DEFENSE INFORMATION SYSTEMS AGENCY
JOINT INTEROPERABILITY TEST COMMAND
P.O. BOX 12798
FORT HUACHUCA, ARIZONA 85670-2798

IN REPLY REFER TO: Networks and Transport Division (JTE) 28 January 2005

MEMORANDUM FOR DISTRIBUTION

SUBJECT: Special Interoperability Test Certification of Avaya S8700 with Software Release Communication Manager (CM) 2.1 (R012x.01.0.411.7) and G3SI with Software Release CM 2.1 (R012i.01.0.411.7) Digital Switching Systems (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 Avaya S8700 with Software Release CM 2.1 (R012x.01.0.411.7), including Voice over Internet Protocol (VoIP), hereinafter referred to as the system under test (SUT), met all of its critical interoperability requirements, and is certified as interoperable for joint use within the Defense Switched Network (DSN). The test discrepancies shown in the Certification Testing Summary (enclosure 2), which remained open after software patches were applied and regression testing was completed, have an overall minor operational impact. The Avaya G3SI digital switching system employs the same software and trunk/line card hardware as the SUT. JITC analysis determined the G3SI with Software Release CM 2.1 (R012i.01.0.411.7) to be functionally identical for interoperability certification purposes as the SUT, and it is also certified as interoperable for joint use within the DSN. The Avaya switch product line offers a Remote Switching Unit (RSU) capability referred to as the Survivable Remote Processor Expansion Port Network. This capability did not meet the minimum critical interoperability requirements for an RSU and it is therefore not covered by this certification. This product line also offers a VoIP capability. Testing was performed on VoIP and it is covered by this certification. The SUT was tested and met the critical interoperability requirements for the following DSN switch types: Small End Office (SMEO), Private Branch Exchange (PBX) 1, and PBX 2. This certification expires upon changes that could affect interoperability, but no later than three years from the date of this memorandum.

3. This finding is based on interoperability testing conducted by JITC and a review of the vendor's Letters of Compliance (LoC). Testing was conducted at JITC's Global Information Grid Network Test Facility at Ft. Huachuca, AZ, from 30 July through 20 September 2004. Review of vendor's LoC was completed on 2 November 2004. Final review of test data and discrepancies was completed on 17 December 2004. Enclosure 2 documents the test results and describes the tested network and system configurations. System interoperability should be verified before deployment in an operational environment that varies significantly from the test environment.

4. The Command and Control Voice Grade Local Area Network certified hardware and software components are listed in table 1. The interoperability test summary of the SUT is indicated in table 2. The SMEO required and conditional Capability Requirements (CRs) and Feature Requirements (FRs) are listed in table 3. If a switch satisfies SMEO criteria, it will satisfy the lesser standards of a PBX. This interoperability test status is based on the SUT's ability to meet:

a. DSN services for Network and Applications specified in reference (c).

b. SMEO interface and signaling requirements for trunks/lines specified in reference (d) verified through JITC testing and/or vendor submission of LoC.

c. SMEO FRs/CRs specified in reference (d) 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. Command and Control Voice Grade Local Area Hardware and Software Network Components

Component	Software Release	Subcomponents
Extreme Summit 300-24	6.2a-1.2.0B422	
Extreme Alpine 3808	6.2.2B134	Card SMMi (45014) Card GM – 4X (45112) Card GM – 4S (45110)
Extreme Black Diamond 6804	6.2.2B134	Card MSM64 (50015) Card G8X (51032) Card F48T (52011)
Extreme Black Diamond 6808		
Phone – 4620IP	DEF 20R2_01	

Legend:

B	- Build	MSM	- Management Switch Module
F	- Fast Ethernet	SMM	- Switch Management Module
G	- Gigabit	s	- Small Profile
GM	- Gigabit Module	T	- Twisted pair copper
i	- Inferno Chip Set	X	- Gigabit interface converter based
IP	- Internet Protocol		

Table 2. SUT Interoperability Test Summary

DSN Trunk Interfaces			
Interface & Signaling	**Critical**	**Status**	**Remarks**
T1 CAS (DTMF, MFR1, DP)	No	Certified	Met all critical CRs and FRs.
E1 CAS (DTMF, MFR1, DP)	No (Europe only)	Certified	Met all critical CRs and FRs.
T1 ISDN PRI NI 1/2 (ANSI T1. 619a)	Yes	Certified	Met all critical CRs and FRs.
DSN Line Interfaces			
Interface & Signaling	**Critical**	**Status**	**Remarks**
2-Wire Analog (GR-506-CORE)	Yes	Certified	Met all critical CRs and FRs with the following minor exception: Full compliance of DSN Announcements and three-way calling were not met.[1] Operational impact is minor.
ISDN BRI NI 1/2	Yes	Certified	Met all critical CRs and FRs with the following minor exception: Full compliance of DSN Announcements and three-way calling were not met.[1] Operational impact is minor.
2-Wire Proprietary Digital	No	Certified	Met all critical CRs and FRs with the following minor exception: Full compliance of DSN Announcements and three-way calling were not met.[1] Operational impact is minor.
VoIP	No	Certified	Met all critical CRs and FRs with the following minor exception: Full compliance of DSN Announcements and three-way calling were not met.[1] Operational impact is minor.
Network Management			
Interface & Signaling	**Critical**	**Status**	**Remarks**
CAT 5 TPC IEEE 802.3 10BaseT Ethernet, TCP/IP	No[2]	Certified	Met all Critical CRs and FRs.[3]
TPC EIA-232 Asynchronous @ 9.6 kbps	No[2]	Certified	Met all Critical CRs and FRs.[4]
DSN Features and Capabilities			
Features and Capabilities	**Critical**	**Status**	**Remarks**
Common Features	No	Certified	
Attendant	No	Certified	Met all critical CRs and FRs for Attendant services with the following console: Lucent Attendant Console Model 302C.
Public Safety	Yes	Not Certified	Public safety not met.[5] Operational impact is minor.
Preset Conferencing	No	Certified	Tested with External Compunetix Contex Audioconferencing Bridge 480 Software Release 1.836.d
Nailed-up Connections	No	Not Tested	
PAT	No	Not Tested	
DSN Hotline Services	Yes	Not Certified	ISDN Hotline services not met.[5] Operational impact is minor.
ISDN Services (EKTS)	No	Certified	Met all critical CRs and FRs.
Synchronization	Yes	Certified	Met all critical CRs and FRs.
Reliability	Yes	Certified	Met all critical CRs and FRs.
Security[6]	Yes	Certified	Met all critical CRs and FRs.
VoIP System	No	Certified	Met all critical CRs and FRs.
VoIP LANs	No	Certified	Met all critical CRs and FRs.

Table 2. SUT Interoperability Test Summary (continued)

Network Gateways				
	Interface & Signaling	**Critical**	**Status**	**Remarks**
PSTN	T1 CAS (DTMF, MFR1, DP)	No	Certified	Met all critical CRs and FRs.
	E1 CAS (DTMF, MFR1, DP)	No (Europe only)	Certified	Met all critical CRs and FRs.
	T1 ISDN PRI NI 1/2 (Q.931)	No	Certified	Met all critical CRs and FRs.
DRSN	TPC 2-Wire Analog (GR-506-CORE)	Yes	Certified[7]	Met all critical CRs and FRs.

Legend:

10BaseT	- 10 Mbps (Baseband Operation, Twisted Pair) Ethernet	ITU	- International Telecommunication Union
802.3	- IEEE Ethernet protocol	kbps	- kilobits per second
ANSI	- American National Standards Institute	LAN	- Local Area Network
BRI	- Basic Rate Interface	LoC	- Letters of Compliance
CAS	- Channel Associated Signaling	Mbps	- Megabits per second
CAT	- Category	MFR1	- Multifrequency Recommendation 1
CRs	- Capability Requirements	MLPP	- Multi-Level Precedence and Preemption
DISA	- Defense Information Systems Agency	NI 1/2	- National ISDN 1 or 2
DP	- Dial Pulse	PAT	- Precedence Access Threshold
DRSN	- Defense Red Switch Network	PM	- Program Manager
DSN	- Defense Switched Network	PRI	- Primary Rate Interface
DTMF	- Dual Tone Multi-Frequency	PSTN	- Public Switched Telephone Network
E1	- European Basic Multiplex Rate (2.048 Mbps)	Q.931	- ITU Signaling Standard for ISDN
EIA	- Electronic Industries Alliance	SS7	- Signaling System 7
EKTS	- Electronic Key Telephone System	SUT	- System Under Test
FRs	- Feature Requirements	T1	- Digital Transmission Link Level 1 (1.544 Mbps)
GR	- Generic Requirement	T1.619a	- SS7 and ISDN MLPP Signaling Standard for T1
GSCR	- Generic Switching Center Requirements	TCP/IP	- Transmission Control Protocol/Internet Protocol
IEEE	- Institute of Electrical and Electronics Engineers, Inc.	TPC	- Twisted Pair Copper
ISDN	- Integrated Services Digital Network	VoIP	- Voice over Internet Protocol

Notes:

1 Met all DSN Announcement requirements except for Isolation Code Announcement. The SUT provides this announcement only for precedence calls above ROUTINE. ROUTINE precedence calls receive a fast busy signal. When a three-way call is established "each connection shall maintain its assigned precedence level". The SUT however connects a three-way call in a single time slot and classmarks all parties at the highest precedence level. The overall operational impact of these noted discrepancies are minor.

2 The Network Management requirements can be satisfied with one of the three following physical interfaces: Ethernet/TCP/IP (IEEE 802.3), Serial EIA-232/Asynchronous, or Serial Synchronous (X.25 and/or BX.25 variant).

