DEFENSE INFORMATION SYSTEMS AGENCY
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IN REPLY REFER TO: Joint Interoperability Test Command (JTE) **29 Sep 11**

MEMORANDUM FOR DISTRIBUTION

SUBJECT: Special Interoperability Test Certification of the Hewlett-Packard (HP) 5400zl Series with Release K.15.04.0003

References: (a) DoD Directive 4630.05, "Interoperability and Supportability of Information Technology (IT) and National Security Systems (NSS)," 5 May 2004
(b) CJCSI 6212.01E, "Interoperability and Supportability of Information Technology and National Security Systems," 15 December 2008
(c) through (e), see Enclosure 1

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

2. The HP 5406zl with Release K.15.04.0003 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 System Network (DISN) as an Assured Services Local Area Network (ASLAN) Core, Distribution, and Layer 2/Layer 3Access switch. 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: 1000 Base-SX, 1000Base-LX, 10Gbase-SR, 10Gbase-LR, 10/100/1000BaseT. JITC tested all these interfaces with the exception of the 10BaseT interface. The JITC analysis determined the 10BaseT interface is low risk for certification based on the vendor's Letter of Compliance (LoC) to the Institute of Electrical and Electronics Engineers, Inc. (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 5412zl switch employs the same software and hardware as the SUT. The JITC analysis determined this system to be functionally identical to the SUT for interoperability certification purposes and it is 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.

No other configurations, features, or functions, except those cited within this document, are

certified by the JITC. This certification expires upon changes that could affect interoperability, but no later than three years from the date the DISA Certifying Authority (CA) provided a positive Recommendation.

3. This finding is based on interoperability testing conducted by JITC, review of the vendor's LoC, and DISA CA Recommendation. Interoperability testing was conducted by JITC, Fort Huachuca, Arizona, from 31 May through 8 July 2011. Review of the vendor's LoC was completed on 30 June 2011. DISA adjudication of open Test Discrepancy Reports was completed on 26 July 2011. The DISA CA provided a positive Recommendation on 21 September 2011 based on the security testing completed by DISA-led 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 Unified Capabilities Approved Products List (UC APL) product summary. The interface, Capability Requirements (CR) and Functional Requirements (FR), and component status of the SUT is listed in Tables 2 and 3. The threshold Capability/Functional requirements for ASLAN components are established by Section 5.3.a of Reference (c) and were used to evaluate the interoperability of the SUT.

Table 1. UC APL Product Summary

Component[1]	Release	Sub-Component[2]	Certification Applicability		
			Core	Distribution	Access
HP 5406zl HP 5412zl	K.15.04.0003	**J8712A**	Yes	Yes	Yes
		J9306A			
		J8713A			
		J8702A			
		J9547A			
		J9307A			
		J9478A			
		J9308A			
		J9536A			
		J9535A			
		J9637A			
		J9534A			
		J9478A			
		J8706A			
		J8708A			
		J8707A			
		J9309A			
		J9536A			
		J9535A			
		J9537A			
		J9637A			
		J8705A			
		J9534A			
		J9478A			
		J9547A			
		J9550A			
		J9549A			
		J9548A			
		J8707A			
		J9548A			
		J9536A			
		J9535A			
		J9549A			

Table 1. UC APL Product Summary (continued)

Component[1]	Release	Sub-Component[2]	Certification Applicability		
			Core	Distribution	Access
HP 5406zl HP 5412zl	K.15.04.0003	J9637A J9534A J9550A J8705A	Y	Y	Y

NOTES:
1. The JITC tested the HP 5406zl and the sub-components which are bolded and underlined. JITC is certifying the other listed components and sub-components because they employ the same software and similar hardware as the SUT.
2. The J8707A and J9309A four port modules are statically mapped with a 14.4 Gbps channel per ASIC. There are two ASICs per module; one is assigned to ports 1 and 4 and one is assigned to ports 2 and 3. Therefore, to meet the 50 percent non-blocking requirements only two ports can be assigned at a time in the following combinations: ports 1 and 2, 1 and 3, 2 and 4 or 3 and 4. .

LEGEND:

APL	Approved Products List	JITC	Joint Interoperability Test Command
ASIC	Application-Specific Integrated Circuit	UC	Unified Capabilities
Gbps	Gigabit per second		

Table 2. SUT Interface Interoperability Status

Interface	Applicability			UCR 2008, Change 2 Reference	Threshold CR/FR[1]	Status	Remarks
	Co	D	A				
10Base-X	C	C	C[2]	5.3.1.3.1	1-6	Met[3]	SUT met CRs and FRs with the following IEEE Standard: 802.3i
100Base-X	R	R	C[2]	5.3.1.3.1	1-6	Met	SUT met CRs and FRs with the following IEEE Standard: 802.3u (100Base-T)
1000Base-X	R	R	C[2]	5.3.1.3.1	1-6	Met	SUT met CR and FRs with the following IEEE Standards: 802.3ab (1000Base-T), 802.3z (1000Base-SX, 1000Base-LX)
10000Base-X	C	C	C	5.3.1.3.1	1-6	Met	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 Tested[4]	
802.11b	C	C	C	5.3.1.3.1/5.3.1.7.2	1-6	Not Tested[4]	
802.11g	C	C	C	5.3.1.3.1/5.3.1.7.2	1-6	Not Tested[4]	
802.11n	C	C	C	5.3.1.3.1/5.3.1.7.2	1-6	Not Tested[4]	
802.16	C	C	C	5.3.1.3.1/5.3.1.7.2	1-6	Not Tested[4]	

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. 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. JITC tested all these interfaces with the exception of the 10BaseT interface. The JITC analysis determined the 10BaseT interface is low risk for certification based on the vendor's Letter of Compliance (LoC) to the Institute of Electrical and Electronics Engineers, Inc. (IEEE) 802.3i and the testing data collected at all other data rates.
4. The SUT does not support this interface. This interface is not required for a core, distribution, or access switch.

Table 2. SUT Interface Interoperability Status (continued)

LEGEND:

A	Access	ID	Identification
C	Conditional	IEEE	Institute of Electrical and Electronic Engineers, Inc.
Co	Core	JITC	Joint Interoperability Test Command
CR	Capability Requirement	LoC	Letter of Compliance
D	Distribution	SUT	System Under Test
FR	Functional Requirement	UCR	Unified Capabilities Requirements

Table 3. SUT CRs and FRs Status

CR/FR ID	Capability/ Function	Applicability[1]	UCR 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	
	Class of Service Markings	Required	5.3.1.3.3	Partially Met[2]	
	VLAN Capabilities	Required	5.3.1.3.4	Met	
	Protocols	Required	5.3.1.3.5	Partially Met[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[4]	
2	**E2E Performance Requirements**				
	Voice Services	Required	5.3.1.4.1	Met[5]	
	Video services	Required	5.3.1.4.2	Met[5]	
	Data services	Required	5.3.1.4.3	Met[5]	
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[6]	
	Traffic Engineering	Required	5.3.1.7.3	Met[6]	Configured with four queues, each set to 25% of total bandwidth.
	Availability	Required	5.3.1.7.6	Met	100% availability during test.
	Redundancy	Required	5.3.1.7.7	Partially Met[7]	
5	**MPLS**				
	MPLS Requirements	Conditional	5.3.1.8.4.1	Not Tested[8]	
	MPLS VPN Augmentation to VLANs	Conditional	5.3.1.8.4.2	Not Tested[8]	
6	**IPv6 Requirements**				
	Product Requirements	Required	5.3.5.4	Met	

