DEFENSE INFORMATION SYSTEMS AGENCY
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ARLINGTON, VIRGINIA 22204-4502

IN REPLY REFER TO: Battlespace Communications Portfolio (JTE) 13 Aug 09

MEMORANDUM FOR DISTRIBUTION

SUBJECT: Special Interoperability Test Certification of the Foundry-Brocade Assured Services Local Area Network (ASLAN) and non-ASLAN with Specified Software Releases

References: (a) DoD Directive 4630.5, "Interoperability and Supportability of Information Technology (IT) and National Security Systems (NSS)," 5 May 2004
(b) CJCSI 6212.01D, "Interoperability and Supportability of Information Technology and National Security Systems," 8 March 2006
(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 Foundry-Brocade ASLAN and non-ASLAN with Specified Software Releases is hereinafter referred to as the system under test (SUT). The SUT meets all of its critical interoperability requirements and is certified as interoperable for joint use within the Defense Switched Network (DSN). The ASLAN is certified to support DSN Assured Services over Internet Protocol. The SUT components which are bolded and underlined in the tables throughout this certification letter are components that were tested in the JITC laboratory for this certification. The SUT components which are not bolded and not underlined, but also listed throughout the tables in this letter, are certified for joint use in the DSN as well. The JITC analysis determined these components contain the same hardware and software and are functionally identical to the tested components for interoperability certification purposes. If a system meets the minimum requirements for an ASLAN, it also meets the lesser requirements for a non-ASLAN. Non-ASLANs are "commercial grade" and provide support to Command and Control (C2) (ROUTINE only calls) (C2(R)) or non-C2 voice subscribers. The SUT is certified for joint use as a non-ASLAN for C2R and non-C2 traffic. Non-ASLANs may also be used to receive all levels of precedence, but are limited to originating ROUTINE precedence only. Non-ASLANs do not need to meet the availability or redundancy requirements of the C2 or Special C2 users, C2 users and Special C2 users are not authorized as subscribers on a non-ASLAN.

Testing did not include video services or data applications; however, simulated data traffic was generated during testing to determine the SUT's ability to prioritize and properly queue voice media and signaling traffic. 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 Defense Information Assurance (IA)/Security Accreditation Working Group (DSAWG) accreditation. Testing was conducted at JITC's Global Information Grid Network Test Facility at Fort Huachuca, Arizona, from 20 April through 08 May 2009. Review of the vendor's LoC was completed on 3 August 2009. The DSAWG grants accreditation based on the security testing completed by DISA-led Information Assurance test teams and published in a separate report (reference (c)). The DSAWG accreditation was granted on 11 August 2009. Enclosure 2 documents the test results and describes the tested network.

4. The overall interoperability status of the SUT is indicated in Table 1. The ASLAN and non-ASLAN system requirements are listed in Table 2. In addition to system level requirements, components that comprise the SUT must meet specific criteria to be certified for use as core, distribution, or access components. The interoperability status of the SUT components is listed in Table 3. The ASLAN and non-ASLAN requirements used to certify the components are listed in Table 4. This interoperability test status is based on the SUT's ability to meet:

a. Assured Services as defined in reference (d).

b. Local Area Network system requirements specified in reference (e) verified through JITC testing and/or vendor submission of LoC.

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

Table 1. SUT Interoperability Status

System Interoperability Status			
Components (See note 1.)	**Release**	**Status**	**Remarks**
Foundry NetIron XMR 4000/**8000/**16000/32000	FI 4.0.0b	Certified	All ASLAN and non-ASLAN system requirements were met when the SUT was configured in accordance with architecture provided in enclosure 2. Additional details about component level certification are provided in table 3. Security testing is accomplished through DISA-led Information Assurance Test teams and published in a separate report.
Foundry NetIron MLX 4/**8/**16/32	FI 4.0.0b		
Foundry BigIron RX 4/**8/**16/32	FI 2.7.01		
FastIron SX 800[2]**/**SX 1600/FastIron Super X	FI 5.0.00		
FastIron FESX648[2]**/** /FESX624/FESX624HF/FESX424/ FESX424-POE/FESX424HF/FESX448	FI 5.0.00		
FastIron GS648P-PoE FGS624P-PoE/FGS648P/FGS624P/FLS648/FLS624	FI 4.3.02		
FastIron WS648G-PoE/ FWS648G/ FWS648-POE/FWS648/FWS624G-POE/FWS624G/ FWS624-POE/FWS624	FI 4.3.02		
FastIron Edge 4802-PoE/2402-PoE/ FES2402-PoE/FES4802/FES2402/FES12GCF	FI 4.1.01		

NOTES:
1 Components bolded and underlined were tested by JITC. The other components in the family series were not tested; however, they utilize the same software and hardware and JITC analysis determined them to be functionally identical for interoperability certification purposes and they are also certified for joint use.
2 Indicates these switches support one processor and must be configured to failover to a redundant Distribution switch.

LEGEND:

ASLAN	Assured Services Local Area Network	ME	Metro Ethernet
DISA	Defense Information Systems Agency	NEB	Network Equipment Building
DSN	Defense Switched Network	SUT	System Under Test
E	Enhanced	SE	System Engineering
IOS	Internetwork Operating System	UCR	Unified Capabilities Requirements
JITC	Joint Interoperability Test Command	WS	Workgroup Switch

Table 2. ASLAN and non-ASLAN System Requirements

System Requirements				
Requirement	**Criteria**		**UCR Paragraph**	**Required**
Delay	One-way packet delay for voice packets of an established call (signaling and media) shall be 5 ms or less averaged over any 5-minute period.		A3.3.2.1	Yes
Jitter	For voice media packets, jitter shall be 5 ms or less averaged over any 5-minute period.		A3.3.2.2	Yes
Packet Loss	Voice packet loss within the LAN shall not exceed 0.05% averaged over any 5-minute period.		A3.3.2.3	Yes
Network Management	LAN Network Management Interface. One of the following methods: In-band or Out-of-band		A3.3.7.1	Yes
	LAN Configuration Control		A3.3.7.2	Yes
	LAN Operational Changes		A3.3.7.3	Yes
	LAN Performance Monitoring		A3.3.7.4	Yes
	LAN Alarms		A3.3.7.5	Yes
	LAN Reporting		A.3.3.7.6	Yes
Availability	ASLAN	99.999% Availability	A3.3.9.2	Yes
	non-ASLAN	99.9% Availability	A3.3.9.2	Yes
Redundancy	ASLAN	No Single Point of Failure that can cause an outage of more than 64 IP telephony subscribers	A3.3.9.3	Yes
	non-ASLAN	No Single Point of Failure that can cause an outage of more than 64 IP telephony subscribers	A3.3.9.3	No
Survivability	ASLAN	Service continuity in the presence of faults within the network	A3.3.9.4	Yes
	non-ASLAN	Service continuity in the presence of faults within the network	A3.3.9.4	No
Traffic Engineering	Voice bandwidth not to exceed 25 percent of available bandwidth, ITU-T G.711 codec with 20ms sample size.		A3.3.9.6	Yes
IPv6	All IP devices shall be IPv6 capable.		1.7, A3.2.8, and A11	Yes
Security	DIACAP/IA (See note.)		A3.3.8	Yes

NOTE: Security testing is accomplished via DISA-led Information Assurance test teams and published in a separate report, reference (c).

LEGEND:

A	Appendix	IPv6	Internet Protocol version 6
ASLAN	Assured Services LAN	ITU-T	International Telecommunication Union - Telecommunication Standardization Sector
DIACAP	Department of Defense Information Assurance Certification and Accreditation Process	LAN	Local Area Network
DISA	Defense Information Systems Agency	ms	milliseconds
G.711	PCM of voice frequencies	PCM	Pulse Code Modulation
IA	Information Assurance	UCR	Unified Capabilities Requirements
IP	Internet Protocol		

Table 3. SUT Component Interoperability Status

Component Interoperability Status					
Component (See note 1.)	**Release**	**Sub-component** (See note 1.)	**Status**	**Layer (s)**	**Remarks**
Foundry NetIron XMR 4000/**8000**/16000/32000	FI 4.0.0b	**NI-XMR-MR**	Certified	Core, Distribution, Access	All CRs and FRs were met.
		NI-XMR-32-MR	Certified		
		NI-X-SF1	Certified		
		NI-X-SF3	Certified		
		NI-X-32-SF	Certified		
		NI-XMR-10Gx4	Certified		
		NI-XMR-10Gx2	Certified		
		NI-XMR-1Gx20-SFP	Certified		
		NI-XMR-1Gx20-GC	Certified		
Foundry NetIron MLX 4/**8**/16/32	FI 4.0.0b	**NI-MLX-MR**	Certified	Core, Distribution, Access	All CRs and FRs were met.
		NI-MLX-32-MR	Certified		
		NI-X-SF1	Certified		
		NI-X-SF3	Certified		
		NI-X-32-SF	Certified		
		NI-MLX-10Gx4	Certified		
		NI-MLX-10Gx2	Certified		
		NI-MLX-1Gx20-SFP	Certified		
		NI-MLX-1Gx20-GC	Certified		
		NI-MLX-1Gx48-T	Certified		
Foundry BigIron RX 4/**8**/16/32	FI 2.7.01	**RX-BI-MR**	Certified	Core, Distribution, Access	All CRs and FRs were met.
		RX-BI-MR2	Certified		
		RX-BI-32-MR	Certified		
		RX-BI-32-MR2	Certified		
		RX-BI-SFM1	Certified		
		RX-BI-SFM3	Certified		
		RX-BI-32-SFM	Certified		
		RX-BI2XG	Certified		
		RX-BI4XG	Certified		
		RX-BI24C	Certified		
		RX-BI24HF	Certified		
		RX-BI48T	Certified		
		RX-BI-16XG	Certified		
FastIron SX 800[2]/SX 1600/ FastIron Super X	FI 5.0.00	**SX-FIZMR-6-PREM6**	Certified	Distribution, Access	All CRs and FRs were met.
		SX-FI624HF	Certified		
		SX-FI62XG	Certified		
		SX-FI624100FX	Certified		
		SX-FI624P	Certified		
		SX-FI624C	Certified		
		SX-24GCPOE	Certified		
		FI-FISF	Certified		
		SX-FI12GM-4	Certified		
		SX-FIZMR	Certified		
		SX-FI424F	Certified		
		SX-FI424C	Certified		
		SX-FI424HF	Certified		
		SX-FI42XG	Certified		
		SX-FI424P	Certified		
		SX-FI12GM-6	Certified		
		SX-FI12GM-6-PREM6	Certified		
		SX-FI8GMR6	Certified		
		SX-FI8GMR6-PREM6	Certified		
		SX-FI2XGMR6	Certified		
		SX-FI2XGMR6-PREM6	Certified		

Table 3. SUT Component Interoperability Status (continued)

Component (See note 1.)	Release	Sub-component (See note 1.)	Status	Layer (s)	Remarks
FastIron FESX648[2]**/** FESX624/FESX624HF/FESX424/ FESX424-PoE/ FESX424HF/FESX448	FI 5.0.00	Not Applicable	Certified	Access Distribution	All CRs and FRs were met.
FastIron Edge 4802-PoE/FES2402-PoE/FES4802/FES2402/ FES12GCF	FI 4.1.01	Not Applicable	Certified	Access	All CRs and FRs were met. See note 3.
FastIron GS648P-PoE FGS624P-PoE/FGS648P/ FGS624P/FLS648/ FLS624	FI 4.3.02	Not Applicable	Certified	Access	All CRs and FRs were met.
FastIronWS648G-PoE/FWS648G/ FWS648-PoE/FWS648/ FWS624G-PoE/FWS624G/ FWS624-PoE/FWS624	FI 4.3.02	Not Applicable	Certified	Access	All CRs and FRs were met.

