



DEFENSE INFORMATION SYSTEMS AGENCY

P. O. BOX 549
FORT MEADE, MARYLAND 20755-0549

IN REPLY
REFER TO: Joint Interoperability Test Command (JTE)

16 Apr 13

MEMORANDUM FOR DISTRIBUTION

SUBJECT: Joint Interoperability Certification of the Hewlett-Packard (HP) 3800 Series Release KA.15.09.0009

References: (a) DoD Directive 4630.05, "Interoperability and Supportability of Information Technology (IT) and National Security Systems (NSS)," 5 May 2004
(b) Department of Defense Instruction 8100.04, "DoD Unified Capabilities (UC)," 9 December 2010
(c) through (e), see Enclosure 1

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

2. The HP 3800 Series Release KA.15.09.0009 is hereinafter referred to as the System Under Test (SUT). The SUT meets all of its critical interoperability requirements and is certified for joint use within the Defense Information Systems Network (DISN) as an Assured Services Local Area Network (ASLAN) Layer 2 Access switch in a stacked configuration. The SUT is certified as interoperable for joint use with other ASLAN components listed on the Unified Capabilities (UC) Approved Product List (APL) with the following interfaces: Institute of Electrical and Electronics Engineers (IEEE) 802.3i (10BaseT), IEEE 802.3u (100BaseT), IEEE 802.3ab (1000BaseT), IEEE 802.3z (1000BaseSX/LX), and IEEE 802.3ae (10GBASE-SR/LR). JITC tested all these interfaces with the exception of the 10BaseT interface. JITC analysis determined the 10BaseT interface is low risk for certification based on the vendor's Letter of Compliance (LoC) to comply with the 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 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.

No other configurations, features, or functions, except those cited within this document, are certified by 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, review of the vendor's LoC, DISA adjudication of open test discrepancy reports (TDRs), and DISA Certifying Authority (CA) Recommendation. Interoperability testing was conducted by JITC, Fort Huachuca, Arizona, from 1 through 12 October and 10 through 14 December 2012. Review of the vendor's LoC was completed on 8 June 2012. DISA adjudication of outstanding TDRs was completed on 26 February 2013. The DISA CA provided a positive Recommendation on 3 April 2013 based on the security testing completed by DISA-led Information Assurance (IA) test teams and published in a separate report, Reference (e). Enclosure 2 documents the 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 interoperability status and Table 3 provides the Capability Requirements (CR) and Functional Requirements (FR) status. The threshold CR/FRs for ASLAN components are established by Section 5.3.a of Reference (c) and were used to evaluate the interoperability of the SUT. Enclosure 3 provides a detailed list of the interface, capability, and functional requirements.

Table 1. UC APL Product Summary

SUT (See note.)	Release	Sub-component (See note.)												
HP 3800-24-G-PoE+-2SFP+ (Model J9573A), HP 3800-48G-PoE+-4XG (Model J9588A), HP 3800-24SFP-2SFP+ (Model J9584A)	KA.15.09.0009	Stacking Module (J9577A)												
		1000BaseT Copper SFP (J8177B)												
		1Gig SFP LC SX Transceivers (J4858C)												
		1/10Gig Fiber SR (J9150A)												
<p>NOTE: All components were tested by JITC and they are certified for joint use.</p> <p>LEGEND:</p> <table> <tr> <td>APL</td> <td>Approved Products List</td> <td>SFP</td> <td>Small Form Factor Pluggable</td> </tr> <tr> <td>HP</td> <td>Hewlett Packard</td> <td>SR</td> <td>Short Range</td> </tr> <tr> <td>JITC</td> <td>Joint Interoperability Test Command</td> <td>UC</td> <td>Unified Capabilities</td> </tr> </table>			APL	Approved Products List	SFP	Small Form Factor Pluggable	HP	Hewlett Packard	SR	Short Range	JITC	Joint Interoperability Test Command	UC	Unified Capabilities
APL	Approved Products List	SFP	Small Form Factor Pluggable											
HP	Hewlett Packard	SR	Short Range											
JITC	Joint Interoperability Test Command	UC	Unified Capabilities											

Table 2. SUT Interface Interoperability Status

Interface	Applicability	UCR 2008, Change 3 Reference	Threshold CR/FR (See note 1.)	Status	Remarks
	L2 Access				
Serial	C	5.3.1.3.9	1-4, 6	Not Tested (See note 3.)	
10Base-X	C (See note 2.)	5.3.1.3.1	1-6	Certified	The SUT met the critical CRs and FRs with the following IEEE standard: 802.3i (10BaseT).
100Base-X	C (See note 2.)	5.3.1.3.1	1-6	Certified	The SUT met the critical CRs and FRs with the following IEEE standard: 802.3u (100BaseT).
1000Base-X	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).

Table 2. SUT Interface Interoperability Status (continued)

Interface	Applicability	UCR 2008, Change 3 Reference	Threshold CR/FR (See note 1.)	Status	Remarks
10000Base-X	C (See note 2.)	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).
Wireless	C	5.3.1.3.1/5.3.1.7.2	1-6	Not Tested (See note 3.)	

NOTES:

- 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.
- Access products must minimally support one of the following standards: 802.3i (10BaseT), 802.3j (10BaseF), 802.3u (100BaseTX/FX), 802.3z (1000BaseX), or 802.3ab (1000BaseT). Other rates and standards may be provided as conditional interfaces.
- The SUT does not support this interface. This interface is not required for an access switch.