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. Met all requirements with the following exception: OSPFv3 IPv6 DSCP values are incorrectly marked with a DSCP value of 0. This discrepancy was adjudicated by DISA on 26 July 2011 as having a minor operational impact based on vendor's submission of a POA&M to fix by 29 February 2012.
3. The DISR profile protocols were met with vendor's LoC and/or testing with the following minor exception adjudicated by DISA on 26 July 2011 with a vendor's submission of a POA&M to fix by 29 February 2012. The vendor's submitted LoC stated that their SUT cannot set the full range (0-65535) of OSPFv3 dead interval. The SUT supports a range from 11 to 65535.
4. Refers to IA requirements for UCR 2008, Change 2, Section 5.4. Detailed IA requirements are included in Reference (e).
5. 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 5.3.1.4.
6. This requirement was 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 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. This requirement was met with the following exceptions: IPv6 failover exceeded the 5 second requirement (5.1 seconds) with a link failover to the Brocade ASLAN component. This discrepancy was adjudicated by DISA on 26 July 2011 as having a minor operational impact based on vendor's submission of a POA&M to fix by 29 February 2012.
8. MPLS is conditional for a core, distribution, or access switch.

LEGEND:

CR	Capability Requirement	NM	Network Management
DISA	Defense Information Systems Agency	OSPFv3	Open Shortest Path First version 3
E2E	End-to-End	POA&M	Plan of Action and Milestones
FR	Functional Requirement	QoS	Quality of Service
IA	Information Assurance	SUT	System Under Test
ID	Identification	UCR	Unified Capabilities Requirements
IPv6	Internet Protocol version 6	VLAN	Virtual Local Area Network
LoC	Letter of Compliance	VPN	Virtual Private Network
MPLS	Multiprotocol Label Switching		

5. No detailed test report was developed in accordance with the Program Manager's request. JITC distributes interoperability information via the JITC Electronic Report Distribution (ERD) system, which uses Unclassified-But-Sensitive Internet Protocol Router Network (NIPRNet) e-mail. More comprehensive interoperability status information is available via the JITC System Tracking Program (STP). The STP is accessible by .mil/gov users on the NIPRNet at https://stp.fhu.disa.mil. Test reports, lessons learned, and related testing documents and references are on the JITC Joint Interoperability Tool (JIT) at http://jit.fhu.disa.mil (NIPRNet). Information related to DSN testing is on the Telecom Switched Services Interoperability (TSSI) website at http://jitc.fhu.disa.mil/tssi. All associated data is available on the Defense Information Systems Agency Unified Capability Coordination Office (UCCO) website located at http://www.disa.mil/ucco/.

6. The JITC point of contact is Mr. Edward Mellon, DSN 879-5159, commercial (520) 538-5159, FAX DSN 879-4347, or e-mail to Edward.Mellon@disa.mil. The JITC's mailing address is P.O. Box 12798, Fort Huachuca, AZ 85670-2798. The Tracking Number for the SUT is 1036202.

FOR THE COMMANDER:

3 Enclosures a/s

for BRADLEY A. CLARK
Chief
Battlespace Communications Portfolio

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

ADDITIONAL REFERENCES

(c) Office of the Assistant Secretary of Defense, "Department of Defense Unified Capabilities Requirements 2008, Change 2," 31 December 2010
(d) Joint Interoperability Test Command, "ASLAN Component Test Plan (UCTP)," November 2010
(e) Joint Interoperability Test Command, "Information Assurance (IA) Assessment of HP 5406zl Series Release (Rel.) K.15.04.0003 (Tracking Number 1036202),"

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CERTIFICATION TESTING SUMMARY

1. SYSTEM TITLE. The HP 5406zl with Release K.15.04.0003; hereinafter referred to as the System Under Test (SUT).

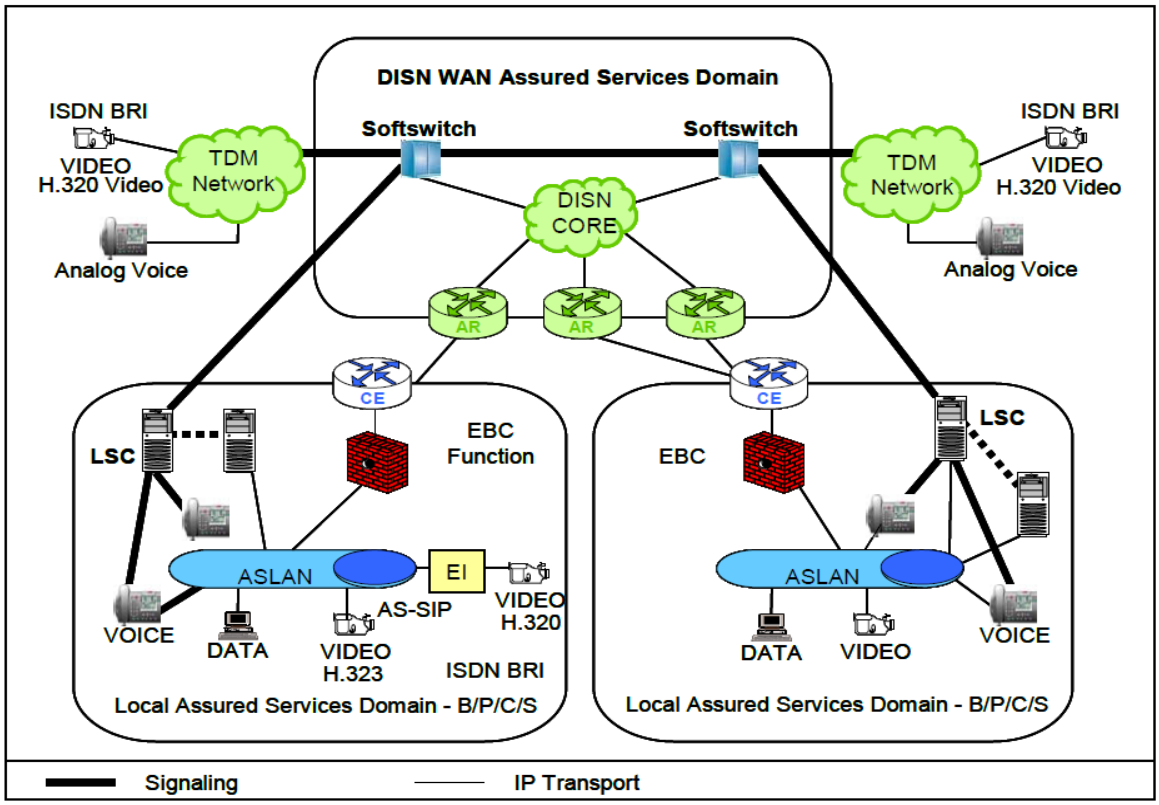
2. SPONSOR. Headquarters United States Army Information Systems Engineering Command (HQUSAISEC).

3. SYSTEM POC. Mr. Jordan Silk, ELIE-ISE-TI, Building 53302, Fort Huachuca, Arizona, 85613-5300, e-mail: jordan.silk@us.army.mil.