3 Performance (e.g. traffic data), alarm/log data, and switch access provided by this interface.

4 Accounting data (e.g. call detail recording) only provided by this interface.

5 This is a new 2003 GSCR critical requirement. The vendor has until March 2005 to meet it. Operational impact is minor.

6 DITSCAP information assurance testing is accomplished via DISA-led Information Assurance test teams.

7 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 3. SMEO Requirements

Interface	Critical	Requirements Required (R) or Conditional (C)		References
DSN Line Interfaces				
2-Wire Analog (GR-506-CORE)	Yes	Access	• DN Identification (R) • Line signaling (R) • Alerting Signals and Tones (R) • WWNDP (R) • Call Processing (R) • Call Treatments (R) • 2W user access (R: 2-Wire Analog only) • Analog busy/idle (R: 2-Wire Analog only)	• GSCR Sect. 2.1.1 • GSCR Sect. 5.2 • GSCR Sect. 5.5 • GSCR Sect. 4.5 • GSCR Sect. 4.4 • GSCR Sect. 4.1 • GSCR Sect. 4.3.3 • GSCR Sect. 4.3.4.1
ISDN BRI NI 1/2 (ANSI T1.619a)	Yes	Voice	• MOS (R) • MLPP (R) • Secure Calls (R)	• CJCSI 6215.01B • GSCR Sect. 3.4.3/3.9 • CJCSI 6215.01B
		Facsimile	• Analog: EIA/TIA-465-A (R) • Digital: MIL-STD-188-161D (C)	• JTA • JTA
2-Wire Proprietary Digital	No	Data	• Modem (VBD) (R) • 56-kbps switched data (R) • 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 Sect. 3.10 • GSCR Sect. 3.10 • GSCR Sect. 3.10 • GSCR Sect. 3.10 • CJCSI 6215.01B
		VTC	• H.320 (R: BRI only)	• JTA
DSN Trunk Interfaces				
T1 CAS (MFR1)	No	Trunking	• Framing (R) • Line Code (R) • Signaling (R) • Alarms (R) • WWNDP (R) • Outpulsing digit formats (R: CAS only) • Routing (R) • Trunk Groups (R) • Call Processing (R) • CAS to CCS trunk interworking (C) • PCM-24/PCM-30 Interoperation (R) • Direct Inward Dialing (C)	• 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 CAS (DTMF, DP)	Yes			
E1 CAS (MFR1, DTMF, DP)	Yes (Europe only)	Voice	• MOS (R) • MLPP (R) • Secure calls (R)	• CJCSI 6215.01B • GSCR Sect. 3 • CJCSI 6215.01B
		Facsimile	• Analog: EIA/TIA-465-A (R) • Digital: MIL-STD-188-161D (C)	• JTA • JTA
T1 ISDN PRI NI 1/2 (ANSI T1.619a)	Yes	Data	• Modem (VBD) (R) • 56-kbps switched data (R: PRI only) • 64-kbps switched data (R: PRI only) • NX56 synchronous BER (R: PRI only) • NX64 synchronous BER (R: PRI only) • Secure data (STE/STU-III) (R)	• CJCSI 6215.01B • GSCR Sect. 3.10 • GSCR Sect. 3.10 • GSCR Sect. 3.10 • GSCR Sect. 3.10 • CJCSI 6215.01B
		VTC	• H.320 (R: PRI only)	• JTA

Table 3. SMEO Requirements (continued)

Interface	Critical	Requirements Required (R) or Conditional (C)	References
Network Management			
CAT 5 TPC IEEE 802.3 10BaseT Ethernet, TCP/IP	No	• Interfaces (R) • Measurements and data generation (R) • Fault management (R) • Configuration management (R) • Automated Message Accounting • Performance management (R) • NM controls (C) • Remote access (R)	• 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
TPC EIA-232 Asynchronous @ 9.6 kbps	No	• Interfaces (R) • Measurements and data generation (R) • Configuration management (R) • Automated Message Accounting • Performance management (R) • NM controls (C) • Remote access (R)	• GSCR Sect. 9.1 • GSCR Sect. 9.2 • GSCR Sect. 9.4 • GSCR Sect. 9.5 • GSCR Sect. 9.6 • GSCR Sect. 9.7 • GSCR Sect. 9.8
DSN Features & Capabilities			
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 and conference calling (C) • Call forwarding (C) • Call pick-up (C)	• 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	• 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)	• 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	Yes	• 911 (C) • Trace of terminating calls (R) • Outgoing call trace (R) • Tandem call trace (R) • Trace of a call in progress (R)	• 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	• 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 retrial and alternate address (C) • Bridge release (C) • Lost connection (C) • Secondary conferencing (C) • Address translation (C)	• 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	• 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)	• GSCR Sect. 2.8 • GSCR Sect. 2.8 • GSCR Sect. 2.8 • GSCR Sect. 2.8 • GSCR Sect. 2.8 • GSCR Sect. 2.8

Table 3. SMEO Requirements (continued)

Interface	Critical	Requirements Required (R) or Conditional (C)	References
PAT	No	• 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)	• 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	Yes	• Hotline restrictions (R) • Auto initiate (R) • Analog and digital (R) • Subscription basis (R) • Protected hotline calling (R) • WWNDP interoperable (R)	• 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
ISDN Services	No	• EKTS (C)	• GSCR Sect. 10, table 10-3
Synchronization	Yes	• Line timing mode (R) • Internal Stratum 4 (R)	• GSCR Sect. 11.1.1.2 • GSCR Sect. 11.1.2.2
Reliability	Yes	• GR-512-CORE (R)	• GSCR Sect. 12
Security[1]	Yes	• DITSCAP (R)	• GSCR Sect. 13
RSU			
Normal Operations	No	RSU function is conditional. If an RSU is provided, **all** of the following requirements must be met: • Same user features as EO, SMEO or PBX • Normal operations in accordance with GR-532-CORE • If EO, provide diverse routing to host and PSTN	 • GSCR Sect. 2.10.2 • GSCR Sect. 2.10.2 • GSCR Sect. 2.10.2
Degraded Operations	No	RSU function is conditional. If an RSU is provided, **all** of the following requirements must be met: • Stand-alone - Stand-alone in accordance with GR-532-CORE - AMA not required - MLPP required • Partial stand-alone operations - Partial in accordance with GR-532-CORE - 3% users provided assured dial tone - Normal MLPP interaction	 • GSCR Sect. 2.10.3.1 • GSCR Sect. 2.10.3.2
VoIP			
VoIP System	No	VoIP function is conditional. If VoIP is provided, **all** of the following requirements must be met: • MOS 4.0 or better • G.711 PCM Codec • Security in accordance with DITSCAP • NM • Line timing • Internal Clock • Latency ≤ 60 msec • IPv6 capable	 • GSCR App. 3 • GSCR App. 3 • GSCR App. 3 • GSCR App. 3 • GSCR App. 3 • GSCR App. 3 • GSCR App. 3 • GSCR App. 3

Table 3. SMEO Requirements (continued)

Interface	Critical	Requirements Required (R) or Conditional (C)		References
VoIP				
C2 VG LANs	No	VoIP function is conditional. If VoIP is provided, **all** of the following requirements must be met: • LAN parameters • CoS /QoS • VLANs • IEEE Standards Conformance • .99999 availability • Modular devices • 2 second link restoral • LAN NM • Traffic Engineering		 • GSCR App. 3 • GSCR App. 3 • GSCR App. 3 • GSCR App. 3 • GSCR App. 3 • GSCR App. 3 • GSCR App. 3 • GSCR App. 3 • GSCR App. 3
Network Gateways				
PSTN[2]	Yes	Trunking	• Positive Identification Control (R) • On-Netting (R) • Off-Netting (R)	• CJCSI 6215.01B • CJCSI 6215.01B • CJCSI 6215.01B
DRSN[3]	Yes	Access	• Alerting Signals and Tones (R) • Call Processing (R) • Call Treatments (R) • Analog busy/idle (R)	• GSCR Sect. 5.5 • GSCR Sect. 4.4 • GSCR Sect. 4.1 • GSCR Sect. 4.3.4.1
		Voice	• MOS (C) • MLPP (C) • Secure calls (C)	• CJCSI 6215.01B • GSCR Sect. 3 • CJCSI 6215.01B

Table 3. SMEO Requirements (continued)

Legend:

2W	- 2-Wire	EKTS	- Electronic Key Telephone System	NX64	- Data format restricted to multiples of 64 kbps
10BaseT	- 10 Mbps (Baseband Operation, Twisted Pair) Ethernet	EO	- End Office	PAT	- Precedence Access Threshold
802.3	- IEEE Ethernet Protocol	GR	- Generic Requirement	PBX	- Private Branch Exchange
A/D	- Analog to Digital Conversion	GSCR	- Generic Switching Center Requirements	PCM	- Pulse Code Modulation
AMA	- Automated Message Accounting	GSTP	- Generic Switch Test Plan	PCM-24	- PCM - 24 Channels
ANSI	- American National Standards Institute	H.320	- ITU Standard for narrowband VTC	PCM-30	- PCM - 30 Channels
App.	- Appendix	IEEE	- Institute of Electrical and Electronics Engineers, Inc.	PRI	- Primary Rate Interface
BER	- Bit Error Ratio	IPv6	- Internet Protocol version 6	PSTN	- Public Switched Telephone Network
BRI	- Basic Rate Interface	ISDN	- Integrated Services Digital Network	QoS	- Quality of Service
C	- Conditional	IT	- Information Technology	R	- Required
C2	- Command and Control	ITU	- International Telecommunication Union	RSU	- Remote Switching Unit
CAS	- Channel Associated Signaling	JTA	- Joint Technical Architecture	Sect.	- Section
CAT	- Category	kbps	- kilobits per second	SMEO	- Small End Office
CCS	- Common Channel Signaling	KXX	- K= any number 2-8; X= any number 1-9	SS7	- Signaling System 7
CJCSI	- Chairman of the Joint Chiefs of Staff Instruction	LAN	- Local Area Network	STE	- Secure Terminal Equipment
Codec	- coder/decoder	LoC	- Letter(s) of Compliance	STU-III	- Secure Telephone Unit-3rd generation
CoS	- Class of Service	Mbps	- Megabits per second	T1	- Digital Transmission Link Level 1 (1.544 Mbps)
D/A	- Digital to Analog Conversion	MFR1	- Multi-Frequency Recommendation 1	T1.619a	- SS7 and ISDN MLPP Signaling Standard For T1
DISA	- Defense Information Systems Agency	MIL-STD	- Military Standard	TIA	- Telecommunications Industry Association
DITSCAP	- DOD IT Security and Accreditation Process	MLPP	- Multi-Level Precedence and Preemption	TCP/IP	- Transmission Control Protocol/Internet Protocol
DN	- Directory Number	MOS	- Mean Opinion Score	TPC	- Twisted Pair Copper
DOD	- Department of Defense	msec	- milliseconds	VBD	- Variable bit data
DP	- Dial Pulse	NI 1/2	- National ISDN Standard 1 or 2	VG	- Voice Grade
DRSN	- Defense Red Switch Network	NM	- Network Management	VLAN	- Virtual LAN
DSN	- Defense Switched Network	NX56	- Data format restricted to multiples of 56 kbps	VoIP	- Voice over Internet Protocol
DTMF	- Dual Tone Multi-Frequency			VTC	- Video Teleconferencing
E1	- European Basic Multiplex Rate (2.048 Mbps)			WWNDP	- Worldwide Numbering and Dialing Plan
EIA	- Electronic Industries Alliance				

Notes:

1 DITSCAP information assurance testing is accomplished via DISA-led Information Assurance test teams.

2 Voice, facsimile, data and VTC service requirements for PSTN are identical to DSN with the exception of MLPP. Testing of the services is accomplished in E-2 of the GSTP; no additional testing is required to verify PSTN.

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 Avaya S8700 with Software Release Communication Manager (CM) 2.1 (R012x.01.0.411.7) and G3SI with Software Release CM 2.1 (R012i.01.0.411.7) Digital Switching Systems (Includes Voice over Internet Protocol)

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.

