



DEFENSE INFORMATION SYSTEMS AGENCY
JOINT INTEROPERABILITY TEST COMMAND
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IN REPLY
REFER TO: Networks and Transport Division (JTE)

16 September 2004

MEMORANDUM FOR DISTRIBUTION

SUBJECT: Special Interoperability Test Certification of Sphere Communications Spherically Digital Switching System with Software Release 4.0.8.10 (Includes Voice over Internet Protocol)

References: (a) DOD Directive 4630.5, "Interoperability and Supportability of Information Technology (IT) and National Security Systems (NSS)," 5 May 2004
(b) CJCSI 6212.01C, "Interoperability and Supportability of Information Technology and National Security Systems," 20 November 2003

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. Additional references are provided in enclosure 1.

2. The Sphere Communications Spherically Digital Switching System with Software Release 4.0.8.10, hereinafter referred to as the system under test (SUT), meets all of its critical interoperability requirements and is certified for joint use within the Defense Switched Network (DSN) as a Private Branch Exchange (PBX) 2. *However, since PBX 2s do not support the Military Unique Feature Requirements detailed in reference (c), connectivity to the DSN is not authorized until a waiver is granted by the Chairman of the Joint Chiefs of Staff (CJCS) for each site.* The PBX 2 family of switches has no military unique features and can only serve Department of Defense (DOD), non-DOD, non-governmental, and foreign government users having no missions or communications requirement to ever originate or receive Command and Control (C2) communications. *C2 users and Special C2 users are not authorized to be served by a PBX 2.* The SUT also offers a Voice over Internet Protocol capability and this capability is covered under this certification. This certification expires upon changes that could 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 at the Global Information Grid Network Test Facility, Fort Huachuca, AZ, from 10 May through 11 June 2004. Review of letters of compliance was completed on 13 July 2004. Testing was conducted in an environment that emulates the DSN. Enclosure 2 provides more details about the test, documents the test results, and describes the tested network and system configurations. The SUT certified Voice Grade (VG) LAN components are listed in enclosure 2, table 2-3.

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

- a. DSN services for Network and Applications specified in reference (c).
- b. PBX 2 interface and signaling requirements for trunks/lines specified in reference (d) as having to be verified through JITC testing and/or vendor submission of Letter(s) of Compliance (LoC).
- c. PBX 2 CRs and FRs specified in reference (d) as having to be verified through JITC testing and/or vendor submission of LoC.
- d. The overall system interoperability performance derived from test procedures listed in reference (e).

Table 1. SUT Interoperability Test Summary

DSN Trunk Interfaces			
Interface & Signaling	Critical	Status	Remarks
T1 CAS (DTMF)	No ¹	Certified	Met all CRs and FRs.
T1 ISDN PRI NI 1/2	No ¹	Certified	Met all CRs and FRs.
DSN Line Interfaces			
Interface & Signaling	Critical	Status	Remarks
2-Wire Analog (GR-506-CORE)	No ²	Certified	Met all CRs and FRs.
VoIP	No	Certified	Met all CRs and FRs.
DSN Features and Capabilities			
Features and Capabilities	Critical	Status	Remarks
Common Features	No	Certified	Met all CRs and FRs.
Attendant	No	Not Tested	
Public Safety	No	Not Tested	
Preset Conferencing	No	Not Tested	
Nailed-up Connections	No	Not Tested	
PAT	No	Not Tested	
DSN Hotline Services	No	Not Tested	

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Table 1. SUT Interoperability Test Summary (continued)

DSN Features and Capabilities				
Features and Capabilities		Critical	Status	Remarks
Network Management		No	Not Tested	
ISDN Services (EKTS)		No	Not Tested	
Synchronization		Yes	Certified	Met all CRs and FRs.
Reliability		No	Not Tested	
Security ³		Yes	Certified	Met all CRs and FRs.
VoIP System		No	Certified	Met all CRs and FRs.
VoIP LANs		No	Certified	Met all CRs and FRs.
Network Gateways				
	Interface & Signaling	Critical	Status	Remarks
PSTN ⁴	T1 CAS (DTMF)	No ¹	Certified	Met all CRs and FRs.
	T1 ISDN PRI NI 1/2	No ¹	Certified	Met all CRs and FRs.
Legend:				
BRI - Basic Rate Interface		LAN - Local Area Network		
CAS - Channel Associated Signaling		LoC - Letters of Compliance		
CRs - Capability Requirements		Mbps - Megabits per second		
DSN - Defense Switched Network		MFR1 - Multi-Frequency R1		
DTMF - Dual Tone Multi-Frequency		MLPP - Multi-Level Precedence and Preemption		
E1 - European Transmission Standard (2.048 Mbps)		NI 1/2 - National ISDN 1 or 2		
EKTS - Electronic Key Telephone System		PAT - Precedence Access Threshold		
FRs - Feature Requirements		PSTN - Public Switched Telephone Network		
GR - Generic Requirement		PRI - Primary Rate Interface		
IATP - Information Assurance Test Plan		Q.931 - ITU Signaling Standard for ISDN		
IAW - In accordance with		SUT - System Under Test		
ISDN - Integrated Services Digital Network		T1 - Digital Transmission Link level 1 (1.544 Mbps)		
ITU - International Telecommunications Union		VoIP - Voice over Internet Protocol		
JITC - Joint Interoperability Test Command				
Notes:				
1 The SUT is required to meet the Interoperability CRs and FRs for only one of the two trunk interfaces (T1 CAS or T1 ISDN PRI).				
2 The SUT is required to meet the Interoperability CRs and FRs for only one of two line interfaces (2-wire Analog or ISDN BRI).				
3 JITC verifies security via vendor LoC. Further testing IAW the IATP is required prior to being authorized connection approval.				
4 The SUT supports only DSN trunk interfaces without the capability of MLPP; therefore, the PSTN trunks and DSN trunks are exactly the same.				

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Table 2. PBX 2 Requirements

DSN Trunk Interfaces				
Interface	Critical	Requirements Required (R) or Conditional (C)		References
T1 CAS	No ¹	Trunking	<ul style="list-style-type: none"> • Framing (R) • Line Code (R) • Signaling (R) • Alarms (R) • WWNDP (C) • Outpulsing digit formats (C: CAS only) • Routing (C) • Trunk Groups (C) • Call Processing (C) • CAS to CCS trunk interworking (C) • PCM-24/PCM-30 Interoperation (C) • Direct Inward Dialing (C) 	<ul style="list-style-type: none"> • GSCR Sect. 7 • GSCR Sect. 7 • GSCR Sect. 5 • GSCR Sect. 2.5.7, 7.1.4 & 7.2.2 • GSCR Sect. 4.5.1 • GSCR Sect. 4.5.2 • GSCR Sect. 4.2 • GSCR Sect. 2.5.5 & 2.5.6 • GSCR Sect. 4 • GSCR Sect. 3.10 • GSCR Sect. 7.3 • GSCR Sect. 2.3.2
T1 ISDN PRI NI 1/2	No ¹	Voice	<ul style="list-style-type: none"> • MOS (R) • Secure calls (R) 	<ul style="list-style-type: none"> • CJCSI 6215.01B • CJCSI 6215.01B
		Facsimile	<ul style="list-style-type: none"> • Analog: EIA/TIA-465-A (R) • Digital: MIL-STD-188-161D (C) 	<ul style="list-style-type: none"> • JTA • JTA
		Data	<ul style="list-style-type: none"> • Modem (VBD) (R) • 56-kbps switched data (R: ISDN PRI only) • 64-kbps switched data (R: ISDN PRI only) • NX56 synchronous BER (R: ISDN PRI only) • NX64 synchronous BER (R: ISDN PRI only) • Secure data (STE/STU-III) (R) 	<ul style="list-style-type: none"> • CJCSI 6215.01B • GSCR Sect. 3.10
		VTC	<ul style="list-style-type: none"> • H.320 (R: ISDN PRI only) 	<ul style="list-style-type: none"> • JTA
DSN Line Interfaces				
2-Wire Analog GR-506-CORE	No ²	Access	<ul style="list-style-type: none"> • DN Identification (R) • Line signaling (C) • Alerting Signals and Tones (C) • WWNDP (C) • Call Treatments (R) • 2W user access (R: 2-Wire Analog only) • Analog busy/idle (R: 2-Wire Analog only) 	<ul style="list-style-type: none"> • GSCR Sect. 2.1.1 • GSCR Sect. 5.2 • GSCR Sect. 5.5 • GSCR Sect. 4.5 • GSCR Sect. 4.1 • GSCR Sect. 4.3.3 • GSCR Sect. 4.3.4.1
		Voice	<ul style="list-style-type: none"> • MOS (R) • Secure Calls (R) 	<ul style="list-style-type: none"> • CJCSI 6215.01B • CJCSI 6215.01B
		Facsimile	<ul style="list-style-type: none"> • Analog: EIA/TIA-465-A (R) • Digital: MIL-STD-188-161D (C) 	<ul style="list-style-type: none"> • JTA • JTA
VoIP	No	Data	<ul style="list-style-type: none"> • Modem (VBD) (R) • 56-kbps switched data (R: ISDN BRI only) • 64-kbps switched data (R: ISDN BRI only) • NX56 synchronous BER (R: ISDN BRI only) • NX64 synchronous BER (R: ISDN BRI only) • Secure data (STE/STU-III) (R) 	<ul style="list-style-type: none"> • CJCSI 6215.01B • GSCR Sect. 3.10
		VTC	<ul style="list-style-type: none"> • H.320 (R: ISDN BRI only) 	<ul style="list-style-type: none"> • JTA

