DEFENSE INFORMATION SYSTEMS AGENCY
P. O. BOX 4502
ARLINGTON, VIRGINIA 22204-4502

IN REPLY REFER TO: Joint Interoperability Test Command (JTE) **22 Apr 10**

MEMORANDUM FOR DISTRIBUTION

SUBJECT: Special Interoperability Test Certification of General Dynamics C4 Systems Sectera® vIPer™ Release 2.14 Public Switched Telephone Network (PSTN) Connect

References: (a) DoD Directive 4630.5, "Interoperability and Supportability of Information Technology (IT) and National Security Systems (NSS)," 5 May 2004
(b) CJCSI 6212.01E, "Interoperability and Supportability of Information Technology and National Security Systems," 15 December 2008
(c) through (f), see Enclosure 1

1. References (a) and (b) establish the Defense Information Systems Agency (DISA), Joint Interoperability Test Command (JITC), as the responsible organization for interoperability test certification.

2. The General Dynamics C4 Systems Sectera® vIPer™ Release 2.14 PSTN Connect, is hereinafter referred to as the system under test (SUT). The SUT meets all of its critical interoperability requirements and is certified for joint use within the Defense Switched Network (DSN) as a Department of Defense (DoD) Secure Communications Device (DSCD). The SUT is certified with any switch in the DSN that offers a certified analog loop-start interface. No other configurations, features, or functions, except those cited within this report, are certified by the JITC. 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, DISA adjudication of open test discrepancy reports, review of the vendor's Letters of Compliance (LoC), and National Security Agency (NSA) Type I Accreditation. Interoperability testing of the SUT was conducted at JITC's Global Information Grid Network Test Facility at Fort Huachuca, Arizona, from 16 November through 14 December 2009. Regression testing was conducted from 28 through 31 December 2009. Review of vendor's LoC was completed on 5 January 2010. DISA adjudication of outstanding test discrepancy reports was completed on 22 January 2010. The SUT NSA Type I accreditation was granted on 22 April 2010, Reference (c). Enclosure 2 documents the test results and describes the tested network and system configurations.

4. The interoperability test summary of the SUT is indicated in Table 1. The Unified Capabilities Requirement DSCD Interoperability Requirements are listed in Table 2. This interoperability test status is based on the SUT's ability to meet:

a. DSN services for Network and Applications specified in Reference (d).

b. DSCD interface and signaling requirements as specified in Reference (e) verified through JITC testing and/or vendor submission of LoC.

c. DSCD Capability Requirements (CRs)/Feature Requirements (FRs) specified in Reference (e) verified through JITC testing and/or vendor submission of LoC.

d. The overall system interoperability performance derived from test procedures listed in Reference (f).

Table 1. SUT Interoperability Test Summary

DSCD Interoperability Requirements			
Interface & Signaling	**Critical**	**Status**	**Remarks**
2-Wire Analog (Loop-Start)	Yes	Certified	Met all Critical CRs and FRs with the following minor exceptions: The SUT would occasionally ring through the handset.[1] The SUT displayed the following error codes when attempting to go secure: 75F20169 and 95D10AE8.[2] The SUT received NSA Type I Accreditation.[3]

NOTES:

1 When a call was placed to the SUT, the phone would occasionally ring through the handset speaker rather than the speakerphone speaker. This anomaly occurred very rarely (approximately 3 out of 900 calls). This discrepancy was adjudicated by DISA on 22 January 2010 as having a minor operational impact with the stipulation that General Dynamics should fix this in the next software release.

2 The SUT displayed the following error codes when attempting to go secure: 75F20169 and 95D10AE8. When these error codes occurred, the SUT was inoperable and had to be rebooted. Error code 95D10AE8 (PSTN connect module not responding) occurred approximately 5 out of 900 calls. Error code 75F20169 occurred approximately 7 out of 900 calls. These discrepancies were adjudicated by DISA on 22 January 2010 as having a minor operational impact with the stipulation that General Dynamics should fix these in the next software release.

3 The SUT NSA Type I accreditation was granted on 22 April 2010, and documented in Reference (c).

LEGEND:

CRs	Capability Requirements	FRs	Feature Requirements
DISA	Defense Information Systems Agency	NSA	National Security Agency
DoD	Department of Defense	PSTN	Public Switched Telephone Network
DSCD	DoD Secure Communications Devices	SUT	System Under Test

Table 2. DSCD UCR Interoperability Requirements

DSN Line Interface			
Interface	**Critical**	**Requirements Required or Conditional**	**References**
2-Wire Analog (Loop-Start)	Yes	• Type Approved by NSA (R) • DSCDs that use 2-wire analog shall meet the end instrument requirements specified in UCR, section 5.2.12.3 (R) • MLPP in accordance with UCR, section 5.2.2 (C) • FCC Part 15/Part 68 and the Administrative Council for Terminal Attachments (ACTA) (R) • Auto-Answer mode settable to a "time" more than the equivalency of four ROUTINE precedence rings (C) • Devices that support precedence calls above ROUTINE shall respond properly to an incoming alerting precedence call cadence (C) • DTMF out-pulsing • All 2-wire analog devices shall conform to the requirements of TIA/EIA-470-B • Shall go secure with at least an 85% call completion rate (R) • Shall establish secure call within 60 seconds for duration of secure call (R) • Shall operate in a network that has an end-to-end latency of up to 600 milliseconds (R) • Maintain secure voice connection with MOS of 3.0 (R) • Voice service quality (non-secure) MOS of 4.0 (R) • Process new key with 95% rekey completion rate (R) • Supports data and facsimile transmission rate of 9.6 kbps or better (C)	• UCR Section 5.2.12.6.6 • UCR Section 5.2.12.6.6 • UCR Section 5.2.12.3.5 • UCR Section 5.2.12.3.5 • UCR Section 5.2.12.3.5 • UCR Section 5.2.12.3.5 • UCR Section 5.2.12.3.5 • UCR Section 5.2.12.3.5.1 • UCR Section 5.2.12.6.6 • UCR Section 5.2.12.6.6 • UCR Section 5.2.12.6.6 • UCR Section 5.2.12.6.6 • UCR Section 5.3.3.15 • UCR Section 5.2.12.6.6 • UCR Section 5.2.12.6.6

LEGEND:

C	Conditional	kbps	kilobits per second	TIA	Telecommunications Industry Association
DoD	Department of Defense	MLPP	Multi-Level Precedence and Preemption	TIA/EIA-470-B	Performance and Compatibility Requirements for Telephone Sets with Loop Signaling
DSCD	DoD Secure Communications Device	MOS	Mean Opinion Score		
DSN	Defense Switched Network	NSA	National Security Agency		
DTMF	Dual-Tone Multifrequency	R	Required	UCR	Unified Capabilities Requirements
EIA	Electronic Industries Alliance				
FCC	Federal Communications Commission				

5. No detailed test report was developed in accordance with the Program Manager's request. The JITC distributes interoperability information via the JITC Electronic Report Distribution (ERD) system, which uses Unclassified-But-Sensitive Internet Protocol Router Network (NIPRNet) e-mail. More comprehensive interoperability status information is available via the JITC System Tracking Program (STP). The STP is accessible by .mil/gov users on the NIPRNet 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.

6. The JITC point of contact is Ms. Anita Bickler, DSN 879-5164, commercial (520) 538-5164, FAX DSN 879-4347, or e-mail to anita.bickler@disa.mil. The JITC's mailing address is P.O. Box 12798, Fort Huachuca, AZ 85670-2798. The tracking number for the SUT is 0920202.

