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) 10 December 2007

MEMORANDUM FOR DISTRIBUTION

SUBJECT: Special Interoperability Test Certification of the Alcatel-Lucent Class 5 Electronic Switching System (5ESS) Very Compact Digital Exchange (VCDX) Digital Switching System with Software Release 5E16.2, Broadcast Warning Message (BWM) 07-0003

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

1. References (a) and (b) establish the Defense Information Systems Agency, Joint Interoperability Test Command (JITC), as the responsible organization for interoperability test certification. Additional references are provided in enclosure 1.

2. The Alcatel-Lucent 5ESS VCDX Digital Switching System with Software Release 5E16.2, BWM 07-0003 is hereinafter referred to as the System Under Test (SUT). The SUT meets the critical interoperability requirements and is certified as interoperable for joint use within the Defense Switched Network (DSN). The SUT was tested and met the critical interoperability requirements for the following DSN switch types: Multifunction Switch (MFS) (except Europe), End Office (EO) (except Europe), Small End Office (SMEO) (except Europe), Private Branch Exchange (PBX) 1, PBX 2, and Deployable Voice Exchange. The SUT does not support the critical European interfaces required for MFS, EO, and SMEO switches. Therefore, the SUT is not certified by JITC nor approved by the DSN Program Management Office (PMO) for use in Europe as a MFS, EO, or SMEO. The identified test discrepancies shown in the Certification Testing Summary (enclosure 2) that remained open after software patches were applied and regression testing was completed have a minor operational impact. 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 conducted by JITC and a review of the vendor's Letters of Compliance (LoC). Certification testing was conducted at JITC's Global Information Grid Network Test Facility at Fort Huachuca, Arizona from 13 August through 24 September 2007. Review of the vendor's LoC was completed on 10 October 2007. Review of system information was completed on 24 October 2007. Enclosure 2 documents the test results and describes the tested network and system configurations.

4. The SUT interoperability test summary is listed in table 1. The MFS Capability Requirements (CRs) and Feature Requirements (FRs) are listed in table 2. This interoperability test summary is based on the SUT's ability to meet:

a. The following network interfaces as specified in reference (c): DSN, Defense Red Switch Network Gateway, Tactical Network Gateway, and Public Switched Telecommunications Network.

b. Interface and signaling requirements for trunk, line, and network management interfaces, and interoperability CRs and FRs derived from reference (d).

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

d. Review of the LoC submitted by Alcatel-Lucent.

Table 1. SUT Interoperability Summary

DSN Trunk Interfaces			
Interface & Signaling	**Critical**	**Status**	**Remarks**
T1 CAS (DTMF, MFR1, DP)	Yes	Certified	Met all CRs and FRs.
E1 CAS (DTMF, MFR1, DP)	Yes (Europe only)	Not Tested	This interface is not supported. Therefore, the SUT is not certified by JITC nor approved by the DSN PMO for use in Europe as a MFS, EO, or SMEO. Since this is not a required interface for a MFS except when deployed in Europe, there is no operational impact.
T1 ISDN PRI NI 1/2 (ANSI T1.619a)	Yes	Certified	Met all CRs and FRs with the following exception: Does not support the full range of MLPP service domain.[1]
E1 ISDN PRI (ITU-T Q.955.3)	Yes (Europe only)	Not Tested	This interface is not supported. Therefore, the SUT is not certified by JITC nor approved by the DSN PMO for use in Europe as a MFS, EO, or SMEO. Since this is not a required interface for a MFS except when deployed in Europe, there is no operational impact.
T1 SS7 (ANSI T1.619a)	Yes	Certified	Met all CRs and FRs with the following exceptions: Does not support the full range of MLPP service domain.[1] Does not have the capability to assign prioritization to the Initial Address Message based on precedence level.[2]
E1 SS7 (ITU-T Q.735.3)	Yes (Europe only)	Not Tested	This interface is not supported. Therefore, the SUT is not certified by JITC nor approved by the DSN PMO for use in Europe as a MFS, EO, or SMEO. Since this is not a required interface for a MFS except when deployed in Europe, there is no operational impact.
DSN Line Interfaces			
Interface & Signaling	**Critical**	**Status**	**Remarks**
2-Wire Analog (GR-506-CORE)	Yes	Certified	Met all CRs and FRs with the following exceptions: Does not fully support MLPP functionality on a 3-Party call.[3] Does not properly support MLPP interaction for call pick-up.[4]
ISDN BRI S/T and U Interface ITU-T Q.931	Yes	Certified	Met all CRs and FRs with the following exceptions: Does not fully support MLPP functionality on a 3-Party call.[3] Does not properly support MLPP interaction for call pick-up.[4] The SUT will only support MLPP (voice) with 5E Custom BRI protocol.[5]
2-Wire Digital and Analog (Proprietary)	No	Not Tested	This interface is not supported. Since this is not a required interface for a MFS, there is no operational impact.
2-Wire Analog Ground Start Line (GR-506-CORE)	Yes	Certified	Met all CRs and FRs.
Voicemail			
Interface	**Critical**	**Status**	**Remarks**
T1 CAS	No	Certified	Met all CRs and FRs.
T1 ISDN PRI NI 1/2 (ANSI T1.607)	No	Certified	Met all CRs and FRs.
Serial SMDI interface[6]	No	Certified	Met all CRs and FRs.
Automated Call Distributor			
Interface	**Critical**	**Status**	**Remarks**
T1 CAS (DTMF, MFR1, DP)	No	Certified	Met all CRs and FRs. The SUT is certified for use with any ACD on the DSN APL which is certified for this interface.
T1 ISDN PRI NI 1/2 (ANSI T1.607)	No	Certified	Met all CRs and FRs. The SUT is certified for use with any ACD on the DSN APL which is certified for this interface.
Analog	No	Certified	Met all CRs and FRs. The SUT is certified for use with any ACD on the DSN APL which is certified for this interface.
Network Management[7]			
Interface & Signaling	**Critical**	**Status**	**Remarks**
IEEE 802.3 10BaseT Ethernet, TCP/IP	No	Certified	Met all CRs and FRs.
EIA-232 Asynchronous at 9.6 kbps	No	Certified	Met all CRs and FRs.
ITU-T X.25	No	Not-Tested	This interface is not supported. Since this is not a required interface for a MFS, there is no operational impact.

Table 1. SUT Interoperability Summary (continued)

DSN Features and Capabilities			
Features and Capabilities	**Critical**	**Status**	**Remarks**
Common Features	Yes	Certified	Met all CRs and FRs.
Attendant	Yes	Certified	Met all CRs and FRs.
Public Safety	Yes	Certified	Met all CRs and FRs.
Preset Conferencing	Yes	Certified	Met all CRs and FRs. Certified with any conference bridge on the DSN APL which is certified for the same interfaces.
Nailed-up Connections	Yes	Certified	Met all CRs and FRs.
Precedence Access Threshold	No	Certified	Met all CRs and FRs with the following exceptions: Does not support PAT queuing.[8]
DSN Hotline Services	Yes	Certified	Met all CRs and FRs.
Tandem Switching	Yes	Certified	Met all CRs and FRs.
ISDN Services (EKTS)	No	Not Certified	Does not support MLPP with EKTS.[9]
Synchronization	Yes	Certified	Met all CRs and FRs.
Reliability	Yes	Certified	Met all CRs and FRs.
Security	Yes	See note 10.	See note 10.

Network Gateways				
Gateway	**Interface & Signaling**	**Critical**	**Status**	**Remarks**
PSTN	T1 CAS (DTMF, MFR1, DP)	Yes	Certified	Met all CRs and FRs.
	E1 CAS (DTMF, MFR1, DP)	Yes (Europe only)	Not Tested	This interface is not supported. Therefore, the SUT is not certified by JITC nor approved by the DSN PMO for use in Europe as a MFS, EO, or SMEO. Since this is not a required interface for a MFS except when deployed in Europe, there is no operational impact.
	T1 ISDN PRI NI 1/2 (ANSI T1.607)	Yes	Certified	Met all CRs and FRs.
	E1 ISDN PRI (ITU-T Q.931)	Yes (Europe only)	Not Tested	This interface is not supported. Therefore, the SUT is not certified by JITC nor approved by the DSN PMO for use in Europe as a MFS, EO, or SMEO. Since this is not a required interface for a MFS except when deployed in Europe, there is no operational impact.
	Ground Start Line	Yes	Certified	Met all CRs and FRs.
Tactical	T1 CAS (DTMF, MFR1, DP)	Yes	Certified	Met all CRs and FRs.
	E1 CAS (MFR1)	Yes (Europe only)	Not Tested	This interface is not supported. Therefore, the SUT is not certified by JITC nor approved by the DSN PMO for use in Europe as a MFS, EO, or SMEO. Since this is not a required interface for a MFS except when deployed in Europe, there is no operational impact.
DRSN[11]	2-Wire Analog (GR-506-CORE)	Yes	Certified	Met all CRs and FRs.

Table 1. SUT Interoperability Summary (continued)

LEGEND:

10BaseT	- 10 Mbps (Baseband Operation, Twisted Pair) Ethernet
802.3	- Standard for carrier sense multiple access with collision detection at 10 Mbps
ACD	- Automated Call Distributor
ANSI	- American National Standards Institute
APL	- Approved Products List
BRI	- Basic Rate Interface
CAS	- Channel Associated Signaling
CRs	- Capability Requirements
DCE	- Data Circuit-Terminating Equipment
DISA	- Defense Information Systems Agency
DN	- Directory Number
DP	- Dial Pulse
DRSN	- Defense Red Switch Network
DSN	- Defense Switched Network
DSS1	- Digital Subscriber Signaling 1
DTE	- Data Terminal Equipment
DTMF	- Dual Tone Multi-Frequency
E1	- European Basic Multiplex Rate (2.048 Mbps)
EIA	- Electronic Industries Alliance
EIA-232	- Standard for defining the mechanical and electrical characteristics for connecting DTE and DCE data communications devices
EKTS	- Electronic Key Telephone System
EO	- End Office
FRs	- Feature Requirements
GR	- Generic Requirement
GR-506-CORE	- Telcordia Signaling for Analog Interface Generic Requirement
GSCR	- Generic Switching Center Requirements
IAM	- Initial Address Message
IEEE	- Institute of Electrical and Electronics Engineers, Inc.
ISDN	- Integrated Services Digital Network
ITU-T	- International Telecommunication Union - Telecommunication Standardization Sector
JITC	- Joint Interoperability Test Command
kbps	- kilobits per second
MADN	- Multiple Appearance Directory Number
Mbps	- Megabits per second
MFR1	- Multifrequency Recommendation 1
MFS	- Multifunction Switch
MLPP	- Multi-Level Precedence and Preemption
NI 1/2	- National ISDN Standard 1 or 2
NM	- Network Management
PAT	- Precedence Access Threshold
PM	- Program Manager
PMO	- Program Management Office
PRI	- Primary Rate Interface
PSTN	- Public Switched Telephone Network
Q.735.3	- SS7 Signaling Standard for E1 MLPP
Q.931	- Signaling Standard for ISDN
Q.955.3	- ISDN Signaling standard for E1 MLPP
SMDI	- Simplified Message Desk Interface
SMEO	- Small End Office
SS7	- Signaling System 7
S/T	- ISDN BRI four-wire interface
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
TCP/IP	- Transmission Control Protocol/Internet Protocol
U	- ISDN BRI two-wire interface
X.25	- Interface between DTE and DCE for terminals operating in the packet mode and connected to public data networks by dedicated circuit

NOTES:

1 The SUT does not support the full range of MLPP service domains on the ANSI T1.619a ISDN T1 PRI and the ANSI T1.619a T1 SS7 trunk types. The SUT supports 256 MLPP service domains instead of the required 16,777,216. Since there is only one MLPP service domain used in the DSN, there is no operational impact.

2 The GSCR states that, in case of congestion, IAMs carrying FLASH or FLASH OVERRIDE calls shall be assigned a priority of three, IMMEDIATE calls shall be assigned a priority of two, PRIORITY calls shall be assigned a priority of one, and ROUTINE calls a priority of zero. The SUT does not have the capability to assign prioritization to SS7 IAMs based on precedence level (i.e. FLASH OVERRIDE, FLASH, IMMEDIATE, etc.). The SUT assigns a priority level of one in the IAMs to all precedence levels. Due to the amount of traffic in the DSN, congestion is not possible over the SS7 56 kbps link; therefore there is no operational impact.

