



## DEFENSE INFORMATION SYSTEMS AGENCY

JOINT INTEROPERABILITY TEST COMMAND

P.O. BOX 12798

FORT HUACHUCA, ARIZONA 85670-2798

IN REPLY  
REFER TO: Battlespace Communications Portfolio (JTE)

8 April 2008

### MEMORANDUM FOR DISTRIBUTION

**SUBJECT:** Special Interoperability Test Certification of Veraz I-Gate 4000 Edge with Software Version C 2.5.1.6\_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. The Veraz I-Gate 4000 Edge with Software Version C 2.5.1.6\_ES is hereinafter referred to as the System Under Test (SUT). The SUT met all of the interface and functional requirements and is certified for joint use within the Defense Switched Network (DSN). The SUT met the critical interoperability requirements for a Strategic Network Element (S-NE) as set forth in appendix 9 of references (c) and (d) using test procedures derived from reference (e). No other configurations, features, or functions, except those cited within this report, are certified by the JITC or authorized by the Program Management Office for use within the DSN. This certification expires upon changes that affect interoperability, but no later than three years from the date of this memorandum.
3. This certification is based on interoperability testing of the SUT and review of the vendor's Letters of Compliance (LoC). Interoperability testing was conducted by JITC at the Global Information Grid Network Test Facility, Fort Huachuca, Arizona, from 19 November through 14 December 2007. Review of the vendor's LoC was completed on 14 December 2007. Validation of new S-NE latency requirements as set forth in appendix 9 of reference (d) was completed on 22 February 2008.
4. The SUT Interoperability Test Summary is shown in table 1 and the Capability and Feature Requirements used to evaluate the interoperability of the SUT are indicated in table 2.

**Table 1. SUT Interoperability Test Summary**

<b>DSN Access Interfaces</b>																																																															
<b>Interface &amp; Signaling</b>	<b>Critical</b>	<b>Status</b>	<b>Remarks</b>																																																												
T1 CAS (AMI/SF) DTMF, MFR1	No <sup>1</sup>	Certified	Met all CRs and FRs.																																																												
T1 CAS (B8ZS/ESF) DTMF, MFR1	No <sup>1</sup>	Certified	Met all CRs and FRs.																																																												
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100 Mbps Ethernet	No <sup>2</sup>	Certified	Met all CRs and FRs.																																																												
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Synchronization	Yes	Certified	Met all CRs and FRs.																																																												
Network Management	Yes	Certified	Met all CRs and FRs.																																																												
Security	Yes	See note 3.	See note 3.																																																												
<p><b>LEGEND:</b></p> <table border="0"> <tr> <td>AMI</td> <td>- Alternate Mark Inversion</td> <td>ISDN</td> <td>- Integrated Services Digital Network</td> </tr> <tr> <td>ANSI</td> <td>- American National Standards Institute</td> <td>ITU-T</td> <td>- International Telecommunication Union – Telecommunication Standardization Sector</td> </tr> <tr> <td>B8ZS</td> <td>- Bipolar Eight Zero Substitution</td> <td>Mbps</td> <td>- Megabits per second</td> </tr> <tr> <td>CAS</td> <td>- Channel Associated Signaling</td> <td>MFR1</td> <td>- Multi-Frequency Recommendation 1</td> </tr> <tr> <td>CRs</td> <td>- Capability Requirements</td> <td>MLPP</td> <td>- Multi-Level Precedence and Preemption</td> </tr> <tr> <td>DISA</td> <td>- Defense Information Systems Agency</td> <td>PRI</td> <td>- Primary Rate Interface</td> </tr> <tr> <td>DP</td> <td>- Dial Pulse</td> <td>Q.955.3</td> <td>- ISDN Signaling Standard for E1 MLPP</td> </tr> <tr> <td>DSN</td> <td>- Defense Switched Network</td> <td>SF</td> <td>- Super Frame</td> </tr> <tr> <td>DSS1</td> <td>- Digital Subscriber Signaling 1</td> <td>SS7</td> <td>- Signaling System 7</td> </tr> <tr> <td>DTMF</td> <td>- Dual Tone Multi-Frequency</td> <td>SUT</td> <td>- System Under Test</td> </tr> <tr> <td>E1</td> <td>- European Basic Multiplex Rate (2.048 Mbps)</td> <td>T1</td> <td>- Digital Transmission Link Level 1 (1.544 Mbps)</td> </tr> <tr> <td>ESF</td> <td>- Extended Super Frame</td> <td>T1.607</td> <td>- ISDN – Layer 3 Signaling Specification for Circuit Switched Bearer Service for DSS1</td> </tr> <tr> <td>FRs</td> <td>- Feature Requirements</td> <td>T1.619a</td> <td>- SS7 and ISDN MLPP Signaling Standard for T1</td> </tr> <tr> <td>GSCR</td> <td>- Generic Switching Center Requirements</td> <td></td> <td></td> </tr> <tr> <td>HDB3</td> <td>- High Density Bipolar 3</td> <td></td> <td></td> </tr> </table> <p><b>NOTES:</b></p> <ol style="list-style-type: none"> <li>The GSCR does not stipulate a minimum Access interface requirement for a Strategic Network Element.</li> <li>The GSCR does not stipulate a minimum Transport interface requirement Strategic Network Element.</li> <li>Information assurance testing is accomplished via DISA-led Information Assurance test teams and published in a separate report.</li> </ol>				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	CRs	- Capability Requirements	MLPP	- Multi-Level Precedence and Preemption	DISA	- Defense Information Systems Agency	PRI	- Primary Rate Interface	DP	- Dial Pulse	Q.955.3	- ISDN Signaling Standard for E1 MLPP	DSN	- Defense Switched Network	SF	- Super Frame	DSS1	- Digital Subscriber Signaling 1	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)	ESF	- Extended Super Frame	T1.607	- ISDN – Layer 3 Signaling Specification for Circuit Switched Bearer Service for DSS1	FRs	- Feature Requirements	T1.619a	- SS7 and ISDN MLPP Signaling Standard for T1	GSCR	- Generic Switching Center Requirements			HDB3	- High Density Bipolar 3		
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**Table 2. SUT Capability and Feature Interoperability Requirements**

