



DEFENSE INFORMATION SYSTEMS AGENCY

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

14 April 2006

MEMORANDUM FOR DISTRIBUTION

SUBJECT: Special Interoperability Test Certification of Tadiran Coral Flexicom™ 200, 400, and 5000 and Tadiran Coral Internet Protocol Exchange (IPx) 800 and 3000 with Software Release 14.67.48

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 Tadiran Coral Flexicom™ 5000 with Software Release 14.67.48 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) for the following switch types: Private Branch Exchange (PBX) 1 and PBX 2. The Tadiran Coral Flexicom™ product family, which includes the Coral Flexicom™ 200, and Flexicom™ 400, and the Coral IPx product family, which includes the IPx 800 and IPx 3000, employ the exact same processor, software, and trunk/line card hardware as the SUT. The only difference between the product families is the Flexicom™ switches are housed in either a wall mount or free-standing housing and the Coral IPx switches are rack mounted. JITC analysis determined the Coral Flexicom™ 200, Flexicom™ 400, Coral IPx 800, and Coral IPx 3000 to be functionally identical to the SUT for interoperability certification purposes, and they are also certified for joint use within the DSN. The SUT and respective product family switches includes Voice over Internet Protocol (VoIP); however, VoIP was not tested and is not covered under this certification. This certification expires upon changes that could affect interoperability, but no later than three years from the date of this memorandum.

3. This finding is based on interoperability testing conducted by JITC, review of vendor's Letters of Compliance (LoC), and review of the other switches. Testing was conducted at JITC's Global Information Grid Network Test Facility at Fort Huachuca, Arizona, from 11 July through 18 November 2005. Review of test data and vendor's LoC was completed on 29 February 2006. At the vendor's request, JITC reviewed the other switches to verify they employ the same hardware, software, and processor. The review was completed on 16 March 2006. 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 interoperability test summary of the SUT is indicated in table 1. The PBX 1 required and conditional Capability Requirements (CRs) and Feature Requirements (FRs) are listed in table 2. This interoperability test status is based on the PBX 1's ability to meet:

- a. DSN services for Network and Applications specified in reference (c).
- b. PBX 1 interface and signaling requirements for trunks/lines specified in reference (d) verified through JITC testing and/or vendor submission of LoC.
- c. PBX 1 CRs/FRs 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. SUT Interoperability Test Summary

DSN Line Interfaces			
Interface & Signaling	Critical	Status	Remarks
2-Wire Analog (GR-506-CORE)	Yes	Certified	Met all CRs and FRs with one minor exception. The SUT supports only 250 different classmarks vice the requirement of a minimum of 256. The operational impact is minor
ISDN BRI NI 1/2	No	Not Certified	This interface is supported by the SUT however it does not support MLPP. There is no operational impact because it is not a critical requirement for a PBX 1.
2-Wire Proprietary Digital	No	Certified	Met all CRs and FRs with one minor exception. The SUT supports only 250 different classmarks vice the requirement of a minimum of 256. The operational impact is minor
VoIP	No	Not Tested	The SUT offers VoIP; however, this capability was not tested and is not covered under this certification.
DSN Trunk Interfaces			
Interface & Signaling	Critical	Status	Remarks
T1 CAS (DTMF, MFR1, DP)	No	Not Tested	This interface is not supported. There is no operational impact because it is not a critical requirement for a PBX 1.
E1 CAS (DTMF, MFR1, DP)	No (Europe only)	Not Tested	This interface is not supported. There is no operational impact because it is not a critical requirement for a PBX 1.
T1 ISDN PRI NI 1/2 (ANSI T1.619a)	Yes	Certified	Met all CRs and FRs with one minor exception. The SUT supports only 250 different classmarks vice the requirement of a minimum of 256. The operational impact is minor.
DSN Features and Capabilities			
Features and Capabilities	Critical	Status	Remarks
Common Features	No	Certified	Met the following CRs and FRs: Code restriction and diversion, Call waiting, Three-way calling, Call hold, Call forwarding, and Call pick-up.
Attendant	No	Not Tested	This feature is not supported. There is no operational impact because it is not a critical requirement for a PBX 1.
Public Safety	No	Not Tested	This feature is not supported. There is no operational impact because it is not a critical requirement for a PBX 1.
Preset Conferencing	No	Not Tested	This feature is not supported. There is no operational impact because it is not a critical requirement for a PBX 1.

Table 1. SUT Interoperability Test Summary, continued

DSN Features and Capabilities				
Features and Capabilities	Critical	Status	Remarks	
Nailed-up Connections	No	Not Tested	This feature is not supported. There is no operational impact because it is not a critical requirement for a PBX 1.	
PAT	No	Not Tested	This feature is not supported. There is no operational impact because it is not a critical requirement for a PBX 1.	
DSN Hotline Services	No	Not Tested	This feature is not supported. There is no operational impact because it is not a critical requirement for a PBX 1.	
Network Management	No	Not Tested	This feature is not supported. There is no operational impact because it is not a critical requirement for a PBX 1.	
ISDN Services (EKTS)	No	Not Tested	This feature is not supported. There is no operational impact because it is not a critical requirement for a PBX 1.	
Synchronization	Yes	Certified	Met all CRs and FRs.	
Reliability	Yes	Certified	Met all CRs and FRs.	
Security	Yes	See note 1.	See note 1.	
VoIP System	No	Not Tested	The SUT offers VoIP; however, this capability was not tested and is not covered under this certification.	
VoIP				
Features and Capabilities	Critical	Status	Remarks	
VoIP	No	Not Tested	The SUT offers VoIP; however, this capability was not tested and is not covered under this certification.	
Network Gateways				
Gateway	Interface & Signaling	Critical	Status	Remarks
PSTN ²	T1 CAS (DTMF, DP)	No	Certified	Met all CRs and FRs.
	E1 CAS (DTMF, MFR1, DP)	No (Europe only)	Not Certified	This interface is not supported. There is no operational impact because it is not a requirement for a PBX 1.
	T1 ISDN PRI NI 1/2 (ANSI T1.607)	No	Certified	Met all CRs and FRs.
	TPC 2-Wire Analog, Loop Start (GR-506-CORE)	Yes	Certified	Met all CRs and FRs.
	TPC 2-Wire Analog, Ground Start (GR-506-CORE)	Yes	Certified	Met all CRs and FRs.
DRSN ³	TPC 2-Wire Analog (GR-506-CORE)	Yes	Certified	Met all CRs and FRs.
LEGEND:				
ANSI	- American National Standards Institute	MFR1	- Multifrequency Recommendation 1	
BRI	- Basic Rate Interface	MLPP	- Multi-Level Precedence and Preemption	
CAS	- Channel Associated Signaling	NI 1/2	- National ISDN Standard 1 or 2	
CRs	- Capability Requirements	PAT	- Precedence Access Threshold	
DISA	- Defense Information Systems Agency	PBX 1	- Private Branch Exchange 1	
DP	- Dial Pulse	PM	- Program Manager	
DRSN	- Defense Red Switch Network	PRI	- Primary Rate Interface	
DSN	- Defense Switched Network	PSTN	- Public Switched Telephone Network	
DSS1	- Digital Subscriber Signaling 1	SS7	- Signaling System 7	
DTMF	- Dual Tone Multi-Frequency	SUT	- System Under Test	
E1	- European Basic Multiplex Rate (2.048 Mbps)	T1	- Digital Transmission Link Level 1 (1.544 Mbps)	
EKTS	- Electronic Key Telephone System	T1.607	- ISDN Layer 3 Signaling Specification for Circuit Switched Bearer Service for DSS1	
FRs	- Feature Requirements	T1.619a	- SS7 and ISDN MLPP Signaling Standard for T1	
GR-506-CORE	- Telcordia Signaling for Analog Interface Generic Requirement	TPC	- Twisted Pair Copper	
ISDN	- Integrated Services Digital Network	VoIP	- Voice over Internet Protocol	
Mbps	- Megabits per second	VTC	- Video Teleconferencing	
NOTES:				
1 Information assurance testing is accomplished via DISA-led Information Assurance test teams and published in a separate report.				
2 Voice, facsimile, data, and VTC service requirements for PSTN are identical to DSN with the exception of MLPP.				
3 Interoperability certification of the SUT does not constitute DRSN PM approval for connectivity to the DRSN. It is the user's responsibility to request connectivity approval directly from the PM.				