FOR THE COMMANDER:

2 Enclosures a/s

MANUEL H. GARCIA, JR.
Acting Chief
Networks and Transport Division

Distribution:
Joint Staff J6I, Room-1E565, Pentagon, Washington, DC 20318-6000
Joint Interoperability Test Command, Washington Operations Division, NSWC, ATTN: JT1, Building 900, 101 Strauss Avenue, Indian Head, MD 20640-5035
Defense Information Systems Agency, GIG Enterprise Services Engineering Directorate, NETCENTRICITY, REQUIREMENTS, ANALYSIS & ASSESSMENTS BRANCH, ATTN: GE333, Rm. 244, 5600 Columbia Pike, Falls Church, VA 22041-2770
Defense Information Systems Agency, GIG-Combat Support Directorate, DSN SYSTEMS MANAGEMENT BRANCH, ATTN: GS235, Rm. 5W248A, 5275 Leesburg Pike, Falls Church, VA 22041
Office of Chief of Naval Operations (N61C22), CNON6/7, 2000 Navy Pentagon, Washington, DC 20350
Headquarters US Air Force, AF/XICC, 1250 Pentagon, Washington, DC 20330-1250
Department of the Army, Office of the Secretary of the Army, G-6/ASA (ALT), ATTN: ASAALT (SAAL-SSI), 103 Army Pentagon, Washington, DC 20310-0103
US Marine Corp (C4ISR), MARCORSYSCOM, 2200 Lester Street, Quantico, VA 22134
DOT&E, Strategic and C3I Systems, 1700 Defense Pentagon, Washington, DC 20301-1700
US Coast Guard, COMDT/G-SCE (C4), 2100 2nd Street SW, Washington, DC 20593
Office of Assistant Secretary of Defense, OASD(NII)/DoD CIO, Crystal Mall 3, 7th Floor, Suite 700, 1931 Jefferson-Davis Hwy, Arlington, VA 22202
Office of Under Secretary of Defense, OUSD(AT&L), Room 3E144, 3070 Defense Pentagon, Washington, DC 20301
US Joint Forces Command, J6I, C4 Plans and Policy, 1562 Mitscher Ave, Norfolk, VA 23551-2488
Defense Intelligence Agency, ATTN: DS-CIO, Bldg 6000, Bolling AFB, Washington, DC 20340-3342
National Security Agency, ATTN: DT, Suite 6496, 9800 Savage Road, Fort Meade, MD 20755-6496
Commander, Defense Information Systems Agency (DISA), ATTN: GS23 (Mr. Osman), 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 (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 Avaya S8700 with Software Release Communication Manager (CM) 2.1 (R012x.01.0.411.7) (hereinafter referred to as the system under test [SUT]).

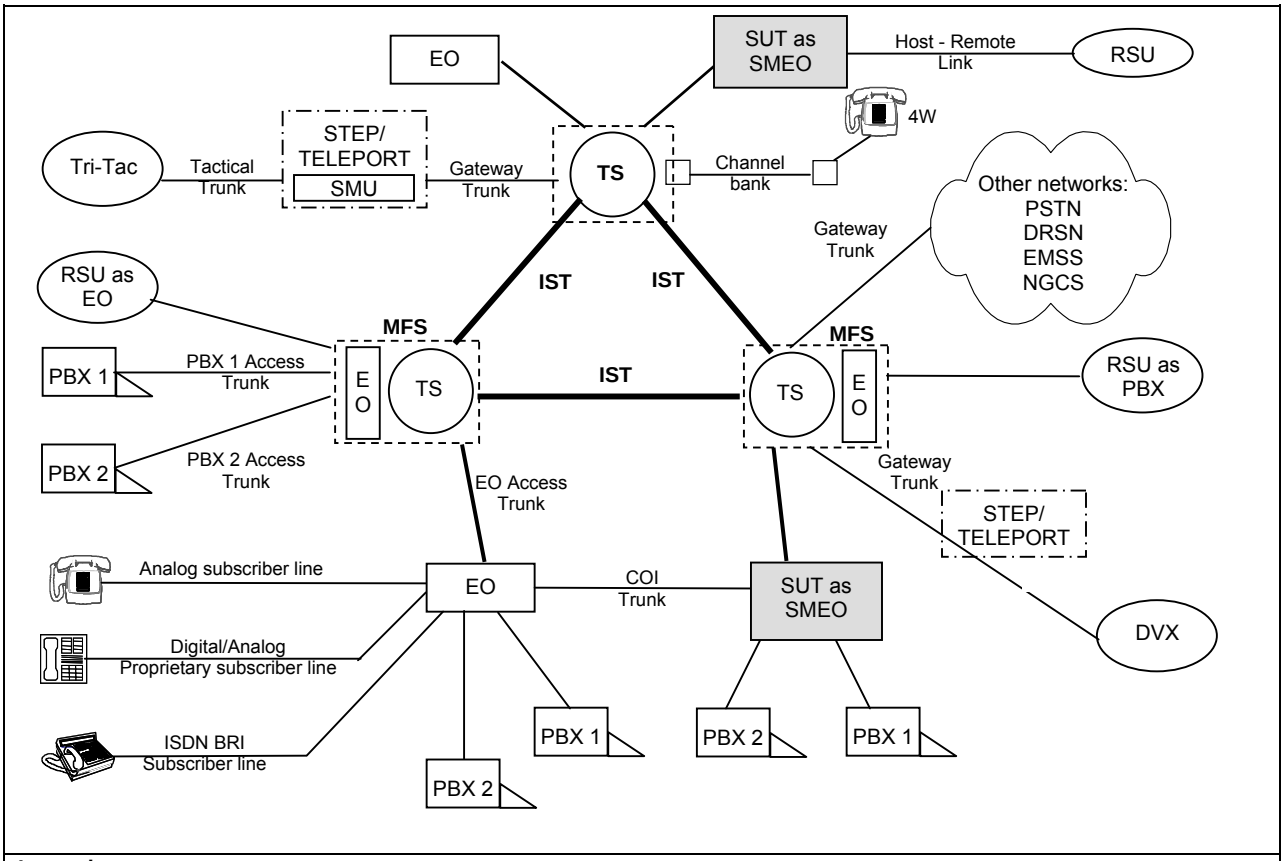
2. PROPONENT. Defense Information Systems Agency (DISA).

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

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

5. SYSTEM UNDER TEST DESCRIPTION. The Avaya Digital Switching System product line, in addition to the S8700, includes the G3SI. The Avaya G3SI digital switching system employs the same software and trunk/line card hardware as the SUT. JITC analysis determined the G3SI and SUT to be functionally identical for interoperability certification purposes and the G3SI with Software Release 2.1 (R012i.01.0.411.7) is also certified as interoperable for joint use within the Defense Switched Network (DSN). These two platforms utilize the same software and trunk/line card hardware and were developed to satisfy scalability requirements. The Avaya switch product line offers a Remote Switch Unit (RSU) capability referred to as the Survivable Remote Processor Expansion Port Network. This capability did not meet the minimum critical interoperability requirements for an RSU and it is therefore not certified as an RSU. This product line also offers a Voice over Internet Protocol (VoIP) capability that was successfully tested and is covered by this certification. Avaya's S8700 and G3SI digital switching systems are currently in use within the Defense Information Systems Network providing Small End Office (SMEO) Switch and Private Branch Exchange (PBX) functionality. If a switch satisfies SMEO criteria, it will satisfy the lesser standards of a PBX.

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 SMEOs. The Generic Switching Center Requirements (GSCR) operational DSN Architecture is depicted in figure 2-1. The architecture depicts the relationship of Military Department SMEOs to the other DSN switch types.



Legend:

4W	- 4-Wire	NGCS	- NATO Gateway Communications Switch
BRI	- Basic Rate Interface	PBX	- Private Branch Exchange
COI	- Community of Interest	PBX 1	- Private Branch Exchange 1
DRSN	- Defense Red Switch Network	PBX 2	- Private Branch Exchange 2
DSN	- Defense Switched Network	PSTN	- Public Switched Telephone Network
DVX	- Deployable Voice Exchange	RSU	- Remote Switching Unit
EMSS	- Enhanced Mobile Satellite System	SMEO	- Small End Office
EO	- End Office	SMU	- Switched Multiplexer Unit
ISDN	- Integrated Services Digital Network	STEP	- Standardized Tactical Entry Point
IST	- Interswitch Trunk	SUT	- System Under Test
MFS	- Multifunction Switch	Tri-Tac	- Tri-Service Tactical Communications Program
NATO	- North Atlantic Treaty Organization	TS	- Tandem Switch

Figure 2-1. DSN Architecture

7. REQUIRED SYSTEM INTERFACES. Requirements specific to SMEOs 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 SMEO Capability and Feature Requirements (CRs/FRs) verified through JITC testing and/or vendor submission of LoC.

Table 2-1 SMEO Requirements

Interface	Critical	Requirements Required (R) or Conditional (C)		References
DSN Line Interfaces				
2-Wire Analog (GR-506-CORE)	Yes	Access	• DN Identification (R) • Line signaling (R) • Alerting Signals and Tones (R) • WWNDP (R) • Call Processing (R) • Call Treatments (R) • 2W user access (R: 2-Wire Analog only) • Analog busy/idle (R: 2-Wire Analog only)	• GSCR Sect. 2.1.1 • GSCR Sect. 5.2 • GSCR Sect. 5.5 • GSCR Sect. 4.5 • GSCR Sect. 4.4 • GSCR Sect. 4.1 • GSCR Sect. 4.3.3 • GSCR Sect. 4.3.4.1
ISDN BRI NI 1/2 (ANSI T1.619a)	Yes	Voice	• MOS (R) • MLPP (R) • Secure Calls (R)	• CJCSI 6215.01B • GSCR Sect. 3.4.3/3.9 • CJCSI 6215.01B
		Facsimile	• Analog: EIA/TIA-465-A (R) • Digital: MIL-STD-188-161D (C)	• JTA • JTA
2-Wire Proprietary Digital	No	Data	• Modem (VBD) (R) • 56-kbps switched data (R) • 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 Sect. 3.10 • GSCR Sect. 3.10 • GSCR Sect. 3.10 • GSCR Sect. 3.10 • CJCSI 6215.01B
		VTC	• H.320 (R: BRI only)	• JTA
DSN Trunk Interfaces				
T1 CAS (MFR1)	No	Trunking	• Framing (R) • Line Code (R) • Signaling (R) • Alarms (R) • WWNDP (R) • Outpulsing digit formats (R: CAS only) • Routing (R) • Trunk Groups (R) • Call Processing (R) • CAS to CCS trunk interworking (C) • PCM-24/PCM-30 Interoperation (R) • Direct Inward Dialing (C)	• 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 CAS (DTMF, DP)	Yes			
E1 CAS (MFR1, DTMF, DP)	Yes (Europe only)	Voice	• MOS (R) • MLPP (R) • Secure calls (R)	• CJCSI 6215.01B • GSCR Sect. 3 • CJCSI 6215.01B
		Facsimile	• Analog: EIA/TIA-465-A (R) • Digital: MIL-STD-188-161D (C)	• JTA • JTA
T1 ISDN PRI NI 1/2 (ANSI T1.619a)	Yes	Data	• Modem (VBD) (R) • 56-kbps switched data (R: PRI only) • 64-kbps switched data (R: PRI only) • NX56 synchronous BER (R: PRI only) • NX64 synchronous BER (R: PRI only) • Secure data (STE/STU-III) (R)	• CJCSI 6215.01B • GSCR Sect. 3.10 • GSCR Sect. 3.10 • GSCR Sect. 3.10 • GSCR Sect. 3.10 • CJCSI 6215.01B
		VTC	• H.320 (R: PRI only)	• JTA