3 The GSCR states that when any party of a 3-party call is preempted, the remaining parties will receive a conference disconnect tone. The SUT however, preempts all parties of the conference when the originator of the 3-party call is preempted. Since the originator is properly classmarked at the highest precedence of both legs of the 3-party call, the operational impact is minor.

4 The SUT call pickup feature doesn't retrieve the call with the highest precedence first. The SUT retrieves unanswered call pickup group calls above ROUTINE in a random sequence. The GSCR requires that "If a call pickup group has more than one party in an unanswered condition and the unanswered parties are at different precedence levels, a call pickup attempt in that group shall retrieve the highest precedence call first." All unanswered precedence calls above ROUTINE in the pickup group do divert after 15-45 seconds if unanswered and are positively connected to the attendant, night service, or alternate DN. The same method is used for diverting calls that go to an unattended phone. There is no operational impact because all precedence calls are answered.

5 The SUT only supports MLPP (voice) with 5E Custom protocol on their ISDN BRI interface with their proprietary 8510 instruments and certified Tone Commander ISDN BRI instruments. The Tone Commander ISDN BRI instruments have been tested and are the only ISDN BRI vendor certified for joint use within the DSN for all major DSN switches to include the SUT. In addition, the SUT BRI interface has been tested and is interoperable with all versions of the L3 Communications Secure Terminal Equipment devices using 5E Custom Protocol; therefore, there is no operational impact.

6 The SMDI serial interface is required for voice mail systems to turn on and turn off the voice mail lamp or stutter dial tone.

7 The GSCR NM requirements state that a switch can provide NM capabilities via Ethernet, serial asynchronous (EIA-232), or serial synchronous (ITU-T X.25). The SUT meets all the requirements for NM over EIA-232 asynchronous serial.

8 The SUT met all CRs and FRs for PAT with the following minor exception: PAT Queuing is not supported by the SUT. PAT is a conditional requirement for a MFS which makes the operational impact of this discrepancy minor.

9 The SUT did not meet all CRs and FRs for ISDN services EKTS. The SUT does not support MLPP interaction with telephones assigned the MADN option. This option applies to EKTS ISDN BRI telephones. The SUT does not support MLPP interaction with these instruments when more than one ISDN BRI instrument shares the same DN. Therefore, the EKTS MADN functionality of the SUT is not certified for use in the DSN. The operational impact is minor.

10 Information assurance testing is accomplished via DISA-led Information Assurance test teams and published in a separate report.

11 Interoperability certification of the SUT does not constitute DRSN PM approval for connectivity to the DRSN. It is the user's responsibility to request connectivity approval directly from the PM.

Table 2. MFS Requirements

DSN Trunk Interfaces				
Interface	**Critical**	**Requirements Required or Conditional**		**References**
T1 SS7 (ANSI T1.619a) E1 SS7 (ITU-T Q.735.3) T1 CAS (MFR1, DTMF, DP) E1 CAS (MFR1, DTMF, DP) T1 ISDN PRI NI 1/2 (ANSI T1.619a) E1 ISDN PRI (ITU-T Q.955.3)	Yes Yes (Europe only) Yes Yes (Europe only) Yes Yes (Europe Only)	Trunking	• Framing (R) • Line Code (R) • Signaling (R) • Alarms (R) • WWNDP (R) • Outpulsing digit formats (R: CAS only) • Routing (R) • Trunk Groups (R) • CAS to CCS trunk interworking (R) • PCM-24/PCM-30 Interoperation (R) • Direct Inward Dialing (R)	• GSCR Section 7 • GSCR Section 7 • GSCR Section 5 • GSCR Section 2.5.7, 7.1.4 & 7.2.2 • GSCR Section 4.5.1 • GSCR Section 4.5.2 • GSCR Section 4.2 • GSCR Section 2.5.5 & 2.5.6 • GSCR Section 3.10 • GSCR Section 7.3 • GSCR Section 2.3.2
		Voice	• MOS (R) • MLPP (R) • Secure calls (R)	• CJCSI 6215.01B • GSCR Section 3 • CJCSI 6215.01B
		Facsimile	• Analog: TIA/EIA-465-A (R)	• DISR
		Data	• Modem (VBD) (R) • 56 kbps switched data (R) • 64 kbps switched data (R: E1, PRI, and SS7) • NX56 synchronous BER (R) • NX64 synchronous BER (R: E1, PRI, and SS7) • Secure data (STE/STU-III) (R)	• CJCSI 6215.01B • GSCR Section 3.10 • GSCR Section 3.10 • GSCR Section 3.10 • GSCR Section 3.10 • CJCSI 6215.01B
		VTC	• ITU-T H.320 (R)	• DISR
DSN Line Interfaces				
2-Wire Analog ISDN BRI NI 1/2 (ANSI T1.619a) Proprietary IEEE 802.3 TCP/IP	Yes Yes No No	Access	• Directory Number Identification (R) • Line signaling (R) • Loop Start Line (R: 2-Wire Analog only) • Analog Ground Start (R) • Alerting Signals and Tones (R) • WWNDP (R) • Call Processing (R) • Call Treatments (R) • 2-Wire user access (R: 2-Wire Analog only) • Analog busy/idle (R: 2-Wire Analog only)	• GSCR Section 2.1.1 • GSCR Section 5.2 • GSCR Section 5.2.1 • GSCR Section 5.2.2 • GSCR Section 5.5 • GSCR Section 4.5 • GSCR Section 4.4 • GSCR Section 4.1 • GSCR Section 4.3.3 • GSCR Section 4.3.4.1
		Voice	• MOS (R) • Announcements (R) • MLPP (R) • Secure Calls (R)	• CJCSI 6215.01B • GSCR Section 3.1.3 • GSCR Section 3.4.3/3.9 • CJCSI 6215.01B
		Facsimile	• Analog: TIA/EIA-465-A (R)	• DISR
		Data	• Modem (VBD) (R: 2-Wire analog only) • 56 kbps switched data (R: BRI only) • 64 kbps switched data (R: BRI only) • NX56 synchronous BER (R: BRI only) • NX64 synchronous BER (R: BRI only) • Secure data (STE/STU-III) (R)	• CJCSI 6215.01B • GSCR Section 3.10 • GSCR Section 3.10 • GSCR Section 3.10 • GSCR Section 3.10 • CJCSI 6215.01B
		VTC	• ITU-T H.320 (R: BRI only)	• DISR

Table 2. MFS Requirements (continued)

Voice Mail Interfaces			
T1 CAS T1 ISDN PRI with B Channel Transfer Serial SMDI Interface	No	• FCC Part15/Part 68 (R) • DTMF outpulsing (C) • ROUTINE precedence only in accordance with GSCR, Section 3.3 (R)	• GSCR A7.5 • GSCR A7.5, 5.4.1, 5.4.2 • GSCR A7.5.5
ACD Interfaces			
T1 CAS (DTMF, MFR1, DP) T1 ISDN PRI NI 1/2 (ANSI T1.607) Analog	No	• DTMF outpulsing (C) • TIA/EIA-470-B (R): Analog only • PCM-24 as specified in GSCR, section 7.1 (R) • ROUTINE precedence only in accordance with GSCR, Section 3.3 (R)	• GSCR Sect. A7.5, 5.4.1, 5.4.2 • GSCR A7.5.1 • GSCR Sect. A7.5.5 • GSCR Sect. A7.5.5
DSN Features & Capabilities			
Feature/ Capability	**Critical**	**Requirements Required or Conditional**	**References**
Common Features	Yes	• Selective call rejection (C) • Denied originating service (C) • Code restriction and diversion (R) • Call waiting (C) • Three-way calling (C) • Add-on transfer, conference calling, and call hold (C) • Call forwarding (C) • Call pick-up (C)	• GSCR Section 2.1.2 • GSCR Section 2.1.3 • GSCR Section 2.1.4 • GSCR Section 2.1.5 • GSCR Section 2.1.6 • GSCR Section 2.1.7 • GSCR Section 2.1.8 • GSCR Section 2.1.9
Attendant	Yes	• Initiate all precedence levels (R) • Visual display (R) • Override class of service (R) • Override busy line (R) • Call deflection (R) • Auto recall (R) • Waiting queue (R) • Release to pivot (R: SS7 only)	• GSCR Section 2.2.1 • GSCR Section 2.2.2 • GSCR Section 2.2.3 • GSCR Section 2.2.4 • GSCR Section 2.2.5 • GSCR Section 2.2.6 • GSCR Section 2.2.7 • GSCR Section 2.2.8
Public Safety	Yes	• Basic Emergency Service (911) (C) • Trace of terminating calls (R) • Outgoing call trace (R) • Tandem call trace (R) • Trace of a call in progress (R)	• GSCR Section 2.4.1 • GSCR Section 2.4.2 • GSCR Section 2.4.3 • GSCR Section 2.4.4 • GSCR Section 2.4.5
Preset Conferencing	Yes	• Support 10 bridges; 1 originator and 20 conferees per bridge (R) • Assign up to 20 address numbers per bridge (R) • Use KXX codes for bridge access (R) • Conference notification recorded announcement (R) • Auto retrial and alternate address (R) • Bridge release (R) • Lost connection (R) • Secondary conferencing (R) • Address translation (R)	• GSCR Section 2.6 • GSCR Section 2.6 • GSCR Section 2.6 • GSCR Section 2.6.1 • GSCR Section 2.6.2 • GSCR Section 2.6.3 • GSCR Section 2.6.4 • GSCR Section 2.6.5 • GSCR Section 2.7
Nailed-up Connections	Yes	• Between any two like terminations (R) • PCM-24 and PCM-30, both CAS and CCS (R) • Supervision passed end-to-end for A/D or D/A (R) • Monitored and auto reconfigure (R) • Support at least 10% of circuits as nailed-up (R) • Non-preemptable (R)	• GSCR Section 2.8 • GSCR Section 2.8 • GSCR Section 2.8 • GSCR Section 2.8 • GSCR Section 2.8 • GSCR Section 2.8

Table 2. MFS Requirements (continued)

DSN Features & Capabilities			
Feature/ Capability	**Critical**	**Requirements Required or Conditional**	**References**
PAT	No	• Classmark for/not for PAT screening (C) • 7 PAT mechanisms (C) • Outgoing call screening (C) • Functional structure (C) • Simultaneous calls limitation (C) • Overflow process (C) • Decrementing call-in-progress count (C) • Call treatment (C) • Queuing (C) • Attendant calls (C) • Operation measurement registers (C) • Maintenance and Administration of thresholds (C)	• GSCR Section 2.11.1 • GSCR Section 2.11.1 • GSCR Section 2.11.1.1 • GSCR Section 2.11.1.2 • GSCR Section 2.11.1.3 • GSCR Section 2.11.1.4 • GSCR Section 2.11.1.5 • GSCR Section 2.11.1.6 • GSCR Section 2.11.1.7 • GSCR Section 2.11.1.8 • GSCR Section 2.11.1.9 • GSCR Section 2.11.1.10
DSN Hotline Services	Yes	• Hotline restrictions (R) • Auto initiate (R) • Analog and digital (R) • Subscription basis (R) • Protected hotline calling (R) • WWNDP interoperable (R)	• GSCR Section 2.12 • GSCR Section 2.12 • GSCR Section 2.12 • GSCR Section 2.12 • GSCR Section 2.12.1-4 • GSCR Section 2.12.2
Tandem Switching	Yes	• Tandem Features (R)	• GSCR Section 8 table 8-1
Network Management	Yes	• Interfaces (R) • Measurements and data generation (R) • Fault management (R) • Configuration management (R) • Accounting management (R) • Performance management (R) • Network Management controls (R) • Remote access (R)	• GSCR Section 9.1 • GSCR Section 9.2 • GSCR Section 9.3 • GSCR Section 9.4 • GSCR Section 9.5 • GSCR Section 9.6 • GSCR Section 9.7 • GSCR Section 9.8
ISDN Services	No	• Electronic Key Telephone Systems (EKTS) (C)	• GSCR Section 10, table 10-3
Synchronization	Yes	• External line timing mode (R) • Line timing mode (R) • Internal Stratum 3 (R)	• GSCR Section 11.1.1.1 • GSCR Section 11.1.1.2 • GSCR Section 11.1.2.1
Reliability	Yes	• GR-512-CORE (R)	• GSCR Section12
Security	Yes	• GR-815, STIGs, and DIACAP (replacement for DITSCAP) (R)	• GSCR Section 13