LEGEND:

802.3ab	1000BaseT Gbps Ethernet over twisted pair at 1 Gbps (125 Mbps)	FR	Functional Requirement
		Gbps	Gigabits per second
802.3ae	10 Gbps over Ethernet	ID	Identification
802.3i	10BaseT Mbps over twisted pair	IEEE	Institute of Electrical and Electronics Engineers
802.3j	10 Mbps fiber media for 10Base-X networks	L2	Layer 2
802.3u	Standard for carrier sense multiple access with collision detection at 100 Mbps	LR	Long Range
802.3z	Gigabit Ethernet Standard	Mbps	Megabits per second
C	Conditional	SR	Short Range
CR	Capability Requirement	SUT	System Under Test
		UCR	Unified Capabilities Requirements

Table 3. SUT CR and FR Status

CR/FR ID	Capability/Function	Applicability (See note 1.)	UCR Reference	Status
1	General Performance Parameters			
	Performance Parameters	Required	5.3.1.3	Partially Met (See note 2.)
	Port Interface Rates	Required	5.3.1.3.1	Met
	Port Parameter Requirements	Required	5.3.1.3.2	Met
	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	Met
	QoS Features	Required	5.3.1.3.6	Met
	Network Monitoring	Required	5.3.1.3.7	Met (See note 3.)
Security	Required	5.3.1.3.8	Met (See note 3.)	
2	E2E Performance			
	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	Network Management			
	Configuration Control	Required	5.3.1.6.1	Met (See note 5.)
	Operational Changes	Required	5.3.1.6.2	Met (See note 5.)
	Performance Monitoring	Required	5.3.1.6.3	Met (See note 5.)
	Alarms	Required	5.3.1.6.4	Met (See note 5.)
	Reporting	Required	5.3.1.6.5	Met (See note 5.)

Table 3. SUT CR and FR Status (continued)

CR/FR ID	Capability/Function	Applicability (See note 1.)	UCR Reference	Status
4	Engineering			
	Physical Media	Required	5.3.1.7.1	Met (See note 6.)
	Wireless	Conditional	5.3.1.7.2	Not Tested
	Traffic Engineering	Required	5.3.1.7.3	Met (See note 6.)
	Availability	Required	5.3.1.7.6	Met (See note 6.)
	Redundancy	Required	5.3.1.7.7	Partially Met (See notes 6 and 7.)
5	IPv6			
	Product Requirements	Required	5.3.5.4	Partially Met (See notes 8 and 9.)
6	Information Assurance			
	Information Assurance	Required	5.4	Met (See note 3.)

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 system under test does not need to provide conditional requirements. However, if a capability is provided, it must function according to the specified requirements.
2. Reference (c) states that access products shall have the capability to transport prioritized packets and that the packet loss requirements shall be achievable over any five-minute period under congested conditions. The SUT met this requirement however, the vendor discovered that their QoS entry command is case sensitive and must be entered correctly to insure no packet loss during congested conditions. The vendor has agreed to document this in detail in their product deployment guide as an interim fix with the intent to fix it in a later patch release. DISA has accepted and approved the vendor's POA&M and adjudicated this discrepancy as having a minor operational impact.
3. Security is tested by DISA-led Information Assurance test teams and the results published in a separate report, Reference (e).
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 in accordance with deployment guide and engineering guidelines provided in UCR 2008 Change 3, paragraph 5.3.1.4.
5. The NM requirements were met by testing and the vendor's LoC and evaluated by the DISA-led IA team and published in a separate report, Reference (e).
6. 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 Section 11.2 d. of Enclosure 2 and that does not create a single point of failure which could impact more than 96 C2 users.
7. The lowest numbered utilized port does not re-initialize on restoral after stack failover. If there is more than one utilized port on the SUT, the higher numbered utilized ports are not affected by a power down/up and do not require manual intervention. DISA has accepted and approved the vendor's POA&M and adjudicated this discrepancy as having a minor operational impact.
8. The IPv6 traffic from OAM, video, and voice queues experienced 100 percent intermittent (bursty) loss, between 2.5 ms and 500 ms in duration. Higher queue traffic should be handled ahead of best effort traffic and experience no measurable loss. DISA has accepted and approved the vendor's POA&M and adjudicated this discrepancy as having a minor operational impact.
9. The SUT stack element failed to come up to a ready state upon power up one time out of sixteen failover test events, but with no POA&M required from the vendor due to non repeatability of this anomaly. DISA adjudicated this as minor with no POA&M with the stipulation that this same failover test event be conducted during a future Verification and Validation event.

LEGEND:

C2	Command and Control	ms	milliseconds
CR	Capability Requirement	NM	Network Management
DISA	Defense Information Systems Agency	POA&M	Plan of Action and Milestones
E2E	End-to-End	OAM	Operations, Administration, and Maintenance
FR	Functional Requirement	QoS	Quality of Service
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

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

Tracking Program (STP). 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-certification-office@mail.mil. All associated data is available on the DISA UCCO website located at <http://www.disa.mil/ucco/>.

6. The JITC point of contact is CPT James Torres, DSN 879-5575, commercial (520) 538-5575, FAX DSN 879-4347, or e-mail to james.m.torres.mil@mail.mil. JITC's mailing address is P.O. Box 12798, Fort Huachuca, AZ 85670-2798. The UCCO tracking number for the SUT is 1221202.

FOR THE COMMANDER:



for RICHARD A. MEADOR
Chief
Battlespace Communications Portfolio

3 Enclosures a/s

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
HQUSAISEC, AMSEL-IE-IS
UCCO

ADDITIONAL REFERENCES

- (c) Office of the Assistant Secretary of Defense, "Department of Defense Unified Capabilities Requirements 2008, Change 3," September 2011
- (d) Joint Interoperability Test Command, "ASLAN Component Test Plan (UCTP)," November 2010
- (e) Joint Interoperability Test Command, "Information Assurance (IA) Findings and Mitigation Summary Assessment of Hewlett Packard (HP) E3800 Release (Rel.) KA 15.09.0009 (Tracking Number 1221202)," Draft

CERTIFICATION TESTING SUMMARY

1. SYSTEM TITLE. Hewlett-Packard (HP) 3800 Series Release KA.15.09.0009; hereinafter referred to as the System Under Test (SUT).

2. SPONSOR. Headquarters United States Army Information Systems Engineering Command (HQUSAISEC), Mr. Jordan R. Silk, USAISEC ELIE-ISE-ES, Building 53301, Fort Huachuca, Arizona 85613, e-mail: jordan.silk@us.army.mil.

3. SYSTEM POC. Mr. Rick De Gabriele, 8000 Foothills Boulevard, Roseville California 95747, e-mail: rick.degabriele@hp.com.