Table 2. PBX 1 Requirements

DSN Line Interfaces				
Interface	Critical	Requirements Required or Conditional		References
2-Wire Analog	Yes	Access	<ul style="list-style-type: none"> • DN Identification (R) • Line signaling (R) • Alerting Signals and Tones (R) • WWNDP (R) • Call Treatments (R) • 2W user access (R: 2-Wire Analog only) • Analog busy/idle (R: 2-Wire Analog only) 	<ul style="list-style-type: none"> • GSCR Sect. 2.1.1 • GSCR Sect. 5.2 • GSCR Sect. 5.5 • GSCR Sect. 4.5 • GSCR Sect. 4.1 • GSCR Sect. 4.3.3 • GSCR Sect. 4.3.4.1
ISDN BRI NI 1/2 (ANSI T1.619a)	No	Voice	<ul style="list-style-type: none"> • MOS (R) • Announcements (R) • MLPP (R) • Secure Calls (R) 	<ul style="list-style-type: none"> • CJCSI 6215.01B • GSCR Sect. 3.1.3 • GSCR Sect. 3.4.3/3.9 • CJCSI 6215.01B
		Facsimile	<ul style="list-style-type: none"> • Analog: TIA/EIA-465-A (R) 	<ul style="list-style-type: none"> • DISR
2-Wire Proprietary Digital	No	Data	<ul style="list-style-type: none"> • Modem (VBD) (R) • 56 kbps switched data (R: BRI only) • 64 kbps switched data (R: BRI only) • NX56 synchronous BER (R: BRI only) • NX64 synchronous BER (R: BRI only) • Secure data (STE/STU-III) (R) 	<ul style="list-style-type: none"> • CJCSI 6215.01B • GSCR Sect. 3.10 • GSCR Sect. 3.10 • GSCR Sect. 3.10 • GSCR Sect. 3.10 • CJCSI 6215.01B
		VTC	<ul style="list-style-type: none"> • ITU-T H.320 (R: BRI only) 	<ul style="list-style-type: none"> • DISR
DSN Trunk Interfaces				
Interface	Critical	Requirements Required or Conditional		References
T1 CAS (MFRI, DTMF, DP)	No	Trunking	<ul style="list-style-type: none"> • Framing (R) • Line Code (R) • Signaling (R) • Alarms (R) • WWNDP (R) • Outpulsing digit formats (C: CAS only) • Routing (C) 	<ul style="list-style-type: none"> • GSCR Sect. 7 • GSCR Sect. 7 • GSCR Sect. 5 • GSCR Sect. 2.5.7, 7.1.4 & 7.2.2 • GSCR Sect. 4.5.1 • GSCR Sect. 4.5.2 • GSCR Sect. 4.2
E1 CAS (MFRI, DTMF, DP)	No (Europe only)		<ul style="list-style-type: none"> • Trunk Groups (C) • Call Processing (C) • CAS to CCS trunk interworking (C) • PCM-24/PCM-30 Interoperation (C) • Direct Inward Dialing (C) 	<ul style="list-style-type: none"> • GSCR Sect. 2.5.5 & 2.5.6 • GSCR Sect. 4 • GSCR Sect. 3.10 • GSCR Sect. 7.3 • GSCR Sect.2.3.2
T1 ISDN PRI NI 1/2 (ANSI T1.619a)	Yes	Voice	<ul style="list-style-type: none"> • MOS (R) • MLPP (R) • Secure calls (R) 	<ul style="list-style-type: none"> • CJCSI 6215.01B • GSCR Sect. 3 • CJCSI 6215.01B
		Facsimile	<ul style="list-style-type: none"> • Analog: TIA/EIA-465-A (R) 	<ul style="list-style-type: none"> • DISR
E1 ISDN PRI (ITU-T Q.955.3)	No (Europe only)	Data	<ul style="list-style-type: none"> • 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) 	<ul style="list-style-type: none"> • CJCSI 6215.01B • GSCR Sect. 3.10 • GSCR Sect. 3.10 • GSCR Sect. 3.10 • GSCR Sect. 3.10 • CJCSI 6215.01B
		VTC	<ul style="list-style-type: none"> • ITU-T H.320 (R: PRI only) 	<ul style="list-style-type: none"> • DISR

Table 2. PBX 1 Requirements (continued)

DSN Features & Capabilities			
Feature/ Capability	Critical	Requirements Required or Conditional	References
Common Features	No	<ul style="list-style-type: none"> • Selective call rejection (C) • Denied originating service (C) • Code restriction and diversion (C) • Call waiting (C) • Three-way calling (C) • Add-on transfer and conference calling and call hold (C) • Call forwarding (C) • Call pick-up (C) 	<ul style="list-style-type: none"> • GSCR Sect. 2.1.2 • GSCR Sect. 2.1.3 • GSCR Sect. 2.1.4 • GSCR Sect. 2.1.5 • GSCR Sect. 2.1.6 • GSCR Sect. 2.1.7 • GSCR Sect. 2.1.8 • GSCR Sect. 2.1.9
Attendant	No	<ul style="list-style-type: none"> • Initiate all precedence levels (C) • Visual display (C) • Override class of service (C) • Override busy line (C) • Call deflection (C) • Auto recall (C) • Waiting queue (C) 	<ul style="list-style-type: none"> • GSCR Sect. 2.2.1 • GSCR Sect. 2.2.2 • GSCR Sect. 2.2.3 • GSCR Sect. 2.2.4 • GSCR Sect. 2.2.5 • GSCR Sect. 2.2.6 • GSCR Sect. 2.2.7
Public Safety	No	<ul style="list-style-type: none"> • E911 (C) • Trace of terminating calls (C) • Outgoing call trace (C) • Tandem call trace (C) • Trace of a call in progress (C) 	<ul style="list-style-type: none"> • GSCR Sect. 2.4.1 • GSCR Sect. 2.4.2 • GSCR Sect. 2.4.3 • GSCR Sect. 2.4.4 • GSCR Sect. 2.4.5
Preset Conferencing	No	<ul style="list-style-type: none"> • Support 10 bridges; 1 originator and 20 conferees per bridge (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) 	<ul style="list-style-type: none"> • GSCR Sect. 2.6 • GSCR Sect. 2.6 • GSCR Sect. 2.6.1 • GSCR Sect. 2.6.2 • GSCR Sect. 2.6.3 • GSCR Sect. 2.6.4 • GSCR Sect. 2.6.5 • GSCR Sect. 2.7
Nailed-up Connections	No	<ul style="list-style-type: none"> • Between any two like terminations (C) • PCM-24 and PCM-30, both CAS and CCS (C) • Supervision passed end-to-end for A/D or D/A (C) • Monitored and auto reconfigure (C) • Support at least 10% of circuits as nailed-up (C) • Non-preemptable (C) 	<ul style="list-style-type: none"> • GSCR Sect. 2.8
PAT	No	<ul style="list-style-type: none"> • Classmark for/not for PAT screening (C) • 7 PAT mechanisms (C) • Outgoing call screening (C) • Functional structure (C) • Simultaneous calls limitation (C) • Overflow process (C) • Decrementing call-in-progress count (C) • Call treatment (C) • Queuing (C) • Attendant calls (C) • Operations measurement registers (C) • Maintenance and Administration of thresholds (C) 	<ul style="list-style-type: none"> • GSCR Sect. 2.11.1 • GSCR Sect. 2.11.1 • GSCR Sect. 2.11.1.1 • GSCR Sect. 2.11.1.2 • GSCR Sect. 2.11.1.3 • GSCR Sect. 2.11.1.4 • GSCR Sect. 2.11.1.5 • GSCR Sect. 2.11.1.6 • GSCR Sect. 2.11.1.7 • GSCR Sect. 2.11.1.8 • GSCR Sect. 2.11.1.9 • GSCR Sect. 2.11.1.10
DSN Hotline Services	No	<ul style="list-style-type: none"> • Hotline restrictions (C) • Auto initiate (C) • Analog and digital (C) • Subscription basis (C) • Protected hotline calling (C) • WWNDP interoperable (C) 	<ul style="list-style-type: none"> • GSCR Sect. 2.12 • GSCR Sect. 2.12 • GSCR Sect. 2.12 • GSCR Sect. 2.12 • GSCR Sect. 2.12.1-4 • GSCR Sect. 2.12.5

Table 2. PBX 1 Requirements (continued)