FOR THE COMMANDER:

2 Enclosures a/s

for RICHARD A. MEADOR
Chief
Battlespace Communications Portfolio

Distribution (electronic mail):
Joint Staff J-6
Joint Interoperability Test Command, Liaison, TE3/JT1
Office of Chief of Naval Operations, CNO N6F2
Headquarters U.S. Air Force, Office of Warfighting Integration & CIO, AF/XCIN (A6N)
Department of the Army, Office of the Secretary of the Army, DA-OSA CIO/G-6 ASA (ALT), SAIS-IOQ
U.S. Marine Corps MARCORSYSCOM, SIAT, MJI Division I
DOT&E, Net-Centric Systems and Naval Warfare
U.S. Coast Guard, CG-64
Defense Intelligence Agency
National Security Agency, DT
Defense Information Systems Agency, TEMC
Office of Assistant Secretary of Defense (NII)/DOD CIO
U.S. Joint Forces Command, Net-Centric Integration, Communication, and Capabilities Division, J68
Defense Information Systems Agency, GS23

ADDITIONAL REFERENCES

(c) National Security Agency, Memo to vIPer Program Manager, 22 April 2010
(d) Chairman of the Joint Chiefs of Staff Instruction (CJCSI) 6215.01C, "Policy for Department of Defense Voice Services with Real Time Services (RTS)," 9 November 2007
(e) Office of the Assistant Secretary of Defense, "Department of Defense Unified Capabilities Requirements 2008," 22 January 2009
(f) Joint Interoperability Test Command, "Defense Switched Network Generic Switch Test Plan (GSTP), Change 2," 2 October 2006

CERTIFICATION TESTING SUMMARY

1. SYSTEM TITLE. General Dynamics C4 Systems Sectera® vIPer™ Release 2.14 Public Switched Telephone Network (PSTN) Connect; will hereinafter be referred to as the System Under Test (SUT).

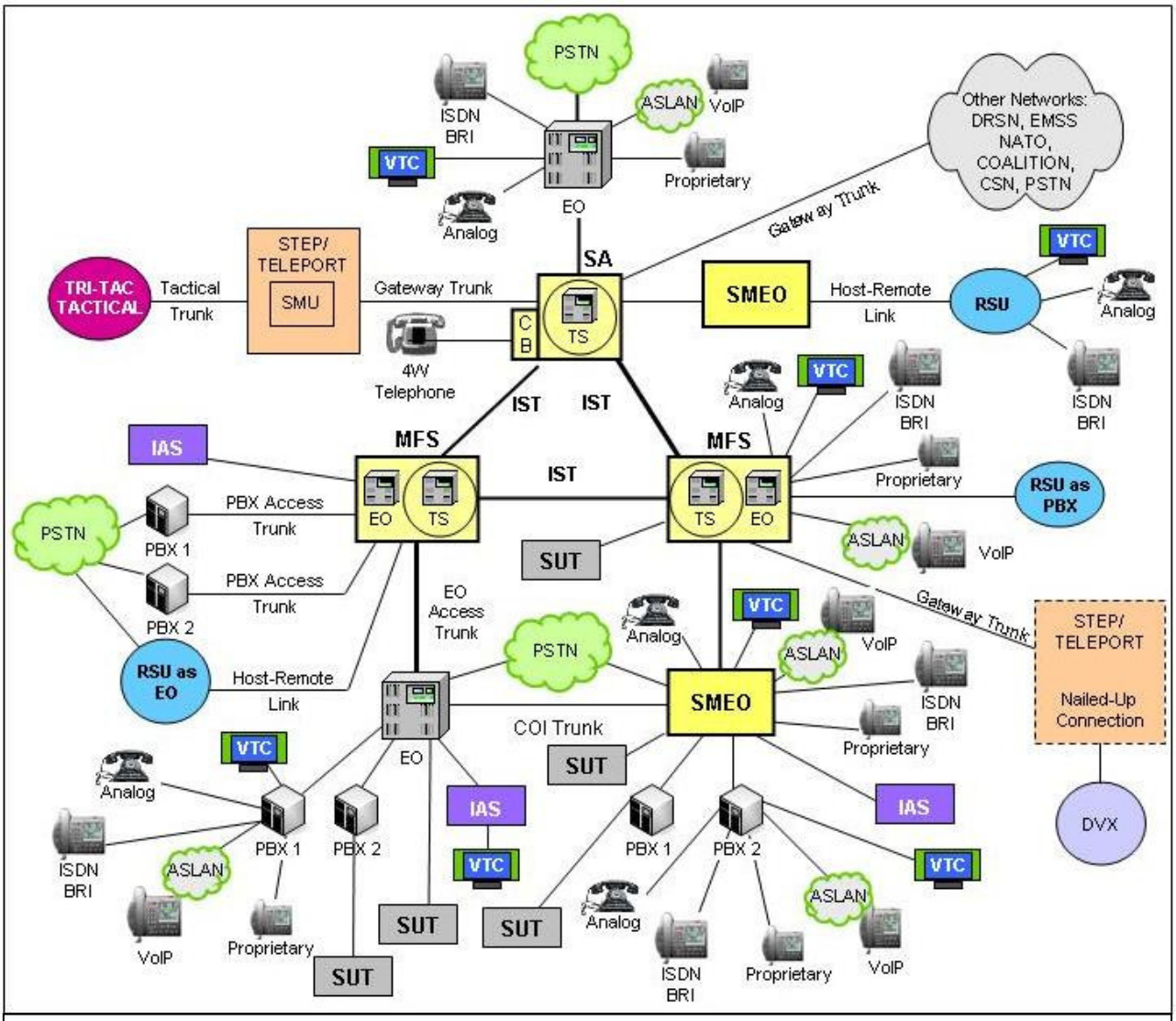
2. PROPONENT. U.S. Army Communications-Electronics Command.

3. PROGRAM MANAGER. Mr. John Kahler, EA-TJTN/GS13, Building 1210 Rittko Ave, Fort Monmouth, NJ, 07703, E-mail: john.kahler@us.army.mil.

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

5. SYSTEM UNDER TEST DESCRIPTION. The SUT is a Department of Defense (DoD) Secure Communications Device (DSCD) that provides voice communications for both secure (National Security Agency [NSA] Accredited Type 1) and non secure communications between other Time Division Multiplex end instruments and Voice over Internet Protocol (VoIP) end instruments.

6. OPERATIONAL ARCHITECTURE. The Defense Switched Network (DSN) architecture is a two-level network hierarchy consisting of DSN backbone switches and Service/Agency installation switches. Joint Staff policy and subscriber mission requirements determine which type of switch can be used at a particular location. The DSN architecture, therefore, consists of several categories of switches, including Private Branch Exchanges (PBX)s. The Unified Capabilities Requirements (UCR) operational DSN Architecture is depicted in Figure 2-1.



LEGEND:

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

Figure 2-1. DSN Architecture

7. REQUIRED SYSTEM INTERFACES. The SUT Interoperability Test Summary is shown in Table 2-1 and the Capability and Feature Requirements used to evaluate the interoperability of the SUT are indicated in Table 2-2. These requirements are derived from the UCR and verified through JITC testing and review of the vendor's Letters of Compliance (LoC).