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

5. SYSTEM DESCRIPTION. The SUT is used to transport voice and video 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 has 24-10/100/1000 Megabits per second (Mbps) RJ-45 ports and two dual-personality ports that can be used as mini GBIC ports or 10/100/1000 Mbps RJ-45 ports. The SUT supports up to two SFP+ 10 GbE ports and 176 Gigabits per second (Gbps) switch fabric capacity. The SUT is certified for joint use as an Assured Services Local Area Network (ASLAN) Layer 2 Access switch in a stacked configuration and is interoperable for joint use with other ASLAN components listed on the Unified Capabilities (UC) Approved Products List (APL) with the following interfaces: Institute of Electrical and Electronics Engineers (IEEE) 802.3i (10BaseT), IEEE 802.3u (100BaseT), IEEE 802.3ab (1000BaseT), IEEE 802.3z (1000BaseSX/LX), and IEEE 802.3ae (10GBASE-SR/LR).

6. OPERATIONAL ARCHITECTURE. Figure 2-1 depicts an ASLAN notional operational architecture that the SUT may be used in. 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.

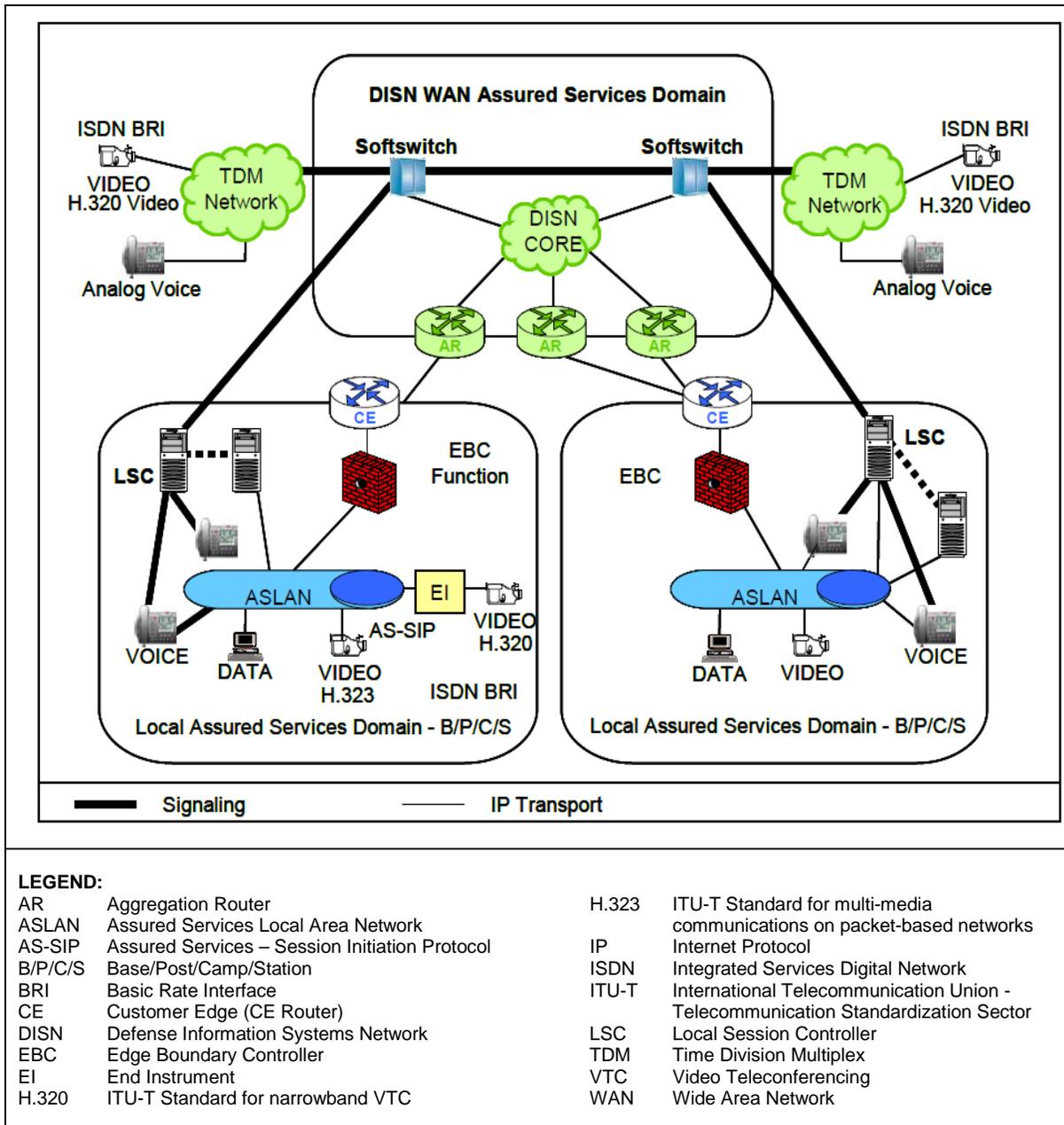


Figure 2-1. DISN Unified Capabilities Notional Operational Architecture

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 Sections 5.3.1 and 5.4 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 Ref	Criteria (See note 1.)	Applicability
			Access
Serial	5.3.1.3.9	Support minimum threshold CRs/FRs 1-4 and meet interface criteria for applicable EIA/TIA standard.	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
100Base-X (See note 2.)	5.3.1.3.1	Support minimum threshold CRs/FRs 1-6 and meet interface criteria for IEEE 802.3u.	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.	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
Wireless	5.3.1.3.1 and 5.3.1.7.2	Support minimum threshold CRs/FRs 1-6 and meet interface criteria for IEEE 802.11a/b/g/n or 802.16.	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 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 (100BaseTX/FX), 802.3z (1000BaseX), 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)	Co	Core
802.3i	10BaseT Mbps over twisted pair	CR	Capability Requirement
802.3j	10 Mbps fiber media for 10Base-X networks	D	Distribution
802.3u	Standard for carrier sense multiple access with collision detection at 100 Mbps	FR	Functional Requirement
802.3z	Gigabit Ethernet Standard	ID	Identification
A	Access	IEEE	Institute of Electrical and Electronic Engineers
ASLAN	Assured Services Local Area Network	Mbps	Megabits per second
C	Conditional	R	Required
		SUT	System Under Test
		UCR	Unified Capabilities Requirements