DSN Features & Capabilities (continued)			
Feature/ Capability	Critical	Requirements Required or Conditional	References
Network Management	No	<ul style="list-style-type: none"> • Interfaces (C) • Measurements and data generation (C) • Fault management (C) • Configuration management (C) • Accounting management (C) • Performance management (C) • NM controls (C) • Remote access (C) 	<ul style="list-style-type: none"> • GSCR Sect. 9.1 • GSCR Sect. 9.2 • GSCR Sect. 9.3 • GSCR Sect. 9.4 • GSCR Sect. 9.5 • GSCR Sect. 9.6 • GSCR Sect. 9.7 • GSCR Sect. 9.8
ISDN Services	No	<ul style="list-style-type: none"> • EKTS (C) 	<ul style="list-style-type: none"> • GSCR Sect. 10, table 10-3
Synchronization	Yes	<ul style="list-style-type: none"> • Line timing mode (R) • Internal Stratum 4 (R) 	<ul style="list-style-type: none"> • GSCR Sect. 11.1.1.2 • GSCR Sect. 11.1.2.2
Reliability	Yes	<ul style="list-style-type: none"> • GR-512-CORE (R) 	<ul style="list-style-type: none"> • GSCR Sect. 12
Security ¹	Yes	<ul style="list-style-type: none"> • DITSCAP (R) 	<ul style="list-style-type: none"> • GSCR Sect. 13
VoIP			
Feature/ Capability	Critical	Requirements Required or Conditional	References
VoIP System	No	<p>VoIP function is conditional. If VoIP is provided, all of the following requirements must be met:</p> <ul style="list-style-type: none"> • MOS 4.0 or better • ITU-T G.711 PCM Codec • Security in accordance with DITSCAP • NM • Line timing • Internal Clock • Latency ≤ 60 ms • IPv6 capable 	<ul style="list-style-type: none"> • GSCR App. 3

Table 2. PBX 1 Requirements (continued)

Network Gateways																																																																												
Gateway	Critical	Requirements Required or Conditional		References																																																																								
PSTN ²	No	Trunking	<ul style="list-style-type: none"> Positive Identification Control (C) On-Netting (C) Off-Netting (C) 	<ul style="list-style-type: none"> CJCSI 6215.01B CJCSI 6215.01B CJCSI 6215.01B 																																																																								
DRSN ³	Yes	Access	<ul style="list-style-type: none"> Alerting Signals and Tones (R) Call Processing (R) Call Treatments (R) Analog busy/idle (R) 	<ul style="list-style-type: none"> GSCR Sect. 5.5 GSCR Sect. 4.4 GSCR Sect. 4.1 GSCR Sect. 4.3.4.1 CJCSI 6215.01B GSCR Sect. 3 CJCSI 6215.01B 																																																																								
		Voice	<ul style="list-style-type: none"> MOS (C) MLPP (C) Secure calls (C) 																																																																									
EMSS	No	CJCS approved requirements not defined.																																																																										
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<table border="0"> <tr> <td>2W - 2-Wire</td> <td>EKTS - Electronic Key Telephone System</td> <td>PAT - Precedence Access Threshold</td> </tr> <tr> <td>A/D - Analog to Digital Conversion</td> <td>EMSS - Enhanced Mobile Satellite System</td> <td>PBX 1 - Private Branch Exchange 1</td> </tr> <tr> <td>ANSI - American National Standards Institute</td> <td>G.711 - Standard for PCM of Voice Frequencies</td> <td>PCM - Pulse Code Modulation</td> </tr> <tr> <td>App. - Appendix</td> <td>GR - Generic Requirements</td> <td>PCM-24 - Pulse Code Modulation - 24 Channels</td> </tr> <tr> <td>BER - Bit Error Ratio</td> <td>GSCR - Generic Switching Center Requirements</td> <td>PCM-30 - Pulse Code Modulation - 30 Channels</td> </tr> <tr> <td>BRI - Basic Rate Interface</td> <td>H.320 - Standard for Narrowband VTC</td> <td>PM - Program Manager</td> </tr> <tr> <td>C - Conditional</td> <td>IPv6 - Internet Protocol version 6</td> <td>PRI - Primary Rate Interface</td> </tr> <tr> <td>CAS - Channel Associated Signaling</td> <td>ISDN - Integrated Services Digital Network</td> <td>PSTN - Public Switched Telephone Network</td> </tr> <tr> <td>CCS - Common Channel Signaling</td> <td>IT - Information Technology</td> <td>Q.955.3 - ISDN Signaling Standard for E1 MLPP</td> </tr> <tr> <td>CJCS - Chairman of the Joint Chiefs of Staff</td> <td>ITU-T - International Telecommunication Union</td> <td>R - Required</td> </tr> <tr> <td>CJCSI - CJCS Instruction</td> <td>Telecommunication Standardization Sector</td> <td>Sect. - Section</td> </tr> <tr> <td>D/A - Digital to Analog Conversion</td> <td>kbps - kilobits per second</td> <td>SS7 - Signaling System 7</td> </tr> <tr> <td>DISA - Defense Information Systems Agency</td> <td>KXX - K= any number 2-8; X= any number 1-9</td> <td>STE - Secure Terminal Equipment</td> </tr> <tr> <td>DIRS - DoD IT Standards Registry</td> <td>Mbps - Megabits per second</td> <td>STU-III - Secure Telephone Unit-3rd generation</td> </tr> <tr> <td>DIITSCAP - DoD IT Security and Accreditation Process</td> <td>MFR1 - Multi-Frequency Recommendation 1</td> <td>SUT - System Under Test</td> </tr> <tr> <td>DN - Directory Number</td> <td>MLPP - Multi-Level Precedence and Preemption</td> <td>T1 - Digital Transmission Link Level 1 (1.544 Mbps)</td> </tr> <tr> <td>DoD - Department of Defense</td> <td>MOS - Mean Opinion Score</td> <td>T1.619a - SS7 and ISDN MLPP Signaling Standard for T1</td> </tr> <tr> <td>DP - Dial Pulse</td> <td>ms - milliseconds</td> <td>TIA - Telecommunications Industry Association</td> </tr> <tr> <td>DSN - Defense Switched Network</td> <td>NATO - North Atlantic Treaty Organization</td> <td>TIA/EIA-465A - Group 3 Facsimile Apparatus for Document</td> </tr> <tr> <td>DRSN - Defense Red Switch Network</td> <td>NGCS - NATO Gateway Communication Switch</td> <td>Transmission</td> </tr> <tr> <td>DTMF - Dual Tone Multi-Frequency</td> <td>NI 1/2 - National ISDN Standard 1 or 2</td> <td>VBD - Variable bit data</td> </tr> <tr> <td>E911 - Enhanced 911 Service</td> <td>NM - Network Management</td> <td>VoIP - Voice over Internet Protocol</td> </tr> <tr> <td>E1 - European Basic Multiplex Rate (2.048 Mbps)</td> <td>NX56 - Data format restricted to multiples of 56 kbps</td> <td>VTC - Video Teleconferencing</td> </tr> <tr> <td></td> <td>NX64 - Data format restricted to multiples of 64 kbps</td> <td>WWNDP - Worldwide Numbering and Dialing Plan</td> </tr> </table>					2W - 2-Wire	EKTS - Electronic Key Telephone System	PAT - Precedence Access Threshold	A/D - Analog to Digital Conversion	EMSS - Enhanced Mobile Satellite System	PBX 1 - Private Branch Exchange 1	ANSI - American National Standards Institute	G.711 - Standard for PCM of Voice Frequencies	PCM - Pulse Code Modulation	App. - Appendix	GR - Generic Requirements	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 - Standard for Narrowband VTC	PM - Program Manager	C - Conditional	IPv6 - Internet Protocol version 6	PRI - Primary Rate Interface	CAS - Channel Associated Signaling	ISDN - Integrated Services Digital Network	PSTN - Public Switched Telephone Network	CCS - Common Channel Signaling	IT - Information Technology	Q.955.3 - ISDN Signaling Standard for E1 MLPP	CJCS - Chairman of the Joint Chiefs of Staff	ITU-T - International Telecommunication Union	R - Required	CJCSI - CJCS Instruction	Telecommunication Standardization Sector	Sect. - Section	D/A - Digital to Analog Conversion	kbps - kilobits per second	SS7 - Signaling System 7	DISA - Defense Information Systems Agency	KXX - K= any number 2-8; X= any number 1-9	STE - Secure Terminal Equipment	DIRS - DoD IT Standards Registry	Mbps - Megabits per second	STU-III - Secure Telephone Unit-3 rd generation	DIITSCAP - DoD IT Security and Accreditation Process	MFR1 - Multi-Frequency Recommendation 1	SUT - System Under Test	DN - Directory Number	MLPP - Multi-Level Precedence and Preemption	T1 - Digital Transmission Link Level 1 (1.544 Mbps)	DoD - Department of Defense	MOS - Mean Opinion Score	T1.619a - SS7 and ISDN MLPP Signaling Standard for T1	DP - Dial Pulse	ms - milliseconds	TIA - Telecommunications Industry Association	DSN - Defense Switched Network	NATO - North Atlantic Treaty Organization	TIA/EIA-465A - Group 3 Facsimile Apparatus for Document	DRSN - Defense Red Switch Network	NGCS - NATO Gateway Communication Switch	Transmission	DTMF - Dual Tone Multi-Frequency	NI 1/2 - National ISDN Standard 1 or 2	VBD - Variable bit data	E911 - Enhanced 911 Service	NM - Network Management	VoIP - Voice over Internet Protocol	E1 - European Basic Multiplex Rate (2.048 Mbps)	NX56 - Data format restricted to multiples of 56 kbps	VTC - Video Teleconferencing		NX64 - Data format restricted to multiples of 64 kbps	WWNDP - Worldwide Numbering and Dialing Plan
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BRI - Basic Rate Interface	H.320 - Standard for Narrowband VTC	PM - Program Manager																																																																										
C - Conditional	IPv6 - Internet Protocol version 6	PRI - Primary Rate Interface																																																																										
CAS - Channel Associated Signaling	ISDN - Integrated Services Digital Network	PSTN - Public Switched Telephone Network																																																																										
CCS - Common Channel Signaling	IT - Information Technology	Q.955.3 - ISDN Signaling Standard for E1 MLPP																																																																										
CJCS - Chairman of the Joint Chiefs of Staff	ITU-T - International Telecommunication Union	R - Required																																																																										
CJCSI - CJCS Instruction	Telecommunication Standardization Sector	Sect. - Section																																																																										
D/A - Digital to Analog Conversion	kbps - kilobits per second	SS7 - Signaling System 7																																																																										
DISA - Defense Information Systems Agency	KXX - K= any number 2-8; X= any number 1-9	STE - Secure Terminal Equipment																																																																										
DIRS - DoD IT Standards Registry	Mbps - Megabits per second	STU-III - Secure Telephone Unit-3 rd generation																																																																										
DIITSCAP - DoD IT Security and Accreditation Process	MFR1 - Multi-Frequency Recommendation 1	SUT - System Under Test																																																																										
DN - Directory Number	MLPP - Multi-Level Precedence and Preemption	T1 - Digital Transmission Link Level 1 (1.544 Mbps)																																																																										
DoD - Department of Defense	MOS - Mean Opinion Score	T1.619a - SS7 and ISDN MLPP Signaling Standard for T1																																																																										
DP - Dial Pulse	ms - milliseconds	TIA - Telecommunications Industry Association																																																																										
DSN - Defense Switched Network	NATO - North Atlantic Treaty Organization	TIA/EIA-465A - Group 3 Facsimile Apparatus for Document																																																																										
DRSN - Defense Red Switch Network	NGCS - NATO Gateway Communication Switch	Transmission																																																																										
DTMF - Dual Tone Multi-Frequency	NI 1/2 - National ISDN Standard 1 or 2	VBD - Variable bit data																																																																										
E911 - Enhanced 911 Service	NM - Network Management	VoIP - Voice over Internet Protocol																																																																										
E1 - European Basic Multiplex Rate (2.048 Mbps)	NX56 - Data format restricted to multiples of 56 kbps	VTC - Video Teleconferencing																																																																										
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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 TSSI website at <http://jitc.fhu.disa.mil/tssi>.