NOTES:
1 Components bolded and underlined were tested by JITC. The other components in the family series were not tested; however, they utilize the same software and hardware and JITC analysis determined them to be functionally identical for interoperability certification purposes and they are also certified for joint use.
2 Indicates these switches support one processor and must be configured to failover to a redundant distribution switch.

LEGEND:

CRs	Capability Requirements	NEB	Network Equipment Building
E	Enhanced	RJ	Registered Jack
FRs	Feature Requirements	S	Standard
FX-MT	Foreign Exchange, ATM Term	SFP	Small Form Factor Pluggable
GB	Gigabit GBIC	SUP	Supervisor
IOS	Internetwork Operating System	SUT	System Under Test
JITC	Joint Interoperability Test Command	TX	The designation of a copper RJ-45 connection for Fast Ethernet
L2	Layer 2		
L3	Layer 3	WS	Workgroup Switch
ME	Metro Ethernet		

Table 4. ASLAN and non-ASLAN Component Requirements

Core/Distribution/Access Component Requirements				
Requirement	**Criteria**		**UCR Paragraph**	**Required**
Traffic Prioritization	Traffic within LAN components shall be prioritized by session media type in accordance with the NCIDs.		A3.3.3	Yes
Traffic Priority Method	LAN components shall support DSCP, and IEEE 802.1p to DSCP mapping.		A3.3.3.1	Yes
Queuing	LAN components shall support one of the following: - Priority Queuing - Weighted Fair Queuing - Class Based Weighted Fair Queuing		A3.3.4.1	Yes
	LAN components shall be capable of - four hardware queues (Expedited Forwarding, Assured Forwarding, Assured Forwarding Preferred, and Default) - Assigning any "tagged" session to any hardware queues		A3.3.4.1	Yes
LAN Behaviors	LAN components shall support Differential Service Per-Hop Behaviors per RFCs 2474, 2475, and 3260		A3.3.4.2	Yes
VLANs	LAN components shall support: - Port based VLANs - MAC address based VLANs - Shall be capable of reassigning VLAN IDs - Accepting VLAN tagged frames in accordance with IEEE 802.1Q		A3.3.5	Yes
IEEE Conformance	LAN components shall support: - IEEE 802.1d – Bridging - IEEE 802.1p/Q – Priority tagging/VLAN tagging - IEEE 802.1s – Per-VLAN Group Spanning Tree - IEEE 802.1v – VLAN Classification by port and protocol - IEEE 802.1w –Rapid Reconfiguration of Spanning Tree - IEEE 802.1x – Port Based Network Access Control - IEEE 802.3ad – Link Aggregation Protocol - IEEE 802.3af - Power over Ethernet (Conditional)		A3.3.9.1	Yes
Single Device Redundancy	ASLAN	LAN components shall support: - ASLAN components shall have a reliability of .99999 or better - Dual power supplies and dual processors (more than 64 users) - N+1 sparing for access (more than 64 users) - Redundancy protocol[1] - 2 second path restoral - No single point of failure will cause loss of more than 64 users	A3.3.9.3.1	Yes
	non-ASLAN	This requirement is conditional for a non-ASLAN.	A3.3.9.3.1	No
Security	LAN components shall employ the Network Infrastructure and VoIP STIGs.[2]		A3.3.8	Yes
IPv6	All IP devices shall be IPv6 capable.		1.7, A3.2.8, and A11	Yes

NOTES:
1 In accordance with UCR 2007, Appendix 3, A3.3.9.4, OSPF, IS-IS, and BGP are the routing protocols supported for core and distribution components. The redundancy protocol shall be VRRP or equivalent protocol for access components.
2 Security is tested by DISA-led Information Assurance test teams and published in a separate report, reference (c).

Table 4. ASLAN and non-ASLAN Component Requirements (continued)

LEGEND:

802.1d	Standard for Local and Metropolitan Area Networks: MAC Bridges	ASLAN	Assured Services LAN
802.1p	LAN Layer 2 QoS/CoS Protocol for Traffic Prioritization	BGP	Border Gateway Protocol
802.1Q	Standards for Local and Metropolitan Area Networks: Virtual Bridged Local Area Networks	CoS	Class of Service
802.1s	Standard for Local and Metropolitan Area Networks - Amendment 3 to 802.1Q Virtual Bridged Local Area Networks: Multiple Spanning Trees	CSMA/CD	Carrier Sense Multiple Access with Collision Detection
802.1v	Standard for Local and Metropolitan Area Networks - Virtual Bridge Local Area Networks - Amendment 2: VLAN Classification by Protocol and Port (Amendment to IEEE 802.1Q, 1998 Edition)	DISA	Defense Information Systems Agency
802.1w	Standard for Local and metropolitan area networks - Common Specifications - Part 3: Media Access Control (MAC) Bridges: Rapid Configuration	DSCP	Differentiated Services Code Point
802.1x	Standard for Local and Metropolitan Area Networks Port-Based Network Access Control	IEEE	Institute of Electrical and Electronics Engineers
802.3ad	Standard for Information Technology – Local and Metropolitan Area Networks – Part 3: CSMA/CD Access Method and Physical Layer Specifications–Aggregation of Multiple Link Segments	ID	Identification
802.3af	Standard for CSMA/CD Access Method and Physical Layer Specifications - Data Terminal Equipment (DTE) Power via Media Dependent Interface (MDI)	IP	Internet Protocol
A	Appendix	IPv6	Internet Protocol version 6
		IS-IS	Intermediate system-Intermediate System
		LAN	Local Area Network
		MAC	Media Access Control
		NCID	Net-Centric Implementation Document
		N	total VoIP users / 64
		OSPF	Open Shortest-Path First
		QoS	Quality of Service
		RFC	Request for Comment
		SNMP	Simple Network Management Protocol
		STIGs	Security Technical Implementation Guides
		UCR	Unified Capabilities Requirements
		VLANs	Virtual LANs
		VoIP	Voice over Internet Protocol
		VRRP	Virtual Router Redundancy Protocol

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 https://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 Mr. Edward Mellon, DSN 879-5159, commercial (520) 538-5159, FAX DSN 879-4347, or e-mail to edward.mellon@disa.mil. The JITC's mailing address is P.O. Box 12798, Fort Huachuca, AZ 85670-2798. The tracking number for the SUT is 0821001.

FOR THE COMMANDER:

2 Enclosures a/s

for RICHARD A. MEADOR
Chief
Battlespace Communications Portfolio

JITC Memo, JTE, Special Interoperability Test Certification of the Foundry-Brocade Assured Services Local Area Network (ASLAN) and non-ASLAN with Specified Software Releases

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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) Joint Interoperability Test Command, "Information Assurance (IA) Assessment of Foundry-Brocade Assured Services Local Area Network (ASLAN) and non-ASLAN with Specified Software Releases (Tracking Number 833804)," 11 August 2009
(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) Defense Information Systems Agency, "Department of Defense Networks Unified Capabilities Requirements," 21 December 2007
(f) Joint Interoperability Test Command, "Defense Switched Network Generic Switch Test Plan (GSTP), Change 2," 2 October 2006

CERTIFICATION TESTING SUMMARY

1. SYSTEM TITLE. Foundry-Brocade Assured Services Local Area Network (ASLAN) and non-ASLAN with Specified Software Releases are hereinafter referred to as the system under test (SUT).

2. PROPONENT. Headquarters United States Army Information Systems Engineering Command (HQUSAISEC).

3. PROGRAM MANAGER. Gary Kitsmiller, AMSEL-IE-IS, Building 53301 Arizona Street, Fort Huachuca, Arizona, 85613-5300, e-mail: gary.kitsmiller@us.army.mil.

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

5. SYSTEM UNDER TEST DESCRIPTION. The SUT is used to transport voice signaling and media as part of an overall Voice over Internet Protocol (VoIP) system. All of the SUT switches provide availability, security, and Quality of Service (QoS) to meet the operational requirements of the network and Assured Services for the warfighter. The SUT components which are bolded and underlined in the tables throughout this certification letter, are components that were tested in the JITC laboratory for this certification. The SUT components which are not bolded and not underlined, but also listed throughout the tables in this letter, were determined by JITC analysis to contain the same hardware and software as, and to be functionally identical to, the tested components for interoperability certification purposes. The ASLAN is certified to support Defense Switched Network (DSN) Assured Services over Internet Protocol (IP).

The SUT is composed of the following components:

The NetIron XMR, NetIron MLX, and BigIron RX series deliver scalable performance and port density across several chassis configurations. The NetIron XMR, NetIron MLX, and BigIron RX series are available in a 4-, 8-, 16-, and 32-slot chassis. These switches feature a range of integrated services modules, including 10-gigabit fiber, 1-gigabit fiber, and 10/100/1000BaseT modules. Users can connect to the Local Area Network (LAN) for data and voice applications using the 10/100/1000BaseT Ethernet interface on the access devices. The NetIron XMR, MLX, and BigIron RX series switches are certified in the core, distribution, and access layers when deployed as a component in an ASLAN or non-ASLAN. The NetIron XMR, NetIron MLX, and BigIron RX series were tested for 100/1000/10000 Megabits per second (Mbps) data load throughput. The NetIron XMR, NetIron MLX, and BigIron RX series met all Internet Protocol version 4(IPv4), Internet Protocol version 6 (IPv6), and Core requirements.

The FastIron Super X chassis series (Super X and SX800/SX1600) delivers scalable performance and port density across two chassis configurations. The FastIron Super X series is available in an 8- or 16-slot chassis. The FastIron Super X series features a range of integrated services modules, including 10-gigabit fiber, 1-gigabit fiber, and

10/100/1000BaseT modules. Users can connect to the LAN for data and voice applications using the 10/100/1000 BaseT Ethernet interface on the access devices. The FastIron Super X series provides QoS and ACL capabilities for control of data entering the network. The FastIron Super X series is certified in the distribution and access layer when deployed as a component in an ASLAN or non-ASLAN. The FastIron Super X series was tested for 100/1000/10000 Mbps data load throughput. The FastIron Super X series met all IPv4 and IPv6 requirements.