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). 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 Reference																												
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 (See note 3.)																														
	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	IPv6 Requirements																														
	Product Requirements	Required	5.3.5.4																												
6	Information Assurance																														
	Information Assurance	Required	5.4 (See note 2.)																												
<p>NOTES:</p> <p>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.</p> <p>2. Refers to IA requirements for UCR 2008, Change 3, Section 5.4. Detailed IA requirements are included in Reference (e).</p> <p>3. The engineering requirements include site requirements. The SUT must be deployed in accordance with deployment guide and engineering guidelines provided in UCR Change 3, paragraph 5.3.1.7.</p> <p>LEGEND:</p> <table> <tr> <td>CR</td> <td>Capability Requirement</td> <td>NM</td> <td>Network Management</td> </tr> <tr> <td>E2E</td> <td>End-to-End</td> <td>QoS</td> <td>Quality of Service</td> </tr> <tr> <td>FR</td> <td>Functional Requirement</td> <td>SUT</td> <td>System Under Test</td> </tr> <tr> <td>IA</td> <td>Information Assurance</td> <td>UCR</td> <td>Unified Capabilities Requirements</td> </tr> <tr> <td>ID</td> <td>Identification</td> <td>VLAN</td> <td>Virtual Local Area Network</td> </tr> <tr> <td>IPv6</td> <td>Internet Protocol version 6</td> <td>VPN</td> <td>Virtual Private Network</td> </tr> <tr> <td>MPLS</td> <td>Multiprotocol Label Switching</td> <td></td> <td></td> </tr> </table>				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	MPLS	Multiprotocol Label Switching		
CR	Capability Requirement	NM	Network Management																												
E2E	End-to-End	QoS	Quality of Service																												
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IPv6	Internet Protocol version 6	VPN	Virtual Private Network																												
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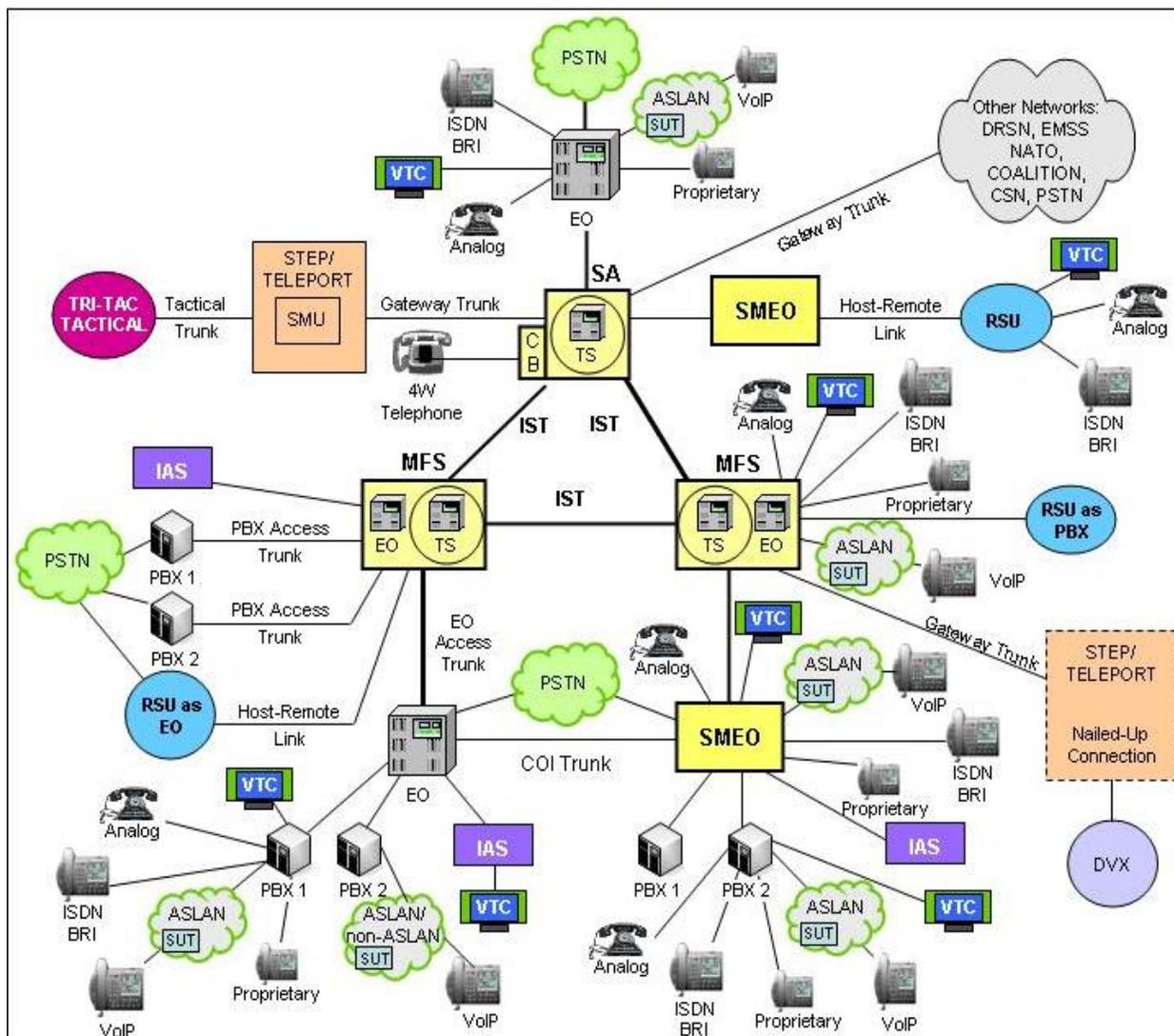
7.3 Information Assurance (IA). Table 2-3 details the IA requirements applicable to the ASLAN products.

