DEFENSE INFORMATION SYSTEMS AGENCY
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FORT MEADE, MARYLAND 20755-0549

IN REPLY REFER TO: Joint Interoperability Test Command (JTE) **5 Nov 13**

MEMORANDUM FOR DISTRIBUTION

SUBJECT: Joint Interoperability Certification of the Amcom Software Inc., Personal Computer/Public Safety Answering Point (PC/PSAP™) Release 11.11.0.21

References: (a) Department of Defense Instruction 8100.04, "DoD Unified Capabilities (UC)," 9 December 2010
(b) DoD CIO, Memorandum, "Interim Guidance for Interoperability of Information Technology (IT) and National Security Systems (NSS)," 27 March 2012
(c) through (e), see Enclosure 1

1. **Certification Authority.** References (a) and (b) establish the Joint Interoperability Test Command (JITC) as the Joint Interoperability Certification Authority for the Unified Capabilities (UC) products.

2. **Conditions of Certification.** The Amcom Software Inc., Personal Computer/Public Safety Answering Point (PC/PSAPTM), Software Release 11.11.0.21; hereinafter referred to as the System Under Test (SUT), meets the critical requirements of the Unified Capabilities Requirements (UCR), Reference (c), and is certified for joint use as Customer Premise Equipment (CPE) PSAP without any conditions (see Table 1). The SUT was tested and certified for use with any Avaya Communication Server (CS) 1000M. JITC analysis determined the SUT is also certified for use with any CS1000E or related switch currently or previously on the UC Approved Products List (APL). The SUT was also tested and certified with the Avaya S8720 CM 4 with AE Services Release 6.2. JITC analysis determined any Avaya switches certified with software version CM4 or CM6 are functionally identical to the S8720 CM4 relative to the SUT. Therefore, the SUT is certified for use with any Avaya CM 4 and CM 6 switches that have been or are on the UC APL and are configured with the Avaya AE Services Release 6.2. This certification expires upon changes that affect interoperability, but no later than three years from the date of this memorandum.

Table 1. Conditions

Condition	Status	Operational Impact	Remarks
Not applicable; the Amcom Software Inc., Personal Computer/Public Safety Answering Point (PC/PSAP™), Software Release 11.11.0.21 meets all of the Unified Capabilities Requirements, Reference (c) joint critical interoperability requirements.			

3. **Interoperability Status.** Table 2 provides the SUT interface interoperability status and Table 3 provides the Capability Requirements (CR) and Functional Requirements (FR) status. Table 4 provides a Unified Capabilities (UC) Approved Products List (APL) product summary.

Table 2. SUT Interface Status

Interface	Threshold CR/FR Requirements (See note 1.)	Status	Remarks
Interfaces			
2-Wire Analog Ground Start Lines (C)	1	Met	The SUT met the critical CRs and FRs for this interface.
2-Wire Analog CAMA Trunks (C)	1	Met	The SUT met the critical CRs and FRs for this interface.
Serial EIA-232 (C)	1 (See note 2.)	Met	The SUT met the critical CRs and FRs for this interface.
Proprietary M2616 (C)	1 (See note 3.)	Met	The SUT met the critical CRs and FRs for this interface.
Proprietary M3904 (C)	1 (See note 3.)	Met	The SUT met the critical CRs and FRs for this interface.
Proprietary M3905 (C)	1 (See note 3.)	Met	The SUT met the critical CRs and FRs for this interface.
Avaya Proprietary Digital supporting MADN (C)	1 (See note 4.)	Met	The SUT met the critical CRs and FRs for this interface.
IP (C)	2, 3 (See note 5.)	Met	The SUT met the critical CRs and FRs for this interface.

NOTES:
1. The UCR does not identify interface CR/FR applicability. The SUT high-level CR and FR ID numbers depicted in the Threshold CRs/FRs column are cross-referenced with Table 3.
2. The serial interface provided connectivity between the SUT server and the telephone XID unit and between the workstation and telephones and TDD/RIM device.
3. The UCR does not include requirements for proprietary interfaces. The SUT can be used with the following phones when connected to the Avaya CS1000 switches: M2616 with an MCA adapter, M3904 with a CTIA adapter, or the M3905 connected to the PC/PSAP server. The SUT can be used with either the M3904 with a CTIA adapter or the M3905 connected to the PC/PSAP integrated workstation.
4. The UCR does not include requirements for proprietary interfaces. The SUT can be used with digital phones certified with any Avaya CM 4 or CM 6 switches that have been or are on the UC APL and are configured with Avaya AE Services Release 6.2.
5. The IP interface provided intra-enclave connectivity for the SUT components and from the SUT to the Avaya Application Enablement Services server.

LEGEND:

AE	Application Enabled	IP	Internet Protocol
C	Conditional	MADN	Multiple Appearance Directory Number
CAMA	Centralized Automatic Message Accounting	MCA	Meridian Communications Adapter
CM	Communication Manager	PSAP	Public Safety Answering Point
CPE	Customer Premise Equipment	SUT	System Under Test
CR	Capability Requirements	TDD/RIM	Telecommunications Device for the Deaf/Radio Interface Module
CTIA	Computer Telephony Integration Adapter		
EIA	Electronic Industries Alliance	UCR	Unified Capability Requirements
FR	Functional Requirements	XID	Exchange Identifier
ID	Identification		

Table 3. SUT Capability Requirements and Functional Requirements Status

CR/FR ID	UCR Requirement (High-Level) (See note 1.)	UCR 2013 Reference	Status
1	Customer Premise Equipment Requirements (R)	3.7.2	Met
2	Differentiated Services Code Point Tagging Requirements (R)	Table 7.2-3	Met
3	Internet Protocol version 6 Requirements (R)	Table 5.2-1	Met (See note 2.)

NOTES:
1. The annotation of 'required' refers to a high-level requirement category. The applicability of each sub-requirement is provided in Enclosure 3.
2. The SUT met all IPv6 requirements. However, the Avaya Application Enablement Services Release 6.2 only supports IPv4. Therefore, the SUT interface to the Avaya Application Enablement Services Release 6.2 is certified for IPv4 only.

LEGEND:

CR	Capability Requirement	IPv6	Internet Protocol version 6
FR	Functional Requirement	R	Required
ID	Identification	SUT	System Under Test
IPv4	Internet Protocol version 4	UCR	Unified Capabilities Requirements

Table 4. UC APL Product Summary

Product Identification			
Product Name	Amcom Software Inc, PC/PSAP		
Software Release	11.11.0.21		
UC Product Type(s)	Customer Premise Equipment (CPE)		
Product Description	Personal Computer/Public Safety Answering Point		
Product Components (See note.)	**Component Name**	**Version**	**Remarks**
PC/PSAP Server	Dell PE R710	11.11.0.21	
PC/PSAP Integrated Workstation	Dell Optiplex XE	11.11.0.21	
XID Unit	ANI Trunk Card	000 Rev. X27	
	ANI Controller Card:	001 Rev. X6	
TDD/RIM Device		ITM061694	

NOTE: The detailed component and subcomponent list is provided in Enclosure 3.

