DEFENSE INFORMATION SYSTEMS AGENCY
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IN REPLY REFER TO: Joint Interoperability Test Command (JTE) **25 Mar 13**

SUBJECT: Joint Interoperability Certification of the Juniper Networks MX240, MX480, and MX960 Switch Series with Software Release Junos 12.1

References: (a) Department of Defense (DoD) Directive 4630.05, "Interoperability and Supportability of Information Technology (IT) and National Security Systems (NSS)," 5 May 2004
(b) DoD Instruction 8100.04, "DoD Unified Capabilities (UC)," 9 December 2010
(c) through (e), 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 (IO) test certification.

2. The Juniper Networks MX240, MX480, and MX960 switch series with software release Junos 12.1 is hereinafter referred to as the system under test (SUT). The SUT meets all of its critical IO requirements and is certified for joint use within the Defense Information System Network (DISN) as an Assured Services Local Area Network (ASLAN) Core, Distribution, and Layer 2/Layer 3 Access switch. The SUT was also tested and certified for Multiprotocol Label Switching (MPLS) and Layer 2/Layer 3 Virtual Private Networks (VPNs). The SUT is certified as interoperable for joint use with other ASLAN components listed on the Unified Capabilities (UC) Approved Products List (APL) with the following interfaces: 10/100/1000BaseT and 100/1000BaseX for access, and 1000BaseT and 1000/10000BaseX for uplink. All of these interfaces were tested with the exception of the 10BaseT interface. JITC analysis determined that the 10BaseT interface is a low risk for certification based on the vendor's Letter of Compliance (LoC) to comply with the Institute of Electrical and Electronics Engineers (IEEE) 802.3i standard and the testing data collected at all other data rates. The SUT meets the critical interoperability requirements set forth in Reference (c), using test procedures derived from Reference (d). The Juniper switches listed under components in Table 1 all employ the same software and similar hardware as the SUT. JITC analysis determined these systems to be functionally identical to the SUT for IO certification purposes, and they are also certified for joint use.

The SUT is certified to support Assured Services within an ASLAN. If a component meets the minimum requirements for deployment in an ASLAN, it also meets the lesser requirements for deployment in 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. When deployed in a non-ASLAN, the SUT may also be used to receive all levels of precedence, but is limited to supporting calls that are originated at ROUTINE precedence only. Non-ASLANs do not meet the availability or redundancy requirements for C2 or Special C2 users and therefore are not authorized to support precedence calls originated above ROUTINE.

Testing of the SUT did not include video services or data applications; however, simulated video traffic, preferred data, and best effort data were 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 document, are certified by JITC. This certification expires upon changes that affect IO but no later than three years from the date of this memorandum.

3. This finding is based on IO testing conducted by the United States Army Information Systems Engineering Command, Technology Integration Center (USAISEC TIC), review of the vendor's LoC, DISA adjudication of open test discrepancy reports (TDRs), and the DISA Certifying Authority (CA) Recommendation. The IO testing was conducted by the USAISEC TIC, Fort Huachuca, Arizona, from 30 July through 13 November 2012. Review of the vendor's LoC was completed on 4 December 2012. The DISA adjudication of outstanding TDRs was completed on 18 December 2012 and 11 February 2013. The DISA CA provided a positive recommendation on 20 November 2012, based on the security testing completed by USAISEC TIC-led information assurance (IA) test teams. The IA test results are published in a separate report, Reference (e). Enclosure 2 documents the IO test results and describes the tested network and system configurations.

4. Table 1 provides a UC APL product summary. Table 2 provides the SUT interface IO status and Table 3 provides the Capability Requirements (CRs) and Functional Requirements (FRs) status. The threshold CRs/FRs for ASLAN components are established by Section 5.3.a of Reference (c) and were used to evaluate the IO of the SUT. Enclosure 3 provides a detailed list of the interface, capability, and functional requirements.

Table 1. UC APL Product Summary

Component (See Note 1)	Release	Sub-Component (See Note 1)	Certification Applicability		
			Core	Distribution	Access
Juniper MX960BASE-AC MX960BASE-AC-ECM MX960BASE-DC MX960BASE-DC-ECM MX960-PREMIUM2-AC MX960-PREMIUM2-AC-ECM MX960-PREMIUM2-DC MX960-PREMIUM2-DC-ECM MX960-PREMIUM-AC MX960-PREMIUM-AC-ECM MX960-PREMIUM-DC MX960-PREMIUM-DC-ECM **MX480BASE-AC** MX480BASE-DC **MX480-PREMIUM2-AC** MX480-PREMIUM2-DC MX480-PREMIUM-AC MX480-PREMIUM-DC MX240BASE-AC-HIGH MX240BASE-AC-LOW MX240BASE-DC MX240-PREMIUM2-AC-HIGH MX240-PREMIUM2-AC-LOW MX240-PREMIUM2-DC MX240-PREMIUM-AC-HIGH MX240-PREMIUM-AC-LOW MX240-PREMIUM-DC	JUNOS OS 12.1	RE-S-1300-2048 **RE-S-2000-4096** RE-S-1800X2-8G RE-S-1800X2-16G RE-S-1800X4-8G **RE-S-1800X4-16G** **SCB-MX960** **SCBE-MX** **DPCE-R-20GE-2XGE** DPCE-R-2XGE-XFP **DPCE-R-40GE-SFP** **DPCE-R-40GE-TX** **DPCE-R-4XGE-XFP** DPCE-R-Q-20GE-2XGE DPCE-R-Q-20GE-SFP **MPC-3D-16XGE-SFPP-R** MPC-3D-16XGE-SFPP (See Note 2) MX-MPC1E-3D (See Note 2) MX-MPC1E-3D-Q (See Note 2) MX-MPC1E-3D-Q-R-B **MX-MPC1E-3D-R-B** MX-MPC2E-3D (See Note 2) MX-MPC2E-3D-EQ (See Note 2) MX-MPC2E-3D-EQ-R-B MX-MPC2E-3D-P (See Note 2) MX-MPC2E-3D-P-Q-B (See Note 2) MX-MPC2E-3D-P-Q-R-B MX-MPC2E-3D-P-R-B MX-MPC2E-3D-Q (See Note 2) MX-MPC2E-3D-Q-R-B **MX-MPC2E-3D-R-B** **MIC-3D-20GE-SFP** **MIC-3D-2XGE-XFP** **MIC-3D-40GE-TX** **MIC-3D-4XGE-XFP** **MS-DPC**	Yes	Yes	Yes

NOTES:
1. Components bolded and underlined were tested by the USAISEC TIC. The other components in the family series were not tested; however, they utilize the same OS software and similar hardware. JITC analysis determined them to be functionally identical for IO certification purposes and they are also certified for joint use.
2. Noted Trio (3D) cards without the "-R" designation are reduced scale, L3 switching cards that do not support MPLS L3 VPN (RFC 2547) with their basic licensing. Additional licensing must be applied to these cards to enable the full L3 scale capabilities of the card, to include support for MPLS L3 VPN (RFC 2547).

LEGEND:

APL	Approved Products List	OS	Operating System
IO	Interoperability	TIC	Technology Integration Center
JITC	Joint Interoperability Test Command	UC	Unified Capabilities
JUNOS	Juniper Operating System	UCR	Unified Capabilities Requirements
L3	Layer 3	USAISEC	U.S. Army Information Systems Engineering Command

Table 2. SUT Interface Interoperability Status

Interface	Applicability			UCR 2008, Change 3 Reference	Threshold CR/FR (See Note 1)	Status	Remarks
	Co	D	A				
Serial	C	C	C	5.3.1.3.9	1-4	Not Certified (See Note 3)	N/A
10Base-X	C	C	C (See Note 2)	5.3.1.3.1	1-6	Certified (See Note 4)	The SUT met CRs and FRs with the following IEEE standard: 802.3i (10BaseT).
100Base-X	R	R	C (See Note 2)	5.3.1.3.1	1-6	Certified	The SUT met CRs and FRs with the following IEEE standard: 802.3u (100BaseT).
1000Base-X	R	R	C (See Note 2)	5.3.1.3.1	1-6	Certified	The SUT met CR and FRs with the following IEEE standards: 802.3ab (1000BaseT), 802.3z (1000Base-SX, 1000Base-LX).
10000Base-X	C	C	C	5.3.1.3.1	1-6	Certified	The SUT met CRs and FRs with the following IEEE standard: 802.3ae (10GBase-SR, 10GBase-LR).
802.11a	C	C	C	5.3.1.3.1/5.3.1.7.2	1-6	Not Supported (See Note 5)	N/A
802.11b	C	C	C	5.3.1.3.1/5.3.1.7.2	1-6	Not Supported (See Note 5)	N/A
802.11g	C	C	C	5.3.1.3.1/5.3.1.7.2	1-6	Not Supported (See Note 5)	N/A
802.11n	C	C	C	5.3.1.3.1/5.3.1.7.2	1-6	Not Supported (See Note 5)	N/A
802.16	C	C	C	5.3.1.3.1/5.3.1.7.2	1-6	Not Supported (See Note 5)	N/A

NOTES:
1. The SUT high-level CR and FR ID numbers depicted in the Threshold CRs/FRs column can be cross-referenced in Table 3. These high-level CR/FR requirements refer to a detailed list of requirements provided in Enclosure 3.
2. Core and Distribution products must minimally support 802.3u (100Base-X) and 802.3z (1000Base-X). Access products must minimally support one of the following standards: 802.3i (10BaseT), 802.3j (10BaseF), 802.3u (100BaseT/F), 802.3z (1000BaseF), or 802.3ab (1000BaseT). Other rates and standards may be provided as conditional interfaces.
3. The SUT does support this interface for Command Line Interface (CLI) connectivity during initial setup only. This interface was not tested and is not certified for UC connectivity use.
4. The USAISEC TIC tested all these interfaces with the exception of the 10BaseT interface. JITC analysis determined that the 10BaseT interface is a low risk for certification based on the vendor's LoC to the IEEE 802.3i and the testing data collected at all other data rates.
5. The SUT does not support this interface. The interface was not tested, therefore, is not certified for use.

Table 2. SUT Interface Interoperability Status (continued)

LEGEND:

802.3ab	1000BaseT Gbps Ethernet Over Twisted Pair at 1Gbps (125 Mbps)
802.3ae	10 Gbps Ethernet
802.3i	10BaseT Mbps Over Twisted Pair
802.3j	10 Mbps Over Fiber
802.3u	Standard for Carrier Sense Multiple Access with Collision Detection at 100 Mbps
802.3z	Gigabit Ethernet Standard
802.11/16	IEEE Wireless Standards
10BaseF	10 Mbps Ethernet Over Fiber
10BaseT	10 Mbps (Baseband Operation, Twisted Pair) Ethernet
10Base-X	10 Mbps Ethernet Over Fiber or Copper
100BaseF	100 Mbps Ethernet Over Fiber
100BaseT	100 Mbps (Baseband Operation, Twisted Pair) Ethernet
100Base-X	100 Mbps Ethernet Over Fiber or Copper
1000BaseF	1000 Mbps Ethernet Over Fiber
1000Base-LX	1000 Mbps Ethernet Over Fiber
1000Base-SX	1000 Mbps Ethernet Over Fiber
1000BaseT	1000 Mbps (Baseband Operation, Twisted Pair) Ethernet
1000Base-X	1000 Mbps Ethernet Over Fiber or Copper
10000Base-X	10000 Mbps Ethernet Over Fiber or Copper
10GBase-LR	10000 Mbps Ethernet Over Fiber
10GBase-SR	10000 Mbps Ethernet Over Fiber
A	Access
C	Conditional
Co	Core
CR	Capability Requirement
D	Distribution
EIA	Electronic Industries Alliance
EIA-232	Standard for Defining the Mechanical and Electrical Characteristics for Connecting Data Terminal Equipment (DTE) and Data Circuit-Terminating Equipment (DCE) Data Communications Devices
FR	Functional Requirement
Gbps	Gigabits Per Second
ID	Identification
IEEE	Institute of Electrical and Electronics Engineers
JITC	Joint Interoperability Test Command
LoC	Letter of Compliance
LR	Long Range Optics
LX	Single-Mode Fiber Optics
Mbps	Megabits Per Second
N/A	Not Applicable
R	Required
SR	Short Range Optics
SX	Multi-Mode Fiber Optics
SUT	System Under Test
TIC	Technology Integration Center
UCR	Unified Capabilities Requirements
USAISEC	U.S. Army Information Systems Engineering Command