Table 2-3. ASLAN Products IA Requirements

Requirement	Applicability (See note.)	UCR 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									
<p>NOTE: The annotation of 'required' refers to a high-level requirement category. Refers to IA requirements for UCR 2008, Change 3, Section 5.4.</p> <p>LEGEND:</p> <table> <tr> <td>ASLAN</td> <td>Assured Services Local Area Network</td> <td>IATP</td> <td>IA Test Plan</td> </tr> <tr> <td>IA</td> <td>Information Assurance</td> <td>UCR</td> <td>Unified Capabilities Requirements</td> </tr> </table>				ASLAN	Assured Services Local Area Network	IATP	IA Test Plan	IA	Information Assurance	UCR	Unified Capabilities Requirements
ASLAN	Assured Services Local Area Network	IATP	IA Test Plan								
IA	Information Assurance	UCR	Unified Capabilities Requirements								

7.4 Other. None

8. TEST NETWORK DESCRIPTION. The SUT was tested at JITC in a manner and configuration similar to that of a notional operational environment. The UCR operational Defense Information Systems 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 Ixia test equipment depicted in Figures 2-3 and 2-4. Figure 2-3 depicts the SUT in a homogeneous configuration. Figure 2-4 depicts the SUT in a heterogeneous configuration. Because the SUT is Layer 2 Access switch (non-routing), advanced networking features were not available for this switch, only Layer 2 behavior was tested for the SUT.



LEGEND:

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

Figure 2-2. DISN Architecture

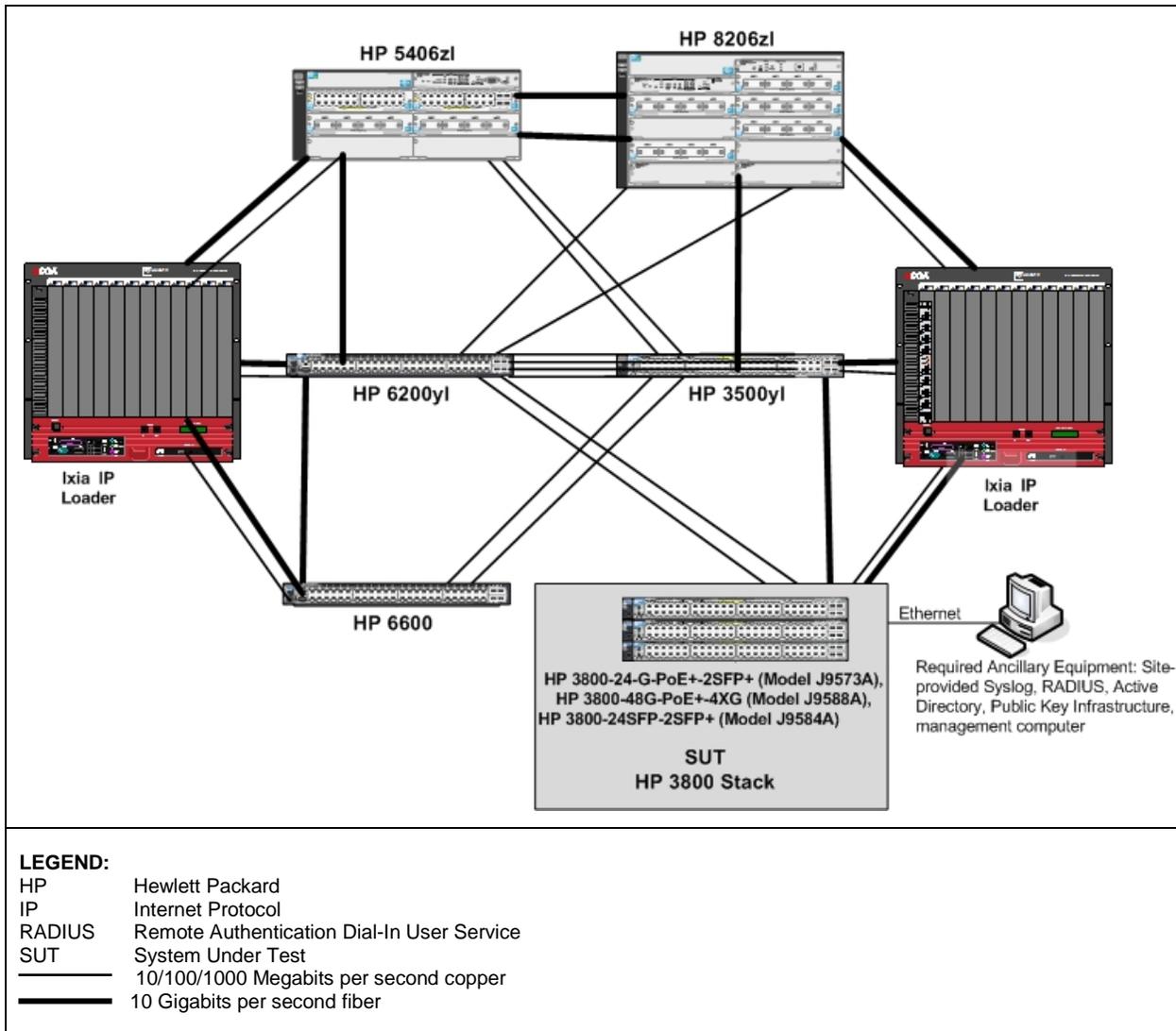


Figure 2-3. SUT Homogeneous Test Configuration (Layer 2 test only)