LEGEND:

APL	Applied Products List	TDD/RIM	Telecommunications Device for the Deaf/Radio Interface Module
ANI	Automatic Number Identification		
PC/PSAP	Personal Computer/Public Safety Answering Point	XID	Exchange Identifier
UC	Unified Capabilities		

4. **Test Details.** This finding is based on interoperability testing, review of the vendor's Letters of Compliance (LoC), and Defense Information Systems Agency (DISA) Certifying Authority (CA) Recommendation for inclusion on the UC APL. Testing was conducted at JITC's Global Information Grid Network Test Facility at Fort Huachuca, Arizona, from 22 through 26 July 2013 using test procedures derived from Reference (d). Review of the vendor's LoC was completed on 29 August 2013. The DISA CA provided a positive Recommendation on 23 October 2013 based on the security testing completed by DISA-led IA test teams and the results published in a separate report, Reference (e). Enclosure 2 documents the test results and describes the tested network and system configurations. Enclosure 3 provides a detailed list of the interface, capability, and functional requirements.

5. **Additional Information.** JITC distributes interoperability information via the JITC Electronic Report Distribution (ERD) system, which uses Sensitive but Unclassified IP Data (formerly known as NIPRNet) e-mail. Interoperability status information is available via the JITC System Tracking Program (STP). STP is accessible by .mil/.gov users at https://stp.fhu.disa.mil/. Test reports, lessons learned, and related testing documents and references are on the JITC Joint Interoperability Tool (JIT) at https://jit.fhu.disa.mil/. Due to the sensitivity of the information, the Information Assurance Accreditation Package (IAAP) that contains the approved configuration and deployment guide must be requested directly from the Unified Capabilities Certification Office (UCCO), e-mail: disa.meade.ns.list.unified-capabilities-certification-office@mail.mil. All associated information is available on the DISA UCCO website located at http://www.disa.mil/Services/Network-Services/UCCO.

6. **Point of Contact (POC).** The JITC point of contact is Ms. Sibylle Gonzales, commercial telephone (520) 538-5483, DSN telephone 879-5483, FAX DSN 879-4347; e-mail address sibylle.j.gonzales.civ@mail.mil; mailing address Joint Interoperability Test Command, ATTN: JTE (Ms. Sibylle Gonzales) P.O. Box 12798, Fort Huachuca, AZ 85670-2798. The tracking number for the SUT is 1233801.

FOR THE COMMANDER:

3 Enclosures a/s

for RICHARD A. MEADOR
Chief
Battlespace Communications Portfolio

Distribution (electronic mail):
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NSG Interoperability Assessment Team
DOT&E, Netcentric Systems and Naval Warfare
Medical Health Systems, JMIS IV&V
HQUSAISEC, AMSEL-IE-IS
UCCO

ADDITIONAL REFERENCES

(c) Office of the Department of Defense Chief Information Officer, "Department of Defense Unified Capabilities Requirements 2013," 1 March 2013
(d) Joint Interoperability Test Command, "Customer Premise Equipment Public Safety Answering Point (PSAP) Test Procedures for Unified Capabilities Requirements (UCR) 2013," Draft
(e) Joint Interoperability Test Command, "Information Assurance (IA) Assessment of Amcom Software, Inc. Personal Computer/Public Safety Answering Point (PC/PSAP) Software Release 11.11.0.321 (Tracking Number 1233801)," Draft

CERTIFICATION SUMMARY

1. SYSTEM AND REQUIREMENTS IDENTIFICATION. Amcom Software Inc., Personal Computer/Public Safety Answering Point (PC/PSAP™), Software Release 11.11.0.21 is hereinafter referred to as the System Under Test (SUT). Table 2-1 depicts the SUT identifying information and requirements source.

Table 2-1. System and Requirements Identification

System Identification	
Sponsor	Headquarters United States Army Information Systems Engineering Command (HQUSAISEC)
Sponsor Point of Contact	Mr. Robert Adkins, USAISEC ELIE-ISE-ES, Building 53301, Fort Huachuca, Arizona 85613, e-mail: robert.h.adkins.civ@mail.mil
Vendor Point of Contact	Amcom Software, Inc., 10400 Yellow Circle Drive, Eden Prairie, Minnesota 55343, e-mail: berdman@amcomsoft.com
System Name	Amcom Software Inc., Personal Computer/Public Safety Answering Point
Increment and/or Version	11.11.0.21
Product Category	Customer Premise Equipment
System Background	
Previous certifications	Special Interoperability Test Certification of the Amcom Software Inc., Personal Computer/Public Safety Answering Point (PC/PSAP™), Version 11 with UCCO Tracking Number 0823801)
Tracking	
UCCO ID	1233801
System Tracking Program ID	3787
Requirements Source	
Unified Capabilities Requirements	Unified Capabilities Requirements 2013
Remarks	
Test Organization(s)	Joint Interoperability Test Command, Fort Huachuca, Arizona
LEGEND:	
ID Identification	UCCO Unified Capabilities Connection Office

2. SYSTEM DESCRIPTION. The SUT gives PSAP dispatchers an easy-to-use interface that integrates the underlying phone system, mapping systems, and other resources to put critical information and tasks at the call-taker's fingertips. The software integrates with the existing base Private Branch Exchange (PBX) for ease of deployment and processes internal PBX emergency calls and external 911 calls routed into the PSAP answering positions. The SUT allows the 911 dispatchers to instantly involve police, fire, emergency medical technicians, and hazardous materials personnel while answering 911 calls and dispatching first responders. The SUT consists of a file/application server and one or more call-taker workstations. The purpose of the file/applications server is to host the Microsoft Structured Query Language (SQL) database containing the local telephone system numbers, the location information and the interface to extract and communicate the Automatic Number Identification and Automatic Location Information for the public enhanced 911 (E911) calls. The call-taker workstation(s) communicate directly with the file/application server only for the purpose of retrieving the emergency call identification and location information. Public Switched Telephone Network (PSTN) 911 calls are delivered to the SUT via special E911 trunks provided by the PSTN. This service typically connects the PSTN with public telephones such as pay phones and on-base housing and not to the base telecommunications system. Integration of the SUT to the military

telecommunications system is accomplished using first party call control of the call-taker's telephone. This provides a simple integration and allows for a robust failure mode in that if the SUT were to fail in total, emergency calls could still be received and handled manually using the telephone. The SUT consists of the following components: PC/PSAP Server, PC/PSAP Integrated Workstation, Exchange Identifier (XID) Unit, and Telecommunications Device for the Deaf (TDD)/Radio Interface Module (RIM).

PC/PSAP Server – The PC/PSAP Server is hosted on a Public Key (PK) enabled Windows 2008 R2 SP1 server that serves as the primary database server and applications engine.

PC/PSAP Integrated Workstation - The PC/PSAP Integrated Workstation is hosted on a PK-enabled Windows 7 SP1. The Integrated Workstation also serves as a backup database that hosts a Microsoft SQL database.

