egress with compression codec’s shall not increase delay to more than 250 ms per NE pair as measured end-to-end. The SUT met this requirement with a measured delay of 155 ms per pair for TDM to TDM, and 140 ms for TDM to IP as shown in table 2-5.

The SUT has a proprietary feature called “end-to-end compression”. This feature allows the SUT to be configured with multiple hops (NE pairs) with only one occurrence of compression and decompression at the ingress and egress of the multiple hops. Table 2-5 depicts the recorded delay measurements of the SUT for secure and non secure calls over multiple hops (pairs).

Table 2-5. SUT Delay Measurements

Mode	Codec	# Hops (NE Pairs)	Delay per Hop (Pair)	Transport (Bearer)
Non Secure Voice	G.729	1	42ms	T1/E1 (TDM)
Secure Voice (SCIP)	G.729	5	77ms	T1/E1 (TDM)
Secure Voice (SCIP)	G.729	4	82ms	T1/E1 (TDM)
Secure Voice (SCIP)	G.729	1	155ms	T1/E1 (TDM)
Secure Voice (STU)	G.729	5	75ms	T1/E1 (TDM)
Secure Voice (STU)	G.729	4	81ms	T1/E1 (TDM)
Non Secure Voice	G.729	1	57ms	Ethernet
Non Secure Voice	G.711	1	32ms	T1/E1 (TDM)
Non Secure Voice	G.711	1	35ms	Ethernet
Non Secure Voice	Clear Channel	1	40ms	Ethernet
Non Secure Voice	Clear Channel	1	39ms	T1/E1 (TDM)
Non Secure Voice	Cross Connect	1	6ms	Ethernet
Non Secure Voice	Cross Connect	1	5ms	T1/E1 (TDM)
Secure Voice (SCIP)	G.729	5	82ms	Ethernet
Secure Voice (SCIP)	G.729	4	88ms	Ethernet
Secure Voice (SCIP)	G.729	1	140ms	Ethernet

LEGEND:
 Codec Compression Decompression
 E1 European Basic Multiplex Rate (2.048 Mbps)
 NE Network Element
 SCIP Secure Communications Internet Protocol
 STU Secure Telephone Unit
 SUT System Under Test
 T1 Digital Transmission Link Level (1.544 Mbps)

(m) Jitter (Transport IP Interface). The UCR 5.2.12.5.5.1.2.9 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. Actual IP Jitter was measured to be less than 1ms, which is the minimum resolvable Jitter within the test instrument.

(n) Packet Loss (Transport IP Interface). The UCR 5.2.12.5.5.1.2.9 states that the insertion of a NE shall not cause packet loss measured from ingress to egress to increase by more than 0.05% averaged over any 5-minute period. Actual Packet Loss determined by Wireshark capture. Measured loss was 0.0036%, which is less than the stipulated 0.05%.

(o) Differential Services Code Point 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, 5.3.3, Network Infrastructure End-to End Requirements, and a capability to limit the provisioning of input and output interfaces such that congestion is impossible under the worst transport congestion scenario. The IP connection emerging from the iGate was captured utilizing a Layer 1 Tap and captured within Wireshark. A capture was performed of call setup, call media, and call teardown. Expected values were Decimal 48 for signaling, and decimal 46 for voice media. The capture was reviewed and it was determined DSCP values were correct. The capture showed all call signaling was DSCP tagged with a decimal value of 48 (Hex 30). The capture further showed all G.711 media was DSCP tagged with a decimal value of 46 (Hex 2E).

(p) Alarm and Restoral Requirements. The UCR, 5.2.12.5.5.1.1.1, states that the NE shall be able to propagate Carrier Group Alarms (CGAs), in accordance with UCR, Section 5.2.1.5.7, upon physical loss of either the access or transport interfaces. The SUT is capable of transparently passing the appropriate alarms, which met the requirement. 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.

(q) Call Congestion. The UCR, 5.2.12.5.5.1.1.2, states that the 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 with software configurations to eliminate congestion. This is met by engineer design and can be found in the vendor deployment guide. In addition, the SUT has the capability to generate a “dry contact” (open or closed circuit) to a DSN switch which will result in a busy out of all idle trunks, and the dry contact will remain until the saturation point is alleviated.

(r) Voice Compression. The UCR, 5.2.12.5.5.1.1.3, 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 supports the following voice compression standards: ITU-T G.711 (ADPCM), and ITU-T G.729 (CS-A CELP) which meets this requirement.

(s) Internet Protocol Version 6 (IPv6). The SUT did not meet the UCR requirements stated in section 5.3.5 for IPv6 compliance. On 12 May 2009, Office of Secretary Defense waived this requirement until 30 September 2010.

(t) Echo Cancellation. The UCR 5.2.12.1 states the requirements for an internal echo canceller which is supported by the SUT. The SUT meets all the critical interoperability requirements for an internal echo canceller which includes the capability to cancel echo with a maximum of 128 ms of end-path-delay.

(2) Device Management

(a) Management Option. The UCR, 5.2.12.5.5.2.1, 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 shall be provided for local management. The NE may be able to be centrally monitored and managed the Advanced DSN Integrated Management Support System (ADMISS) in accordance with UCR, sections 5.2.8 and 5.2.8.4. The SUT is managed from a remote client, which can be used to monitor multiple units. The SUT is monitored by xMS. The xMS contains four functional modules. The status manager module gathers, formats, and presents status information from every network element. The configuration manager module is responsible for configuration and provisioning of the various services. The agent access control module is designed to perform network security tasks, which ensures that only authorized xMS applications are allowed access to the network elements. The software version manager module controls software downloads and manages the various versions of all the network element software. The functionality of each xMS module was verified over the IP connection.

(b) Fault Management. The UCR, 5.2.12.5.5.2.2, 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 xMS.

(c) Operational Configuration Restoral. The UCR, 5.2.12.5.5.3, 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. The SUT returned to the last customer configured state prior to the power failure, which met the requirement.

(3) Security. The UCR, section 3.2.3, states that the NE shall conform to the requirements outlined in Department of Defense Instruction (DoDI) 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 Veraz I-Gate 4000 Edge with Software Version C 2.8.2.3_ C 2.8.2.3_ES meets all of its critical interoperability requirements set forth in reference (c) for a S-NE and T-NE and is certified as interoperable for joint use within the DSN. When connected to the interfaces certified in this letter, the SUT and its associated applications were transparent to the switching systems interfaced causing no degradation of service or negative impact, and met all the critical interoperability requirements.

12. TEST AND ANALYSIS REPORT. No detailed test report was developed in accordance with the Program Manager's request. The 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>.