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Table 2. PBX 2 Requirements (continued)

DSN Features & Capabilities			
Interface	Critical	Requirements Required (R) or Conditional (C)	References
Common Features	No	<ul style="list-style-type: none"> • Selective call rejection (C) • Denied originating service (C) • Code restriction and diversion (C) • Call waiting (C) • Three-way calling (C) • Add-on transfer and conference calling (C) • Call forwarding (C) • Call pick-up (C) 	<ul style="list-style-type: none"> • GSCR Sect. 2.1.2 • GSCR Sect. 2.1.3 • GSCR Sect. 2.1.4 • GSCR Sect. 2.1.5 • GSCR Sect. 2.1.6 • GSCR Sect. 2.1.7 • GSCR Sect. 2.1.8 • GSCR Sect. 2.1.9
Attendant	No	<ul style="list-style-type: none"> • Initiate all precedence levels (C) • Visual display (C) • Override class of service (C) • Override busy line (C) • Call deflection (C) • Auto recall (C) • Waiting queue (C) 	<ul style="list-style-type: none"> • GSCR Sect. 2.2.1 • GSCR Sect. 2.2.2 • GSCR Sect. 2.2.3 • GSCR Sect. 2.2.4 • GSCR Sect. 2.2.5 • GSCR Sect. 2.2.6 • GSCR Sect. 2.2.7
Public Safety	No	<ul style="list-style-type: none"> • 911 (C) • Trace of terminating calls (C) • Outgoing call trace (C) • Tandem call trace (C) • Trace of a call in progress (C) 	<ul style="list-style-type: none"> • GSCR Sect. 2.4.1 • GSCR Sect. 2.4.2 • GSCR Sect. 2.4.3 • GSCR Sect. 2.4.4 • GSCR Sect. 2.4.5
Preset Conferencing	No	<ul style="list-style-type: none"> • Support 10 bridges; 1 originator and 20 conferees (C) • Assign up to 20 address numbers per bridge (C) • Use KXX codes for bridge access (C) • Conference notification recorded announcement (C) • Auto retrieval and alternate address (C) • Bridge release (C) • Lost connection (C) • Secondary conferencing (C) • Address translation (C) 	<ul style="list-style-type: none"> • GSCR Sect. 2.6 • GSCR Sect. 2.6 • GSCR Sect. 2.6 • GSCR Sect. 2.6.1 • GSCR Sect. 2.6.2 • GSCR Sect. 2.6.3 • GSCR Sect. 2.6.4 • GSCR Sect. 2.6.5 • GSCR Sect. 2.7
Nailed-up Connections	No	<ul style="list-style-type: none"> • Between any two like terminations (C) • PCM-24 and PCM-30, both CAS and CCS (C) • Supervision passed end-to-end for A/D or D/A (C) • Monitored and auto reconfigure (C) • Support at least 10% of circuits as nailed-up (C) • Non-preemptable (C) 	<ul style="list-style-type: none"> • GSCR Sect. 2.8
PAT	No	<ul style="list-style-type: none"> • Classmark for/not for PAT screening (C) • 7 PAT mechanisms (C) • Outgoing call screening • Functional structure (C) • Simultaneous calls limitation (C) • Overflow process (C) • Decrementing call-in-progress count (C) • Call treatment (C) • Queuing (C) • Attendant calls (C) • Operations measurement registers (C) • Maintenance and Administration of thresholds (C) 	<ul style="list-style-type: none"> • GSCR Sect. 2.11.1 • GSCR Sect. 2.11.1 • GSCR Sect. 2.11.1.1 • GSCR Sect. 2.11.1.2 • GSCR Sect. 2.11.1.3 • GSCR Sect. 2.11.1.4 • GSCR Sect. 2.11.1.5 • GSCR Sect. 2.11.1.6 • GSCR Sect. 2.11.1.7 • GSCR Sect. 2.11.1.8 • GSCR Sect. 2.11.1.9 • GSCR Sect. 2.11.1.10
DSN Hotline Services	No	<ul style="list-style-type: none"> • Hotline restrictions (C) • Auto initiate (C) • Analog and digital (C) • Subscription basis (C) • Protected hotline calling (C) • WWNDP interoperable (C) 	<ul style="list-style-type: none"> • GSCR Sect. 2.12 • GSCR Sect. 2.12 • GSCR Sect. 2.12 • GSCR Sect. 2.12 • GSCR Sect. 2.12.1-4 • GSCR Sect. 2.12.5

Table 2. PBX 2 Requirements (continued)

DSN Features & Capabilities (continued)			
Interface	Critical	Requirements Required (R) or Conditional (C)	References
Network Management	No	<ul style="list-style-type: none"> • Interfaces (C) • Measurements and data generation (C) • Fault management (C) • Configuration management (C) • Accounting management (C) • Performance management (C) • NM controls (C) • Remote access (C) 	<ul style="list-style-type: none"> • GSCR Sect. 9.1 • GSCR Sect. 9.2 • GSCR Sect. 9.3 • GSCR Sect. 9.4 • GSCR Sect. 9.5 • GSCR Sect. 9.6 • GSCR Sect. 9.7 • GSCR Sect. 9.8
ISDN Services	No	<ul style="list-style-type: none"> • EKTS (C) 	<ul style="list-style-type: none"> • GSCR Sect. 10, table 10-3
Synchronization	Yes	<ul style="list-style-type: none"> • Line timing mode (C) • Internal Stratum 4 (R) 	<ul style="list-style-type: none"> • GSCR Sect. 11.1.1.2 • GSCR Sect. 11.1.2.2
Reliability	No	<ul style="list-style-type: none"> • GR-512-CORE (C) 	<ul style="list-style-type: none"> • GSCR Sect.12
Security	Yes ³	<ul style="list-style-type: none"> • DAA (R) 	<ul style="list-style-type: none"> • DODI 8100.3
VoIP			
VoIP System	No	<p>VoIP function is conditional. If VoIP is provided, all of the following requirements must be met:</p> <ul style="list-style-type: none"> • MOS 4.0 or better • G.711 PCM Codec • Security IAW DITSCAP • NM • Line timing • Internal Clock • Latency ≤ 60 msec • IPv6 capable 	<ul style="list-style-type: none"> • GSCR App. 3
LANs	No	<p>VoIP function is conditional. If VoIP is provided, all of the following requirements must be met:</p> <ul style="list-style-type: none"> • LAN parameters • CoS • Queuing mechanisms • Policing mechanism • VLAN support • NM and voice in different VLAN • IEEE Standards Conformance • 2 second link restoral • LAN NM • Traffic Engineering 	<ul style="list-style-type: none"> • GSCR App. 3

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Table 2. PBX 2 Requirements (continued)

Network Gateways				
Gateway	Critical	Requirements Required (R) or Conditional (C)		References
PSTN	No	Trunking	<ul style="list-style-type: none"> • Positive Identification (C) • On-Netting (C) • Off-Netting (C) 	<ul style="list-style-type: none"> • CJCSI 6215.01B • CJCSI 6215.01B • CJCSI 6215.01B
Legend:				
2W	- 2-Wire	kbps	- kilobits per second	
911	- 911 Emergency Service	KXX	- K= any number 2-8; X= any number 1-9	
A/D	- analog to digital	LAN	- Local Area Network	
App	- Appendix	LoC	- Letter(s) of Compliance	
BER	- bit error ratio	Mbps	- Megabits per second	
BRI	- Basic Rate Interface	MIL-STD	- Military Standard	
C	- Conditional	MOS	- Mean Opinion Score	
CAS	- Channel Associated Signaling	msec	- millisecond	
CCS	- Common Channel Signaling	NI 1/2	- National ISDN Standard 1 or 2	
CJCSI	- Chairman of the Joint Chiefs of Staff Instruction	NM	- Network Management	
Codec	- Coder/Decoder	NX56	- Data format restricted to multiples of 56 kbps	
CoS	- Class of Service	NX64	- Data format restricted to multiples of 64 kbps	
D/A	- Digital to Analog	PAT	- Precedence Access Threshold	
DAA	- Designated Accreditation Authority	PBX	- Private Branch Exchange	
DITSCAP	- Department of Defense Information Technology Security Certification and Accreditation Process	PCM-24	- Pulse Code Modulation 24 Channels	
DODI	- Department of Defense Instruction	PCM-30	- Pulse Code Modulation 30 Channels	
DN	- Directory Number	PRI	- Primary Rate Interface	
DSN	- Defense Switched Network	PSTN	- Public Switched Telephone Network	
EIA	- Electronic Industries Alliance	QoS	- Quality of Service	
EKTS	- Electronic Key Telephone System	R	- Required	
GR	- Generic Requirement	Sect	- section	
GSCR	- Generic Switching Center Requirements	STE	- Secure Terminal Equipment	
H.320	- ITU Standard for narrowband VTC	STU-III	- Secure Telephone Unit-Third Generation	
IAW	- In accordance with	T1	- Digital Transmission Link Level 1 (1.544 Mbps)	
IEEE	- Institute of Electronic and Electrical Engineers, Inc.	TIA	- Telecommunications Industry Association	
ISDN	- Integrated Services Digital Network	VBD	- variable bit data	
ITU	- International Telecommunications Union	VLAN	- Virtual Local Area Network	
JITC	- Joint Interoperability Test Command	VoIP	- Voice over Internet Protocol	
JTA	- Joint Technical Architecture	VTC	- Video Conferencing	
		WWNDP	- Worldwide Numbering and Dialing Plan	
Notes:				
1 For certification, only one of two trunk types (T1 CAS or T1 ISDN PRI) is required.				
2 For certification, only one line type (2-wire analog or ISDN BRI) is required.				
3 JITC verifies security via a vendor LoC. Local DAA process required prior to being authorized connection approval.				