XID Unit – The XID interface is a hardware appliance that functions as a trunk interface device and is configured by setting dip switches on the inside of the unit. It sends information regarding the status of each port and information on what 911 calls are incoming. This in turn feeds the XNXID application that resides on the PC/PSAP server.

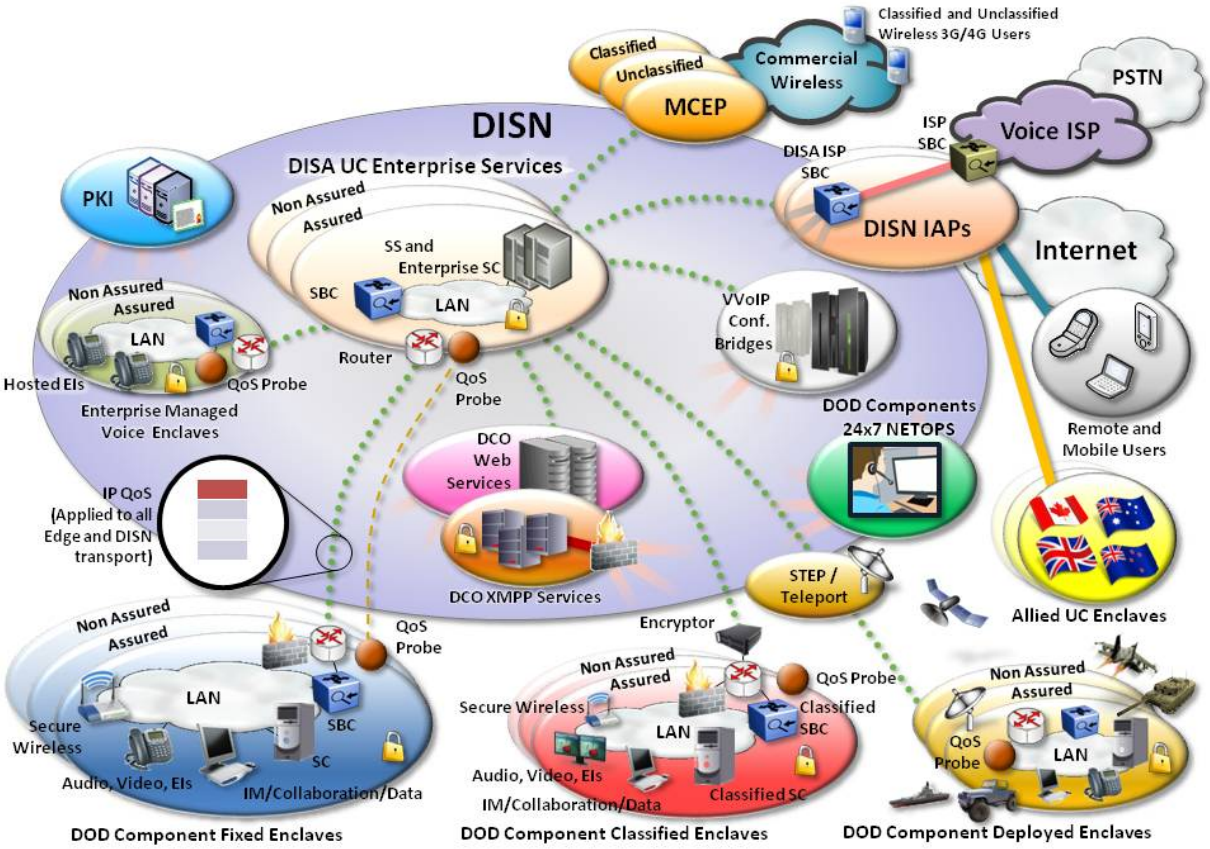
TDD/RIM – The TDD is a slow speed, manually operated, in-band tone signaling method that allows the typing of a message between two parties. The TDD is specially designed for typing back and forth between the two parties. This connection is manually established between the two parties and, in addition, allows normal voice communications interspersed with the typed communications. The RIM enables the use of a single headset for both telephone and radio. It provides a connection to the RIM port on the radio console.

3. OPERATIONAL ARCHITECTURE. The Unified Capabilities (UC) architecture is a two-level network hierarchy consisting of Defense Information Systems Network backbone switches and Service/Agency installation switches. The Department of Defense (DoD) Chief Information Officer and Joint Staff policy and subscriber mission requirements determine which type of switch can be used at a particular location. The UC architecture, therefore, consists of several categories of switches. Figure 2-1 depicts the notional operational UC architecture that the SUT may be used in.

4. TEST CONFIGURATION. The test team tested the SUT at JITC, Fort Huachuca, Arizona in a manner and configuration similar to that of a notional operational environment. Testing of the system's required functions and features was conducted using the test configurations depicted in Figures 2-2 and 2-3. Figure 2-2 depicts the SUT test configuration with the Avaya CS1000M. Figure 2-3 depicts the SUT test configuration with the Avaya S8720. Testing was conducted after Information Assurance testing using the same configuration.

5. METHODOLOGY. Testing was conducted using Customer Premises Equipment (CPE) requirements derived from the Unified Capabilities Requirements (UCR) 2013, Reference (c), and CPE test procedures, Reference (d). Any discrepancy noted in the operational environment will be evaluated for impact on the existing certification. These discrepancies will be adjudicated