DSN Interfaces					
DSN Access Interfaces		Requirements Required or Conditional	References		
Interface	Critical	<ul style="list-style-type: none"> <li>• DS1 Interface Characteristics (C)</li> <li>• DS1 Supervisory Channel Associated Signaling (C)</li> <li>• DS1 Clear Channel Capability (C)</li> <li>• DS1 Alarm and Restoral Requirements (C)</li> <li>• E1 Interface Characteristics (C)</li> <li>• E1 Supervisory Channel Associated Signaling (C)</li> <li>• E1 Clear Channel Capability (C)</li> <li>• E1 Alarm and Restoral Requirements (C)</li> <li>• MOS (R)</li> <li>• BERT (R)</li> <li>• Secure Transmission (Voice and Data) (R)</li> <li>• Modem (R)</li> <li>• Facsimile (R)</li> <li>• Call Control Signals (R)</li> <li>• Call Congestion (R)</li> <li>• Voice Compression (C)</li> <li>• IP Interface (C)                             <ul style="list-style-type: none"> <li>- Delay (R)</li> <li>- Jitter (R)</li> <li>- Packet Loss (R)</li> </ul> </li> </ul>	<ul style="list-style-type: none"> <li>• GSCR para. A9.5.1.2.4</li> <li>• GSCR para. A9.5.1.2.4</li> <li>• GSCR para. A9.5.1.2.4</li> <li>• GSCR para. A9.5.1.2.4</li> <li>• GSCR para. A9.5.1.2.5</li> <li>• GSCR para. A9.5.1.2.5</li> <li>• GSCR para. A9.5.1.2.5</li> <li>• GSCR para. A9.5.1.2.5</li> <li>• GSCR para. A9.5.1.1</li> <li>• GSCR para. A9.5.1.1.4</li> <li>• GSCR para. A9.5.1.2.9</li> <li>• UCR para. A9.5.1.2.9a</li> <li>• GSCR para. A9.5.1.2.9b</li> <li>• GSCR para. A9.5.1.2.9c</li> </ul>		
T1 CAS	No <sup>1</sup>				
T1 SS7 (ANSI T1.619a)	No <sup>1</sup>				
T1 ISDN PRI (ANSI T1.607/ANSI T1.619a)	No <sup>1</sup>				
E1 ISDN PRI (ITU-T Q.955.3)	No <sup>1</sup> (Europe only)				
E1 CAS	No <sup>1</sup> (Europe only)				
E1 SS7 (ANSI T1.619a)	No <sup>1</sup> (Europe only)				
DSN Transport Interfaces					
Interface	Critical				
E1 (HDB3) Proprietary	No <sup>2</sup>				
T1 (B8ZS/ESF) Proprietary	No <sup>2</sup>				
100 Mbps Ethernet	No <sup>2</sup>				
SUT Features And Capabilities					
Feature/Capability	Critical	Requirements Required or Conditional	References		
Synchronization	Yes	<ul style="list-style-type: none"> <li>• Timing (R)</li> </ul>	<ul style="list-style-type: none"> <li>• GSCR para. A9.5.1.2.7</li> </ul>		
Network Management	Yes	<ul style="list-style-type: none"> <li>• Management Option (R)                             <ul style="list-style-type: none"> <li>- Local Management (Front Panel and/or External Console) (C)</li> <li>- ADIMSS (C)</li> </ul> </li> <li>• Fault Management (C)</li> <li>• Loop Back Capability (C)</li> <li>• Operational Configuration Restoral (R)</li> </ul>	<ul style="list-style-type: none"> <li>• GSCR para. A9.5.2.2</li> <li>• GSCR para. A9.5.2.3</li> <li>• GSCR para. A9.5.3</li> </ul>		
Security	Yes	<ul style="list-style-type: none"> <li>• DIACAP (replacement for DITSCAP) (R)</li> </ul>	<ul style="list-style-type: none"> <li>• GSCR para. A9.6</li> </ul>		
<b>LEGEND:</b> <table style="width: 100%; border: none;"> <tr> <td style="width: 50%; vertical-align: top;">                     A - Appendix                      ADIMSS - Advanced DSN Integrated Management Support System                      ANSI - American National Standards Institute                      B8ZS - Bipolar Eight Zero Substitution                      BERT - Bit Error Rate Test                      C - Conditional                      CAS - Channel Associated Signaling                      DIACAP - DoD Information Assurance Certification and Accreditation Process                      DITSCAP - DoD Information Technology Security Certification and Accreditation Process                      DoD - Department of Defense                      DS1 - Digital Signal Level 1                      DSN - Defense Switched Network                      DSS1 - Digital Subscriber Signaling 1                      E1 - European Basic Multiplex Rate (2.048 Mbps)                      ESF - Extended Super Frame                      GSCR - Generic Switching Center Requirement                      HDB3 - High Density Bipolar 3                 </td> <td style="width: 50%; vertical-align: top;">                     IP - Internet Protocol                      ISDN - Integrated Services Digital Network                      ITU-T - International Telecommunication Union - Telecommunication Standardization Sector                      Mbps - Megabits per second                      MLPP - Multi-Level Precedence and Preemption                      MOS - Mean Opinion Score                      para - paragraph                      PRI - Primary Rate Interface                      Q.955.3 - ISDN Signaling standard for E1 MLPP                      R - Required                      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                 </td> </tr> </table>				A - Appendix ADIMSS - Advanced DSN Integrated Management Support System ANSI - American National Standards Institute B8ZS - Bipolar Eight Zero Substitution BERT - Bit Error Rate Test C - Conditional CAS - Channel Associated Signaling DIACAP - DoD Information Assurance Certification and Accreditation Process DITSCAP - DoD Information Technology Security Certification and Accreditation Process DoD - Department of Defense DS1 - Digital Signal Level 1 DSN - Defense Switched Network DSS1 - Digital Subscriber Signaling 1 E1 - European Basic Multiplex Rate (2.048 Mbps) ESF - Extended Super Frame GSCR - Generic Switching Center Requirement HDB3 - High Density Bipolar 3	IP - Internet Protocol ISDN - Integrated Services Digital Network ITU-T - International Telecommunication Union - Telecommunication Standardization Sector Mbps - Megabits per second MLPP - Multi-Level Precedence and Preemption MOS - Mean Opinion Score para - paragraph PRI - Primary Rate Interface Q.955.3 - ISDN Signaling standard for E1 MLPP R - Required 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
A - Appendix ADIMSS - Advanced DSN Integrated Management Support System ANSI - American National Standards Institute B8ZS - Bipolar Eight Zero Substitution BERT - Bit Error Rate Test C - Conditional CAS - Channel Associated Signaling DIACAP - DoD Information Assurance Certification and Accreditation Process DITSCAP - DoD Information Technology Security Certification and Accreditation Process DoD - Department of Defense DS1 - Digital Signal Level 1 DSN - Defense Switched Network DSS1 - Digital Subscriber Signaling 1 E1 - European Basic Multiplex Rate (2.048 Mbps) ESF - Extended Super Frame GSCR - Generic Switching Center Requirement HDB3 - High Density Bipolar 3	IP - Internet Protocol ISDN - Integrated Services Digital Network ITU-T - International Telecommunication Union - Telecommunication Standardization Sector Mbps - Megabits per second MLPP - Multi-Level Precedence and Preemption MOS - Mean Opinion Score para - paragraph PRI - Primary Rate Interface Q.955.3 - ISDN Signaling standard for E1 MLPP R - Required 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				
<b>NOTES:</b> 1 The GSCR does not stipulate a minimum Access interface requirement for a Strategic Network Element. 2 The GSCR does not stipulate a minimum Transport interface requirement for a Strategic Network Element.					