Table 2-1. SMEO Requirements (continued)

Interface	Critical	Requirements Required (R) or Conditional (C)	References
Network Management			
CAT 5 TPC IEEE 802.3 10BaseT Ethernet, TCP/IP	No	• Interfaces (R) • Measurements and data generation (R) • Fault management (R) • Configuration management (R) • Automated Message Accounting • Performance management (R) • NM controls (C) • Remote access (R)	• 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
TPC EIA-232 Asynchronous @ 9.6 kbps	No	• Interfaces (R) • Measurements and data generation (R) • Configuration management (R) • Automated Message Accounting • Performance management (R) • NM controls (C) • Remote access (R)	• GSCR Sect. 9.1 • GSCR Sect. 9.2 • GSCR Sect. 9.4 • GSCR Sect. 9.5 • GSCR Sect. 9.6 • GSCR Sect. 9.7 • GSCR Sect. 9.8
DSN Features & Capabilities			
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 and conference calling (C) • Call forwarding (C) • Call pick-up (C)	• 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	• 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)	• 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	Yes	• 911 (C) • Trace of terminating calls (R) • Outgoing call trace (R) • Tandem call trace (R) • Trace of a call in progress (R)	• 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	• 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 retrial and alternate address (C) • Bridge release (C) • Lost connection (C) • Secondary conferencing (C) • Address translation (C)	• 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	• 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)	• GSCR Sect. 2.8 • GSCR Sect. 2.8 • GSCR Sect. 2.8 • GSCR Sect. 2.8 • GSCR Sect. 2.8 • GSCR Sect. 2.8

Table 2-1. SMEO Requirements (continued)

Interface	Critical	Requirements Required (R) or Conditional (C)	References
PAT	No	• 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)	• 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	Yes	• Hotline restrictions (R) • Auto initiate (R) • Analog and digital (R) • Subscription basis (R) • Protected hotline calling (R) • WWNDP interoperable (R)	• 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
ISDN Services	No	• EKTS (C)	• GSCR Sect. 10, table 10-3
Synchronization	Yes	• Line timing mode (R) • Internal Stratum 4 (R)	• GSCR Sect. 11.1.1.2 • GSCR Sect. 11.1.2.2
Reliability	Yes	• GR-512-CORE (R)	• GSCR Sect. 12
Security[1]	Yes	• DITSCAP (R)	• GSCR Sect. 13
RSU			
Normal Operations	No	RSU function is conditional. If an RSU is provided, **all** of the following requirements must be met: • Same user features as EO, SMEO or PBX • Normal operations in accordance with GR-532-CORE • If EO, provide diverse routing to host and PSTN	 • GSCR Sect. 2.10.2 • GSCR Sect. 2.10.2 • GSCR Sect. 2.10.2
Degraded Operations	No	RSU function is conditional. If an RSU is provided, **all** of the following requirements must be met: • Stand-alone - Stand-alone in accordance with GR-532-CORE - AMA not required - MLPP required • Partial stand-alone operations - Partial in accordance with GR-532-CORE - 3% users provided assured dial tone - Normal MLPP interaction	 • GSCR Sect. 2.10.3.1 • GSCR Sect. 2.10.3.2
VoIP			
VoIP System	No	VoIP function is conditional. If VoIP is provided, **all** of the following requirements must be met: • MOS 4.0 or better • G.711 PCM Codec • Security in accordance with DITSCAP • NM • Line timing • Internal Clock • Latency ≤ 60 msec • IPv6 capable	 • GSCR App. 3 • GSCR App. 3 • GSCR App. 3 • GSCR App. 3 • GSCR App. 3 • GSCR App. 3 • GSCR App. 3 • GSCR App. 3

Table 2-1. SMEO Requirements (continued)

Interface	Critical	Requirements Required (R) or Conditional (C)		References
VoIP				
C2 VG LANs	No	VoIP function is conditional. If VoIP is provided, **all** of the following requirements must be met: • LAN parameters • CoS /QoS • VLANs • IEEE Standards Conformance • .99999 availability • Modular devices • 2 second link restoral • LAN NM • Traffic Engineering		 • GSCR App. 3 • GSCR App. 3 • GSCR App. 3 • GSCR App. 3 • GSCR App. 3 • GSCR App. 3 • GSCR App. 3 • GSCR App. 3 • GSCR App. 3
Network Gateways				
PSTN[2]	Yes	Trunking	• Positive Identification Control (R) • On-Netting (R) • Off-Netting (R)	• CJCSI 6215.01B • CJCSI 6215.01B • CJCSI 6215.01B
DRSN[3]	Yes	Access	• Alerting Signals and Tones (R) • Call Processing (R) • Call Treatments (R) • Analog busy/idle (R)	• GSCR Sect. 5.5 • GSCR Sect. 4.4 • GSCR Sect. 4.1 • GSCR Sect. 4.3.4.1
		Voice	• MOS (C) • MLPP (C) • Secure calls (C)	• CJCSI 6215.01B • GSCR Sect. 3 • CJCSI 6215.01B

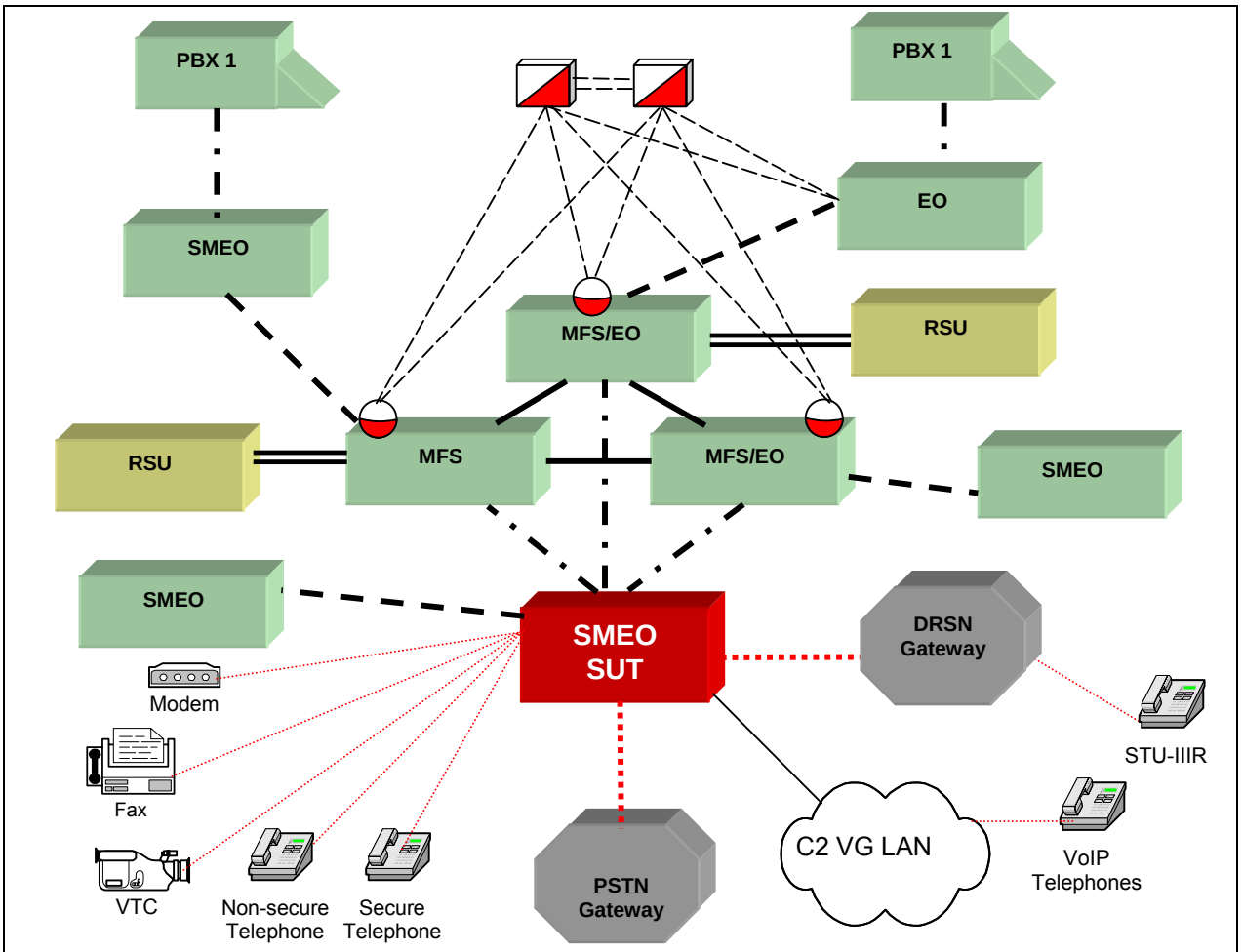
Table 2-1. SMEO Requirements (continued)

Legend:

2W	- 2-Wire	EKTS	- Electronic Key Telephone System	NX64	- Data format restricted to multiples of 64 kbps
10BaseT	- 10 Mbps (Baseband Operation, Twisted Pair) Ethernet	EO	- End Office	PAT	- Precedence Access Threshold
802.3	- IEEE Ethernet Protocol	GR	- Generic Requirement	PBX	- Private Branch Exchange
A/D	- Analog to Digital Conversion	GSCR	- Generic Switching Center Requirements	PCM	- Pulse Code Modulation
AMA	- Automated Message Accounting	GSTP	- Generic Switch Test Plan	PCM-24	- PCM - 24 Channels
ANSI	- American National Standards Institute	H.320	- ITU Standard for narrowband VTC	PCM-30	- PCM - 30 Channels
App.	- Appendix	IEEE	- Institute of Electrical and Electronics Engineers, Inc.	PRI	- Primary Rate Interface
BER	- Bit Error Ratio	IPv6	- Internet Protocol version 6	PSTN	- Public Switched Telephone Network
BRI	- Basic Rate Interface	ISDN	- Integrated Services Digital Network	QoS	- Quality of Service
C	- Conditional	IT	- Information Technology	R	- Required
C2	- Command and Control	ITU	- International Telecommunication Union	RSU	- Remote Switching Unit
CAS	- Channel Associated Signaling	JTA	- Joint Technical Architecture	Sect.	- Section
CAT	- Category	kbps	- kilobits per second	SMEO	- Small End Office
CCS	- Common Channel Signaling	KXX	- K= any number 2-8; X= any number 1-9	SS7	- Signaling System 7
CJCSI	- Chairman of the Joint Chiefs of Staff Instruction	LAN	- Local Area Network	STE	- Secure Terminal Equipment
Codec	- coder/decoder	LoC	- Letter(s) of Compliance	STU-III	- Secure Telephone Unit-3rd generation
CoS	- Class of Service	Mbps	- Megabits per second	T1	- Digital Transmission Link Level 1 (1.544 Mbps)
D/A	- Digital to Analog Conversion	MFR1	- Multi-Frequency Recommendation 1	T1.619a	- SS7 and ISDN MLPP Signaling Standard For T1
DISA	- Defense Information Systems Agency	MIL-STD	- Military Standard	TIA	- Telecommunications Industry Association
DITSCAP	- DOD IT Security and Accreditation Process	MLPP	- Multi-Level Precedence and Preemption	TCP/IP	- Transmission Control Protocol/Internet Protocol
DN	- Directory Number	MOS	- Mean Opinion Score	TPC	- Twisted Pair Copper
DOD	- Department of Defense	msec	- milliseconds	VBD	- Variable bit data
DP	- Dial Pulse	NI 1/2	- National ISDN Standard 1 or 2	VG	- Voice Grade
DRSN	- Defense Red Switch Network	NM	- Network Management	VLAN	- Virtual LAN
DSN	- Defense Switched Network	NX56	- Data format restricted to multiples of 56 kbps	VoIP	- Voice over Internet Protocol
DTMF	- Dual Tone Multi-Frequency			VTC	- Video Teleconferencing
E1	- European Basic Multiplex Rate (2.048 Mbps)			WWNDP	- Worldwide Numbering and Dialing Plan
EIA	- Electronic Industries Alliance				