JITC Memo, JTE, Special Interoperability Test Certification of Tadiran Coral Flexicom™ 200, 400, and 5000 and Tadiran Coral Internet Protocol Exchange (IPx) 800 and 3000 with Software Release 14.67.48

6. The JITC point of contact is Michael Napier, DSN 879-6787, commercial (520) 538-6787, FAX DSN 879-4347, or e-mail to michael.napier@disa.mil. The tracking number for the SUT is 43011.

FOR THE COMMANDER:



RICHARD A. MEADOR
Chief
Networks and Transport Division

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ADDITIONAL REFERENCES

- (c) Chairman of the Joint Chiefs of Staff Instruction (CJCSI) 6215.01B, "Policy for Department of Defense Voice Services," 23 September 2001
- (d) Defense Information Systems Agency (DISA), "Defense Switched Network (DSN) Generic Switching Center Requirements (GSCR), Incorporated Change 1," 1 March 2005
- (e) Joint Interoperability Test Command, "Defense Switched Network Generic Switch Test Plan (GSTP), Change 1, Revision 1," 01 June 2005

CERTIFICATION TESTING SUMMARY

1. SYSTEM TITLE. Tadiran Coral Flexicom™ 5000 with Software Release 14.67.48 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: Howard.Osman@disa.mil.

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

5. SYSTEM UNDER TEST DESCRIPTION. The SUT Flexicom™ product family, which includes the Coral Flexicom™ 200, and Flexicom™ 400, and the Coral Internet Protocol Exchange (IPx) product family, which includes the IPx 800 and IPx 3000, employ the exact same processor, software, and trunk/line card hardware as the SUT. The only difference between the product families is the Flexicom™ switches are housed in either a wall mount or freestanding housing and the Coral IPx switches are rack mounted. JITC analysis determined the Coral Flexicom™ 200, Flexicom™ 400, Coral IPx 800, and Coral IPx 3000 to be functionally identical to the SUT for interoperability certification purposes. The SUT and respective product family switches offer Voice over Internet Protocol (VoIP); however, VoIP was not tested and is not covered under this certification. The Coral FlexiCom™ and IPx systems provide scalability and flexibility serving offices needing as few as 20 ports to large enterprises needing 5,000 ports. The Coral FlexiCom™ and Coral IPx family of switches supports advanced applications such as automatic call distribution, call center capabilities, open system Computer Telephony Integration, multi-media messaging, and integrated voice mail, however none of these features were tested and are therefore not covered under this certification. The Coral FlexiCom™ and Coral IPx family of switches support a dual bus architecture, which removes any single point of failure by splitting communications into two paths. The features and comparison of the Coral FlexiCom™ and Coral IPx family of switches covered under this certification are listed below:

Coral FlexiCom™ 200 (supports up to 200 ports)

- 32-bit processor (Main Enhanced Processor)
- 1 to 3 cabinets – 50 x 41 x 20 centimeters (cm)
- Wall or rack mounted
- Optional internal battery support for power failure operation

Coral FlexiCom™ 400 (supports up to 384 ports)

- 32-bit processor (Main Enhanced Processor)
- 1 cabinet - 56 x 87 x 34 cm
- Wall-mounted

- 48 volts Direct Current (vDC) input (Optional battery support for power failure operation)

Coral FlexiCom™ 5000 (supports up to 5000 ports)

- 32-bit processor (Duplex Main Enhanced Processors)
- 1 to 5 cabinets
 - 3 shelves - 152 x 89 x 52 cm
 - 4 shelves - 187 x 89 x 52 cm
- 48 vDC input (Optional battery support for power failure operation)
- Optional duplicate common control