5. 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

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references are on the JITC Joint Interoperability Tool (JIT) at <http://jit.fhu.disa.mil> (NIPRNet), or <http://199.208.204.125> (SIPRNet). Information related to DSN testing is on the Telecom Switched Services Interoperability (TSSI) website at <http://jitc.fhu.disa.mil/tssi>.

6. The JITC point of contact is Mr. Michael Napier, DSN 879-6787, commercial (520) 538-6787, FAX DSN 879-4347, or e-mail to [Edward.mellon@disa.mil](mailto:Edward.mellon@disa.mil). The tracking number for the SUT is 0713001.

FOR THE COMMANDER:

2 Enclosures a/s



RICHARD A. MEADOR

Chief

Battlespace Communications Portfolio

Distribution:

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

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

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

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

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

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

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

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

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

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

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

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

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

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

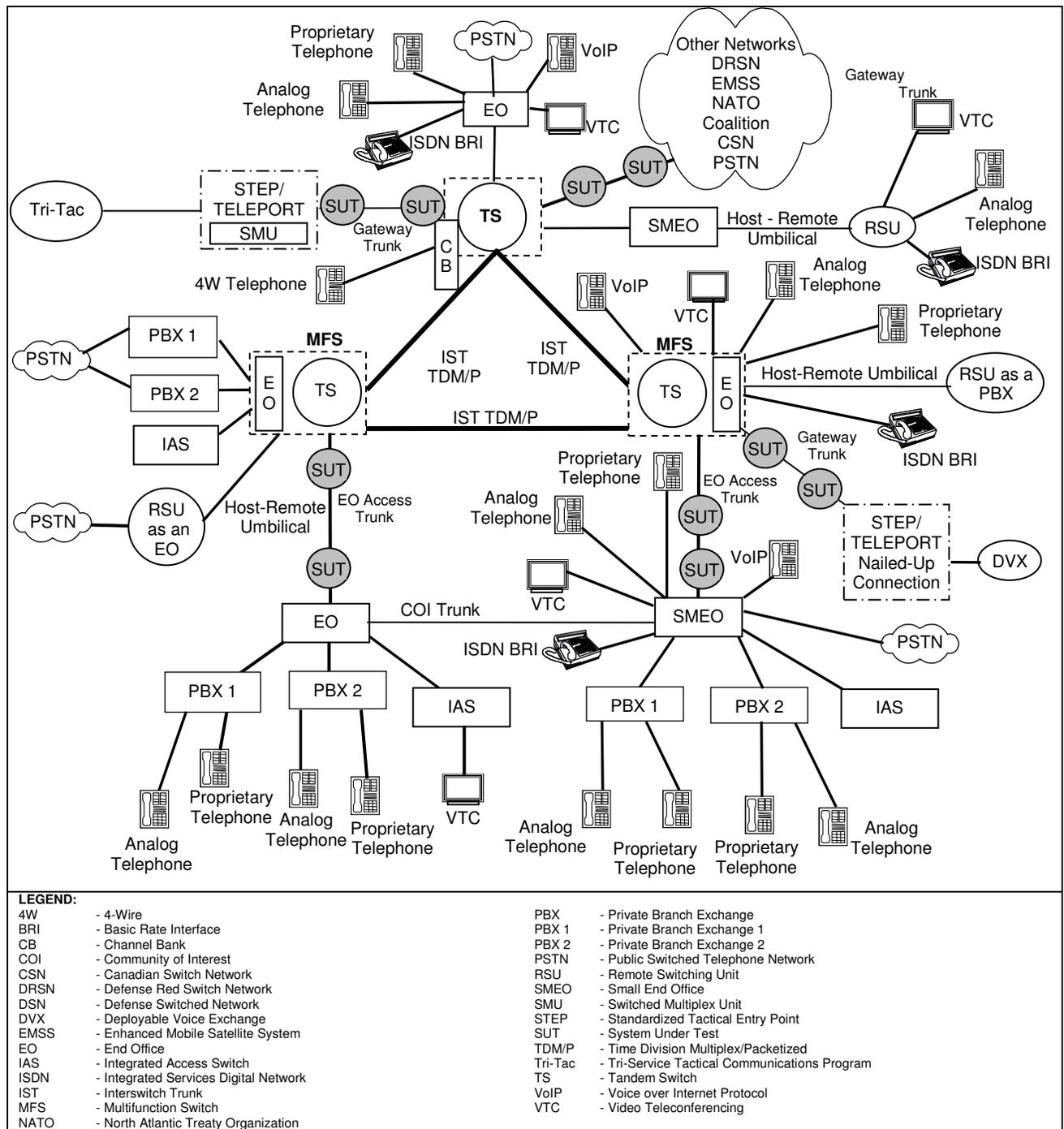
Defense Information Systems Agency (DISA), ATTN: GS23 (Mr. McLaughlin), Room 5W23, 5275 Leesburg Pike (RTE 7), Falls Church, VA 22041