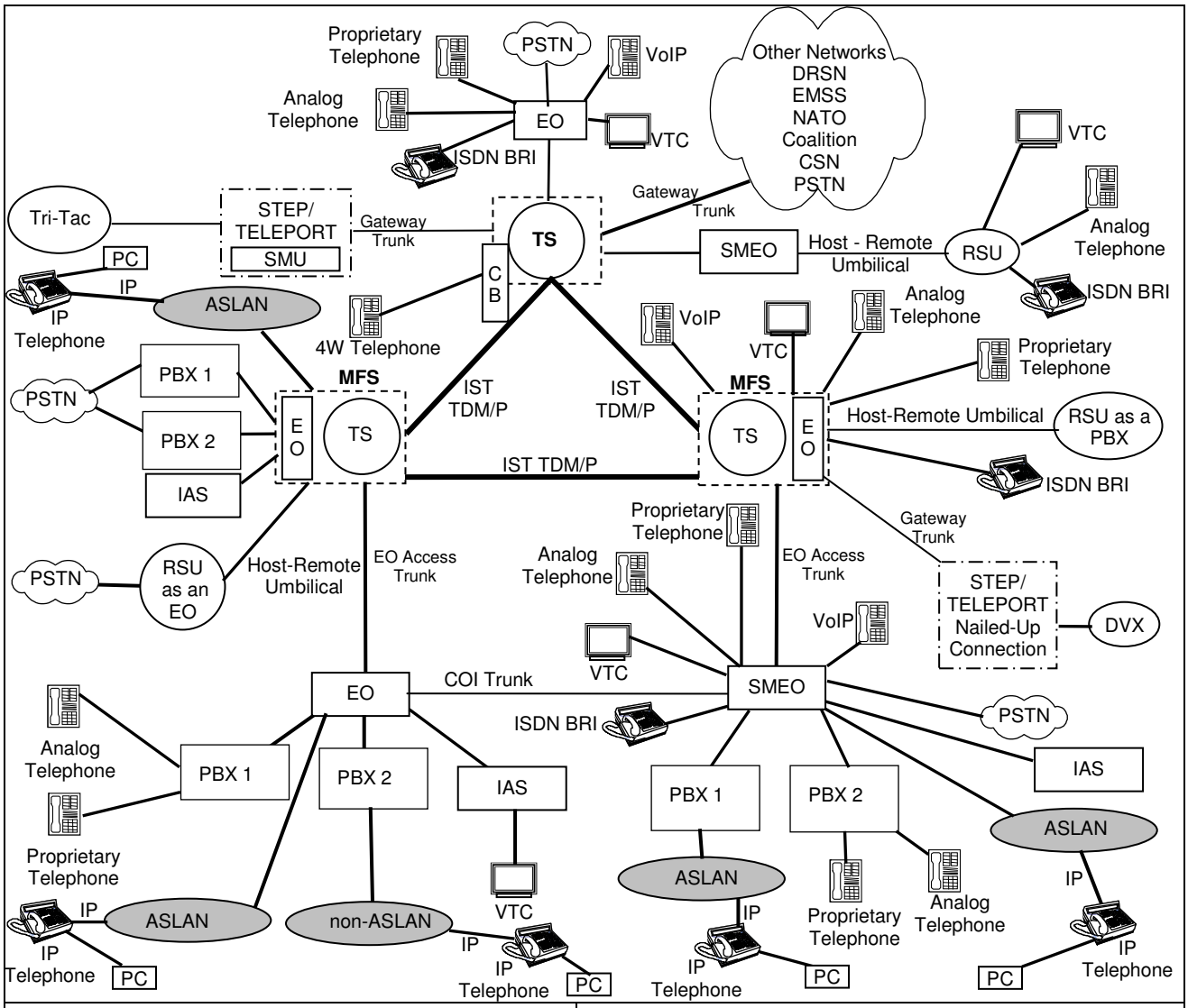
The FastIron Edge X series delivers performance and port density across four factory configured standalone units. The FastIron Edge X series is available in a model X424-PoE, X424, X424HF, X448, X648, X624 and X624HF standalone units. The FastIron Edge X series features a range of factory installed services interfaces, including 1-gigabit fiber, 10/100/1000BaseT and 10 Gigabit interfaces. For data and voice applications, users can connect to the LAN using the 10/100/1000BaseT Ethernet interface on these access devices. The FastIron Edge X series provides QoS and ACL capabilities for control of data entering into the network. The FastIron Edge X series is certified in the distribution and access layer when deployed as a component in an ASLAN or non-ASLAN. The FastIron Edge X series was tested for 100/1000/10000 Mbps data load throughput. The FastIron Edge X series met all IPv4 and IPv6 requirements.

The FastIron GS/LS series delivers performance and port density across six factory configured standalone units. The FastIron GS/LS series is available in a model FGS 648P-PoE, FGS 624P-PoE, FGS648, FGS624, FLS648, and FLS624 standalone units. The FastIron GS/LS series features a range of factory installed services interfaces, including 1-gigabit fiber, and 10/100/1000BaseT interfaces. Foundry offers a 10-gigabit fiber interface; however, it was not tested and is not covered under this certification. Users can connect to the LAN for data and voice applications, using the 10/100/1000 BaseT Ethernet interface on these access devices. The FastIron GS/LS series provides QoS and ACL capabilities for control of data entering into the network. The FastIron GS/LS series is certified in the access layer when deployed as a component in an ASLAN or NON-ASLAN. The FastIron GS/LS series was tested for 100/1000 Mbps data load throughput. The FastIron GS/LS series met all IPv4 and IPv6 requirements.

The FastIron FWS series delivers performance and port density across six factory configured standalone units. The FastIron FWS series is available in a model FWS 648G-PoE, FWS648G, FWS648, FWS624G-PoE, FWS624G and FWS624 standalone units. The FastIron FWS series features a range of factory installed services interfaces, including 1-gigabit fiber, and 10/100/1000BaseT interfaces. Users can connect to the LAN for data and voice applications using the 10/100/1000 BaseT Ethernet interface on these access devices. The FastIron FWS series provides QoS and ACL capabilities for control of data entering into the network. The FastIron FWS series is certified in the Access layer when deployed as a component in an ASLAN or NON-ASLAN. The FastIron FWS series was tested for 100/1000 Mbps data load throughput. The FastIron FWS series met all IPv4 and IPv6 requirements.

The FastIron Edge series delivers performance and port density across two factory configured standalone units. The FastIron Edge series is available in a model FES2402-Power over Ethernet (PoE), FES4802-PoE, FES2402, FES4802 and FES12GCF standalone units. The FastIron Edge series features a range of factory installed services interfaces, including 1- gigabit fiber and 10/100BaseT interfaces. Users can connect to the LAN for data and voice applications using the 10/100BaseT Ethernet interface on these access devices. The FastIron Edge series provides QoS and ACL capabilities for control of packets entering into the network. The FastIron Edge series is certified in the access layer when deployed as a component in an ASLAN or NON-ASLAN. The FastIron Edge series was tested for 100 Mbps data load throughput. The FastIron Edge series met all IPv4 and IPv6 requirements.

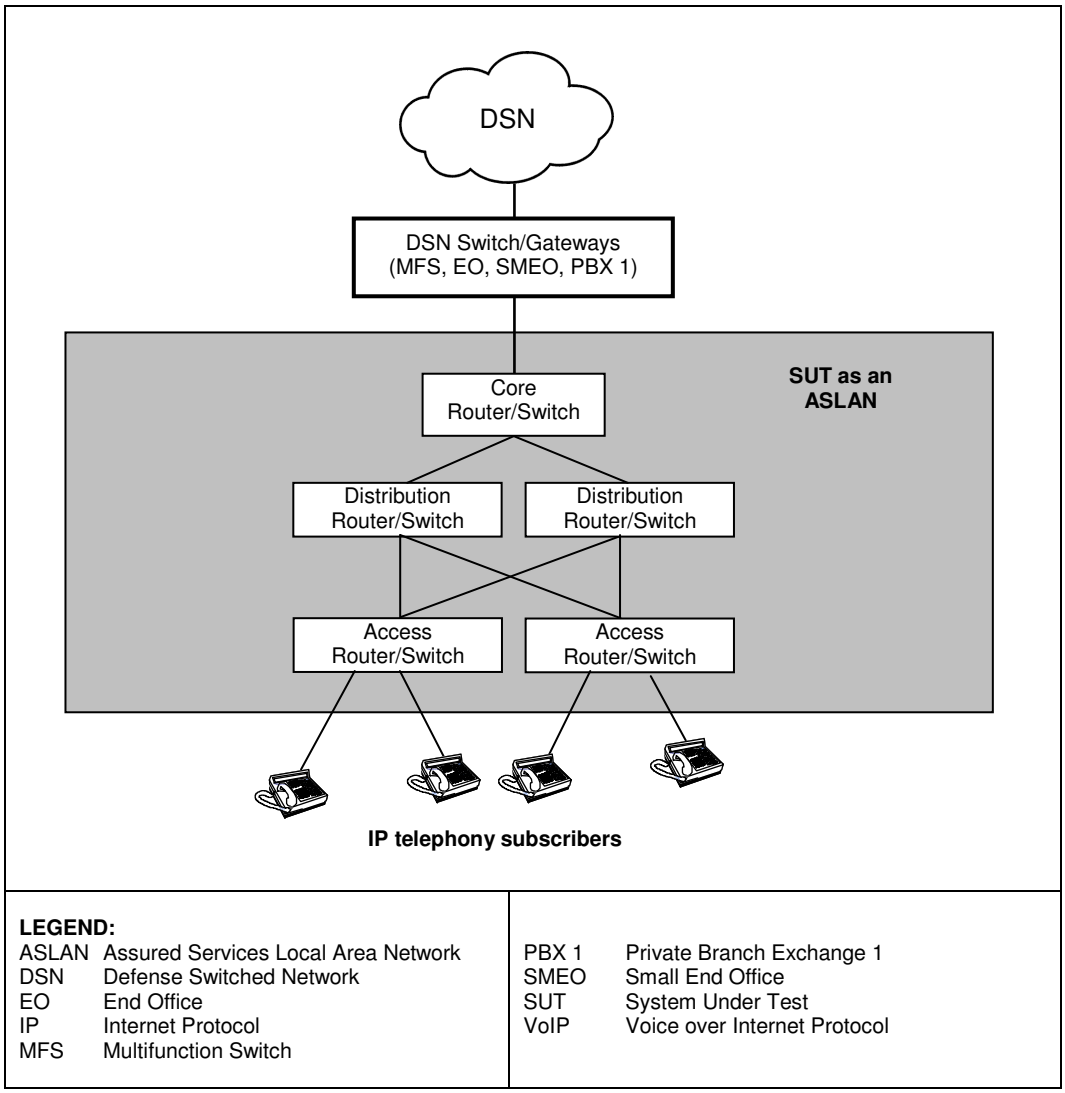
6. OPERATIONAL ARCHITECTURE. The DSN architecture is a two-level network hierarchy consisting of DSN backbone switches and Service/Agency installation switches. Service/Agency installation switches have been authorized to extend voice services over IP infrastructures. The Unified Capabilities Requirements (UCR) operational DSN Architecture is depicted in Figure 2-1, which depicts the relationship of the ASLAN and non-ASLAN to the DSN switch types. The installation ASLAN VoIP architecture is depicted in Figure 2-2 and the non-ASLAN VoIP architecture is depicted in Figure 2-3. The ASLAN and non-ASLAN combined VoIP architecture is depicted in Figure 2-4.