Table 2-1. SUT Interoperability Test Summary

DSCD Interoperability Requirements			
Interface & Signaling	**Critical**	**Status**	**Remarks**
2-Wire Analog (Loop-Start)	Yes	Certified	Met all Critical CRs and FRs with the following minor exceptions: The SUT would occasionally ring through the handset.[1] The SUT displayed the following error codes when attempting to go secure: 75F20169 and 95D10AE8.[2] The SUT received NSA Type I Accreditation.[3]

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1 When a call was placed to the SUT, the phone would occasionally ring through the handset speaker rather than the speakerphone speaker. This anomaly occurred very rarely (approximately 3 out of 900 calls). This discrepancy was adjudicated by DISA on 22 January 2010 as having a minor operational impact with the stipulation that General Dynamics should fix this in the next software release.
2 The SUT displayed the following error codes when attempting to go secure: 75F20169 and 95D10AE8. When these error codes occurred, the SUT was inoperable and had to be rebooted. Error code 95D10AE8 (PSTN connect module not responding) occurred approximately 5 out of 900 calls. Error code 75F20169 occurred approximately 7 out of 900 calls. These discrepancies were adjudicated by DISA on 22 January 2010 as having a minor operational impact with the stipulation that General Dynamics should fix these in the next software release.
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DISA	Defense Information Systems Agency	NSA	National Security Agency
DoD	Department of Defense	PSTN	Public Switched Telephone Network
DSCD	DoD Secure Communications Devices	SUT	System Under Test

Table 2-2. DSCD UCR Interoperability Requirements

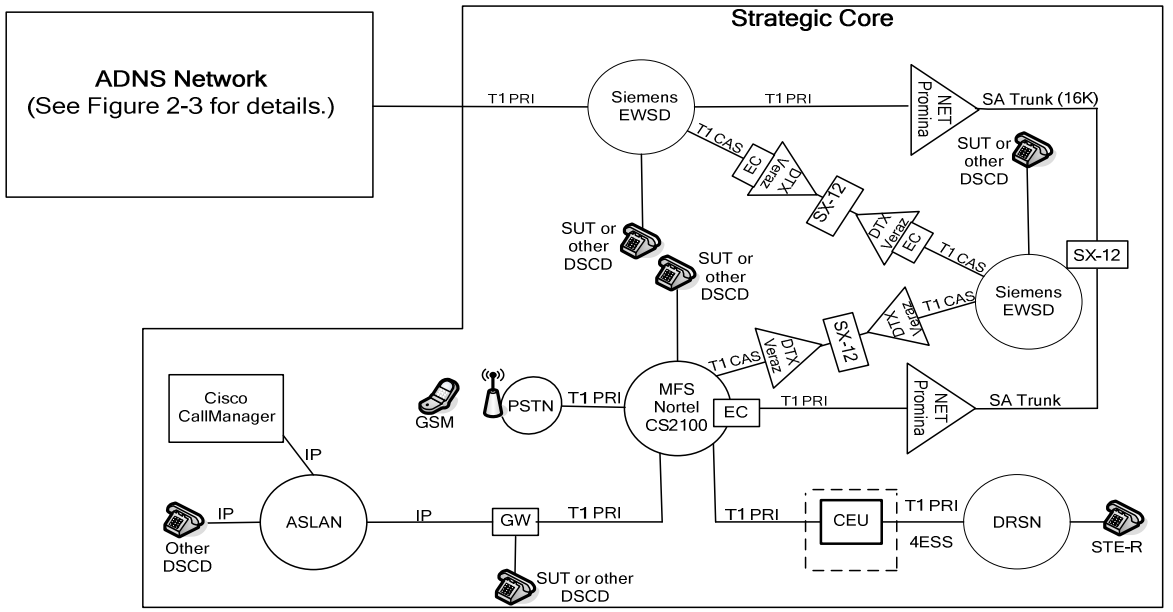
DSN Line Interface			
Interface	**Critical**	**Requirements Required or Conditional**	**References**
2-Wire Analog (Loop-Start)	Yes	• Type Approved by NSA (R)	• UCR Section 5.2.12.6.6
		• DSCDs that use 2-wire analog shall meet the end instrument requirements specified in UCR, section 5.2.12.3 (R)	• UCR Section 5.2.12.6.6
		• MLPP in accordance with UCR, section 5.2.2 (C)	• UCR Section 5.2.12.3.5
		• FCC Part 15/Part 68 and the Administrative Council for Terminal Attachments (ACTA) (R)	• UCR Section 5.2.12.3.5
		• Auto-Answer mode settable to a "time" more than the equivalency of four ROUTINE precedence rings (C)	• UCR Section 5.2.12.3.5
		• Devices that support precedence calls above ROUTINE shall respond properly to an incoming alerting precedence call cadence (C)	• UCR Section 5.2.12.3.5
		• DTMF out-pulsing	• UCR Section 5.2.12.3.5
		• All 2-wire analog devices shall conform to the requirements of TIA/EIA-470-B	• UCR Section 5.2.12.3.5.1
		• Shall go secure with at least an 85% call completion rate (R)	• UCR Section 5.2.12.6.6
		• Shall establish secure call within 60 seconds for duration of secure call (R)	• UCR Section 5.2.12.6.6
		• Shall operate in a network that has an end-to-end latency of up to 600 milliseconds (R)	• UCR Section 5.2.12.6.6
		• Maintain secure voice connection with MOS of 3.0 (R)	• UCR Section 5.2.12.6.6
		• Voice service quality (non-secure) MOS of 4.0 (R)	• UCR Section 5.3.3.15
		• Process new key with 95% rekey completion rate (R)	• UCR Section 5.2.12.6.6
		• Supports data and facsimile transmission rate of 9.6 kbps or better (C)	• UCR Section 5.2.12.6.6

Table 2-2. DSCD UCR Interoperability Requirements (continued)

LEGEND:

C	Conditional	FCC	Federal Communications Commission	TIA	Telecommunications Industry Association
DoD	Department of Defense	kbps	kilobits per second	TIA/EIA-470-B	Performance and Compatibility Requirements for Telephone Sets with Loop Signaling
DSCD	DoD Secure Communications Device	MLPP	Multi-Level Precedence and Preemption		
DSN	Defense Switched Network	MOS	Mean Opinion Score		
DTMF	Dual-Tone Multifrequency	NSA	National Security Agency	UCR	Unified Capabilities Requirements
EIA	Electronic Industries Alliance	R	Required		