## **ADDITIONAL REFERENCES**

- (c) Defense Information Systems Agency, "Department of Defense Voice Networks Generic Switching Center Requirements (GSCR), Errata Change 2," 14 December 2006, Revised 27 March 2007
- (d) Department of Defense, "Department of Defense Networks, Unified Capabilities Requirements," 21 December 2007
- (e) Joint Interoperability Test Command, "Defense Switched Network Generic Switch Test Plan (GSTP), Change 2," 2 October 2006

## CERTIFICATION TESTING SUMMARY

- 1. SYSTEM TITLE.** Veraz I-Gate 4000 Edge with Software Version C 2.5.1.6\_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 SUT is a Strategic Network Element (S-NE) that is used to simultaneously compress toll quality voice, facsimile (Fax), Voice Band Data (VBD), and signaling. The system improves transmission media efficiency and helps achieve maximum bandwidth utilization of traffic payloads. The SUT can take line interfaces composed of 24 or 30 Digital System Level 0s (DS0s) respectively for T1 or E1 and compresses the DS0 level channels on the output aggregate (bearer) side. Non-secure voice channels can be compressed up to 20:1, secure voice 6:1, Fax 6:1, and VBD 2:1. The SUT has a management platform called VerazView-xMS Management System (xMS) that provides fault management, configuration management, security management, and performance management services. The xMS is a modular, Personal Computer-based (Windows Server 2003) management application designed to provide the operator with a management tool. The xMS covers all of the functions required to configure and monitor multiple terminals, both locally and from any authorized remote location.
- 6. OPERATIONAL ARCHITECTURE.** The Generic Switching Center Requirements (GSCR) Defense Switched Network (DSN) architecture in figure 2-1 depicts the relationship of the SUT to the DSN switches.