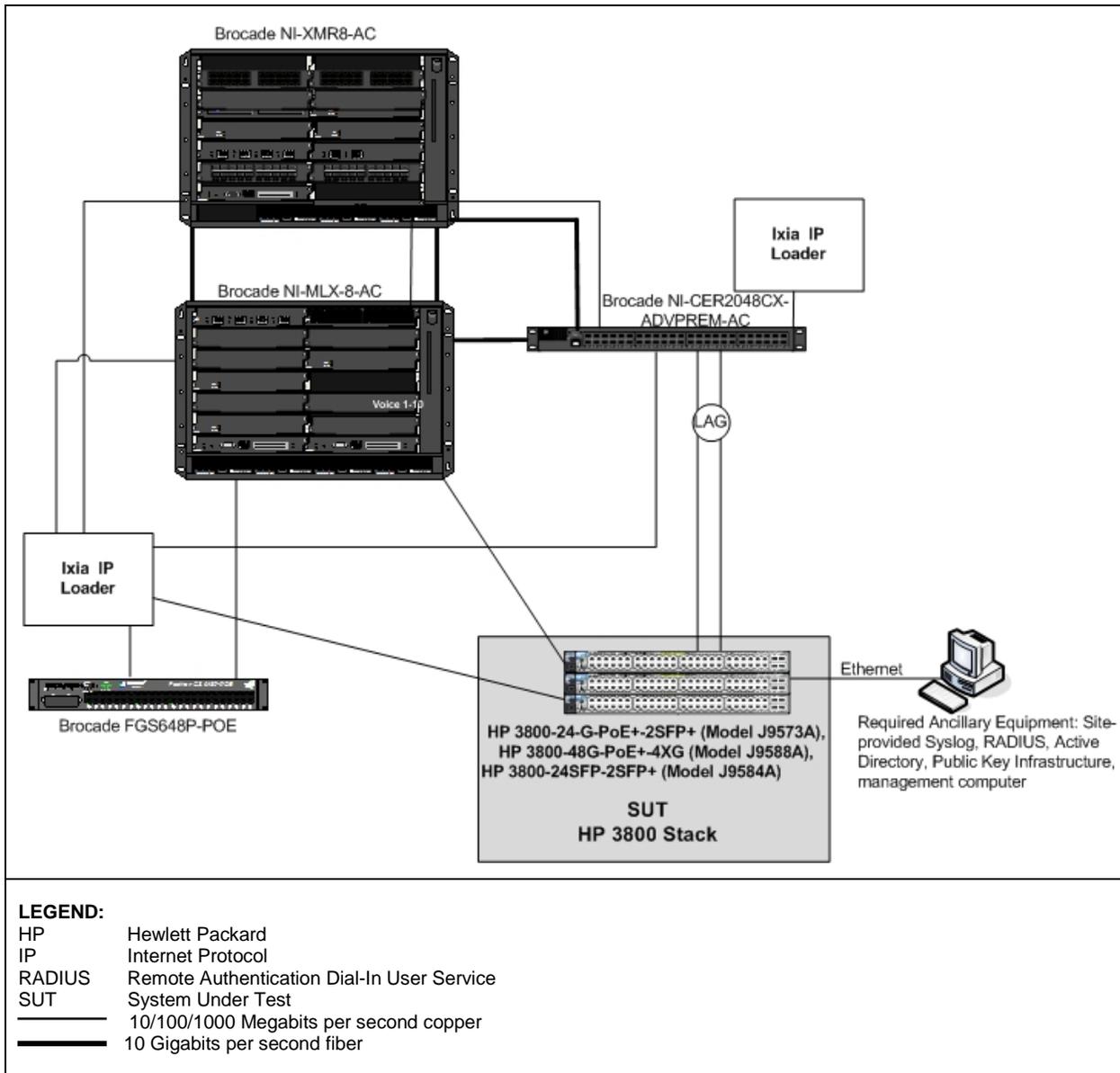


Figure 2-4. SUT Heterogeneous Test Configuration (Layer 2 test only)

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

Table 2-4. Tested System Configurations

Equipment		Software		
Ixia Test Tool		IxNetwork 6.10		
Required Ancillary Equipment		Active Directory		
		Public Key Infrastructure		
		Remote Authentication Dial-In User Service		
		SysLog Server		
Site-provided Management Workstation Microsoft Windows 7				
SUT	Release	Function	Sub-component	Description
HP 3800-24-G-PoE+-2SFP+ (Model J9573A)	KA 15.09.0009	Access (Layer 2)	J9577A	Stacking Module
HP 3800-48G-PoE+-4XG (Model J9588A)			J8177B	1000BaseT Copper SFP
HP 3800-24SFP-2SFP+ (Model J9584A)			J4858C	1Gig SFP LC SX Transceiver
			J9150A	1/10Gig Fiber SR
LEGEND: HP Hewlett Packard PoE Power over Ethernet SFP Small Form Factor Pluggable SR Short Range SUT System Under Test				

10. TESTING LIMITATIONS. None.

11. INTEROPERABILITY EVALUATION RESULTS. The SUT meets the critical interoperability requirements for a Layer 2 Access switch in accordance 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
	L2 Access				
Serial	C	5.3.1.3.9	1-4, 6	Not Tested (See note 3.)	
10Base-X	C (See note 2.)	5.3.1.3.1	1-6	Certified	The SUT met the critical CRs and FRs with the following IEEE standard: 802.3i (10BaseT).
100Base-X	C (See note 2.)	5.3.1.3.1	1-6	Certified	The SUT met the critical CRs and FRs with the following IEEE standard: 802.3u (100BaseT).
1000Base-X	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 (See note 2.)	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).
Wireless	C	5.3.1.3.1/5.3.1.7.2	1-6	Not Tested (See note 3.)	

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

NOTES:				
1. The SUT high-level CR and FR ID numbers depicted in the Threshold CRs/FRs column can be cross-referenced in Table 2-6. These high-level CR/FR requirements refer to a detailed list of requirements provided in Enclosure 3.				
2. Access products must minimally support one of the following standards: 802.3i (10BaseT), 802.3j (10BaseF), 802.3u (100BaseTX/FX), 802.3z (1000BaseX), or 802.3ab (1000BaseT). Other rates and standards may be provided as conditional interfaces.				
3. The SUT does not support this interface. This interface is not required for an access switch.				
LEGEND:				
802.3ab	1000BaseT Gbps Ethernet over twisted pair at 1 Gbps (125 Mbps)	FR	Functional Requirement	
802.3ae	10 Gbps over Ethernet	Gbps	Gigabits per second	
802.3i	10BaseT Mbps over twisted pair	ID	Identification	
802.3j	10 Mbps fiber media for 10Base-X networks	IEEE	Institute of Electrical and Electronics Engineers	
802.3u	Standard for carrier sense multiple access with collision detection at 100 Mbps	L2	Layer 2	
802.3z	Gigabit Ethernet Standard	LR	Long Range	
C	Conditional	Mbps	Megabits per second	
CR	Capability Requirement	SR	Short Range	
		SUT	System Under Test	
		UCR	Unified Capabilities Requirements	

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 CR and FR Status

CR/FR ID	Capability/Function	Applicability (See note 1.)	UCR Reference	Status
1	General Performance Parameters			
	Performance Parameters	Required	5.3.1.3	Partially Met (See note 2.)
	Port Interface Rates	Required	5.3.1.3.1	Met
	Port Parameter Requirements	Required	5.3.1.3.2	Met
	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	Met
	QoS Features	Required	5.3.1.3.6	Met
	Network Monitoring	Required	5.3.1.3.7	Met (See note 3.)
	Security	Required	5.3.1.3.8	Met (See note 3.)
2	E2E Performance			
	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	Network Management			
	Configuration Control	Required	5.3.1.6.1	Met (See note 5.)
	Operational Changes	Required	5.3.1.6.2	Met (See note 5.)
	Performance Monitoring	Required	5.3.1.6.3	Met (See note 5.)
	Alarms	Required	5.3.1.6.4	Met (See note 5.)
	Reporting	Required	5.3.1.6.5	Met (See note 5.)