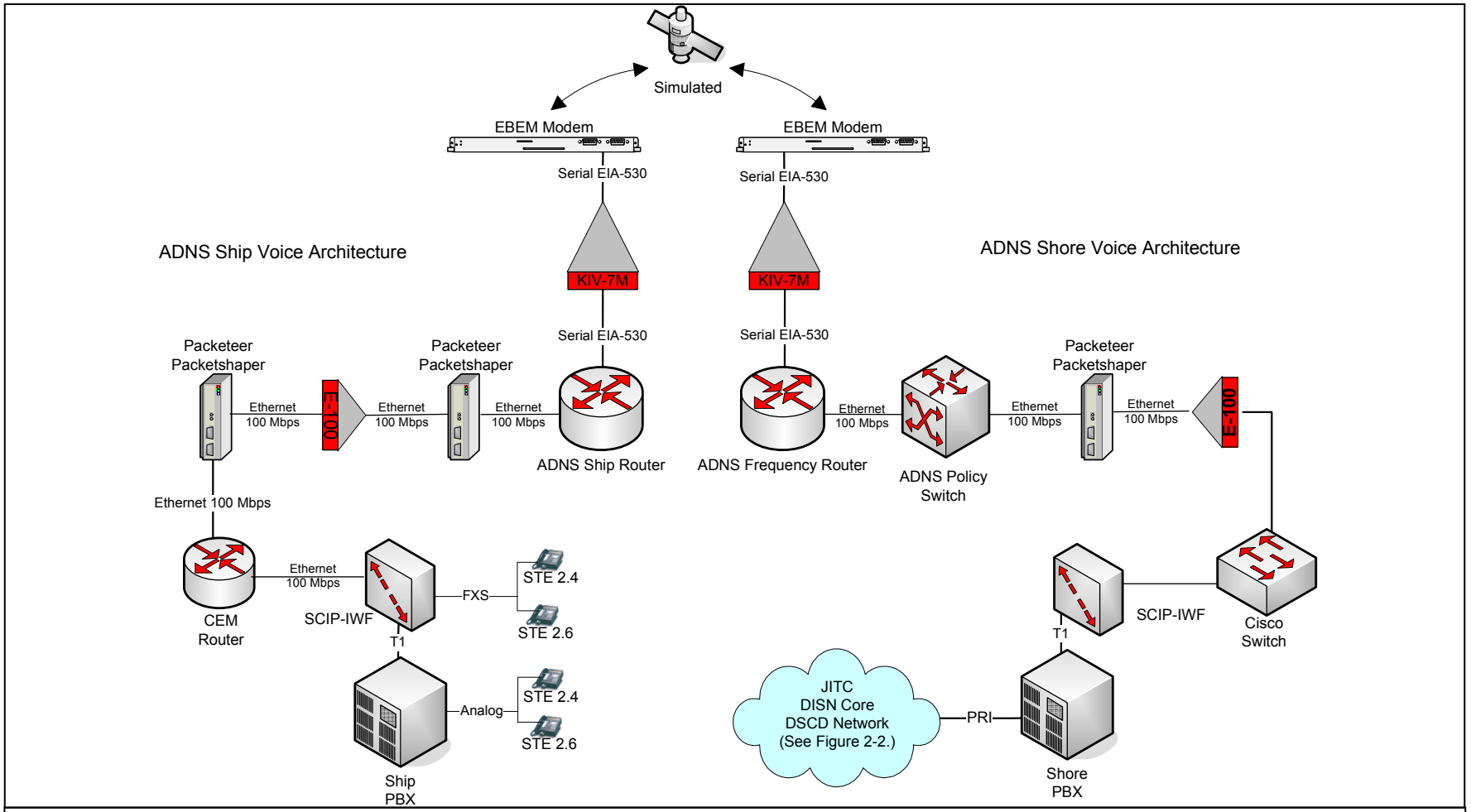
8. TEST NETWORK DESCRIPTION. The SUT was tested at JITC's Global Information Grid Network Test Facility in a manner and configuration similar to that of the DSN operational environment. Testing of the SUT required functions and features was conducted using the test configurations depicted in Figures 2-2 through 2-9. Figures 2-2 through 2-9 simulate actual DoD operationally deployed network to strategic core network test configuration strings. The SUT was tested with other DSCD devices between the various test points denoted in each figure.



LEGEND:

4ESS	Class 4 Electronic Switching System	EC	Echo Canceller	NET	Network Equipment Technology
ADNS	Automated Digital Network System	EWSD	Elektronisches Wählsystem Digital	PRI	Primary Rate Interface
ASLAN	Assured Services Local Area Network	GSM	Global System for Mobile Communications	PSTN	Public Switched Telephone Network
CAS	Channel Associated Signaling	GW	Gateway	SA	Satellite Access
CEU	Channel Encryption Unit	IP	Internet Protocol	STE	Secure Telephone Equipment-RED Switch
CS	Communication Server	K	Kilobit	SUT	System Under Test
DRSN	Defense Red Switch Network	Mbps	Megabits per second	T1	Digital Transmission Link Level 1 (1.544 Mbps)
DSCD	Department of Defense (DoD) Secure Communications Device	MFS	Multifunction Switch		

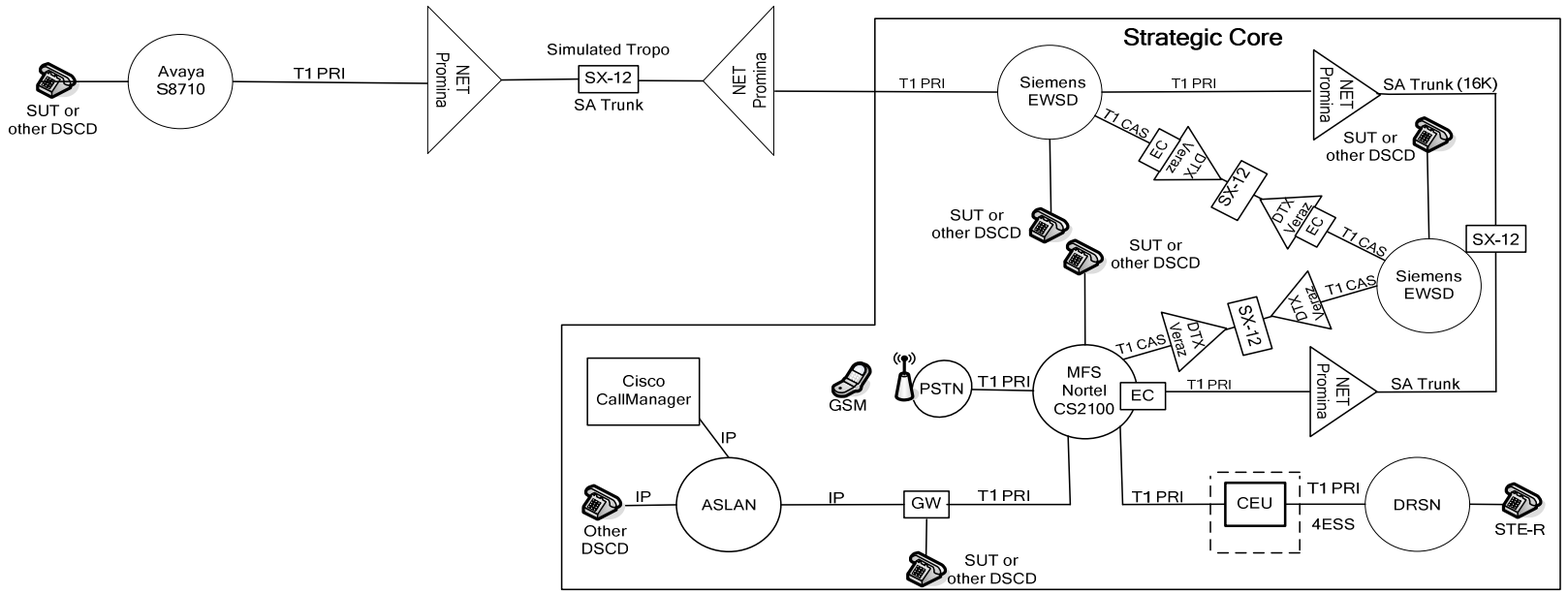
Figure 2-2. ADNS Composite Test Diagram



LEGEND:

ADNS	Automated Digital Network System
CEM	Circuit Emulation
DISN	Defense Information System Network
DSCD	Department of Defense Secure Communications Device
EBEM	Advanced Bandwidth Efficient Modem I
EIA	Electronic Industries Alliance
EIA-530	Standard for 25-position interface for data terminal equipment and data circuit-terminating equipment employing serial binary data interchange
FXS	Foreign Exchange Station
IP	Internet Protocol
IWF	Interworking Function
JITC	Joint Interoperability Test Command
Mbps	Megabits per second
PBX	Private Branch Exchange
RTR	router
SCIP	Secure Communications Internet Protocol
STE	Secure Terminal Equipment
T1	Digital Transmission Link Level 1 (1.544 Mbps)

