



DEFENSE INFORMATION SYSTEMS AGENCY

P. O. BOX 549
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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) 6600 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 6600 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) Layer 2/Layer 3 Access 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: 1000Base-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 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 29 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. Table 2 provides the SUT interface interoperability status, and Table 3 provides the Capability Requirements (CR) and Functional Requirements (FR) status. 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 | Release | Sub-Component | Certification Applicability | | |
|--|--------------|---------------|-----------------------------|--------------|--------|
| | | | Core | Distribution | Access |
| HP 6600 | K.15.04.0003 | J9305A | No | No | Yes |
| LEGEND: APL Approved Products List JITC Joint Interoperability Test Command UC Unified Capabilities | | | | | |

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) |

Table 2. SUT Interface Interoperability Status (continued)

| | | | | | | | |
|------------|---|---|---|---------------------|-----|-------------------------|--|
| 1000Base-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 [†] | |
| 802.11b | C | C | C | 5.3.1.3.1/5.3.1.7.2 | 1-6 | Not Tested [†] | |
| 802.11g | C | C | C | 5.3.1.3.1/5.3.1.7.2 | 1-6 | Not Tested [†] | |
| 802.11n | C | C | C | 5.3.1.3.1/5.3.1.7.2 | 1-6 | Not Tested [†] | |
| 802.16 | C | C | C | 5.3.1.3.1/5.3.1.7.2 | 1-6 | Not Tested [†] | |

NOTES:

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

Table 3. SUT CRs and FRs Status (continued)

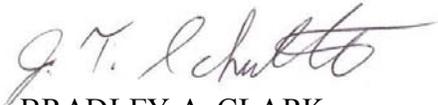
| | | | |
|---|------------------------------------|--------|------------------------------------|
| NOTES: | | | |
| 1. The annotation of 'required' refers to a high-level requirement category. The applicability of each sub-requirement is provided in Enclosure 3. The SUT does not need to provide conditional 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 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 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. This requirement was met with the following exception: IPv6 failover exceeded the 5 second requirement (5.8 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 1036206.

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

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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 6600 with Release (Rel.) K.15.04.0003 (Tracking Number 1036206),"

CERTIFICATION TESTING SUMMARY

1. SYSTEM TITLE. The HP 6600 with Release K.15.04.0003; hereinafter referred to as the System Under Test (SUT).

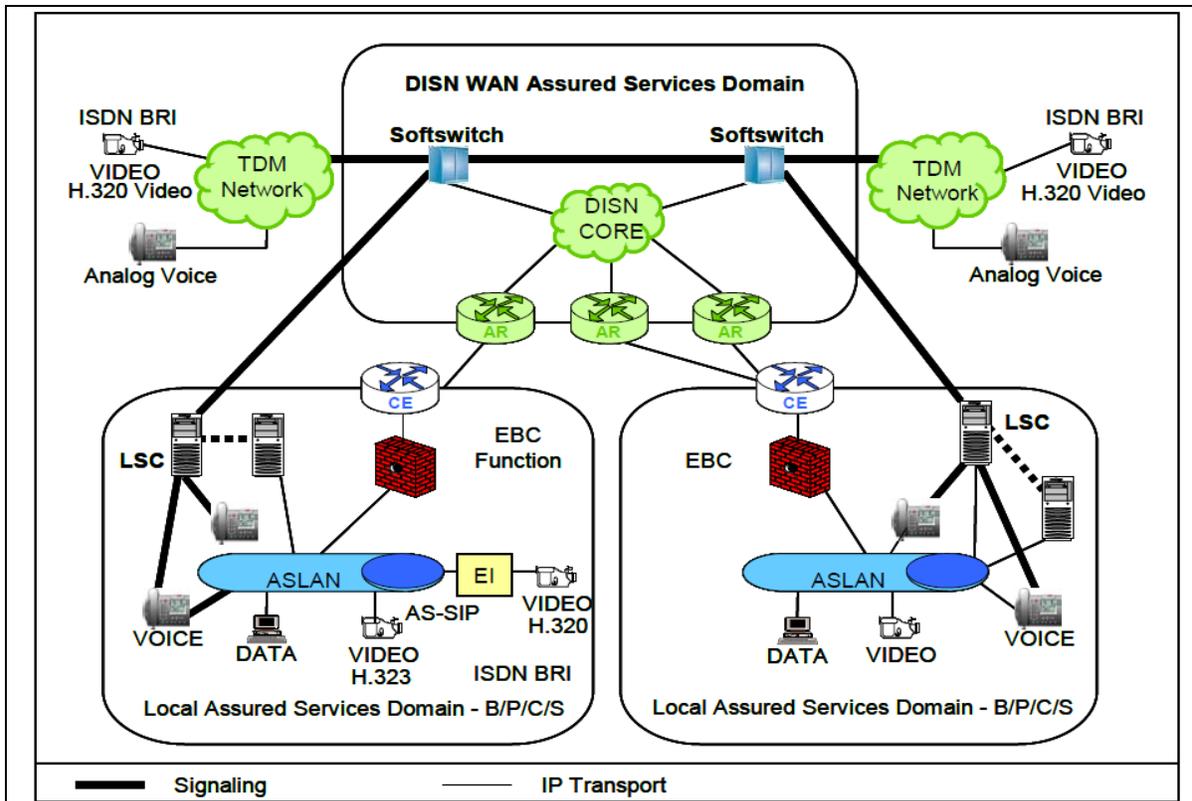
2. SPONSOR. Headquarters United States Army Information Systems Engineering Command (HQUSAISEC).