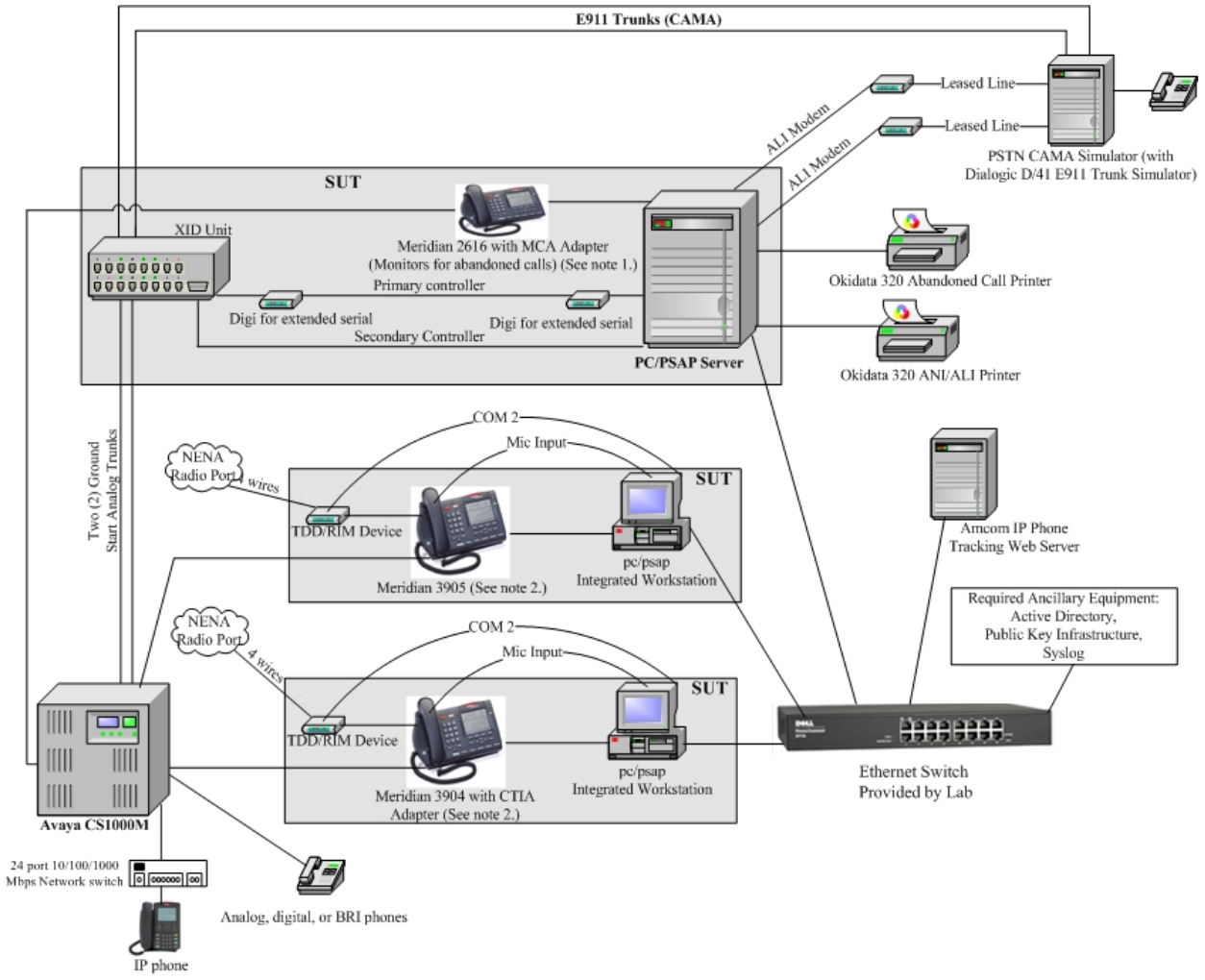
to the satisfaction of DISA via a vendor Plan of Action and Milestones (POA&M), which will address all new critical Test Discrepancy Reports (TDRs) within 120 days of identification.



LEGEND:

DCO	Defense Connection Online	NETOPS	Network Operations
DISA	Defense Information Systems Agency	PKI	Public Key Infrastructure
DISN	Defense Information Systems Network	PSTN	Public Switched Telephone Network
DoD	Department of Defense	QoS	Quality of Service
EI	End Item	SBC	Session Border Controller
IAP	Integrated Access Point	SC	Session Controller
IM	Instant Messaging	SS	Softswitch
IP	Internet Protocol	STEP	Standardized Tactical Entry Point
ISP	Internet Service Provider	UC	Unified Capabilities
LAN	Local Area Network	VVoIP	Voice and Video over IP
MCEP	Multi-Carrier Entry Point	XMPP	Extensible Messaging and Presence Protocol

Figure 2-1. Notional UC Network Architecture



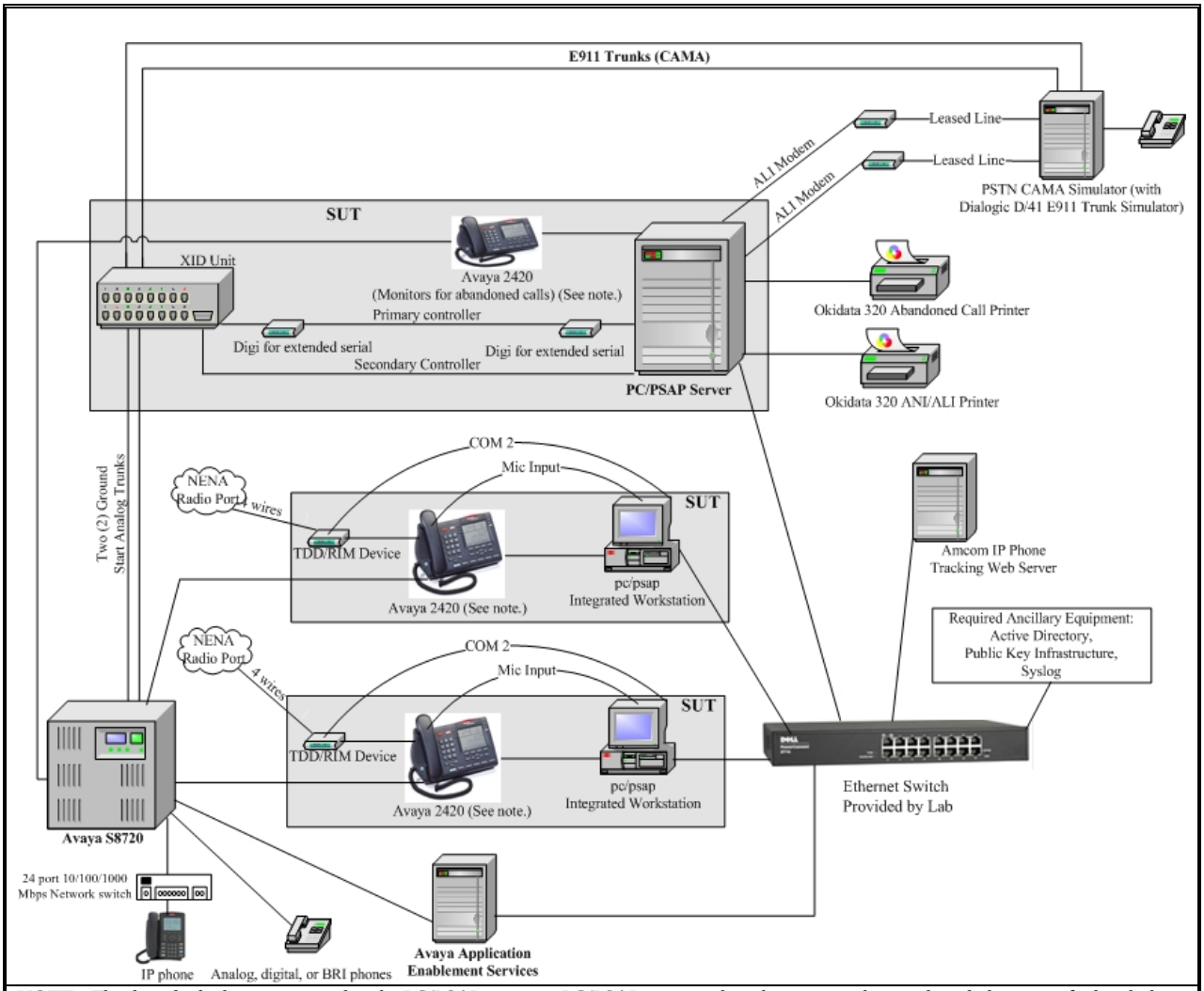
NOTES:

1. The digital telephone connected to the PC/PSAP server can be any one of the following: M2616, M3904 with CTIA adapter, or a M3905.
2. The digital telephone connected to the PC/PSAP integrated workstation can be either the M3904 with CTIA adapter or a M3905.