**Figure 2-1. DSN Architecture**

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

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

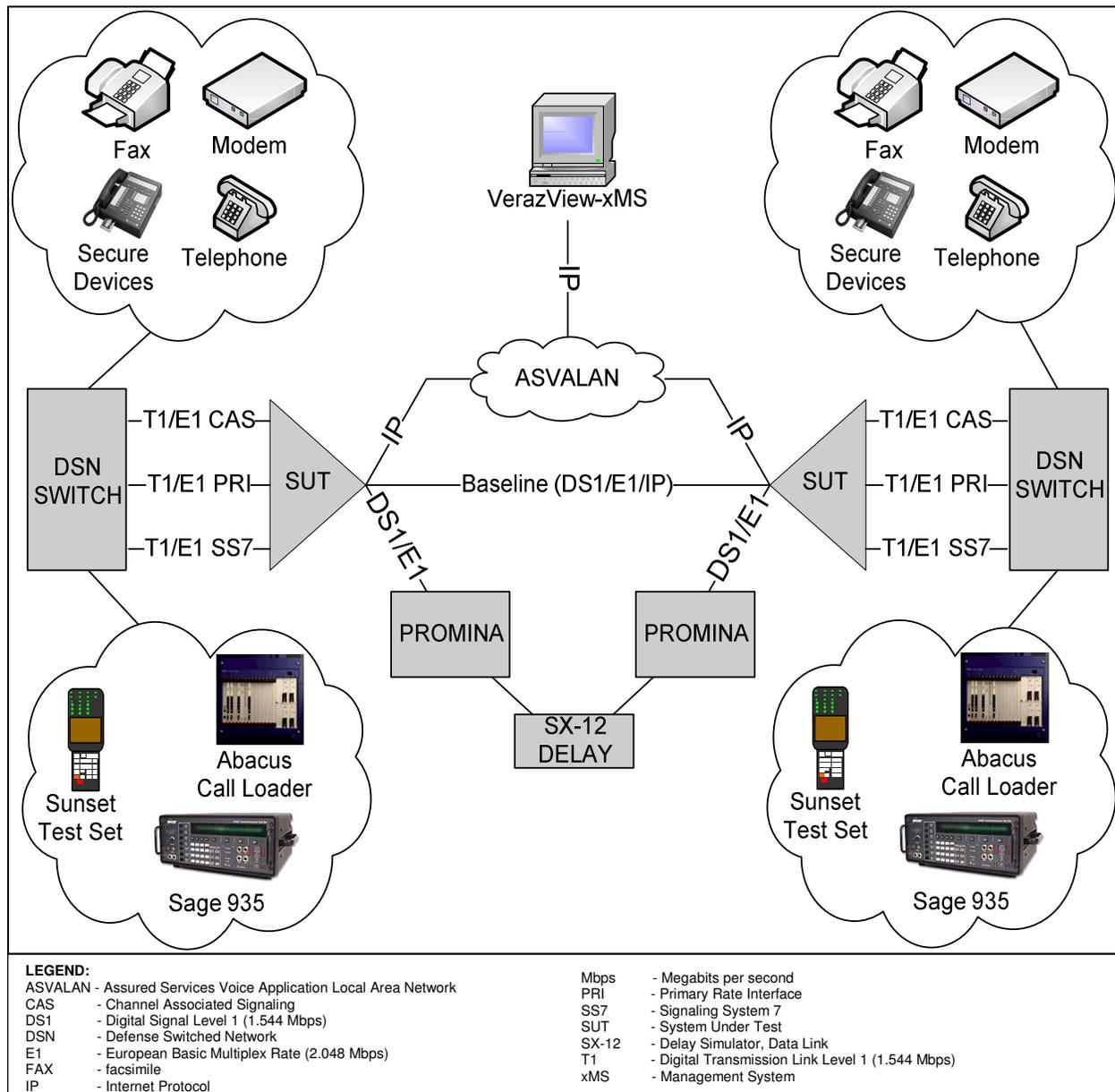
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Network Management	Yes	Certified	Met all CRs and FRs.																																																												
Security	Yes	See note 3.	See note 3.																																																												
<p><b>LEGEND:</b></p> <table border="0"> <tr> <td>AMI</td> <td>- Alternate Mark Inversion</td> <td>ISDN</td> <td>- Integrated Services Digital Network</td> </tr> <tr> <td>ANSI</td> <td>- American National Standards Institute</td> <td>ITU-T</td> <td>- International Telecommunication Union – Telecommunication Standardization Sector</td> </tr> <tr> <td>B8ZS</td> <td>- Bipolar Eight Zero Substitution</td> <td>Mbps</td> <td>- Megabits per second</td> </tr> <tr> <td>CAS</td> <td>- Channel Associated Signaling</td> <td>MFR1</td> <td>- Multi-Frequency Recommendation 1</td> </tr> <tr> <td>CRs</td> <td>- Capability Requirements</td> <td>MLPP</td> <td>- Multi-Level Precedence and Preemption</td> </tr> <tr> <td>DISA</td> <td>- Defense Information Systems Agency</td> <td>PRI</td> <td>- Primary Rate Interface</td> </tr> <tr> <td>DP</td> <td>- Dial Pulse</td> <td>Q.955.3</td> <td>- ISDN Signaling Standard for E1 MLPP</td> </tr> <tr> <td>DSN</td> <td>- Defense Switched Network</td> <td>SF</td> <td>- Super Frame</td> </tr> <tr> <td>DSS1</td> <td>- Digital Subscriber Signaling 1</td> <td>SS7</td> <td>- Signaling System 7</td> </tr> <tr> <td>DTMF</td> <td>- Dual Tone Multi-Frequency</td> <td>SUT</td> <td>- System Under Test</td> </tr> <tr> <td>E1</td> <td>- European Basic Multiplex Rate (2.048 Mbps)</td> <td>T1</td> <td>- Digital Transmission Link Level 1 (1.544 Mbps)</td> </tr> <tr> <td>ESF</td> <td>- Extended Super Frame</td> <td>T1.607</td> <td>- ISDN – Layer 3 Signaling Specification for Circuit Switched Bearer Service for DSS1</td> </tr> <tr> <td>FRs</td> <td>- Feature Requirements</td> <td>T1.619a</td> <td>- SS7 and ISDN MLPP Signaling Standard for T1</td> </tr> <tr> <td>GSCR</td> <td>- Generic Switching Center Requirements</td> <td></td> <td></td> </tr> <tr> <td>HDB3</td> <td>- High Density Bipolar 3</td> <td></td> <td></td> </tr> </table> <p><b>NOTES:</b></p> <p>1 The GSCR does not stipulate a minimum Access interface requirement for a Strategic Network Element.</p> <p>2 The GSCR does not stipulate a minimum Transport interface requirement Strategic Network Element.</p> <p>3 Information assurance testing is accomplished via DISA-led Information Assurance test teams and published in a separate report.</p>				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	CRs	- Capability Requirements	MLPP	- Multi-Level Precedence and Preemption	DISA	- Defense Information Systems Agency	PRI	- Primary Rate Interface	DP	- Dial Pulse	Q.955.3	- ISDN Signaling Standard for E1 MLPP	DSN	- Defense Switched Network	SF	- Super Frame	DSS1	- Digital Subscriber Signaling 1	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)	ESF	- Extended Super Frame	T1.607	- ISDN – Layer 3 Signaling Specification for Circuit Switched Bearer Service for DSS1	FRs	- Feature Requirements	T1.619a	- SS7 and ISDN MLPP Signaling Standard for T1	GSCR	- Generic Switching Center Requirements			HDB3	- High Density Bipolar 3		
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**Table 2-2. SUT Capability and Feature Interoperability Requirements**