Table 3. SUT CRs and FRs Status

CR/FR ID	Capability/Function	Applicability (See Note 1)	UCR 2008, Change 3 Reference	Status	Remarks
1	**General Performance Parameters**				
	Performance Parameters	Required	5.3.1.3	Met	
	Port Interface Rates	Required	5.3.1.3.1	Met	
	Port Parameter Requirements	Required	5.3.1.3.2	Met (See Note 2)	
	Class of Service Markings	Required	5.3.1.3.3	Met	
	VLAN Capabilities	Required	5.3.1.3.4	Met	
	Protocols	Required	5.3.1.3.5	Partially Met (See Note 3)	
	QoS Features	Required	5.3.1.3.6	Met	
	Network Monitoring	Required	5.3.1.3.7	Met	
	Security	Required	5.3.1.3.8	Met (See Note 7)	
2	**E2E Performance Requirements**				
	Voice Services	Required	5.3.1.4.1	Met (See Note 4)	
	Video Services	Required	5.3.1.4.2	Met (See Note 4)	
	Data Services	Required	5.3.1.4.3	Met (See Note 4)	
3	**NM Requirements**				
	Configuration Control	Required	5.3.1.6.1	Met	
	Operational Changes	Required	5.3.1.6.2	Met	
	Performance Monitoring	Required	5.3.1.6.3	Met	
	Alarms	Required	5.3.1.6.4	Met	
	Reporting	Required	5.3.1.6.5	Met	
4	**Engineering Requirements**				
	Physical Media	Required	5.3.1.7.1	Met (See Note 5)	
	Wireless	Conditional	5.3.1.7.2	Not Tested (See Note 6)	
	Traffic Engineering	Required	5.3.1.7.3	Met (See Note 5)	
	Availability	Required	5.3.1.7.6	Met (See Note 5)	
	Redundancy	Required	5.3.1.7.7	Met (See Note 5)	
5	**MPLS**				
	MPLS Requirements	Conditional	5.3.1.8.4.1	Partially Met (See Note 3)	
	MPLS VPN Augmentation to VLANs	Conditional	5.3.1.8.4.2	Met	
6	**IPv6 Requirements**				
	Product Requirements	Required	5.3.5.4	Partially Met (See Note 3)	

Table 3. SUT CRs and FRs Status (continued)

NOTES:

1. The annotation of "required" refers to a high-level requirement category. The applicability of each sub-requirement is provided in Enclosure 3. The SUT does not need to provide conditional requirements. However, if a capability is provided, it must function according to the specified requirements.
2. When port duplex is manually set on 10/100/1000 speed interfaces, SUT does not indicate the state of the duplex through the command line. DISA adjudicated this as a minor impact with a Condition of Fielding outlined in the Juniper MX Series Deployment Guide.
3. The SUT does not comply with the following protocols:
   a. RFC5798: Partial Comply - Virtual Router Redundancy Protocol (VRRP) Version 3 for IPv4 and IPv6. JUNOS 12.2, the next new software release, does support VRRP which will be submitted for verification and validation testing through UCCO Desktop Review process. DISA has adjudicated this discrepancy as having a minor operational impact and accepted the vendor's POA&M.
   b. RFC 2737: Partial Comply - MIB (Entity). DISA adjudicated this as a minor impact with no POA&M required.
   c. RFC 4502: Partial Comply - RMON MIB. DISA adjudicated this as a minor impact with no POA&M required.
   d. RFC 3479 (MPLS): Non Comply – Fault Tolerance for the Label Distribution Protocol (LDP). JUNOS 12.1 does provide support for RFC 3478, Graceful Restart for LDP, which protects against LDP control plane failures. DISA has adjudicated this discrepancy as having minor operational impact with a Condition of Fielding that Juniper uses RFC3478 in lieu of RFC3479.
4. This requirement was verified and met using simulated voice, video, and data traffic in an operational emulated environment to meet E2E requirements. The SUT must be deployed IAW deployment guide and engineering guidelines in UCR 2008, Change 3, Section 5.3.1.4.
5. This requirement was met with the following stipulations: It is the site's responsibility to configure the SUT in a manner which meets the engineering requirements listed in Enclosure 2, Section 11.2 d, and that it does not create a single point of failure which could impact more than 96 C2 users.
6. Wireless requirements are conditional, were not tested, and, therefore, are not certified for use.
7. Security testing was accomplished via USAISEC TIC-led IA test teams and published in a separate report, Reference (e).

LEGEND:

ASLAN	Assured Services Local Area Network	MIB	Management Information Base
C2	Command and Control	MPLS	Multiprotocol Label Switching
CR	Capability Requirement	NM	Network Management
DISA	Defense Information Systems Agency	POA&M	Plan of Action and Milestones
E2E	End-to-End	QoS	Quality of Service
FR	Functional Requirement	RFC	Request For Comment
IAW	In Accordance With	RMON	Remote Monitoring
ID	Identification	SUT	System Under Test
IPv4	Internet Protocol Version 4	UCR	Unified Capabilities Requirements
IPv6	Internet Protocol Version 6	VLAN	Virtual Local Area Network
JUNOS	Juniper Operating System	VPN	Virtual Private Network

5. In accordance with the Program Manager's request, no detailed test report was developed. JITC distributes IO information via the JITC Electronic Report Distribution (ERD) system, which uses Unclassified-But-Sensitive Internet Protocol Router Network (NIPRNet) e-mail. More comprehensive IO status information is available via the JITC System Tracking Program (STP), which 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) NIPRNet at http://jit.fhu.disa.mil. Information related to DISN testing is on the Telecom Switched Services Interoperability (TSSI) website at http://jitc.fhu.disa.mil/tssi. All associated data is available on the DISA Unified Capability Coordination Office (UCCO) website located at http://www.disa.mil/ucco/. Due to the sensitivity of the information, the Information Assurance Accreditation Package (IAAP) that contains the approved configuration and deployment guide must be requested directly from U.S. Government civilian or uniformed military personnel at the UCCO; e-mail: disa.meade.ns.list.unified-capabilities-certification-office@mail.mil.

6. The testing point of contact Mr. James Hatch, DSN 821-2860, commercial (520) 533-2860, or email to james.d.hatch12.civ@mail.mil. The JITC point of contact is Ms. Anita Mananquil, DSN

879-5164, commercial (520) 538-5164, FAX DSN 879-4347, commercial (520) 538-4347, or e-mail to anita.l.mananquil.civ@mail.mil. JITC's mailing address is P.O. Box 12798, Fort Huachuca, AZ 85670-2798. The Tracking Number for the SUT is 1124204.

FOR THE COMMANDER:

3 Enclosures a/s

for RICHARD A. MEADOR
Chief
Battlespace Communications Portfolio

DISTRIBUTION (electronic mail):
DoD CIO
Joint Staff J-6, JCS
USD(AT&L)
ISG Secretariat, DISA, JTA
U.S. Strategic Command, J665
US Navy, OPNAV N2/N6FP12
US Army, DA-OSA, CIO/G-6 ASA(ALT), SAIS-IOQ
US Air Force, A3CNN/A6CNN
US Marine Corps, MARCORSYSCOM, SIAT, A&CE Division
US Coast Guard, CG-64
DISA/TEMC
DIA, Office of the Acquisition Executive
NSG Interoperability Assessment Team
DOT&E, Netcentric Systems and Naval Warfare
Medical Health Systems, JMIS IV&V
Defense Information Systems Agency, NS23

ADDITIONAL REFERENCES

(c) Office of the DoD Chief Information Officer, "Department of Defense Unified Capabilities Requirements 2008, Change 3," September 2011
(d) Joint Interoperability Test Command, "ASLAN Component Test Plan (UCTP)," February 2012
(e) U.S. Army Information Systems Engineering Command, Technology Integration Center (USAISEC TIC), "Information Assurance (IA) Assessment of Juniper MX240/480/960 Junos 12.1 (Tracking Number 1124204)," 23 October 2012

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CERTIFICATION TESTING SUMMARY

1. SYSTEM TITLE. Juniper Networks MX240/480/960 Switch Series with Software Release Junos 12.1

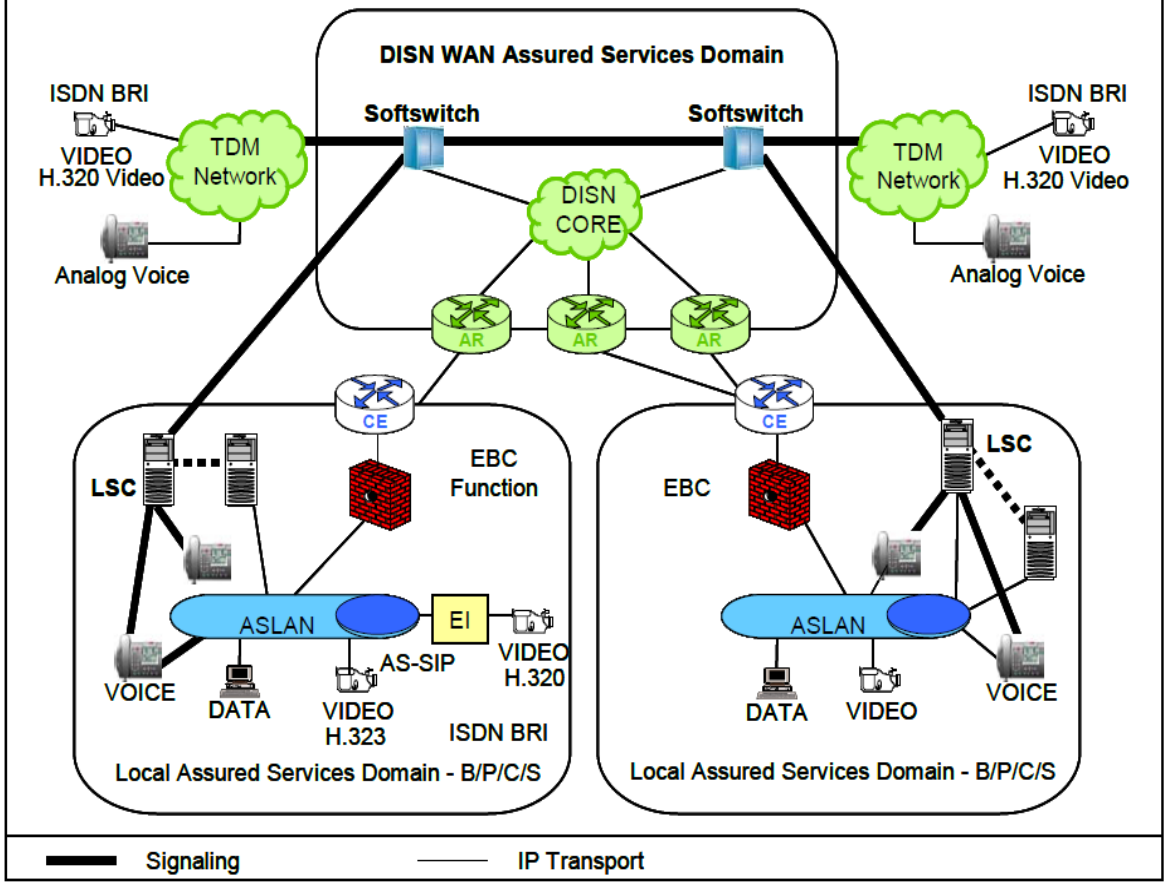
2. SPONSOR. Program Manager (PM) Installation Information Infrastructure Modernization Program (I3MP), point of contact (POC): Mr. Jordan Silk, United States Army Information Systems Engineering Command, Technology Integration Center (USAISEC TIC), Building 53302, Fort Huachuca, Arizona 85613; e-mail: jordan.r.silk.civ@mail.mil.

3. SYSTEM POC. Juniper Networks UC APL Certification Team, 2251 Corporate Park Drive Suite 100, Herndon, VA 20171, e-mail: uc-apl@juniper.net, website: www.juniper.net.

4. TESTER. USAISEC TIC, Fort Huachuca, Arizona.

5. SYSTEM DESCRIPTION. The Juniper Networks MX480 series Switch with Release 12.1 is hereinafter referred to as System Under Test (SUT). The SUT is used to transport voice signaling and media as part of an overall Voice over Internet Protocol (VoIP) system. The SUT provides availability, security, and Quality of Service (QoS) to meet the operational requirements of the network and Assured Services for the Warfighter. The SUT is certified as a Core, Distribution, Layer 2/Layer 3 Access switch and MPLS Router, and is interoperable for joint use with other Assured Services Local Area Network (ASLAN) components listed on the Unified Capabilities (UC) Approved Products List (APL) with the following interfaces: 10/100/1000BaseT and 100/1000BaseX for access; and 1000BaseT and 1000/10000BaseX for uplink. All of these interfaces were tested with the exception of the 10BaseT interface. Joint Interoperability Test Command (JITC) analysis determined that the 10BaseT interface is a low risk for certification based on the vendor's Letter of Compliance (LoC) to comply with the Institute of Electrical and Electronics Engineers (IEEE) 802.3i standard and the testing data collected at all other data rates. The Juniper switches listed under components in Table 1 all employ the same software and similar hardware as the SUT.