Table 2. MFS Requirements (continued)

Network Gateways				
Gateway	**Critical**	**Requirements Required or Conditional**		**References**
PSTN[1]	Yes	Trunking	• Positive Identification Control (R) • On-Netting (R) • Off-Netting (R)	• CJCSI 6215.01B • CJCSI 6215.01B • CJCSI 6215.01B
Tactical[2]	Yes	Trunking	• Trunk Groups (R) • Call Processing (R)	• GSCR Section 2.5.5 & 2.5.6 • GSCR Section 4
		Voice	• MLPP (R) • Secure calls (R)	• GSCR Section 3 • CJCSI 6215.01B
		Facsimile	• Analog: TIA/EIA-465-A (R)	• DISR
DRSN[3]	Yes	Access	• Alerting Signals and Tones (R) • Call Processing (R) • Call Treatments (R) • Analog busy/idle (R)	• GSCR Section 5.5 • GSCR Section 4.4 • GSCR Section 4.1 • GSCR Section 4.3.4.1
		Voice	• MOS (R) • MLPP (R) • Secure calls (R)	• CJCSI 6215.01B • GSCR Section 3 • CJCSI 6215.01B

LEGEND:

802.3 - Standard for carrier sense multiple access with collision detection at 10 Mbps
A - Appendix
A/D - Analog to Digital Conversion
ACD - Automated Call Distributor
ANSI - American National Standards Institute
BER - Bit Error Ratio
BRI - Basic Rate Interface
C - Conditional
CAS - Channel Associated Signaling
CCS - Common Channel Signaling
CJCSI - Chairman of the Joint Chiefs of Staff Instruction
D/A - Digital to Analog Conversion
DIACAP - DoD Information Assurance Certification and Accreditation Process
DISR - DoD IT Standards Registry
DITSCAP - DoD IT Security Certification and Accreditation Process
DoD - Department of Defense
DP - Dial Pulse
DRSN - Defense Red Switch Network
DSN - Defense Switched Network
DTMF - Dual Tone Multi-Frequency
E1 - European Basic Multiplex Rate (2.048 Mbps)
EIA - Electronic Industries Alliance
FCC - Federal Communications Commission
GR - Generic Requirement
GR-512 - LSSGR: Reliability, Section 12
GR-815 - Generic Requirements For Network Element/Network System (NE/NS) Security
GSCR - Generic Switching Center Requirements
H.320 - Standard for Narrowband VTC
IEEE - Institute of Electrical and Electronics Engineers, Inc.
ISDN - Integrated Services Digital Network
IT - Information Technology
ITU-T - International Telecommunication Union - Telecommunication Standardization Sector
kbps - kilobits per second
KXX - K= any number 2-8; X= any number 1-9
LSSGR - Local Access and Transport Area (LATA) Switching Systems Generic Requirements
Mbps - Megabits per second
MFR1 - Multi-Frequency Recommendation 1
MFS - Multifunction Switch
MLPP - Multi-Level Precedence and Preemption
MOS - Mean Opinion Score
NI 1/2 - National ISDN Standard 1 or 2
NX56 - Data format restricted to multiples of 56 kbps
NX64 - Data format restricted to multiples of 64 kbps
PAT - Precedence Access Threshold
PCM-24 - Pulse Code Modulation - 24 Channels
PCM-30 - Pulse Code Modulation - 30 Channels
PRI - Primary Rate Interface
PSTN - Public Switched Telephone Network
Q.735.3 - SS7 Signaling Standard for E1 MLPP
Q.955.3 - ISDN Signaling standard for E1 MLPP
R - Required
SMDI - Simplified Message Desk Interface
SMU - Switch Multiplexer Unit
SS7 - Signaling System 7
STE - Secure Terminal Equipment
STIGs - Security Technical Implementation Guides
STU-III - Secure Telephone Unit - 3rd generation
T1 - Digital Transmission Link Level 1 (1.544 Mbps)
T1.619a - SS7 and ISDN MLPP Signaling Standard for T1
TCP/IP - Transmission Control Protocol/Internet Protocol
TIA - Telecommunications Industry Association
TIA/EIA-465-A - Group 3 Facsimile Apparatus for Document Transmission
TIA/EIA-470-B - Performance and Compatibility Requirements for Telephone Sets with Loop Signaling
VBD - Variable bit data
VTC - Video Teleconferencing
WWNDP - Worldwide Numbering and Dialing Plan

NOTES:

1 Voice, facsimile, data, and VTC service requirements for PSTN are identical to DSN with the exception of MLPP.
2 Data and VTC services are not provided via the DSN to tactical (SMU) interface.
3 Facsimile, data, and VTC services are not provided via the DSN to DRSN interface.

5. No detailed test report was developed in accordance with the Program Manager's request. JITC distributes interoperability information via the JITC Electronic Report Distribution (ERD) system, which uses Unclassified-But-Sensitive Internet Protocol Router Network (NIPRNet) e-mail. More comprehensive interoperability status information is available via the JITC System Tracking Program (STP). The STP is accessible by .mil/gov users on the NIPRNet at https://stp.fhu.disa.mil. Test reports, lessons learned, and related testing documents and references are on the JITC Joint Interoperability Tool (JIT) at http://jit.fhu.disa.mil (NIPRNet), or http://199.208.204.125 (SIPRNet). Information related to DSN testing is on the Telecom Switched Services Interoperability (TSSI) website at http://jitc.fhu.disa.mil/tssi.

JITC Memo, JTE, Special Interoperability Test Certification of the Alcatel-Lucent Class 5 Electronic Switching System (5ESS) Very Compact Digital Exchange (VCDX) Digital Switching System with Software Release 5E16.2, Broadcast Warning Message (BWM) 07-0003

6. The JITC point of contact is Mr. Joseph Schulte, DSN 879-5164, commercial (520) 538-5164, FAX DSN 879-4347, or e-mail to joseph.schulte@disa.mil. The tracking number for the SUT is 0706704.

FOR THE COMMANDER:

2 Enclosures a/s

MANUEL H. GARCIA, JR.
Acting 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), MARCORSYSCOM, 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) Chairman of the Joint Chiefs of Staff Instruction (CJCSI) 6215.01B, "Policy for Department of Defense Voice Services," 23 September 2001

(d) Defense Information Systems Agency, "Department of Defense Voice Networks Generic Switching Center Requirements (GSCR), Errata Change 2," 14 December 2006, Revised 27 March 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. Alcatel-Lucent Class 5 Electronic Switching System (5ESS) Very Compact Digital Exchange (VCDX) Digital Switching System with Software Release 5E16.2, Broadcast Warning Message (BWM) 07-0003 is hereinafter referred to as the System Under Test (SUT).

2. PROPONENT. Defense Information Systems Agency-Pacific Command (DISA-PAC).

3. PROGRAM MANAGER. Ms. JoAnne Rhoden, JHITS Program Manager, 477 Essex Street, Building 77, Pearl Harbor, Hawaii, 96860 e-mail: joanne.rhoden@disa.mil.

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

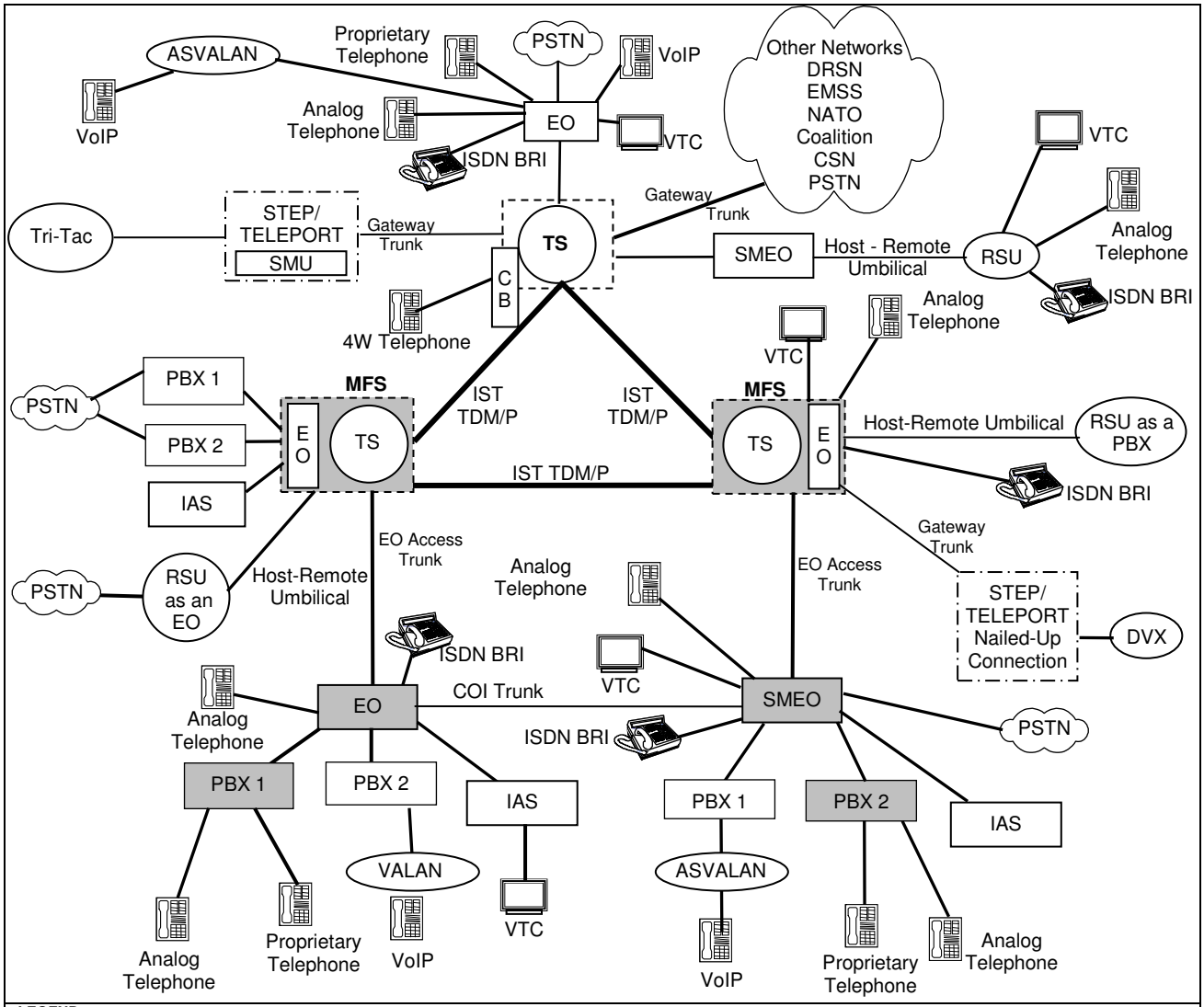
5. SYSTEM UNDER TEST DESCRIPTION. The SUT is designed for application as a local, toll, combined local/toll, operator services, commercial, Defense Switched Network (DSN), or local tandem digital electronic switching system. It supports the Integrated Services Digital Network (ISDN), which provides integrated voice and data services. The architecture of the SUT switch emphasizes flexibility through the use of distributed processing and a modular growth plan. The modular design allows switching capacity, system interfaces, and call processing capacity to be added incrementally. It has the capacity to support over 20,000 lines and 5,000 trunks simultaneously. The SUT supports ISDN Basic Rate Interface (BRI) and analog line interfaces and Digital Transmission Link Level 1 (T1) trunk interfaces. The SUT offers various possibilities for the connection of remote subscribers, depending on the quantity and the grouping of the subscribers. The SUT has a distributed architecture, which consists of two basic hardware elements:

- **Administrative Workstation (AWS**). The AWS is a Sun Netra 240 whose function is to emulate the Administrative Module (AM) and Communications Module (CM) functions normally provided separately in the full 5ESS switch configuration. Acting as the AM, the AWS provides all external interfaces for operations, maintenance and provisioning of the system. The Netra 240 requires a Terminal Server for access and an external DAT drive for backup purposes.