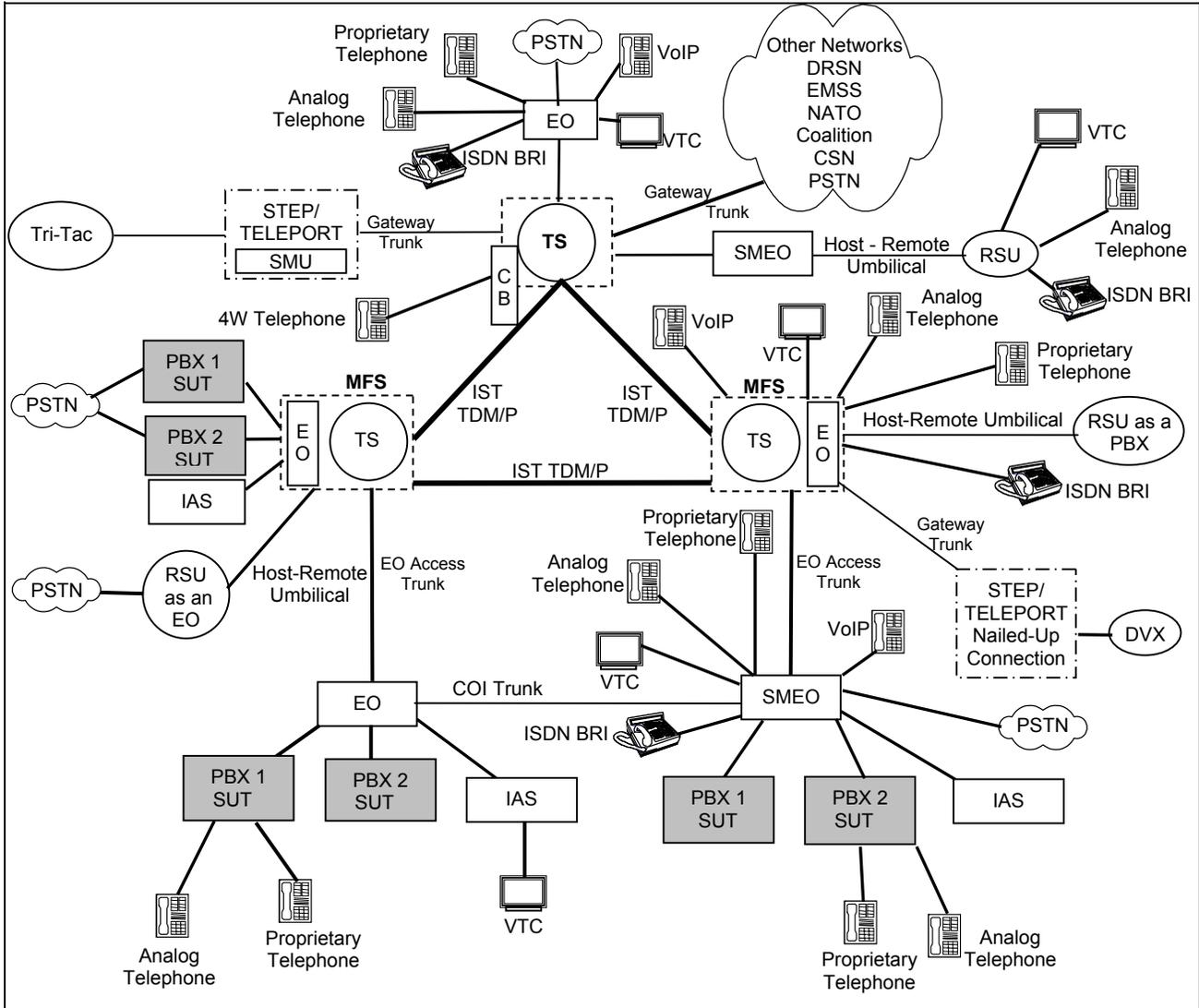
Coral IPx 800 (supports up to 800 ports)

- 32-bit processor (Main Enhanced Processor)
- Rack-mounted design
- Up to 30 universal card slots or 3 cages
- Operates from a standard 100-240 volts Alternating Current (vAC) 47-63Hertz (Hz) power source, or from a 48 vDC stationary battery

Coral IPx 3000 (supports up to 3000 ports)

- 32-bit processor (Duplex Main Enhanced Processor)
- Rack-mounted design
- Up to 178 universal card slots or 16 cages
- Operates from a standard 100-240vAC 47-63Hz power source, or from a 48 vDC stationary battery

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



LEGEND:

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

Figure 2-1. DSN Architecture

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

- a. DSN services for Network and Applications specified in Chairman of the Joint Chiefs of Staff Instruction (CJCSI) 6215.01B, “Policy for Department of Defense Voice Services.”
- b. GSCR interface and signaling requirements for trunks/lines verified through JITC testing and/or vendor submission of Letter(s) of Compliance (LoC).
- c. GSCR PBX 1 Capability Requirements (CRs) and Feature Requirements (FRs) verified through JITC testing and/or vendor submission of LoC.

Table 2-1. PBX 1 Requirements

DSN Line Interfaces				
Interface	Critical	Requirements Required or Conditional		References
2-Wire Analog	Yes	Access	<ul style="list-style-type: none"> • DN Identification (R) • Line signaling (R) • Alerting Signals and Tones (R) • WWNDP (R) • Call Treatments (R) • 2W user access (R: 2-Wire Analog only) • Analog busy/idle (R: 2-Wire Analog only) 	<ul style="list-style-type: none"> • GSCR Sect. 2.1.1 • GSCR Sect. 5.2 • GSCR Sect. 5.5 • GSCR Sect. 4.5 • GSCR Sect. 4.1 • GSCR Sect. 4.3.3 • GSCR Sect. 4.3.4.1
ISDN BRI NI 1/2 (ANSI T1.619a)	No	Voice	<ul style="list-style-type: none"> • MOS (R) • Announcements (R) • MLPP (R) • Secure Calls (R) 	<ul style="list-style-type: none"> • CJCSI 6215.01B • GSCR Sect. 3.1.3 • GSCR Sect. 3.4.3/3.9 • CJCSI 6215.01B
		Facsimile	<ul style="list-style-type: none"> • Analog: TIA/EIA-465-A (R) 	<ul style="list-style-type: none"> • DISR
2-Wire Proprietary Digital	No	Data	<ul style="list-style-type: none"> • Modem (VBD) (R) • 56 kbps switched data (R: BRI only) • 64 kbps switched data (R: BRI only) • NX56 synchronous BER (R: BRI only) • NX64 synchronous BER (R: BRI only) • Secure data (STE/STU-III) (R) 	<ul style="list-style-type: none"> • CJCSI 6215.01B • GSCR Sect. 3.10 • GSCR Sect. 3.10 • GSCR Sect. 3.10 • GSCR Sect. 3.10 • CJCSI 6215.01B
		VTC	<ul style="list-style-type: none"> • ITU-T H.320 (R: BRI only) 	<ul style="list-style-type: none"> • DISR

Table 2-1. PBX 1 Requirements (continued)