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 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>.

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6. The JITC point of contact is Capt. Michel Roy, DSN 821-8575, commercial (520) 533-8575, FAX DSN 879-4347, or e-mail to roym@fhu.disa.mil.

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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 (DISA), "Defense Switched Network (DSN) Generic Switching Center Requirements (GSCR)," 8 September 2003
- (e) Joint Interoperability Test Command, "Defense Switched Network Generic Switch Test Plan (GSTP)," 23 April 2004

CERTIFICATION TESTING SUMMARY

1. SYSTEM TITLE. The Sphere Communications Spherically Digital Switching System with Software Release 4.0.8.10, hereinafter referred to as the System Under Test (SUT).

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

3. PROGRAM MANAGER. Mr. Howard Osman, GS23, Room 5W23, 5275 Leesburg Pike, Falls Church, VA 22041, E-mail: Osmanh@ncr.disa.mil.

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

5. SYSTEM UNDER TEST DESCRIPTION. Private Branch Exchanges (PBXs) are Military Department (MILDEP)-controlled elements of the Defense Switched Network (DSN). The SUT was tested and met all of its critical interoperability requirements and is certified for joint use within the DSN as a PBX 2. *However, since PBX 2s do not support the Military Unique Feature Requirements detailed in reference (c), connectivity to the DSN is not authorized until a waiver is granted by the Chairman of the Joint Chiefs of Staff (CJCS) for each site.* The PBX 2 family of switches has no military unique features and can only serve Department of Defense (DOD), non-DOD, non-governmental, and foreign government users having no missions or communications requirement to ever originate or receive Command and Control (C2) communications. *C2 users and Special C2 users are not authorized to be served by a PBX 2.* The SUT provides enterprise-wide 20-20,000 ports with distributed or centralized deployments. The SUT offers a Voice over Internet Protocol (VoIP) capability, which is included in this certification. The SUT offers either Media Gateway Control Protocol or Session Initiation Protocol standard VoIP protocols with automatic Public Switched Telephone Network (PSTN) failover during network interruption. The SUT combines voice and data in both circuit and packet switching.

6. OPERATIONAL ARCHITECTURE. The DSN architecture is a two-level network hierarchy consisting of DSN backbone switches and Military/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 PBXs. The Generic Switching Center Requirements (GSCR) operational DSN Architecture is depicted in figure 2-1. The architecture depicts the relationship of MILDEP PBX 2s to the rest of the DSN switch types.

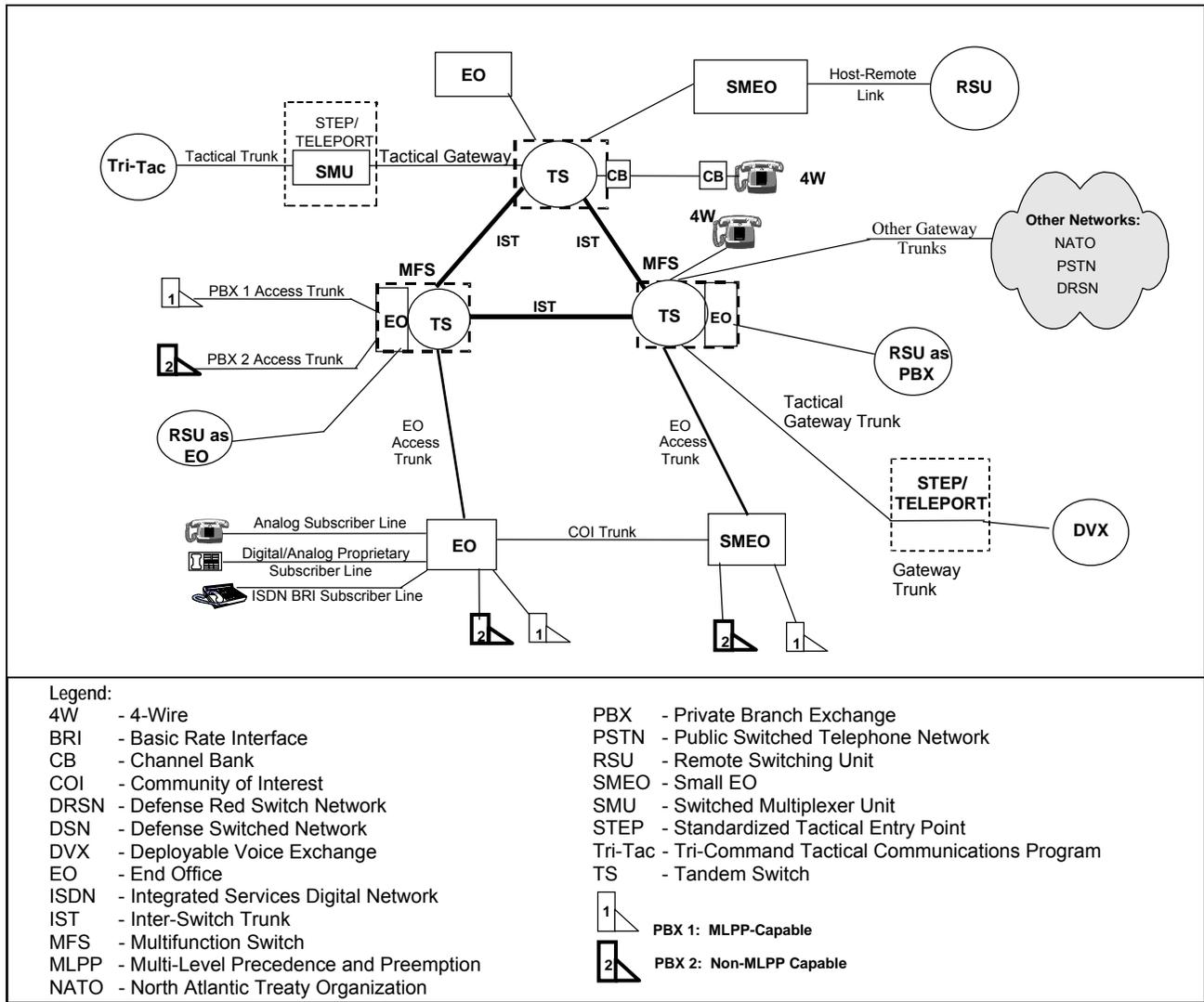


Figure 2-1. DSN Architecture

7. REQUIRED SYSTEM INTERFACES. Requirements specific to PBX 2s 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 Letter(s) of Compliance (LoC).
- c. GSCR PBX 2 Capability Requirements (CRs) and Feature Requirements (FRs) verified through JITC testing and/or vendor submission of LoC.

Table 2-1. PBX 2 Requirements

DSN Trunk Interfaces				
Interface	Critical	Requirements Required (R) or Conditional (C)		References
T1 CAS	No ¹	Trunking	<ul style="list-style-type: none"> • Framing (R) • Line Code (R) • Signaling (R) • Alarms (R) • WWNDP (C) • Outpulsing digit formats (C: CAS only) • Routing (C) • Trunk Groups (C) • Call Processing (C) • CAS to CCS trunk interworking (C) • PCM-24/PCM-30 Interoperation (C) • Direct Inward Dialing (C) 	<ul style="list-style-type: none"> • GSCR Sect. 7 • GSCR Sect. 7 • GSCR Sect. 5 • GSCR Sect. 2.5.7, 7.1.4 & 7.2.2 • GSCR Sect. 4.5.1 • GSCR Sect. 4.5.2 • GSCR Sect. 4.2 • GSCR Sect. 2.5.5 & 2.5.6 • GSCR Sect. 4 • GSCR Sect. 3.10 • GSCR Sect. 7.3 • GSCR Sect. 2.3.2
		Voice	<ul style="list-style-type: none"> • MOS (R) • Secure calls (R) 	<ul style="list-style-type: none"> • CJCSI 6215.01B • CJCSI 6215.01B
T1 ISDN PRI NI 1/2	No ¹	Facsimile	<ul style="list-style-type: none"> • Analog: EIA/TIA-465-A (R) • Digital: MIL-STD-188-161D (C) 	<ul style="list-style-type: none"> • JTA • JTA
		Data	<ul style="list-style-type: none"> • Modem (VBD) (R) • 56-kbps switched data (R: ISDN PRI only) • 64-kbps switched data (R: ISDN PRI only) • NX56 synchronous BER (R: ISDN PRI only) • NX64 synchronous BER (R: ISDN PRI only) • Secure data (STE/STU-III) (R) 	<ul style="list-style-type: none"> • CJCSI 6215.01B • GSCR Sect. 3.10
		VTC	<ul style="list-style-type: none"> • H.320 (R: ISDN PRI only) 	<ul style="list-style-type: none"> • JTA
DSN Line Interfaces				
2-Wire Analog GR-506-CORE	No ²	Access	<ul style="list-style-type: none"> • DN Identification (R) • Line signaling (C) • Alerting Signals and Tones (C) • WWNDP (C) • Call Treatments (R) • 2W user access (R: 2-Wire Analog only) • Analog busy/idle (R: 2-Wire Analog only) 	<ul style="list-style-type: none"> • GSCR Sect. 2.1.1 • GSCR Sect. 5.2 • GSCR Sect. 5.5 • GSCR Sect. 4.5 • GSCR Sect. 4.1 • GSCR Sect. 4.3.3 • GSCR Sect. 4.3.4.1
		Voice	<ul style="list-style-type: none"> • MOS (R) • Secure Calls (R) 	<ul style="list-style-type: none"> • CJCSI 6215.01B • CJCSI 6215.01B
		Facsimile	<ul style="list-style-type: none"> • Analog: EIA/TIA-465-A (R) • Digital: MIL-STD-188-161D (C) 	<ul style="list-style-type: none"> • JTA • JTA
VoIP	No	Data	<ul style="list-style-type: none"> • Modem (VBD) (R) • 56-kbps switched data (R: ISDN BRI only) • 64-kbps switched data (R: ISDN BRI only) • NX56 synchronous BER (R: ISDN BRI only) • NX64 synchronous BER (R: ISDN BRI only) • Secure data (STE/STU-III) (R) 	<ul style="list-style-type: none"> • CJCSI 6215.01B • GSCR Sect. 3.10
		VTC	<ul style="list-style-type: none"> • H.320 (R: ISDN BRI only) 	<ul style="list-style-type: none"> • JTA