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

5. SYSTEM DESCRIPTION. 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 a 6 slot chassis switch that will accept a variety of connectivity, management and application modules. The SUT is certified for joint use as an Assured Services Local Area Network (ASLAN) Core, Distribution, and Layer 2/Layer 3 Access switch and as interoperable with other ASLAN components listed on the Unified Capabilities (UC) Approved Products List (APL) with the following interfaces: 1000 Base-SX, 1000Base-LX, 10Gbase-SR, 10Gbase-LR, 10/100/1000BaseT. JITC tested all these interfaces with the exception of the 10BaseT interface. The JITC analysis determined the 10BaseT interface is low risk for certification based on the vendor's Letter of Compliance (LoC) to the Institute of Electrical and Electronics Engineers, Inc. (IEEE) 802.3i and the testing data collected at all other data rates. Therefore, the 10BaseT interface is also certified for joint use. The HP 5412zl switch employs the same software and similar hardware as the SUT. The JITC analysis determined these systems to be functionally identical to the SUT for interoperability certification purposes.

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 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.



LEGEND:

ASLAN	Assured Services Local Area Network	IP	Internet Protocol
AS-SIP	Assured Services - Session Initiation Protocol	ISDN	Integrated Services Digital Network
B/P/C/S	Base/Post/Camp/Station	ITU-T	International Telecommunication Union - Telecommunication Standardization Sector
BRI	Basic Rate Interface		
CE	Customer Edge (CE Router)	LSC	Local Session Controller
DISN	Defense Information System Network	TDM	Time Division Multiplexing
EBC	Edge Boundary Controller	VTC	Video Teleconferencing
EI	End Instrument	WAN	Wide Area Network
H.320	ITU-T standard for narrowband VTC		

Figure 2-1. ASLAN 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. The SUT uses the interfaces shown in Table 2-1 to connect to the Global Information Grid network. This table shows the physical interfaces supported by the SUT and the associated standards.

Table 2-1. ASLAN Products Interface Requirements

Interface	UCR Ref	Criteria[1]	Applicability		
			Co	D	A
10Base-X[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[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[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[2]	5.3.1.3.1	Support minimum threshold CRs/FRs 1-6 and meet interface criteria for IEEE 802.ae	R	R	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 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:

A	Access	FR	Functional Requirement
ASLAN	Assured Services Local Area Network	ID	Identification
C	Conditional	IEEE	Institute of Electrical and Electronic Engineers, Inc.
Co	Core	R	Required
CR	Capability Requirement	SUT	System Under Test
D	Distribution	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 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 SUTs features and capabilities and its aggregated requirements in accordance with 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[1]	UCR 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[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	Site requirement
	Traffic Engineering	Required	5.3.1.7.3	Site requirement
	Availability	Required	5.3.1.7.6	Partially driven by topology
	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	

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 2, Section 5.4. Detailed IA requirements are included in Reference (e).

LEGEND:

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		

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

Table 2-3. ASLAN Products IA Requirements

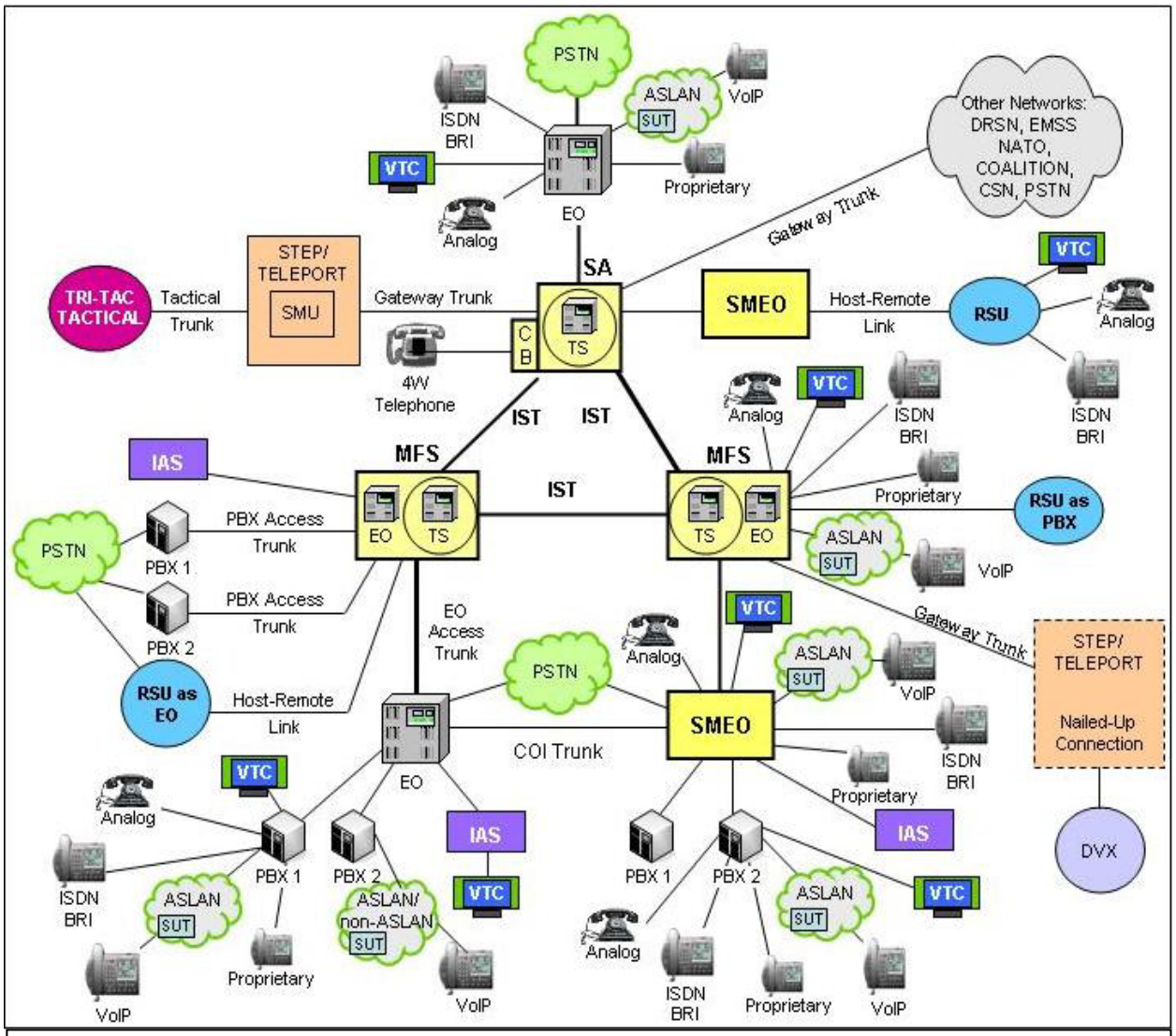
Requirement	Applicability (See note.)	UCR Reference	Criteria
General Requirements	Required	5.4.6.2	Detailed requirements and associated criteria for ASLAN products are listed Reference (c) Section 5.4.
Authentication	Required	5.4.6.2.1	
Integrity	Required	5.4.6.2.2	
Confidentiality	Required	5.4.6.2.3	
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 Section 5.4. Detailed IA requirements are included in Reference (c).

LEGEND:
ASLAN Assured Services Local Area Network
IA Information Assurance
IATP IA Test Plan
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 Unified Capabilities Requirements (UCR) operational DSN Architecture is depicted in Figure 2-2, which depicts the relationship of the ASLAN and non-ASLAN to the DSN switch types. Testing the system's required functions and features was conducted using the test configurations depicted in Figures 2-3 through 2-5. Figure 2-3 depicts the ASLAN components in a homogeneous configuration. Figures 2-4 and 2-5 depict the ASLAN components in heterogeneous configuration with Brocade and Cisco ASLAN components.