DSN Trunk Interfaces				
Interface	Critical	Requirements Required or Conditional		References
T1 CAS (MFR1, DTMF, DP)	No	Trunking	<ul style="list-style-type: none"> • Framing (R) • Line Code (R) • Signaling (R) • Alarms (R) • WWNDP (R) • Outpulsing digit formats (C: CAS only) • Routing (C) 	<ul style="list-style-type: none"> • GSCR Sect. 7 • GSCR Sect. 7 • GSCR Sect. 5 • GSCR Sect. 2.5.7, 7.1.4 & 7.2.2 • GSCR Sect. 4.5.1 • GSCR Sect. 4.5.2 • GSCR Sect. 4.2
E1 CAS (MFR1, DTMF, DP)	No (Europe only)		<ul style="list-style-type: none"> • Trunk Groups (C) • Call Processing (C) • CAS to CCS trunk interworking (C) • PCM-24/PCM-30 Interoperation (C) • Direct Inward Dialing (C) 	<ul style="list-style-type: none"> • GSCR Sect. 2.5.5 & 2.5.6 • GSCR Sect. 4 • GSCR Sect. 3.10 • GSCR Sect. 7.3 • GSCR Sect.2.3.2
T1 ISDN PRI NI 1/2 (ANSI T1.619a)	Yes	Voice	<ul style="list-style-type: none"> • MOS (R) • MLPP (R) • Secure calls (R) 	<ul style="list-style-type: none"> • CJCSI 6215.01B • GSCR Sect. 3 • CJCSI 6215.01B
	No (Europe only)	Facsimile	<ul style="list-style-type: none"> • Analog: TIA/EIA-465-A (R) 	<ul style="list-style-type: none"> • DISR
Data		<ul style="list-style-type: none"> • 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) 	<ul style="list-style-type: none"> • CJCSI 6215.01B • GSCR Sect. 3.10 • GSCR Sect. 3.10 • GSCR Sect. 3.10 • GSCR Sect. 3.10 • CJCSI 6215.01B 	
VTC		<ul style="list-style-type: none"> • ITU-T H.320 (R: PRI only) 	<ul style="list-style-type: none"> • DISR 	
DSN Features & Capabilities				
Feature/ Capability	Critical	Requirements Required or Conditional		References
Common Features	No	<ul style="list-style-type: none"> • Selective call rejection (C) • Denied originating service (C) • Code restriction and diversion (C) • Call waiting (C) • Three-way calling (C) • Add-on transfer and conference calling and call hold (C) • Call forwarding (C) • Call pick-up (C) 		<ul style="list-style-type: none"> • GSCR Sect. 2.1.2 • GSCR Sect. 2.1.3 • GSCR Sect. 2.1.4 • GSCR Sect. 2.1.5 • GSCR Sect. 2.1.6 • GSCR Sect. 2.1.7 • GSCR Sect. 2.1.8 • GSCR Sect. 2.1.9
Attendant	No	<ul style="list-style-type: none"> • Initiate all precedence levels (C) • Visual display (C) • Override class of service (C) • Override busy line (C) • Call deflection (C) • Auto recall (C) • Waiting queue (C) 		<ul style="list-style-type: none"> • GSCR Sect. 2.2.1 • GSCR Sect. 2.2.2 • GSCR Sect. 2.2.3 • GSCR Sect. 2.2.4 • GSCR Sect. 2.2.5 • GSCR Sect. 2.2.6 • GSCR Sect. 2.2.7
Public Safety	No	<ul style="list-style-type: none"> • E911 (C) • Trace of terminating calls (C) • Outgoing call trace (C) • Tandem call trace (C) • Trace of a call in progress (C) 		<ul style="list-style-type: none"> • GSCR Sect. 2.4.1 • GSCR Sect. 2.4.2 • GSCR Sect. 2.4.3 • GSCR Sect. 2.4.4 • GSCR Sect. 2.4.5
Preset Conferencing	No	<ul style="list-style-type: none"> • Support 10 bridges; 1 originator and 20 conferees per bridge (C) • Assign up to 20 address numbers per bridge (C) • Use KXX codes for bridge access (C) • Conference notification recorded announcement (C) • Auto retrieval and alternate address (C) • Bridge release (C) • Lost connection (C) • Secondary conferencing (C) • Address translation (C) 		<ul style="list-style-type: none"> • GSCR Sect. 2.6 • GSCR Sect. 2.6 • GSCR Sect. 2.6.1 • GSCR Sect. 2.6.2 • GSCR Sect. 2.6.3 • GSCR Sect. 2.6.4 • GSCR Sect. 2.6.5 • GSCR Sect. 2.7

Table 2-1. PBX 1 Requirements (continued)

DSN Features & Capabilities			
Feature/ Capability	Critical	Requirements Required or Conditional	References
Nailed-up Connections	No	<ul style="list-style-type: none"> • Between any two like terminations (C) • PCM-24 and PCM-30, both CAS and CCS (C) • Supervision passed end-to-end for A/D or D/A (C) • Monitored and auto reconfigure (C) • Support at least 10% of circuits as nailed-up (C) • Non-preemptable (C) 	<ul style="list-style-type: none"> • GSCR Sect. 2.8
PAT	No	<ul style="list-style-type: none"> • Classmark for/not for PAT screening (C) • 7 PAT mechanisms (C) • Outgoing call screening (C) • Functional structure (C) • Simultaneous calls limitation (C) • Overflow process (C) • Decrementing call-in-progress count (C) • Call treatment (C) • Queuing (C) • Attendant calls (C) • Operations measurement registers (C) • Maintenance and Administration of thresholds (C) 	<ul style="list-style-type: none"> • GSCR Sect. 2.11.1 • GSCR Sect. 2.11.1 • GSCR Sect. 2.11.1.1 • GSCR Sect. 2.11.1.2 • GSCR Sect. 2.11.1.3 • GSCR Sect. 2.11.1.4 • GSCR Sect. 2.11.1.5 • GSCR Sect. 2.11.1.6 • GSCR Sect. 2.11.1.7 • GSCR Sect. 2.11.1.8 • GSCR Sect. 2.11.1.9 • GSCR Sect. 2.11.1.10
DSN Hotline Services	No	<ul style="list-style-type: none"> • Hotline restrictions (C) • Auto initiate (C) • Analog and digital (C) • Subscription basis (C) • Protected hotline calling (C) • WWNDP interoperable (C) 	<ul style="list-style-type: none"> • GSCR Sect. 2.12 • GSCR Sect. 2.12 • GSCR Sect. 2.12 • GSCR Sect. 2.12 • GSCR Sect. 2.12.1-4 • GSCR Sect. 2.12.5
Network Management	No	<ul style="list-style-type: none"> • Interfaces (C) • Measurements and data generation (C) • Fault management (C) • Configuration management (C) • Accounting management (C) • Performance management (C) • NM controls (C) • Remote access (C) 	<ul style="list-style-type: none"> • GSCR Sect. 9.1 • GSCR Sect. 9.2 • GSCR Sect. 9.3 • GSCR Sect. 9.4 • GSCR Sect. 9.5 • GSCR Sect. 9.6 • GSCR Sect. 9.7 • GSCR Sect. 9.8
ISDN Services	No	<ul style="list-style-type: none"> • EKTS (C) 	<ul style="list-style-type: none"> • GSCR Sect. 10, table 10-3
Synchronization	Yes	<ul style="list-style-type: none"> • Line timing mode (R) • Internal Stratum 4 (R) 	<ul style="list-style-type: none"> • GSCR Sect. 11.1.1.2 • GSCR Sect. 11.1.2.2
Reliability	Yes	<ul style="list-style-type: none"> • GR-512-CORE (R) 	<ul style="list-style-type: none"> • GSCR Sect. 12
Security ¹	Yes	<ul style="list-style-type: none"> • DITSCAP (R) 	<ul style="list-style-type: none"> • GSCR Sect. 13
VoIP			
Feature/ Capability	Critical	Requirements Required or Conditional	References
VoIP System	No	<p>VoIP function is conditional. If VoIP is provided, all of the following requirements must be met:</p> <ul style="list-style-type: none"> • MOS of 4.0 or better • ITU-T G.711 PCM Codec • Security in accordance with DITSCAP • NM • Line timing • Internal Clock • Latency ≤ 60 ms • IPv6 capable 	<ul style="list-style-type: none"> • GSCR App. 3

Table 2-1. PBX 1 Requirements (continued)

Network Gateways				
Gateway	Critical	Requirements Required or Conditional		References
PSTN ¹	No	Trunking	<ul style="list-style-type: none"> Positive Identification Control (C) On-Netting (C) Off-Netting (C) 	<ul style="list-style-type: none"> CJCSI 6215.01B CJCSI 6215.01B CJCSI 6215.01B
DRSN ²	Yes	Access	<ul style="list-style-type: none"> Alerting Signals and Tones (R) Call Processing (R) Call Treatments (R) Analog busy/idle (R) 	<ul style="list-style-type: none"> GSCR Sect. 5.5 GSCR Sect. 4.4 GSCR Sect. 4.1 GSCR Sect. 4.3.4.1
		Voice	<ul style="list-style-type: none"> MOS (C) MLPP (C) Secure calls (C) 	<ul style="list-style-type: none"> CJCSI 6215.01B GSCR Sect. 3 CJCSI 6215.01B
EMSS	No	CJCS approved requirements not defined.		
NGCS	No	CJCS approved requirements not defined.		
LEGEND: 2W - 2-Wire A/D - Analog to Digital Conversion ANSI Institute - American National Standards Institute App. - Appendix BER - Bit Error Ratio BRI - Basic Rate Interface C - Conditional CAS - Channel Associated Signaling CCS - Common Channel Signaling CJCS - Chairman of the Joint Chiefs of Staff CJCSI - CJCS Instruction D/A - Digital to Analog Conversion DISA - Defense Information Systems Agency DISR - DoD IT Standards Registry DITSCAP - DoD IT Security and Accreditation Process DN - Directory Number DoD - Department of Defense DP - Dial Pulse DSN - Defense Switched Network DRSN - Defense Red Switch Network DTMF - Dual Tone Multi-Frequency E1 - European Basic Multiplex Rate (2.048 Mbps) E911 - Emergency 911 Service EKTS - Electronic Key Telephone System EMSS - Enhanced Mobile Satellite System G.711 - Standard for PCM of Voice Frequencies GSCR - Generic Switching Center Requirements H.320 - Standard for Narrowband VTC IPv6 - Internet Protocol version 6 ISDN - Integrated Services Digital Network IT - Information Technology ITU-T - International Telecommunication Union Telecommunication Standardization Sector kbps - kilobits per second KXX - K=any number 2-8; X= any number 1-9 Mbps - Megabits per second MFR1 - Multi-Frequency Recommendation 1 MLPP - Multi-Level Precedence and Preemption MOS - Mean Opinion Score ms - milliseconds NATO - North Atlantic Treaty Organization NGCS - NATO Gateway Communication Switch NI 1/2 - National ISDN Standard 1 or 2 NM - Network Management NX56 - Data format restricted to multiples of 56 kbps NX64 - Data format restricted to multiples of 64 kbps PAT - Precedence Access Threshold PBX 1 - Private Branch Exchange 1 PCM - Pulse Code Modulation PCM-24 - Pulse Code Modulation - 24 Channels PCM-30 - Pulse Code Modulation - 30 Channels PM - Program Manager PRI - Primary Rate Interface PSTN - Public Switched Telephone Network Q.955.3 - ISDN Signaling Standard for E1 R - Required Sect. - Section SS7 - Signaling System 7 STE - Secure Terminal Equipment STU-III - Secure Telephone Unit-3 rd generation SUT - System Under Test T1 - Digital Transmission Link Level 1 (1.544 Mbps) T1.619a - SS7 and ISDN MLPP Signaling Standard for T1 TIA/EIA-465A - Group 3 Facsimile Apparatus for Document Transmission VBD - Variable bit data VoIP - Voice over Internet Protocol VTC - Video Teleconferencing WWNDP - Worldwide Numbering and Dialing Plan				
NOTES: 1 Information Assurance testing is accomplished by DISA-led information Assurance test teams in accordance with the Information Assurance Test Plan and published in a separate report. 2 Voice, facsimile, data, and VTC service requirements for PSTN are identical to DSN with the exception of MLPP. 3 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.				