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 an Assured Services Local Area Network (ASLAN) Layer 2/Layer 3 Access Switch and 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 and the testing data collected at all other data rates. Therefore the 10BaseT interface is also certified for joint use.

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
 AS-SIP Assured Services - Session Initiation Protocol
 B/P/C/S Base/Post/Camp/Station
 BRI Basic Rate Interface
 CE Customer Edge (CE Router)
 DISN Defense Information System Network
 EBC Edge Boundary Controller
 EI End Instrument
 H.320 ITU-T standard for narrowband VTC

IP Internet Protocol
 ISDN Integrated Services Digital Network
 ITU-T International Telecommunication Union -
 Telecommunication Standardization Sector
 LSC Local Session Controller
 TDM Time Division Multiplexing
 VTC Video Teleconferencing
 WAN Wide Area Network

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. Table 2-1 depicts the physical ASLAN Product interfaces 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 | |

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

| | | | |
|---|-------------------------------|------|-----------------------------------|
| NOTES: | | | |
| 1. The annotation of 'required' refers to a high-level requirement category. The applicability of each sub-requirement is provided in Enclosure 3. The SUT does not need to provide conditional requirements. However, if a capability is provided, it must function according to the specified requirements. | | | |
| 2. Refers to IA requirements for UCR 2008, Change 2, Section 5.4. Detailed IA requirements are included in Reference (e). | | | |
| LEGEND: | | | |
| CR | Capability Requirement | | |
| E2E | End-to-End | NM | Network Management |
| 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 |
| MPLS | Multiprotocol Label Switching | VPN | Virtual Private Network |