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	PC	Personal Computer
CSN	Canadian Switch Network	PSTN	Public Switched Telephone Network
DRSN	Defense Red Switch Network	RSU	Remote Switching Unit
DSN	Defense Switched Network	SMEO	Small End Office
DVX	Deployable Voice Exchange	SMU	Switched Multiplex Unit
EMSS	Enhanced Mobile Satellite System	STEP	Standardized Tactical Entry Point
EO	End Office	TDM/P	Time Division Multiplex/Packetized
IAS	Integrated Access Switch	Tri-Tac	Tri-Service Tactical Communications Program
IP	Internet Protocol	TS	Tandem Switch
ISDN	Integrated Services Digital Network	VoIP	Voice over Internet Protocol
IST	Interswitch Trunk	VTC	Video Teleconferencing
MFS	Multifunction Switch	SUT	System Under Test

Figure 2-2. DSN Architecture

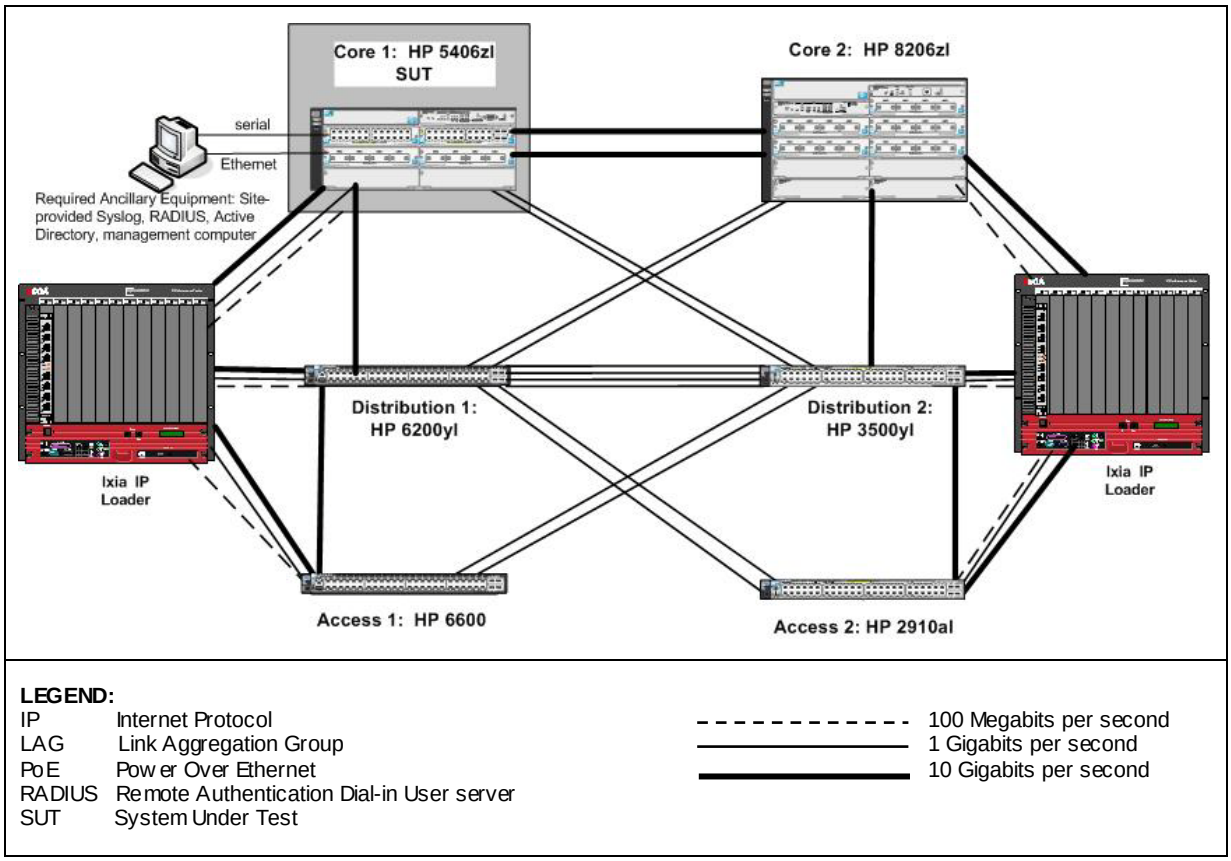


Figure 2-3. SUT Homogeneous Test Configuration

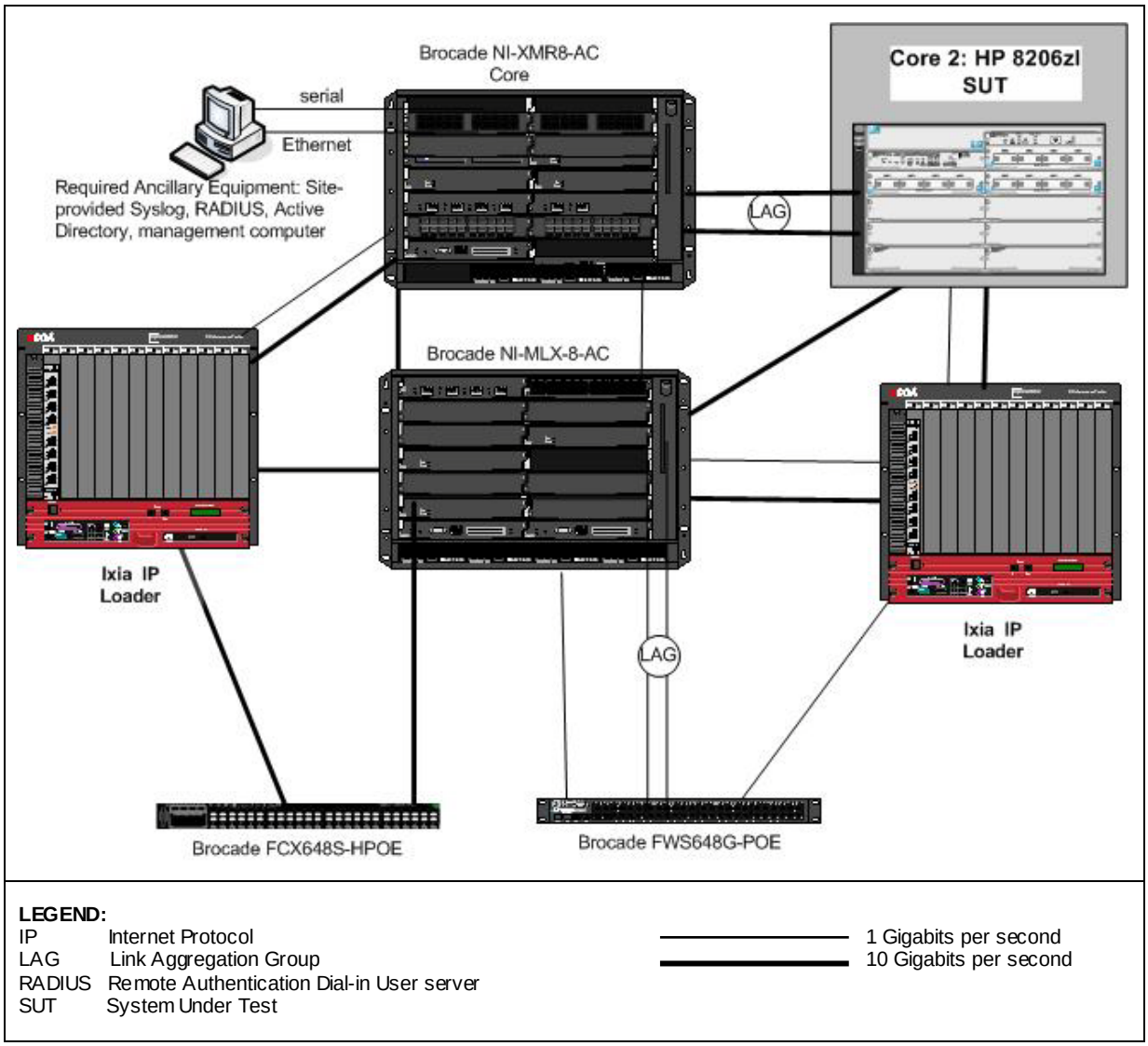


Figure 2-4. SUT Heterogeneous Test Configuration with Brocade

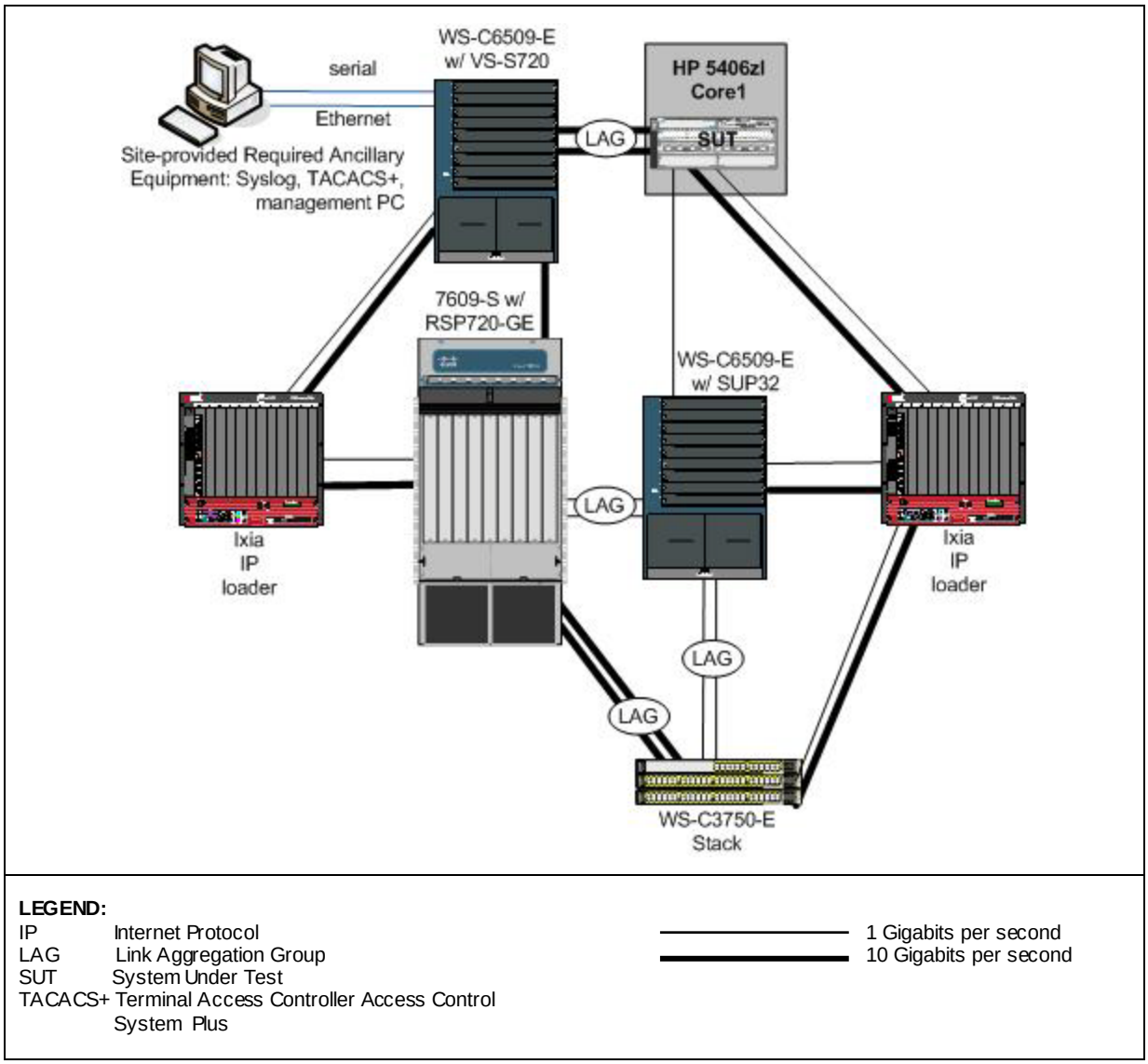


Figure 2-5. SUT Heterogeneous Test Configuration with Cisco

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

System Name	Equipment	
Required Ancillary Equipment (site-provided)	Active Directory	
	Public Key Infrastructure	
	RADIUS	
	SysLog Server	
Additional Equipment Needed	Site-provided Management Workstation	
Cisco ASLAN	**Cisco Hardware**	**Cisco Software**
	WS-C6509-E	IOS® 12.2(33)SX14
	7609-Sw/RSP720-GE	IOS® 12.2(33)SRE2
	WS-C4507R-Ew/SUP6L-E	IOS® 12.2(53)SG4
	WS-C3750-E	IOS® 12.2(53)SE2
Brocade ASLAN	**Brocade Hardware**	**Brocade Software**
	NI-XMR-8-AC	NI 5.1.01
	NI-MLX-8-AC	NI 5.1.01