    - **MRV LX 4016T Terminal Server:** The LX4016T is a Federal Information Processing Standard Mode Terminal Server that provides secure access to the Sun Netra 240 console port.
    - **DAT72:** The DAT72 is an external Digital Audio Tape Drive that is used for system backup purposes.

- **Switching Module (SM).** The SM serves as the Time Division Multiplexing switch which provides analog and ISDN service to subscribers, provides trunking connections to other networks, converts between analog and digital and provides call processing logic. The VCDX configuration supports only a single SM.

6. OPERATIONAL ARCHITECTURE. The DSN architecture is a two-level network hierarchy consisting of DSN backbone switches and Service/Agency installation switches. Joint Staff policy and subscriber mission requirements determine which type of switch can be used at a particular location. The DSN architecture therefore consists of several categories of switches including Multifunction Switch (MFS)s. The Generic Switching Center Requirements (GSCR) operational DSN Architecture is depicted in figure 2-1. The architecture depicts the relationship of MFSs to the other DSN switch types.



LEGEND:

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

Figure 2-1. DSN Architecture

7. REQUIRED SYSTEM INTERFACES. Requirements specific to the MFS are listed in table 2-1. These requirements are derived from:

a. DSN services for Network and Applications specified in Chairman of the Joint Chiefs of Staff Instruction (CJCSI) 6215.01B, "Policy for Department of Defense Voice Services."

b. GSCR interface and signaling requirements for trunks/lines verified through JITC testing and/or vendor submission of Letters of Compliance (LoC).

c. GSCR MFS Capability Requirements (CRs) and Feature Requirements (FRs) verified through JITC testing and/or vendor submission of LoC.

Table 2-1. MFS Requirements

DSN Trunk Interfaces				
Interface	**Critical**	**Requirements Required or Conditional**		**References**
T1 SS7 (ANSI T1.619a) E1 SS7 (ITU-T Q.735.3) T1 CAS (MFR1, DTMF, DP) E1 CAS (MFR1, DTMF, DP) T1 ISDN PRI NI 1/2 (ANSI T1.619a) E1 ISDN PRI (ITU-T Q.955.3)	Yes Yes (Europe only) Yes Yes (Europe only) Yes Yes (Europe Only)	Trunking	• Framing (R) • Line Code (R) • Signaling (R) • Alarms (R) • WWNDP (R) • Outpulsing digit formats (R: CAS only) • Routing (R) • Trunk Groups (R) • CAS to CCS trunk interworking (R) • PCM-24/PCM-30 Interoperation (R) • Direct Inward Dialing (R)	• GSCR Section 7 • GSCR Section 7 • GSCR Section 5 • GSCR Section 2.5.7, 7.1.4 & 7.2.2 • GSCR Section 4.5.1 • GSCR Section 4.5.2 • GSCR Section 4.2 • GSCR Section 2.5.5 & 2.5.6 • GSCR Section 3.10 • GSCR Section 7.3 • GSCR Section 2.3.2
		Voice	• MOS (R) • MLPP (R) • Secure calls (R)	• CJCSI 6215.01B • GSCR Section 3 • CJCSI 6215.01B
		Facsimile	• Analog: TIA/EIA-465-A (R)	• DISR
		Data	• Modem (VBD) (R) • 56 kbps switched data (R) • 64 kbps switched data (R: E1, PRI, and SS7) • NX56 synchronous BER (R) • NX64 synchronous BER (R: E1, PRI, and SS7) • Secure data (STE/STU-III) (R)	• CJCSI 6215.01B • GSCR Section 3.10 • GSCR Section 3.10 • GSCR Section 3.10 • GSCR Section 3.10 • CJCSI 6215.01B
		VTC	• ITU-T H.320 (R)	• DISR

Table 2-1. MFS Requirements (continued)

DSN Line Interfaces				
2-Wire Analog	Yes	Access	• Directory Number Identification (R) • Line signaling (R) • Loop Start Line (R: 2-Wire Analog only) • Analog Ground Start (R) • Alerting Signals and Tones (R) • WWNDP (R) • Call Processing (R) • Call Treatments (R) • 2-Wire user access (R: 2-Wire Analog only) • Analog busy/idle (R: 2-Wire Analog only)	• GSCR Section 2.1.1 • GSCR Section 5.2 • GSCR Section 5.2.1 • GSCR Section 5.2.2 • GSCR Section 5.5 • GSCR Section 4.5 • GSCR Section 4.4 • GSCR Section 4.1 • GSCR Section 4.3.3 • GSCR Section 4.3.4.1
ISDN BRI NI 1/2 (ANSI T1.619a)	Yes			
Proprietary	No	Voice	• MOS (R) • Announcements (R) • MLPP (R) • Secure Calls (R)	• CJCSI 6215.01B • GSCR Section 3.1.3 • GSCR Section 3.4.3/3.9 • CJCSI 6215.01B
IEEE 802.3 TCP/IP	No	Facsimile	• Analog: TIA/EIA-465-A (R)	• DISR
		Data	• Modem (VBD) (R: 2-Wire analog only) • 56 kbps switched data (R: BRI only) • 64 kbps switched data (R: BRI only) • NX56 synchronous BER (R: BRI only) • NX64 synchronous BER (R: BRI only) • Secure data (STE/STU-III) (R)	• CJCSI 6215.01B • GSCR Section 3.10 • GSCR Section 3.10 • GSCR Section 3.10 • GSCR Section 3.10 • CJCSI 6215.01B
		VTC	• ITU-T H.320 (R: BRI only)	• DISR
Voice Mail Interfaces				
T1 CAS T1 ISDN PRI with B Channel Transfer Serial SMDI Interface	No		• FCC Part15/Part 68 (R) • DTMF outpulsing (C) • ROUTINE precedence only in accordance with GSCR, Section 3.3 (R)	• GSCR A7.5 • GSCR A7.5, 5.4.1, 5.4.2 • GSCR A7.5.5
ACD Interfaces				
T1 CAS (DTMF, MFR1, DP) T1 ISDN PRI NI 1/2 (ANSI T1.607) Analog	No		• DTMF outpulsing (C) • TIA/EIA-470-B (R): Analog only • PCM-24 as specified in GSCR, section 7.1 (R) • ROUTINE precedence only in accordance with GSCR, Section 3.3 (R)	• GSCR Sect. A7.5, 5.4.1, 5.4.2 • GSCR A7.5.1 • GSCR Sect. A7.5.5 • GSCR Sect. A7.5.5
DSN Features & Capabilities				
Feature/ Capability	**Critical**	**Requirements Required or Conditional**		**References**
Common Features	Yes		• Selective call rejection (C) • Denied originating service (C) • Code restriction and diversion (R) • Call waiting (C) • Three-way calling (C) • Add-on transfer, conference calling, and call hold (C) • Call forwarding (C) • Call pick-up (C)	• GSCR Section 2.1.2 • GSCR Section 2.1.3 • GSCR Section 2.1.4 • GSCR Section 2.1.5 • GSCR Section 2.1.6 • GSCR Section 2.1.7 • GSCR Section 2.1.8 • GSCR Section 2.1.9
Attendant	Yes		• Initiate all precedence levels (R) • Visual display (R) • Override class of service (R) • Override busy line (R) • Call deflection (R) • Auto recall (R) • Waiting queue (R) • Release to pivot (R: SS7 only)	• GSCR Section 2.2.1 • GSCR Section 2.2.2 • GSCR Section 2.2.3 • GSCR Section 2.2.4 • GSCR Section 2.2.5 • GSCR Section 2.2.6 • GSCR Section 2.2.7 • GSCR Section 2.2.8

Table 2-1. MFS Requirements (continued)

DSN Features & Capabilities			
Feature/ Capability	**Critical**	**Requirements Required or Conditional**	**References**
Public Safety	Yes	• Basic Emergency Service (911) (C) • Trace of terminating calls (R) • Outgoing call trace (R) • Tandem call trace (R) • Trace of a call in progress (R)	• GSCR Section 2.4.1 • GSCR Section 2.4.2 • GSCR Section 2.4.3 • GSCR Section 2.4.4 • GSCR Section 2.4.5
Preset Conferencing	Yes	• Support 10 bridges; 1 originator and 20 conferees per bridge (R) • Assign up to 20 address numbers per bridge (R) • Use KXX codes for bridge access (R) • Conference notification recorded announcement (R) • Auto retrial and alternate address (R) • Bridge release (R) • Lost connection (R) • Secondary conferencing (R) • Address translation (R)	• GSCR Section 2.6 • GSCR Section 2.6 • GSCR Section 2.6 • GSCR Section 2.6.1 • GSCR Section 2.6.2 • GSCR Section 2.6.3 • GSCR Section 2.6.4 • GSCR Section 2.6.5 • GSCR Section 2.7
Nailed-up Connections	Yes	• Between any two like terminations (R) • PCM-24 and PCM-30, both CAS and CCS (R) • Supervision passed end-to-end for A/D or D/A (R) • Monitored and auto reconfigure (R) • Support at least 10% of circuits as nailed-up (R) • Non-preemptable (R)	• GSCR Section 2.8 • GSCR Section 2.8 • GSCR Section 2.8 • GSCR Section 2.8 • GSCR Section 2.8 • GSCR Section 2.8
PAT	No	• Classmark for/not for PAT screening (C) • 7 PAT mechanisms (C) • Outgoing call screening (C) • Functional structure (C) • Simultaneous calls limitation (C) • Overflow process (C) • Decrementing call-in-progress count (C) • Call treatment (C) • Queuing (C) • Attendant calls (C) • Operation measurement registers (C) • Maintenance and Administration of thresholds (C)	• GSCR Section 2.11.1 • GSCR Section 2.11.1 • GSCR Section 2.11.1.1 • GSCR Section 2.11.1.2 • GSCR Section 2.11.1.3 • GSCR Section 2.11.1.4 • GSCR Section 2.11.1.5 • GSCR Section 2.11.1.6 • GSCR Section 2.11.1.7 • GSCR Section 2.11.1.8 • GSCR Section 2.11.1.9 • GSCR Section 2.11.1.10
DSN Hotline Services	Yes	• Hotline restrictions (R) • Auto initiate (R) • Analog and digital (R) • Subscription basis (R) • Protected hotline calling (R) • WWNDP interoperable (R)	• GSCR Section 2.12 • GSCR Section 2.12 • GSCR Section 2.12 • GSCR Section 2.12 • GSCR Section 2.12.1-4 • GSCR Section 2.12.2
Tandem Switching	Yes	• Tandem Features (R)	• GSCR Section 8 table 8-1
Network Management	Yes	• Interfaces (R) • Measurements and data generation (R) • Fault management (R) • Configuration management (R) • Accounting management (R) • Performance management (R) • Network Management controls (R) • Remote access (R)	• GSCR Section 9.1 • GSCR Section 9.2 • GSCR Section 9.3 • GSCR Section 9.4 • GSCR Section 9.5 • GSCR Section 9.6 • GSCR Section 9.7 • GSCR Section 9.8
ISDN Services	No	• Electronic Key Telephone Systems (EKTS) (C)	• GSCR Section 10, table 10-3
Synchronization	Yes	• External line timing mode (R) • Line timing mode (R) • Internal Stratum 3 (R)	• GSCR Section 11.1.1.1 • GSCR Section 11.1.1.2 • GSCR Section 11.1.2.1
Reliability	Yes	• GR-512-CORE (R)	• GSCR Section12
Security	Yes	• GR-815, STIGs, and DIACAP (replacement for DITSCAP) (R)	• GSCR Section 13

Table 2-1. MFS Requirements (continued)

Network Gateways				
Gateway	**Critical**	**Requirements Required or Conditional**		**References**
PSTN[1]	Yes	Trunking	• Positive Identification Control (R) • On-Netting (R) • Off-Netting (R)	• CJCSI 6215.01B • CJCSI 6215.01B • CJCSI 6215.01B
Tactical[2]	Yes	Trunking	• Trunk Groups (R) • Call Processing (R)	• GSCR Section 2.5.5 & 2.5.6 • GSCR Section 4
		Voice	• MLPP (R) • Secure calls (R)	• GSCR Section 3 • CJCSI 6215.01B
		Facsimile	• Analog: TIA/EIA-465-A (R)	• DISR
DRSN[3]	Yes	Access	• Alerting Signals and Tones (R) • Call Processing (R) • Call Treatments (R) • Analog busy/idle (R)	• GSCR Section 5.5 • GSCR Section 4.4 • GSCR Section 4.1 • GSCR Section 4.3.4.1
		Voice	• MOS (R) • MLPP (R) • Secure calls (R)	• CJCSI 6215.01B • GSCR Section 3 • CJCSI 6215.01B