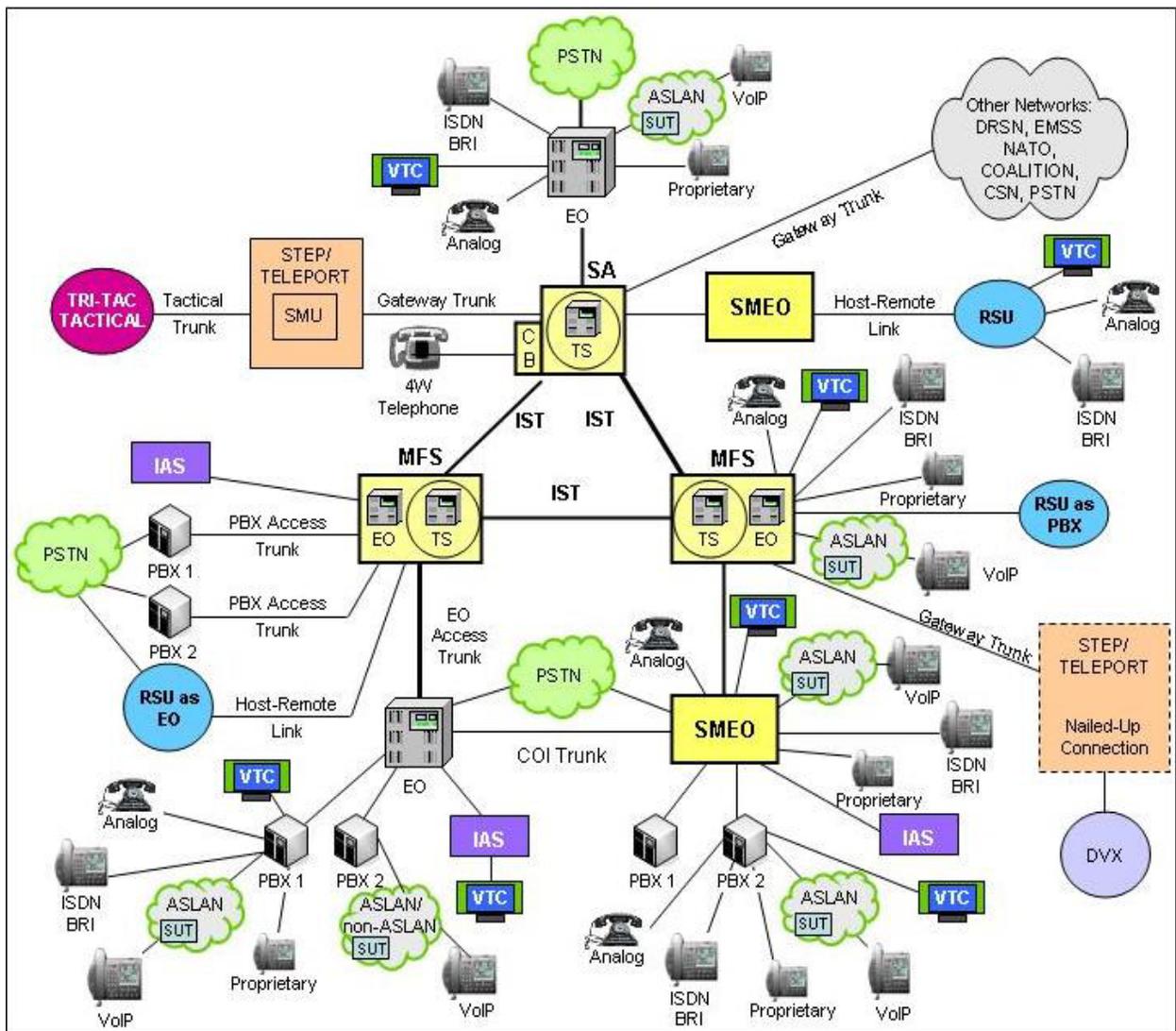
7.3 Information Assurance (IA). Table 2-3 details the IA requirements applicable to the ASLAN products.

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 | |
| 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 | 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 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 Switched 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