Table 2-6. SUT CR and FR Status (continued)

CR/FR ID	Capability/Function	Applicability ¹	UCR Reference	Status
4	Engineering			
	Physical Media	Required	5.3.1.7.1	Met (See note 6.)
	Wireless	Conditional	5.3.1.7.2	Not Tested
	Traffic Engineering	Required	5.3.1.7.3	Met (See note 6.)
	Availability	Required	5.3.1.7.6	Met (See note 6.)
5	Redundancy	Required	5.3.1.7.7	Partially Met (See notes 6 and 7.)
	IPv6			
6	Product Requirements	Required	5.3.5.4	Partially Met (See notes 8 and 9.)
	Information Assurance			
6	Information Assurance	Required	5.4	Met (See note 3.)

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 system under test does not need to provide conditional requirements. However, if a capability is provided, it must function according to the specified requirements.
2. Reference (c) states that access products shall have the capability to transport prioritized packets and that the packet loss requirements shall be achievable over any five-minute period under congested conditions. The SUT met this requirement however, the vendor discovered that their QoS entry command is case sensitive and must be entered correctly to insure no packet loss during congested conditions. The vendor has agreed to document this in detail in their product deployment guide as an interim fix with the intent to fix it in a later patch release. DISA has accepted and approved the vendor's POA&M and adjudicated this discrepancy as having a minor operational impact.
3. Security is tested by DISA-led Information Assurance test teams and the results published in a separate report, Reference (e).
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 in accordance with deployment guide and engineering guidelines provided in UCR 2008 Change 3, paragraph 5.3.1.4.
5. The NM requirements were met by testing and the vendor's LoC and evaluated by the DISA-led IA team and published in a separate report, Reference (e).
6. 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 Section 11.2.d. of Enclosure 2 and that does not create a single point of failure which could impact more than 96 C2 users.
7. The lowest numbered utilized port does not re-initialize on restoral after stack failover. If there is more than one utilized port on the SUT, the higher numbered utilized ports are not affected by a power down/up and do not require manual intervention. DISA has accepted and approved the vendor's POA&M and adjudicated this discrepancy as having a minor operational impact.
8. The IPv6 traffic from OAM, video, and voice queues experienced 100 percent intermittent (bursty) loss, between 2.5 ms and 500 ms in duration. Higher queue traffic should be handled ahead of best effort traffic and experience no measurable loss. DISA has accepted and approved the vendor's POA&M and adjudicated this discrepancy as having a minor operational impact.
9. The SUT stack element failed to come up to a ready state upon power up one time out of sixteen failover test events, but with no POA&M required from the vendor due to non repeatability of this anomaly. DISA adjudicated this as minor with no POA&M with the stipulation that this same failover test event be conducted during a future Verification and Validation event.

LEGEND:

C2	Command and Control	ms	milliseconds
CR	Capability Requirement	NM	Network Management
DISA	Defense Information Systems Agency	POA&M	Plan of Action and Milestones
E2E	End-to-End	OAM	Operations, Administration, and Maintenance
FR	Functional Requirement	QoS	Quality of Service
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

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

(1) Performance Parameters IAW UCR 2008 Change 3, section 5.3.1.3. The

SUT met the performance parameters depicted in the UCR 2008, Change 3 Section 5.3.1.3 with both testing and vendor's Letters of Compliance (LoC). The SUT operated in 100 percent non-blocking mode, which exceeded the 12.5 percent non-blocking for the Access layer. The SUT met all of the requirements through testing and the vendor's LoC with the following minor exception. Reference (c) states that access products shall have the capability to transport prioritized packets and that packet loss requirements shall be achievable over any five-minute period under congested conditions as follows: voice packets shall measure no more than 0.015 percent, video packets shall measure no more than 0.05 percent, and preferred data packets shall measure no more than 0.05 percent. The SUT met this requirement however, the vendor discovered that their Quality of Service (QoS) entry command is case sensitive and must be entered correctly to insure no packet loss during congested conditions. The vendor has agreed to document this in detail in their product deployment guide as an interim fix with the intent to fix it in a later patch release. DISA has accepted and approved the vendor's Plan of Action and Milestone (POA&M) and adjudicated this discrepancy as having a minor operational impact.

(2) Port Interface Rates. The UCR 2008, Change 3, section 5.3.1.3.1, states that 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: 1000Base SX/LX, and 10/100/1000BaseT/10000Base-SR/LR. JITC tested all these interfaces with the exception of the 10BaseT interface. JITC analysis determined the 10BaseT interface is 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 RFC 1812. Port parameters were configurable, and conformed to the requirements. The SUT met these requirements with testing and the vendor's LoC.

(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, 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 0 to 4095 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 with the vendor's LoC.

(7) QoS Features. The UCR 2008, Change 3, section 5.3.1.3.6, states that access products shall be capable of providing a minimum of four queues, assign any "tagged" session to any of the queues, and 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, met the requirements. 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 access products shall support network monitoring features. Network Monitoring via Simple Network Management Protocol (SNMP) was evaluated by the DISA-led IA team and published in a separate report, Reference (e). Based on this evaluation, the SUT met all requirements.