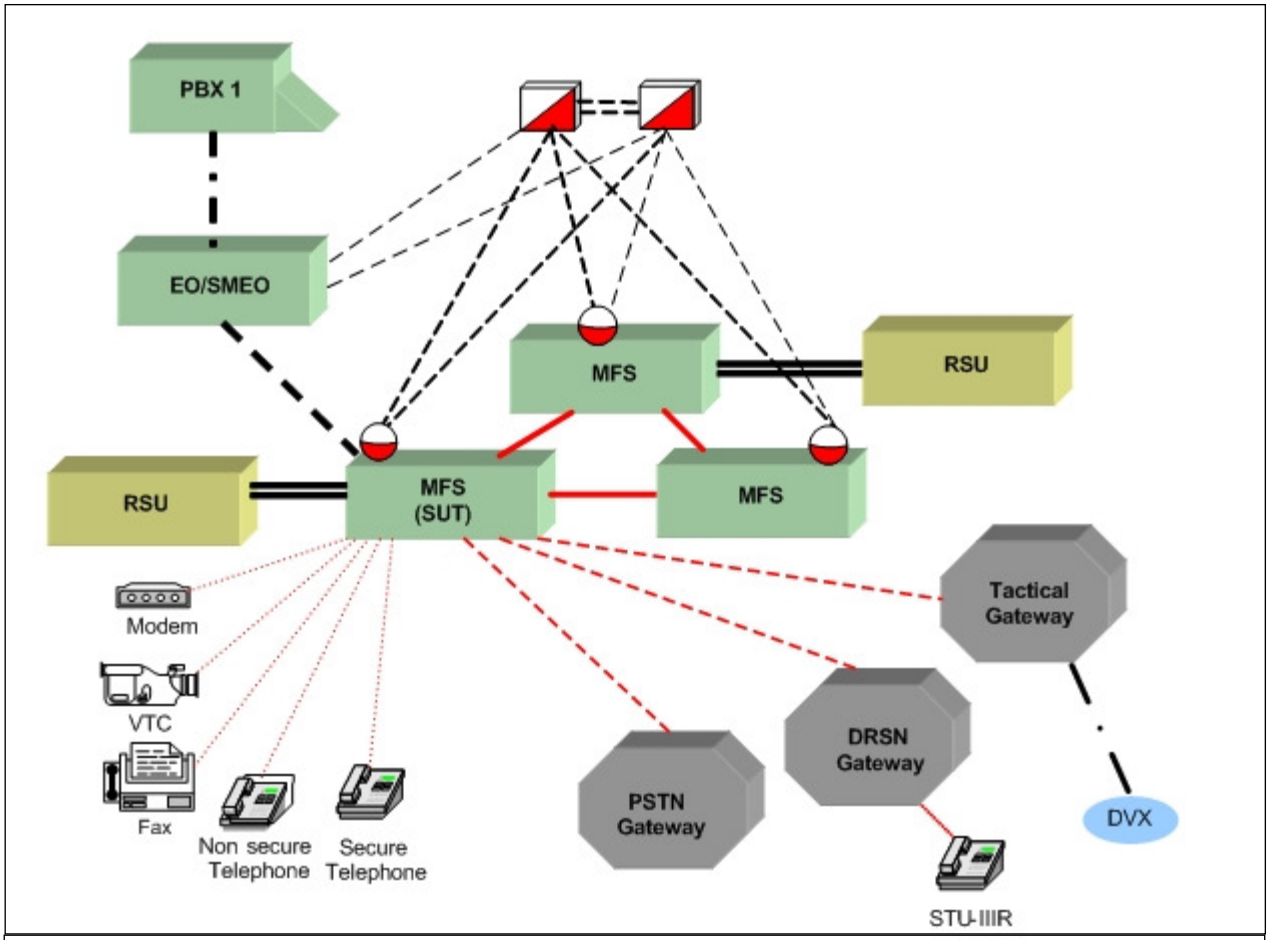
LEGEND:

802.3 - Standard for carrier sense multiple access with collision detection at 10 Mbps
A - Appendix
A/D - Analog to Digital Conversion
ACD - Automated Call Distributor
ANSI - American National Standards Institute
BER - Bit Error Ratio
BRI - Basic Rate Interface
C - Conditional
CAS - Channel Associated Signaling
CCS - Common Channel Signaling
CJCSI - Chairman of the Joint Chiefs of Staff Instruction
D/A - Digital to Analog Conversion
DIACAP - DoD Information Assurance Certification and Accreditation Process
DISR - DoD IT Standards Registry
DITSCAP - DoD IT Security Certification and Accreditation Process
DoD - Department of Defense
DP - Dial Pulse
DRSN - Defense Red Switch Network
DSN - Defense Switched Network
DTMF - Dual Tone Multi-Frequency
E1 - European Basic Multiplex Rate (2.048 Mbps)
EIA - Electronic Industries Alliance
FCC - Federal Communications Commission
GR - Generic Requirement
GR-512 - LSSGR: Reliability, Section 12
GR-815 - Generic Requirements For Network Element/Network System (NE/NS) Security
GSCR - Generic Switching Center Requirements
H.320 - Standard for Narrowband VTC
IEEE - Institute of Electrical and Electronics Engineers, Inc.
ISDN - Integrated Services Digital Network
IT - Information Technology
ITU-T - International Telecommunication Union - Telecommunication Standardization Sector
kbps - kilobits per second
KXX - K= any number 2-8; X= any number 1-9
LSSGR - Local Access and Transport Area (LATA) Switching Systems Generic Requirements
Mbps - Megabits per second
MFR1 - Multi-Frequency Recommendation 1
MFS - Multifunction Switch
MLPP - Multi-Level Precedence and Preemption
MOS - Mean Opinion Score
NI 1/2 - National ISDN Standard 1 or 2
NX56 - Data format restricted to multiples of 56 kbps
NX64 - Data format restricted to multiples of 64 kbps
PAT - Precedence Access Threshold
PCM-24 - Pulse Code Modulation - 24 Channels
PCM-30 - Pulse Code Modulation - 30 Channels
PRI - Primary Rate Interface
PSTN - Public Switched Telephone Network
Q.735.3 - SS7 Signaling Standard for E1 MLPP
Q.955.3 - ISDN Signaling standard for E1 MLPP
R - Required
SMDI - Simplified Message Desk Interface
SMU - Switch Multiplexer Unit
SS7 - Signaling System 7
STE - Secure Terminal Equipment
STIGs - Security Technical Implementation Guides
STU-III - Secure Telephone Unit - 3rd generation
T1 - Digital Transmission Link Level 1 (1.544 Mbps)
T1.619a - SS7 and ISDN MLPP Signaling Standard for T1
TCP/IP - Transmission Control Protocol/Internet Protocol
TIA - Telecommunications Industry Association
TIA/EIA-465-A - Group 3 Facsimile Apparatus for Document Transmission
TIA/EIA-470-B - Performance and Compatibility Requirements for Telephone Sets with Loop Signaling
VBD - Variable bit data
VTC - Video Teleconferencing
WWNDP - Worldwide Numbering and Dialing Plan

NOTES:

1 Voice, facsimile, data, and VTC service requirements for PSTN are identical to DSN with the exception of MLPP.
2 Data and VTC services are not provided via the DSN to tactical (SMU) interface.
3 Facsimile, data, and VTC services are not provided via the DSN to DRSN interface.

8. TEST NETWORK DESCRIPTION. The SUT was tested at the JITC Global Information Grid Network Test Facility. This test was conducted using four test configurations shown in figures 2-2 through 2-6. Testing of the system's required functions and features was conducted using the test configuration depicted in figure 2-2. Network integration testing was conducted using the test configuration depicted in figure 2-3. These figures accurately emulate the DSN operational environment. Figure 2-4 depicts the SUT components. Figure 2-5 depicts the test configuration used to test the Advanced DSN Integrated Management Support System (ADIMSS) network management required functions and features.



LEGEND:

A-Link	- Access Link (SS7)
ASVALAN	- Assured Services Voice Application Local Area Network
B-Link	- Bridge Link (SS7)
BRI	- Basic Rate Interface
C-Link	- Cross Link (SS7)
CAS	- Channel Associated Signaling
DRSN	- Defense Red Switch Network
DSN	- Defense Switched Network
DVX	- Deployable Voice Exchange
E1	- European Basic Multiplex Rate (2.048 Mbps)
EO	- End Office
FAX	- facsimile
ISDN	- Integrated Services Digital Network
Mbps	- Megabits per second
MFS	- Multifunction Switch
PBX	- Private Branch Exchange
PBX 1	- Private Branch Exchange 1
PRI	- Primary Rate Interface
PSTN	- Public Switched Telephone Network
RSU	- Remote Switching Unit
SMEO	- Small End Office
SS7	- Signaling System 7
STU-IIIR	- Secure Telephone Unit-3rd generation Red Switch
SUT	- System Under Test
T1	- Digital Transmission Link Level 1 (1.544 Mbps)
VTC	- Video Teleconferencing

SS7 Service Switching Point (SSP)

SS7 Signal Transfer Point (STP)

DSN Gateway Trunk

DSN Interswitch Trunk (T1/E1 SS7, T1/E1 CAS, T1/E1 ISDN PRI)

DSN Line (2 Wire Analog, ISDN BRI, Digital Proprietary)

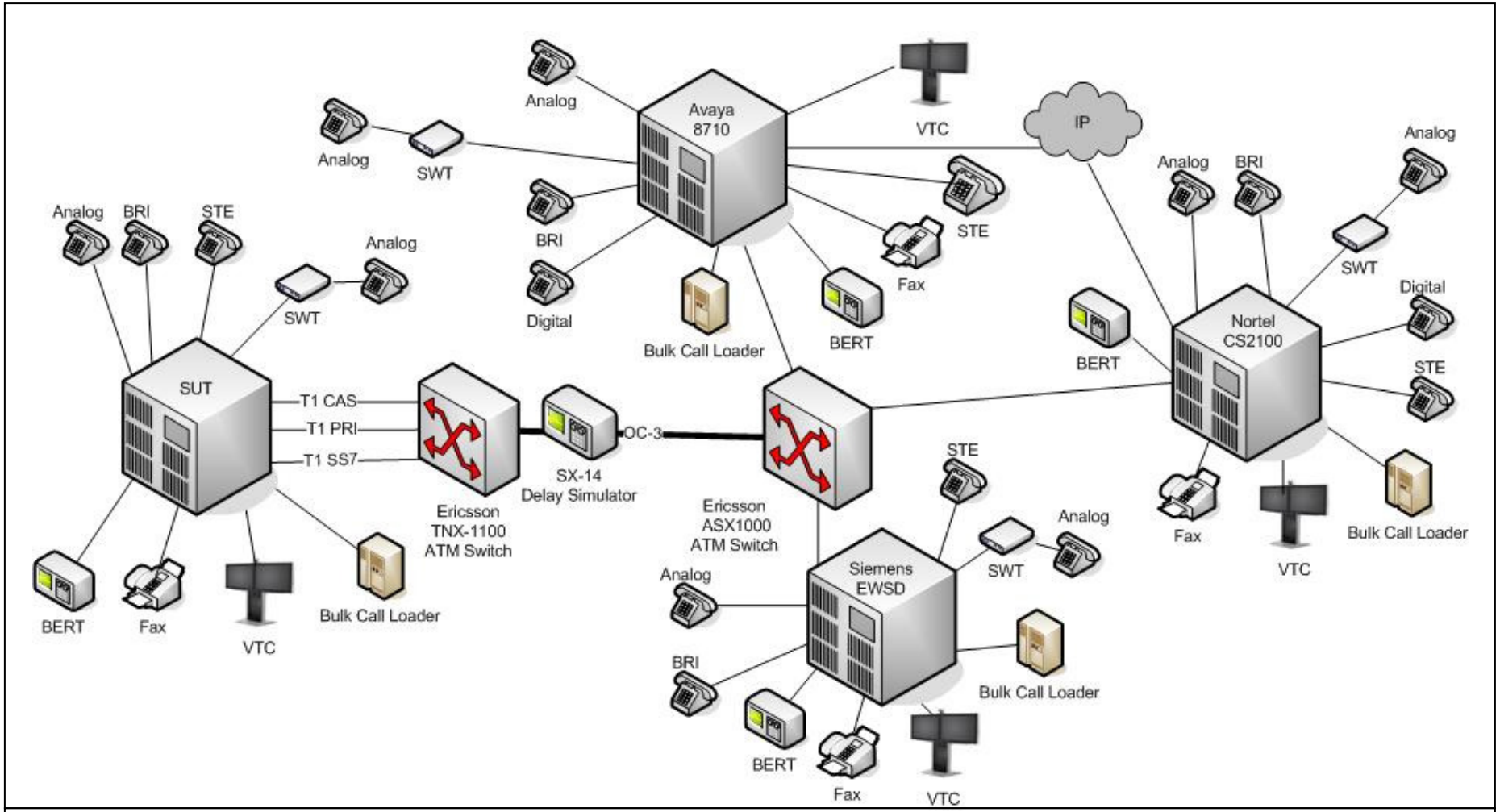
SS7 Links (A-Link, B-Link, or C-Link)