6. OPERATIONAL ARCHITECTURE. Figure 2-1 depicts an ASLAN notional operational architecture in which the SUT may be used. The SUT is certified to support Assured Services within an ASLAN. If a component meets the minimum requirements for deployment in an ASLAN, it also meets the lesser requirements for deployment in a non-ASLAN. Non-ASLANs are "commercial grade" and provide support to Command and Control (C2) (ROUTINE calls only) (C2(R)) or non-C2 voice subscribers. When deployed in a non-ASLAN, the SUT may also be used to receive all levels of precedence, but is limited to supporting calls that are originated at ROUTINE precedence only. Non-ASLANs do not meet the availability or redundancy requirements for C2 or Special C2 users, and therefore, are not authorized to support precedence calls originated above ROUTINE.



LEGEND:

AR	Aggregation Router
ASLAN	Assured Services Local Area Network
AS-SIP	Assured Services – Session Initiation Protocol
B/P/C/S	Base / Post / Camp / Station
BRI	Basic Rate Interface
CE	Customer Edge (CE Router)
DISN	Defense Information System Network
EBC	Edge Boundary Controller
EI	End Instrument
H.320	ITU-T Standard for Narrowband VTC
H.323	ITU-T Standard for Multi-Media Communications on Packet-Based Networks
IP	Internet Protocol
ISDN	Integrated Services Digital Network
ITU-T	International Telecommunication Union - Telecommunication Standardization Sector
LSC	Local Session Controller
TDM	Time Division Multiplex
UC	Unified Capabilities
VTC	Video Teleconferencing
WAN	Wide Area Network

Figure 2-1. DISN UC Notional Operational Architecture

7. INTEROPERABILITY REQUIREMENTS. The interface, Capability Requirements (CR) and Functional Requirements (FR), Information Assurance (IA), and other requirements for ASLAN infrastructure products are established by Section 5.3.1 of Reference (c).

7.1 Interfaces. Table 2-1 depicts the physical ASLAN Product interfaces and the associated standards.

Table 2-1. ASLAN Products Interface Requirements

Interface	UCR 2008, Change 3 Reference	Criteria (See Note 1)	Applicability		
			Co	D	A
Serial	5.3.1.3.9	Support minimum threshold CRs/FRs 1-4 and meet interface criteria for applicable EIA/TIA standard.	C	C	C
10Base-X (See Note 2)	5.3.1.3.1	Support minimum threshold CRs/FRs 1-6 and meet interface criteria for IEEE 802.3i or 802.3j.	C	C	C
100Base-X (See Note 2)	5.3.1.3.1	Support minimum threshold CRs/FRs 1-6 and meet interface criteria for IEEE 802.3.u.	R	R	C
1000Base-X (See Note 2)	5.3.1.3.1	Support minimum threshold CRs/FRs 1-6 and meet interface criteria for IEEE 802.3z, or 802.3ab.	R	R	C
10000Base-X (See Note 2)	5.3.1.3.1	Support minimum threshold CRs/FRs 1-6 and meet interface criteria for IEEE 802.3ae.	C	C	C
802.11a	5.3.1.3.1 and 5.3.1.7.2	1-6	C	C	C
802.11b	5.3.1.3.1 and 5.3.1.7.2	1-6	C	C	C
802.11g	5.3.1.3.1 and 5.3.1.7.2	1-6	C	C	C
802.11n	5.3.1.3.1 and 5.3.1.7.2	1-6	C	C	C
802.16	5.3.1.3.1 and 5.3.1.7.2	1-6	C	C	C

NOTES:
1. The SUT high-level CR and FR ID numbers depicted in the Threshold CRs/FRs column can be cross-referenced in Table 2-2. These high-level CR/FR requirements refer to a detailed list of requirements provided in Enclosure 3.
2. Core and Distribution products must minimally support the following standards: 802.3u (100Base-X) and 802.3z (1000Base-X). Access products must minimally support one of the following standards: 802.3i (10BaseT), 802.3j (10BaseF), 802.3u (100BaseTX/FX), 802.3z (1000Base-X), or 802.3ab (1000BaseT). Other rates and standards may be provided as conditional interfaces

LEGEND:

802.3ab	1000BaseT Gbps Ethernet Over Twisted Pair at 1 Gbps (125 Mbps)	1000Base-X	1000 Mbps Ethernet over Fiber or Copper
802.3ae	10 Gbps Ethernet	10000Base-X	10000 Mbps Ethernet over Fiber or Copper
802.3i	10BaseT Mbps Over Twisted Pair	A	Access
802.3j	10 Mbps Over Fiber	ASLAN	Assured Services Local Area Network
802.3u	Standard for Carrier Sense Multiple Access with Collision Detection at 100 Mbps	C	Conditional
		Co	Core
802.3z	Gigabit Ethernet Standard	CR	Capability Requirement
802.11/16	IEEE Wireless Standards	D	Distribution
10BaseF	10 Mbps Ethernet Over Fiber	EIA/TIA	Electronics Industries Alliance/ Telecommunications Industry Association
10BaseT	10 Mbps (Baseband Operation, Twisted Pair) Ethernet	FR	Functional Requirement
		Gbps	Gigabits Per Second
10BaseX	10 Mbps Ethernet Over Fiber or Copper	ID	Identification
100BaseFX	100 Mbps Ethernet Over Fiber	IEEE	Institute of Electrical and Electronic Engineers
100BaseTX	100 Mbps (Baseband Operation, Twisted Pair) Ethernet	Mbps	Megabits Per Second
		R	Required
100Base-X	100 Mbps Ethernet Over Fiber or Copper	UCR	Unified Capabilities Requirements
1000BaseFX	1000 Mbps Ethernet Over Fiber		
1000BaseT	1000 Mbps (Baseband Operation, Twisted Pair) Ethernet		

7.2 CR and FR. Switches have required and conditional features and capabilities that are established by Section 5.3.1 of the Unified Capabilities Requirements (UCR) 2008, Change 3, Reference (c). The SUT does not need to provide non-critical (conditional) requirements. If they are provided, they must function according to the specified requirements. The SUT's features and capabilities and its aggregated requirements in accordance with (IAW) the ASLAN requirements are listed in Table 2-2. Detailed CR/FR requirements are provided in Table 3-1 of Enclosure 3.

Table 2-2. ASLAN CRs and FRs

CR/FR ID	Capability/Function	Applicability (See Note 1)	UCR 2008, Change 3 Reference	Remarks
1	**General Performance Parameters**			
	Performance Parameters	Required	5.3.1.3	
	Port Interface Rates	Required	5.3.1.3.1	
	Port Parameter Requirements	Required	5.3.1.3.2	
	Class of Service Markings	Required	5.3.1.3.3	
	VLAN Capabilities	Required	5.3.1.3.4	
	Protocols	Required	5.3.1.3.5	
	QoS Features	Required	5.3.1.3.6	
	Network Monitoring	Required	5.3.1.3.7	
	Security	Required	5.3.1.3.8 (See Note 2)	
2	**E2E Performance Requirements**			
	Voice Services	Required	5.3.1.4.1	
	Video Services	Required	5.3.1.4.2	
	Data Services	Required	5.3.1.4.3	
3	**NM Requirements**			
	Configuration Control	Required	5.3.1.6.1	
	Operational Changes	Required	5.3.1.6.2	
	Performance Monitoring	Required	5.3.1.6.3	
	Alarms	Required	5.3.1.6.4	
	Reporting	Required	5.3.1.6.5	
4	**Engineering Requirements**			
	Physical Media	Required	5.3.1.7.1	
	Wireless	Conditional	5.3.1.7.2	
	Traffic Engineering	Required	5.3.1.7.3	
	Availability	Required	5.3.1.7.6	
	Redundancy	Required	5.3.1.7.7	
5	**MPLS**			
	MPLS Requirements	Conditional	5.3.1.8.4.1	
	MPLS VPN Augmentation to VLANs	Conditional	5.3.1.8.4.2	
6	**IPv6 Requirements**			
	Product Requirements	Required	5.3.5.4	

Table 2-2. ASLAN CRs and FRs (continued)

NOTES:
1. The annotation of "required" refers to a high-level requirement category. The applicability of each sub-requirement is provided in Enclosure 3. The SUT does not need to provide conditional requirements. However, if a capability is provided, it must function according to the specified requirements.
2. Refers to IA requirements for UCR 2008, Change 3, Section 5.4. Detailed IA requirements are included in Reference (e).

LEGEND:

ASLAN	Assured Services Local Area Network	MPLS	Multiprotocol Label Switching
CR	Capability Requirement	NM	Network Management
E2E	End-to-End	QoS	Quality of Service
FR	Functional Requirement	SUT	System Under Test
IA	Information Assurance	UCR	Unified Capabilities Requirements
ID	Identification	VLAN	Virtual Local Area Network
IPv6	Internet Protocol Version 6	VPN	Virtual Private Network

7.3 Information Assurance. Table 2-3 details the IA requirements applicable to the ASLAN products.

Table 2-3. ASLAN Products IA Requirements

Requirement	Applicability (See Note)	UCR 2008, Change 3 Reference	Criteria
General Requirements	Required	5.4.6.2	Detailed requirements and associated criteria for ASLAN products are listed in Reference (c) Section 5.4.
Authentication	Required	5.4.6.2.1	
Integrity	Required	5.4.6.2.2	
Confidentiality	Required	5.4.6.2.3	
Non-Repudiation	Required	5.4.6.2.4	
Availability	Required	5.4.6.2.5	

NOTE: The annotation of "required" refers to a high-level requirement category. Refers to IA requirements for UCR 2008, Change 3, Section 5.4.

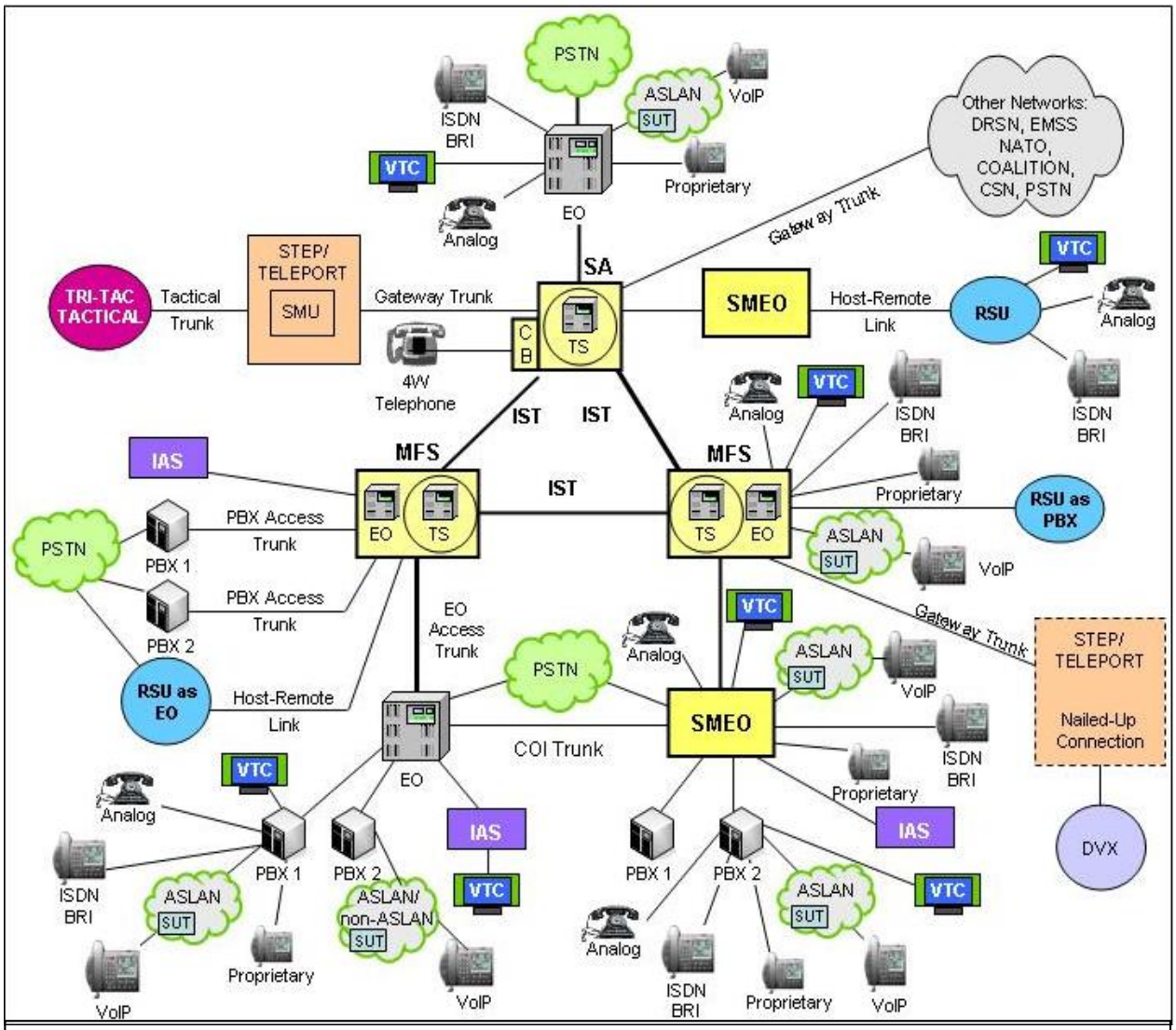
LEGEND

ASLAN	Assured Services Local Area Network	UCR	Unified Capabilities Requirements
IA	Information Assurance		