DSN Interfaces					
DSN Access Interfaces		Requirements Required or Conditional	References		
Interface	Critical	<ul style="list-style-type: none"> <li>• DS1 Interface Characteristics (C)</li> <li>• DS1 Supervisory Channel Associated Signaling (C)</li> <li>• DS1 Clear Channel Capability (C)</li> <li>• DS1 Alarm and Restoral Requirements (C)</li> <li>• E1 Interface Characteristics (C)</li> <li>• E1 Supervisory Channel Associated Signaling (C)</li> <li>• E1 Clear Channel Capability (C)</li> <li>• E1 Alarm and Restoral Requirements (C)</li> <li>• MOS (R)</li> <li>• BERT (R)</li> <li>• Secure Transmission (Voice and Data) (R)</li> <li>• Modem (R)</li> <li>• Facsimile (R)</li> <li>• Call Control Signals (R)</li> <li>• Call Congestion (R)</li> <li>• Voice Compression (C)</li> <li>• IP Interface (C)                             <ul style="list-style-type: none"> <li>- Delay (R)</li> <li>- Jitter (R)</li> <li>- Packet Loss (R)</li> </ul> </li> </ul>	<ul style="list-style-type: none"> <li>• GSCR para. A9.5.1.2.4</li> <li>• GSCR para. A9.5.1.2.4</li> <li>• GSCR para. A9.5.1.2.4</li> <li>• GSCR para. A9.5.1.2.5</li> <li>• GSCR para. A9.5.1.2.5</li> <li>• GSCR para. A9.5.1.2.5</li> <li>• GSCR para. A9.5.1.1</li> <li>• GSCR para. A9.5.1.1.4</li> <li>• GSCR para. A9.5.1.2.9</li> <li>• UCR para. A9.5.1.2.9a</li> <li>• GSCR para. A9.5.1.2.9b</li> <li>• GSCR para. A9.5.1.2.9c</li> </ul>		
T1 CAS	No <sup>1</sup>				
T1 SS7 (ANSI T1.619a)	No <sup>1</sup>				
T1 ISDN PRI (ANSI T1.607/ANSI T1.619a)	No <sup>1</sup>				
E1 ISDN PRI (ITU-T Q.955.3)	No <sup>1</sup> (Europe only)				
E1 CAS	No <sup>1</sup> (Europe only)				
E1 SS7 (ANSI T1.619a)	No <sup>1</sup> (Europe only)				
DSN Transport Interfaces					
Interface	Critical				
E1 (HDB3) Proprietary	No <sup>2</sup>				
T1 (B8ZS/ESF) Proprietary	No <sup>2</sup>				
100 Mbps Ethernet	No <sup>2</sup>				
SUT Features And Capabilities					
Feature/Capability	Critical	Requirements Required or Conditional	References		
Synchronization	Yes	<ul style="list-style-type: none"> <li>• Timing (R)</li> </ul>	<ul style="list-style-type: none"> <li>• GSCR para. A9.5.1.2.7</li> </ul>		
Network Management	Yes	<ul style="list-style-type: none"> <li>• Management Option (R)                             <ul style="list-style-type: none"> <li>- Local Management (Front Panel and/or External Console) (C)</li> <li>- ADIMSS (C)</li> </ul> </li> <li>• Fault Management (C)</li> <li>• Loop Back Capability (C)</li> <li>• Operational Configuration Restoral (R)</li> </ul>	<ul style="list-style-type: none"> <li>• GSCR para. A9.5.2.1</li> <li>• GSCR para. A9.5.2.2</li> <li>• GSCR para. A9.5.2.3</li> <li>• GSCR para. A9.5.3</li> </ul>		
Security	Yes	<ul style="list-style-type: none"> <li>• DIACAP (replacement for DITSCAP) (R)</li> </ul>	<ul style="list-style-type: none"> <li>• GSCR para. A9.6</li> </ul>		
<b>LEGEND:</b> <table style="width: 100%; border: none;"> <tr> <td style="width: 50%; vertical-align: top;">                     A - Appendix                      ADIMSS - Advanced DSN Integrated Management Support System                      ANSI - American National Standards Institute                      B8ZS - Bipolar Eight Zero Substitution                      BERT - Bit Error Rate Test                      C - Conditional                      CAS - Channel Associated Signaling                      DIACAP - DoD Information Assurance Certification and Accreditation Process                      DITSCAP - DoD Information Technology Security Certification and Accreditation Process                      DoD - Department of Defense                      DS1 - Digital Signal Level 1                      DSN - Defense Switched Network                      DSS1 - Digital Subscriber Signaling 1                      E1 - European Basic Multiplex Rate (2.048 Mbps)                      ESF - Extended Super Frame                      GSCR - Generic Switching Center Requirement                      HDB3 - High Density Bipolar 3                 </td> <td style="width: 50%; vertical-align: top;">                     IP - Internet Protocol                      ISDN - Integrated Services Digital Network                      ITU-T - International Telecommunication Union - Telecommunication Standardization Sector                      Mbps - Megabits per second                      MLPP - Multi-Level Precedence and Preemption                      MOS - Mean Opinion Score                      para - paragraph                      PRI - Primary Rate Interface                      Q.955.3 - ISDN Signaling standard for E1 MLPP                      R - Required                      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                 </td> </tr> </table>				A - Appendix ADIMSS - Advanced DSN Integrated Management Support System ANSI - American National Standards Institute B8ZS - Bipolar Eight Zero Substitution BERT - Bit Error Rate Test C - Conditional CAS - Channel Associated Signaling DIACAP - DoD Information Assurance Certification and Accreditation Process DITSCAP - DoD Information Technology Security Certification and Accreditation Process DoD - Department of Defense DS1 - Digital Signal Level 1 DSN - Defense Switched Network DSS1 - Digital Subscriber Signaling 1 E1 - European Basic Multiplex Rate (2.048 Mbps) ESF - Extended Super Frame GSCR - Generic Switching Center Requirement HDB3 - High Density Bipolar 3	IP - Internet Protocol ISDN - Integrated Services Digital Network ITU-T - International Telecommunication Union - Telecommunication Standardization Sector Mbps - Megabits per second MLPP - Multi-Level Precedence and Preemption MOS - Mean Opinion Score para - paragraph PRI - Primary Rate Interface Q.955.3 - ISDN Signaling standard for E1 MLPP R - Required 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
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<b>NOTES:</b> 1 The GSCR does not stipulate a minimum Access interface requirement for a Strategic Network Element. 2 The GSCR does not stipulate a minimum Transport interface requirement for a Strategic Network Element.					