Table 2-1. PBX 2 Requirements (continued)

DSN Features & Capabilities			
Interface	Critical	Requirements Required (R) or Conditional (C)	References
Common Features	No	<ul style="list-style-type: none"> • Selective call rejection (C) • Denied originating service (C) • Code restriction and diversion (C) • Call waiting (C) • Three-way calling (C) • Add-on transfer and conference calling (C) • Call forwarding (C) • Call pick-up (C) 	<ul style="list-style-type: none"> • GSCR Sect. 2.1.2 • GSCR Sect. 2.1.3 • GSCR Sect. 2.1.4 • GSCR Sect. 2.1.5 • GSCR Sect. 2.1.6 • GSCR Sect. 2.1.7 • GSCR Sect. 2.1.8 • GSCR Sect. 2.1.9
Attendant	No	<ul style="list-style-type: none"> • Initiate all precedence levels (C) • Visual display (C) • Override class of service (C) • Override busy line (C) • Call deflection (C) • Auto recall (C) • Waiting queue (C) 	<ul style="list-style-type: none"> • GSCR Sect. 2.2.1 • GSCR Sect. 2.2.2 • GSCR Sect. 2.2.3 • GSCR Sect. 2.2.4 • GSCR Sect. 2.2.5 • GSCR Sect. 2.2.6 • GSCR Sect. 2.2.7
Public Safety	No	<ul style="list-style-type: none"> • 911 (C) • Trace of terminating calls (C) • Outgoing call trace (C) • Tandem call trace (C) • Trace of a call in progress (C) 	<ul style="list-style-type: none"> • GSCR Sect. 2.4.1 • GSCR Sect. 2.4.2 • GSCR Sect. 2.4.3 • GSCR Sect. 2.4.4 • GSCR Sect. 2.4.5
Preset Conferencing	No	<ul style="list-style-type: none"> • Support 10 bridges; 1 originator and 20 conferees (C) • Assign up to 20 address numbers per bridge (C) • Use KXX codes for bridge access (C) • Conference notification recorded announcement (C) • Auto retrieval and alternate address (C) • Bridge release (C) • Lost connection (C) • Secondary conferencing (C) • Address translation (C) 	<ul style="list-style-type: none"> • GSCR Sect. 2.6 • GSCR Sect. 2.6 • GSCR Sect. 2.6 • GSCR Sect. 2.6.1 • GSCR Sect. 2.6.2 • GSCR Sect. 2.6.3 • GSCR Sect. 2.6.4 • GSCR Sect. 2.6.5 • GSCR Sect. 2.7
Nailed-up Connections	No	<ul style="list-style-type: none"> • Between any two like terminations (C) • PCM-24 and PCM-30, both CAS and CCS (C) • Supervision passed end-to-end for A/D or D/A (C) • Monitored and auto reconfigure (C) • Support at least 10% of circuits as nailed-up (C) • Non-preemptable (C) 	<ul style="list-style-type: none"> • GSCR Sect. 2.8
PAT	No	<ul style="list-style-type: none"> • Classmark for/not for PAT screening (C) • 7 PAT mechanisms (C) • Outgoing call screening • Functional structure (C) • Simultaneous calls limitation (C) • Overflow process (C) • Decrementing call-in-progress count (C) • Call treatment (C) • Queuing (C) • Attendant calls (C) • Operations measurement registers (C) • Maintenance and Administration of thresholds (C) 	<ul style="list-style-type: none"> • GSCR Sect. 2.11.1 • GSCR Sect. 2.11.1 • GSCR Sect. 2.11.1.1 • GSCR Sect. 2.11.1.2 • GSCR Sect. 2.11.1.3 • GSCR Sect. 2.11.1.4 • GSCR Sect. 2.11.1.5 • GSCR Sect. 2.11.1.6 • GSCR Sect. 2.11.1.7 • GSCR Sect. 2.11.1.8 • GSCR Sect. 2.11.1.9 • GSCR Sect. 2.11.1.10
DSN Hotline Services	No	<ul style="list-style-type: none"> • Hotline restrictions (C) • Auto initiate (C) • Analog and digital (C) • Subscription basis (C) • Protected hotline calling (C) • WWNDP interoperable (C) 	<ul style="list-style-type: none"> • GSCR Sect. 2.12 • GSCR Sect. 2.12 • GSCR Sect. 2.12 • GSCR Sect. 2.12 • GSCR Sect. 2.12.1-4 • GSCR Sect. 2.12.5

Table 2-1. PBX 2 Requirements (continued)

DSN Features & Capabilities (continued)			
Interface	Critical	Requirements Required (R) or Conditional (C)	References
Network Management	No	<ul style="list-style-type: none"> • Interfaces (C) • Measurements and data generation (C) • Fault management (C) • Configuration management (C) • Accounting management (C) • Performance management (C) • NM controls (C) • Remote access (C) 	<ul style="list-style-type: none"> • GSCR Sect. 9.1 • GSCR Sect. 9.2 • GSCR Sect. 9.3 • GSCR Sect. 9.4 • GSCR Sect. 9.5 • GSCR Sect. 9.6 • GSCR Sect. 9.7 • GSCR Sect. 9.8
ISDN Services	No	<ul style="list-style-type: none"> • EKTS (C) 	<ul style="list-style-type: none"> • GSCR Sect. 10, table 10-3
Synchronization	Yes	<ul style="list-style-type: none"> • Line timing mode (C) • Internal Stratum 4 (R) 	<ul style="list-style-type: none"> • GSCR Sect. 11.1.1.2 • GSCR Sect. 11.1.2.2
Reliability	No	<ul style="list-style-type: none"> • GR-512-CORE (C) 	<ul style="list-style-type: none"> • GSCR Sect.12
Security	Yes ³	<ul style="list-style-type: none"> • DAA (R) 	<ul style="list-style-type: none"> • DODI 8100.3
VoIP			
VoIP System	No	<p>VoIP function is conditional. If VoIP is provided, all of the following requirements must be met:</p> <ul style="list-style-type: none"> • MOS 4.0 or better • G.711 PCM Codec • Security IAW DITSCAP • NM • Line timing • Internal Clock • Latency ≤ 60 msec • IPv6 capable 	<ul style="list-style-type: none"> • GSCR App. 3
LANs	No	<p>VoIP function is conditional. If VoIP is provided, all of the following requirements must be met:</p> <ul style="list-style-type: none"> • LAN parameters • CoS • Queuing mechanisms • Policing mechanism • VLAN support • NM and voice in different VLAN • IEEE Standards Conformance • 2 second link restoral • LAN NM • Traffic Engineering 	<ul style="list-style-type: none"> • GSCR App. 3

Table 2-1. PBX 2 Requirements (continued)

Network Gateways				
Gateway	Critical	Requirements Required (R) or Conditional (C)		References
PSTN	No	Trunking	<ul style="list-style-type: none"> • Positive Identification (C) • On-Netting (C) • Off-Netting (C) 	<ul style="list-style-type: none"> • CJCSI 6215.01B • CJCSI 6215.01B • CJCSI 6215.01B
Legend: 2W - 2-Wire 911 - 911 Emergency Service A/D - analog to digital App - Appendix 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 Codec - Coder/Decoder CoS - Class of Service D/A - Digital to Analog DAA - Designated Accreditation Authority DITSCAP - Department of Defense Information Technology Security Certification and Accreditation Process DODI - Department of Defense Instruction DN - Directory Number DSN - Defense Switched Network EIA - Electronic Industries Alliance EKTS - Electronic Key Telephone System GR - Generic Requirement GSCR - Generic Switching Center Requirements H.320 - ITU Standard for narrowband VTC IAW - In accordance with IEEE - Institute of Electronic and Electrical Engineers, Inc. ISDN - Integrated Services Digital Network ITU - International Telecommunications Union JITC - Joint Interoperability Test Command JTA - Joint Technical Architecture kbps - kilobits per second KXX - K= any number 2-8; X= any number 1-9 LAN - Local Area Network LoC - Letter(s) of Compliance Mbps - Megabits per second MIL-STD - Military Standard MOS - Mean Opinion Score msec - millisecond NI 1/2 - National ISDN Standard 1 or 2 NM - Network Management NX56 - Data format restricted to multiples of 56 kbps NX64 - Data format restricted to multiples of 64 kbps PAT - Precedence Access Threshold PBX - Private Branch Exchange PCM-24 - Pulse Code Modulation 24 Channels PCM-30 - Pulse Code Modulation 30 Channels PRI - Primary Rate Interface PSTN - Public Switched Telephone Network QoS - Quality of Service R - Required Sect - section STE - Secure Terminal Equipment STU-III - Secure Telephone Unit-Third Generation T1 - Digital Transmission Link Level 1 (1.544 Mbps) TIA - Telecommunications Industry Association VBD - variable bit data VLAN - Virtual Local Area Network VoIP - Voice over Internet Protocol VTC - Video Teleconferencing WWNDP - Worldwide Numbering and Dialing Plan				
Notes: 1 For certification, only one of two trunk types (T1 CAS or T1 ISDN PRI) is required. 2 For certification, only one line type (2-wire analog or ISDN BRI) is required. 3 JITC verifies security via a vendor LoC. Local DAA process required prior to being authorized connection approval.				