7.4 Other. None

8. TEST NETWORK DESCRIPTION. The SUT was tested at the USAISEC TIC, a Department of Defense (DoD) component test lab, in a manner and configuration similar to that of a notional operational environment. The UCR 2008, Change 3, operational Defense Information System Network (DISN) Architecture is depicted in Figure 2-2, which depicts the relationship of the ASLAN and non-ASLAN to the DISN switch types. Testing the system's required functions and features was conducted using the test

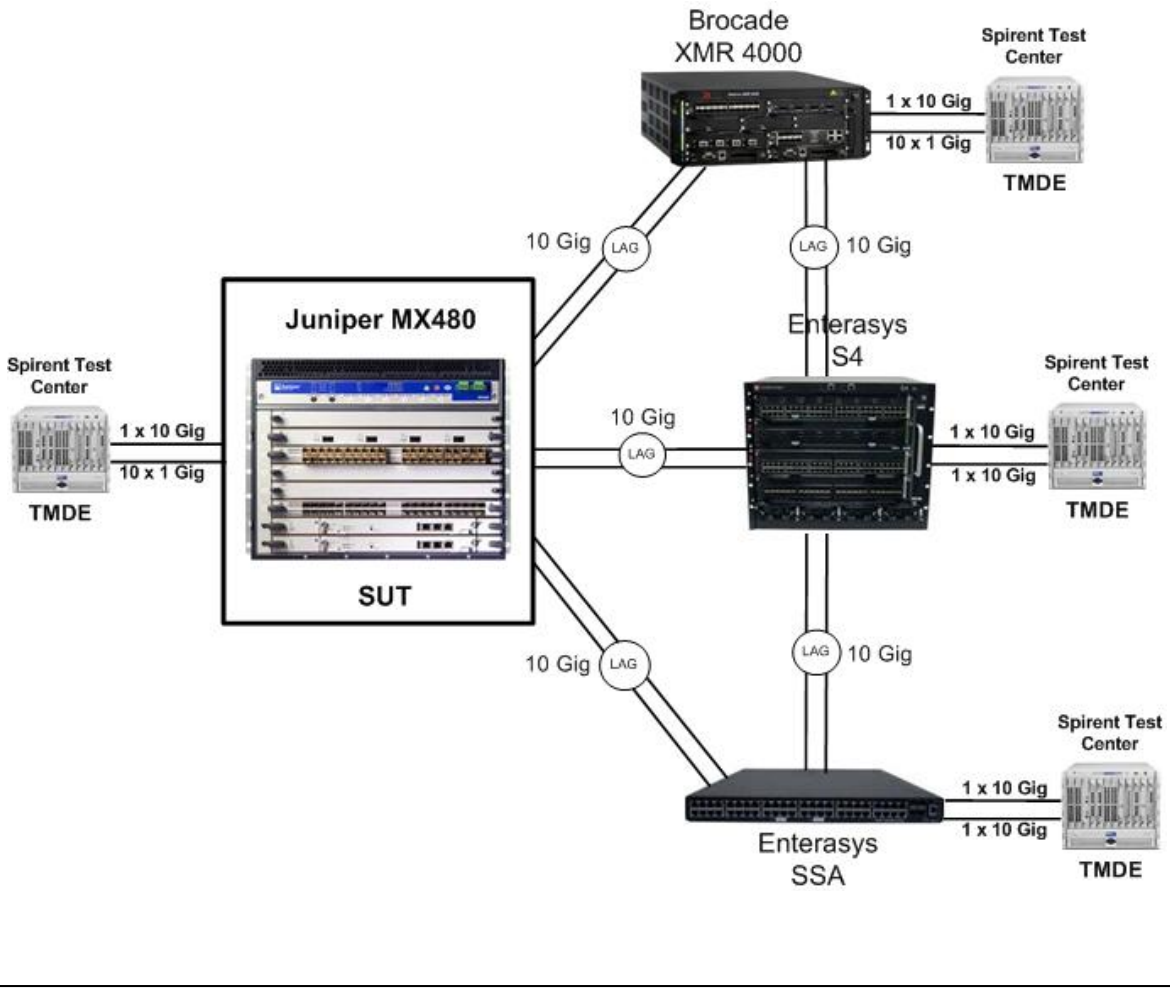
configurations depicted in Figure 2-3 and 2-4. Figure 2-3 depicts the ASLAN components in a heterogeneous configuration with Brocade and Enterasys ASLAN components. Figure 2-4 depicts the ASLAN-MPLS components in a heterogeneous configuration with Cisco.



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
DISN	Defense Information System Network
DRSN	Defense Red Switch Network
DVX	Deployable Voice Exchange
EMSS	Enhanced Mobile Satellite System
EO	End Office
IAS	Integrated Access Switch
ISDN	Integrated Services Digital Network
IST	Interswitch Trunk
MFS	Multifunction Switch
NATO	North Atlantic Treaty Organization
PBX	Private Branch Exchange
PBX 1	Private Branch Exchange 1
PBX 2	Private Branch Exchange 2
PSTN	Public Switched Telephone Network
RSU	Remote Switching Unit
SA	Systems Administrator
SMEO	Small End Office
SMU	Switched Multiplex Unit
STEP	Standardized Tactical Entry Point
SUT	System Under Test
Tri-Tac	Tri-Service Tactical Communications Program
TS	Tandem Switch
VoIP	Voice over Internet Protocol
VTC	Video Teleconferencing

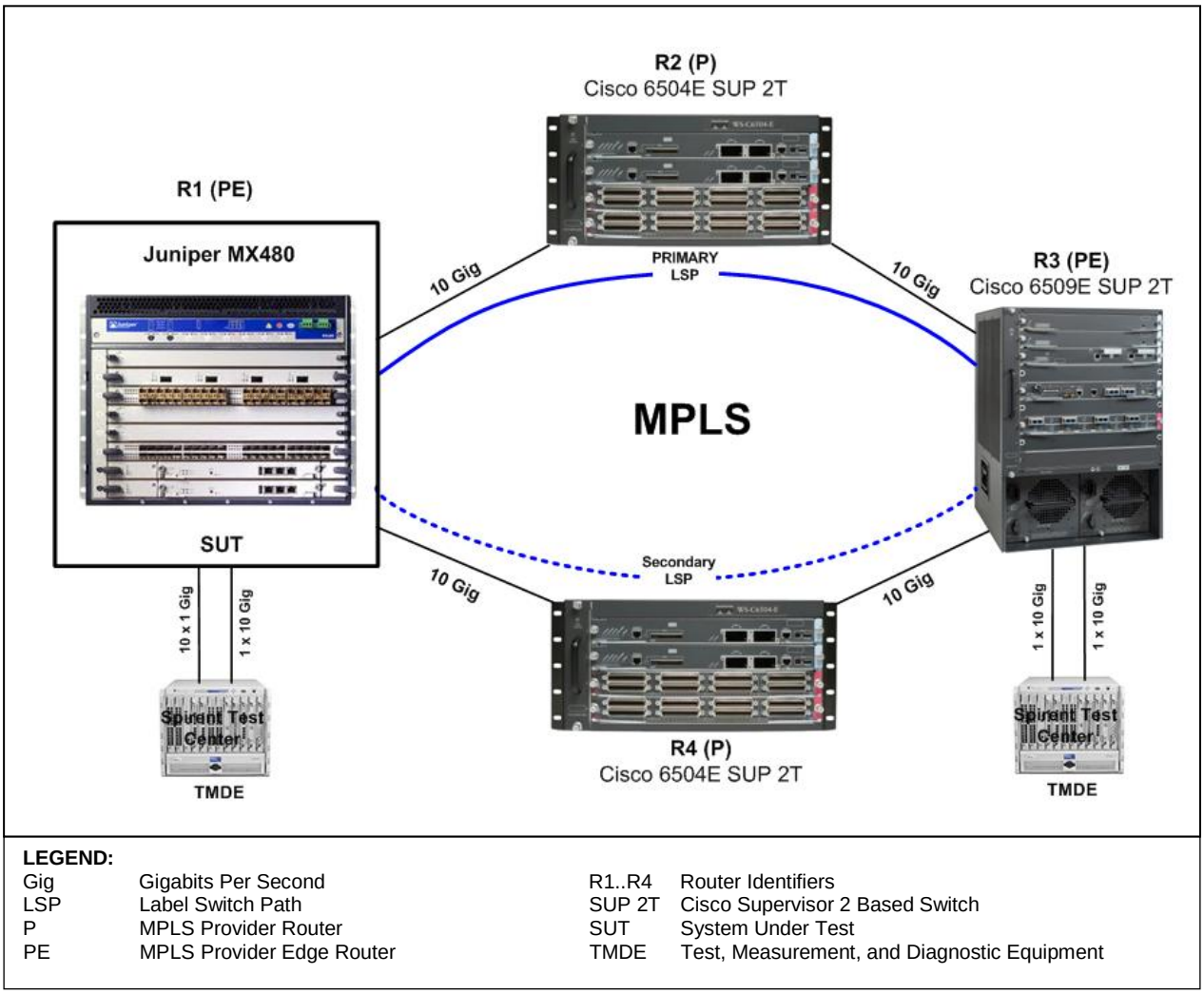
Figure 2-2. DISN Architecture



LEGEND:

Gig	Gigabits Per Second	SUT	System Under Test
LAG	Link Aggregation Group	TMDE	Test, Measurement, and Diagnostic Equipment
SSA	S-Series Stand Alone		

Figure 2-3. Heterogeneous Test Configuration with Brocade and Enterasys



LEGEND:

Gig	Gigabits Per Second	R1..R4	Router Identifiers
LSP	Label Switch Path	SUP 2T	Cisco Supervisor 2 Based Switch
P	MPLS Provider Router	SUT	System Under Test
PE	MPLS Provider Edge Router	TMDE	Test, Measurement, and Diagnostic Equipment

Figure 2-4. Heterogeneous ASLAN-MPLS Test Configuration with Cisco

9. SYSTEM CONFIGURATIONS. Table 2-4 provides the system configuration, hardware, and software components tested with the SUT. The SUT was tested in an operationally realistic environment to determine its IO capability with associated network devices and network traffic.