DSN End Office Access Trunk (T1/E1 SS7, T1/E1 CAS, T1/E1 ISDN PRI)

DSN PBX Access Trunk (T1/E1 SS7, T1/E1 CAS, T1/E1 ISDN PRI)

RSU-Host Umbilical Link

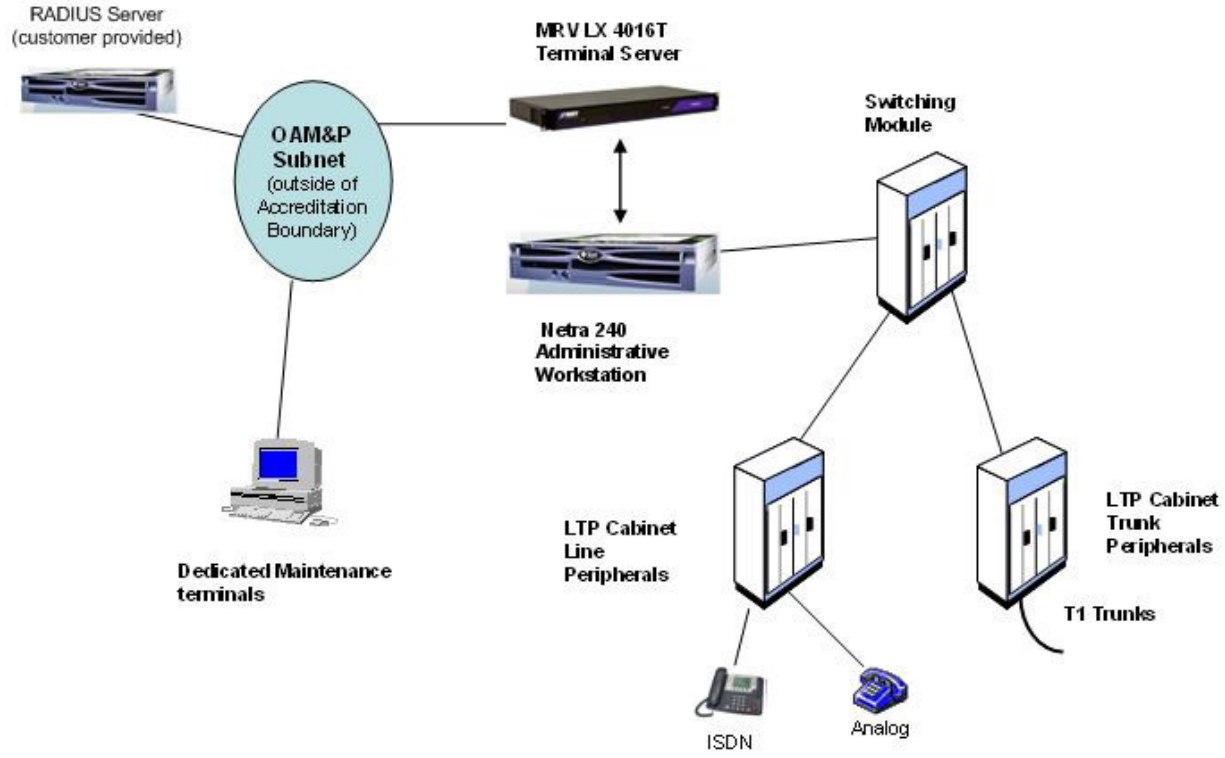
Figure 2-2. Test Configuration



LEGEND:

ATM	- Asynchronous Transfer Mode
BERT	- Bit Error Test
BRI	- Basic Rate Interface
CAS	- Channel Associated Signaling
CS	- Communication Server
EWSD	- Elektronisches Wählsystem Digital
Fax	- Facsimile
IP	- Internet Protocol
Mbps	- Megabits per second
OC-3	- Optical Carrier Level 3
PRI	- Primary Rate Interface
SS7	- Signaling System 7
STE	- Secure Terminal Equipment
SWT	- Secure Wireline Terminal
SUT	- System Under Test
T1	- Digital Transmission Link Level 1 (1.544 Mbps)
VTC	- Video Teleconferencing

Figure 2-3. SUT Network Integration Testing Configuration



LEGEND:

ISDN	- Integrated Services Digital Network
LTP	- Line and Trunk Peripheral
Mbps	- Megabits per second
OAM&P	- Operations, Administration, Maintenance and Provisioning
RADIUS	- Remote Authentication Dial In User Service
T1	- Digital Transmission Link Level 1 (1.544 Mbps)
VCDX	- Very Compact Digital Exchange

Figure 2-4. VCDX Configuration

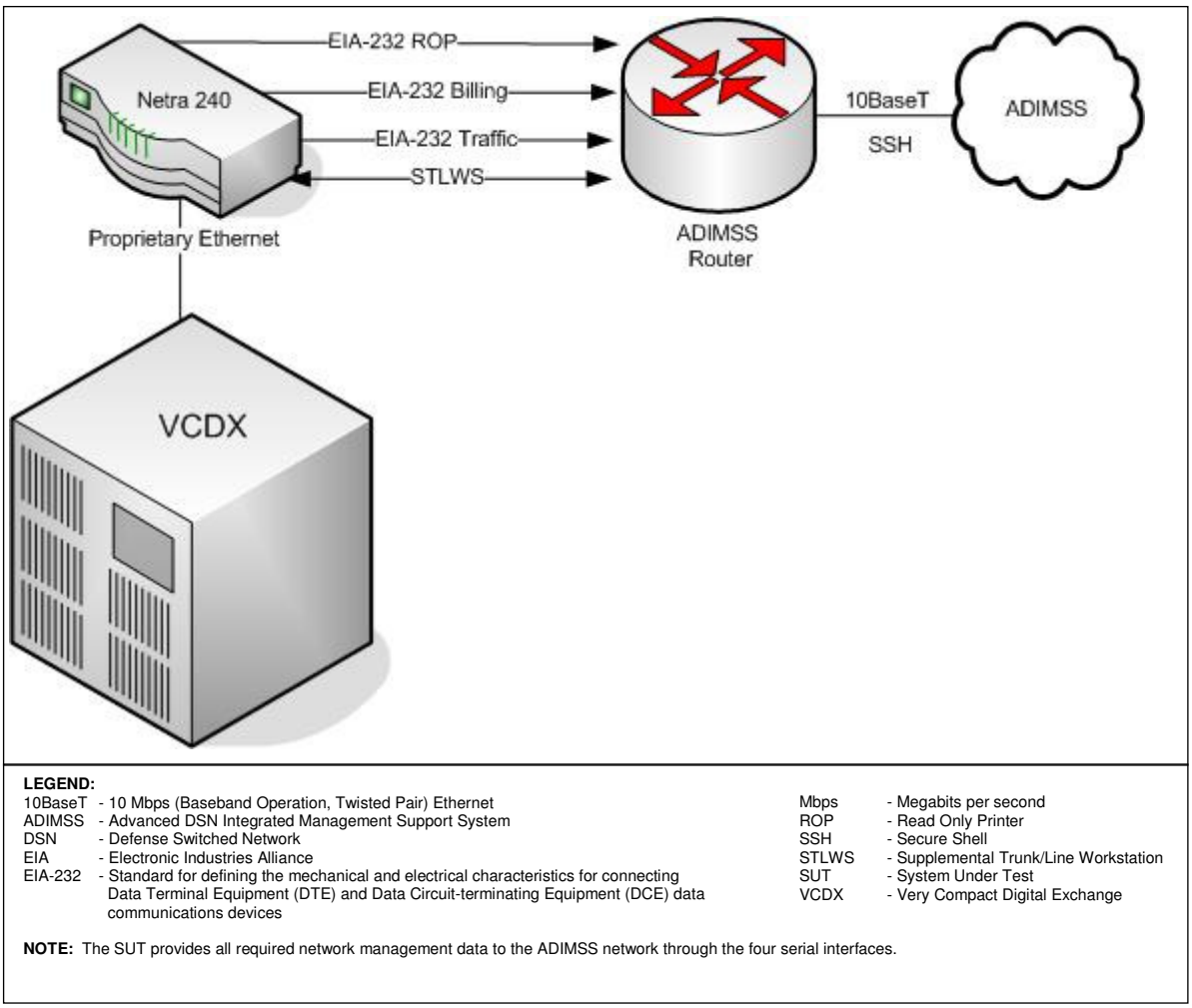


Figure 2-5. VCDX ADIMSS Network Management Test Configuration

9. SYSTEM CONFIGURATIONS. Table 2-2 provides the system configurations, hardware and software components tested with the SUT. The SUT was tested in an operationally realistic environment to determine interoperability with a complement of DSN switches noted in table 2-2. The DSN switches listed in table 2-2 only depict the tested configuration. Table 2-2 is not intended to identify the only switches that are certified with the SUT. The SUT is certified with switching systems listed on the DSN Approved Products List (APL) that offer the same certified interfaces.

Table 2-2. Tested System Configurations

System Name	Software Release
Siemens EWSD	19d with Patch set 46
Avaya S8710	Communication Manager (CM) 4.0 (R014x.00.2.731.7) patch 14419
Nortel CS2100	Succession Enterprise (SE)09.1
Secure Digital Switch (DRSN)	15.04.01
Digital Small Switch (DRSN)	8.07.03
Nortel BroadBand STP	Release 8.0.12.16E
Tekelec STP	31.6.11-53.46.65
SMU 96 Tactical Gateway	Version RD30220F
Ericsson ATM ASX-1000, ASX-200BX, and TNX-1100	ForeThought Versions 6.2 & 7.1
Compunetix Conference Engine	1.0

SUT				
	Component Cabinet/ Unit	**Product Code**	**Description**	**Version**
5ESS VCDX	**M01**	Sun Netra 240	DRM Administrative Work Station (AWS)	5E16.2 BWM07-0003
		Sun DAT 72	Sun External SCSI Digital Audio Tape	N/A
		MRV Terminal Server	LX4016 Terminal Server	5.1.1
		SMDR Translator	SMDR Interface that Converts ISDN BRI to RS-232	N/A
		SMSI Translator	SMSI Interface that Converts ISDN BRI to RS-232	N/A
		17A Announcement System	Provides Local Recorded Announcements Capability	N/A
	SM003 LPT001 / DLTU2 – 0	SN730	DLTU2 Automatic Power Start Card for T1 Trunks	1:1
		TN1611C	DLTU DFI	1:3
	SM003 LPT001 / MMSU 00	494GD	MMSU Power Supply	1:3
		TN879B	MMSU Common Pack	1:9
		TN138	MMSU Metallic Access	9:11
		TN220B	MMSU Scan Point Pack	4:10
	SM003 LPT001 / PSU2-0	TN1846	PSU2 PH Type 4	3:5
		TN1873	PSU2 PH Type 22	2:7
		UN396	PSU2 PF Model 2	2:5
		UN192D	PSU2 DF Model 2	3
	SM003 SMC000 / SMPU5 SG0	UN589B	SMP Unit Power Conversion Pack	2:2
		UN288	SMP Core Microprocessor	5:11
		TN1806	SMP Random Access Memory	2:3
		KBN8B	SMP Communication Bus Service Node	1:7
		UN584	SMP Message Handling Subprocessor	1:1
		UN538	SMP Message Handling	9:13
		UN539B	SMP Application Control Function	2:2
		UN395B	SMP Packet Interface Module	1:1
		UN71C	SMP Control Interface	2:5
		UN590	SMP Digital Service Circuit	3:3
	SM003 SMC000 / SMPU5 SG1	UN589B	SMP Unit Power Conversion Pack	2:2
		UN288	SMP Core Microprocessor	5:11
		TN1806	SMP Random Access Memory	2:3
		KBN8B	SMP Communication Bus Service Node	1:7
		UN584	SMP Message Handling Subprocessor	1:1
		UN538	SMP Message Handling	9:13
		UN539B	SMP Application Control Function	2:2
		UN395B	SMP Packet Interface Module	1:1
		UN71C	SMP Control Interface	2:5
		UN590	SMP Digital Service Circuit	3:3