8. TEST NETWORK DESCRIPTION. The SUT was tested at JITC’s Global Information Grid Network Test Facility in a manner and configuration similar to that of the DSN operational environment. This test was conducted using the notional configuration depicted in figure 2-2 and the Voice Grade (VG) Local Area Network (LAN) depicted in figure 2-3 with various switching systems listed in table 2-2. Per this configuration the SUT was tested as the end-point in relation to the other switches.

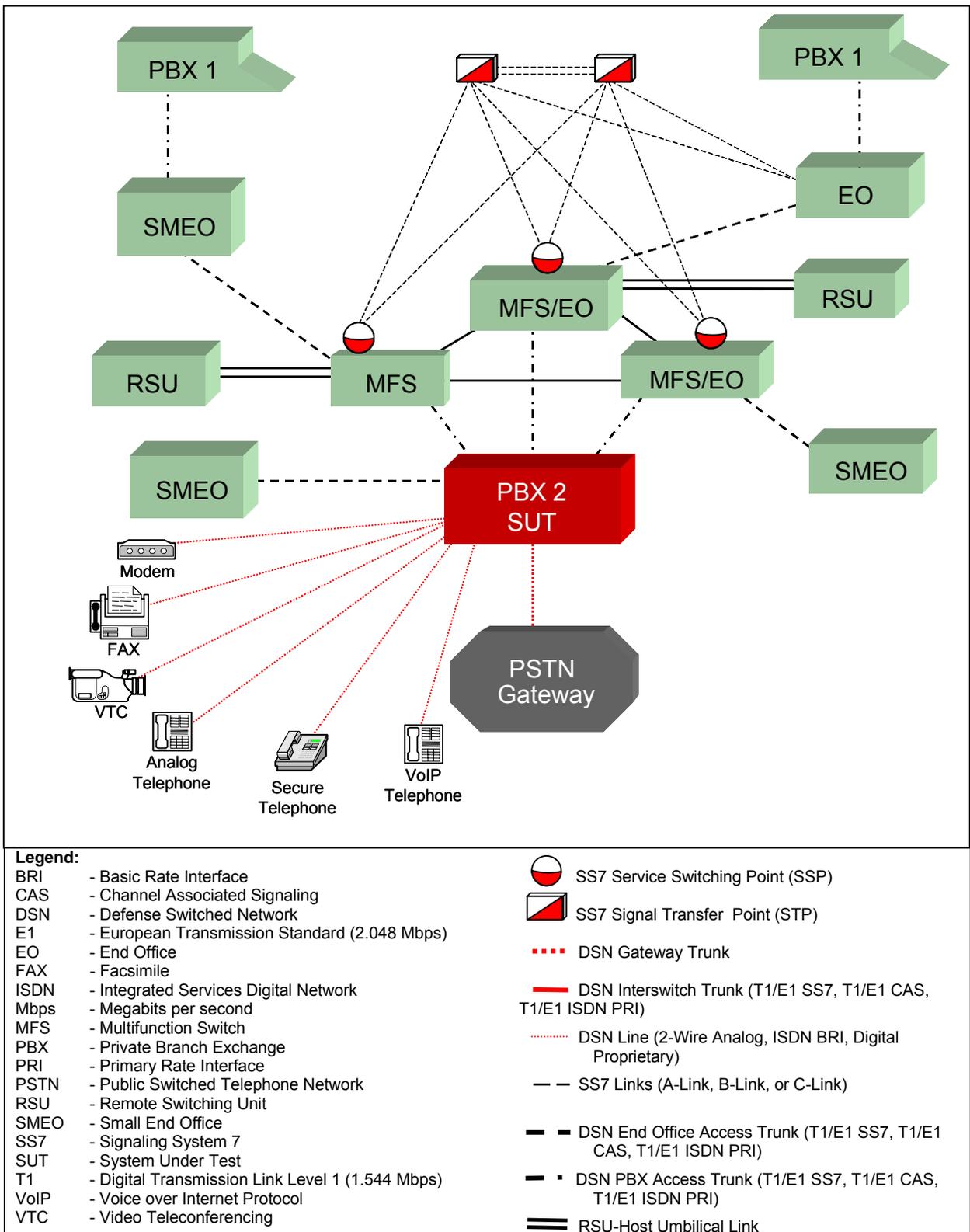


Figure 2-2. Test Configuration

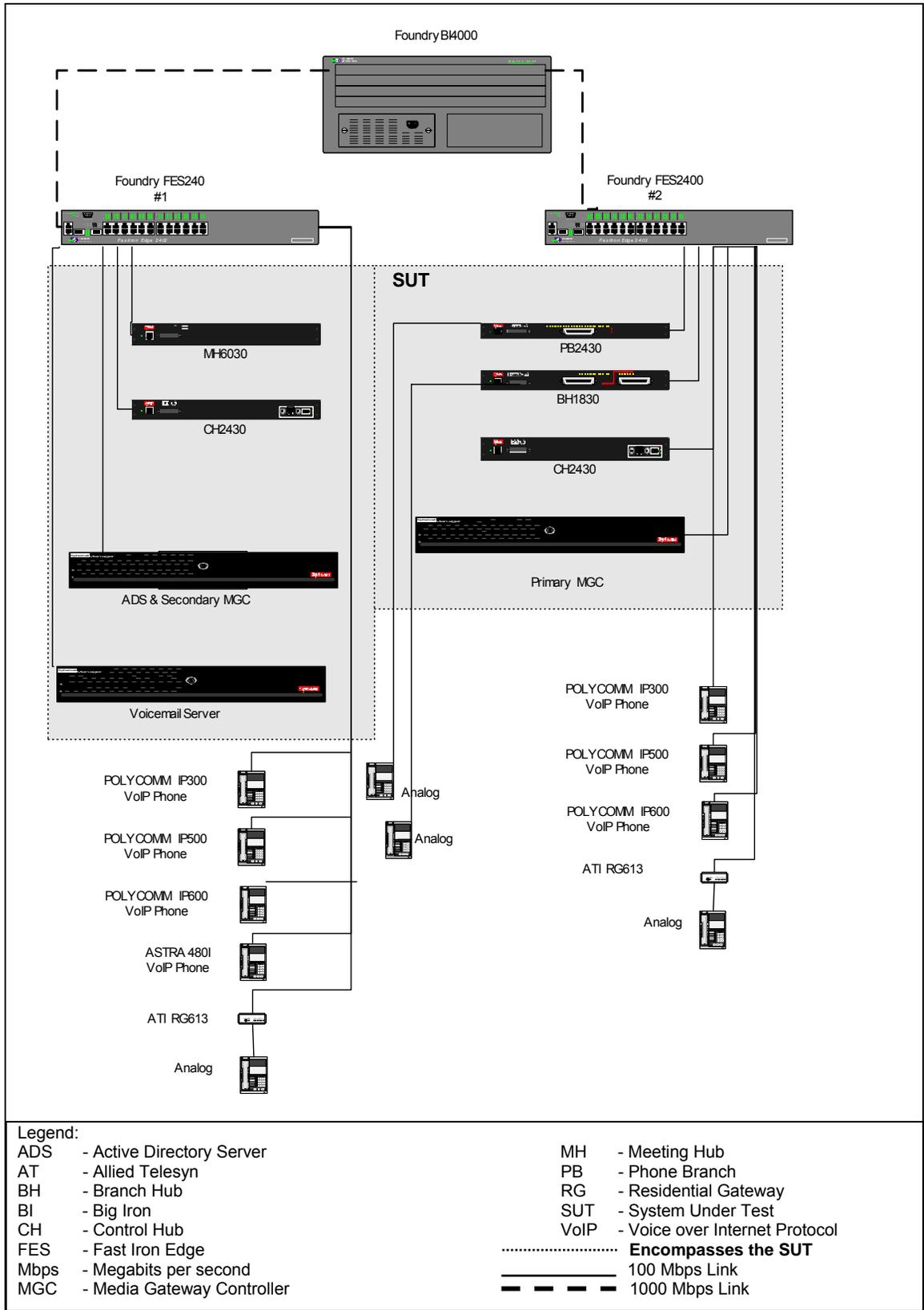


Figure 2-3. SUT Voice Grade Local Area Network Test Configuration

9. SYSTEM CONFIGURATIONS. Tables 2-2 and 2-3 provide the system configurations used in the test.

Table 2-2. Tested System Configurations

System Name	Software Release
Sphere Communications Spherically	4.0.8.10
Nortel Networks MSL-100 (MFS, EO, SMEO, PBX)	SEO6
REDCOM IGX (SMEO, PBX)	6.0A R1P3
Avaya MultiVantage (SMEO, PBX)	CM 2.01 (R012x.00.221.1)
Siemens EWSD (MFS, EO, SMEO, PBX)	19d with Patch Set 43
Lucent 5ESS	5E16.2 SU9
Tekelec STP	30.2
Nortel Networks Broad Band STP	8.0.4.38E
Legend: 5ESS - Class 5 Electronic Switching System CM - Communication Manager EO - End Office EWSD - Elektronisches Wählsystem Digital IGX - ISDN Gateway Exchange IPX - Internet Protocol Exchange ISDN - Integrated Services Digital Network MFS - Multifunction Switch MSL - Meridian Switching Load PBX - Private Branch Exchange SMEO - Small End Office STP - Signal Transfer Point SU - Software Update	