LEGEND:

ALI	Automatic Location Information	MCA	Meridian Communications Adapter
ANI	Automatic Number Indication	Mic	Microphone
BRI	Basic Rate Interface	NENA	National Emergency Number Association
CAMA	Centralized Automatic Message Accounting	PC/PSAP	Personal Computer/Public Safety Answering Point
COM	Communication Port	PSTN	Public Switched Telephone Network
CS	Communication Server	SUT	System Under Test
CTIA	Computer Telephony Integration Adapter	TDD/RIM	Telecommunications Device for the Deaf/Radio Interface Module
E911	Enhanced 911 Service	XID	Trunk Interface Device
IP	Internet Protocol		
Mbps	Megabits per second		

Figure 2-2. SUT Test Configuration with the Avaya CS1000M



NOTE: The digital telephone connected to the PC/PSAP server or PC/PSAP integrated workstation can be any digital phone certified with the Avaya switches.

LEGEND:

ALI	Automatic Location Information	Mbps	Megabits per second
ANI	Automatic Number Indication	Mic	Microphone
BRI	Basic Rate Interface	NENA	National Emergency Number Association
CAMA	Centralized Automatic Message Accounting	PC/PSAP	Personal Computer/Public Safety Answering Point
COM	Communication Port	PSTN	Public Switched Telephone Network
CTIA	Computer Telephony Integration Adapter	SUT	System Under Test
E911	Enhanced 911 Service	TDD/RIM	Telecommunications Device for the Deaf/Radio Interface Module
IP	Internet Protocol	XID	Trunk Interface Device

Figure 2-3. SUT Test Configuration with the Avaya S8720

6. INTEROPERABILITY REQUIREMENTS, RESULTS, AND ANALYSIS. The interface, Capability Requirements (CR), and Functional Requirements (FR) for UC CPE are defined by UCR 2013, section 3.7.2.

a. CPE Requirements

(1) If a CPE device supports Multilevel Precedence and Preemption (MLPP), then that device shall do so in accordance with the requirements listed in Section 2.25.2, Multilevel Precedence and Preemption, and shall not affect the Defense Switch Network (DSN) interface features and functions associated with line supervision and control. The SUT does not support this conditional requirement.

(2) All DSN CPE, at a minimum, must meet the requirements of Part 15 and Part 68 of the Federal Communications Commission (FCC) Rules and Regulations, and the Administrative Council for Terminal Attachment. The SUT met this requirement with the vendor's Letters of Compliance.

(3) If a CPE device supports autoanswer, then that device shall have an "autoanswer" mode feature allowing the autoanswer mode to be set to a "time" more than the equivalency of four ROUTINE precedence ring intervals, in accordance with Section 2.25.2, Multilevel Precedence and Preemption, before "answer" supervision is provided. The SUT does not support this conditional requirement.

(4) If a CPE device is required to support precedence calls above ROUTINE precedence, then that device shall respond properly to an incoming alerting (ringing) precedence call cadence, as described in Section 2.9.1.2.1, UC Ringing Tones, Cadences, and Information Signals. The SUT does not support this conditional requirement.

(5) If a CPE device can "out dial" Dual Tone Multifrequency (DTMF) and/or dial pulse (DP) digits (automatic and/or manual), then that device shall comply with the requirements as specified in Telcordia Technologies GR-506-CORE, LSSGR: Signaling for Analog Interfaces, Issue 1, June 1996, paragraph 10. That device shall also be capable of outpulsing and interpretation of DTMF digits on outgoing and two-way trunks as specified in Telcordia Technologies GR-506-CORE, LSSGR: Signaling for Analog Interfaces, Issue 1, June 1996, paragraph 15, and Table 3.7-1. The SUT does not support this conditional requirement.

(6) If a CPE device contains a modem or facsimile machine, then that modem or facsimile machine shall be compatible with International Telecommunications Union (ITU) and Telcordia standards, as applicable. The SUT does not support this conditional requirement.

(7) If a CPE device contains a facsimile device, then that facsimile device, at a minimum, shall meet the requirements in accordance with applicable DoD Information Technology (IT) Standards Registry standards. The SUT does not support this conditional requirement.

(8) If Configuration Management and/or Fault Management is provided by the CPE device so that it can be managed by the Advanced DSN Integrated Management Support System or other management systems, then the management information for that CPE device shall be provided by one or more of the following serial or Ethernet interfaces:

(a) Serial interfaces shall be in accordance with one of the following standards:

1. ITU-T Recommendation V.35

2. TIA-232-F

3. EIA-449-1

4. TIA-530-A

(b) Ethernet interfaces shall be in accordance with Institute of Electrical and Electronics Engineers (IEEE) 802.3-2002.

The SUT does not support this conditional requirement.

(9) If a CPE device supports 911 and enhanced 911 (E911) emergency services, then, at a minimum, the 911 and the E911 (tandem) emergency services shall have the capability to "hold" (prevent) the originating subscriber or caller from releasing the call, via the "switch supervision interaction for line and trunk control by the called party" feature, in accordance with Telcordia Technologies GR-529-CORE. This functionality is not a feature of the SUT, but rather the local base switch and the E911 (tandem) emergency services switch in accordance with Telcordia Technologies GR-529-CORE. Additionally, the FCC regulations regarding 911 and E911 must be considered. The SUT met this requirement by testing and the vendor's LoC. Testing details are documented in the subparagraphs below. Both, the Avaya CS1000M and Avaya S8720 local base switches, depicted in Figures 2-2 and 2-3, were included in the test. The PSTN calls were initiated via the PSTN Centralized Automatic Message Accounting (CAMA) simulator.

(a) Intra-enclave 911calls (local base switch) and inter-enclave 911 calls (via PSTN) were placed to the SUT. Testers verified that the SUT PSAP agent received the call with the appropriate address manually loaded in the ALI database. In addition, subsequent 911 calls were placed to the SUT to ensure that the available idle PSAP agent received the new 911 call.

(b) An outgoing call was placed from the PSAP agent phone and testers monitored the incoming PSAP interfaces to insure that the outbound call did not route over the same inbound interface.

(c) Local 911 calls were placed from the base switch to the SUT. Another local call with the precedence level set to above ROUTINE was placed to the same 911 originator which preempted the 911 call. This Multilevel Precedence and Preemption function is performed by the local switch and not the SUT. The UCR 2013, section 2.2.11.1, includes the requirement that 911 users are not to be preempted. This requirement for established 911 calls to be non-preemptable is a switch/session controller function. In addition, this is a new UCR 2013 requirement for Session Controllers and is optional for legacy switching systems.