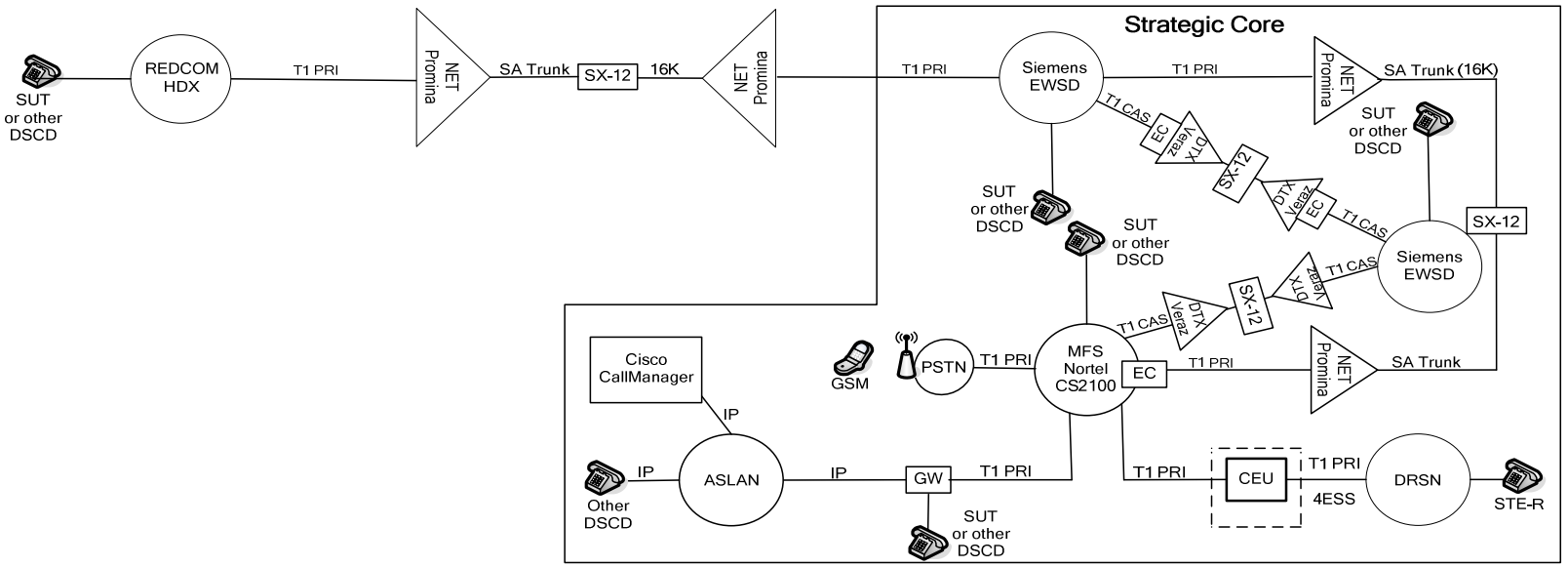
Figure 2-3. ADNS Test Network



LEGEND:

4ESS	Class 4 Electronic Switching System	EWSD	Elektronisches Wählsystem Digital	PRI	Primary Rate Interface
ASLAN	Assured Services Local Area Network	GSM	Global System for Mobile Communications	PSTN	Public Switched Telephone Network
CAS	Channel Associated Signaling	GW	Gateway	SA	Satellite Access
CEU	Channel Encryption Unit	IP	Internet Protocol	STE-R	Secure Telephone Equipment-RED Switch
CS2100	Communication Server 2100	K	Kilobit	SUT	System Under Test
DRSN	Defense Red Switch Network	Mbps	Megabits per second	SX-12	Simulator, Data Link
DSCD	Department of Defense (DoD) Secure Communications Device	MFS	Multifunction Switch	T1	Digital Transmission Link Level 1 (1.544 Mbps)
		NET	Network Equipment Technology	Tropo	Tropospheric Scatter Radio
EC	Echo Canceller				

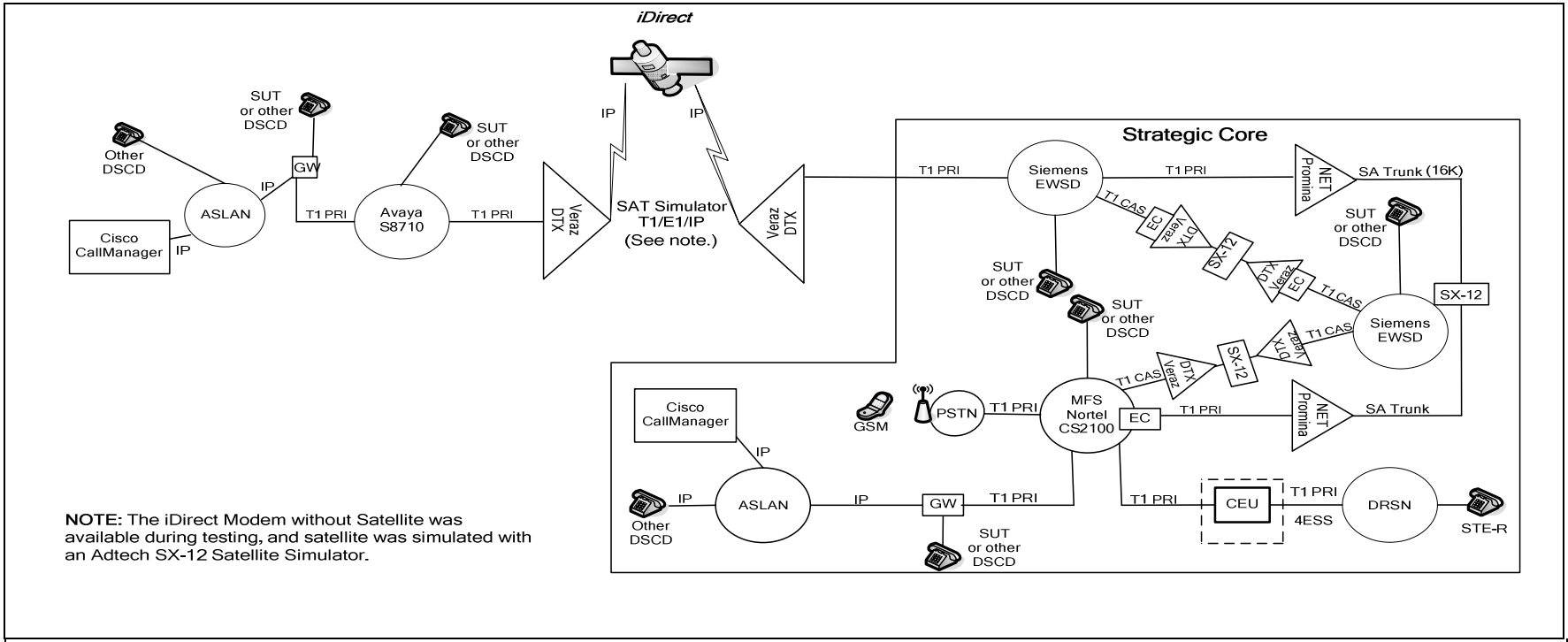
Figure 2-4. Air Force Composite Test Diagram



LEGEND:

4ESS	Class 4 Electronic Switching System	EC	Echo Canceller	NET	Network Equipment Technology
ASLAN	Assured Services Local Area Network	EWSD	Elektronisches Wählsystem Digital	PRI	Primary Rate Interface
CAS	Channel Associated Signaling	GSM	Global System for Mobile Communications	PSTN	Public Switched Telephone Network
CENTCOM	Central Command	GW	Gateway	SA	Satellite Access
CEU	Channel Encryption Unit	HDX	High Density Exchange	STE-R	Secure Telephone Equipment-RED Switch
CS	Communication Server	IP	Internet Protocol	SUT	System Under Test
DRSN	Defense Red Switch Network	K	Kilobit	SX-12	Simulator, Data Link
DSCD	Department of Defense (DoD) Secure Communications Device	Mbps	Megabits per second	T1	Digital Transmission Link Level 1 (1.544 Mbps)
		MFS	Multifunction Switch		

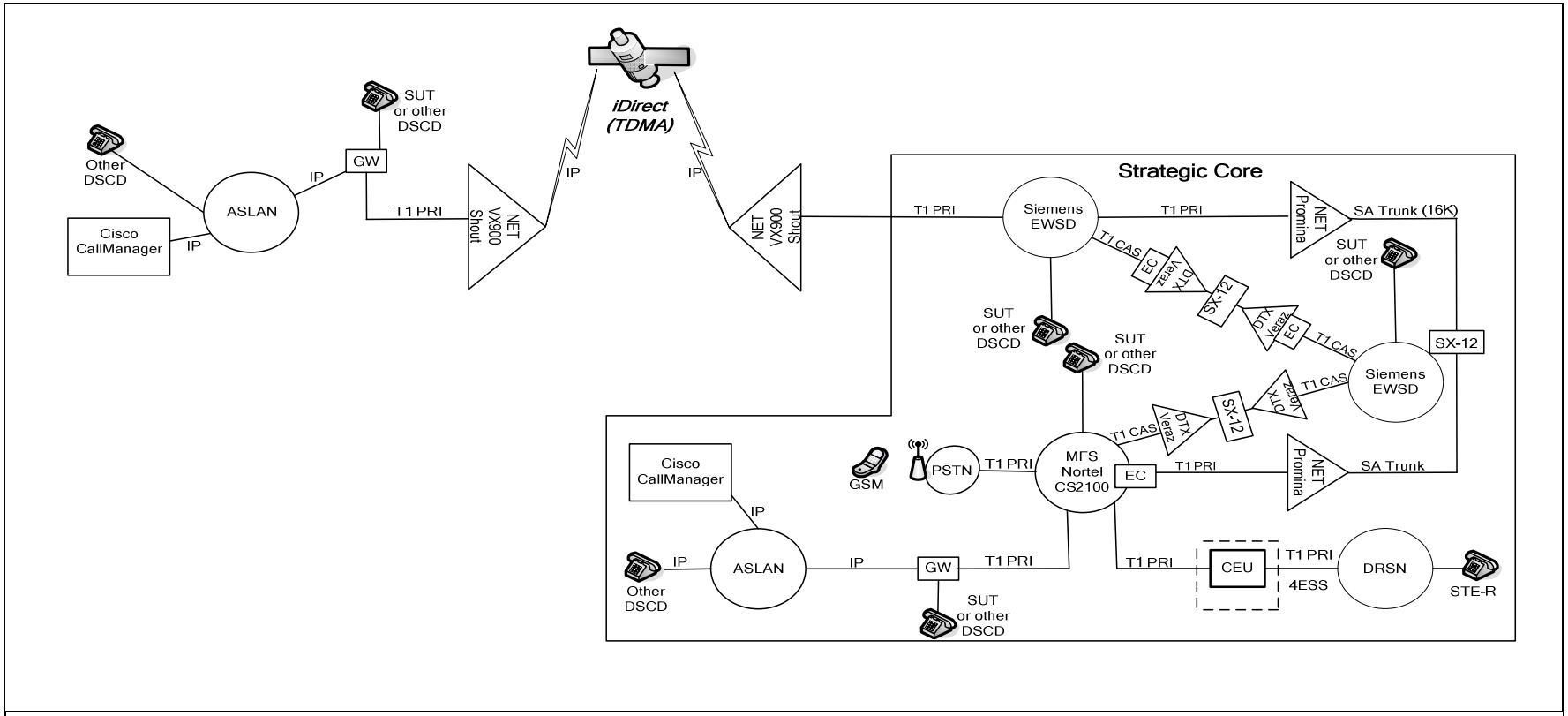
Figure 2-5. CENTCOM Dual Hop Composite Test Diagram



LEGEND:

4ESS	Class 4 Electronic Switching System	E1	European Basic Mutilplex Rate (2.048 Mbps)	NET	Network Equipment Technology
ASLAN	Assured Services Local Area Network	EC	Echo Canceller	PRI	Primary Rate Interface
CAS	Channel Associated Signaling	EWSD	Elektronisches Wählsystem Digital	PSTN	Public Switched Telephone Network
CENTCOM	Central Command	GSM	Global System for Mobile Communications	SA	Satellite Access
CEU	Channel Encryption Unit	GW	Gateway	SAT	Subscriber Access Termination
CS	Communication Server	IP	Internet Protocol	STE-R	Secure Telephone Equipment-RED Switch
DRSN	Defense Red Switch Network	K	Kilobit	SUT	System Under Test
DSCD	Department of Defense (DoD) Secure Communications Device	Mbps	Megabits per second	SX-12	Simulator, Data Link
		MFS	Multifunction Switch	T1	Digital Transmission Link Level 1 (1.544 Mbps)

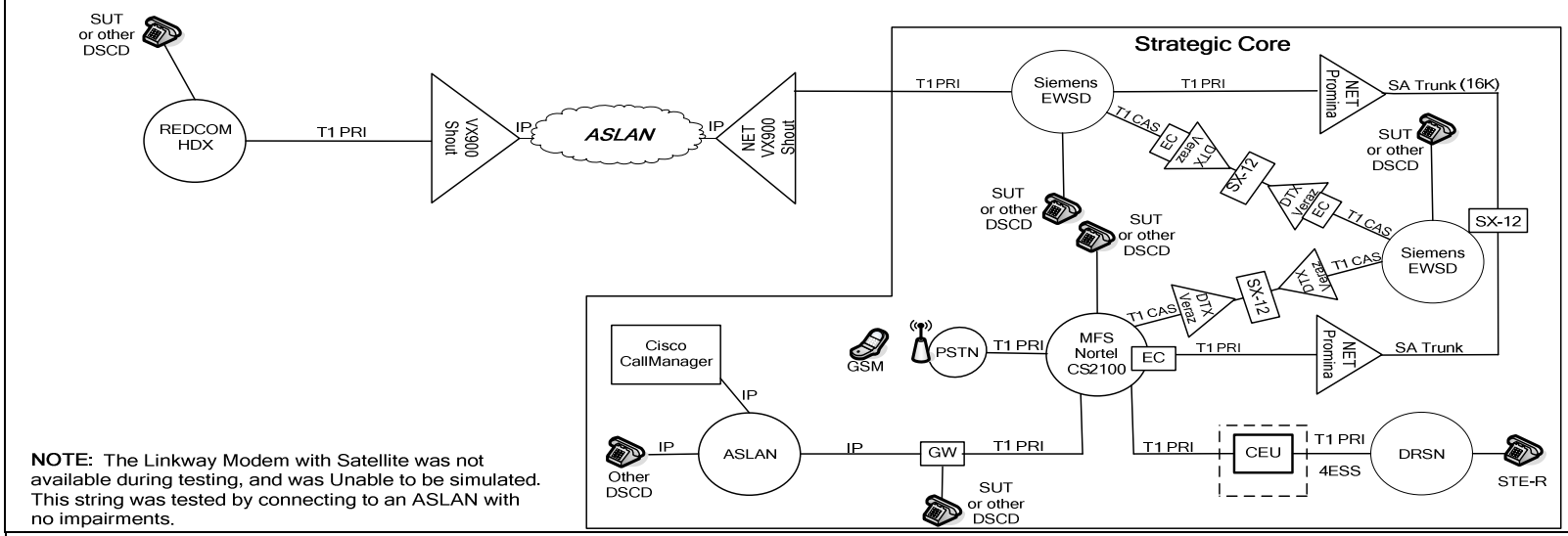
Figure 2-6. CENTCOM Composite Test Diagram