Table 2-3. VoIP Tested System Configurations

VoIP Components				
System	Hardware	HW Version	SW Release	Function
Digital Switching System	MGC		4.0.8.10	Processing/Signaling
	MH 6030		4.0.3.13	Conference Calls
	CH 2430			VoIP/TDM conversion
	BH1830			Analog Gateway
	PB2430			Analog Distribution/Access
VG LAN	Foundry BI 4000	SYSIF version 21	07.6.05aT51	Core/Access
	Foundry FES 2400	31134-405P	3.1.02B	Access
	AT-RG613	A1	2-0-1 release 22	Analog Gateway
	IP 300		App Version MGCP JB Test build 0003	IP Phone
	IP 500			
	IP 600			
Astra 480i		0.9.1	IP Phone	
Legend: App - Application AT - Allied Telesyn BH - Branch Hub BI - Big Iron CH - Control Hub FES - Fast Iron Edge HW - Hardware IP - Internet Protocol JB - Job Build LAN - Local Area Network MGC - Media Gateway Controller MGCP - Media Gateway Controller Protocol MH - Meeting Hub PB - Phone Branch RG - Residential Gateway SW - Software TDM - Time Division Multiplexing VoIP - Voice over IP VG - Voice Grade				

10. TESTING LIMITATIONS. None.

11. TEST RESULTS

a. Discussion

(1) DSN Trunk Interfaces. SUT met all critical interoperability certification requirements for DSN Trunk Interfaces.

(2) DSN Line Interfaces. SUT met all critical interoperability certification requirements for DSN Line Interfaces.

(3) Features and Functions. SUT met all critical interoperability certification requirements for Features and Functions.

(4) Network Gateways. The SUT met all critical interoperability certification requirements for PSTN.

(5) VoIP. The SUT VoIP solution comprises of the centric switch and the VG LAN as shown in figure 2-3. The VG LAN infrastructure consists of the equipment listed in table 2-3. The results for the overall VoIP system and VG LAN, as defined by the GSCR, appendix 3, are presented below.

(a) VoIP System. The GSCR, appendix 3, section A3.2, outlines the requirements for the VoIP system. The VoIP system requirements encompass end-to-end VoIP requirements (i.e., encompasses both the circuit switch and VG LAN). The following paragraphs detail the results of the SUT VoIP solution.

1. Voice Quality. Per the GSCR, appendix 3, VoIP calls shall have an average Mean Opinion Score (MOS) score of at least 4.0 as measured over a 5-minute period. For intra-switch calls, the SUT VoIP solution measured an average MOS of 4.32. Inter-switch calls measured an average MOS of 4.33. This average was based a total of 50 intra-switch and inter-switch calls.

2. Codec. Per the GSCR, appendix 3, section A3.2.2, the G.711 Pulse Code Modulation (PCM) codec was required and was met by the SUT VoIP solution.

3. Multi-Level Precedence and Preemption (MLPP). The GSCR, section 3, details the requirements for MLPP. MLPP features or functions are not required for a PBX 2 and were not tested.

4. Security. Security requirements per the GSCR, appendix 3, were 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.

5. Network Management (NM). The GSCR, appendix 3, defines the overall NM requirements that VoIP system must meet. The SUT VoIP system met these NM requirements. The switching system NM requirements are not required for a PBX 2 and were not tested.

6. Synchronization. Synchronization is required for overall voice platforms to include VoIP systems. For the SUT VoIP solution, synchronization per the GSCR, section 11, was met. The SUT VoIP solution derived synchronization with line timing mode via traditional T1 Time Division Multiplexed-based interfaces.

7. Latency. The requirement for one-way system latency for the VoIP system is 60 milliseconds (msec) or less as averaged over any 5-minute period. The latency requirement is measured from VoIP handset to the egress trunk. For this system to meet these requirements the "G.711 CODEC only" must be set to "True". This is found under the global settings under the "System Initialization Settings" tab. The SUT average latency over 30 calls was measured at 56.1 msec.

8. Internet Protocol version 6 (IPv6). The GSCR, appendix 3, states that the C2 LAN components must be IPv6 capable. The SUT VG LAN is IPv6 capable.

(b) Local Area Network. The SUT VG LAN solution as shown in figure 2-3 and table 2-3 met the minimum interoperability requirements of the GSCR, appendix 3. The network consisted of two main components: the core switch and the access switches. The SUT VG LAN solution used several industry standards to provide resiliency and quality of service.

1. Design

a. Delay. Per the GSCR, appendix 3, section A3.3.1.1, the one-way packet delay, the amount of time a packet takes to traverse the network, will be 5 msec or less, as measured over a 5-minute period. The averaged one-way delay measured in the SUT VG LAN solution was 1 msec.

b. Jitter. Jitter buffer in all VoIP phones are configured to buffer for 20-msec increments. All gateways have jitter buffers, which are set for its default, 2, which will buffer up to 40 msec. With a 40 percent bandwidth load, an average 0.84 msec of jitter was measured.

c. Packet Loss. Network packet loss occurs when packets are sent, but not received at the final destination. The GSCR, appendix 3, states that LANs shall be engineered so the measured voice packet loss within the LAN shall not exceed 0.05 percent averaged over any 5-minute period. With 40 percent bandwidth load, the measured packet loss was 0.00 percent for the SUT VG LAN infrastructure used.

d. Class of Service (CoS) and Quality of Service (QoS). The GSCR, appendix 3, outlines several methodologies to implement CoS and QoS.

Differentiated Services Code Point (DSCP) at the Network Layer (L3) was employed. DSCP L3 signaling was set for 5. The SUT solution provides CoS by assignment of 802.1p/Q tags. The 802.1p tags were set for 7, and the 802.1Q tags were prioritized by Virtual LAN (VLAN) IDs. These tags are implemented on all tagged trunks between the access switch (Foundry Fast Edge Switch 2400) and core switch (Foundry Big Iron 4000). Switches within the topology were configured with multiple VLANs to separate data, voice, and management traffic. The 802.1Q tags were used to uniquely identify and separate traffic as it passed through network connections. Voice VLAN traffic was assigned to a high priority queue, ensuring voice traffic took precedence over data traffic.

2. Traffic Engineering

a. The SUT can support 24 IP subscribers on each access device.

b. Core to Access. This configuration is switching at Layer 2, not Layer 3 routing.

3. Management. The GSCR, appendix 3, requires that the vendor provide a management system to monitor the performance of the LAN portion of the VoIP system. Due to numerous third party systems and applications capable of performing this function, this requirement was verified via vendor letter of compliance.

4. Phones. The SUT VoIP phones that met all critical interoperability requirements were the Polycom IP300, IP500, IP600, and the Astra 480i phones. Although the phones are capable of shared access (i.e., same switch port is shared by Personal Computer (PC) and VoIP phone), the dedicated access was tested (separate ports for VoIP phones and PCs).

5. Scalability. The SUT, as shown in figure 2-3, can support 64 users. For implementation purposes, the VG LAN can be scaled to meet any number of subscribers, as long as it is comprised of the equipment and software listed, and meets the traffic engineering constraints contained in the GSCR, appendix 3.

b. System Interoperability Results. The Sphere Communications Spherically Digital Switching System with Software Release 4.0.8.10 including VoIP meets the critical interoperability requirements in accordance with the requirements set forth in the GSCR and is certified for joint use within the DSN as a PBX 2. *However, since PBX 2s do not support the Military Unique Feature Requirements detailed in reference (c), connectivity to the DSN is not authorized until a waiver is granted by the CJCS for each site.* The interoperability test summary is shown in table 2-4 and the detailed interoperability test status is shown table 2-5.

Table 2-4. SUT Interoperability Test Summary

DSN Trunk Interfaces				
Interface & Signaling	Critical	Status	Remarks	
T1 CAS (DTMF)	No ¹	Certified	Met all CRs and FRs.	
T1 ISDN PRI NI 1/2	No ¹	Certified	Met all CRs and FRs.	
DSN Line Interfaces				
Interface & Signaling	Critical	Status	Remarks	
2-Wire Analog GR-506-CORE	No ²	Certified	Met all CRs and FRs.	
VoIP	No	Certified	Met all CRs and FRs.	
DSN Features and Capabilities				
Features and Capabilities	Critical	Status	Remarks	
Common Features	No	Certified	Met all CRs and FRs.	
Attendant	No	Not Tested		
Public Safety	No	Not Tested		
Preset Conferencing	No	Not Tested		
Nailed-up Connections	No	Not Tested		
PAT	No	Not Tested		
DSN Hotline Services	No	Not Tested		
Network Management	No	Not Tested		
ISDN Services (EKTS)	No	Not Tested		
Synchronization	Yes	Certified	Met all CRs and FRs.	
Reliability	No	Certified	Met all CRs and FRs.	
Security	Yes ³	Certified	Met all CRs and FRs.	
VoIP System	No	Not Tested		
VoIP LANs	No	Not Tested		
Network Gateways				
	Interface & Signaling	Critical	Status	Remarks
PSTN ⁴	T1 CAS (DTMF)	No ¹	Certified	Met all critical CRs and FRs.
	T1 ISDN PRI NI 1/2	No ¹	Certified	Met all critical CRs and FRs.