Table 2-4. Tested System Configurations

System Name			Release	
Brocade NetIron XMR 4000			5.3	
Enterasys S4			7.41	
Enterasys SSA			7.41	
Cisco WS-C6509-E			15.0(1)SY1	
SUT[1]	**Release**	**Function**	**Sub-component (See Note 1)**	**Description**
Juniper MX960BASE-AC MX960BASE-AC-ECM MX960BASE-DC MX960BASE-DC-ECM MX960-PREMIUM2-AC MX960-PREMIUM2-AC-ECM MX960-PREMIUM2-DC MX960-PREMIUM2-DC-ECM MX960-PREMIUM-AC MX960-PREMIUM-AC-ECM MX960-PREMIUM-DC MX960-PREMIUM-DC-ECM **MX480BASE-AC** MX480BASE-DC **MX480-PREMIUM2-AC** MX480-PREMIUM2-DC MX480-PREMIUM-AC MX480-PREMIUM-DC MX240BASE-AC-HIGH MX240BASE-AC-LOW MX240BASE-DC MX240-PREMIUM2-AC-HIGH MX240-PREMIUM2-AC-LOW MX240-PREMIUM2-DC MX240-PREMIUM-AC-HIGH MX240-PREMIUM-AC-LOW MX240-PREMIUM-DC	JUNOS OS 12.1	Core, Distribution, Access	RE-S-1300-2048	Routing Engine with 1300Mhz processor and 2G memory
			RE-S-2000-4096	**Routing Engine with 2000Mhz processor and 4G memory**
			RE-S-1800X2-8G	Routing Engine with Dual Core 1800Ghz processor with 8G memory
			RE-S-1800X2-16G	Routing Engine with Dual Core 1800Ghz processor with 16G memory
			RE-S-1800X4-8G	Routing Engine with Quad Core 1800Ghz processor with 8G memory
			RE-S-1800X4-16G	**Routing Engine with Quad Core 1800Ghz processor with 16G Memory**
			SCB-MX960	**Switch Control Board**
			SCBE-MX	**Enhanced Switch Control Board**
			DPCE-R-20GE-2XGE	**20 Port GE + 2 port 10GE DPC with L2+L3 features, Requires Optics Sold Separately**
			DPCE-R-2XGE-XFP	**2x10GE Enhanced DPC for MX, requires optics sold separately**
			DPCE-R-40GE-SFP	**40x1GE Enhanced DPC for MX, requires optioncs sold separately**
			DPCE-R-40GE-TX	**40 Port 10/100/1000 RJ-45 DPC with L2+L3 Features**
			DPCE-R-4XGE-XFP	**4x10GE Enhanced DPC for MX, requires optics sold separately**
			DPCE-R-Q-20GE-2XGE	20 Port GE + 2 port 10GE Enhanced Queuing DPC with L2+L3 Features, Requires Optics sold separately
			DPCE-R-Q-20GE-SFP	20x1G Enhanced Queuing DPC for MX with full L2/L3 features & VLAN-HQos, requires optics sold separately
			MPC-3D-16XGE-SFPP-R	**16x10GE line card bundle, price includes full scale L3, L2 and L2.5 features; requires SFPP**
			MPC-3D-16XGE-SFPP (See Note 2)	16x10GE line card, price includes full scale L2/L2.5 and reduced scale L3 features; requires SFPP optics
			MX-MPC1E-3D (See Note 2)	1xTrio chipset Enhanced MPC, port queuing, price includes full scale L2/L2.5 and reduced scale L3 features
			MX-MPC1E-3D-Q (See Note 2)	1xTrio Chipset Enhanced MPC, per-IFL HQoS, 128K queues (max 64K egress); price includes full scale L2/L2.5 and reduced scale L3 features

Table 2-4. Tested System Configurations (continued)

SUT[1]	Release	Function	Sub-component (See Note 1)	Description
			MX-MPC1E-3D-Q-R-B	MX-MPC1E-3D-Q line card bundle, price includes full scale L3, L2 and L2.5 features
			MX-MPC1E-3D-R-B	**MX-MPC1E-3D line card bundle, price includes full scale L3, L2 and L2.5 features**
			MX-MPC2E-3D (See Note 2)	2xTrio Chipset Enhanced MPC, port queuing, price includes full scale L2/L2.5 and reduced scale L3 features
			MX-MPC2E-3D-EQ (See Note 2)	2xTrio Chipset Enhanced MPC, per-IFL HQoS, 512K queues; price includes full scale L2/L2.5 and reduced scale L3 features
			MX-MPC2E-3D-EQ-R-B	MX-MPC2E-3D-EQ line card bundle, price includes full scale L3, L2 and L2.5 features
			MX-MPC2E-3D-P (See Note 2)	2xTrio Chipset Enhanced MPC, 1588v2, port queuing, price includes full scale L2/L2.5 and reduced scale L3 features
			MX-MPC2E-3D-P-Q-B (See Note 2)	MX-MPC2E-3D-P line card bundle, price includes 1588v2, per-IFL HQoS, 256K queues (max 128K egress), full scale L2/L2.5 and reduced scale L3 features
			MX-MPC2E-3D-P-Q-R-B	MX-MPC2E-3D-P line card bundle, price includes 1588v2, per-IFL HQoS, 256K queues (max 128K egress), full scale L3, L2 and L2.5 features
			MX-MPC2E-3D-P-R-B	MX-MPC2E-3D-P line card bundle, price includes 1588v2, full scale L3, L2 and L2.5 features
			MX-MPC2E-3D-Q (See Note 2)	2xTrio Chipset Enhanced MPC, per-IFL HQoS, 256K queues (max 128K egress); price includes full scale L2/L2.5 and reduced scale L3 features
			MX-MPC2E-3D-Q-R-B	MX-MPC2E-3D-Q line card bundle, price includes full scale L3, L2 and L2.5 features
			MX-MPC2E-3D-R-B	**MX-MPC2E-3D line card bundle, price includes full scale L3, L2 and L2.5 features**
			MIC-3D-20GE-SFP	**20x10/100/1000 MIC for MX, requires optics sold separately**
			MIC-3D-2XGE-XFP	**2x10G MIC for MX, requires optics sold separately**
			MIC-3D-40GE-TX	**40x10/100/1000 RJ-45 full height MIC (fixed optics)**
			MIC-3D-4XGE-XFP	**4x10G MIC for MX, requires optics sold separately. Only supported on MX-MPC2 line cards**
			MS-DPC	**MultiServices MPC for the MX platforms**

Table 2-4. Tested System Configurations (continued)

NOTE:
1. Components bolded and underlined were tested by the USAISEC TIC. The other components in the family series were not tested; however, they utilize the same OS software and similar hardware as the SUT. JITC analysis determined them to be functionally identical for IO certification purposes. As such, they are also certified for joint use.
2. Noted Trio (3D) cards without the "-R" designatation are reduced scale, L3 switching cards that do not support MPLS L3 VPN (RFC 2547) with their basic licensing. Additional licensing must be applied to these cards to enable the full L3 scale capabilities of the card, to include support for MPLS L3 VPN (RFC 2547).

LEGEND:

10/100/1000BASE-T	10/100/1000 Mbps Ethernet Over Copper	L3	Layer 3
		MIC	Modular Interface Card
		MPC	Modular Port Concentrator
10GBASE-X	10000 Mbps Ethernet Over Fiber	MPLS	Multiprotocol Label Switching
		OS	Operating System
AC	Alternating Current	RJ	Registered Jack
DC	Direct Current	SFP	Small Form Factor Pluggable
DPC	Dense Port Concentrator	SSA	S-Series Stand Alone
ECM	Enhanced Cable Manager	SUT	System Under Test
GE	Gigabit Ethernet	TIC	Technology Integration Center
Ghz	Gigahertz	TX	Twisted Pair Cabling
HQoS	Hierarchical Quality of Service	USAISEC	U.S. Army Information Systems Engineering Command
IFL	Logical Interface		
IO	Interoperability	VLAN	Virtual Local Area Network
JITC	Joint Interoperability Test Command	XFP	10 Gigabit Small Form Factor Pluggable
JUNOS	Juniper Operating System		
L2	Layer 2		
L2.5	Layer 2.5 (reference to MPLS)		

10. TESTING LIMITATIONS. None.

11. INTEROPERABILITY EVALUATION RESULTS. The SUT meets the critical IO requirements for a Core, Distribution, Layer 2/Layer 3 Access switch and Multiprotocol Label Switching (MPLS) Layer 2 and Layer 3 Virtual Private Networks (VPNs) IAW with UCR 2008, Change 3, Section 5.3.1, and is certified for joint use with other network infrastructure products listed on the UC APL. Additional discussion regarding specific testing results is located in subsequent paragraphs.

11.1 Interfaces. The interface status of the SUT is provided in Table 2-5.

Table 2-5. SUT Interface Requirements Status

Interface	Applicability			UCR 2008, Change 3 Reference	Threshold CR/FR (See Note 1)	Status	Remarks
	Co	D	A				
Serial	C	C	C	5.3.1.3.9	1-4	Not Certified (See Note 3)	N/A
10Base-X	C	C	C (See Note 2)	5.3.1.3.1	1-6	Certified (See Note 4)	The SUT met CRs and FRs with the following IEEE standard: 802.3i (10BaseT).
100Base-X	R	R	C (See Note 2)	5.3.1.3.1	1-6	Certified	The SUT met CRs and FRs with the following IEEE standard: 802.3u (100BaseT).

Table 2-5. SUT Interface Requirements Status (continued)

Interface	Applicability			UCR 2008, Change 3 Reference	Threshold CR/FR (See Note 1)	Status	Remarks
1000Base-X	R	R	C (See Note 2)	5.3.1.3.1	1-6	Certified	The SUT met CR and FRs with the following IEEE standards: 802.3ab (1000BaseT), 802.3z (1000Base-SX, 1000Base-LX).
10000Base-X	C	C	C	5.3.1.3.1	1-6	Certified	The SUT met CRs and FRs with the following IEEE standard: 802.3ae (10GBase-SR, 10GBase-LR).
802.11a	C	C	C	5.3.1.3.1/5.3.1.7.2	1-6	Not Supported (See Note 5)	N/A
802.11b	C	C	C	5.3.1.3.1/5.3.1.7.2	1-6	Not Supported (See Note 5)	N/A
802.11g	C	C	C	5.3.1.3.1/5.3.1.7.2	1-6	Not Supported (See Note 5)	N/A
802.11n	C	C	C	5.3.1.3.1/5.3.1.7.2	1-6	Not Supported (See Note 5)	N/A
802.16	C	C	C	5.3.1.3.1/5.3.1.7.2	1-6	Not Supported (See Note 5)	N/A

NOTES:
1. The SUT high-level CR and FR ID numbers depicted in the Threshold CRs/FRs column can be cross-referenced in Table 3. These high-level CR/FR requirements refer to a detailed list of requirements provided in Enclosure 3.
2. Core and Distribution products must minimally support 100Base-X (802.3u) and 1000Base-X (802.3z). Access products must minimally support one of the following standards: 802.3i (10BaseT), 802.3j (10BaseF), 802.3u (100BaseT/F), 802.3z (1000BaseF), or 802.3ab (1000BaseT). Other rates and standards may be provided as conditional interfaces.
3. The SUT does support this interface for Command Line Interface (CLI) connectivity during initial setup only. This interface was not tested and is not certified for UC connectivity use.
4. The USAISEC TIC tested all these interfaces with the exception of the 10BaseT interface. JITC analysis determined that the 10BaseT interface is a low risk for certification based on the vendor's LoC to the IEEE 802.3i and the testing data collected at all other data rates.
5. The SUT does not support this interface. The interface was not tested, therefore, is not certified for use.

Table 2-5. SUT Interface Requirements Status (continued)

LEGEND:

802.3ab	1000BaseT Gbps Ethernet Over Twisted Pair at 1 Gbps (125 Mbps)	A	Access
		C	Conditional
802.3ae	10 Gbps Ethernet	Co	Core
802.3i	10BaseT Mbps Over Twisted Pair	CR	Capability Requirement
802.3j	10 Mbps Over Fiber	D	Distribution
802.3u	Standard for Carrier Sense Multiple Access with Collision Detection at 100 Mbps	EIA	Electronic Industries Alliance
		EIA-232	Standard for Defining the Mechanical and Electrical Characteristics for Connecting Data Terminal Equipment (DTE) and Data Circuit-Terminating Equipment (DCE) Data Communications Devices
802.3z	Gigabit Ethernet Standard		
802.11/16	IEEE Wireless Standards		
10BaseF	10 Mbps Ethernet Over Fiber		
10BaseT	10 Mbps (Baseband Operation, Twisted Pair) Ethernet	FR	Functional Requirement
		Gbps	Gigabits Per Second
10Base-X	10 Mbps Ethernet Over Fiber or Copper	ID	Identification
100BaseF	100 Mbps Ethernet Over Fiber	IEEE	Institute of Electrical and Electronics Engineers
100BaseT	100 Mbps (Baseband Operation, Twisted Pair) Ethernet	JITC	Joint Interoperability Test Command
		LoC	Letter of Compliance
100Base-X	100 Mbps Ethernet Over Fiber or Copper	LR	Long Range Optics
1000BaseF	1000 Mbps Ethernet Over Fiber	LX	Single-Mode Fiber Optics
1000Base-LX	1000 Mbps Ethernet Over Fiber	Mbps	Megabits per second
1000Base-SX	1000 Mbps Ethernet Over Fiber	N/A	Not Applicable
1000BaseT	1000 Mbps (Baseband Operation, Twisted Pair) Ethernet	R	Required
		SR	Short Range Optics
1000Base-X	1000 Mbps Ethernet Over Fiber or Copper	SX	Multi-mode Fiber Optics
10000Base-X	10000 Mbps Ethernet Over Fiber or Copper	SUT	System Under Test
		TIC	Technology Integration Center
10GBase-LR	10000 Mbps Ethernet Over Fiber	UCR	Unified Capabilities Requirements
10GBase-SR	10000 Mbps Ethernet Over Fiber	USAISEC	U.S. Army Information Systems Engineering Command

11.2 CR and FR. The SUT CR and FR status is depicted in Table 2-6. Detailed CR/FR requirements are provided in Enclosure 3, Table 3-1.