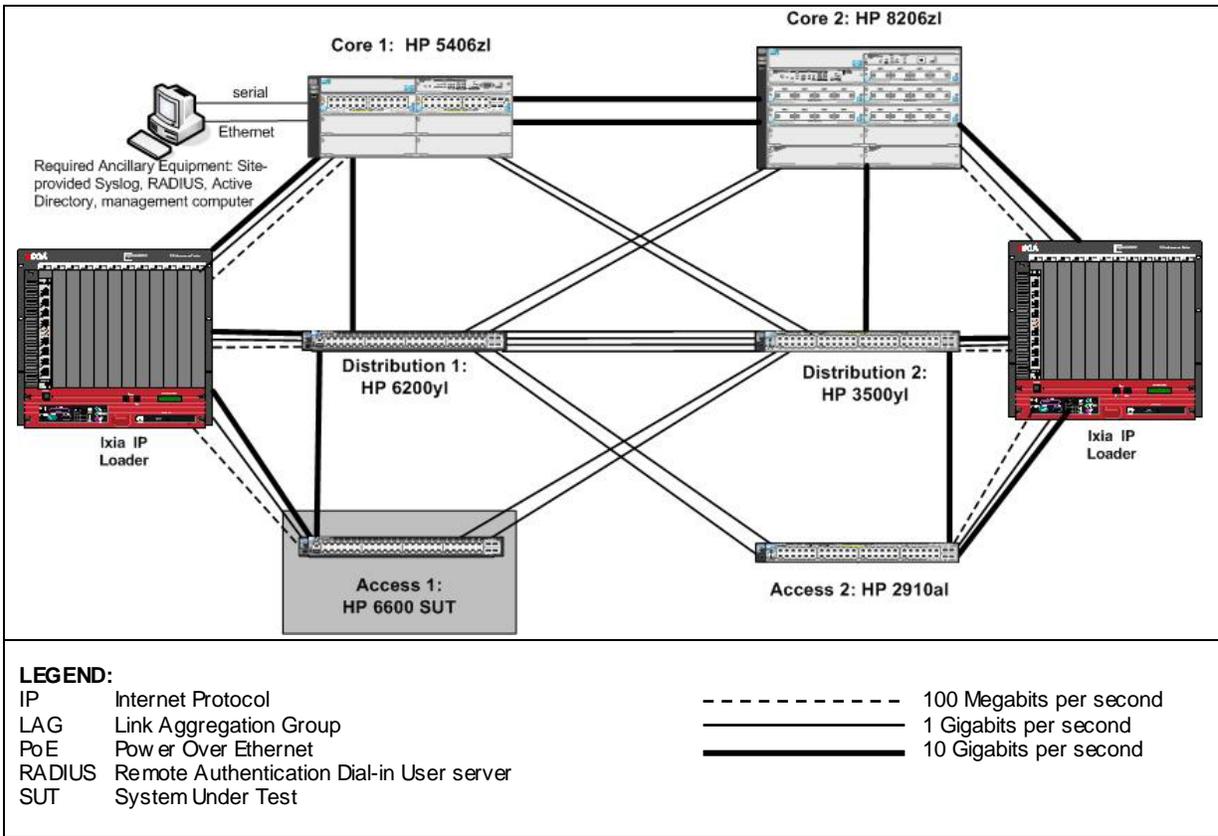


Figure 2-3. SUT Homogeneous Test Configuration

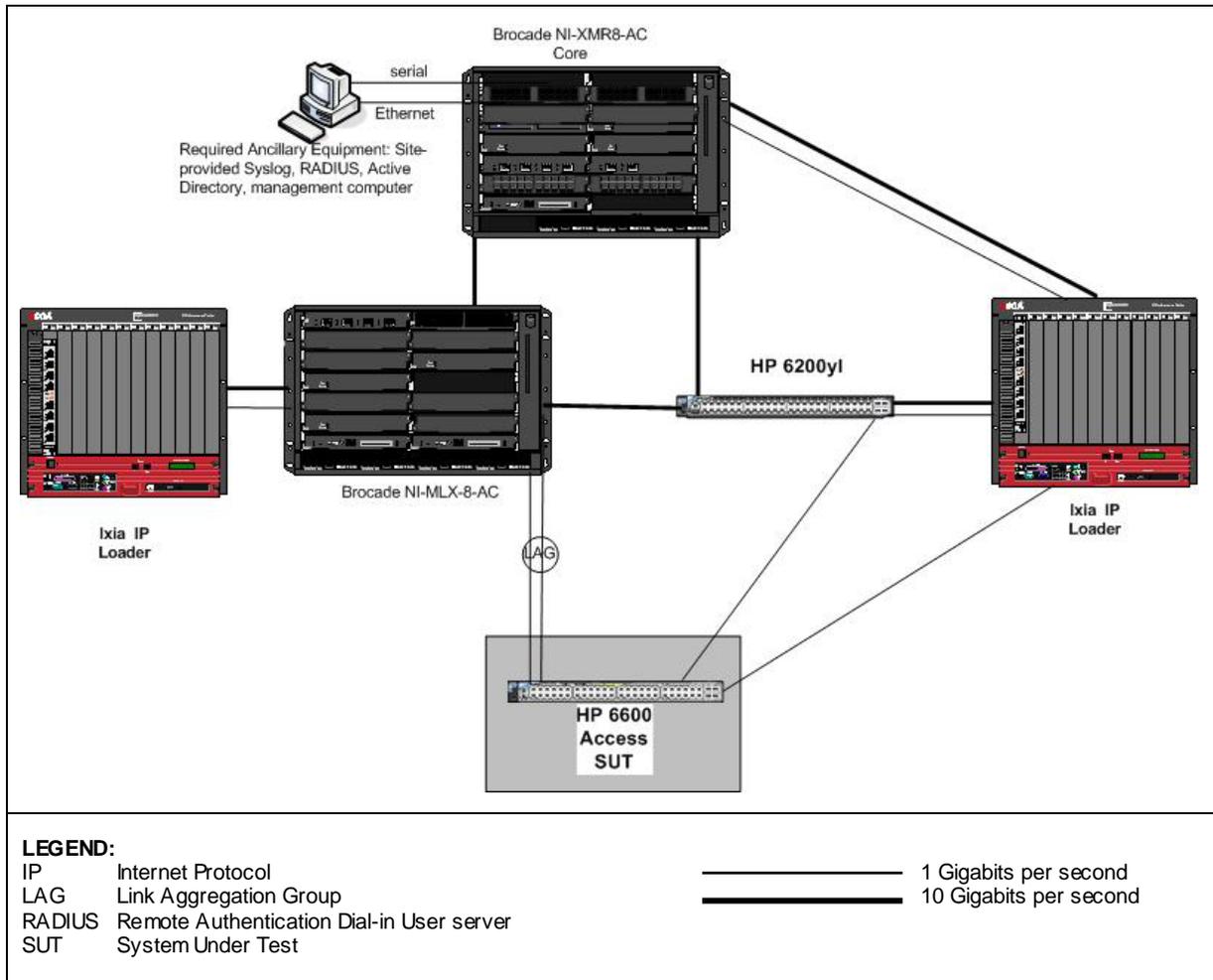


Figure 2-4. SUT Heterogeneous Test Configuration with Brocade

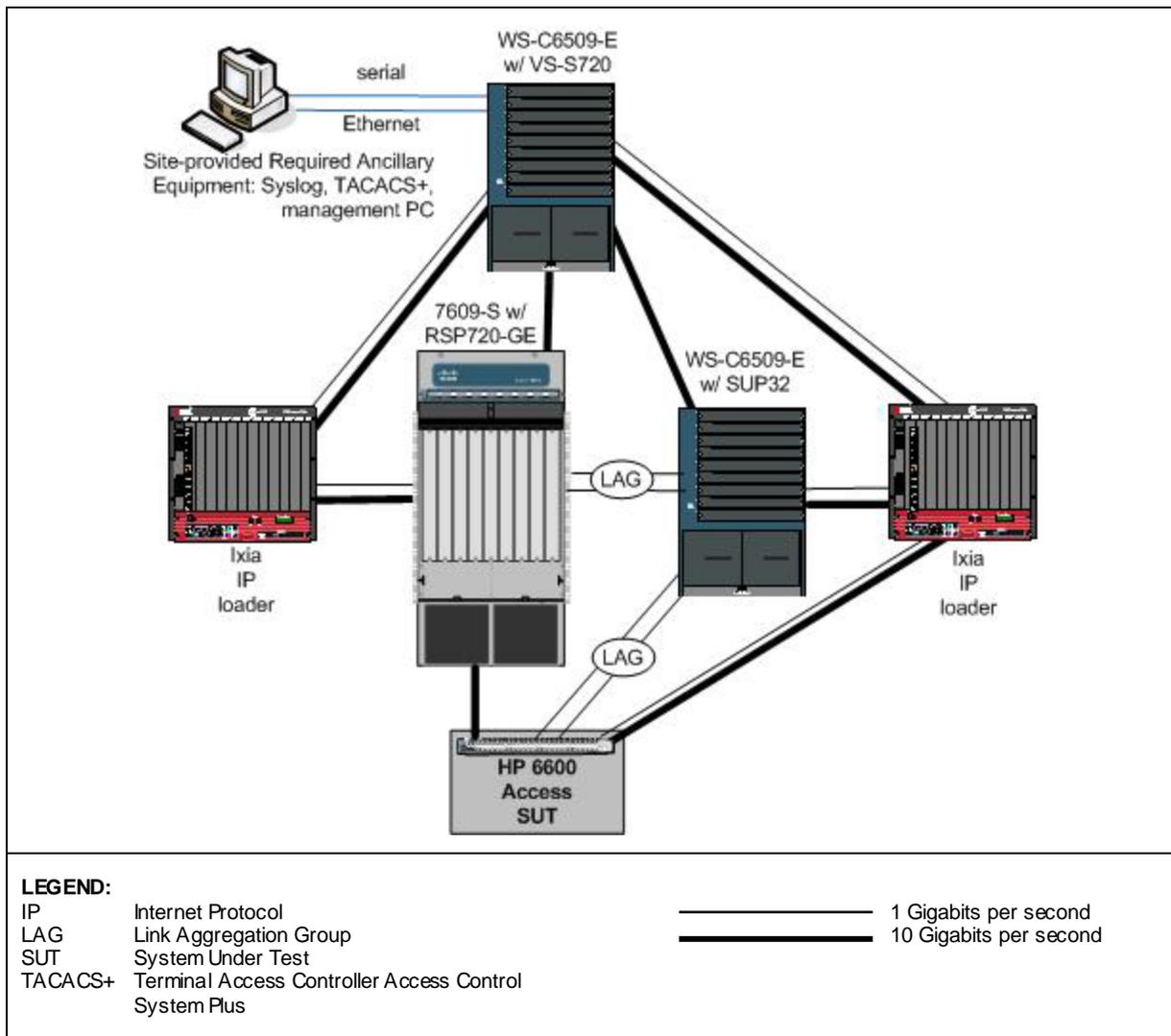


Figure 2-5. SUT Heterogeneous Test Configuration with Cisco

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-6509-E | | IOS® 12.2(33)SX14 | | | | | | | | | | | | | | | | | | | | | | | | | |
| | 7609-S | | IOS® 12.2(33)SRE2 | | | | | | | | | | | | | | | | | | | | | | | | | |
| Brocade ASLAN | Brocade Hardware | | Brocade Software | | | | | | | | | | | | | | | | | | | | | | | | | |
| | NI-XMR-8-AC | | NI 5.1.01 | | | | | | | | | | | | | | | | | | | | | | | | | |
| | NI-MLX-8-AC | | NI 5.1.01 | | | | | | | | | | | | | | | | | | | | | | | | | |
| HP | HP Hardware | | HP Software | | | | | | | | | | | | | | | | | | | | | | | | | |
| | 2910al | | W.14.49 | | | | | | | | | | | | | | | | | | | | | | | | | |
| | 6200yl | | K.15.04.0003 | | | | | | | | | | | | | | | | | | | | | | | | | |
| | 3300yl | | K.15.04.0003 | | | | | | | | | | | | | | | | | | | | | | | | | |
| | 8206zl | | K.15.04.0003 | | | | | | | | | | | | | | | | | | | | | | | | | |