Table 2-2. Tested System Configurations (continued)

SUT				
	Component Cabinet/ Unit	**Product Code**	**Description**	**Version**
5ESS VCDX	**SM003 SMC000 / TSIU4-2**	486AA	Power Conversion Pack for the MCTSI TSI Slice Cards	1:9
		486AA	Power Conversion Pack for the MCTSI TSI Slice Cards	1:9
		UM74D	TSI Control Card	1:1
		UM74D	TSI Control Card	1:1
		410AA2	TSI Power Board	1:4
		UN553	TSI Extended Data Extension Pack	3:6
	SM003 LTP002 / AIU 0	DAC100B	AIU Common Data and Control Card	2:2
		LPZ100E	AIU Analog Line Pack	1:2
		LPU116	AIU ISDN BRI Pack	2:3
		RGP100B	AIU Ring Generator	1:2

	Type	**Manufacturer**	**Model**	**Firmware**
Telephones	Analog	Panasonic	Kx-ts-105-w	N/A
	ISDN	Lucent	8510T/U	3.2/3.6
	ISDN	Lucent	8520T/U	3.6
	ISDN	Lucent	311A	N/A
	ISDN	Tone Commander	6210U and 6210T	01.07.22
	ISDN	Tone Commander	6220U and 6220T	01.07.22
	ISDN	Tone Commander	6220T TSG	01.07.22
	ISDN	Tone Commander	8610U and 8610T	01.07.22
	ISDN	Tone Commander	8620U and 8620T	01.07.22
	ISDN	Tone Commander	8810U and 8810T	02.07.22
	ISDN	Tone Commander	6030X (Expansion Module)	01.01.03
	ISDN	Tone Commander	8030X (Expansion Module)	02.01.03

LEGEND:

5ESS	- Class 5 Electronic Switching System
AIU	- Access Interface Unit
ATM	- Asynchronous Transfer Mode
BRI	- Basic Rate Interface
BWM	- Broadcast Warning Message
CS	- Communication Server
DF	- Data Fanout
DFI	- Digital Facility Interface
DRSN	- Defense Red Switch Network
EIA	- Electronic Industries Alliance
EIA-232	- Standard for defining the mechanical and electrical characteristics for connecting Data Terminal Equipment (DTE) and Data Circuit-terminating Equipment (DCE) data communications devices
EWSD	- Elektronisches Wählsystem Digital
ISDN	- Integrated Services Digital Network
Mbps	- Megabits per second
MMSU	- Modular Metallic Service Unit
N/A	- Not Applicable
PF	- Packet Fanout
PH	- Protocol Handler
PSU2	- Packet Switch Unit Model 2
RS-232	- Recommended Standard 232 (now formally known as EIA-232)
SCSI	- Small Computer System Interface
SMDR	- Station Message Detail Recording
SMP	- Switching Module Processor
SMSI	- Simplified Message Service Interface
SMU	- Switch Multiplexer Unit
STP	- Signal Transfer Point
SUT	- System Under Test
T	- Part designator for S/T interface
T1	- Digital Transmission Link Level 1 (1.544 Mbps)
TSG	- Telephone Secure Group
TSI	- Time Slot Interchanger
U	- 2- wire BRI Interface
U	**- Part designator for U interface**
VCDX	- Very Compact Digital Exchange

10. TESTING LIMITATIONS. None

11. TEST RESULTS

a. Discussion

(1) DSN Trunk Interfaces. The SUT met all critical interoperability certification requirements for the following DSN trunk interfaces with the minor exceptions listed in the paragraphs below: T1 Channel Associated Signaling (CAS), TI ISDN Primary Rate Interface (PRI) National ISDN (NI) 2, and T1 Signaling System 7 (SS7). The SUT does not support European interfaces. Therefore, the SUT is not

certified by JITC nor approved by the DSN Program Management Office (PMO) for use in Europe as a MFS, End Office (EO), or Small End Office (SMEO).

(a) The SUT does not support the full range of Multi-Level Precedence and Preemption (MLPP) service domains on the American National Standards Institute (ANSI) T1.619a ISDN T1 PRI and the ANSI T1.619a T1 SS7 trunk types. The SUT supports 256 MLPP service domains instead of the required 16,777,216. Since there is only one MLPP service domain used in the DSN, there is no operational impact.

(b) The GSCR states that, in case of congestion, Initial Address Messages (IAMs) carrying FLASH or FLASH OVERRIDE calls shall be assigned a priority of three, IMMEDIATE calls shall be assigned a priority of two, PRIORITY calls shall be assigned a priority of one, and ROUTINE calls a priority of zero. The SUT does not have the capability to assign prioritization to SS7 IAMs based on precedence level (i.e. FLASH OVERRIDE, FLASH, IMMEDIATE, etc.). The SUT assigns a priority level of one in the IAMs to all precedence levels. Due to the amount of traffic in the DSN, congestion is not possible over the SS7 56 kbps link; therefore there is no operational impact.

(2) DSN Line Interfaces. The SUT met all critical interoperability certification requirements for the following DSN line interfaces with the minor exceptions listed in the paragraphs below: 2-Wire Analog (GR-506-CORE), ISDN BRI S/T and U Interface International Telecommunication Union - Telecommunication Standardization Sector (ITU-T) Q.931, 2 Wire Analog Ground Start Line (GR-506-CORE).

(a) The GSCR states that when any party of a 3-party call is preempted, the remaining parties will receive a conference disconnect tone. The SUT however, preempts all parties of the conference when the originator of the 3-party call is preempted. Since the originator is properly classmarked at the highest precedence of both legs of the 3-party call, the operational impact is minor.

(b) The SUT call pickup feature doesn't retrieve the call with the highest precedence first. The SUT retrieves unanswered call pickup group calls above ROUTINE in a random sequence. The GSCR requires that "If a call pickup group has more than one party in an unanswered condition and the unanswered parties are at different precedence levels, a call pickup attempt in that group shall retrieve the highest precedence call first." All unanswered precedence calls above ROUTINE in the pickup group do divert after 15-45 seconds if unanswered and are positively connected to either the attendant, night service, or alternate Directory Number (DN). The operational impact is minor.

(c) The SUT only supports MLPP (voice) with 5E Custom protocol on their ISDN BRI interface with their proprietary 8510 instruments and certified Tone Commander ISDN BRI instruments. The Tone Commander ISDN BRI instruments have been tested and are the only ISDN BRI vendor certified for joint use within the DSN for all major DSN switches to include the SUT. In addition, the SUT BRI interface has been tested and is interoperable with all versions of the L3 Communications Secure

Terminal Equipment devices using 5E Custom Protocol; therefore, there is no operational impact.

(3) Voicemail. The SUT met all CRs and FRs for voicemail with the following interfaces: T1 CAS, T1 ISDN PRI NI 1/2 (ANSI T1.607), and Serial Simplified Message Desk Interface (SMDI). The SMDI serial interface is required for voice mail systems to turn on and turn off the voice mail lamp or stutter dial tone.

(4) ACD. The SUT met all CRs and FRs for ACD with the following interfaces: T1 CAS (DTMF, DP, MFR1), T1 ISDN PRI NI 1/2 (ANSI T1.607), and analog.

(5) Network Management (NM). The GSCR NM requirements are that a switch provides NM capabilities via Ethernet, serial asynchronous (Electronic Industries Alliance [EIA]-232), or serial synchronous (ITU-T X.25). The SUT meets all the requirements for NM over EIA-232 asynchronous serial.

(6) Features and Capabilities

(a) Common Features. The SUT met all CRs and FRs for common features.

(b) Attendant. The SUT met all CRs and FRs for attendant services.

(c) Public Safety. The SUT met all CRs and FRs for public safety.

(d) Preset Conferencing. The SUT used the Compunetix Contex® to meet its Preset Conferencing requirements. The SUT is certified with any conference bridge listed on the DSN APL which is certified for the same interfaces.

(e) Nailed-up Connections. The SUT met all CRs and FRs for nailed-up connections.

(f) Precedence Access Threshold. The SUT met all CRs and FRs for Precedence Access Threshold (PAT) with the following minor exception: PAT Queuing is not supported by the SUT. PAT is a conditional requirement for a MFS which makes the operational impact of this discrepancy minor.

(g) DSN Hotline Services. The SUT met all CRs and FRs for DSN Hotline Services. The SUT however does not support Protected Hotline Services on an ISDN BRI line. Only Unprotected Hotline Services are supported on the ISDN BRI line. Since the GSCR only requires Hotline Services for analog lines, which it meets, there is no operational impact.

(h) ISDN Services Electronic Key Telephone System (EKTS). The SUT did not meet all CRs and FRs for ISDN services EKTS. The SUT does not support Multi-Level Precedence and Preemption (MLPP) interaction with telephones assigned

the Multiple Appearance Directory Number (MADN) option. This option applies to Electronic Key Telephone Service ISDN BRI telephones. The SUT does not support MLPP interaction with these instruments when more than one ISDN BRI instrument shares the same DN. Therefore, the EKTS MADN functionality of the 5ESS is not certified for use in the DSN. The operational impact is minor.

(i) Synchronization. All critical interoperability certification CRs and FRs were met for this feature by the SUT. The SUT supports synchronization in the following modes: line timing mode, external timing mode, and internal timing mode.

(j) Reliability. All critical interoperability certification CRs and FRs for this feature were met by the SUT and verified by vendor LoC.

(k) Security. Security CRs and FRs are verified using the Information Assurance Test Plan. Results of the security testing are reported in a separate test report generated by the DISA Information Assurance test personnel.

(7) Network Gateways. The SUT met all critical interoperability certification CRs and FRs for the following Network Gateways: PSTN, Defense Red Switch Network (DRSN) and the Tactical Network Gateway. The certified interfaces for the PSTN are T1 CAS, T1 ISDN PRI, and Ground Start Line. The certified interface for the DRSN is 2-Wire analog (GR-506-CORE). Interoperability Certification of the SUT does not constitute DRSN Program Manager (PM)'s approval for connectivity to the DRSN. It is the user's responsibility to request connectivity approval directly from the PM. The certified interface for the Tactical Network Gateway is T1 CAS.

b. Test Summary. The Lucent 5ESS VCDX Digital Switching System with Software Release 5E16.2, Broadcast Warning Message (BWM) 07-0003 is certified for joint use in the DSN. The SUT was tested and met the critical interoperability requirements for the following DSN switch types: MFS (except Europe), EO (except Europe), Small End Office (SMEO) (except Europe), Private Branch Exchange (PBX) 1, PBX 2, and Deployable Voice Exchange. ACD and Voice Mail requirements can both be met with any external third-party APL certified solution. The interoperability summary and status to include criticality for each interface can be found in table 2-3.