Notes:
1 DITSCAP information assurance testing is accomplished via DISA-led Information Assurance test teams.
2 Voice, facsimile, data and VTC service requirements for PSTN are identical to DSN with the exception of MLPP. Testing of the services is accomplished in E-2 of the GSTP; no additional testing is required to verify PSTN.
3 Facsimile, data and VTC services are not provided via the DSN to DRSN interface.

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. Testing of the system's required functions and features was conducted using the notional test configuration depicted in figure 2-2. The Command and Control (C2) Voice Grade (VG) Local Area Network (LAN) is depicted in figure 2-3. Figure 2-4 depicts the test configuration used to test the Advanced Defense Switched Network Integrated Management Support System network management required functions and features. The SUT was tested as the end-point in relation to the other switches.



Legend:

BRI	- Basic Rate Interface
C2	- Command and Control
CAS	- Channel Associated Signaling
DRSN	- Defense Red Switch Network
DSN	- Defense Switched Network
E1	- European Basic Multiplex Rate (2.048 Mbps)
EO	- End Office
FAX	- facsimile
ISDN	- Integrated Services Digital Network
LAN	- Local Area Network
Mbps	- Megabits per second
MFS	- Multifunction Switch
PBX	- Private Branch Exchange
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)
TCP/IP	- Transmission Control Protocol/Internet Protocol
VG	- Voice Grade
VoIP	- Voice over Internet Protocol

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)

TCP/IP

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. Notional Test Configuration

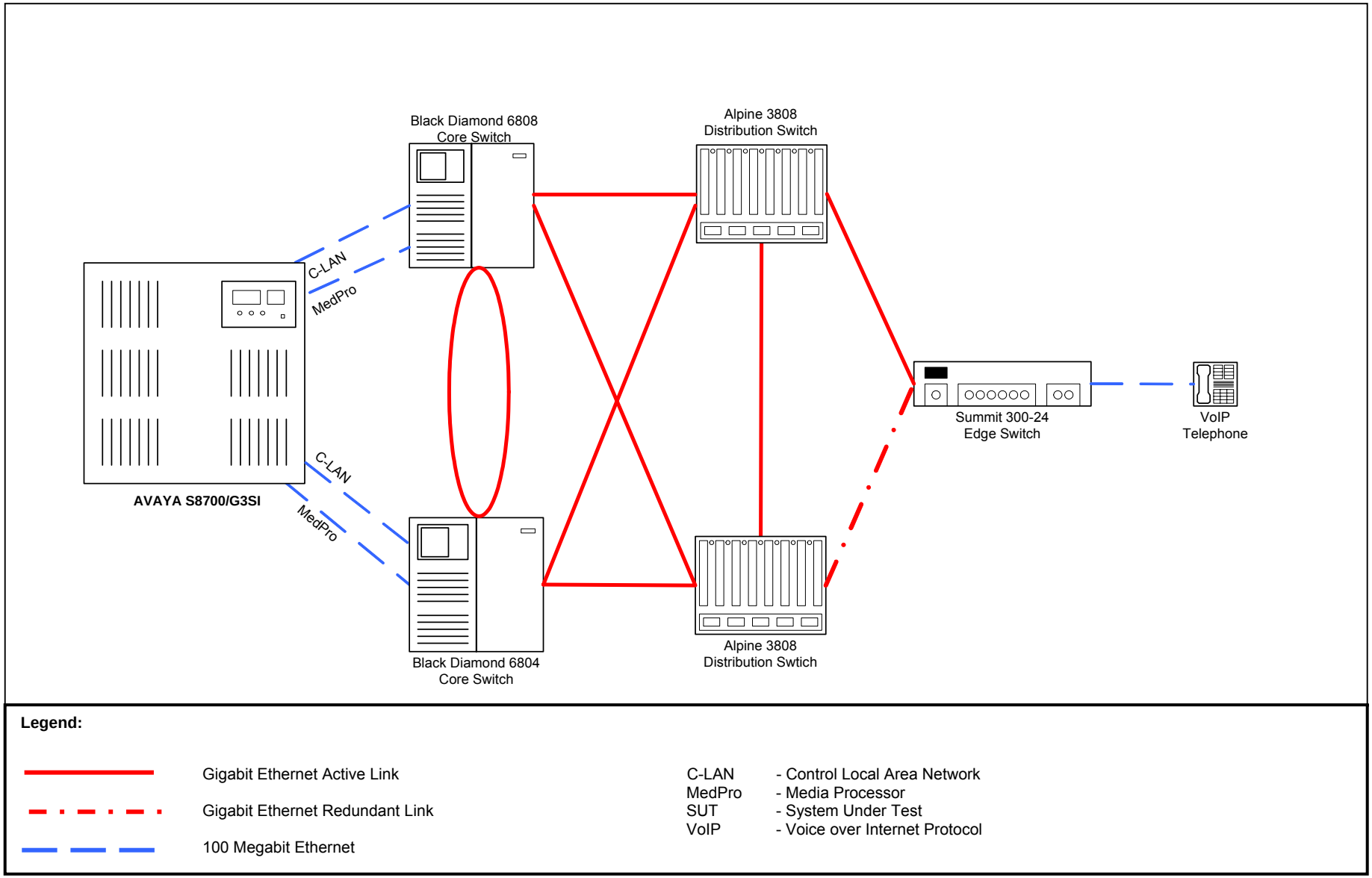
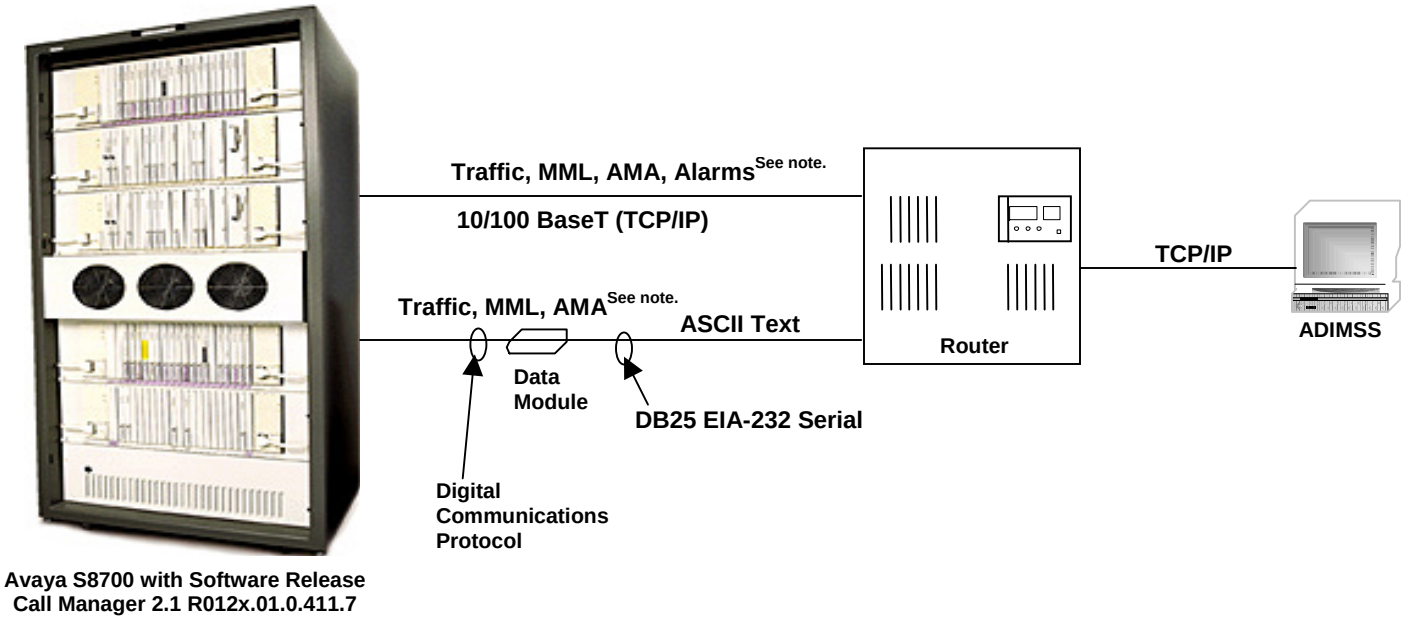


Figure 2-3. SUT Command and Control Voice Grade Local Area Network



Legend:

10/100 BaseT	- Ethernet Baseband Operation, Twisted Pair
ADIMSS	- Advanced Defense Switched Network Integrated Management Support System
Alarms	- Fault Management
AMA	- Automated Message Accounting (Accounting Management)
ASCII	- American Standard Code for Information Interchange
DB	- "D" describes the shape of the housing, "B" describes the size of the housing
DSN	- Defense Switched Network
EIA	- Electronic Industries Alliance
MML	- Man Machine Language (Remote access to switch)
TCP/IP	- Transmission Control Protocol/Internet Protocol
Traffic	- Performance Management

Note: DSN Switch Network Management Interfaces as described in reference (d).

Figure 2-4. Avaya S8700 ADIMSS Network Management System Interface

9. SYSTEM CONFIGURATIONS. Table 2-2 provides the system configurations used in the test and table 2-3 provides the C2 VG LAN hardware and software components tested with the SUT.