(9) Security. The UCR 2008, Change 3, section 5.3.1.3.8, states that access products shall meet the security protocol requirements listed in UCR 2008, Change 3, section 5.4. Security testing is accomplished via DISA-led IA test teams and published in a separate report, Reference (e).

b. End-to-End (E2E) Performance Requirements. These requirements were verified using simulated voice, video, and data traffic in an emulated operational environment. To meet E2E requirements the SUT must be deployed in accordance with deployment guide 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). E2E performance was evaluated in a heterogeneous configuration as depicted in Figure 2-4.

(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 millisecond (ms) E2E across the ASLAN over any 5-

minute measured period under congested conditions. The measured latency for the SUT was .072 ms, which met the requirement.

b. Jitter. The UCR 2008, Change 3, section 5.3.1.4.1.2, states that when transporting voice IP packets, the E2E jitter shall not be more than 3 ms over any 5-minute measured period under congested conditions. The measured jitter for the SUT was .020 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 five-minute measured period under congested conditions. The measured packet loss for the SUT was 0 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 be more than 30 ms E2E across the ASLAN over any 5-minute period measured under congested conditions. The measured latency for the SUT was .051 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 be more than 30 ms over any 5-minute measured period under congested conditions. The measured jitter for the SUT was .00025 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 measured period under congested conditions. The measured packet loss for the SUT was 0 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 be more than 45 ms E2E across the ASLAN over any 5-minute period as measured under congested conditions. The measured latency for the SUT was .07 ms, 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

five-minute measured period under congested conditions. The measured packet loss for the SUT was 0 percent, 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 the DISA-led IA team and 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 will 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 5 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 will 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 will have the NM capability of automatically generating and providing an integrated/correlated presentation of network and all associated networks.

d. Engineering Requirements. These requirements were met with the following stipulation. It is the site's responsibility to configure the SUT in a manner which meets the engineering requirements listed in Reference (c) and that does not create a single point of failure which could impact more than 96 C2 users. Any exceptions are noted in the sub-paragraphs below.

(1) Physical 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. The SUT does not support wireless and it is not covered under this certification.

(3) Traffic Engineering. IAW UCR 2008, Change 3, section 5.3.1.7.3, bandwidth in the LAN shall be engineered so that voice IP subscribers do not exceed more than 25 percent of available trunk bandwidth and no single point of failure within the ASLAN can cause a voice service outage to more than 96 users.

(4) Availability. IAW UCR 2008 Change 3, section 5.3.1.7.6, system reliability must be engineered for 99.999 percent for FLASH/FLASH OVERRIDE users, 99.997 for IMMEDIATE/PRIORITY users in an ASLAN. ROUTINE users may be supported by a non-ASLAN with a reliability of only 99.9 percent. C2 users may not be supported by a non-ASLAN. It is the site responsibility to configure the SUT in a manner which meets the user requirement and that 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, 5.3.1.7.7.2, state that ASLAN components can have no single point of failure for more than 96 users for 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 processors, 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 calls that are active shall not be disrupted (loss of existing connection requiring redialing) and the path through the network shall be restored within five 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 can have a single point of failure for C2(R) and non-C2 users. The SUT met all requirements in a stacked configuration with testing and the vendor's LoC with the following minor exception. The lowest numbered utilized port does not re-initialize on restoral after stack failover. If there is more than one utilized port on the SUT, the higher numbered utilized ports are not affected by a power down/up and do not require manual intervention. DISA has accepted and approved the vendor's POA&M and adjudicated this discrepancy as having a minor operational impact.

f. IPv6 Requirements. All UC products must meet the IPv6 requirements IAW UCR 2008, Change 3, section 5.3.5.4. IPv6 requirements were met by testing and the vendor's LoC with the following minor exceptions. The IPv6 traffic from OAM, video,

and voice queues experienced 100 percent intermittent (bursty) loss, between 2.5 milliseconds (ms) and 500 ms in duration. Higher queue traffic should be handled ahead of best effort traffic and experience no measurable loss. DISA has accepted and approved the vendor's POA&M and adjudicated this discrepancy as having a minor operational impact. The SUT stack element failed to come up to a ready state upon power up one time out of sixteen failover test events, but with no POA&M required from the vendor due to non repeatability of this anomaly. DISA adjudicated this as minor with no POA&M with the stipulation that this same failover test event be conducted during a future Verification and Validation event.

11.3 Information Assurance (IA). Security testing is accomplished via DISA-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 in accordance with the Program Manager's request. JITC distributes interoperability information via the JITC Electronic Report Distribution (ERD) system, which uses Unclassified-But-Sensitive Internet Protocol Router Network (NIPRNet) e-mail. More comprehensive interoperability status information is available via the JITC System Tracking Program (STP). 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-certification-office@mail.mil. All associated data is available on the DISA UCCO website located at <http://www.disa.mil/ucco/>.

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). The system under test 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 (FR) and Capability Requirements (CR) 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 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 12.5%. (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	Access layer components must support at least one of the following interfaces: 10 Mbps IAW IEEE 802.3i/j, 100 Mbps IAW IEEE 802.3u, 1000 Mbps IAW IEEE 803.3z/ab. (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 802.3AX (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. Access (R)	
17		Link Layer Discovery- Media Endpoint Discovery IAW ANSI/TIA-1057. Access (R)	
18	Power over Ethernet IAW either 802.3af-2003 or 802.3at-2009. (R)		
19	Class of Service Marking: Layer 3 DSCPs IAW RFC 2474. (R) Layer 2 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, Layer 2 Switch): IPv6 (R: LAN Switch, C: Layer 2 Switch). Note: Layer 2 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)		
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	

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

ID	Requirement (See note.)		UCR Reference
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 must be IAW RFC 3315, if DHCPv6 is supported it shall be IAW RFC 3313. (C)	
61	IPv6 Router Advertisements	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 in accordance with 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)	
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)	

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

ID	Requirement (See note.)	UCR Reference
67	If the system supports stateless IP address Auto-configuration, the system shall support IPv6 SLAAC for interfaces supporting UC functions in accordance with 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 in accordance with 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	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	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), 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	If nodes are managed via SNMP it shall use MIBs in conformance with 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	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
90	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

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

NOTE: All requirements are for core, distribution, and access layer components unless otherwise specified.

LEGEND:

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