Legend:

BRI - Basic Rate Interface	LAN - Local Area Network
CAS - Channel Associated Signaling	LoC - Letters of Compliance
CRs - Capability Requirements	Mbps - Megabits per second
DAA - Designated Accreditation Authority	MLPP - Multi-Level Precedence and Preemption
DSN - Defense Switched Network	NI 1/2 - National ISDN 1 or 2
DTMF - Dual Tone Multi-Frequency	PAT - Precedence Access Threshold
EKTS - Electronic Key Telephone System	PRI - Primary Rate Interface
FRs - Feature Requirements	PSTN - Public Switched Telephone Network
GR - Generic Requirement	SUT - System Under Test
ISDN - Integrated Services Digital Network	T1 - Digital Transmission Link level 1 (1.544 Mbps)
JITC - Joint Interoperability Test Command	VoIP - Voice over Internet Protocol

Notes:

- The SUT is required to meet the Interoperability CRs and FRs for only one of the two trunk interfaces (T1 CAS or T1 ISDN PRI).
- The SUT is required to meet the Interoperability CRs and FRs for only one of two line interfaces (2W Analog or ISDN BRI).
- JITC verifies security via an LoC. Local DAA process is required prior to being authorized connection approval.
- The SUT only supports DSN trunk interfaces without the capability of MLPP; therefore, the PSTN trunks and DSN trunks are exactly the same.

12. TEST AND ANALYSIS REPORT. No detailed test report was developed per 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>.

Table 2-5. SUT Interoperability Requirements/Status

DSN Trunk Interfaces							
Interface	Critical	Interface Status	GSCR Requirement Required (R) Conditional (C)		Reference	Test Results	Operational Impact
T1 CAS	No ¹	Certified	Trunking	Framing (R)	GSCR Sect. 7	Met	
				Line Code (R)	GSCR Sect. 7	Met	
				Signaling (R)	GSCR Sect. 5	Met	
				Alarms (R)	GSCR Sect. 2.5.7, 7.1.4 & 7.2.2	Met	
				WWNDP (C)	GSCR Sect. 4.5.1	Not Tested	
				Outpulsing digit formats (C)	GSCR Sect. 4.5.2	Not Tested	
				Routing (C)	GSCR Sect. 4.2	Not Tested	
				Trunk Groups (C)	GSCR Sect. 2.5.5 & 2.5.6	Met	
				Call Processing (C)	GSCR Sect. 4	Met	
				CAS to CCS trunk interworking (C)	GSCR Sect. 3.10	Not Tested	
			PCM-24/PCM-30 Interoperation (C)	GSCR Sect. 7.3	Not Tested		
			Direct Inward Dialing (C)	GSCR Sect. 2.3.2	Met		
			Voice	MOS (R)	CJCSI 6215.01B	Met	
				Secure calls (R)	CJCSI 6215.01B	Met	
			Facsimile	Analog: EIA/TIA-465-A (R)	JTA	Met	
				Digital: MIL-STD-188-161D (C)	JTA	Not Tested	
			Data	Modem (VBD) (R)	CJCSI 6215.01B	Met	
				56-kbps switched data (R: ISDN PRI only)	GSCR Sect. 3.10	Not Tested	
				64-kbps switched data (R: ISDN PRI only)	GSCR Sect. 3.10	Not Tested	
				NX56 synchronous BER (R: ISDN PRI only)	GSCR Sect. 3.10	Not Tested	
NX64 synchronous BER (R: ISDN PRI only)	GSCR Sect. 3.10	Not Tested					
VTC	Secure data (STE/STU-III) (R)	GSCR Sect. 3.10	Met				
	H.320 (R: ISDN PRI only)	JTA	Not Tested				

Table 2-5. SUT Interoperability Requirements/Status (continued)

DSN Trunk Interfaces							
Interface	Critical	Interface Status	GSCR Requirement Required (R) Conditional (C)		Reference	Test Results	Operational Impact
T1 ISDN PRI	No ¹	Certified	Trunking	Framing (R)	GSCR Sect. 7	Met	
				Line Code (R)	GSCR Sect. 7	Met	
				Signaling (R)	GSCR Sect. 5	Met	
				Alarms (R)	GSCR Sect. 2.5.7, 7.1.4 & 7.2.2	Met	
				WWNDP (C)	GSCR Sect. 4.5.1	Not Tested	
				Outpulsing digit formats (C)	GSCR Sect. 4.5.2	Not Tested	
				Routing (C)	GSCR Sect. 4.2	Not Tested	
				Trunk Groups (C)	GSCR Sect. 2.5.5 & 2.5.6	Met	
				Call Processing (C)	GSCR Sect. 4	Met	
				CAS to CCS trunk interworking (C)	GSCR Sect. 3.10	Not Tested	
				PCM-24/PCM-30 Interoperation (C)	GSCR Sect. 7.3	Not Tested	
			Voice	Direct Inward Dialing (C)	GSCR Sect. 2.3.2	Met	
				MOS (R)	CJCSI 6215.01B	Met	
			Facsimile	Secure calls (R)	CJCSI 6215.01B	Met	
				Analog: EIA/TIA-465-A (R)	JTA	Met	
			Data	Digital: MIL-STD-188-161D (C)	JTA	Not Tested	
				Modem (VBD) (R)	CJCSI 6215.01B	Met	
				56-kbps switched data (R: ISDN PRI only)	GSCR Sect. 3.10	Met	
				64-kbps switched data (R: ISDN PRI only)	GSCR Sect. 3.10	Met	
				NX56 synchronous BER (R: ISDN PRI only)	GSCR Sect. 3.10	Met	
NX64 synchronous BER (R: ISDN PRI only)	GSCR Sect. 3.10	Met					
VTC	Secure data (STE/STU-III) (R)	GSCR Sect. 3.10	Met				
	H.320 (R: ISDN PRI only)	JTA	Met				

Table 2-5. SUT Interoperability Requirements/Status (continued)

DSN Line Interfaces							
Interface	Critical	Interface Status	GSCR Requirement Required (R) Conditional (C)		Reference	Test Results	Operational Impact
2-Wire Analog (GR-506-CORE)	No ²	Certified	Access	DN Identification (R)	GSCR Sect. 2.1.1	Met	
				Line signaling (C)	GSCR Sect. 5.2	Met	
				Alerting Signals and Tones (C)	GSCR Sect. 5.5	Met	
				WWNDP (C)	GSCR Sect. 4.5	Not Tested	
				Call Treatments (R)	GSCR Sect. 4.1	Met	
				2W user access (R)	GSCR Sect. 4.3.3	Met	
				Analog busy/idle (R)	GSCR Sect. 4.3.4.1	Met	
			Voice	MOS (R)	CJCSI 6215.01B	Met	
				Secure calls (R)	CJCSI 6215.01B	Met	
			Facsimile	Analog: EIA/TIA-465-A (R)	JTA	Met	
				Digital: MIL-STD-188-161D (C)	JTA	Not Tested	
			Data	Modem (VBD) (R)	CJCSI 6215.01B	Met	
				Secure data (STE/STU-III) (R)	GSCR Sect. 3.10	Met	
			VTC	H.320 (R: ISDN BRI only)	JTA	Not Tested	

Table 2-5. SUT Interoperability Requirements/Status (continued)

DSN Line Interfaces (continued)							
Interface	Critical	Interface Status	GSCR Requirement Required (R) Conditional (C)		Reference	Test Results	Operational Impact
VoIP	No	Certified	Access	DN Identification (R)	GSCR Sect. 2.1.1	Met	
				Alerting Signals and Tones (C)	GSCR Sect. 5.5	Met	
				WWNDP (C)	GSCR Sect. 4.5	Not Tested	
				Call Processing (C)	GSCR Sect. 4.4	Not Tested	
				Call Treatments (R)	GSCR Sect. 4.1	Met	
			Voice	MOS (R)	CJCSI 6215.01B	Met	
DSN Features & Capabilities							
Features/ Capabilities	Critical	Status	GSCR Requirement Required (R) Conditional (C)		Reference	Test Results	Operational Impact
Common Features	No	Certified	Selective call rejection (C)		GSCR Sect. 2.1.2	Not Tested	
			Denied originating service (C)		GSCR Sect. 2.1.3	Not Tested	
			Code restriction and diversion (C)		GSCR Sect. 2.1.4	Not Tested	
			Three-way calling (C)		GSCR Sect. 2.1.5	Met	
			Add-on transfer and conference calling (C)		GSCR Sect. 2.1.6	Met	
			Call forwarding (C)		GSCR Sect. 2.1.7	Met	
			Call pick-up (C)		GSCR Sect. 2.1.8	Met	
Call waiting (C)		GSCR Sect. 2.1.9	Met				
Attendant	No	Not Tested	Initiate all precedence levels (C)		GSCR Sect. 2.2.1	Not Tested	
			Visual display (C)		GSCR Sect. 2.2.2	Not Tested	
			Override class of service (C)		GSCR Sect. 2.2.3	Not Tested	
			Override busy line (C)		GSCR Sect. 2.2.4	Not Tested	
			Call deflection (C)		GSCR Sect. 2.2.5	Not Tested	
			Auto recall (C)		GSCR Sect. 2.2.6	Not Tested	
			Waiting queue (C)		GSCR Sect. 2.2.7	Not Tested	
Public Safety	No	Not Tested	911 (C)		GSCR Sect. 2.4.1	Not Tested	
			Trace of terminating calls (C)		GSCR Sect. 2.4.2	Not Tested	
			Outgoing call trace (C)		GSCR Sect. 2.4.3	Not Tested	
			Tandem call trace (C)		GSCR Sect. 2.4.4	Not Tested	
			Trace of a call in progress (C)		GSCR Sect. 2.4.5	Not Tested	