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 test configuration depicted in figure 2-2. The SUT was tested as the end-point in relation to the other switches.

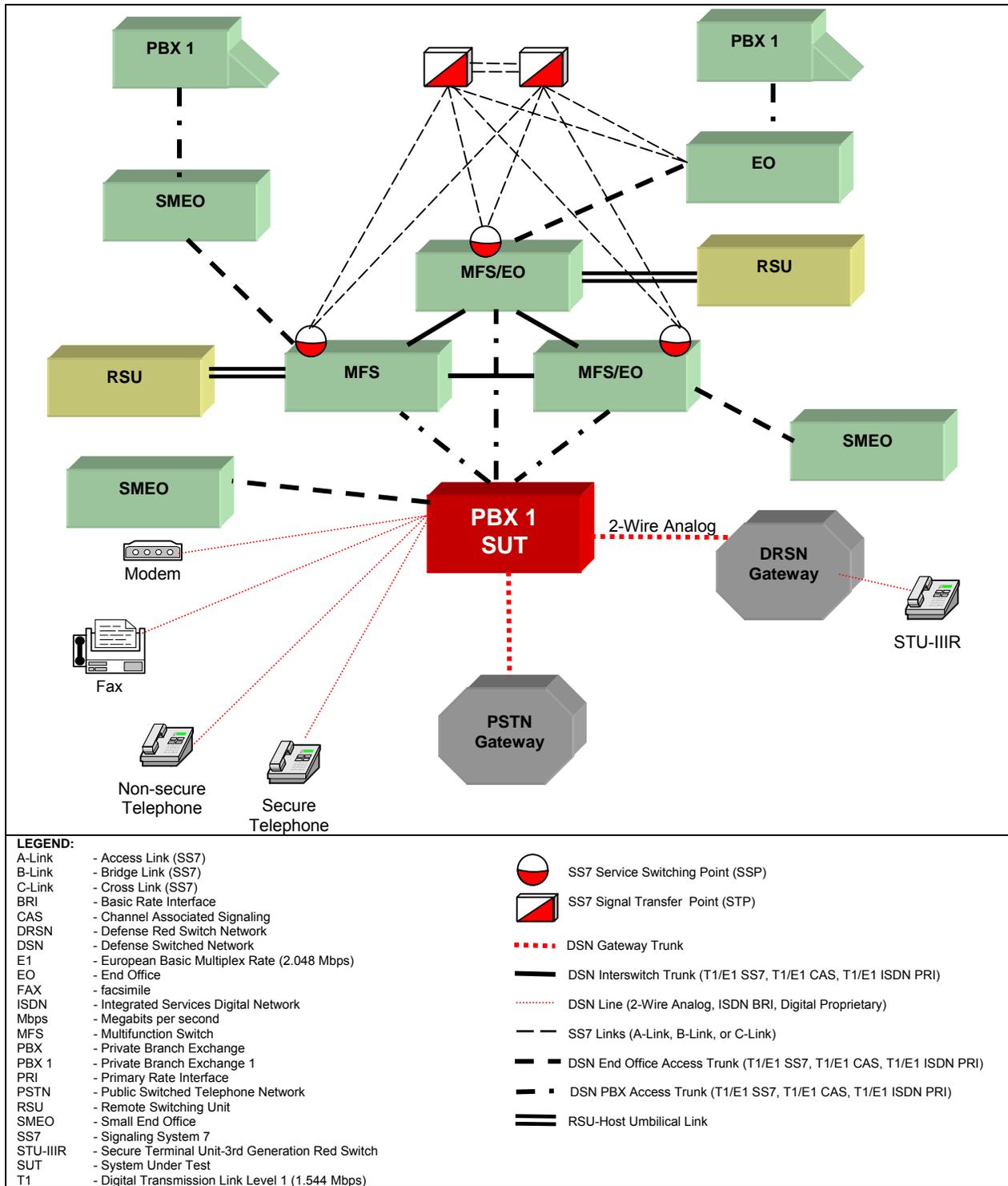


Figure 2-2. Test Configuration

9. SYSTEM CONFIGURATIONS. Table 2-2 provides the system configurations, hardware and software used in the test.

Table 2-2. Tested System Configurations

System Name		Software Release		
Nortel Networks MSL-100 (MFS, EO)		SE08		
Siemens EWSD (MFS, EO)		19d with Patch Set 46		
Lucent 5ESS (MFS, EO, SMEO, PBX 1, PBX 2)		5E16.2 SU 05-0005		
Avaya S8710 (SMEO, PBX 1, PBX 2)		Communication Manager (CM) 3.0 (R013x.00.0.340.3)		
SUT	Software Release	Card Name	Version	Subversion
	14.67.48	T1 CAS	14	38
		T1 CAS	50	21
		PRI23	52	34
		8T/S	14	35
		24SLS	1	24
		4VS	50	54
		8DRCM	2	14
		18DTR/S	17	8
	16SFT	2	0	
	SUT Telephones			
	Interface Type	Model(s)		Firmware Version
2-Wire Analog	Panasonic KX-TS15-W		NA	
2-Wire Digital Proprietary	FlexSets 120, 120D, 120S, 280D, and 280S		NA	
LEGEND:				
4VS	- 4 Port Announcer Card	Mbps	- Megabits per second	
8DRCM	- 8 Port Dial Tone Receiver Card	MFS	- Multifunction Switch	
8T/S	- Trunk Basic Rate	MSL	- Meridian Switching Load	
18DTR/S	- 8 Port DTMF Receiver Card	NA	- Not Applicable	
16SFT	- 16 Port Soft Telephone (Proprietary Digital Card)	PBX 1	- Private Branch Exchange 1	
24SLS	- 24 Port Single Line Station Analog	PBX 2	- Private Branch Exchange 2	
5ESS	- Class 5 Electronic Switching System	PRI23	- ISDN Primary Rate Interface Card	
CAS	- Channel Associated Signaling	SE	- Succession Enterprise	
DTMF	- Dual Tone Multi-Frequency	SMEO	- Small End Office	
EO	- End Office	SUT	- System Under Test	
EWSD	- Elektronisches Wählsystem Digital	SU	- Software Update	
ISDN	- Integrated Services Digital Network	T1	- Digital Transmission Link Level 1 (1.544 Mbps)	

10. TESTING LIMITATIONS. None.

11. TEST RESULTS

a. Discussion

(1) DSN Line Interfaces. The SUT met all critical CRs and FRs for the line interfaces as shown in table 2-3 with one minor exception. The SUT does not support the minimum 256 classmarks of trunk and line combinations as required by the GSCR, paragraph 4.1.6. The SUT is certified with the Panasonic KX-TS15-W analog instruments as well as the following digital proprietary instruments: FlexSet 120, FlexSet 120D, FlexSet 120S, FlexSet 280D, and FlexSet 280S.