Table 2-6. SUT CRs and FRs Status

CR/FR ID	Capability/Function	Applicability (See Note 1)	UCR 2008, Change 3 Reference	Status	Remarks
1	**General Performance Parameters**				
	Performance Parameters	Required	5.3.1.3	Met	
	Port Interface Rates	Required	5.3.1.3.1	Met	
	Port Parameter Requirements	Required	5.3.1.3.2	Met (See Note 2)	
	Class of Service Markings	Required	5.3.1.3.3	Met	
	VLAN Capabilities	Required	5.3.1.3.4	Met	
	Protocols	Required	5.3.1.3.5	Partially Met (See Note 3)	
	QoS Features	Required	5.3.1.3.6	Met	
	Network Monitoring	Required	5.3.1.3.7	Met	
	Security	Required	5.3.1.3.8	Met (See Note 7)	
2	**E2E Performance Requirements**				
	Voice Services	Required	5.3.1.4.1	Met (See Note 4)	
	Video Services	Required	5.3.1.4.2	Met (See Note 4)	
	Data Services	Required	5.3.1.4.3	Met (See Note 4)	
3	**NM Requirements**				
	Configuration Control	Required	5.3.1.6.1	Met	
	Operational Changes	Required	5.3.1.6.2	Met	
	Performance Monitoring	Required	5.3.1.6.3	Met	
	Alarms	Required	5.3.1.6.4	Met	
	Reporting	Required	5.3.1.6.5	Met	
4	**Engineering Requirements**				
	Physical Media	Required	5.3.1.7.1	Met (See Note 5)	
	Wireless	Conditional	5.3.1.7.2	Not Tested (See Note 6)	
	Traffic Engineering	Required	5.3.1.7.3	Met (See Note 5)	
	Availability	Required	5.3.1.7.6	Met (See Note 5)	
	Redundancy	Required	5.3.1.7.7	Met (See Note 5)	
5	**MPLS**				
	MPLS Requirements	Conditional	5.3.1.8.4.1	Partially Met (See Note 3)	
	MPLS VPN Augmentation to VLANs	Conditional	5.3.1.8.4.2	Met	
6	**IPv6 Requirements**				
	Product Requirements	Required	5.3.5.4	Partially Met (See Note 3)	

Table 2-6. SUT CRs and FRs Status (continued)

NOTES:

1. The annotation of "required" refers to a high-level requirement category. The applicability of each sub-requirement is provided in Enclosure 3. The SUT does not need to provide conditional requirements. However, if a capability is provided, it must function according to the specified requirements.
2. When port duplex is manually set on 10/100/1000 speed interfaces, SUT does not indicate the state of the duplex through the command line. DISA adjudicated this as a minor impact with a Condition of Fielding outlined in the Juniper MX Series Deployment Guide.
3. The SUT does not comply with the following protocols:
   a. RFC5798: Partial Comply - Virtual Router Redundancy Protocol (VRRP) Version 3 for IPv4 and IPv6. JUNOS 12.2, the next new software release, does support VRRP which will be submitted for verification and validation testing through UCCO Desktop Review process. DISA has adjudicated this discrepancy as having a minor operational impact and accepted the vendor's POA&M.
   b. RFC 2737: Partial Comply - MIB (Entity). DISA adjudicated this as a minor impact with no POA&M required.
   c. RFC 4502: Partial Comply - RMON MIB. DISA adjudicated this as a minor impact with no POA&M required.
   d. RFC 3479 (MPLS): Non Comply – Fault Tolerance for the Label Distribution Protocol (LDP). JUNOS 12.1 does provide support for RFC 3478, Graceful Restart for LDP, which protects against LDP control plane failures. DISA has adjudicated this discrepancy as having minor operational impact with a Condition of Fielding that Juniper uses RFC3478 in lieu of RFC3479.
4. This requirement was verified and met using simulated voice, video, and data traffic in an operational emulated environment to meet E2E requirements. The SUT must be deployed IAW deployment guide and engineering guidelines in UCR 2008, Change 3, Section 5.3.1.4.
5. This requirement was met with the following stipulations: It is the site's responsibility to configure the SUT in a manner which meets the engineering requirements listed in Enclosure 2, Section 11.2 d, and that it does not create a single point of failure which could impact more than 96 C2 users.
6. Wireless requirements are conditional, were not tested, and, therefore, are not certified for use.
7. Security testing was accomplished via USAISEC TIC-led IA test teams and published in a separate report, Reference (e).

LEGEND:

C2	Command and Control	MPLS	Multiprotocol Label Switching
CR	Capability Requirement	NM	Network Management
DISA	Defense Information Systems Agency	POA&M	Plan of Action and Milestones
E2E	End-to-End	QoS	Quality of Service
FR	Functional Requirement	RFC	Request For Comment
IAW	In Accordance With	RMON	Remote Monitoring
ID	Identification	SUT	System Under Test
IPv4	Internet Protocol Version 4	UCR	Unified Capabilities Requirements
IPv6	Internet Protocol Version 6	VLAN	Virtual Local Area Network
JUNOS	Juniper Operating System	VPN	Virtual Private Network
MIB	Management Information Base		

a. General Performance Parameters: Internet Protocol Version 4 (IPv4) and Internet Protocol Version 6 (IPv6).

(1) The SUT complies with the Non-blocking requirement in the Performance Parameters IAW UCR 2008, Change 3, Section 5.3.1.3, Paragraph 1 and the QoS blocking factor features IAW UCR 2008, Change 3, Section 5.3.1.3.6, Paragraph 5b as an Access switch in all modes of operation for all modules listed in Table 1. The SUT operated in the required 50 percent non-blocking mode on all interfaces for Core, Distribution, and Access layers.

(2) Port Interface Rates. The UCR 2008, Change 3, Section 5.3.1.3.1, states that Core and Distribution products shall minimally support 100 Megabits per second (Mbps) IAW IEEE 802.3u and 1 Gigabit per second (Gbps) IAW with IEEE 802.3z.

Access products must minimally provide one of the following interface rates: 10 Mbps IAW IEEE 802.3i and j, 100 Mbps IAW IEEE 802.3u, and 1000 Mbps IAW IEEE 802.3z and 802.3ab. The SUT is certified as interoperable for joint use with other ASLAN components listed on the UC APL with the following interfaces: 10/100/1000BaseT and 100/1000BaseX for access and 1000BaseT and 1000/10GBaseX for uplink. All of these interfaces were tested with the exception of the 10BaseT interface. JITC analysis determined that the 10BaseT interface is a low risk for certification based on the vendor's LoC to comply with the IEEE 802.3i standard and the testing data collected at all other data rates. All the SUT interfaces linked up at the required rates and negotiated for the correct rates, which met this requirement.

(3) Port Parameter Requirements. The UCR 2008, Change 3, Section 5.3.1.3.2, states that Core, Distribution, and Access products shall provide the following parameters on a per port basis: Auto-negotiation IAW IEEE 802.3, Force mode IAW IEEE 802.3, and Filtering IAW Request for Comments (RFC) 1812. Port parameters were configurable and conformed to the requirements with the following exception: when port duplex is manually set on 10/100/1000 speed interfaces, SUT does not indicate the state of the Duplex through the command line. Defense Information Systems Agency (DISA) adjudicated this as a minor impact with a Condition of Fielding outlined in the Juniper MX Series Deployment Guide.

(4) Class of Service (CoS) Markings. The UCR 2008, Change 3, Section 5.3.1.3.3, states that the SUT shall support Differentiated Services Code Points (DSCPs) for both IPv4 and IPv6 as shown in the sub-paragraphs below. The SUT met these requirements with both testing and the vendor's LoC.

(a) Accept any packet tagged with a DSCP value (0-63) on an ingress port and assign that packet to a QoS behavior.

(b) Accept any packet tagged with a DSCP value (0-63) on an ingress port and reassign that packet to any new DSCP value (0-63).

(c) Support the prioritization of aggregate service classes with queuing according to QoS features.

(5) Virtual Local Area Network (VLAN) Capabilities. The SUT met VLAN capabilities IAW UCR 2008, Change 3, Section 5.3.1.3.4, with testing and the vendor's LoC. The VLAN markings were preserved on the SUT and VLAN tagged traffic was separated and managed according to IEEE 802.1q. The SUT successfully performed both port-based and address-based VLANs and can assign any VLAN tag any value from 1 through 4094 (0 and 4095 are excluded), which met this requirement.

(6) Protocols. The SUT met all of the protocols IAW UCR 2008, Change 3, Section 5.3.1.3.5, for IPv4 and Section 5.3.5 for IPv6 by testing and the vendor's LoCs with the following exceptions:

(a) RFC5798: Partial Comply - Virtual Router Redundancy Protocol (VRRP) Version 3 for IPv4 and IPv6. JUNOS 12.2, the next new software release, does support VRRP which will be submitted for verification and validation testing through UCCO Desktop Review process. DISA has adjudicated this discrepancy as having a minor operational impact and accepted the vendor's POA&M.

(b) RFC 2737: Partial Comply - MIB (Entity). DISA adjudicated this as a minor impact with no POA&M required.

(c) RFC 4502: Partial Comply - RMON MIB. DISA adjudicated this as a minor impact with no POA&M required.

(7) QoS Features. The UCR 2008, Change 3, Section 5.3.1.3.6, states that the Core, Distribution, and Access products shall be capable of providing a minimum of four queues, assign any "tagged" session to any of the queues, support Differentiated Services per hop behaviors and traffic conditioning with an assigned bandwidth percentage per queue, and meet traffic conditioning requirements. The SUT QoS, which includes rate-shaping, performed as configured. All variance was within the limitation of resolution of the test instruments. The test equipment recorded that the higher prioritized traffic was properly queued above lower prioritized best effort traffic; therefore, the SUT met this requirement.

(8) Network Monitoring. The UCR 2008, Change 3, Section 5.3.1.3.7, states that Core, Distribution, and Access products shall support network monitoring features. Network Monitoring via Simple Network Management Protocol (SNMP) was evaluated by the USAISEC TIC-led IA test teams and published in a separate report, Reference (e). Based on this evaluation, the SUT met all requirements.

(a) SNMP IAW RFCs 3411, 3412, 3413, 3414, 3415, 3416, and 3417. The SUT met the requirements through the vendor's LoC and testing. The SilverCreek SNMP Test Suite was used to capture SNMP traps. For the port configuration change test, the speed of an individual port on each switch was changed from 1000 Mbps to 100 Mbps and back again.

(b) Remote Monitoring (RMON) IAW RFC 2819. The SUT met this requirement through the vendor's LoC.

(c) Coexistence between Version 1, Version 2, and Version 3 of the Internet-standard Network Management Framework IAW RFC 3584. The SUT met this requirement through the vendor's LoC.

(d) Advanced Encryption Standard (AES) Cipher Algorithm in the SNMP User-based Security Model IAW RFC 3826. Security was tested by USAISEC TIC-led IA test teams, and the results were published in a separate report, Reference (e).

(9) Security. The UCR 2008, Change 3, Section 5.3.1.3.8, states that the Core, Distribution, and Access products shall meet the security protocol requirements listed in UCR 2008, Change 3, Section 5.4. Security was tested via USAISEC TIC-led IA test teams and published in a separate report, Reference (e).

b. End-to-End (E2E) Performance Parameters. These requirements were verified using simulated voice, video, and data traffic in an emulated operational environment. To meet these requirements, the SUT must be deployed IAW deployment and engineering guidelines provided in UCR 2008, Change 3, Section 5.3.1.4, Congested condition is defined as 100 percent of link capacities (as defined by baseline traffic engineering). The general performance was evaluated in a heterogeneous configuration, as depicted in Figure 2-3.

(1) Voice Services

(a) Latency. The UCR 2008, Change 3, Section 5.3.1.4.1.1, states that latency shall not be more than 6 ms E2E across the ASLAN over any 5-minute measured period under congested conditions. The measured latency for the SUT was 0.053 ms, which met the requirement.

(b) Jitter. The UCR 2008, Change 3, Section 5.3.1.4.1.2, states that when transporting voice Internet Protocol (IP) packets, the E2E jitter shall not exceed 3 ms over any 5-minute measured period under congested conditions. The measured jitter for the SUT was 0.009 ms, which met the requirement.

(c) Packet Loss. The UCR 2008, Change 3, Section 5.3.1.4.1.3, states that actual measured packet loss across the local area network (LAN) shall not exceed 0.045 percent within the defined queuing parameters. The packet loss requirement shall be achievable over any 5-minute period measured from ingress ports to egress ports under congested conditions. The measured packet loss for the SUT was 0.01 percent, which met the requirement.