**8. TEST NETWORK DESCRIPTION.** The SUT was tested at JITC’s Global Information Grid Network Test Facility (GNTF) in a manner and configuration similar to

that of its DSN operational environment. Testing the system's required functions and features was conducted using the test configuration depicted in figure 2-2.



**Figure 2-2. Test Configuration**

**9. SYSTEM CONFIGURATIONS.** Table 2-3 provides the system configurations used in the test. The SUT was tested in an operationally realistic environment to determine interoperability with a complement of DSN switches noted in table 2-3. The DSN switches listed in table 2-3 only depict the tested configuration. Table 2-3 is not intended to identify the only switches that are certified with the SUT. The SUT is

certified with switching systems listed on the DSN Approved Products List (APL) that offer the same certified SUT interfaces.

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

System Name		Hardware/Software Release	
Nortel CS2100		Succession Enterprise (SE)09.1	
Siemens EWSD		19d with Patch Set 46	
Alcatel-Lucent 5ESS		5E16.2 Broadcast Warning Message (BWM) 07-0003	
Avaya S8710		Communication Manager (CM) 4.0 (R014x.00.2.731.7: Super Patch 14419)	
Promina/IDNX		82.80	
SUT	Component	Hardware/Firmware/Software	
	I-Gate 4000 Edge	Card: IC8P, Type: S420, Rev: A00, Firmware: NA	C 2.5.1.6 ES/VxWorks 5.5.1
		Card: XPSM, Type: S410, Rev: A03, Firmware: AB	C 2.5.1.6 ES/VxWorks 5.5.1
		Card: XPSM, Type: S410, Rev: A06, Firmware: AB	C 2.5.1.6 ES/VxWorks 5.5.1
System Administration Computer	Windows 2003 Server SP1/SQL Server 2005/IIS 6.0/VerazView-xMS Management System 4.5.0		
<b>LEGEND:</b>			
5ESS	- Class 5 Electronic Switching System	Rev	- Revision
CS	- Communication Server	SP	- Service Pack
ES	- Echo Canceller Support	SQL	- Structured Query Language
EWSD	- Elektronisches Wählsystem Digital	SUT	- System Under Test
IDNX	- Integrated Digital Network Exchange	xMS	- Management System
IIS	- Internet Information Services		

**10. TEST LIMITATIONS.** None.

**11. TEST RESULTS**

**a. Discussion**

**(1) DSN Interfaces.** The SUT supports both DS1 and E1 access interfaces. Channel Associated Signaling (CAS) and Common Channel Signaling trunks were provisioned and tested for both DS1 and E1 access interfaces. The SUT supports DS1, E1, and IP transport interfaces. All of the access interface types were mapped through the test network over all of the supported transport interfaces. The specific requirements and test results of the DSN Interface testing are described below.

**(a) Access Interface Characteristics.** The DS1 and E1 interface characteristics were tested according to GSCR, appendix 9. The DS1 interface supports both Alternate Mark Inversion (AMI) and Bipolar Eight Zero Substitution (B8ZS) line coding, as required by the GSCR, appendix 9, paragraph A9.5.1.2.4. The E1 interface supports HDB3 line coding, as required by GSCR, appendix 9, paragraph A9.5.1.2.5. The SUT supports Dual Tone Multi-Frequency (DTMF) and Multi-Frequency (MF) signaling, but it does not support Dial Pulse (DP) signaling. There is no impact from the SUT not supporting DP signaling because it is not required for a Network Element (NE). All Access interface characteristics were verified through both vendor Letter of Compliance (LoC) and testing.

**(b) DSN Transport Interfaces.** The SUT supports DS1, E1, and IP transport interfaces. The DS1 interface is proprietary signaling that is framed with ESF

and B8ZS line coding, as required by the GSCR, appendix 9, paragraph A9.5.1.2.4. The E1 interface is proprietary signaling that framed with HDB3, as required by GSCR, appendix 9, paragraph A9.5.1.2.5. The IP interface provides 100 Mbps of transport bandwidth, as required by the GSCR, appendix 9, paragraph A9.5.1.2.9. When transporting Non-Facility Associated Signaling (NFAS) ISDN PRI access trunks, the SUT recommended configuration for the D-Channels is clear channel. This is required to effectively support the increased volume of signaling channel traffic that will occur as a result of the NFAS configuration.

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

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

**(e) Alarm and Restoral Requirements.** In accordance with GSCR, appendix 9, paragraph A9.5.1.2, the NE shall be able to propagate Carrier Group Alarms (CGAs) in accordance with GSCR, section 7 upon physical loss of the Time Division Multiplex (TDM) interface. Voice switching systems shall receive the proper CGAs from the NE upon loss of the transport link between NEs, regardless of whether it is TDM or IP. The SUT is capable of transparently passing the alarm and restoral features of the DSN switch's digital interface unit, which meets the requirement.

**(f) Mean Opinion Score (MOS).** In accordance with GSCR, appendix 9, paragraph A9.5.1.1, the introduction of NE(s) shall not cause the end-to-end average MOS to fall below 4.0 as measured over any 5 minute time interval. SAGE 935 communications test sets were connected to DSN end instrument handset jacks for the purpose of conducting MOS tests. There were 36 manual calls placed through the test network, over all supported interfaces all having an MOS of 4.0 or greater, which meets the requirement.

**(g) Bit Error Rate Tests (BERTs).** In accordance with GSCR, appendix 9, paragraph A9.5.1.1, the introduction of a NE shall exceed the end-to-end digital bit error rate requirement of less than 1 error in  $1 \times 10^9$  averaged over a nine-hour period. BERTs were conducted across all access interfaces. The SUT met the requirement for all interfaces with a recorded bit error ratio of  $1 \times 10^{-9}$ .