LEGEND:

4W	4-Wire
ASLAN	Assured Services Local Area Network
BRI	Basic Rate Interface
CB	Channel Bank
COI	Community of Interest
CSN	Canadian Switch Network
DRSN	Defense Red Switch Network
DSN	Defense Switched Network
DVX	Deployable Voice Exchange
EMSS	Enhanced Mobile Satellite System
EO	End Office
IAS	Integrated Access Switch
IP	Internet Protocol
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
PC	Personal Computer
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
⬭	System Under Test

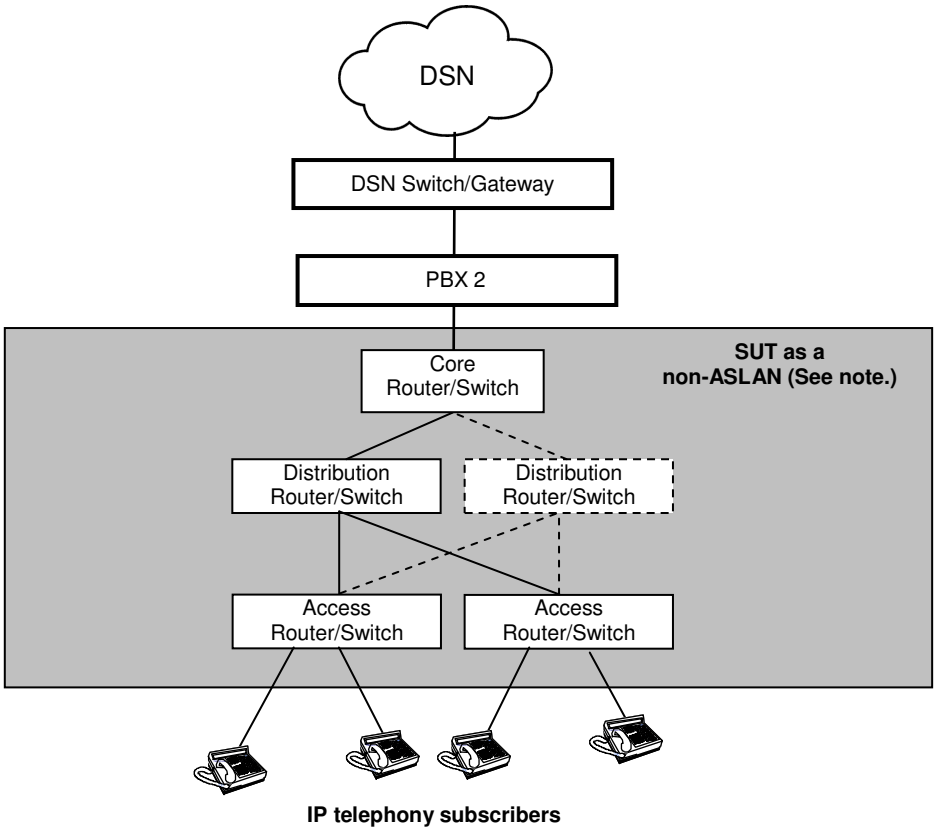
Figure 2-1. DSN Architecture



LEGEND:

ASLAN	Assured Services Local Area Network
DSN	Defense Switched Network
EO	End Office
IP	Internet Protocol
MFS	Multifunction Switch
PBX 1	Private Branch Exchange 1
SMEO	Small End Office
SUT	System Under Test
VoIP	Voice over Internet Protocol

Figure 2-2. ASLAN VoIP Architecture

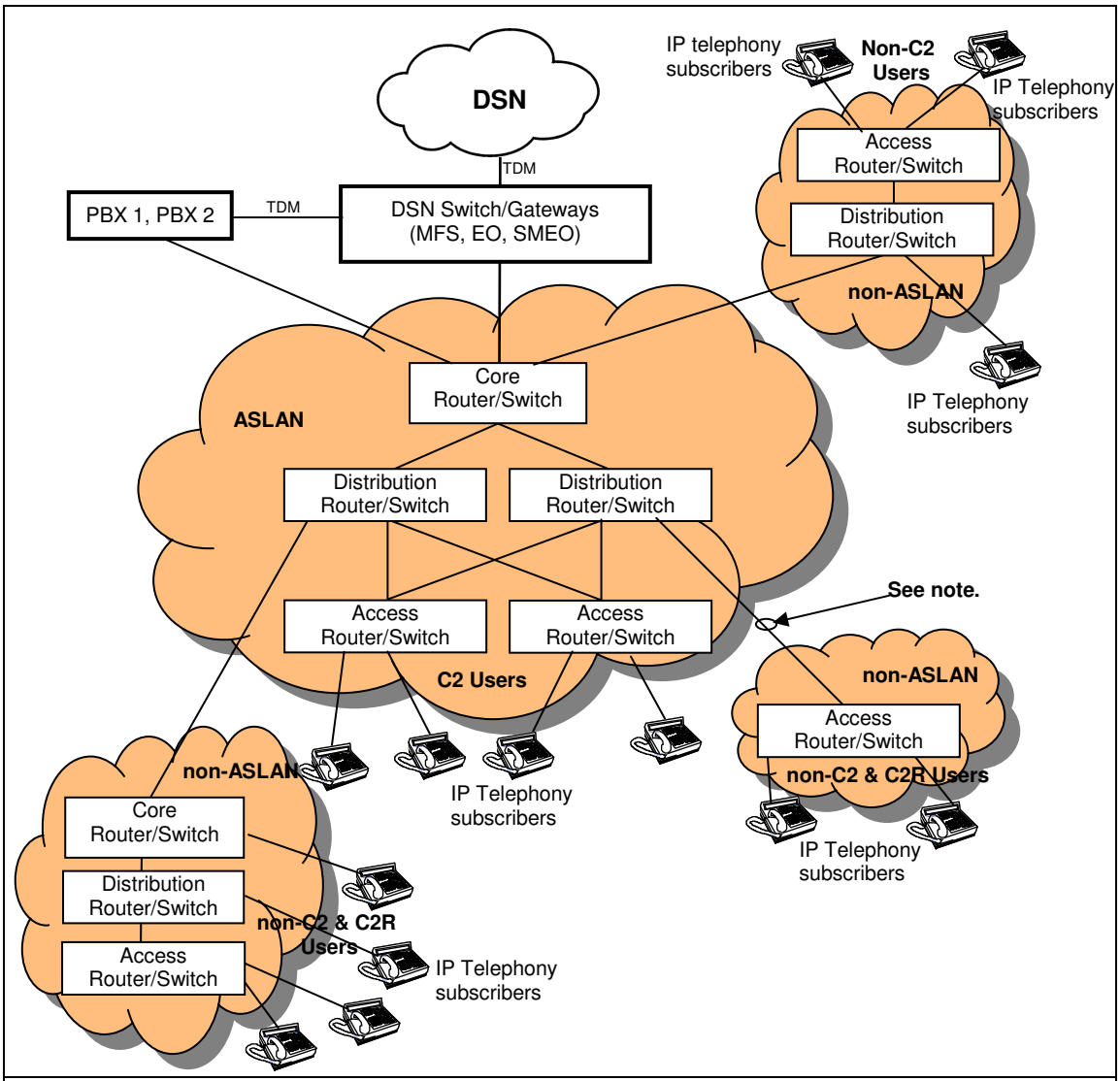


NOTE: Dotted lines denote optional links/components not required for a non-ASLAN. A single point of failure, which could impact more than 64 telephony subscribers, is permitted and switch modularity is not required.

LEGEND:

ASLAN	Assured Services Local Area Network
DSN	Defense Switched Network
IP	Internet Protocol
PBX 2	Private Branch Exchange 2
SUT	System Under Test
VoIP	Voice over Internet Protocol

Figure 2-3. Non-ASLAN VoIP Architecture



NOTE: A non-ASLAN switch can connect to an ASLAN switch at any layer provided that the connection does not cause the ASLAN to exceed the traffic engineering limits as depicted in Table 2-5. A single point of failure, which could impact more than 64 telephony subscribers, is permitted and switch modularity is not required.

LEGEND:

ASLAN	Assured Services Local Area Network
C2	Command and Control
DSN	Defense Switched Network
EO	End Office
IP	Internet Protocol
MFS	Multifunction Switch
PBX 1	Private Branch Exchange 1
PBX 2	Private Branch Exchange 2
SMEO	Small End Office
TDM	Time Division Multiplexing
VoIP	Voice over Internet Protocol
C2R	Command and Control Routine Only

Figure 2-4. ASLAN and non-ASLAN Combined VoIP Architecture

7. REQUIRED SYSTEM INTERFACES. The SUT ASLAN and non-ASLAN system requirements are listed in Table 2-1. The requirements specific to the SUT ASLAN and non-ASLAN components are shown in Table 2-2. These requirements are derived from:

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

b. UCR, appendix 3, Capability Requirements (CRs) and Feature Requirements (FRs) verified through JITC testing and/or vendor submission of Letters of Compliance (LoC).

Table 2-1. ASLAN and non-ASLAN System Requirements

System Requirements				
Requirement	**Criteria**		**UCR Paragraph**	**Required**
Delay	One-way packet delay for voice packets of an established call (signaling and media) shall be 5 ms or less averaged over any 5-minute period.		A3.3.2.1	Yes
Jitter	For voice media packets, jitter shall be 5 ms or less averaged over any 5-minute period.		A3.3.2.2	Yes
Packet Loss	Voice packet loss within the LAN shall not exceed 0.05% averaged over any 5-minute period.		A3.3.2.3	Yes
Network Management	LAN Network Management Interface. One of the following methods: In-band, or Out-of-band		A3.3.7.1	Yes
	LAN Configuration Control		A3.3.7.2	Yes
	LAN Operational Changes		A3.3.7.3	Yes
	LAN Performance Monitoring		A3.3.7.4	Yes
	LAN Alarms		A3.3.7.5	Yes
	LAN Reporting		A.3.3.7.6	Yes
Availability	ASLAN	99.999% Availability	A3.3.9.2	Yes
	non-ASLAN	99.9% Availability	A3.3.9.2	Yes
Redundancy	ASLAN	No Single Point of Failure that can cause an outage of more than 64 IP telephony subscribers	A3.3.9.3	Yes
	non-ASLAN	No Single Point of Failure that can cause an outage of more than 64 IP telephony subscribers	A3.3.9.3	No
Survivability	ASLAN	Service continuity in the presence of faults within the network	A3.3.9.4	Yes
	non-ASLAN	Service continuity in the presence of faults within the network	A3.3.9.4	No
Traffic Engineering	Voice bandwidth not to exceed 25 percent of available bandwidth, ITU-T G.711 codec with 20ms sample size.		A3.3.9.6	Yes
IPv6	All IP devices shall be IPv6 capable.		1.7, A3.2.8, and A11	Yes
Security	DIACAP/IA (See note.)		A3.3.8	Yes

NOTE: Security testing is accomplished via DISA-led Information Assurance test teams and published in a separate report, reference (c).