Table 2-5. SUT Interoperability Requirements/Status (continued)

DSN Features & Capabilities (continued)						
Features/ Capabilities	Critical	Status	GSCR Requirement Required (R) Conditional (C)	Reference	Test Results	Operational Impact
Preset Conferencing	No	Not Tested	Support 10 bridges; 1 originator and 20 conferees (C)	GSCR Sect. 2.1.6	Not Tested	
			Assign up to 20 address numbers per bridge (C)	GSCR Sect. 2.6	Not Tested	
			Use KXX codes for bridge access (C)	GSCR Sect. 2.6	Not Tested	
			Conference notification recorded announcement (C)	GSCR Sect. 2.6.1	Not Tested	
			Auto retrieval and alternate address (C)	GSCR Sect. 2.6.2	Not Tested	
			Bridge release (C)	GSCR Sect. 2.6.3	Not Tested	
			Lost connection (C)	GSCR Sect. 2.6.4	Not Tested	
			Secondary conferencing (C)	GSCR Sect. 2.6.5	Not Tested	
Nailed-Up Connections	No	Not Tested	Address translation (C)	GSCR Sect. 2.7	Not Tested	
			Between any two like terminations (C)	GSCR Sect. 2.8	Not Tested	
			PCM-24 and PCM-30, both CAS and CCS (C)	GSCR Sect. 2.8	Not Tested	
			Supervision passed end-to-end for A/D or D/A (C)	GSCR Sect. 2.8	Not Tested	
			Monitored and auto reconfigure (C)	GSCR Sect. 2.8	Not Tested	
PAT	No	Not Tested	Support at least 10% of circuits as nailed-up (C)	GSCR Sect. 2.8	Not Tested	
			Non-preemptable (C)	GSCR Sect. 2.8	Not Tested	
			Classmark for/not for PAT screening (C)	GSCR Sect. 2.11.1	Not Tested	
			7 PAT mechanisms (C)	GSCR Sect. 2.11.1	Not Tested	
			Outgoing call screening (C)	GSCR Sect. 2.11.1.1	Not Tested	
			Functional structure (C)	GSCR Sect. 2.11.1.2	Not Tested	
			Overflow Process (C)	GSCR Sect. 2.11.1.3	Not Tested	
			Simultaneous calls limitation (C)	GSCR Sect. 2.11.1.4	Not Tested	
			Decrementing call-in-progress count (C)	GSCR Sect. 2.11.1.5	Not Tested	
			Call treatment (C)	GSCR Sect. 2.11.1.6	Not Tested	
DSN Hotline Services	No	Not Tested	Queuing (C)	GSCR Sect. 2.11.1.7	Not Tested	
			Attendant calls (C)	GSCR Sect. 2.11.1.8	Not Tested	
			Operations measurement registers (C)	GSCR Sect. 2.11.1.9	Not Tested	
			Maintenance and Administration of thresholds (C)	GSCR Sect. 2.11.1.10	Not Tested	
			Hotline restrictions (C)	GSCR Sect. 2.12	Not Tested	
			Auto initiate (C)	GSCR Sect. 2.12	Not Tested	
			Analog and digital (C)	GSCR Sect. 2.12	Not Tested	
			Subscription basis (C)	GSCR Sect. 2.12	Not Tested	
			Protected hotline calling (C)	GSCR Sect. 2.12.1-4	Not Tested	
			WWNDP interoperable (C)	GSCR Sect. 2.12.5	Not Tested	

Table 2-5. SUT Interoperability Requirements/Status (continued)

DSN Features & Capabilities (continued)						
Features/ Capabilities	Critical	Status	GSCR Requirement Required (R) Conditional (C)	Reference	Test Results	Operational Impact
Network Management	No	Not Tested	Interfaces (C)	GSCR Sect. 9.1	Not Tested	
			Measurements and data generation (C)	GSCR Sect. 9.2	Not Tested	
			Fault management (C)	GSCR Sect. 9.3	Not Tested	
			Configuration management (C)	GSCR Sect. 9.4	Not Tested	
			Accounting management (C)	GSCR Sect. 9.5	Not Tested	
			Performance management (C)	GSCR Sect. 9.6	Not Tested	
			NM controls (C)	GSCR Sect. 9.7	Not Tested	
Remote access (C)	GSCR Sect. 9.8	Not Tested				
ISDN Services	No	Not Tested	EKTS (C)	GSCR Sect. 10, table 10-3	Not Tested	
Synchronization	Yes	Certified	Line timing mode (C)	GSCR Sect. 11.1.1.2	Met	
			Internal Stratum 4 (R)	GSCR Sect. 11.1.2.2	Met	
Reliability	No	Not Tested	GR-512-CORE (C)	GSCR Sect. 12	Not Tested	
Security	Yes ³	Certified	DAA (R)	DODI 8100.3	Met	
VoIP System	No	Certified	MOS 4.0 or better (R)	GSCR App. 3	Met	
			G.711 PCM Codec (R)	GSCR App. 3	Met	
			Security IAW DITSCAP (R)	GSCR App. 3	Met	
			NM (R)	GSCR App. 3	Met	
			Line timing (R)	GSCR App. 3	Met	
			Internal Clock (R)	GSCR App. 3	Met	
			Latency @ 60 msec or less (R)	GSCR App. 3	Met	
IPv6 capable (R)	GSCR App. 3	Met				
VoIP LANs	No	Certified	LAN parameters (R)	GSCR App. 3	Met	
			CoS /QoS (R)	GSCR App. 3	Met	
			VLANs (R)	GSCR App. 3	Met	
			IEEE Standards Conformance (R)	GSCR App. 3	Met	
			.99999 availability (R)	GSCR App. 3	Met	
			Modular devices (R)	GSCR App. 3	Met	
			2 second link restoral (R)	GSCR App. 3	Met	
LAN NM (R)	GSCR App. 3	Met				
Traffic Engineering (R)	GSCR App. 3	Met				

Table 2-5. SUT Interoperability Requirements/Status (continued)

Network Gateway							
Gateway	Critical	Interface Status	GSCR Requirement Required (R) Conditional (C)		Reference	Test Results	Operational Impact
PSTN	No	Certified	Trunking	Positive Identification (C)	CJCSI 6215.01B	Met	
				On-Netting (C)	CJCSI 6215.01B	Met	
				Off-Netting (C)	CJCSI 6215.01B	Met	
Legend: 2W - 2-Wire A/D - Analog to Digital Conversion App. - Appendix BER - Bit Error Ratio BRI - Basic Rate Interface C - conditional CAS - Channel Associated Signaling CCS - Common Channel Signaling CJCS - Chairman of the Joint Chiefs of Staff CJCSI - CJCS Instruction Codec - Coder/Decoder CoS - Class of Service CRs - Capability Requirements D/A - Digital to Analog Conversion DAA - Designated Accreditation Authority DITSCAP - DOD Information Technology Security and Accreditation Process DN - Directory Number DOD - Department of Defense DODI - DOD Instruction DSN - Defense Switched Network EIA - Electronic Industries Alliance EKTS - Electronic Key Telephone System FRs - Feature Requirements GR - Generic Requirement GSCR - Generic Switching Center Requirements H.320 - ITU Standard for narrowband VTC IATP - Information Assurance Test Plan IAW - In accordance with IEEE - Institute of Electrical and Electronics Engineers, Inc. IPv6 - Internet Protocol version 6 ISDN - Integrated Services Digital Network ITU - International Telecommunications Union JITC - Joint Interoperability Test Command JTA - Joint Technical Architecture kbps - kilobits per second KXX - K= any number 2-8; X= any number 1-9 LAN - Local Area Network LoC - Letter(s) of Compliance Mbps - Megabits per second MIL-STD - Military Standard MLPP - Multi-Level Precedence and Preemption MOS - Mean Opinion Score Msec - Milliseconds NI 1/2 - National ISDN Standard 1 or 2 NM - Network Management 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 QoS - Quality of Service R - Required Sect. - Section STE - Secure Terminal Equipment STU-III - Secure Telephone Unit-Third Generation SUT - System Under Test T1 - Digital Link Level 1 (1.544 Mbps) TIA - Telecommunications Industry Association VBD - Variable bit data VLAN - Virtual LAN VoIP - Voice over Internet Protocol VTC - Video Teleconferencing WWNDP - Worldwide Numbering and Dialing Plan							
Notes: 1 The SUT is required to meet the Interoperability CRs and FRs for only one of the two trunk interfaces (T1 CAS or T1 ISDN PRI). 2 The SUT is required to meet the Interoperability CRs and FRs for only one of two line interfaces (2W Analog or ISDN BRI). 3 JITC verifies security via vendor LoC. Further testing IAW the IATP is required prior to being authorized connection approval.							