Table 2-3. SUT Interoperability Summary

DSN Trunk Interfaces			
Interface & Signaling	**Critical**	**Status**	**Remarks**
T1 CAS (DTMF, MFR1, DP)	Yes	Certified	Met all CRs and FRs.
E1 CAS (DTMF, MFR1, DP)	Yes (Europe only)	Not Tested	This interface is not supported. Therefore, the SUT is not certified by JITC nor approved by the DSN PMO for use in Europe as a MFS, EO, or SMEO. Since this is not a required interface for a MFS except when deployed in Europe, there is no operational impact.
T1 ISDN PRI NI 1/2 (ANSI T1.619a)	Yes	Certified	Met all CRs and FRs with the following exception: Does not support the full range of MLPP service domain.[1]
E1 ISDN PRI (ITU-T Q.955.3)	Yes (Europe only)	Not Tested	This interface is not supported. Therefore, the SUT is not certified by JITC nor approved by the DSN PMO for use in Europe as a MFS, EO, or SMEO. Since this is not a required interface for a MFS except when deployed in Europe, there is no operational impact.
T1 SS7 (ANSI T1.619a)	Yes	Certified	Met all CRs and FRs with the following exceptions: Does not support the full range of MLPP service domain.[1] Does not have the capability to assign prioritization to the Initial Address Message based on precedence level.[2]
E1 SS7 (ITU-T Q.735.3)	Yes (Europe only)	Not Tested	This interface is not supported. Therefore, the SUT is not certified by JITC nor approved by the DSN PMO for use in Europe as a MFS, EO, or SMEO. Since this is not a required interface for a MFS except when deployed in Europe, there is no operational impact.
DSN Line Interfaces			
Interface & Signaling	**Critical**	**Status**	**Remarks**
2-Wire Analog (GR-506-CORE)	Yes	Certified	Met all CRs and FRs with the following exceptions: Does not fully support MLPP functionality on a 3-Party call.[3] Does not properly support MLPP interaction for call pick-up.[4]
ISDN BRI S/T and U Interface ITU-T Q.931	Yes	Certified	Met all CRs and FRs with the following exceptions: Does not fully support MLPP functionality on a 3-Party call.[3] Does not properly support MLPP interaction for call pick-up.[4] The SUT will only support MLPP (voice) with 5E Custom BRI protocol.[5]
2-Wire Digital and Analog (Proprietary)	No	Not Tested	This interface is not supported. Since this is not a required interface for a MFS, there is no operational impact.
2-Wire Analog Ground Start Line (GR-506-CORE)	Yes	Certified	Met all CRs and FRs.
Voicemail			
Interface	**Critical**	**Status**	**Remarks**
T1 CAS	No	Certified	Met all CRs and FRs.
T1 ISDN PRI NI 1/2 (ANSI T1.607)	No	Certified	Met all CRs and FRs.
Serial SMDI interface[6]	No	Certified	Met all CRs and FRs.
Automated Call Distributor			
Interface	**Critical**	**Status**	**Remarks**
T1 CAS (DTMF, MFR1, DP)	No	Certified	Met all CRs and FRs. The SUT is certified for use with any ACD on the DSN APL which is certified for this interface.
T1 ISDN PRI NI 1/2 (ANSI T1.607)	No	Certified	Met all CRs and FRs. The SUT is certified for use with any ACD on the DSN APL which is certified for this interface.
Analog	No	Certified	Met all CRs and FRs. The SUT is certified for use with any ACD on the DSN APL which is certified for this interface.
Network Management[7]			
Interface & Signaling	**Critical**	**Status**	**Remarks**
IEEE 802.3 10BaseT Ethernet, TCP/IP	No	Certified	Met all CRs and FRs.
EIA-232 Asynchronous at 9.6 kbps	No	Certified	Met all CRs and FRs.
ITU-T X.25	No	Not-Tested	This interface is not supported. Since this is not a required interface for a MFS, there is no operational impact.

Table 2-3. SUT Interoperability Summary (continued)

DSN Features and Capabilities				
Features and Capabilities		**Critical**	**Status**	**Remarks**
Common Features		Yes	Certified	Met all CRs and FRs.
Attendant		Yes	Certified	Met all CRs and FRs.
Public Safety		Yes	Certified	Met all CRs and FRs.
Preset Conferencing		Yes	Certified	Met all CRs and FRs. Certified with any conference bridge on the DSN APL which is certified for the same interfaces.
Nailed-up Connections		Yes	Certified	Met all CRs and FRs.
Precedence Access Threshold		No	Certified	Met all CRs and FRs with the following exceptions: Does not support PAT queuing.[8]
DSN Hotline Services		Yes	Certified	Met all CRs and FRs.
Tandem Switching		Yes	Certified	Met all CRs and FRs.
ISDN Services (EKTS)		No	Not Certified	Does not support MLPP with EKTS.[9]
Synchronization		Yes	Certified	Met all CRs and FRs.
Reliability		Yes	Certified	Met all CRs and FRs.
Security		Yes	See note 10.	See note 10.
Network Gateways				
Gateway	**Interface & Signaling**	**Critical**	**Status**	**Remarks**
PSTN	T1 CAS (DTMF, MFR1, DP)	Yes	Certified	Met all CRs and FRs.
	E1 CAS (DTMF, MFR1, DP)	Yes (Europe only)	Not Tested	This interface is not supported. Therefore, the SUT is not certified by JITC nor approved by the DSN PMO for use in Europe as a MFS, EO, or SMEO. Since this is not a required interface for a MFS except when deployed in Europe, there is no operational impact.
	T1 ISDN PRI NI 1/2 (ANSI T1.607)	Yes	Certified	Met all CRs and FRs.
	E1 ISDN PRI (ITU-T Q.931)	Yes (Europe only)	Not Tested	This interface is not supported. Therefore, the SUT is not certified by JITC nor approved by the DSN PMO for use in Europe as a MFS, EO, or SMEO. Since this is not a required interface for a MFS except when deployed in Europe, there is no operational impact.
	Ground Start Line	Yes	Certified	Met all CRs and FRs.
Tactical	T1 CAS (DTMF, MFR1, DP)	Yes	Certified	Met all CRs and FRs.
	E1 CAS (MFR1)	Yes (Europe only)	Not Tested	This interface is not supported. Therefore, the SUT is not certified by JITC nor approved by the DSN PMO for use in Europe as a MFS, EO, or SMEO. Since this is not a required interface for a MFS except when deployed in Europe, there is no operational impact.
DRSN[11]	2-Wire Analog (GR-506-CORE)	Yes	Certified	Met all CRs and FRs.

Table 2-3. SUT Interoperability Summary (continued)

LEGEND:

10BaseT	- 10 Mbps (Baseband Operation, Twisted Pair) Ethernet
802.4	- Standard for carrier sense multiple access with collision detection at 10 Mbps
ACD	- Automated Call Distributor
ANSI	- American National Standards Institute
APL	- Approved Products List
BRI	- Basic Rate Interface
CAS	- Channel Associated Signaling
CRs	- Capability Requirements
DCE	- Data Circuit-Terminating Equipment
DISA	- Defense Information Systems Agency
DN	- Directory Number
DP	- Dial Pulse
DRSN	- Defense Red Switch Network
DSN	- Defense Switched Network
DSS1	- Digital Subscriber Signaling 1
DTE	- Data Terminal Equipment
DTMF	- Dual Tone Multi-Frequency
E1	- European Basic Multiplex Rate (2.048 Mbps)
EIA	- Electronic Industries Alliance
EIA-232	- Standard for defining the mechanical and electrical characteristics for connecting DTE and DCE data communications devices
EKTS	- Electronic Key Telephone System
EO	- End Office
FRs	- Feature Requirements
GR	- Generic Requirement
GR-506-CORE	- Telcordia Signaling for Analog Interface Generic Requirement
GSCR	- Generic Switching Center Requirements
IAM	- Initial Address Message
IEEE	- Institute of Electrical and Electronics Engineers, Inc.
ISDN	- Integrated Services Digital Network
ITU-T	- International Telecommunication Union - Telecommunication Standardization Sector
JITC	- Joint Interoperability Test Command
kbps	- kilobits per second
MADN	- Multiple Appearance Directory Number
Mbps	- Megabits per second
MFR1	- Multifrequency Recommendation 1
MFS	- Multifunction Switch
MLPP	- Multi-Level Precedence and Preemption
NI 1/2	- National ISDN Standard 1 or 2
NM	- Network Management
PAT	- Precedence Access Threshold
PM	- Program Manager
PMO	- Program Management Office
PRI	- Primary Rate Interface
PSTN	- Public Switched Telephone Network
Q.735.3	- SS7 Signaling Standard for E1 MLPP
Q.931	- Signaling Standard for ISDN
Q.955.3	- ISDN Signaling standard for E1 MLPP
SMDI	- Simplified Message Desk Interface
SMEO	- Small End Office
SS7	- Signaling System 7
S/T	- ISDN BRI four-wire interface
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
TCP/IP	- Transmission Control Protocol/Internet Protocol
U	- ISDN BRI two-wire interface
X.25	- Interface between DTE and DCE for terminals operating in the packet mode and connected to public data networks by dedicated circuit

NOTES:

1 The SUT does not support the full range of MLPP service domains on the ANSI T1.619a ISDN T1 PRI and the ANSI T1.619a T1 SS7 trunk types. The SUT supports 256 MLPP service domains instead of the required 16,777,216. Since there is only one MLPP service domain used in the DSN, there is no operational impact.

2 The GSCR states that, in case of congestion, IAMs carrying FLASH or FLASH OVERRIDE calls shall be assigned a priority of three, IMMEDIATE calls shall be assigned a priority of two, PRIORITY calls shall be assigned a priority of one, and ROUTINE calls a priority of zero. The SUT does not have the capability to assign prioritization to SS7 IAMs based on precedence level (i.e. FLASH OVERRIDE, FLASH, IMMEDIATE, etc.). The SUT assigns a priority level of one in the IAMs to all precedence levels. Due to the amount of traffic in the DSN, congestion is not possible over the SS7 56 kbps link; therefore there is no operational impact.

3 The GSCR states that when any party of a 3-party call is preempted, the remaining parties will receive a conference disconnect tone. The SUT however, preempts all parties of the conference when the originator of the 3-party call is preempted. Since the originator is properly classmarked at the highest precedence of both legs of the 3-party call, the operational impact is minor.

4 The SUT call pickup feature doesn't retrieve the call with the highest precedence first. The SUT retrieves unanswered call pickup group calls above ROUTINE in a random sequence. The GSCR requires that "If a call pickup group has more than one party in an unanswered condition and the unanswered parties are at different precedence levels, a call pickup attempt in that group shall retrieve the highest precedence call first." All unanswered precedence calls above ROUTINE in the pickup group do divert after 15-45 seconds if unanswered and are positively connected to the attendant, night service, or alternate DN. The same method is used for diverting calls that go to an unattended phone. There is no operational impact because all precedence calls are answered.

5 The SUT only supports MLPP (voice) with 5E Custom protocol on their ISDN BRI interface with their proprietary 8510 instruments and certified Tone Commander ISDN BRI instruments. The Tone Commander ISDN BRI instruments have been tested and are the only ISDN BRI vendor certified for joint use within the DSN for all major DSN switches to include the SUT. In addition, the SUT BRI interface has been tested and is interoperable with all versions of the L3 Communications Secure Terminal Equipment devices using 5E Custom Protocol; therefore, there is no operational impact.

6 The SMDI serial interface is required for voice mail systems to turn on and turn off the voice mail lamp or stutter dial tone.

7 The GSCR NM requirements state that a switch can provide NM capabilities via Ethernet, serial asynchronous (EIA-232), or serial synchronous (ITU-T X.25). The SUT meets all the requirements for NM over EIA-232 asynchronous serial.

8 The SUT met all CRs and FRs for PAT with the following minor exception: PAT Queuing is not supported by the SUT. PAT is a conditional requirement for a MFS which makes the operational impact of this discrepancy minor.

9 The SUT did not meet all CRs and FRs for ISDN services EKTS. The SUT does not support MLPP interaction with telephones assigned the MADN option. This option applies to EKTS ISDN BRI telephones. The SUT does not support MLPP interaction with these instruments when more than one ISDN BRI instrument shares the same DN. Therefore, the EKTS MADN functionality of the SUT is not certified for use in the DSN. The operational impact is minor.

10 Information assurance testing is accomplished via DISA-led Information Assurance test teams and published in a separate report.

11 Interoperability certification of the SUT does not constitute DRSN PM approval for connectivity to the DRSN. It is the user's responsibility to request connectivity approval directly from the PM.

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.