LEGEND:

4ESS	Class 4 Electronic Switching System	EWSD	Elektronisches Wählsystem Digital	PRI	Primary Rate Interface
ASLAN	Assured Services Local Area Network	GSM	Global System for Mobile Communications	PSTN	Public Switched Telephone Network
CAS	Channel Associated Signaling	GW	Gateway	SA	Satellite Access
CEU	Channel Encryption Unit	IP	Internet Protocol	STE-R	Secure Telephone Equipment-RED Switch
CS	Communication Server	JCSE	Joint Communications Support Element	SUT	System Under Test
DRSN	Defense Red Switch Network	K	Kilobit	SX-12	Simulator, Data Link
DSCD	Department of Defense (DoD) Secure Communications Device	Mbps	Megabits per second	T1	Digital Transmission Link Level 1 (1.544 Mbps)
		MFS	Multifunction Switch	TDMA	Time Division Multiple Access
EC	Echo Canceller	NET	Network Equipment Technology		

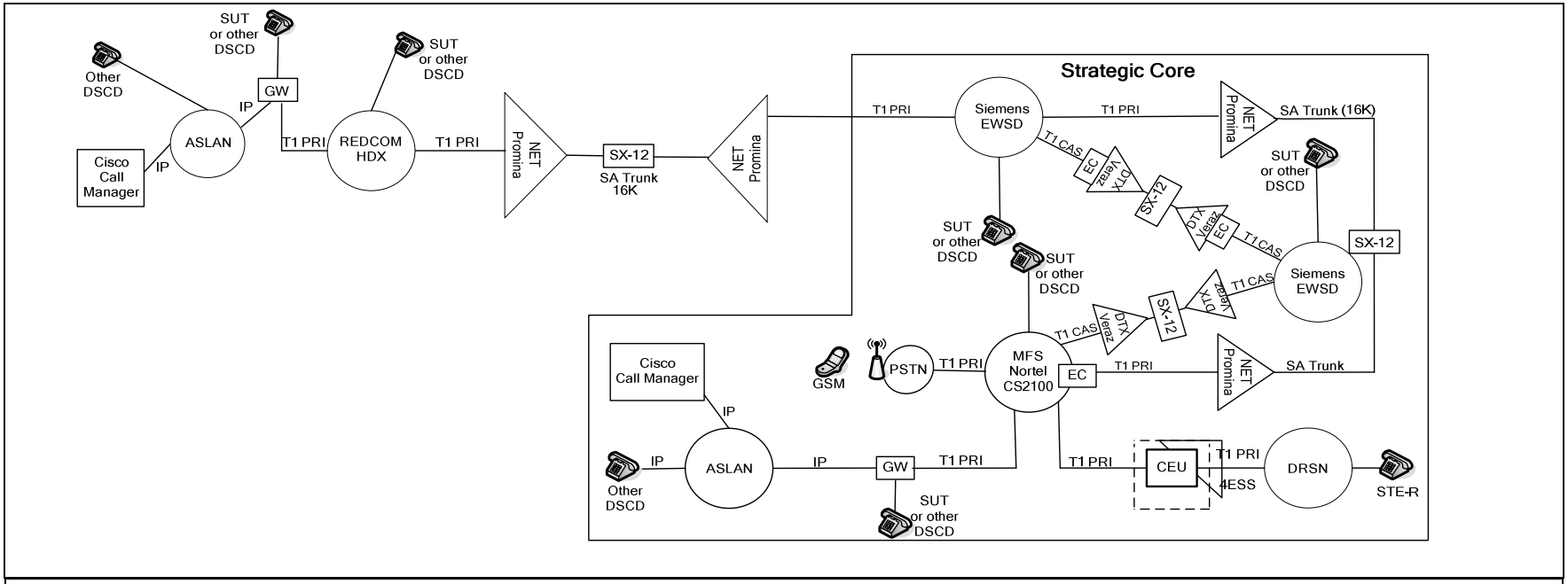
Figure 2-7. JCSE DSCD Composite Test Diagram



LEGEND:

4ESS	Class 4 Electronic Switching System	EWSD	Elektronisches Wählsystem Digital	PRI	Primary Rate Interface
ASLAN	Assured Services Local Area Network	GSM	Global System for Mobile Communications	PSTN	Public Switched Telephone Network
CAS	Channel Associated Signaling	GW	Gateway	SA	Satellite Access
CEU	Channel Encryption Unit	HDX	High Density Exchange	STE	Secure Telephone Equipment
CS	Communication Server	IP	Internet Protocol	SUT	System Under Test
DRSN	Defense Red Switch Network	K	Kilobit	SX-12	Simulator, Data Link
DSCD	Department of Defense (DoD) Secure Communications Device	Mbps	Megabits per second	T1	Digital Transmission Link Level 1 (1.544 Mbps)
		MFS	Multifunction Switch	USMC	United States Marine Corps
EC	Echo Canceller	NET	Network Equipment Technology		

Figure 2-8. USMC Composite Test Diagram



LEGEND:

4ESS	Class 4 Electronic Switching System	EWSD	Elektronisches Wählsystem Digital	PRI	Primary Rate Interface
ASLAN	Assured Services Local Area Network	GSM	Global System for Mobile Communications	PSTN	Public Switched Telephone Network
CAS	Channel Associated Signaling	GW	Gateway	SA	Satellite Access
CEU	Channel Encryption Unit	HDX	High Density Exchange	STE-R	Secure Telephone Equipment-RED Switch
CS	Communication Server	IP	Internet Protocol	SUT	System Under Test
DRSN	Defense Red Switch Network	K	Kilobit	SX-12	Simulator, Data Link
DSCD	Department of Defense (DoD) Secure Communications Device	Mbps	Megabits per second	T1	Digital Transmission Link Level 1 (1.544 Mbps)
		MFS	Multifunction Switch	WIN-T	Warfighter Information Network - Tactical
EC	Echo Canceller	NET	Network Equipment Technology		

Figure 2-9. WIN-T Composite Test Diagram

9. SYSTEM CONFIGURATIONS. Table 2-2 provides the system configurations, hardware, and software components tested with the SUT. The SUT was tested in an operationally realistic environment to determine interoperability with a complement of DSN switches, network elements, and comparable DSCD end instruments noted in Table 2-2. Table 2-2 lists the DSN switches and Network Elements which depict the tested configuration and is not intended to identify the only switches and Network Elements that are certified with the SUT. The SUT is certified with any switch on the Unified Capabilities (UC) Approved Products List (APL) that offers a certified analog loop-start interface.