	FCX648S-HPOE	FI 7.2.01
	FWS648G-POE	FI 7.2.01
HP	**HP Hardware**	**HP Software**
	6600	K.15.04.0003
	2910al	W.14.49
	6200yl	K.15.04.0003
	3300yl	K.15.04.0003
	8206zl	K.15.04.0003

SUT[1]	Release	Function	Sub-component[2]	Description
5406zl 5412zl	K.15.04.0003	Core, Distribution, Access	**J8712A**	**875W zl Power Supply**
			J9306A	HP 1500W PoE+ zl Power Supply
			J8713A	HP 1500W zl Power Supply
			J8702A	**HP 24-port 10/100/1000 PoE zl Module**
			J9547A	HP 24-port 10/100 PoE+ v2 zl Module
			J9307A	HP 24-port 10/100/1000 PoE+ zl Module
			J9478A	HP 24-port 10/100 PoE+ zl Module
			J9308A	HP 20-Port 10/100/1000 PoE+/4-Port Mini-GBIC zl Module
			J9536A	HP 20-port Gig-T PoE+ / 2-port 10-GbE SFP+ v2 zl Module
			J9535A	HP 20-port Gig-T PoE+ / 4-port SFP v2 zl Module
			J9637A	HP 12-port Gig-T PoE+ / 12-port SFP v2 zl Module
			J9534A	HP 24-port Gig-T PoE+ v2 zl Module
			J9478A	HP 24-Port 10/100 PoE+ zl Module
			J8706A	**HP 24-port Mini-GBIC zl Module**
			J8708A	HP 4-Port 10 GbE CX4 zl Module
			J8707A	HP 4-Port 10 GbE X2 zl Module
			J9309A	HP 4-Port 10 GbE SFP+ zl Module
			J9536A	HP 20-port Gig-T PoE+ / 2-port 10-GbE SFP+ v2 zl Module
			J9535A	HP 20-port Gig-T PoE+ / 4-port SFP v2 zl Module
			J9537A	HP 24-port SFP v2 zl Module
			J9637A	HP 12-port Gig-T PoE+ / 12-port SFP v2 zl Module
			J8705A	HP 20-Port Gig-T/4-Port Mini-GBIC zl Module
			J9534A	HP 24-port Gig-T PoE+ v2 zl Module
			J9478A	HP 24-Port 10/100 PoE+ zl Module
			J9547A	HP 24-port 10/100 PoE+ v2 zl Module
			J9550A	HP 24-port Gig-T v2 zl Module
			J9549A	HP 20-port Gig-T / 4-port SFP v2 zl Module