**(h) Secure Transmission (Voice and Data).** In accordance with GSCR, appendix 9, paragraph A9.5.1.1, the introduction of NE(s) shall not degrade secure transmission for secure end devices as defined by Appendix 10. There were 280 secure calls placed between Secure Terminal Equipment and Secure Wireline Terminals without degrading transmissions between end devices, which meets the requirement. These tests included secure voice, data, fax, and crypto rekey.

**(i) Modem.** In accordance with GSCR, appendix 9, paragraph A9.5.1.1, the NE(s) shall support a minimum modem transmission speed of 9.6 kilobits per second (kbps) across the associated NE(s). For proper functionality of modem calls, a SUT compression feature called "v.34 by v.32" must be deactivated. When this feature is deactivated, it permits on-demand clear-channel for v.34 or greater modem types. Modems were connected to phones on the DSN switches. Manual calls were placed from these devices for the purpose of conducting modem tests. There were 138 modem calls placed through the SUT. All modem calls had a transmission rate of equal to or greater than 9.6 kbps, which meets the requirement.

**(j) Facsimile.** In accordance with GSCR, appendix 9, paragraph A9.5.1.1, the NE(s) shall support a minimum facsimile transmission speed of 9.6 kbps across the associated NE(s). There were 279,786 facsimile calls placed through the SUT using the Abacus call loader. All facsimile calls had a transmission rate of 14.4 kbps, which meets the requirement.

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

**(l) Call Congestion.** In accordance with GSCR, appendix 9, paragraph A9.5.1.1.3, call congestion handling can be met one of the following three ways: dynamic load control signal; software capability which makes congestion impossible; or congestion is not possible in the SUT. Call congestion is supported in the SUT by providing a dynamic load control signal, which meets the requirement.

**(m) Voice Compression.** In accordance with GSCR, appendix 9, paragraph A9.5.1.1, 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, 8 kbps Conjugate-Structure Algebraic-Code-Excited Linear-Prediction (CS-A CELP).

The SUT supports ITU-T G.729 voice compression, which meets the requirement. The SUT also supports Digital Speech Interpolation/Silence Suppression. This provides the SUT the ability of detecting and removing the periods of silence in a call, and thereby providing additional bandwidth over the transport interface for other calls.

**(n) Delay.** Delay occurs when packets take more time than expected to reach their destination. The Unified Capabilities Requirement, appendix 9, paragraph A9.5.1.2.9 1.(b), states the addition of S-NE with TDM ingress to transcoding packet

egress shall not increase delay by more than 100 milliseconds (ms) as measured from end-to-end as a pair. The average one-way delay for each of the sampled five-minute periods, measured between the SUT nodes was measured at an average of 49 ms, which meets the requirement.

**(o) Jitter.** Jitter occurs when packets are sent and received with timing variations. The GSCR, appendix 9, paragraph A9.5.1.2.9b, states the addition of S-NE shall not cause jitter, measured from ingress to egress, to increase by more than five ms averaged over any five-minute period. With a full bandwidth load, jitter was measured to be 0.723 ms over a five-minute period, which meets the requirement

**(p) Packet Loss.** Packet loss occurs when packets are sent, but not received at the final destination. The GSCR, appendix 9, paragraph A9.5.1.2.9c, states that the addition of an S-NE shall not cause packet loss measured from ingress to egress to increase by more than 0.05% averaged over any five-minute period. With bandwidth load, the measured packet loss was 0.00% over a five-minute period, which meets the requirement.

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

1. Circuit for Reuse; Answered Call
2. Circuit for Reuse; Unanswered Call
3. Circuit not for Reuse; Answered Call
4. Circuit not for Reuse; Unanswered Call
5. Resources not Available (Intra- and inter-switch)
6. Circuit for Reuse; Answered Call (simultaneous preemption of line

and trunk)

7. Circuit for Reuse; Unanswered Call (simultaneous preemption of line and trunk)

**(2) Synchronization.** In accordance with GSCR, appendix 9, paragraph A9.5.1.2.7, the NE shall be able to derive timing signal from an internal source, an incoming digital signal, or an external source. The SUT can derive timing from an external DS1 or E1 link. During this test, the timing was derived from both DS1 and E1 sources, which meets the requirement.

**(3) Device Management.** In accordance with GSCR, appendix 9, paragraph A9.5.2.1, NE devices are to be managed by at least one of the following: The device may be managed locally by a front or back panel and/or external console control capability shall be provided for local management. NE devices in the DSN may be monitored and managed by the Advanced DSN Integrated Management Support

System (ADIMSS) as described in the GSCR, section 9. The NE is capable of being centrally monitored and managed as described in sections 9.3 and 9.4 of the GSCR.

**(a) Management Option.** The SUT meets the device management requirement with their proprietary management platform. The SUT management platform, VerazView-xMS Management System (xMS), provides fault management, configuration management, security management, and performance management services. The xMS is a modular, Personal Computer-based (Windows Server 2003) management application designed to provide the operator with a management tool. The xMS covers all of the functions required to configure and monitor multiple terminals, both locally and from any remote authorized location.

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

**(c) Loop Back Capability.** In accordance with GSCR, appendix 9, paragraph A9.5.2.3, NEs 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”*. The SUT does not support ITU-T Recommendation V.54. This requirement is conditional and has no operational impact on network interoperability.

**(d) Operational Configuration Restoral.** In accordance with GSCR, appendix 9, paragraph A9.5.3, 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 meets the requirement.

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

**b. Summary.** The SUT is certified for joint use within the DSN as a S-NE in accordance with the requirements set forth in reference (c). When connected to the interfaces certified in this letter, the SUT and its associated applications were transparent to the switching systems interfaced causing no degradation of service or negative impact.

**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>.