LEGEND:

A	Appendix	IPv6	Internet Protocol version 6
ASLAN	Assured Services LAN	ITU-T	International Telecommunication Union - Telecommunication Standardization Sector
DIACAP	Department of Defense Information Assurance Certification and Accreditation Process	LAN	Local Area Network
DISA	Defense Information Systems Agency	ms	milliseconds
G.711	PCM of voice frequencies	PCM	Pulse Code Modulation
IA	Information Assurance	UCR	Unified Capabilities Requirements
IP	Internet Protocol		

Table 2-2. ASLAN and non-ASLAN Component Requirements

Core/Distribution/Access Component Requirements				
Requirement	**Criteria**		**UCR Paragraph**	**Required**
Traffic Prioritization	Traffic within LAN components shall be prioritized by session media type in accordance with the NCIDs.		A3.3.3	Yes
Traffic Priority Method	LAN components shall support DSCP, and IEEE 802.1p to DSCP mapping.		A3.3.3.1	Yes
Queuing	LAN components shall support one of the following: - Priority Queuing - Weighted Fair Queuing - Class Based Weighted Fair Queuing		A3.3.4.1	Yes
	LAN components shall be capable of - four hardware queues (Expedited Forwarding, Assured Forwarding, Assured Forwarding Preferred, and Default) - Assigning any "tagged" session to any hardware queues		A3.3.4.1	Yes
LAN Behaviors	LAN components shall support Differential Service Per-Hop Behaviors per RFCs 2474, 2475, and 3260		A3.3.4.2	Yes
VLANs	LAN components shall support: - Port based VLANs - MAC address based VLANs - Shall be capable of reassigning VLAN IDs - Accepting VLAN tagged frames in accordance with IEEE 802.1Q		A3.3.5	Yes
IEEE Conformance	LAN components shall support: - IEEE 802.1d – Bridging - IEEE 802.1p/Q – Priority tagging/VLAN tagging - IEEE 802.1s – Per-VLAN Group Spanning Tree - IEEE 802.1v – VLAN Classification by port and protocol - IEEE 802.1w –Rapid Reconfiguration of Spanning Tree - IEEE 802.1x – Port Based Network Access Control - IEEE 802.3ad – Link Aggregation Protocol - IEEE 802.3af - Power over Ethernet (Conditional)		A3.3.9.1	Yes
Single Device Redundancy	ASLAN	LAN components shall support: - ASLAN components shall have a reliability of .99999 or better - Dual power supplies and dual processors (more than 64 users) - N+1 sparing for access (more than 64 users) - Redundancy protocol[1] - 2 second path restoral - No single point of failure will cause loss of more than 64 users	A3.3.9.3.1	Yes
	non-ASLAN	This requirement is conditional for a non-ASLAN.	A3.3.9.3.1	No
Security	LAN components shall employ the Network Infrastructure and VoIP STIGs.[2]		A3.3.8	Yes
IPv6	All IP devices shall be IPv6 capable.		1.7, A3.2.8, and A11	Yes

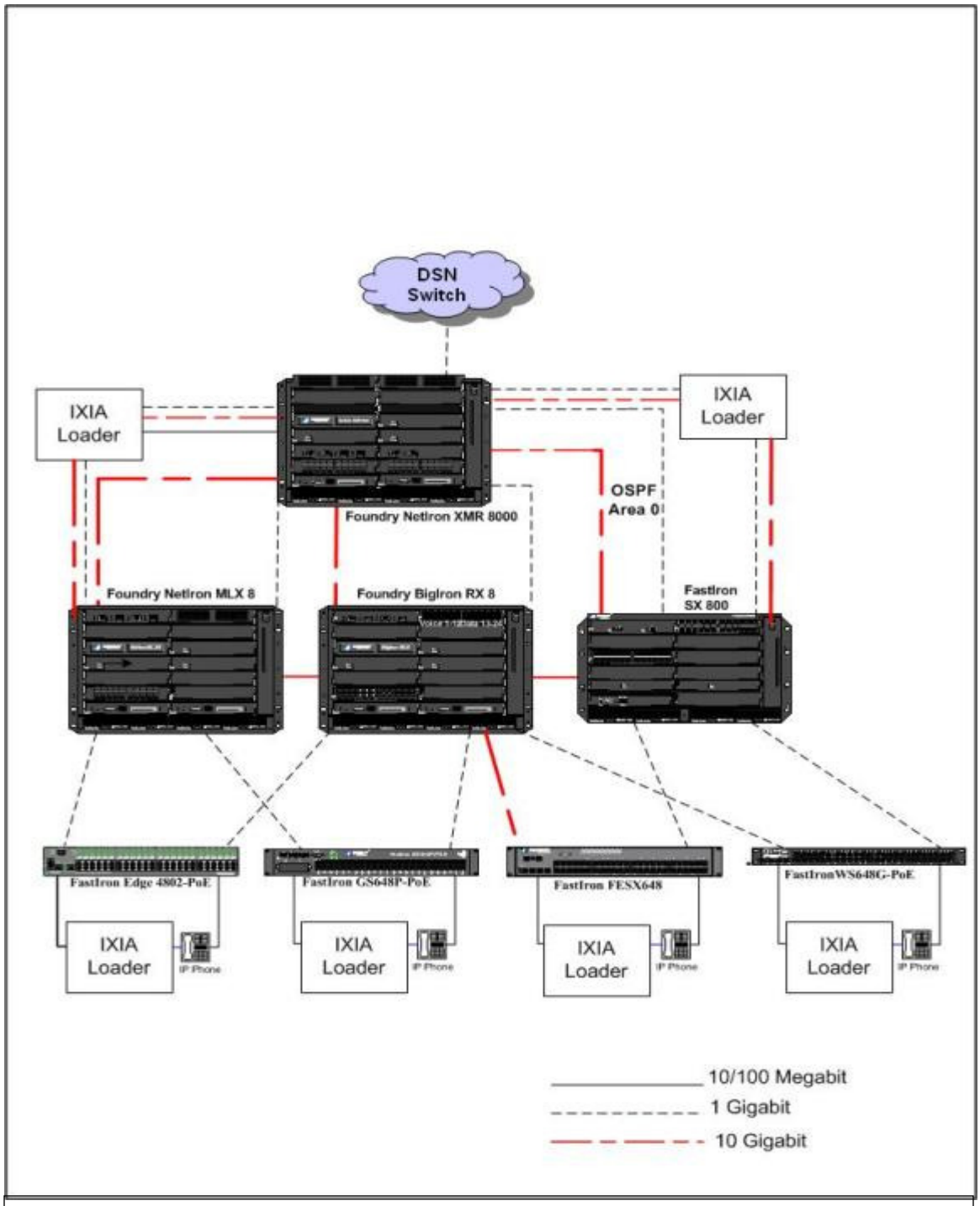
NOTES:
1 In accordance with UCR 2007, Appendix 3, A3.3.9.4, OSPF, IS-IS, and BGP are the routing protocols supported for core and distribution components. The redundancy protocol shall be VRRP or equivalent protocol for access components.
2 Security is tested by DISA-led Information Assurance test teams and published in a separate report, reference (c).

Table 2-2. ASLAN and non-ASLAN Component Requirements (continued)

LEGEND:

802.1d	Standard for Local and Metropolitan Area Networks: MAC Bridges	ASLAN	Assured Services LAN
802.1p	LAN Layer 2 QoS/CoS Protocol for Traffic Prioritization	BGP	Border Gateway Protocol
802.1Q	Standards for Local and Metropolitan Area Networks: Virtual Bridged Local Area Networks	CoS	Class of Service
802.1s	Standard for Local and Metropolitan Area Networks - Amendment 3 to 802.1Q Virtual Bridged Local Area Networks: Multiple Spanning Trees	CSMA/CD	Carrier Sense Multiple Access with Collision Detection
802.1v	Standard for Local and Metropolitan Area Networks - Virtual Bridge Local Area Networks - Amendment 2: VLAN Classification by Protocol and Port (Amendment to IEEE 802.1Q, 1998 Edition)	DISA	Defense Information Systems Agency
802.1w	Standard for Local and metropolitan area networks - Common Specifications - Part 3: Media Access Control (MAC) Bridges: Rapid Configuration	DSCP	Differentiated Services Code Point
802.1x	Standard for Local and Metropolitan Area Networks Port-Based Network Access Control	IEEE	Institute of Electrical and Electronics Engineers
802.3ad	Standard for Information Technology – Local and Metropolitan Area Networks – Part 3: CSMA/CD Access Method and Physical Layer Specifications– Aggregation of Multiple Link Segments	ID	Identification
802.3af	Standard for CSMA/CD Access Method and Physical Layer Specifications - Data Terminal Equipment (DTE) Power via Media Dependent Interface (MDI)	IP	Internet Protocol
A	Appendix	IPv6	Internet Protocol version 6
		IS-IS	Intermediate System-Intermediate System
		LAN	Local Area Network
		MAC	Media Access Control
		NCID	Net-Centric Implementation Document
		N	total VoIP users / 64
		OSPF	Open Shortest-Path First
		QoS	Quality of Service
		RFC	Request for Comment
		SNMP	Simple Network Management Protocol
		STIGs	Security Technical Implementation Guides
		UCR	Unified Capabilities Requirements
		VLANs	Virtual LANs
		VoIP	Voice over Internet Protocol
		VRRP	Virtual Router Redundancy Protocol

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. Figure 2-5 depicts the SUT test configuration.



NOTE:
The SUT ASLAN as a Duel processors per chassis and must be deployed with a dual chassis for the core or distribution layers.

LEGEND:

ASLAN	Assured Services Local Area Network	IP	Internet Protocol
DSN	Defense Switched Network	SUT	System Under Test

Figure 2-5. SUT Test Configuration

9. SYSTEM CONFIGURATIONS. Table 2-3 provides the system configurations, hardware, and software components tested with the SUT. The SUT is certified with switching systems listed on the Unified Capabilities (UC) Approved Products List (APL) that are certified for use with an ASLAN or non-ASLAN.

Table 2-3. Tested System Configuration

System Under Test Components with Current Operating System			
Component (See note 1.)	**Release**	**Sub-component** (See note 1.)	**Function**
Foundry NetIron XMR 4000/**8000**/16000/32000	FI 4.0.0b	**NI-XMR-MR**	Core Processor for 4000/8000/16000 system
		NI-XMR-32-MR	Core Processor for 32000 system
		NI-X-SF1	Switch Fabric for 4000 system
		NI-X-SF3	Switch Fabric for 8000/16000 system
		NI-X-32-SF	Switch Fabric for 32000 system
		NI-XMR-10Gx2	2 Port 1/10 Gig fiber module
		NI-XMR-10Gx4	4 Port 1/10 Gig fiber module
		NI-XMR-1Gx20-SFP	20-Port 1 Gig fiber module
		NI-XMR-1Gx20-GC	20-Port 10/100/1000 Mbps copper module
Foundry NetIron MLX 4/**8**/16/32	FI 4.0.0b	**NI-MLX-MR**	Core Processor for 4/8/16 system
		NI-MLX-32-MR	Core Processor for 32 system
		NI-X-SF1	Switch Fabric 4 system
		NI-X-SF3	Switch Fabric 8/16 system
		NI-X-32-SF	Switch Fabric 32 system
		NI-MLX-10Gx2	2 Port 1/10 Gig fiber module
		NI-MLX-10Gx4	4 Port 1/10 Gig fiber module
		NI-MLX-1Gx20-SFP	20-Port 1 Gig fiber module
		NI-MLX-1Gx20-GC	20-Port 10/100/1000 Mbps copper module
		NI-MLX-1Gx48-T	48-port 10/100/1000Base-T, MRJ21 module
Foundry BigIron RX 4/**8**/16/32	FI 2.7.01	**RX-BI-MR**	Core Processor with 512MB Memory
		RX-BI-MR2	Core Processor with 2GB Memory
		RX-BI-32-MR	Core Processor with 512MB Memory for RX-32
		RX-BI-32-MR2	Core Processor with 2GB Memory for RX-32
		RX-BI-SFM1	Switch Fabric for RX-4
		RX-BI-SFM3	Switch Fabric for RX-8 and RX-16
		RX-BI-32-SFM	Switch Fabric for RX-32
		RX-BI-BI2XG	2 Port 1/10 Gig fiber module
		RX-BI-BI4XG	4 Port 1/10 Gig fiber module
		RX-BI-BI24F	24-Port Gig Ethernet SFP module
		RX-BI-BI24HF	24-Port 100/1000 Ethernet SFP module
		RX-BI-BI24C	24-Port 10/100/1000 Mbps copper module
		RX-BI-16XG	16-port 10GbE SFP+ module
FastIron SX 800[2]/SX 1600/ FastIron Super X	FI 5.0.00	**SX-FIZMR**	Core Processor SX-800 / SX-1600
		SX-FI12GM-4	12 Port 10/100/1000 Copper / Fiber Core Processor Super X
		FI-FISF	Switch Fabric SX-800 / SX-1600
		SX-FI42XG	2 Port XFP 10 Gig Ethernet module
		SX-FI42XGW	2 Port LAN/WAN XFP 10 Gig Ethernet module
		SX-FI424F	24-Port mini-GBIC based Ethernet module
		SX-FI424C	24-Port 10/100/1000 Ethernet module
		SX-FI424HF	24-Port 10/100/1000 Combo Fiber Ethernet module
		SX-FI424P	24-Port 10/100/1000 Ethernet module with PoE
		SX-FIZMR-6-PREM6	Zero Port Core Processor SX-800 / SX-1600
		SX-FI624HF	24-Port 10/100/1000 Combo Fiber Ethernet module
		SX-FI62XG	2 Port XFP 10 Gig Ethernet module
		SX-FI624P	24-Port 10/100/1000 Ethernet module with PoE
		SX-FI624C	24-Port 10/100/1000 Ethernet module
		SX-24GCPOE	PoE Module to upgrade non PoE copper ports to POE