Table 2-4. Tested System Configurations (continued)

SUT[1]	Release	Function	Sub-component[2]	Description
5406zl 5412zl	K.15.04.0003	Core, Distribution, Access	J9548A	HP 20-port Gig-T / 2-port 10-GbE SFP+ v2 zl Module
			J8707A	**HP 4-port 10GbE X2 zl Module**
			J9548A	**HP 20-port Gig-T / 2-port 10-GbE SFP+ v2 zl Module**
			J9536A	HP 20-port Gig-T PoE+ / 2-port 10-GbE SFP+ v2 zl Module
			J9535A	HP 20-port Gig-T PoE+ / 4-port SFP v2 zl Module
			J9549A	HP 20-port Gig-T / 4-port SFP v2 zl Module
			J9637A	HP 12-port Gig-T PoE+ / 12-port SFP v2 zl Module
			J9534A	HP 24-port Gig-T PoE+ v2 zl Module
			J9550A	HP 24-port Gig-T v2 zl Module
			J8705A	HP 20-p Gig-T / 4-p Mini-GBIC zl Module

NOTE:
1. Components bolded and underlined were tested by JITC. The other components in the family series were not tested; however, they utilize the same software and hardware and JITC analysis determined them to be functionally identical for interoperability certification purposes and they are also certified for joint use.
2. The J8707A and J9309A four port modules are statically mapped with a 14.4 Gbps channel per ASIC. There are two ASICs per module, one is assigned to ports 1 and 4 and one is assigned to ports 2 and 3. Therefore, to meet the 50 percent non-blocking requirements only two ports can be assigned at a time in the following combinations: ports 1 and 2, 1 and 3, 2 and 4 or 3 and 4.

LEGEND:

ASIC	Application-Specific Integrated Circuit	PoE	Power over Ethernet
ASLAN	Assured Services Local Area Network	RADIUS	Remote Authentication Dial-In User Server
GBIC	Gigabit Interface Converter	SFP	Small Form Factor Pluggable
Gig, GbE	Gigabit Ethernet	T	Twisted Pair
HP	Hewlett Packard		
N/A	Not Applicable		

10. TESTING LIMITATIONS. None

11. INTEROPERABILITY EVALUATION RESULTS. The SUT meets the critical interoperability requirements for a Core, Distribution, and Layer 2/Layer 3 Access switch in accordance with UCR 2008, Change 2, 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 2 Reference	Threshold CR/FR [1]	Status	Remarks
	Co	D	A				
10Base-X	C	C	C[2]	5.3.1.3.1	1-6	Met[3]	SUT met CRs and FRs with the following IEEE Standard: 802.3i
100Base-X	R	R	C[2]	5.3.1.3.1	1-6	Met	SUT met CRs and FRs with the following IEEE Standard: 802.3u (100Base-T)
1000Base-X	R	R	C[2]	5.3.1.3.1	1-6	Met	SUT met CR and FRs with the following IEEE Standards: 802.3ab (1000Base-T), 802.3z (1000Base-SX, 1000Base-LX)
10000Base-X	C	C	C	5.3.1.3.1	1-6	Met	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 Tested[4]	
802.11b	C	C	C	5.3.1.3.1/5.3.1.7.2	1-6	Not Tested[4]	
802.11g	C	C	C	5.3.1.3.1/5.3.1.7.2	1-6	Not Tested[4]	
802.11n	C	C	C	5.3.1.3.1/5.3.1.7.2	1-6	Not Tested[4]	
802.16	C	C	C	5.3.1.3.1/5.3.1.7.2	1-6	Not Tested[4]	

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. 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. JITC tested all these interfaces with the exception of the 10BaseT interface. The JITC analysis determined the 10BaseT interface is low risk for certification based on the vendor's Letter of Compliance (LoC) to the Institute of Electrical and Electronics Engineers, Inc. (IEEE) 802.3i and the testing data collected at all other data rates.
4. The SUT does not support this interface. This interface is not required for a core, distribution, or access switch.

LEGEND:

A	Access	IEEE	Institute of Electrical and Electronics Engineers, Inc.
C	Conditional	JITC	Joint Interoperability Test Command
Co	Core	LoC	Letter of Compliance
CR	Capability Requirement	SUT	System Under Test
D	Distribution	UCR	Unified Capabilities Requirements
FR	Functional Requirement		
ID	Identification		

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[1]	UCR 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	
	Class of Service Markings	Required	5.3.1.3.3	Partially Met[2]	
	VLAN Capabilities	Required	5.3.1.3.4	Met	
	Protocols	Required	5.3.1.3.5	Partially Met[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[4]	
2	**E2E Performance Requirements**				
	Voice Services	Required	5.3.1.4.1	Met[5]	
	Video services	Required	5.3.1.4.2	Met[5]	
	Data services	Required	5.3.1.4.3	Met[5]	
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	

Table 2-6. SUT Interface Requirements Status (continued)

4	**Engineering Requirements**				
	Physical Media	Required	5.3.1.7.1	Met[6]	
	Traffic Engineering	Required	5.3.1.7.3	Met[6]	Configured with four queues, each set to 25% of total bandwidth.
	Availability	Required	5.3.1.7.6	Met[7]	100% availability during test.
	Redundancy	Required	5.3.1.7.7	Partially Met[7]	
5	**MPLS**				
	MPLS Requirements	Conditional	5.3.1.8.4.1	Not Tested[8]	
	MPLS VPN Augmentation to VLANs	Conditional	5.3.1.8.4.2	Not Tested[8]	
6	**IPv6 Requirements**				
	Product Requirements	Required	5.3.5.4	Met	

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. Met all requirements with the following exception: OSPFv3 IPv6 DSCP values are incorrectly marked with a DSCP value of 0. This discrepancy was adjudicated by DISA on 26 July 2011 as having a minor operational impact based on vendor's submission of a POA&M to fix by 29 February 2012.
3. The DISR profile protocols were met with vendor's LoC and/or testing with the following minor exception adjudicated by DISA on 26 July 2011 with a vendor's submission of a POA&M to fix by 29 February 2012. The vendor's submitted LoC stated that their SUT cannot set the full range (0-65535) of OSPFv3 dead interval. The SUT can set a range from 11-65535) seconds.
4. Refers to IA requirements for UCR 2008, Change 2, Section 5.4. Detailed IA requirements are included in Reference (e).
5. 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 5.3.1.4.
6. This requirement was 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 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. This requirement was met with the following exception: IPv6 failover exceeded the 5 second requirement (5.1 seconds). This discrepancy was adjudicated by DISA on 26 July 2011 as having a minor operational impact based on vendor's submission of a POA&M to fix by 29 February 2012.
8. MPLS is conditional for a core, distribution, or access switch.