Table 2-2. Tested System Configurations

System Name		Software Release
Nortel CS2100 (MFS)		Succession Enterprise (SE) 09.1
Nokia-Siemens EWSD (MFS)		19d with Patch Set 46
Avaya S8710 (SMEO)		Communication Manager (CM) 4.0 (R014x.00.2.731.7: Super Patch 14419)
Avaya G3CSI (PBX 1)		Communication Manager (CM) 3.0 (R013i.00.0.340.5: Patch 8893.1.0.7)
Cisco Unified CallManager (PBX 1)		4.3(2) Service Release (SR) 1b, with IOS Software Release 12.4(15) T8
REDCOM High Density Exchange (SMEO)		Release 3.0A Revision 3, with Specified Patch Group 0 (3.0A R3P0)
Raytheon Channel Encryption Unit (CEU)		Release Version (v) 2.01.08 with LogiTel Mesh Router (MR) 1060 Release Version (v) 1.01.0205
L3 Communications STE and STE-R		2.6 with KSV-21
L3 Communications Omni Secure Wireline Terminal		5.07
General Dynamics Sectéra® Wireline Terminal		12.05
General Dynamics IP vIPer (Model SVT1000SM)		1.0 Version 6.04
NET Promina 800 and 400		4.x.2.02 Version 92.45
NET VX900		4.3.5 Version 55
Veraz DTX 600		JITC022.1
SUT	General Dynamics PSTN vIPer (Part Numbers VIPS1000XA and VIPS1000XA)	2.14

LEGEND:

CS	Communication Server	PBX 1	Private Branch Exchange 1
EWSD	Elektronisches Wählsystem Digital	PSTN	Public Switched Telephone Network
IOS	Internetwork Operating System	SMEO	Small End Office
JITC	Joint Interoperability Test Command	STE	Secure Terminal Equipment
MFS	Multifunction Switch	STE-R	Secure Terminal Equipment-RED Switch
NET	Network Equipment Technologies	SUT	System Under Test

10. TESTING LIMITATIONS. Synchronous transmission is predominately used for secure faxes within the DSN. The SUT only supports asynchronous data transmission and there were no asynchronous fax machines available during this test.

11. TEST RESULTS

a. Discussion. The SUT met all of the critical interoperability requirements for a DSCD with an analog loop-start interface.

(1) The UCR, section 5.2.12.6.6, states that DSCD shall be only those that are Type Approved by the NSA and are listed on the NSA Secure Product Web site. Each DSCD must support at least one NSA approved secure protocol. If the DSCD supports more than one secure protocol, it must meet all the requirements for at least one of the secure protocols, and must minimally support the other protocols that are provided on the DSCD. The SUT received an NSA Type I accreditation on 22 April 2010, which meets this requirement.

(2) The UCR, section 5.2.12.8, states that DSCD devices that use a 2-wire analog interface shall meet the end instrument requirements as specified in the UCR, section 5.2.12.3. The SUT met the requirements in accordance with section 5.2.12.3 as described below:

- The UCR, section 5.2.12.3.5, states that all CPE devices that support MLPP shall do so in accordance with the requirements listed in UCR 2008, section 5.2.2, and shall not affect the DSN interface features, and functions associated with the line supervision and control. The SUT met all requirements without affecting any of the MLPP functionality of all switching systems the SUT was tested with.

- The UCR, section 5.2.12.3.5, states that the SUT that supports the "auto-answer" function shall have an "auto-answer" mode settable to a time more than the equivalency of 4 ROUTINE ring intervals. All calls with this mode enables shall be handled in accordance with the UCR, section 5.2.2.2.4.2. The SUT met all requirements.

- The UCR, section 5.2.12.3.5 states that devices required to support precedence calls above ROUTINE, shall respond properly to an incoming alerting (ringing) precedence call cadence as described in the UCR, section 5.2.4.5.1. The SUT met all requirements.

- The UCR, section 5.2.12.3.5 states that devices that can "out-dial" Dual Tone Multifrequency (DTMF) and/or Dial Pulse (DP) digits (automatic and/or manual) shall comply with the requirements as stated in the UCR, sections 5.2.4.4.1 and 5.2.4.4.2, respectively, for its address digit generating capabilities and shall be capable of outpulsing DTMF digits specified in Telcordia Technologies Generic Requirement (GR)-506-CORE. The SUT met all requirements for DTMF out-pulsing.

- The UCR, section 5.2.12.3.5.1 states that all 2-wire analog devices shall conform to the requirements of TIA/EIA-470-B. This was verified through the vendor's LoC.

(3) The UCR, section 5.2.12.6.6, states that a DSCD device that supports one of the required signaling modes shall interoperate with and establish secure session with other compatible devices with at least a 85 percent secure call completion rate. A total of 900 secure calls were placed with the SUT to other DSCD secure devices listed in Table 2-2 over the test configurations depicted in Figures 2-2 through 2-9 with a

secure call completion rate of 90 percent, which meets this requirement. All calls that were placed established a secure call, and then were manually placed non-secure, then placed in secure mode again without tearing down the call for a series of 10 calls in each direction.

(4) The UCR, section 5.2.12.6.6, states that the DSCD shall be capable of using the protocols provided to establish a secure session within 60 seconds and must maintain secure communications for the duration of the secure portion of the call. The SUT setup secure calls over the test configurations depicted in Figures 2-2 through 2-9. All calls established a secure connection within 42 seconds and maintained calls until sessions were ended, which meets this requirement.

(5) The UCR, section 5.2.12.6.6, states that the DSCD shall operate in a network that has an end-to-end latency of up to 600 milliseconds (ms). The SUT was able to establish secure calls over the test configurations depicted in Figures 2-2 through 2-9. The maximum end-to-end latency was 950 ms, which meets this requirement.

(6) The UCR, section 5.2.12.6.6, states that the DSCD shall achieve and maintain a secure voice connection with a minimum Mean Opinion Score (MOS) of 3.0. A SAGE 960B was used to measure MOS from the handset of the SUT. The SUT secure voice connection at 9.6 kilobits per second (kbps) Conjugate-Structure Algebraic-Code-Excited Linear-Prediction (CS-A CELP) measured a MOS from 3.9 to 4.07 for an average of 3.95, which meets this requirement.

(7) The UCR, section 5.3.3.15, states that the voice service quality rating shall be at least 4.0. A SAGE 960B was used to measure MOS from the handset of the SUT. The SUT non-secure voice connection measured a MOS between 4.2 and 4.51 with an average of 4.4, which meets this requirement.

(8) The UCR, section 5.2.12.6.6, states that once connected to the rekey center, the DSCD shall obtain a new key and properly process that new key with a 95 percent rekey completion rate. The SUT rekey completion rate over test configurations depicted in Figures 2-2 through 2-9 was 100 percent for a total of 12 rekey calls attempted, which meets this requirement.

(9) The UCR, section 5.2.12.6.6, states that DSCD devices shall support a minimum data rate and facsimile (fax) transmission rate of 9.6 kbps. A total of 200 secure data calls were placed over the test diagrams depicted in Figure 2-9 with the SUT via the SUT's analog interface. All calls were successful with a data rate of 9.6 kbps, which meets this requirement. Synchronous transmission is predominately used for secure faxes within the DSN. The SUT only supports asynchronous data transmission and there were no asynchronous fax machines available during this test. Due to the fact that the SUT successfully transmitted secure data, JITC determined there is a minor risk in certifying the SUT for secure fax transmission. In addition, 200 encryption key data transfers using Data Transfer Devices were placed with the SUT at

a data rate of 9.6 kbps. All data transfers were successful with a data rate of 9.6 kbps, which meets this requirement.

b. Test Summary. The SUT met all of the critical interoperability requirements for a DSCD and is certified for joint use within the DSN with any switch on the UC APL that offers a certified analog loop-start interface.

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