Table 2-3. Tested System Configurations (continued)

Component (See note 1.)	Release	Sub-component (See note 1.)	Function
FastIron SX 800[2]/SX 1600/ FastIron Super X	FI 5.0.00	SX-FI8GMR6	4 Port 10/100/1000 Copper + 4 Port 1000 SFP Core Processor SX-800 / SX-1600
		SX-FI8GMR6-PREM6	4 Port 10/100/1000 Copper + 4 Port 1000 SFP Core Processor SX-800 / SX-1600
		SX-FI2XGMR6	2 Port XFP 10 Gig Ethernet Core Processor Module
		SX-FI2XGMR6-PREM6	2 Port XFP 10 Gig Ethernet Core Processor Module
		SX-FI8GMR6	4 Port 10/100/1000 Copper + 4 Port 1000 SFP Core Processor SX-800 / SX-1600
		SX-FI8GMR6-PREM6	4 Port 10/100/1000 Copper + 4 Port 1000 SFP Core Processor SX-800 / SX-1600
FastIron FESX648[2]/ FESX624/FESX624HF/FESX424/ FESX424-PoE/ FESX424HF/FESX448	FI 5.0.00	Not Applicable	2- port 10 gig / 4-port T/X interface and 24-P10/100/1000 Mbps copper interface or 24-P10/100/1000 Mbps SFP interface
FastIron Edge 4802-PoE/FES2402-PoE/FES4802/FES2402/ FES12GCF	FI 4.1.01	Not Applicable	2-port T/X interface and 48-P10/100 Mbps copper interface
FastIron GS648P-PoE FGS624P-PoE/FGS648P/ FGS624P/FLS648/ FLS624	FI 4.3.02	Not Applicable	4-port T/X interface and 48-P10/100/1000 Mbps interface
FastIronWS648G-PoE/FWS648G/ FWS648-PoE/FWS648/ FWS624G-PoE/FWS624G/ FWS624-PoE/FWS624	FI 4.3.02	Not Applicable	4-port T/X interface and 48-P 10/100/1000 Mbps copper interface

NOTES:
1 Components bolded and underlined were tested by JITC. The other components in the family series were not tested; however, they utilize the same software and hardware and JITC analysis determined them to be functionally identical for interoperability certification purposes and they are also certified for joint use.
2 Indicates these switches support one processor and must be configured to failover to a redundant distribution switch.

LEGEND:

CRs	Capability Requirements
E	Enhanced
FRs	Feature Requirements
FX-MT	Foreign Exchange, ATM Term
GB	Gigabit GBIC
IOS	Internetwork Operating System
JITC	Joint Interoperability Test Command
L2	Layer 2
L3	Layer 3
ME	Metro Ethernet
NEB	Network Equipment Building
RJ	Registered Jack
S	Standard
SFP	Small Form Factor Pluggable
SUP	Supervisor
SUT	System Under Test
TX	The designation of a copper RJ-45 connection for Fast Ethernet
WS	Workgroup Switch

10. TESTING LIMITATIONS. None.

11. TEST RESULTS

a. Components. The SUT met the minimum interoperability requirements of the UCR, appendix 3, for an ASLAN. If a system meets the minimum requirements for an ASLAN, it also meets the lesser requirements for a non-ASLAN. The network consisted of three main components: core, distribution, and access switches. The SUT system and component test results are provided below.

(1) LAN Traffic Prioritization. The UCR, Appendix 3, Section A3.3.3, outlines several methodologies to implement prioritization. The SUT employed IEEE 802.1p/Q at the Data Link Layer (L2) and Differentiated Services Code Point (DSCP) at the Network Layer (L3) and 802.1p/Q to DSCP mapping, which was verified by capturing packets at both layers within the network.

(2) LAN Traffic Priority Methods. As required by the UCR 2007 A3.3.3.1, all LAN components supported DSCP and 802.1p to DSCP mapping. DSCP marking ensured voice signaling would get the highest level of priority; voice media stream would be prioritized lower than voice signaling but higher than data, and data traffic would receive the lowest priority. At L2, packets were tagged as: Data traffic = 0, Voice media = 5, and Voice Signaling and Network Management = 6, for L3 prioritization, DSCP were marked 0, 46, and 48 respectively for IPv4. The traffic class for IPv6 was marked as: 0x00000000 for data, 0x000000b8 for Voice Signaling and 0x000000c0 for Signaling and Network Management respectively. Uplinks were filled to capacity with data packets and voice packets were transmitted across the SUT. The voice packets were placed in a higher queue and were not delayed through the network. The SUT configuration for all access layer ports was trusted. This was accomplished by default or by assigning the trust QoS statements to all ports. The SUT has the capability to assign layer 2 tagging of any value 0-7, IPv4 DSCP values 0-63, and IPv6 traffic classes which meets the requirement.

(3) LAN Queuing. The UCR, Appendix 3, Paragraph 3.3.4.1, outlines that an ASLAN must support at least one of the following queuing mechanisms: Priority Queuing, Custom Queuing, Weighted Fair Queuing, or Class-Based Weighted Fair Queuing. The SUT supports all of the queuing mechanisms; however, only Priority Queuing was tested and is covered under this certification. Priority Queuing supports queues from high to low. All packets of a higher priority queue will be transmitted before any packets from a lower priority queue. Queues are serviced in order of queue priority. The highest queue gets serviced first until the queue is empty and then the next lower priority queue is serviced. If a lower priority queue is being serviced and a packet in the higher queue enters the higher queue, the highest priority queue gets serviced immediately after the current packet from the lower queue is sent. Once the higher priority queue is empty, the lower priority queue continues being serviced.

(4) LAN Behaviors. The SUT implemented DiffServ Class-Based Shaping (CBS) that uses DSCP values to define how traffic is treated at each individual network node. The DSCP values are used from the L3 IP header.

Traffic Policing limits the input or output transmission rate of a class of traffic based on user-defined criteria and marks packets by setting the IP Precedence value, the QoS group, or the DSCP value. The UCR, Appendix 3, Paragraph A3.3.4.2, outlines that the ASLAN must meet at least one of the following policing mechanisms: DiffServ PHB, Generic Traffic Shaping (GTS), or CBS. The SUT implemented DiffServ PHB which uses DSCP values to define how traffic is treated at each individual node, which meets the requirement.

(5) Virtual LAN (VLAN). The UCR, Appendix 3, Paragraph A3.3.5, outlines that the ASLAN shall support either implicit or explicit VLAN membership for: Port-based VLANs, Media Access Control (MAC) address-based VLANs, or L3 protocol-based VLANs. The SUT supports port-based VLANs that meet the requirement. Switches within the topology were configured with multiple VLANs using the IEEE 802.1Q tag to separate data from voice traffic. The MAC address and Protocol-based VLANs were verified through the LoC along with the packet captures.

(6) IEEE Conformance. All aspects of IEEE conformance were met through the LoC or testing. All test results are discussed under their respective topics.

(7) Reliability. The UCR, Appendix 3, Section A3.3.9.3, requires there be no single point of failure within the ASLAN that can cause an outage of more than 64 telephony subscribers. If an access device has a single point of failure and offers more than 64 ports (e.g. 96), the end users shall not use more than 64 of these connections for IP telephony. The remaining 32 ports shall only be utilized for data connections. In order to meet the availability requirement of an ASLAN, all switching/routing platforms that offer more than 64 telephony subscribers shall have a switch design or configuration that provides at a minimum: dual power supplies, dual processors, redundancy protocol, and switch fabric redundancy. To meet the reliability requirements, dual Gigabit and/or 10 Gigabit Link Aggregation was configured between the core and distribution switches, and dual Gigabit and/or 10 Gigabit L2 rapid spanning tree links connected the distribution and access switches, as shown in Figure 2-5. The link aggregation from the distribution to the core must be terminated onto separate fiber cards at the core switch. In addition, the reliability requirements for the SUT were verified via an LOC submitted by the Vendor. Reliability is a conditional requirement for a non-ASLAN.

(8) Network Management. The UCR, Appendix 3, Paragraph A3.3.7, requires that the vendor provide a management system to monitor the performance of the ASLAN portion of the VoIP system. Due to numerous third party systems and applications capable of performing this function, this requirement was verified via LoC.

(9) Security. Security requirements in accordance with the UCR, Appendix 3, Paragraph A3.3.8, were verified using the Information Assurance Test Plan. Results of the security testing are reported in a separate test report generated by the Defense Information Systems Agency (DISA) Information Assurance test personnel.

(10) LAN Availability. The UCR, Appendix 3, Paragraph A3.3.9.2, requires the ASLAN must have a hardware availability designed to meet the needs of the following subscribers: Special C2 ASLAN supports, Special C2 users, and are classified as a High Availability ASLAN and must meet 99.999 percent availability. A C2 ASLAN supports C2 users is classified as a Medium Availability ASLAN must have 99.997 percent availability. The LAN Availability was satisfied by a vendor LoC.

(11) IPv6. The UCR, Appendix 3, Section A3.2.8, requires that VoIP systems must meet the IPv6 capability requirements as defined in the UCR, appendix 11. An IPv6 capable system or product, as defined in the UCR, paragraph 1.7, shall be capable of receiving, processing, and forwarding IPv6 packets and/or interfacing with other systems and protocols in a manner similar to that of IPv4. The IPv6 capability is now satisfied with ASLAN certification testing and a vendor LoC signed by an authorized representative of the company. The vendor stated, in writing, compliance to the following criteria:

(a) Conformant with IPv6 standards profile contained in the Department of Defense (DoD) Information Technology Standards Registry (DISR).

(b) Maintaining interoperability in heterogeneous environments and with IPv4.

(c) Commitment to upgrade as the IPv6 standard evolves.

(d) Availability of contractor/vendor IPv6 technical support.

The UCR, Appendix 11, Section A11.3.15, requires the system to support the Open Shortest Path First (OSPF) for IPv6. The OSPF version three (OSPF v3) was used during the tests. The IPv6 capabilities were tested and all requirements were met.