LEGEND:

CR	Capability Requirement	MPLS	Multiprotocol Label Switching
DISA	Defense Information Systems Agency	NM	Network Management
DISR	Department of Defense Information Technology Standards Registry	OSPFv3	Open Shortest Path First version 3
		POA&M	Plan of Action and Milestones
DSCP	Differentiated Services Code Point	QoS	Quality of Service
E2E	End-to-End	SUT	System Under Test
FR	Functional Requirement	UCR	Unified Capabilities Requirements
IA	Information Assurance	VLAN	Virtual Local Area Network
ID	Identification	VPN	Virtual Private Network
IPv6	Internet Protocol version 6		
LoC	Letter of Compliance		

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

(1) Performance Parameters. The SUT operated in the required non-blocking mode on all interfaces. Jitter was measured to be less than one millisecond (ms), which, is the limits of the resolution of the test equipment. Latency was also

measured to be less than one ms average. Packet loss was zero percent. All performance requirements were met by the SUT. The UCR 2008, Change 2 requires 50 percent non-blocking for the core element and the HP 5406 met this requirement. However, the J8707A and J9309A modules must be engineered as follows: the J8707A and J9309A four port modules are statically mapped with a 14.4 Gbps channel per ASIC assigned to ports 1 and 4 and 2 and 3 respectively. Therefore, to meet the 50 percent non-blocking requirements only two ports can be assigned at a time in the following combinations: ports 1 and 2, 1 and 3, 2 and 4 or 3 and 4.

(2) Port Interface Rates. All interfaces linked up at the required rates. All interfaces negotiated for the correct rates. The SUT supports all of the required port rates and the optional 10 Megabits per second and 10 Gigabits per second (Gbps) rate.

(3) Port Parameter Requirements. Port parameters were configurable, and conformed to the requirements. The SUT was tested to confirm Auto-negotiation, Force Mode, Link Aggregation, Spanning Tree and IA confirmed 802.1 x authentications. In addition, these standards were met with the vendor's LoC.

(4) Class of Service (CoS) Markings. Class of service was preserved throughout the SUT. The SUT was able to assign any Differentiated Services Code Point (DSCP) value 0-63 to IPv4 traffic per the vendor's LoC. The SUT conformed to all required Request for Comments (RFCs). The DSCP values were handled correctly by the queuing mechanism in the SUT. OSPFv3 Ipv6 DSCP values are incorrectly marked with a DSCP value of 0. This discrepancy was adjudicated by DISA on 26 Jul 2011 as having a minor operational impact based on vendor's submission of a Plan of Action and Milestones (POA&M) to fix by 29 February 2012.

(5) Virtual Local Area Network (VLAN) Capabilities. The VLAN markings were preserved on the SUT, VLAN tagged traffic was separated and managed according to Institute of Electrical and Electronics Engineers (IEEE) 802.1q. The SUT successfully performed both port-based and address-based VLANs.

(6) Protocols. The required protocols are defined in the Department of Defense Information Technology Standards Registry (DISR) profile. The DISR profile protocols were met with vendor's LoC and/or testing with the following minor exception: The vendor's submitted LoC stated that their SUT cannot set the full range of OSPFv3 dead interval. The required dead interval range is from 1 to 65535 and the SUT can only set the range from 11 to 65535. This discrepancy was adjudicated by DISA on 26 July 2011 with a vendor's submission of a POA&M to fix by 29 February 2012:

(7) QoS Features. QoS, which includes rate-shaping, performed as configured. All variance was within the limitation of resolution of the test instruments. The ASLAN infrastructure components shall be capable of accepting any packet tagged with a DSCP value (0-63) on an ingress port and assign that packet to a QoS

behavior listed in UCR 2008, Change 2, Section 5.3.1.3.6. The test equipment recorded that the higher prioritized traffic was properly queued above lower prioritized best effort traffic. In addition, it was verified that the SUT can assign any DSCP value from 0-63 for each type of traffic with the exception of OSPFv3 IPv6 DSCP. The IPv6 DSCP values are incorrectly marked with a DSCP value of 0. DISA adjudicated this discrepancy on 26 July 2011 as having a minor operational impact based on vendor's submission of a POA&M to fix by 29 February 2012.

(8) Network Monitoring. Network Monitoring via 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. 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.

(1) Voice, Video, and Data Services. 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 Section 5.3.1.4. E2E performance was evaluated in a homogeneous and heterogeneous configuration as depicted in Figures 2-3 through 2-5. Voice jitter, latency, and packet loss were measured below the allowable 5 ms requirement in all scenarios. Across the SUT, latency and jitter were measured at less than one ms and packet loss was zero.

(2) Video services. Video jitter, latency, and packet loss were measured below the allowable 5 ms requirement in all scenarios. Across the SUT, latency and jitter were measured at less than one ms and packet loss was zero.

(3) Data services. Data latency and packet loss were measured below the allowable 5 ms requirement in all scenarios. Across the SUT the average, latency and jitter were measured at less than one ms and packet loss was zero when total link traffic did not exceed 98 percent of the uplink capacity.

c. Network Management (NM) Requirements. The following NM requirements were met by vendor's LoC and evaluated by IA under a separate report, Reference (e):

(1) Configuration Control. In accordance with UCR 2008 Change 2 paragraph 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 5 seconds of detecting the event, excluding transport time.

(2) Operational Changes. In accordance with UCR 2008 Change 2 paragraph 5.3.1.6.2, local area network 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. In accordance with UCR 2008 Change 2 paragraph 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. In accordance with UCR 2008 Change 2 paragraph 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. In accordance with UCR 2008 Change 2 paragraph 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. 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.

The SUT must meet the redundancy requirement with either a single chassis or multiple chassis. The requirement states no single point of failure may take longer than five seconds for the network to resume IP traffic. The SUT met the requirement for multiple chassis redundancy and is certified for joint use with multiple chassis only

as a distribution switch. The SUT does not support multiple processors and is therefore not certified for joint use in a single chassis configuration. The SUT had redundant power supply resources. The SUT performed power supply failover with no loss. Chassis failover was performed in less than five seconds for IPv4 and IPv6 traffic when configured across a homogeneous network and when configured with other vendors in a heterogeneous network. Link Aggregate Control Protocol (LACP) and Non-LACP failover occurred in less than five seconds for IPv4 and IPv6 traffic when configured as a homogeneous network and as an element of the Cisco network. IPv4 Non-LACP link failover with Brocade occurred in 632 ms; however, IPv6 Non-LACP link failover with Brocade occurred slightly above the five second requirement with a failover time of 5.1 seconds. This discrepancy was adjudicated by DISA on 26 July 2011 as having a minor operational impact based on vendor's submission of a POA&M to fix by 30 November 2012.

e. Multiprotocol Label Switching (MPLS) Requirements. MPLS was not evaluated. This is a conditional requirement for a core, distribution, or access switch.

f. IPv6 Requirements. All IPv6 requirements were met by testing and/or LoC. The SUT was tested and certified for joint use with IPv6 voice, video, and data traffic.

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 2-7 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.