Table 2-2. Tested System Configurations

System Name	Software Release
Compunetix Contex Audioconferencing Bridge 480	1.836.d
Nortel Networks MSL-100 (MFS)	SE06
Avaya S8500 (PBX 1)	CM 2.1 (R012x.01.0.411.7)
REDCOM IGX (SMEO)	6.0A R1PB
Siemens EWSD (MFS)	19d with Patch Set 43
Nortel Networks Meridian 1 Option 61C (SMEO)	Succession 3.0
Lucent 5ESS (MFS)	5E16.2 SU9
Secure Digital Switch (DRSN)	15.02.03
Digital Small Switch (DRSN)	8.04.04

	Software	Component	Hardware/Firmware
SUT	CM 2.1 (R012x.01.0.411.7)	BRI Line Card TN556D	000001
		BRI Line Card TN2198	000003
		Media Processor Board TN2302AP	HW13 FW092 HW13 FW095 HW11 FW095 HW15 FW092 HW20 FW077
		Announcement Card TN2501AP	HW01 FW007
		Control LAN Card TN799DP	HW01 FW011
		Analog Card TN793B	000006 000002 000007
		DS1 Interface Card TN464GP	HW06 FW16
		Call Classifier Card TN744E	000091
		Digital Line Card TN2224CP	HW05 FW014

Telephone Instruments	
Interface Type	**Model (s)/ Release**
2-Wire Analog	Panasonic KX-TS15-W
2-Wire Digital Proprietary	2420 Standard
ISDN BRI	8510T
VoIP	4620IP

Legend:

5ESS - Class 5 Electronic Switching System
BRI - Basic Rate Interface
CM - Communication Manager
DRSN - Defense Red Switch Network
DS1 - Digital Signal Level 1
EWSD - Elektronisches Wählsystem Digital
IGX - ISDN Gateway Exchange
IP - Internet Protocol
ISDN - Integrated Services Digital Network
LAN - Local Area Network
MFS - Multifunction Switch
MSL - Meridian Switching Load
PBX 1 - Private Branch Exchange 1
SE - Succession Enterprise
SMEO - Small End Office
SU - Software Update
VoIP - Voice over Internet Protocol

Table 2-3. Command and Control Voice Grade Local Area Hardware and Software Network Components

Component	Software Release	Subcomponents
Extreme Summit 300-24	6.2a-1.2.0B422	
Extreme Alpine 3808	6.2.2B134	Card SMMi (45014) Card GM – 4X (45112) Card GM – 4S (45110)
Extreme Black Diamond 6804	6.2.2B134	Card MSM64 (50015) Card G8X (51032) Card F48T (52011)
Extreme Black Diamond 6808		
Phone – 4620IP	DEF 20R2_01	

Legend:

B	- Build	MSM	- Management Switch Module
F	- Fast Ethernet	SMM	- Switch Management Module
G	- Gigabit	s	- Small Profile
GM	- Gigabit Module	T	- Twisted pair copper
i	- Inferno Chip Set	X	- Gigabit interface converter based
IP	- Internet Protocol		

10. TESTING LIMITATIONS. IPV6 capability was not tested due to lack of resources available to test it. Although IPV6 capability is a required feature, JITC determined a minor risk of not testing it due to the fact that no other systems are currently using it within the DSN.

11. TEST RESULTS

a. Discussion

(1) DSN Trunk Interfaces. The SUT met all critical interoperability certification requirements for DSN Trunk Interfaces. Detailed trunk configurations and associated lessons learned can be found on the DISA web page: http://jitc.fhu.disa.mil.

(2) DSN Line Interfaces. The SUT met all critical interoperability certification requirements for DSN Line Interfaces with the following exceptions. Refer to table 2-2 for specific instrument models tested under this certification test.

(a) The SUT does not support the Isolation Code Announcement (ICA) for ROUTINE precedence calls. ROUTINE precedence calls receive a fast busy tone rather than the required ICA. The ICA is received by calls above ROUTINE precedence. The operational impact is minor.

(b) When a three-way call is established, each connection shall maintain its assigned precedence level. The SUT, however, connects a three-way call in a single time slot and classmarks all parties at the highest precedence level. This is a new 2003 GSCR requirement and the vendor has until March 2005 to meet it. The operational impact is minor.

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

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

(5) VoIP. The SUT VoIP solution is composed of the S8700/G3SI Time Division Multiplexing (TDM) circuit switch and the C2 VG LAN as shown in figure 2-3. The C2 VG LAN infrastructure was made up of the Extreme Networks equipment listed in table 2-3. The results for the overall VoIP system and C2 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 C2 VG LAN). The following paragraphs detail the results of the SUT VoIP solution.

1. Voice Quality. VoIP calls shall have an average Mean Opinion Score (MOS) of at least 4.0 as measured over a 5-minute period. For intra-switch calls, the SUT VoIP solution had a MOS of 4.26, and inter-switch calls had a MOS of 4.28. This average was based a total of 40 intra-switch and inter-switch calls.

2. Codec. The G.711 Pulse-Code Modulation (PCM) codec with a 20 millisecond (msec) packet fill is required and was met by the SUT.

3. Multi-Level Precedence and Preemption (MLPP). All critical MLPP features and functions were met by the SUT. Currently there are no mature standards for MLPP over Internet Protocol (IP) requiring the vendor to implement proprietary IP signaling.

4. Security. Security requirements were verified using the Information Assurance Test Plan. Results of the security testing are reported in a separate test report generated by DISA Information Assurance test personnel.

5. Network Management (NM). The SUT VoIP system met NM requirements. The switching system NM requirements contained in section 9 of the GSCR were also met by the SUT.

6. Synchronization. Synchronization requirements of the GSCR, section 11, were met with line timing mode via traditional TDM based interfaces (i.e., T1 or E1 digital).

7. Latency. The requirement for one-way system latency for the VoIP system is 60 msec or less as averaged over any 5-minute period. The

latency requirement is measured from IP handset to the egress trunk. The SUT average latency over 40 calls was measured to be 55.79 msec.

8. Internet Protocol version 6 (IPv6). IPV6 capability was not tested due to lack of resources available to test it. Although IPV6 capability is a required feature, JITC determined a minor risk of not testing it due to the fact that no other systems are currently using it within the DSN.

(b) C2 VG LAN. The SUT/Extreme C2 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 three main components: the core switches, distribution switches, and access switches. The Extreme networks C2 VG LAN solution used several industry standards to provide resiliency and quality of service.

1. Design

a. Delay. As stated in the GSCR, 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 VoIP solution was 1 msec.

b. Jitter. The SUT utilizes a dynamic jitter buffer in both the 4620IP phones and its IP Media Processor (MedPro) boards. These buffers automatically adjust depending on the amount of jitter within the network. With a 40% bandwidth load, 0.004 msec was noted.

c. Packet Loss. Network packet loss occurs when packets are sent, but not received at the final destination. The GSCR requires that C2 VG LANs shall be engineered so that the measured voice packet loss within the C2 VG LAN shall not exceed 0.05% averaged over any 5-minute period. With 40% bandwidth load, the measured packet loss was 0.002% for the Extreme Networks C2 VG LAN infrastructure.

d. Class of Service (CoS) and Quality of Service (QoS). The GSCR outlines several methodologies to implement CoS and QoS. IEEE 802.1P/Q at the Data Link Layer (L2) and Differentiated Services Code Point (DSCP) at the Network Layer (L3) were two CoS mechanisms that the Extreme Networks products employed. The SUT/Extreme solution provides CoS by assigning an 802.1P/Q tag. Switches within the topology were configured with multiple Virtual LANs (VLANs) to separate data from voice traffic. 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. For DSCP, L2 audio/signaling was set for 6 and L3 audio/signaling was set for 46 in the tested configuration.

2. Traffic Engineering

a. The SUT's IP MedPro cards can only support 64 IP subscribers and still meet DSN assured connectivity requirements. To determine the number of MedPro cards per switch, the following formula must be used:

Total number of MedPro cards = total VoIP users / 64.

For redundancy purposes, the number of MedPro cards shall be implemented on an n+1 basis (i.e., 64 users require two MedPro cards).

b. To determine the number of C-LAN cards needed to support IP subscribers, use:

Total number of C-LAN cards = number of VoIP users / 250.

This is based on the manufacturer recommendation that no more than 250 users per C-LAN Card be assigned. C-LAN cards shall also be implemented on an n+1 basis to meet redundancy requirements.

c. Core to Core. Ethernet Automatic Protection Switching (EAPS) RFC 3619 was implemented between the two core routers allowing the redundant transport of layer 2 VLAN traffic while providing sub-second fail over. EAPS is a ring technology that is designed to minimize network re-convergence time. EAPS utilizes master and transit nodes that are physically connected into a ring configuration. The master sends a hello packet out the primary port and blocks the secondary port upon receiving the packet, thus ensuring the ring is complete. If a transit node detects a failed link, a packet is sent to the master, which in turn unblocks the master port and sends a signal for all nodes to flush their forwarding databases.

d. Core to Distribution. The Extreme Networks C2 VG LAN used Open Shortest Path First, Equal Cost Multi-Path. This protocol allowed all routers to share traffic loads, while having active paths to all routers in the core. This protocol played a key role under the failed conditions testing because the routing tables were pre-populated alleviating the time needed to learn alternate paths.

e. Distribution to Access. Access switches require layer 2 and 3 redundancy to ensure traffic integrity. The GSCR, appendix 3, requires that C2 VG LAN devices provide a redundancy protocol for the distribution and core devices. Extreme Stand by Router Protocol layer 2 traffic is blocked and prevents loops within the network. The technology exists between the two distribution switches, so any edge switch will be compatible with the topology.

3. Management. The GSCR requires that the vendor provide a management system to monitor the performance of the C2 VG LAN portion of the VoIP system. This requirement was verified via an LoC because of the numerous third party systems and applications capable of performing this function.

4. Phones. The only SUT phone which met all requirements for certification was the 4620IP phone. Although the phones are capable of shared access (i.e., same switch port is shared by Personal Computer (PC) and IP phone), the dedicated access was tested (separate ports for phones and PCs).