(12) Traffic Engineering

(a) Links. To meet the ASLAN requirements for failover, all links connected between the core and distribution switches and between the distribution switches were configured as Link Aggregation. The link aggregation between the core and distribution must be terminated on separate fiber cards at each switch.

(b) Scalability. The SUT can be scaled to meet any number of IP phone subscribers as long as the SUT is composed of the equipment and software listed in Table 2-3, and are consistent with traffic engineering constraints contained in the UCR, Appendix 3. Table 2-4, which was approved by the DSN Configuration Control Board (DSN CCB) on Dec 2004, outlines the maximum number of subscribers that can be supported per each link capacity.

Table 2-4. IP Subscriber Supportability by Link Capacity

Link Type	LAN BW	Users
Non-Converged	10 Mbps	64 (See note 1.)
	100 Mbps	64 (See note 1.)
	1 Gbps	64 (See note 1.)
	10 Gbps	64 (See note 1.)
	10 Mbps LP	100 (See note 2.)
	100 Mbps LP	1000 (See note 2.)
	1 Gbps LP	10000 (See note 2.)
	10 Gbps LP	100000 (See note 2.)
Converged	10 Mbps	25 (See note 3.)
	100 Mbps	64 (See note 1.)
	1 Gbps	64 (See note 1.)
	10 Gbps	64 (See note 1.)
	10 Mbps LP	25 (See note 3.)
	100 Mbps LP	250 (See note 4.)
	1 Gbps LP	2500 (See note 4.)
	10 Gbps LP	25000 (See note 4.)

NOTES:
1 For single links, number of telephony subscribers is limited to a maximum of 64 because of single point of failure. This limit applies specifically to ASLANs.
2 The number of users is calculated as bandwidth (BW) divided by 100 kbps per user.
3 The number of users was limited to 64 telephony subscribers per note 1 or 25% of total users per note 1, whichever was less.
4 For the converged network, voice traffic was engineered not to exceed 25 % of total utilization using an estimated 100 kbps per voice call.

LEGEND:

ASLAN	Assured Services LAN	kbps	kilobits per second
BW	Bandwidth	LAN	Local Area Network
Gbps	Gigabits per second	LP	Link Pair
IP	Internet Protocol	Mbps	Megabits per second

(13) LAN Architectures. The Foundry NetIron XMR, MLX, and BigIron RX series is certified for use in the core, distribution, and access layers under the guidelines of the UCR 2007. The Foundry FastIron Super X and FastIron FESX series are certified for use in the distribution and access layers. The Foundry FES, FGS, FLS, and FWS series are certified for use in the access layer.

The core switch is configured with fully redundant processors and a full mesh links to the distribution switches. To meet the ASLAN failover requirements, OSPF V.3 was implemented between the core and distribution layer. The OSPF V.3 utilizes link-state protocols to identify lowest cost paths within the LAN. Additionally, OSPF V.3 is an open standard, and will potentially be a common protocol between different vendors equipment.

The distribution layer switches are connected in a fully redundant mode to the core switches and to each other using the OSPF V.3 and VRRP architecture. These switches also provide redundant connectivity to the access switches wherever possible. If there are less than 64 users, redundancy is not required.

The access layer switches provide access to telephony users. Components supporting the IEEE 802.3af standard are depicted with PoE in the component title or function and they will provide PoE to any certified IP phone on the DSN APL that supports IEEE 802.3af. Other components that provide PoE but do not comply with the IEEE 802.3af standard will support any IP phone on the DSN APL. Other IP phones on the DSN APL will have to be powered by an external power supply if they are connected to a component that provides PoE but does not support the IEEE 802.3af standard.

To meet the ASLAN failover requirements, OSPF was implemented between the core and distribution layer. The OSPF utilizes link-state protocols to identify lowest cost paths within the LAN. Additionally, OSPF is an open standard, and is a common protocol between different vendors equipment.

(a) Delay. The UCR, Appendix 3, Section A3.3.2.1, states the one-way packet delay shall be five milliseconds (ms) or less, as measured over a five-minute period. The average one-way delay for each of the sampled five-minute periods, measured between the access and core devices, was less than 0.1 ms, which met the requirement.

(b) Jitter. The UCR, appendix 3, section A3.3.2.2 states jitter for voice media packets will be 5 ms or less as averaged over any five-minute period. With a 100 percent bandwidth load, jitter was measured was less than 0.1 ms over a five-minute period, which met the requirement.

(c) Packet Loss. Network packet loss occurs when packets are sent, but not received at the final destination. The UCR, Appendix 3, Section A3.3.2.3, states that LANs shall be engineered so the measured voice packet loss within the LAN shall not exceed 0.05 percent averaged over any five-minute period. With 100 percent bandwidth load, the measured packet loss was less than minimum device measurement, which met the requirement.

b. System Interoperability Results. The SUT is certified for joint use within the DSN with a digital switching systems listed on the UC APL which are certified for use with an ASLAN or non-ASLAN. The SUT is certified to support DSN Assured Services over IP as an ASLAN in accordance with the requirements set forth in the UCR, Appendix 3. If a system meets the minimum requirements for an ASLAN, it also meets the lesser requirements for a non-ASLAN. Non-ASLANs are “commercial grade” and provide support to Command and Control (C2) (ROUTINE only calls) (C2(R)) or non-C2 voice subscribers. The SUT is certified for joint use as a non-ASLAN for C2R and non-C2 traffic. Non-ASLANs may provide MLPP to users authorized to originate only ROUTINE precedence calls but terminate all precedence levels. Non-ASLANs do not need to meet the availability or redundancy requirements of the Special C2 users or the C2 users capable of originating precedence calls above ROUTINE. Since non-ASLANs are not required to support the reliability requirements detailed in the UCR for ASLANs, C2 users and Special C2 users are not authorized to be served by a non-ASLAN. The

system interoperability test summary is shown in Table 2-5 and the detailed component interoperability test status is shown Table 2-6.

Table 2-5. SUT System Interoperability Test Summary

Device Requirement[1]	Reference	Test Results	Remarks
Delay measured at 5 ms or less	UCR, Appendix 3, A3.3.2.1	Met	The average was 0.0 ms.
Jitter measured at less than 5 ms	UCR, Appendix 3, A3.3.2.2	Met	Measured to be 0.0 ms or less.
Packet Loss less than 0.05%	UCR, Appendix 3, A3.3.2.3	Met	Measured to be 0.00%.
Reliability	UCR, Appendix 3, Section A.3.3.9.3	Met	See note 2.
Availability	UCR, Appendix 3, Section A3.3.9.2	Met	See note 3.
IPv6	UCR, Appendix 3, Section A3.2.8	Met	See note 3.
Security	UCR, Appendix 3, A3.3.8	Met	See note 4.

NOTES:
1 If a system meets the minimum requirements for an ASLAN, it also meets the lesser requirements for a non-ASLAN.
2 Reliability is a conditional requirement for a non-ASLAN.
3 Availability must meet the requirement of 99.999% for Special C2 users and 99.997% for C2 users. LAN Availability was satisfied by vendor Letter of Compliance.
4 An IPv6 capable system or product, as defined in the UCR, paragraph 1.7, shall be capable of receiving, processing, and forwarding IPv6 packets and/or interfacing with other systems and protocols in a manner similar to that of IPv4. IPv6 capability was satisfied by JITC Interoperability testing and vendor Letter of Compliance signed by the Vice President of the company. The vendor must state, in writing, compliance to the following criteria:
   a. Conformant with IPv6 standards profile contained in the DISR.
   b. Maintaining interoperability in heterogeneous environments and with IPv4.
   c. Commitment to upgrade as the IPv6 standard evolves.
   d. Availability of contractor/vendor IPv6 technical support.
5 Security is tested by DISA-led Information Assurance test teams and published in a separate report, reference (c).

LEGEND:

ASLAN	Assured Services Local Area Network	IPv6	Internet Protocol version 6
C2	Command and Control	LAN	Local Area Network
DISA	Defense Information Systems Agency	ms	millisecond
DISR	DoD Information Technology Standards Registry	SUT	System Under Test
DoD	Department of Defense	UCR	Unified Capabilities Requirements
IPv4	Internet Protocol version 4		

Table 2-6. Component Interoperability Test Summary

DSN Line Interfaces						
Interface	**Component (See note 1.)**	**Status**	**Device Requirement**	**Test Results**	**Reference**	**Remarks**
10000/1000 Base SX/LX **100BaseFX** **10/100/1000 BaseT**	**Foundry NetIron XMR** 4000/**8000**/16000/32000	Certified as: Core Distribution Access	LAN Traffic Prioritization	Met	UCR, Appendix 3, A3.3.3	
			LAN Traffic Priority Methods	Met	UCR, Appendix 3, A3.3.3.1	
			LAN Queuing	Met	UCR, Appendix 3, A3.3.4.1	
			LAN Behaviors	Met	UCR, Appendix 3, A3.3.4.2	
			VLANs	Met	UCR, Appendix 3, A3.3.5	
			IEEE Conformance	Met	UCR, Appendix 3, A3.3.9.1	
			LAN Availability	Met	UCR, Appendix 3, A3.3.9.2	This is met by a vendor LoC.
			LAN Redundancy	Met	UCR, Appendix 3, A3.3.9.3	Redundancy is a conditional requirement for a non-ASLAN.[2]
			LAN Network Management	Met	UCR, Appendix 3, A3.3.7	This is met by a vendor LoC.
			LAN Security	Met	UCR, Appendix 3, A.3.3.8	See note 3.
			LAN IPv6 Requirements	Met	UCR, Paragraph 1.7, Appendix 3, A3.2.8 and Appendix 11	See note 4.
			TE	Met	UCR, Appendix 3, A.3.3.9.6	Redundant links are not required for a non-ASLAN.[2]
10000/1000 Base SX/LX **10/100/1000 BaseT**	**Foundry NetIron MLX** 4/**8**/16/32	Certified as: Core Distribution Access	LAN Traffic Prioritization	Met	UCR, Appendix 3, A3.3.3	
			LAN Traffic Priority Methods	Met	UCR, Appendix 3, A3.3.3.1	
			LAN Queuing	Met	UCR, Appendix 3, A3.3.4.1	
			LAN Behaviors	Met	UCR, Appendix 3, A3.3.4.2	
			VLANs	Met	UCR, Appendix 3, A3.3.5	
			IEEE Conformance	Met	UCR, Appendix 3, A3.3.9.1	
			LAN Availability	Met	UCR, Appendix 3, A3.3.9.2	This is met by a vendor LoC.
			LAN Redundancy	Met	UCR, Appendix 3, A3.3.9.3	Redundancy is a conditional requirement for a non-ASLAN.[2]
			LAN Network Management	Met	UCR, Appendix 3, A3.3.7	This is met by a vendor LoC.
			LAN Security	Met	UCR, Appendix 3, A.3.3.8	See note 3.
			LAN IPv6 Requirements	Met	UCR, Paragraph 1.7, Appendix 3, A3.2.8 and Appendix 11	See note 4.
			TE	Met	UCR, Appendix 3, A.3.3.9.6	Redundant links are not required for a non-ASLAN.[2]

Table 2-6. Component Interoperability Test Summary (continued)