| SUT | Release | Function | Sub-component | Description | | | | | | | | | | | | | | | | | | | | | | | | |
| 6600 | K.15.04.0003 | Access | J9305A | HP 6600 Switch Premium License | | | | | | | | | | | | | | | | | | | | | | | | |
| <p>LEGEND:</p> <table> <tr> <td>ASIC</td> <td>Application-Specific Integrated Circuit</td> <td>PoE</td> <td>Power over Ethernet</td> </tr> <tr> <td>ASLAN</td> <td>Assured Services Local Area Network</td> <td>RADIUS</td> <td>Remote Authentication Dial-In User Server</td> </tr> <tr> <td>GBIC</td> <td>Gigabit Interface Converter</td> <td>SFP</td> <td>Small Form Factor Pluggable</td> </tr> <tr> <td>Gig, GbE</td> <td>Gigabit Ethernet</td> <td>T</td> <td>Twisted Pair</td> </tr> <tr> <td>HP</td> <td>Hewlett Packard</td> <td></td> <td></td> </tr> <tr> <td>N/A</td> <td>Not Applicable</td> <td></td> <td></td> </tr> </table> | | | | | 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 | | |
| 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 an Access Layer 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:

- 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.
- 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.
- 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 LoC to the IEEE 802.3i and the testing data collected at all other data rates.
- 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 | Partially Met ² | |
| | 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 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 | | |

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

NOTES:

1. The annotation of 'required' refers to a high-level requirement category. The applicability of each sub-requirement is provided in Enclosure 3. The SUT does not need to provide conditional requirements. However, if a capability is provided, it must function according to the specified requirements.
2. 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 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 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. This requirement was met with the following exception: IPv6 failover exceeded the 5 second requirement (5.8 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 | 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 |
| DSCP | Differentiated Services Code Point | POA&M | Plan of Action and Milestones |
| 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 |
| 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 8 to 1 non-blocking for the access element and the HP 6600 met this requirement.