5. Scalability. The SUT can support 200 MedPro cards, which limits the maximum IP subscribers to 12,800. However, the manufacturer recommendation for release 2.1 is not to exceed 12,000 users. The SUT C2 VG LAN solution tested consisted of one Black Diamond 6808 (core), one Black Diamond 6804 (core), two Alpine 3808s (distribution), and one Summit 300-24 (access) as shown in figure 2-3 and table 2-3. For implementation purposes, the C2 VG LAN can be scaled to meet the 12,800 IP phone subscribers as long as it consists of the equipment and software listed, and meets the traffic engineering constraints contained in the GSCR, appendix 3.

b. System Interoperability Results. The Avaya switch product line offers an RSU capability referred to as the Survivable Remote Processor Expansion Port Network. This capability did not meet the minimum critical interoperability requirements for an RSU and it is therefore not covered by this certification. This product line also offers a VoIP capability that was successfully tested and is covered by this certification. The SUT including VoIP is certified for joint use in the DSN for the following switch types: SMEO, PBX 1, and PBX 2 in accordance with the requirements set forth in the GSCR. The identified test discrepancies shown that remained open after software patches were applied and regression testing was completed have an overall minor operational impact. 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, MFR1, DP)	No	Certified	Met all critical CRs and FRs.
E1 CAS (DTMF, MFR1, DP)	No (Europe only)	Certified	Met all critical CRs and FRs.
T1 ISDN PRI NI 1/2 (ANSI T1. 619a)	Yes	Certified	Met all critical CRs and FRs.
DSN Line Interfaces			
Interface & Signaling	**Critical**	**Status**	**Remarks**
2-Wire Analog (GR-506-CORE)	Yes	Certified	Met all critical CRs and FRs with the following minor exception: Full compliance of DSN Announcements and three-way calling were not met.[1] Operational impact is minor.
ISDN BRI NI 1/2	Yes	Certified	Met all critical CRs and FRs with the following minor exception: Full compliance of DSN Announcements and three-way calling were not met.[1] Operational impact is minor.
2-Wire Proprietary Digital	No	Certified	Met all critical CRs and FRs with the following minor exception: Full compliance of DSN Announcements and three-way calling were not met.[1] Operational impact is minor.
VoIP	No	Certified	Met all critical CRs and FRs with the following minor exception: Full compliance of DSN Announcements and three-way calling were not met.[1] Operational impact is minor.
Network Management			
Interface & Signaling	**Critical**	**Status**	**Remarks**
CAT 5 TPC IEEE 802.3 10BaseT Ethernet, TCP/IP	No[2]	Certified	Met all Critical CRs and FRs.[3]
TPC EIA-232 Asynchronous @ 9.6 kbps	No[2]	Certified	Met all Critical CRs and FRs.[4]
DSN Features and Capabilities			
Features and Capabilities	**Critical**	**Status**	**Remarks**
Common Features	No	Certified	
Attendant	No	Certified	Met all critical CRs and FRs for Attendant services with the following console: Lucent Attendant Console Model 302C.
Public Safety	Yes	Not Certified	Public safety not met.[5] Operational impact is minor.
Preset Conferencing	No	Certified	Tested with External Compunetix Contex Audioconferencing Bridge 480 Software Release 1.836.d
Nailed-up Connections	No	Not Tested	
PAT	No	Not Tested	
DSN Hotline Services	Yes	Not Certified	ISDN Hotline services not met.[5] Operational impact is minor.
ISDN Services (EKTS)	No	Certified	Met all critical CRs and FRs.
Synchronization	Yes	Certified	Met all critical CRs and FRs.
Reliability	Yes	Certified	Met all critical CRs and FRs.
Security[6]	Yes	Certified	Met all critical CRs and FRs.
VoIP System	No	Certified	Met all critical CRs and FRs.
VoIP LANs	No	Certified	Met all critical CRs and FRs.

Table 2-4. SUT Interoperability Test Summary (continued)

Network Gateways				
	Interface & Signaling	**Critical**	**Status**	**Remarks**
PSTN	T1 CAS (DTMF, MFR1, DP)	No	Certified	Met all critical CRs and FRs.
	E1 CAS (DTMF, MFR1, DP)	No (Europe only)	Certified	Met all critical CRs and FRs.
	T1 ISDN PRI NI 1/2 (Q.931)	No	Certified	Met all critical CRs and FRs.
DRSN	TPC 2-Wire Analog (GR-506-CORE)	Yes	Certified[7]	Met all critical CRs and FRs.

Legend:

10BaseT	- 10 Mbps (Baseband Operation, Twisted Pair) Ethernet	ISDN	- Integrated Services Digital Network
802.3	- IEEE Ethernet protocol	ITU	- International Telecommunication Union
ANSI	- American National Standards Institute	kbps	- kilobits per second
BRI	- Basic Rate Interface	LAN	- Local Area Network
CAS	- Channel Associated Signaling	LoC	- Letters of Compliance
CAT	- Category	Mbps	- Megabits per second
CRs	- Capability Requirements	MFR1	- Multifrequency Recommendation 1
DISA	- Defense Information Systems Agency	MLPP	- Multi-Level Precedence and Preemption
DP	- Dial Pulse	NI 1/2	- National ISDN 1 or 2
DRSN	- Defense Red Switch Network	PAT	- Precedence Access Threshold
DSN	- Defense Switched Network	PM	- Program Manager
DTMF	- Dual Tone Multi-Frequency	PRI	- Primary Rate Interface
E1	- European Basic Multiplex Rate (2.048 Mbps)	PSTN	- Public Switched Telephone Network
EIA	- Electronic Industries Alliance	Q.931	- ITU Signaling Standard for ISDN
EKTS	- Electronic Key Telephone System	SS7	- Signaling System 7
FRs	- Feature Requirements	SUT	- System Under Test
GR	- Generic Requirement	T1	- Digital Transmission Link Level 1 (1.544 Mbps)
GSCR	- Generic Switching Center Requirements	T1.619a	- SS7 and ISDN MLPP Signaling Standard for T1
IEEE	- Institute of Electrical and Electronics Engineers, Inc.	TCP/IP	- Transmission Control Protocol/Internet Protocol
		TPC	- Twisted Pair Copper
		VoIP	- Voice over Internet Protocol

Notes:

1 Met all DSN Announcement requirements except for Isolation Code Announcement. The SUT provides this announcement only for precedence calls above ROUTINE. ROUTINE precedence calls receive a fast busy signal. When a three-way call is established "each connection shall maintain its assigned precedence level". The SUT however connects a three-way call in a single time slot and classmarks all parties at the highest precedence level. The overall operational impact of these noted discrepancies are minor.

2 The Network Management requirements can be satisfied with one of the three following physical interfaces: Ethernet/TCP/IP (IEEE 802.3), Serial EIA-232/Asynchronous, or Serial Synchronous (X.25 and/or BX.25 variant).

3 Performance (e.g. traffic data), alarm/log data, and switch access provided by this interface.

4 Accounting data (e.g. call detail recording) only provided by this interface.

5 This is a new 2003 GSCR critical requirement. The vendor has until March 2005 to meet it. Operational impact is minor.

6 DITSCAP information assurance testing is accomplished via DISA-led Information Assurance test teams.

7 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.

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	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	
				Timing (R)	GSCR Sect. 11.1.1.2	Met	
				WWNDP (R)	GSCR Sect. 4.5.1	Met	
				Outpulsing digit formats (R: CAS only)	GSCR Sect. 4.5.2	Met	
				Routing (R)	GSCR Sect. 4.2	Met	
				Trunk Groups (R)	GSCR Sect. 2.5.5 & 2.5.6	Met	
				Call Processing (R)	GSCR Sect. 4	Met	
				CAS to CCS trunk interworking (C)	GSCR Sect. 3.10	Met	
				PCM-24/PCM-30 Interoperation (R)	GSCR Sect. 7.3	Met	
				Direct Inward Dialing (C)	GSCR Sect. 2.3.2	Met	
			Voice	MOS (R)	CJCSI 6215.01B	Met	
				MLPP (R)	GSCR Sect. 3	Met[1]	Minor
				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	Met	
				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	Met	
				NX64 synchronous BER (R: ISDN PRI only)	GSCR Sect. 3.10	Not Tested	
				Secure data (STE/STU-III) (R)	GSCR Sect. 3.10	Met	
			VTC	H.320 (R: ISDN PRI only)	JTA	Met	

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 (ANSI T1.619a)	Yes	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	
				Timing (R)	GSCR Sect. 11.1.1.2	Met	
				WWNDP (R)	GSCR Sect. 4.5.1	Met	
				Outpulsing digit formats (R: CAS only)	GSCR Sect. 4.5.2	Met	
				Routing (R)	GSCR Sect. 4.2	Met	
				Trunk Groups (R)	GSCR Sect. 2.5.5 & 2.5.6	Met	
				Call Processing (R)	GSCR Sect. 4	Met	
				CAS to CCS trunk interworking (C)	GSCR Sect. 3.10	Met	
				PCM-24/PCM-30 Interoperation(R)	GSCR Sect. 7.3	Met	
				Direct Inward Dialing (C)	GSCR Sect. 2.3.2	Met	
			Voice	MOS (R)	CJCSI 6215.01B	Met	
				MLPP (R)	GSCR Sect. 3	Met[1]	Minor
				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	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	
				Secure data (STE/STU-III) (R)	GSCR Sect. 3.10	Met	
			VTC	H.320 (R: ISDN PRI only)	JTA	Met	

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**
E1 CAS	No	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	
				Timing (R)	GSCR Sect. 11.1.1.2	Met	
				WWNDP (R)	GSCR Sect. 4.5.1	Met	
				Outpulsing digit formats (R: CAS only)	GSCR Sect. 4.5.2	Met	
				Routing (R)	GSCR Sect. 4.2	Met	
				Trunk Groups (R)	GSCR Sect. 2.5.5 & 2.5.6	Met	
				Call Processing (R)	GSCR Sect. 4	Met	
				CAS to CCS trunk interworking (C)	GSCR Sect. 3.10	Met	
				PCM-24/PCM-30 Interoperation (R)	GSCR Sect. 7.3	Met	
				Direct Inward Dialing (C)	GSCR Sect. 2.3.2	Met	
			Voice	MOS (R)	CJCSI 6215.01B	Met	
				MLPP (R)	GSCR Sect. 3	Met[1]	Minor
				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	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	
				Secure data (STE/STU-III) (R)	GSCR Sect. 3.10	Met	
			VTC	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)	Yes	Certified	Access	DN Identification (R)	GSCR Sect 2.1.1	Met	
				Line signaling (R)	GSCR Sect 5.2	Met	
				Alerting Signals and Tones (R)	GSCR Sect 5.5	Met	
				WWNDP (R)	GSCR Sect. 4.5	Met	
				Call Processing (R)	GSCR Sect. 4.4	Met	
				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	
				MLPP (R)	GSCR Sect. 3.4.3, 3.9	Met[1]	Minor
				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	
ISDN BRI NI 1/2	Yes	Certified	Access	DN Identification (R)	GSCR Sect 2.1.1	Met	
				Line signaling (R)	GSCR Sect 5.2	Met	
				Alerting Signals and Tones (R)	GSCR Sect 5.5	Met	
				WWNDP (R)	GSCR Sect. 4.5	Met	
				Call Processing (R)	GSCR Sect. 4.4	Met	
				Call Treatments (R)	GSCR Sect. 4.1	Met	
			Voice	MOS (R)	CJCSI 6215.01B	Met	
				MLPP (R)	GSCR Sect. 3.4.3, 3.9	Met[1]	Minor
				Secure calls (R)	CJCSI 6215.01B	Met	
			Data	Modem (VBD) (R)	CJCSI 6215.01B	Met	
				56-kbps switched data (R)	GSCR Sect. 3.10	Met	
				64-kbps switched data (R)	GSCR Sect. 3.10	Met	
				NX56 synchronous BER (R)	GSCR Sect. 3.10	Met	
				NX64 synchronous BER (R)	GSCR Sect. 3.10	Met	
				Secure data (STE/STU-III) (R)	GSCR Sect. 3.10	Met	
			VTC	H.320 (R: ISDN BRI only)	JTA	Met	