DSN Line Interfaces						
Interface	**Component (See note 1.)**	**Status**	**Device Requirement**	**Test Results**	**Reference**	**Remarks**
10000/1000 Base SX/LX **10/100/1000 BaseT**	**Foundry BigIron RX** 4/**8**/16/32	Certified as: Core Distribution Access	LAN Traffic Prioritization	Met	UCR, Appendix 3, A3.3.3	
			LAN Traffic Priority Methods	Met	UCR, Appendix 3, A3.3.3.1	
			LAN Queuing	Met	UCR, Appendix 3, A3.3.4.1	
			LAN Behaviors	Met	UCR, Appendix 3, A3.3.4.2	
			VLANs	Met	UCR, Appendix 3, A3.3.5	
			IEEE Conformance	Met	UCR, Appendix 3, A3.3.9.1	
			LAN Availability	Met	UCR, Appendix 3, A3.3.9.2	This is met by a vendor LoC.
			LAN Redundancy	Met	UCR, Appendix 3, A3.3.9.3	Redundancy is a conditional requirement for a non-ASLAN.[2]
			LAN Network Management	Met	UCR, Appendix 3, A3.3.7	This is met by a vendor LoC.
			LAN Security	Met	UCR, Appendix 3, A.3.3.8	See note 3.
			LAN IPv6 Requirements	Met	UCR, Paragraph 1.7, Appendix 3, A3.2.8 and Appendix 11	See note 4.
			TE	Met	UCR, Appendix 3, A.3.3.9.6	Redundant links are not required for a non-ASLAN.[2]
10000/1000 Base SX/LX **10/100/1000 BaseT**	**FastIron SX 800**/SX 1600/ FastIron Super X	Certified as: Distribution Access	LAN Traffic Prioritization	Met	UCR, Appendix 3, A3.3.3	
			LAN Traffic Priority Methods	Met	UCR, Appendix 3, A3.3.3.1	
			LAN Queuing	Met	UCR, Appendix 3, A3.3.4.1	
			LAN Behaviors	Met	UCR, Appendix 3, A3.3.4.2	
			VLANs	Met	UCR, Appendix 3, A3.3.5	
			IEEE Conformance	Met	UCR, Appendix 3, A3.3.9.1	
			LAN Availability	Met	UCR, Appendix 3, A3.3.9.2	This is met by a vendor LoC.
			LAN Redundancy	Met	UCR, Appendix 3, A3.3.9.3	Redundancy is a conditional requirement for a non-ASLAN.[2]
			LAN Network Management	Met	UCR, Appendix 3, A3.3.7	This is met by a vendor LoC.
			LAN Security	Met	UCR, Appendix 3, A.3.3.8	See note 3.
			LAN IPv6 Requirements	Met	UCR, Paragraph 1.7, Appendix 3, A3.2.8 and Appendix 11	See note 4.
			TE	Met	UCR, Appendix 3, A.3.3.9.6	Redundant links are not required for a non-ASLAN.[2]

Table 2-6. Component Interoperability Test Summary (continued)

DSN Line Interfaces						
Interface	**Component (See note 1.)**	**Status**	**Device Requirement**	**Test Results**	**Reference**	**Remarks**
10000/1000 Base SX/LX **10/100/1000 BaseT**	**FastIron FESX648**[2]/ FESX624/FESX624 HF/FESX424/ FESX424-PoE/FESX424HF/FE SX448	Certified as: Distribution Access	LAN Traffic Prioritization	Met	UCR, Appendix 3, A3.3.3	
			LAN Traffic Priority Methods	Met	UCR, Appendix 3, A3.3.3.1	
			LAN Queuing	Met	UCR, Appendix 3, A3.3.4.1	
			LAN Behaviors	Met	UCR, Appendix 3, A3.3.4.2	
			VLANs	Met	UCR, Appendix 3, A3.3.5	
			IEEE Conformance	Met	UCR, Appendix 3, A3.3.9.1	
			LAN Availability	Met	UCR, Appendix 3, A3.3.9.2	This is met by a vendor LoC.
			LAN Redundancy	Met	UCR, Appendix 3, A3.3.9.3	Redundancy is a conditional requirement for a non-ASLAN.[2]
			LAN Network Management	Met	UCR, Appendix 3, A3.3.7	This is met by a vendor LoC.
			LAN Security	Met	UCR, Appendix 3, A.3.3.8	See note 3.
			LAN IPv6 Requirements	Met	UCR, Paragraph 1.7, Appendix 3, A3.2.8 and Appendix 11	See note 4.
			TE	Met	UCR, Appendix 3, A.3.3.9.6	Redundant links are not required for a non-ASLAN.[2]
1000 Base SX/LX **10/100/1000 BaseT**	**FastIron Edge 4802-PoE**/ FES2402-PoE/FES4802/FES 2402/ FES12GCF	Certified as: Access	LAN Traffic Prioritization	Met	UCR, Appendix 3, A3.3.3	
			LAN Traffic Priority Methods	Met	UCR, Appendix 3, A3.3.3.1	
			LAN Queuing	Met	UCR, Appendix 3, A3.3.4.1	
			LAN Behaviors	Met	UCR, Appendix 3, A3.3.4.2	
			VLANs	Met	UCR, Appendix 3, A3.3.5	
			IEEE Conformance	Met	UCR, Appendix 3, A3.3.9.1	
			LAN Availability	Met	UCR, Appendix 3, A3.3.9.2	This is met by a vendor LoC.
			LAN Redundancy	Met	UCR, Appendix 3, A3.3.9.3	Redundancy is a conditional requirement for a non-ASLAN.[2]
			LAN Network Management	Met	UCR, Appendix 3, A3.3.7	This is met by a vendor LoC.
			LAN Security	Met	UCR, Appendix 3, A.3.3.8	See note 3.
			LAN IPv6 Requirements	Met	UCR, Paragraph 1.7, Appendix 3, A3.2.8 and Appendix 11	See note 4.
			TE	Met	UCR, Appendix 3, A.3.3.9.6	Redundant links are not required for a non-ASLAN.[2]

Table 2-6. Component Interoperability Test Summary (continued)

DSN Line Interfaces						
Interface	**Component (See note 1.)**	**Status**	**Device Requirement**	**Test Results**	**Reference**	**Remarks**
1000 Base SX/LX **10/100/1000 BaseT**	**FastIron GS648P-PoE** FGS624P-PoE/FGS648P/ FGS624P/FLS648/ FLS624	Certified as: Access	LAN Traffic Prioritization	Met	UCR, Appendix 3, A3.3.3	
			LAN Traffic Priority Methods	Met	UCR, Appendix 3, A3.3.3.1	
			LAN Queuing	Met	UCR, Appendix 3, A3.3.4.1	
			LAN Behaviors	Met	UCR, Appendix 3, A3.3.4.2	
			VLANs	Met	UCR, Appendix 3, A3.3.5	
			IEEE Conformance	Met	UCR, Appendix 3, A3.3.9.1	
			LAN Availability	Met	UCR, Appendix 3, A3.3.9.2	This is met by a vendor LoC.
			LAN Redundancy	Met	UCR, Appendix 3, A3.3.9.3	Redundancy is a conditional requirement for a non-ASLAN.[2]
			LAN Network Management	Met	UCR, Appendix 3, A3.3.7	This is met by a vendor LoC.
			LAN Security	Met	UCR, Appendix 3, A.3.3.8	See note 3.
			LAN IPv6 Requirements	Met	UCR, Paragraph 1.7, Appendix 3, A3.2.8 and Appendix 11	See note 4.
			TE	Met	UCR, Appendix 3, A.3.3.9.6	Redundant links are not required for a non-ASLAN.[2]

Table 2-6. Component Interoperability Test Summary (continued)

DSN Line Interfaces						
Interface	**Component (See note 1.)**	**Status**	**Device Requirement**	**Test Results**	**Reference**	**Remarks**
1000 Base SX/LX **10/100/1000 BaseT**	**FastIron WS648G-PoE**/ FWS648G/FWS648-PoE/FWS648/FWS624G-PoE/FWS624G/FWS624-PoE/FWS624	Certified as: Access	LAN Traffic Prioritization	Met	UCR, Appendix 3, A3.3.3	
			LAN Traffic Priority Methods	Met	UCR, Appendix 3, A3.3.3.1	
			LAN Queuing	Met	UCR, Appendix 3, A3.3.4.1	
			LAN Behaviors	Met	UCR, Appendix 3, A3.3.4.2	
			VLANs	Met	UCR, Appendix 3, A3.3.5	
			IEEE Conformance	Met	UCR, Appendix 3, A3.3.9.1	
			LAN Availability	Met	UCR, Appendix 3, A3.3.9.2	This is met by a vendor LoC.
			LAN Redundancy	Met	UCR, Appendix 3, A3.3.9.3	Redundancy is a conditional requirement for a non-ASLAN.[2]
			LAN Network Management	Met	UCR, Appendix 3, A3.3.7	This is met by a vendor LoC.
			LAN Security	Met	UCR, Appendix 3, A.3.3.8	See note 3.
			LAN IPv6 Requirements	Met	UCR, Paragraph 1.7, Appendix 3, A3.2.8 and Appendix 11	See note 4.
			TE	Met	UCR, Appendix 3, A.3.3.9.6	Redundant links are not required for a non-ASLAN.[2]

NOTES:
1 Components bolded and underlined were tested by JITC. The other components in the family series were not tested; however, they utilize the same software and hardware and JITC analysis determined them to be functionally identical for interoperability certification purposes and they are also certified for joint use.
2 Indicates these switches support one processor and must be configured to failover to a redundant distribution switch.
3 If a system meets the requirements for an ASLAN, it also meets the lesser requirements for a non-ASLAN.
4 Security is tested by DISA-led Information Assurance test teams and published in a separate report, reference (c).
5 The UCR, appendix 3, section A3.2.8, requires that VoIP systems must meet the IPv6 capability requirements as defined in the UCR, appendix 11. An IPv6 capable system or product, as defined in the UCR, paragraph 1.7, shall be capable of receiving, processing, and forwarding IPv6 packets and/or interfacing with other systems and protocols in a manner similar to that of IPv4. IPv6 capability is satisfied with ASLAN certification testing and a vendor LoC signed by the Vice President of the company. Open Shortest Path First version three (OSPF V.3) was used during the tests. IPv6 capabilities were tested and requirements were met. The vendor stated, in writing, compliance to the following criteria:
a. Conformant with IPv6 standards profile contained in the DISR.
b. Maintaining interoperability in heterogeneous environments and with IPv4.
c. Commitment to upgrade as the IPv6 standard evolves.
d. Availability of contractor/vendor IPv6 technical support.

Table 2-6. Component Interoperability Test Summary (continued)

LEGEND:

10/100/1000BaseT	10/100/1000 Mbps (Baseband Operation, Twisted Pair)Ethernet	IPv6	Internet Protocol version 6
ASLAN	Assured Services Local Area Network	JITC	Joint Interoperability Test Command
DISA	Defense Information Systems Agency	LAN	Local Area Network
DISR	DoD Information Technology Standards Registry	Mbps	Megabits per second
DoD	Department of Defense	NEB	Network Equipment Building
DSN	Defense Switch Network	S	Standard
E	Enhanced	TE	Traffic Engineering
IEEE	Institute of Electrical and Electronics Engineers	UCR	Unified Capabilities Requirements
IPv4	Internet Protocol version 4	VLAN	Virtual Local Area Network
		WS	Workgroup Station

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 https://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.