(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 vendor additionally submitted LoCs for all required RFCs associated with CoS. The DSCP values were handled correctly by the queuing mechanism in the SUT. OSPFv3 IPv6 DSCP values are incorrectly marked as 0. This discrepancy was adjudicated by DISA on 26 July 2011 as having a minor operational impact based on vendor's submission of a Plan of Action and Milestones (POA&M) 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 a 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 could 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, paragraph 5.3.1.3.6. The SUT prioritized the following traffic for queuing from lowest to highest with distinct IPv4 and IPv6 DSCP tags. The traffic load included a data best effort load of 35 percent line rate, voice at 25 percent of line rate, 25 percent video and 25 percent preferred data. Voice signaling and voice media are in the highest priority queue, 25 percent of video media in the next lower priority queue, and 25 percent of preferred data in the lowest priority queue. Best effort data is a lower priority than preferred data. 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. 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 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, 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. 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 GIG 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.

As an access switch with less than 96 users, the SUT does not have to meet the redundancy requirement. 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. The IPv4 link failover with Brocade occurred in 927 ms however, the IPv6 link failover with Brocade occurred slightly above the five second requirement with a failover time of 5.9 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 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 a vendor's 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 (f).

Table 3-1. ASLAN Products CR 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) |
| 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) |
| 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) | 5.3.1.3.6 |
| 25 | Network Monitoring | SNMP IAW RFC's 1157, 2206, 3410, 3411, 3412, 3413, and 3414. (R) |
| 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) |
| 9 | | No more than 3 ms jitter over any 5-minute period measured under 100% congestion. (R) |
| 9 | | 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 (See note.) | UCR Reference | |
|----|--|--|------------------|
| 30 | E2E Performance (Video) | 5.3.1.4.2 | |
| | No more than 30 ms latency over any 5-minute period measured under 100% congestion. (R) | | |
| | No more than 30 ms jitter over any 5-minute period measured under 100% congestion. (R) | | |
| 31 | E2E Performance (Data) | 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 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 |
| 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 | The system shall support the ICMPv6 as described in RFC 4443. (R) | |
| 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. | 5.3.5.4.7 |
| 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 | If the system supports routing functions, the system shall support the OSPF for IPv6 as described in RFC 5340. (C) | |
| 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) | 5.3.5.4.8 |
| 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-SHA 1-96 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 | 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 | 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 | HTTP | Hypertext Transfer Protocol | ms | millisecond |
| AH | Authentication Header | HTTPS | Hyper Text Transfer Protocol, Secure | MTU | Maximum Transmission Unit |
| ASLAN | Assured Services Local Area Network | IA | Information Assurance | OSPF | Open Shortest Path First |
| C | Conditional | IAW | in accordance with | OSPFv3 | Open Shortest Path First Version 3 |
| C2 | Command and Control | ICMP | Internet Control Message Protocol | PHB | Per Hop Behavior |
| C2(R) | Command and Control ROUTINE only | ICMPv6 | Internet Control Message Protocol for IPv6 | PQ | Priority Queuing |
| CPU | Central Processing Unit | ID | Identification | QoS | Quality of Service |
| DAD | Duplicate Address Detection | IEEE | Institute of Electrical and Electronics Engineers | R | Required |
| DHCP | Dynamic Host Configuration Protocol | IPv4 | Internet Protocol version 4 | RFC | Request for Comments |
| DHCPv6 | Dynamic Host Configuration Protocol for IPv6 | IPv6 | Internet Protocol version 6 | SHA | Secure Hash Algorithm |
| DISR | Department of Defense Information Technology Standards Registry | L2 | Layer 2 | SLAAC | Stateless Auto Address Configuration |
| DSCP | Differentiated Services Code Point | L3 | Layer 3 | SNMP | Simple Network Management Protocol |
| E2E | End-to-End | LACP | Link Aggregation Control Protocol | SSH2 | Secure Shell Version 2 |
| ESP | Encapsulating Security Payload | LAN | Local Area Network | SUT | System Under Test |
| Gbps | Gigabits per second | LS | LAN Switch | TCI | Tag Control Information |
| HMAC | Hash-based Message Authentication Code | Mbps | Megabits per second | UC | Unified Capabilities |
| | | MLD | Multicast Listener Discovery | UCR | Unified Capabilities Requirements |
| | | MPLS | Multiprotocol Label Switching | VLAN | Virtual Local Area Network |
| | | | | VPN | Virtual Private Network |
| | | | | WFQ | Weighted Fair Queuing |