(d) The requirement to "hold" (prevent) the originating subscriber or caller from releasing the call, via the "switch supervision interaction for line and trunk control by the called party" feature, in accordance with Telcordia Technologies GR-529-CORE and automatically release after 45 minutes were not tested. Refer to Testing Limitations stipulated in paragraph 7 for details and impact.

b. Differentiated Services Code Point (DSCP) Requirements. Products that supports Internet Protocol (IP) interfaces shall support the DSCP plan, as shown in Table 7.2-3. Differentiated Services (DS) assignments shall be software configurable for the full range of six bit values (0-63 Base10). Request For Comment (RFC) 2474 defines the DS field. In IP version 4 (IPv4), it defines the layout of the Type of Service octet. In IPv6, it defines the layout in the Traffic Class octet. This requirement was met with testing. The Wireshark test tool was used to capture the DSCP values. The SUT successfully demonstrated it could configure DSCP values from 0-63 for both IPv4 and IP version 6 (IPv6).

c. IPv6 Requirements. UCR 2013, section 5, Table 5.2-1 states that if a CPE device supports IP interfaces, then the CPE shall support the IPv6 requirements as defined for Network Appliance/Simple Server in UCR Section 5, IPv6. The SUT met this requirement with the vendor's LoC and intra-enclave testing only. The SUT was tested inter-enclave and intra-enclave using IPv4. The interface to Communication Manager (CM) 4 and CM 6 switches configured with Avaya Application Enablement (AE) Services Release 6.2 only support IPv4.

d. Hardware/Software/Firmware Version Identification: Table 3-3 provides the SUT components' hardware, software, and firmware tested. The JITC tested the SUT in an operationally realistic environment to determine its interoperability capability with associated network devices and network traffic. Table 3-4 provides the hardware, software, and firmware of the components used in the test infrastructure.

7. TESTING LIMITATIONS. JITC test teams noted the following testing limitations including the impact they may have on interpretation of the results and conclusions. Any untested requirements are also included in the testing limitations.

a. The JITC test configuration did not include a tandem switch with the E911 emergency service features over a CAMA interface. Instead, a CAMA simulator was used to simulate trunk-originated calls via a CAMA interface to the SUT. There is no operational impact because the CAMA simulator emulated an operational realistic environment.

b. The local base switches tested with the SUT did not have the E911 capability that prevents the 911 caller from releasing the call. This functionality is not a feature of the SUT but rather the local base switch and the E911 (tandem) emergency services switch in accordance with Telcordia Technologies GR-529-CORE. There is no operational impact since this functionality is a function of the local base and the E911 (tandem) emergency services switch and not the SUT.

c. JITC was not able to conduct end-to-end IPv6 testing between the SUT and the Avaya CM switches with AE Services Release 6.2. The Avaya CM switches with AE Services Release 6.2 only support IPv4. There is no impact since IPv6 deployment per the Program Manager has been delayed for several years and the connection between the SUT and the Avaya CM with AE Services Release 6.2 is via the Assured Services Local Area Network, which is certified for dual stack.

8. CONCLUSION(S). The SUT meets the critical interoperability requirements for a CPE in accordance with the UCR and is certified for joint use with other UC Products listed on the Approved Products List (APL). The SUT meets the interoperability requirements for the interfaces listed in Table 3-1.

DATA TABLES

Table 3-1. Interface Status

Interface	Threshold CR/FR Requirements (See note 1.)	Status	Remarks
Interfaces			
2-Wire Analog Ground Start Lines (C)	1	Met	The SUT met the critical CRs and FRs for this interface.
2-Wire Analog CAMA Trunks (C)	1	Met	The SUT met the critical CRs and FRs for this interface.
Serial EIA-232 (C)	1 (See note 2.)	Met	The SUT met the critical CRs and FRs for this interface.
Proprietary M2616 (C)	1 (See note 3.)	Met	The SUT met the critical CRs and FRs for this interface.
Proprietary M3904 (C)	1 (See note 3.)	Met	The SUT met the critical CRs and FRs for this interface.
Proprietary M3905 (C)	1 (See note 3.)	Met	The SUT met the critical CRs and FRs for this interface.
Avaya Proprietary Digital supporting MADN (C)	1 (See note 4.)	Met	The SUT met the critical CRs and FRs for this interface.
IP (C)	2, 3 (See note 5.)	Met	The SUT met the critical CRs and FRs for this interface.

NOTES:
1. The UCR does not identify interface CR/FR applicability. The SUT high-level CR and FR ID numbers depicted in the Threshold CRs/FRs column are cross-referenced with Table 3.
2. The serial interface provided connectivity between the SUT server and the telephone XID unit and between the workstation and telephones and TDD/RIM device.
3. The UCR does not include requirements for proprietary interfaces. The SUT can be used with the following phones when connected to the Avaya CS1000 switches: M2616 with an MCA adapter, M3904 with a CTIA adapter, or the M3905 connected to the PC/PSAP server. The SUT can be used with either the M3904 with a CTIA adapter or the M3905 connected to the PC/PSAP integrated workstation.
4. The UCR does not include requirements for proprietary interfaces. The SUT can be used with digital phones certified with any Avaya CM 4 or CM 6 switches that have been or are on the UC APL and are configured with Avaya AE Services Release 6.2.
5. The IP interface provided intra-enclave connectivity for the SUT components and from the SUT to the Avaya Application Enablement Services server.

LEGEND:

AE	Application Enabled	IP	Internet Protocol
C	Conditional	MADN	Multiple Appearance Directory Number
CAMA	Centralized Automatic Message Accounting	MCA	Meridian Communications Adapter
CM	Communication Manager	PSAP	Public Safety Answering Point
CPE	Customer Premise Equipment	SUT	System Under Test
CR	Capability Requirements	TDD/RIM	Telecommunications Device for the Deaf/Radio Interface Module
CTIA	Computer Telephony Integration Adapter		
EIA	Electronic Industries Alliance	UCR	Unified Capability Requirements
FR	Functional Requirements	XID	Exchange Identifier
ID	Identification		

Table 3-2. Capability and Functional Requirements and Status

CR/FR ID	UCR Requirement (High-Level) (See note 1.)	UCR 2013 Reference	Status
1	Customer Premise Equipment Requirements (R)	3.7.2	Met
2	Differentiated Services Code Point Tagging Requirements (R)	Table 7.2-3	Met
3	Internet Protocol version 6 Requirements (R)	Table 5.2-1	Met (See note 2.)

NOTES:
1. The annotation of 'required' refers to a high-level requirement category. The applicability of each sub-requirement is provided in Table 3-5.
2. The SUT met all IPv6 requirements. However, the Avaya Application Enablement Services Release 6.2 only supports IPv4. Therefore, the SUT interface to the Avaya Application Enablement Services Release 6.2 is certified for IPv4 only.