SYSTEM FUNCTIONAL AND CAPABILITY REQUIREMENTS

The Assured Services Local Area Networks (ASLAN) components have required 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 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 50% for core and distribution layer switches and 12.5% blocking for access layer switches. (R)		5.3.1.3
3	Maximum of 1 ms of jitter for voice and 10 ms for video for all ASLAN components. (R) Does not apply to preferred data and best effort data.		5.3.1.3
4	Maximum of .015% packet loss for voice and .05 % for video and preferred data for all ASLAN components. (R) Does not apply to best effort data.		5.3.1.3
5	Maximum of 2 ms latency for voice, 10 ms for video, and 15 ms for preferred data for all ASLAN components. (R) Does not apply to best effort data.		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 at least one of the following IEEE interfaces for access layer components: 802.3i, 802.3j, 802.3u, 802.3ab, and 802.3z. (R)		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) Conditional for Core	
11		Filtering IAW RFC 1812. (R)	
12		Link Aggregation IAW IEEE 802.3ad (output/egress ports only). (R)	
13		Spanning Tree Protocol IAW IEEE 802.1D. (R) Conditional for Core	
14		Multiple Spanning Tree IAW IEEE 802.1s. (R) Conditional for Core	
15		Rapid Reconfiguration of Spanning Tree IAW IEEE 802.1w. (R) Conditional for Core	
16	LACP link Failover and Link Aggregation IAW IEEE 802.3ad (uplink ports only) core and distribution switches (C)		5.3.1.3.2, 5.3.1.7.7.1
17	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
18	VLAN Capabilities IAW IEEE 802.1Q. (R)		5.3.1.3.4
19	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 RFC 2460, 5095, 2464, and be able to queue packets based on DSCPs in accordance with RFC 2474.		5.3.1.3.5
20	QoS Features	Shall support minimum of 4 queues. (R)	5.3.1.3.6
21		Must be able to assign VLAN tagged packets to a queue. (R)	
22		Support DSCP PHBs per RFCs 2474, 2597, 2598, and 3246. (R: LAN Switch). Note: Layer 2 switch is required to support RFC 2474 only.	
23		Support a minimum of one of the following: WFQ IAW RFC 3662, PQ IAW RFC 1046, or Class-Based WFQ IAW RFC 3366. (R)	
24		Must be able to assign a bandwidth or percent of traffic to any queue. (R)	
25	Network Monitoring	SNMP IAW RFC's 1157, 2206, 3410, 3411, 3412, 3413, and 3414. (R)	5.3.1.3.7
26		SNMP traps IAW RFC1215. (R)	
27		Remote monitoring IAW RFC1281 and AES Cipher Algorithm in the SNMP User-based Security Model IAW RFC 3826. (R)	
28	Product Requirements Summary IAW UCR 2008, Change 2, Table 5.3.1-5. (R)		5.3.1.3.9
29	E2E Performance (Voice)	No more than 6 ms latency over any 5-minute period measured under 100% congestion. (R)	5.3.1.4.1
		No more than 3 ms jitter over any 5-minute period measured under 100% congestion. (R)	
		Packet loss not to exceed .045% engineered (queuing) parameters over any 5-minute period under 100% congestion. (R)	

Table 3-1. SUT CRs and FRs (continued)

ID	Requirement		UCR Reference
30	E2E Performance (Video)	No more than 30 ms latency over any 5-minute period measured under 100% congestion. (R)	5.3.1.4.2
		No more than 30 ms jitter over any 5-minute period measured under 100% congestion. (R)	
		Packet loss not to exceed .15% engineered (queuing) parameters over any 5-minute period under 100% congestion. (R)	
31	E2E Performance (Data)	No more than 45 ms latency over any 5-minute period measured under 100% congestion. (R)	5.3.1.4.3
		Packet loss not to exceed .15% engineered (queuing) parameters over any 5-minute period under 100% congestion. (R)	
32	LAN Network Management	Configuration Control for ASLAN and non-ASLAN. (R)	5.3.1.6.1
33		Operational Controls for ASLAN and non-ASLAN. (R)	5.3.1.6.2
34		Performance Monitoring for ASLAN and non-ASLAN. (R)	5.3.1.6.3
35		Alarms for ASLAN and non-ASLAN. (R)	5.3.1.6.4
36		Reporting for ASLAN and non-ASLAN. (R)	5.3.1.6.5
37	Redundancy	Redundant Power Supplies. (Required on standalone redundant products.)	5.3.1.7.7
38		Chassis Failover. (Required on standalone redundant products.)	
39		Switch Fabric Failover. (Required on standalone redundant products.)	
40		Non-LACP Link Failover. (R)	
41		Fiber Blade Failover. (R)	
42		Stack Failover. (C) (Required if the stack supports more than 96 users.)	
43		CPU (routing engine) blade Failover. (R)	
44	MPLS	MPLS May not add measurable Loss or Jitter to system. (C)	5.3.1.8.4.1
45		MPLS Conforms to RFCs in Table 5.3.1-14. (C)	5.3.1.8.4.1
46		MPLS Support L2 and L3 VPNs. (C)	5.3.1.8.4.2.1 /2
47	IPv6 Product Requirements: Dual Stack for IPv4 and IPv6 IAW RFC 4213 if routing functions are supported. (C)		5.3.5.4
48	IPv6 System Requirements	Support IPv6 IAW RFCs 2460 and 5095 if routing functions are supported. (C)	5.3.5.4
49		Support IPv6 packets over Ethernet IAW RFC2464. (R)	5.3.5.4
50		Support MTU discovery IAW RFC 1981 if routing functions are supported. (R)	5.3.5.4.1
51		Support a minimum MTU of 1280 IAW RFCs 2460 and 5095. (C)	5.3.5.4.1
52		Shall support IPv6 addresses IAW RFC 4291. (R)	5.3.5.4.3
53		Shall support IPv6 scoped addresses IAW RFC4007. (R)	5.3.5.4.3
54		if routing functions are supported: If DHCP is supported must be IAW RFC3315, if DHCPv6 is supported it shall be IAW RFC 3313. (C)	5.3.5.4.4
55	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
56		If the system supports routing functions, the system shall include the MTU value in the router advertisement message for all links in accordance with RFCs 2461 and 4861. (C)	
57		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)	
58	IPv6 Neighbor Discovery	if routing functions are supported: Neighbor discovery IAW RFCs 2461 and 4861. (C)	5.3.5.4.5
59		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)	
60		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)	
61	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 in accordance with RFCs 2462 and 4862. (C)	5.3.5.4.6
62		If the product supports IPv6 SLAAC, the product shall have a configurable parameter that allows the function to be enabled and disabled. (C)	
63		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)	

Table 3-1. SUT CRs and FRs (continued)

ID	Requirement (See note.)		UCR Reference
64		If the product supports stateless IP address auto-configuration including those provided for the commercial market, the DAD shall be disabled in accordance with RFCs 2462 and 4862. (R)	
65		The system shall support manual assignment of IPv6 addresses. (R)	
66		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)	
67	IPv6 ICMP	The system shall support the ICMPv6 as described in RFC 4443. (R)	5.3.5.4.7
68		The system shall have a configurable rate limiting parameter for rate limiting the forwarding of ICMP messages. (R)	
69		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.	
70		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. (R)	
71		The system shall validate ICMPv6 messages, using the information contained in the payload, prior to acting on them. (R)	
72	IPv6 Routing Functions	If the system supports routing functions, the system shall support the OSPF for IPv6 as described in RFC 5340. (C)	5.3.5.4.8
73		If the system supports routing functions, the system shall support securing OSPF with Internet Protocol Security (IPSec) as described for other IPSec instances in UCR 2008, Section 5.4. (C)	
74		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-SHA1-96 with ESP and AH as described in RFC 2404, shall support OSPFv3 IAW RFC 4552. (C)	
75		If the system supports routing functions, the system shall support the (MLD process as described in RFC 2710 and extended in RFC 3810. (C)	
76	Site Requirements	Engineering Requirements: Physical Media for ASLAN and non-ASLAN. (R) (Site requirement)	5.3.1.7.1
77		Battery Back up two hours for non-ASLAN components and eight hours for ASLAN components. (R) (Site requirement)	5.3.1.7.5
78		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
79	IA Security requirements	Port-Based access Control IAW IEEE 802.1x. (R) Conditional for Core	5.3.1.3.2
80		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
81		Security (R)	5.3.1.3.8
82		Must meet IA requirements IAW UCR 2008, Change 2, 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.

Table 3-1. SUT CRs and FRs (continued)

LEGEND:

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