(2) DSN Trunk Interfaces. The SUT met all critical CRs and FRs for the trunk interfaces as shown in table 2-3 with one minor exception. The SUT does not support the minimum 256 classmarks of trunk and line combinations as required by the GSCR,

paragraph 4.1.6. The SUT supports only 250 classmarks. This deficiency will have no operational impact. The only trunk interface certified for DSN is Digital Transmission Link Level 1 (T1) Integrated Services Digital Network (ISDN) Primary Rate Interface (PRI) National ISDN Standard 1 or 2. Detailed trunk configurations and associated lessons learned can be found on the Telecom Switched Services Interoperability (TSSI) web page: <http://jitc.fhu.disa.mil/tssi>.

(3) Features and Capabilities. The SUT met all the critical interoperability certification requirements for the following Features and Capabilities:

(a) Common features: Code restriction and diversion, Call waiting, Three-way calling, Call hold, Call forwarding, and Call pick-up.

(b) Synchronization: The SUT met all the critical interoperability requirements for synchronization. The SUT provides a Stratum-4 internal timing source as required by the GSCR, paragraph 11.1.1.2, and supports line timing via a T1 interface as required by the GSCR, paragraph 11.1.2.2.

(c) Reliability: The SUT met all the critical interoperability certification requirements for Reliability with a vendor's LoC.

(d) Security: Department of Defense Information Technology Security Certification and Accreditation Process information assurance testing is accomplished by DISA led Information Assurance test teams and published in a separate report.

(4) VoIP. The SUT offers VoIP; however, this capability was not tested and is not covered under this certification.

(5) Network Gateways. The SUT met all critical interoperability certification requirements for the Public Switched Telephone Network (PSTN) and the Defense Red Switch Network (DRSN) Gateways. The T1 ISDN PRI NI 1/2 (ANSI T1.607), T1 Channel Associated Signaling, and 2-wire analog loop start and ground start (GR-506-CORE) interfaces were certified for the PSTN Gateway. The 2-wire analog (GR-506-CORE) interface was the only interface certified for the DRSN Gateway.

b. System Interoperability Results. The SUT meets all of its critical interoperability requirements and is certified for joint use within the DSN as a PBX 1 and PBX 2 in accordance with the requirements set forth in the GSCR. The Tadiran Coral Flexicom™ product family and Coral IPx product family includes VoIP; however, VoIP was not tested and is not covered under this certification. The SUT interoperability test summary is shown in table 2-3.

Table 2-3. SUT Interoperability Test Summary

DSN Line Interfaces			
Interface & Signaling	Critical	Status	Remarks
2-Wire Analog (GR-506-CORE)	Yes	Certified	Met all CRs and FRs with one minor exception. The SUT supports only 250 different classmarks vice the requirement of a minimum of 256. The operational impact is minor
ISDN BRI NI 1/2	No	Not Certified	This interface is supported by the SUT however it does not support MLPP. There is no operational impact because it is not a critical requirement for a PBX 1.
2-Wire Proprietary Digital	No	Certified	Met all CRs and FRs with one minor exception. The SUT supports only 250 different classmarks vice the requirement of a minimum of 256. The operational impact is minor
VoIP	No	Not Tested	The SUT offers VoIP; however, this capability was not tested and is not covered under this certification.
DSN Trunk Interfaces			
Interface & Signaling	Critical	Status	Remarks
T1 CAS (DTMF, MFR1, DP)	No	Not Tested	This interface is not supported. There is no operational impact because it is not a critical requirement for a PBX 1.
E1 CAS (DTMF, MFR1, DP)	No (Europe only)	Not Tested	This interface is not supported. There is no operational impact because it is not a critical requirement for a PBX 1.
T1 ISDN PRI NI 1/2 (ANSI T1.619a)	Yes	Certified	Met all CRs and FRs with one minor exception. The SUT supports only 250 different classmarks vice the requirement of a minimum of 256. The operational impact is minor.
DSN Features and Capabilities			
Features and Capabilities	Critical	Status	Remarks
Common Features	No	Certified	Met the following CRs and FRs: Code restriction and diversion, Call waiting, Three-way calling, Call hold, Call forwarding, and Call pick-up.
Attendant	No	Not Tested	This feature is not supported. There is no operational impact because it is not a critical requirement for a PBX 1.
Public Safety	No	Not Tested	This feature is not supported. There is no operational impact because it is not a critical requirement for a PBX 1.
Preset Conferencing	No	Not Tested	This feature is not supported. There is no operational impact because it is not a critical requirement for a PBX 1.
DSN Features and Capabilities			
Features and Capabilities	Critical	Status	Remarks
Nailed-up Connections	No	Not Tested	This feature is not supported. There is no operational impact because it is not a critical requirement for a PBX 1.
PAT	No	Not Tested	This feature is not supported. There is no operational impact because it is not a critical requirement for a PBX 1.
DSN Hotline Services	No	Not Tested	This feature is not supported. There is no operational impact because it is not a critical requirement for a PBX 1.
Network Management	No	Not Tested	This feature is not supported. There is no operational impact because it is not a critical requirement for a PBX 1.
ISDN Services (EKTS)	No	Not Tested	This feature is not supported. There is no operational impact because it is not a critical requirement for a PBX 1.
Synchronization	Yes	Certified	Met all CRs and FRs.
Reliability	Yes	Certified	Met all CRs and FRs.
Security	Yes	See note 1.	See note 1.
VoIP System	No	Not Tested	The SUT offers VoIP; however, this capability was not tested and is not covered under this certification.

Table 2-3. SUT Interoperability Test Summary (continued)

VoIP				
Features and Capabilities	Critical	Status	Remarks	
VoIP	No	Not Tested	The SUT offers VoIP; however, this capability was not tested and is not covered under this certification.	
Network Gateways				
Gateway	Interface & Signaling	Critical	Status	Remarks
PSTN ²	T1 CAS (DTMF, DP)	No	Certified	Met all CRs and FRs.
	E1 CAS (DTMF, MFR1, DP)	No (Europe only)	Not Certified	This interface is not supported. There is no operational impact because it is not a requirement for a PBX 1.
	T1 ISDN PRI NI 1/2 (ANSI T1.607)	No	Certified	Met all CRs and FRs.
DRSN ³	TPC 2-Wire Analog (GR-506-CORE)	Yes	Certified	Met all CRs and FRs.
LEGEND: ANSI - American National Standards Institute BRI - Basic Rate Interface CAS - Channel Associated Signaling CRs - Capability Requirements DISA - Defense Information Systems Agency DoD - Department of Defense DP - Dial Pulse DRSN - Defense Red Switch Network DSN - Defense Switched Network DSS1 - Digital Subscriber Signaling 1 DTMF - Dual Tone Multi-Frequency E1 - European Basic Multiplex Rate (2.048 Mbps) EKTS - Electronic Key Telephone System FRs - Feature Requirements GR-506-CORE - Telcordia Signaling for Analog Interface Generic Requirement ISDN - Integrated Services Digital Network Mbps - Megabits per second MFR1 - Multifrequency Recommendation 1 MLPP - Multi-Level Precedence and Preemption NI 1/2 - National ISDN Standard 1 or 2 PAT - Precedence Access Threshold PBX 1 - Private Branch Exchange 1 PM - Program Manager PRI - Primary Rate Interface PSTN - Public Switched Telephone Network SS7 - Signaling System 7 SUT - System Under Test T1 - Digital Transmission Link Level 1 (1.544 Mbps) T1.607 - ISDN Layer 3 Signaling Specification for Circuit Switched Bearer Service for DSS1 T1.619a - SS7 and ISDN MLPP Signaling Standard for T1 TDM - Time Division Multiplexing TPC - Twisted Pair Copper VoIP - Voice over Internet Protocol VTC - Video Teleconferencing				
NOTES: 1 Information assurance testing is accomplished via DISA-led Information Assurance test teams and published in a separate report. 2 Voice, facsimile, data, and VTC service requirements for PSTN are identical to DSN with the exception of MLPP. 3 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 TSSI website at <http://jitc.fhu.disa.mil/tssi>.