(2) Video Services

(a) Latency. The UCR 2008, Change 3, Section 5.3.1.4.2.1, states that latency shall not exceed 30 ms E2E across the ASLAN over any 5-minute period measured under congested conditions. The measured latency for the SUT was 0.154 ms, which met the requirement.

(b) Jitter. The UCR 2008, Change 3, Section 5.3.1.4.2.2, states that when transporting video IP packets E2E jitter shall not exceed 30 ms over any 5-minute measured period under congested conditions. The measured jitter for the SUT was 0.003 ms, which met the requirement.

(c) Packet Loss. The UCR 2008, Change 3, Section 5.3.1.4.2.3, states that actual measured packet loss across the LAN shall not exceed 0.15 percent within the defined queuing parameters. The packet loss requirement shall be achievable over any 5-minute period measured from ingress sports to egress ports under congested conditions. The measured packet loss for the SUT was 0.00 percent, which met the requirement.

(3) Data Services

(a) Latency. The UCR 2008, Change 3, Section 5.3.1.4.3.1, states that latency for prioritized data IP packets shall not exceed 45 ms E2E across the ASLAN over any 5-minute period as measured under congested conditions. The measured latency for the SUT was 0.051 ms for Preferred Data and 0.077 ms for Best Effort Data, which met the requirement.

(b) Jitter. The UCR 2008, Change 3, Section 5.3.1.4.3.2 states that there are no jitter requirements for preferred data IP packets.

(c) Packet Loss. The UCR 2008, Change 3, Section 5.3.1.4.3.3, states that actual measured packet loss across the LAN shall not exceed 0.15 percent within the defined queuing parameters. The packet loss requirement shall be achievable over any 5-minute period measured from ingress sports to egress ports under congested conditions. The measured packet loss for the SUT was 0.00 percent for Preferred Data and 0.01 percent for Best Effort Data, which met the requirement.

c. Network Management (NM) Requirements. The NM requirements in the subparagraphs below were met by testing and the vendor's LoC and evaluated by USAISEC TIC-led IA test teams, and the results are published in a separate report, Reference (e).

(1) Configuration Control. IAW UCR 2008, Change 3, Section 5.3.1.6.1, the SUT Network Management System (NMS) shall report configuration change events in near-real-time (NRT). The system shall report the success or failure of authorized configuration change attempts in NRT. NRT is defined as within five seconds of detecting the event, excluding transport time.

(2) Operational Changes. IAW UCR 2008, Change 3, Section 5.3.1.6.2, LAN infrastructure components must provide metrics to the NMS to allow them to make decisions on managing the network. The SUT NMS shall have an automated NM capability to obtain the status of networks and associated assets in NRT 99 percent of the time (with 99.9 percent as an Objective Requirement).

(3) Performance Monitoring. IAW UCR 2008, Change 3, Section 5.3.1.6.3, all LAN components shall be capable of providing status changes 99 percent of the time (with 99.9 percent as an Objective Requirement) by means of an automated capability

in NRT. The SUT NMS shall have an automated NM capability to obtain the status of networks and associated assets 99 percent of the time (with 99.9 percent as an Objective Requirement) within five seconds of detecting the event, excluding transport. The NMS shall collect statistics and monitor bandwidth utilization, delay, jitter, and packet loss.

(4) Alarms. IAW UCR 2008, Change 3, Section 5.3.1.6.4, all LAN components shall be capable of providing SNMP alarm indications to an NMS. The SUT NMS shall have the NM capability to perform automated fault management of the network, to include problem detection, fault correction, fault isolation and diagnosis, problem tracking until corrective actions are completed, and historical archiving.

(5) Reporting. IAW UCR 2008, Change 3, Section 5.3.1.6.5, to accomplish Global Information Grid E2E situational awareness, an NMS shall have the NM capability of automatically generating and providing an integrated/correlated presentation of network and all associated networks.

d. Engineering Requirements.

(1) Copper Media. IAW UCR 2008, Change 3, Section 5.3.1.7.1, cabling used for the LAN shall not be lower than a Category 5 performance.

(2) Wireless. The UCR 2008, Change 3, Section 5.3.1.7.2, states that wireless LAN implementations are considered as extensions of the physical layer. If an ASLAN supports wireless, it must meet all of the applicable requirements of this section. This requirement is conditional, was not tested, and therefore, not certified for use.

(3) Traffic Engineering. IAW UCR 2008, Change 3, Section 5.3.1.7.3, bandwidth in the LAN shall be engineered so Voice IP subscribers do not exceed more than 25 percent of available trunk bandwidth. This requirement was met with the following stipulations: It is the site's responsibility to configure the SUT in a manner which meets the engineering requirements listed in Enclosure 2, Section 11.2 d, and that it does not create a single point of failure which could impact more than 96 C2 users.

(4) Availability. IAW UCR 2008, Change 3, Section 5.3.1.7.6, system reliability must be engineered at 99.999 percent for FLASH/FLASH OVERRIDE users, and 99.997 for IMMEDIATE/PRIORITY users in an ASLAN. ROUTINE users may be supported by a non-ASLAN with a reliability of 99.9 percent. The C2 users may not be supported by a non-ASLAN. This requirement was met with the following stipulations: It is the site's responsibility to configure the SUT in a manner which meets the engineering requirements listed in Enclosure 2, Section 11.2 d, and that it does not create a single point of failure which could impact more than 96 C2 users.

(5) Redundancy. The UCR 2008, Change 3, Sections 5.3.1.2.1, 5.3.1.7.7, 5.3.1.7.7.1, and 5.3.1.7.7.2, state that ASLAN components shall have no single point of

failure for more than 96 C2 and Special C2 users. The UCR 2008, Change 3, Section 5.3.1.7.7, states the following redundancy requirements: redundancy can be met if the product itself provides redundancy internally or a secondary product is added to the ASLAN to provide redundancy to the primary product. Single-product redundancy may be met with a modular chassis that at a minimum provides the following: dual power supplies, dual processers, termination sparing, redundancy protocol, no single point of failure, and switch fabric or backplane redundancy. In the event of a component failure in the network, all active calls shall not be disrupted (loss of existing connection requiring redialing) and the path through the network shall be restored within 5 seconds. If a secondary product has been added to provide redundancy to a primary product, the failover to the secondary product must meet the same requirements. Non-ASLAN components shall have a single point of failure for C2(R) and non-C2 users. The SUT met all of these requirements. All of the redundant components were tested and found to meet all the failover and access requirements with a measured restoral within 5 seconds, with no loss of existing active circuits. This requirement was met with the following stipulations: It is the site's responsibility to configure the SUT in a manner which meets the engineering requirements listed in Enclosure 2, Section 11.2 d, and that it does not create a single point of failure which could impact more than 96 C2 users.

e. Multiprotocol Label Switching (MPLS) Requirements. IAW UCR 2008, Change 3, Section 5.3.1.8.4, MPLS may be used to improve the performance of the ASLAN Core layer for implementations covering a large geographical area. The ASLAN MPLS requirements were met by testing and the vendor's LoC with the exception of the Fault Tolerance for the Label Distribution Protocol (LDP) RFC 3479. The vendor does not meet the requirement for Fault Tolerance for the Label Distribution Protocol (LDP) RFC 3479. Juniper supports RFC3478 in lieu of RFC3479. MPLS was tested and is certified for joint use as a Core, Distribution and Access switch. On 11 February 2013, DISA has accepted and approved the vendor's POA&M and adjudicated this discrepancy as having minor operational impact with a Condition of Fielding. . The SUT was also tested and certified for Multiprotocol Label Switching (MPLS) and MPLS Layer 2/Layer 3 Virtual Private Networks (VPNs).

f. IPv6 Requirements. All UC products must meet the IPv6 requirements IAW UCR 2008, Change 3, Section 5.3.5. The IPv6 requirements were met by testing and the vendor's LoC with the exceptions of the IPv6 RFC 5798. On 18 December 2012, DISA accepted and approved the vendor's POA&M and adjudicated this discrepancy as minor. The SUT was tested and certified for joint use with IPv6 voice, video, and data traffic.

11.3 Information Assurance (IA). Security testing was accomplished via USAISEC TIC-led IA test teams and published in a separate report, Reference (e).

11.4 Other. None

12. TEST AND ANALYSIS REPORT. No detailed test report was developed IAW with the Program Manager's request. JITC distributes IO information via the JITC Electronic Report Distribution (ERD) system, which uses Unclassified-But-Sensitive Internet Protocol Router Network (NIPRNet) e-mail. More comprehensive IO 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). Information related to DSN testing is on the Telecom Switched Services Interoperability (TSSI) website at http://jitc.fhu.disa.mil/tssi. Due to the sensitivity of the information, the Information Assurance Accreditation Package (IAAP) that contains the approved configuration and deployment guide must be requested directly through government civilian or uniformed military personnel from the Unified Capabilities Certification Office (UCCO); e-mail: disa.meade.ns.list.unified-capabilities-certificaion-office@mail.mil.

SYSTEM FUNCTIONAL AND CAPABILITY REQUIREMENTS

The Assured Services Local Area Networks (ASLAN) components have required and conditional features and capabilities that are established by Section 5.3.1 of the Unified Capabilities Requirements (UCR) 2008, Change 3. The system under test (SUT) does not need to provide conditional requirements. However, if a capability is provided, it must function according to the specified requirements. The detailed Functional requirements (FRs) and Capability Requirements (CRs) for ASLAN products are listed in Table 3-1. Detailed Information Assurance (IA) requirements are included in Reference (e).

Table 3-1. ASLAN Products CRs and FRs

ID	Requirement (See note.)		UCR 2008, Change 3 Reference
1	ASLAN components can have no single point of failure for >96 users for C2 and Special C2 users. Non-ASLAN components can have a single point of failure for C2(R) and non-C2 users. (R)		5.3.1.2.1, 5.3.1.7.7
2	Non-blocking of any voice or video traffic at 50% Core/Distribution (R), 12.5% Non-Blocking Access. (R)		5.3.1.3
3	Maximum of 1 ms of voice jitter for all ASLAN components, 10 ms for video. (R)		5.3.1.3
4	Maximum of 0.015% voice, 0.05% video, and 0.05% Preferred Data packet loss. (R)		5.3.1.3
5	Maximum of 2 ms latency for voice, 10 ms for video. (R)		5.3.1.3
6	100 Mbps IAW IEEE 802.3u and 1 Gbps IAW IEEE 802.3z for Core and Distribution layer components and one of : 10 Mbps IAW IEEE 802.3i/j, 100 Mbps IAW IEEE 802.3u or 1000 Mbps IAW IEEE 803.3z/ab for Access layer components. (R) May provide Fiber Channel IAW INCITS T11.2/3, but if provided, must support RFC 4338 and RFC 4044. (C)		5.3.1.3.1
7	Force mode and auto-negotiation IAW IEEE 802.3, filtering IAW RFC 1812, and flow control IAW IEEE 802.3x. (R)		5.3.1.3.2
8	Port Parameter Requirements	Auto-negotiation IAW IEEE 802.3. (R)	5.3.1.3.2
9		Force mode IAW IEEE 802.3. (R)	
10		Flow control IAW IEEE 802.3x. (R)	
11		Filtering IAW RFC 1812. (R)	
12		Link Aggregation IAW IEEE 802.1AX (output/egress ports only). (R)	
13		Spanning Tree Protocol IAW IEEE 802.1D. (R)	
14		Multiple Spanning Tree IAW IEEE 802.1s. (R)	
15		Rapid Reconfiguration of Spanning Tree IAW IEEE 802.1w. (R)	
16		Link Layer Discovery Protocol (LLDP) IAW IEEE 802.1AB. Core and Distribution (C) Access (R)	
17		Link Layer Discovery- Media Endpoint Discovery IAW ANSI/TIA-1057. Core and Distribution (C) Access (R)	
18		Power over Ethernet IAW either 802.3af-2003 or 802.3at-2009. (R)	
19	Class of Service Marking: L3 DSCPs IAW RFC 2474. (R) L2 3-bit user priority field of the IEEE 802.1Q 2-byte TCI field. (C)		5.3.1.3.3
20	VLAN Capabilities IAW IEEE 802.1Q. (R)		5.3.1.3.4
21	Protocols IAW DISR profile (IPv4 and IPv6). IPv4 (R: LAN Switch, L2 Switch): IPv6 (R: LAN Switch, C: L2 Switch). Note: L2 switch is required to support only RFCs 2460, 5095, 2464, and be able to queue packets based on DSCPs in accordance with RFC 2474. Must conform to UCR 2008, Change 3, Table 5.3.1-4.		5.3.1.3.5
22	QoS Features	Shall support minimum of 4 queues. (R)	5.3.1.3.6
23		Must be able to assign VLAN tagged packets to a queue. (R)	
24		Support DSCP PHBs per RFCs 2474, 2597, 3140, and 3246. (R: LAN Switch).	
25		Support RFCs in Table 5.3.1-5, FIFO 3670 (C), and one of the following RFCs: WFQ 3662, CQ 3670, PQ 1046 and CB-WFQ 3366. (R)	
26		Must be able to assign a bandwidth or percent of traffic to any queue. (R)	