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**
Digital Proprietary	No	Certified	Access	DN Identification (R)	GSCR Sect 2.1.1	Met	
				Line signaling (R)	GSCR Sect 5.2	Met	
				Alerting Signals and Tones (R)	GSCR Sect 5.5	Met	
				WWNDP (R)	GSCR Sect. 4.5	Met	
				Call Processing (R)	GSCR Sect. 4.4	Met	
				Call Treatments (R)	GSCR Sect. 4.1	Met	
			Voice	MOS (R)	CJCSI 6215.01B	Met	
				MLPP (R)	GSCR Sect. 3.4.3, 3.9	Met[1]	Minor
Network Management							
Interface	**Critical**	**Interface Status**	**GSCR Requirement Required (R) Conditional (C)**		**Reference**	**Test Results**	**Operational Impact**
CAT 5 TPC IEEE 802.3 10BaseT Ethernet, TCP/IP	No	Certified	• Interfaces (R)		GSCR Sect. 9.1	Met	
			• Measurements and data generation (R)		GSCR Sect. 9.2	Met	
			• Fault Management (R)		GSCR Sect. 9.3	Met	
			• Configuration management (R)		GSCR Sect. 9.4	Met	
			• Automated Message Accounting (R)		GSCR Sect. 9.5	Met	
			• Performance management (R)		GSCR Sect. 9.6	Met	
			• NM controls (C)		GSCR Sect. 9.7	Met	
			• Remote access (R)		GSCR Sect. 9.8	Met	
TPC EIA232 Asynchronous @ 9.6 kbps	No	Certified	• Interfaces (R)		GSCR Sect. 9.1	Met	
			• Measurements and data generation (R)		GSCR Sect. 9.2	Met	
			• Configuration management (R)		GSCR Sect. 9.4	Met	
			• Automated Message Accounting (R)		GSCR Sect. 9.5	Met	
			• Performance management (R)		GSCR Sect. 9.6	Met	
			• NM controls (C)		GSCR Sect. 9.7	Met	
			• Remote access (R)		GSCR Sect. 9.8	Met	
DSN Features & Capabilities							
Features/ Capabilities	**Critical**	**Status**	**GSCR Requirement Required (R) Conditional (C)**		**Reference**	**Test Results**	**Operational Impact**
Common Features	Yes	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 (R)		GSCR Sect. 2.1.4	Met	
			Three-way calling (C)		GSCR Sect. 2.1.5	Met[2]	Minor
			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	Not Met[3]	Minor
			Call waiting (C)		GSCR Sect. 2.1.9	Met	

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

DSN Features & Capabilities						
Features/ Capabilities	**Critical**	**Status**	**GSCR Requirement Required (R) Conditional (C)**	**Reference**	**Test Results**	**Operational Impact**
Attendant	No	Certified	Initiate all precedence levels (C)	GSCR Sect. 2.2.1	Met	
			Visual display (C)	GSCR Sect. 2.2.2	Met	
			Override class of service (C)	GSCR Sect. 2.2.3	Met	
			Override busy line (C)	GSCR Sect. 2.2.4	Met	
			Call deflection (C)	GSCR Sect. 2.2.5	Met	
			Auto recall (C)	GSCR Sect. 2.2.6	Met	
			Waiting queue (C)	GSCR Sect. 2.2.7	Met	
Public Safety	Yes	Not Tested	911 (C)	GSCR Sect. 2.4.1	Not Tested	
			Trace of terminating calls (R)	GSCR Sect. 2.4.2	Not Tested[3]	
			Outgoing call trace (R)	GSCR Sect. 2.4.3	Not Tested[3]	
			Tandem call trace (R)	GSCR Sect. 2.4.4	Not Tested[3]	
			Trace of a call in progress (R)	GSCR Sect. 2.4.5	Not Tested[3]	
Preset Conferencing	No	Certified	Support 10 bridges; 1 originator and 20 conferees (C)	GSCR Sect. 2.1.6	Met	
			Assign up to 20 address numbers per bridge (C)	GSCR Sect. 2.6	Met	
			Use KXX codes for bridge access (C)	GSCR Sect. 2.6	Met	
			Conference notification recorded announcement (C)	GSCR Sect. 2.6.1	Met	
			Auto retrial and alternate address (C)	GSCR Sect. 2.6.2	Met	
			Bridge release (C)	GSCR Sect. 2.6.3	Met	
			Lost connection (C)	GSCR Sect. 2.6.4	Met	
			Secondary conferencing (C)	GSCR Sect. 2.6.5	Met	
			Address translation (C)	GSCR Sect. 2.7	Met	
Nailed-Up Connections	No	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	
			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	

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**
PAT	No	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	
			Queuing (C)	GSCR Sect. 2.11.1.7	Not Tested	
			Attendant calls (C)	GSCR Sect. 2.11.1.8	Not Tested	
			Operation 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	
DSN Hotline Services	Yes	Not Tested	Hotline restrictions (R)	GSCR Sect. 2.12	Not Tested[3]	
			Auto initiate (R)	GSCR Sect. 2.12	Not Tested[3]	
			Analog and digital (R)	GSCR Sect. 2.12	Not Tested[3]	
			Subscription basis (R)	GSCR Sect. 2.12	Not Tested[3]	
			Protected hotline calling (R)	GSCR Sect. 2.12.1-4	Not Tested[3]	
			WWNDP interoperable (R)	GSCR Sect. 2.12.5	Not Tested[3]	
Network Management	Yes	Certified	Interfaces (R)	GSCR Sect. 9.1	Met	
			Measurements and data generation (R)	GSCR Sect. 9.2	Met	
			Fault management (R)	GSCR Sect. 9.3	Met	
			Configuration management (R)	GSCR Sect. 9.4	Met	
			Accounting management (R)	GSCR Sect. 9.5	Met	
			Performance management (R)	GSCR Sect. 9.6	Met	
			NM controls (R)	GSCR Sect. 9.7	Met	
			Remote access (R)	GSCR Sect. 9.8	Met	
ISDN Services	No	Certified	EKTS (C)	GSCR Sect. 10, table 10-3	Met	
Synchronization	Yes	Certified	Line timing mode (R)	GSCR Sect. 11.1.1.2	Met	
			Internal Stratum 4 (R)	GSCR Sect. 11.1.2.2	Met	
Reliability	Yes	Certified	GR-512-CORE (R)	GSCR Sect. 12	Met	
Security[4]	Yes	Certified	DITSCAP (R)	DODI 8100.3	Met	

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**
VoIP System	No	Certified	MOS 4.0 or better (R)		GSCR App. 3	Met	
			G.711 PCM Codec (R)		GSCR App. 3	Met	
			Security in accordance with DITSCAP (R)		GSCR App. 3	Met[4]	
			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	Not Tested[5]	
C2 VG 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	
Network Gateway							
Gateway	**Critical**	**Interface Status**	**GSCR Requirement Required (R) Conditional (C)**		**Reference**	**Test Results**	**Operational Impact**
PSTN	Yes	Certified	Trunking	Positive Identification Control (R)	CJCSI 6215.01B	Met	
				On-Netting (R)	CJCSI 6215.01B	Met	
				Off-Netting (R)	CJCSI 6215.01B	Met	
DRSN[6]	Yes	Certified	Access	Alerting Signals and Tones (R)	GSCR Sect. 5.5	Met	
				Call Processing (R)	GSCR Sect. 4.4	Met	
				Call Treatments (R)	GSCR Sect. 4.1	Met	
				Analog busy/idle (R)	GSCR Sect. 4.3.4.1	Met	
			Voice	MOS (C)	CJCSI 6215.01B	Met	
				MLPP (C)	GSCR Sect. 3	Met	
				Secure Calls (C)	CJCSI 6215.01B	Met	

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

Legend:

2W	- 2-Wire	DSN	- Defense Switched Network	NX56	- Data format restricted to multiples of 56 kbps
911	- 911 Emergency Service	E1	- European Basic Multiplex Rate (2.048 Mbps)	NX64	- Data format restricted to multiples of 64 kbps
A/D	- Analog to Digital Conversion	EIA	- Electronic Industries Alliance	PAT	- Precedence Access Threshold
ANSI	- American National Standards Institute	EKTS	- Electronic Key Telephone System	PCM	- Pulse Code Modulation
App.	- Appendix	GR	- Generic Requirement	PCM-24	- Pulse Code Modulation - 24 Channels
BER	- Bit Error Ratio	GSCR	- Generic Switching Center Requirements	PCM-30	- Pulse Code Modulation - 30 Channels
BRI	- Basic Rate Interface	H.320	- ITU standard for narrowband VTC	PRI	- Primary Rate Interface
C	- Conditional	IEEE	- Institute of Electrical and Electronics Engineers, Inc.	PSTN	- Public Switched Telephone Network
C2	- Command and Control			QoS	- Quality of Service
CAS	- Channel Associated Signaling	IPv6	- Internet Protocol version 6	R	- Required
CCS	- Common Channel Signaling	ISDN	- Integrated Services Digital Network	Sect.	- Section
CJCSI	- Chairman of the Joint Chiefs of Staff Instruction	ITU	- International Telecommunications Union	STE	- Secure Terminal Equipment
		JTA	- Joint Technical Architecture	STU-III	- Secure Telephone Unit-3rd generation
Codec	- Coder/Decoder	kbps	- kilobits per second	SUT	- System Under Test
CoS	- Class of Service	KXX	- K= any number 2-8; X= any number 1-9	T1	- Digital Transmission Link Level 1 (1.544 Mbps)
D/A	- Digital to Analog Conversion	LAN	- Local Area Network	T1.619a	- SS7 and ISDN MLPP Signaling Standard for T1
DAA	- Designated Accreditation Authority	LoC	- Letter(s) of Compliance		
DISA	- Defense Information Systems Agency	Mbps	- Megabits per second	TIA	- Telecommunication Industry Association
DITSCAP	- DOD Information Technology Security and Accreditation Process	MLPP	- Multi-Level Precedence and Preemption	VBD	- Variable bit data
		MIL-STD	- Military Standard	VG	- Voice Grade
DN	- Directory Number	MOS	- Mean Opinion Score	VLAN	- Virtual LAN
DOD	- Department of Defense	msec	- milliseconds	VoIP	- Voice over Internet Protocol
DODI	- DOD Instruction	NI 1/2	- National ISDN standard 1 or 2	VTC	- Video Teleconferencing
DRSN	- Defense Red Switch Network	NM	- Network Management	WWNDP	- Worldwide Numbering and Dialing Plan

Notes:

1 Met all DSN Announcement requirements except for Isolation Code Announcement. The SUT provides this announcement only for precedence calls above ROUTINE. ROUTINE precedence calls receive a fast busy signal. Operational impact is minor.

2 When a three-way call is established “each connection shall maintain its assigned precedence level”. The SUT however connects a three-way call in a single time slot and class marks all parties at the highest precedence level. This is a new 2003 GSCR requirement and the vendor has until March 2005 to meet it. The operational impact is minor.

3 This is a new 2003 GSCR requirement and the vendor has until March 2005 to meet it.

4 DITSCAP information assurance testing is accomplished via DISA-led Information Assurance test teams.

5 IPv6 capability was not tested due to lack of resources available to test it. Although IPv6 capability is a required feature, JITC determined a minor risk of not testing it due to the fact that no other systems are currently using it within the DSN.

6 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.