LEGEND:

CR	Capability Requirement	IPv6	Internet Protocol version 6
FR	Functional Requirement	SUT	System Under Test
ID	Identification	UCR	Unified Capabilities Requirements
IPv4	Internet Protocol version 4		

Table 3-3. SUT Hardware/Software/Firmware Version Identification

Component	Release	Sub-component	Function
PC/PSAP Server (Dell PE R710)	11.11.0.21	Windows 2008 Server R2 SP1 XNXID Version 2.8.0, XNALIMST Ver 3.1.0.1, XNGETTMS Ver 2.01.0024, XNUPDATE Version 5.1.117, XNREPORT Version 6.0.3, AES Service Setup Utility 4.6.0.5	Application/Database Server
PC/PSAP Integrated Workstation (Dell Optiplex XE)	11.11.0.21	Windows 7 Professional SP1 Xn911adox Version 11.11.0.21, XNAliAdo Version 5.8.0.34, XnTdd Version 11.0.0.1, genM39xxTapi Version 11.1.0.23 genM2616 Version 11.0.0.6 genCPI Version 11.0.0.4 genBridge Version 11.0.0.109 XnTdd Version 11.0.0.1	Attendant Console
XID Unit	N/A	ANI Trunk Card: 000 Rev. X27 ANI Controller Card: 001 Rev. X6	Trunk interface device
TDD/RIM Device	ITM061694	N/A	Enables a 911 call agent to communicate directly with a deaf person.

LEGEND:

AES	Application Enabled Services	SP	Service Pack
ANI	Automatic Number Identification	TDD/RIM	Telecommunications Device for the Deaf/Radio Interface Module
N/A	Not Applicable		
PC/PSAP	Personal Computer/Public Safety Answering Point	XID	Exchange Identifier
R2	Release 2		

Table 3-4. Test Infrastructure Hardware/Software/Firmware Version Identification

System Name	Software Release	Function
Required Ancillary Equipment		
Active Directory		
Public Key Infrastructure		
SysLog Server		
Test Network Components		
Amcom IP Phone Tracking Gateway	3.4.12	IP Phone Tracking Gateway
Avaya CS1000M (See note 1.)	Succession DSN 5.0	SMEO
M2616 with an MCA adapter (See note 2.)	Not Applicable	Proprietary digital telephone for the Avaya CS1000 switches
M3904 with a CTIA adapter (See note 2.)	Not Applicable	Proprietary digital telephone for the Avaya CS1000 switches
M3905 (See note 2.)	Not Applicable	Proprietary digital telephone for the Avaya CS1000 switches
Avaya S8720 (See note 3.)	CM 4.0 (R014x.00.2.731.7: Super Patch 14419)	SMEO
Avaya 2420	Not Applicable	Proprietary digital telephone for the Avaya S8xxx switches
PSTN CAMA Simulator with Dialogic D/41JCT-LS PCI-x Card	Dialogic software version 6.0 Build 167	PSTN CAMA simulator (E911 Trunk Simulator)

Table 3-4. Test Infrastructure Hardware/Software/Firmware Version Identification (continued)

NOTES:

1. The SUT was tested with the Avaya CS1000M. JITC analysis determined the CS1000M is functionally identical to the CS1000E and related switches. Therefore, the SUT is also certified for use with any CS1000E currently or previously on the UC APL. The SUT can be used with the following phones when connected to the Avaya CS1000 switches: M2616 with an MCA adapter, M3904 with a CTIA adapter, or the M3905 connected to the PC/PASAP server. The SUT can be used with either the M3904 with a CTIA adapter or the M3905 connected to the PC/PASAP integrated workstation.
2. The SUT was tested with the Avaya S8720 CM 4 with AE Services Release 6.2. JITC analysis determined any CM4 or CM6 Avaya switches are functionally identical to the S8720. The SUT is certified for use with any Avaya CM 4 and CM 6 switches listed that have been or are on the UC APL and are configured with Avaya AE Services Release 6.2. The Avaya AE Services Release 6.2 is posted on the UC APL under tracking number 1309901. The SUT can be used with the digital phones certified with the switches.

LEGEND:

AE Services	Application Enablement Services	M1	Meridian 1
APL	Approved Products List	MCA	Meridian Communications Adapter
CAMA	Centralized Automatic Message Accounting	MG	Multi-Group
CM	Communication Manager	PC/PSAP	Personal Computer/Public Safety Answering Point
CS	Communication Server		
CTIA	Computer Telephony Integration Adapter	PSTN	Public Switched Telephone Network
DSN	Defense Switched Network	SG	Single-Group
HP	Hewlett Packard	SMEO	Small End Office
IP	Internet Protocol	SUT	System Under Test
JITC	Joint Interoperability Test Command	UC	Unified Capabilities

Table 3-5. Products Capability/Functional Requirements

ID	Requirement	UCR Ref (UCR 2013)	LoC/TP ID	CPE
1	**3.7.2 – CPE Requirements**			
1-1	If a CPE device supports MLPP, then that device shall do so in accordance with the requirements listed in Section 2.25.2, Multilevel Precedence and Preemption, and shall not affect the DSN interface features and functions associated with line supervision and control.	3.7.2 AUX-006140	T	C
1-2	All DSN CPE, at a minimum, must meet the requirements of Part 15 and Part 68 of the FCC Rules and Regulations, and the Administrative Council for Terminal Attachments (ACTA).	3.7.2 AUX-006150	L	R
1-3	If a CPE device supports autoanswer, then that device shall have an "autoanswer" mode feature allowing the autoanswer mode to be set to a "time" more than the equivalency of four ROUTINE precedence ring intervals, in accordance with Section 2.25.2, Multilevel Precedence and Preemption, before "answer" supervision is provided.	3.7.2 AUX-006160	T	C
1-4	If a CPE device is required to support precedence calls above ROUTINE precedence, then that device shall respond properly to an incoming alerting (ringing) precedence call cadence, as described in Section 2.9.1.2.1, UC Ringing Tones, Cadences, and Information Signals.	3.7.2 AUX-006170	L/T	C
1-5	If a CPE device can "out dial" DTMF and/or dial pulse (DP) digits (automatic and/or manual), then that device shall comply with the requirements as specified in Telcordia Technologies GR-506-CORE, LSSGR: Signaling for Analog Interfaces, Issue 1, June 1996, paragraph 10. That device shall also be capable of outpulsing and interpretation of DTMF digits on outgoing and two-way trunks as specified in Telcordia Technologies GR-506-CORE, LSSGR: Signaling for Analog Interfaces, Issue 1, June 1996, paragraph 15, and Table 3.7-1.	3.7.2 AUX-006180	L	C
1-6	If a CPE device contains a modem or facsimile machine, then that modem or facsimile machine shall be compatible with ITU and Telcordia standards, as applicable.	3.7.2 AUX-006190	L	C
1-7	If a CPE device contains a facsimile device, then that facsimile device, at a minimum, shall meet the requirements in accordance with applicable DoD Information Technology (IT) Standards Registry (DISR) standards.	3.7.2 AUX-006200	L	C
1-8	If Configuration Management and/or Fault Management is provided by the CPE device so that it can be managed by the Advanced DSN Integrated Management Support System (ADIMSS) or other management systems, then the management information for that CPE device shall be provided by one or more of the following serial or Ethernet interfaces: Serial interfaces shall be in accordance with one of the following standards: ITU-T Recommendation V.35. TIA-232-F. EIA-449-1. TIA-530-A. Ethernet interfaces shall be in accordance with IEEE 802.3-2002.	3.7.2 AUX-006210	L	C
1-9	If a CPE device supports 911 and E911 emergency services, then, at a minimum, the 911 and the E911 (tandem) emergency services shall have the capability to "hold" (prevent) the originating subscriber or caller from releasing the call, via the "switch supervision interaction for line and trunk control by the called party" feature, in accordance with Telcordia Technologies GR-529-CORE. Additionally, the FCC regulations regarding 911 and E911 must be considered.	3.7.2 AUX-006220	L/T IO-1	C
2	**Table 7.2-3 – DSCP Tagging Requirements**			
2-1	Products that supports IP interfaces shall support the DSCP plan, as shown in Table 7.2-3. Differentiated Services (DS) assignments shall be software configurable for the full range of six bit values (0-63 Base10).	7.2.1 EDG-000160	T	R
3	**5.2 – IPv6 Requirements**			
3-1	If a CPE device supports IP interfaces, then the CPE shall support the IPv6 requirements as defined for NA/SS in UCR Section 5, IPv6. Refer to Table 3-6.	Table 5.2-1	L	R