Table 3-1. ASLAN Products CRs and FRs (continued)

ID	Requirement (See note.)		UCR 2008, Change 3 Reference
27	Network Monitoring	SNMP IAW RFCs 3411, 3412, 3413, 3414, 3415, 3416 and 3417. (R)	5.3.1.3.7
28		SNMP traps IAW RFC 1215. (R)	
29		Remote monitoring IAW RFC 2819 and Advanced Encryption Standard (AES) Cipher Algorithm in the SNMP User-based Security Model IAW RFC 3826. (R)	
30		Coexistence between Version 1, Version 2, and Version 3 of the Internet-standard Network Management Framework IAW RFC 3584. (R)	
31	Product Requirements Summary IAW UCR 2008, Change 3, Table 5.3.1-5. (R)		5.3.1.3.9
32	E2E Performance (Voice)	No more than 6 ms latency over any 5-minute period measured under congestion. (R)	5.3.1.4.1
		No more than 3 ms jitter over any 5-minute period measured under congestion. (R)	
		Packet loss not to exceed 0.045% engineered (queuing) parameters over any 5-minute period under congestion. (R)	
33	E2E Performance (Video)	No more than 30 ms latency over any 5-minute period measured under congestion. (R)	5.3.1.4.2
		No more than 30 ms jitter over any 5-minute period measured under congestion. (R)	
		Packet loss not to exceed engineered 0.15% (queuing) parameters over any 5-minute period under congestion. (R)	
34	E2E Performance (Data)	No more than 45 ms latency over any 5-minute period measured under congestion (R)	5.3.1.4.3
		Packet loss not to exceed 0.15% engineered (queuing) parameters over any 5-minute period under congestion. (R)	
35	LAN Network Management	Configuration Control for ASLAN and non-ASLAN. (R)	5.3.1.6.1
36		Operational Controls for ASLAN and non-ASLAN. (R)	5.3.1.6.2
37		Performance Monitoring for ASLAN and non-ASLAN. (R)	5.3.1.6.3
38		Alarms for ASLAN and non-ASLAN. (R)	5.3.1.6.4
39		Reporting for ASLAN and non-ASLAN. (R)	5.3.1.6.5
40	Redundancy	Redundant Power Supplies. (Required on standalone redundant products.)	5.3.1.7.7
41		Chassis Failover. (Required on standalone redundant products.)	
42		Switch Fabric Failover. (Required on standalone redundant products.)	
43		Non-LACP Link Failover. (R)	
44		Fiber Blade Failover. (R)	
45		Stack Failover. (C) (Required if the stack supports more than 96 users.)	
46		CPU (routing engine) blade Failover. (R)	
47	MPLS	MPLS may not add measurable loss or jitter to system. (C)	5.3.1.8.4.1
48		MPLS conforms to RFCs in UCR 2008, Change 3, Table 5.3.1-14. (C)	5.3.1.8.4.1
49		MPLS Support L2 and L3 VPNs. (C)	5.3.1.8.4.2.1/2
50	IPv6 Product Requirements: Dual Stack for IPv4 and IPv6 IAW RFC 4213 if routing functions are supported. (C)		5.3.5.4
51	IPv6 System Requirements	Support IPv6 IAW RFCs 2460 and 5095 if routing functions are supported. (C)	5.3.5.4
52		Support IPv6 packets over Ethernet IAW RFC 2464. (R)	5.3.5.4
53		Support MTU discovery IAW RFC 1981 if routing functions are supported. (C)	5.3.5.4.1
54		Support a minimum MTU of 1280 IAW RFCs 2460 and 5095. (R)	5.3.5.4.1
55		Shall not use the Flow Label field as described in RFC 2460. (R)	5.3.5.4.2
56		Shall be capable of setting the Flow Label field when forwarding packets. (R)	5.3.5.4.2
57		Shall be capable of ignoring the Flow Label field when receiving packets. (R)	5.3.5.4.2
58		Shall support IPv6 addresses IAW RFC 4291. (R)	5.3.5.4.3
59		Shall support IPv6 scoped address IAW RFC 4007. (R)	5.3.5.4.3
60		If routing functions are supported: If DHCP is supported, the product shall support RFC 3315; if DHCPv6 is supported, it shall be implemented IAW RFC 3315. (C)	5.3.5.4.4
61	IPv6 Router Advertise-ments	If the system supports routing functions, the system shall inspect valid router advertisements sent by other routers and verify that the routers are advertising consistent information on a link and shall log any inconsistent router advertisements, and shall prefer routers that are reachable over routers whose reachability is suspect or unknown (C).	5.3.5.4.5.2
62		If the system supports routing functions, the system shall include the MTU value in the router advertisement message for all links IAW RFC 2461 and RFC 4861. (C)	
63		IPv6 Neighbor Discovery: The system shall not set the override flag bit in the neighbor advertisement message for solicited advertisements for anycast addresses or solicited proxy advertisements. (R)	

Table 3-1. ASLAN Products CRs and FRs (continued)

ID	Requirement (See note.)		UCR 2008, Change 3 Reference
64	IPv6 Neighbor Discovery	If routing functions are supported: Neighbor discovery IAW RFCs 2461 and 4861. (C)	5.3.5.4.5
65		The system shall not set the override flag bit in the neighbor advertisement message for solicited advertisements for anycast addresses or solicited proxy advertisements. (R)	
66		The system shall set the override flag bit in the neighbor advertisement message to "1" if the message is not an anycast address or a unicast address for which the system is providing proxy service. (R)	
67	IPv6 SLAAC and Manual Address Assignment	If the system supports stateless IP address Auto-configuration, the system shall support IPv6 SLAAC for interfaces supporting UC functions IAW RFC 4862. (C)	5.3.5.4.6
68		If the product supports IPv6 SLAAC, the product shall have a configurable parameter that allows the function to be enabled and disabled. (C)	
69		If the product supports IPv6 SLAAC, the product shall have a configurable parameter that allows the "managed address configuration" flag and the "other stateful configuration" flag to always be set and not perform stateless auto-configuration. (C)	
70		If the product supports stateless IP address auto-configuration including those provided for the commercial market, the DAD shall be disabled IAW RFC 4862. (C)	
71		The system shall support manual assignment of IPv6 addresses. (R)	
72		If the system provides routing functions, the system shall default to using the "managed address configuration" flag and the "other stateful flag" set to TRUE in their router advertisements when stateful auto-configuration is implemented. (C)	
73	IPv6 ICMP	The system shall support the ICMPv6 as described in RFC 4443. (R)	5.3.5.4.7
74		The system shall have a configurable rate limiting parameter for rate limiting the forwarding of ICMP messages. (R)	
75		The system shall support the capability to enable or disable the ability of the system to generate a Destination Unreachable message in response to a packet that cannot be delivered to its destination for reasons other than congestion. (R) Required if LS supports routing functions.	
76		The system shall support the enabling or disabling of the ability to send an Echo Reply message in response to an Echo Request message sent to an IPv6 multicast or anycast address (C). Required if LS supports routing functions.	
77		The system shall validate ICMPv6 messages, using the information contained in the payload, prior to acting on them. (C) Required if LS supports routing functions.	
78	IPv6 Routing Functions	If the system supports routing functions, the system shall support the OSPF for IPv6, as described in RFC 5340. (C) This replaces RFC 2740.	5.3.5.4.8
79		If the system supports routing functions, the system shall support securing OSPF with IPSec as described for other IPSec instances in UCR 2008, Change 3, Section 5.4. (C)	
80		If the system supports routing functions, the system shall support OSPF for IPv6, as described in RFC 2740, router to router integrity using IP authentication header with HMAC-SHA1-128 with ESP, and AH as described in RFC 4302 (IA superseding requirement), and shall support OSPFv3 IAW RFC 4552. (C)	
81		If the system supports routing functions, the system shall support the Multicast Listener Discovery (MLD) process as described in RFC 2710 and extended in RFC 3810 and RFC 2711. (C)	
82	IPv6 Network Management	If nodes are managed via SNMP, it shall use MIBs IAW RFC 4293. (R)	5.3.4.4.10/ 5.3.2.17.3.1.5
83		If the product performs routing functions and is managed by SNMP, the product shall support the IP Forwarding MIB as defined in RFC 4292. (R)	5.3.4.4.10
84	Site Requirements	Engineering Requirements: Physical Media for ASLAN and non-ASLAN. (R) (Site requirement)	5.3.1.7.1
85		Wireless. (C)	5.3.1.7.2
86		Traffic Engineering. (R)	5.3.1.7.3
87		VLAN Design and configuration. (R)	5.3.1.7.4
88		Battery back-up 2 hours for non-ASLAN components and 8 hours for ASLAN components. (R) (Site requirement)	5.3.1.7.5
89		Availability of 99.999 percent (Special C2), and 99.997 percent (C2) for ASLAN (R), and 99.9 percent (non-C2 and C2(R) for non-ASLAN. (R) (Site requirement)	5.3.1.7.6

Table 3-1. ASLAN Products CRs and FRs (continued)

ID	Requirement (See note.)		UCR 2008, Change 3 Reference
90	IA Security Requirements	Port-Based Access Control IAW IEEE 802.1x. (R)	5.3.1.3.2
91		Secure methods for network configuration. SSH2 instead of Telnet and support RFCs 4251-4254. Must use HTTPS instead of http, and support RFCs 2660 and 2818 for ASLAN and non-ASLAN. (R)	5.3.1.6
92		IPSec shall be IAW RFC 4301. (R if IPSec is supported)	5.3.1.3.8/ 5.3.5.4.9
93		Must meet IA requirements IAW UCR 2008, Change 3, Section 5.4, for ASLAN and non-ASLAN. (R)	5.3.1.5

NOTE: All requirements are for Core, Distribution, and Access layer components unless otherwise specified.

LEGEND:

AES	Advanced Encryption Standard	HTTP	Hypertext Transfer Protocol	MIB	Management Information Base
AH	Authentication Header			MLD	Multicast Listener Delivery
ANSI	American National Standards Institute	HTTPS	Hyper Text Transfer Protocol, Secure	MPLS	Multiprotocol Label Switching
				ms	Millisecond
ASLAN	Assured Services Local Area Network	IA	Information Assurance	MTU	Maximum Transmission Unit
		IAW	In Accordance With	OSPF	Open Shortest Path First
C	Conditional	ICMP	Internet Control Message Protocol	OSPFv3	Open Shortest Path First Version 3
C2	Command and Control				
C2(R)	Command and Control ROUTINE Only	ICMPv6	Internet Control Message Protocol for IPv6	PHB	Per Hop Behavior
				PQ	Priority Queuing
CB-WFQ	Class Based-Weighted Fair Queuing	ID	Identification	QoS	Quality of Service
		IEEE	Institute of Electrical and Electronics Engineers	R	Required
CPU	Central Processing Unit			RFC	Request for Comments
CQ	Custom Queuing	INCITS	InterNational Committee for Information Technology Standards	SHA1	Secure Hash Algorithm Version 1.0
DAD	Duplicate Address Detection				
DHCP	Dynamic Host Configuration Protocol	IP	Internet Protocol	SLAAC	Stateless Auto Address Configuration
		IPSec	Internet Protocol Security	SNMP	Simple Network Management Protocol
DHCPv6	Dynamic Host Configuration Protocol for IPv6	IPv4	Internet Protocol Version 4		
		IPv6	Internet Protocol Version 6	SSH2	Secure Shell Version 2
DISR	Department of Defense Information Technology Standards Registry	L2	Layer 2	TCI	Tag Control Information
		L3	Layer 3	TIA	Telecommunications Industry Association
DSCP	Differentiated Services Code Point	LACP	Link Aggregation Control Protocol		
				UC	Unified Capabilities
E2E	End-to-End	LAN	Local Area Network	UCR	Unified Capabilities Requirements
ESP	Encapsulating Security Payload	LLDP	Link Layer Discovery Protocol		
				VLAN	Virtual Local Area Network
FIFO	First-in First-Out	LS	LAN Switch	VPN	Virtual Private Network
Gbps	Gigabits Per Second	Mbps	Megabits Per Second	WFQ	Weighted Fair Queuing
HMAC	Hash-Based Message Authentication Code	MIB	Management Information Base		