Table 3-5. Products Capability/Functional Requirements (continued)

LEGEND:			
C	Conditional	ITU	International Telecommunication Union
CPE	Customer Premise Equipment	L	LoC Item
DoD	Department of Defense	LoC	Letter(s) of Compliance
DSCP	Differentiated Services Code Point	LSSGR	Local Access and Transport Area (LATA) Switching Systems Generic Requirements
DSN	Defense Switched Network		
DTMF	Dual Tone Multi Frequency	MLPP	Multi-level Precedence and Preemption
EIA	Electronic Industries Alliance	NA/SS	Network Appliance/Simple Server
FCC	Federal Communications Commission	R	Required
GR	Generic Requirement	TIA	Telecommunications Industry Association
ID	Identification	TP	Test Plan
IEEE	Institute of Electrical and Electronics Engineers	UC	Unified Capabilities
IP	Internet Protocol	UCR	Unified Capabilities Requirements
IPv6	Internet Protocol version 6		

Table 3-6. IPv6 Requirements

ID	Requirement	UCR Ref (UCR 2013)	LoC/TP ID	CPE
	5.2 – IPv6 Requirements			
3-1	The product shall support dual IPv4 and IPv6 stacks as described in RFC 4213.	5.2.1 IP6-000010	L	R
3-2	Dual-stack end points or Call Connection Agents (CCAs) shall be configured to choose IPv4 over IPv6.	5.2.1 IP6-000020	L	R
3-3	All nodes and interfaces that are "IPv6-capable" must be carefully configured and verified that the IPv6 stack is disabled until it is deliberately enabled as part of a deliberate transition strategy. This includes the stateless autoconfiguration of link-local addresses. Nodes with multiple network interfaces may need to be separately configured per interface.	5.2.1 IP6-000030	L	R
3-4	The system shall provide the same (or equivalent) functionality in IPv6 as in IPv4 consistent with the requirements in the UCR for its Approved Products List (APL) category. NOTE: This requirement applies only to products that are required to perform IPv6 functionality.	5.2.1 IP6-000050	L	R
3-5	The product shall support the IPv6 format as described in RFC 2460 and updated by RFC 5095.	5.2.1 IP6-000060	L	R
3-6	The product shall support the transmission of IPv6 packets over Ethernet networks using the frame format defined in RFC 2464. NOTE: This requirement does not mandate that the remaining sections of RFC 2464 have to be implemented.	5.2.1 IP6-000070	L	R
3-7	The product shall support a minimum MTU of 1280 bytes as described in RFC 2460 and updated by RFC 5095.	5.2.1.1 IP6-000090	L	R
3-8	If Path MTU Discovery is used and a "Packet Too Big" message is received requesting a next-hop MTU that is less than the IPv6 minimum link MTU, then the product shall ignore the request for the smaller MTU and shall include a fragment header in the packet.	5.2.1.1 IP6-000100	L	C
3-9	The product shall not use the Flow Label field as described in RFC 2460.	5.2.1.2 IP6-000110	L	R
3-10	The product shall be capable of setting the Flow Label field to zero when originating a packet.	5.2.1.2 IP6-000120	L	R
3-11	The product shall be capable of ignoring the Flow Label field when receiving packets.	5.2.1.2 IP6-000140	L	R
3-12	The product shall support the IPv6 Addressing Architecture as described in RFC 4291.	5.2.1.3 IP6-000150	L	R
3-13	The product shall support the IPv6 Scoped Address Architecture as described in RFC 4007.	5.2.1.3 IP6-000160	L	R
3-14	If a scoped address (RFC 4007) is used, then the product shall use a scope index value of zero when the default zone is intended.	5.2.1.3 IP6-000170	L	C

Table 3-6. IPv6 Requirements (continued)

ID	Requirement	UCR Ref (UCR 2013)	LoC/TP ID	CPE
3-15	If Dynamic Host Configuration Protocol (DHCP) is supported within an IPv6 environment, then it shall be implemented in accordance with the DHCP for IPv6 (DHCPv6) as described in RFC 3315.	5.2.1.4 IP6-000180	L	C
3-16	If the product is a DHCPv6 client, then the product shall discard any messages that contain options that are not allowed to appear in the received message type (e.g., an Identity Association option in an Information-Request message).	5.2.1.4 IP6-000200	L	C
3-17	If the product is a DHCPv6 client and the first retransmission timeout has elapsed since the client sent the Solicit message and the client has received an Advertise message(s), but the Advertise message(s) does not have a preference value of 255, then the client shall continue with a client-initiated message exchange by sending a Request message.	5.2.1.4 IP6-000220	L	C
3-18	If the product is a DHCPv6 client and the DHCPv6 solicitation message exchange fails, then it shall restart the reconfiguration process after receiving user input, system restart, attachment to a new link, a system configurable timer, or a user defined external event occurs.	5.2.1.4 IP6-000230	L	C
3-19	If the product is a DHCPv6 client and it sends an Information-Request message, then it shall include a Client Identifier option to allow it to be authenticated to the DHCPv6 server.	5.2.1.4 IP6-000240	L	C
3-20	If the product is a DHCPv6 client, then it shall perform duplicate address detection upon receipt of an address from the DHCPv6 server before transmitting packets using that address for itself.	5.2.1.4 IP6-000250	L	C
3-21	If the product is a DHCPv6 client, then it shall log all reconfigure events. NOTE: Some systems may not be able to log all this information (e.g., the system may not have access to this information).	5.2.1.4 IP6-000260	L	C
3-22	If the product supports DHCPv6 and uses authentication, then it shall discard unauthenticated DHCPv6 messages from UC products and log the event.	5.2.1.4 IP6-000270	L	C
3-23	The product shall support Neighbor Discovery for IPv6 as described in RFC 4861.	5.2.1.5 IP6-000280	L	R
3-24	The product shall not set the override flag bit in the Neighbor Advertisement message for solicited advertisements for any cast addresses or solicited proxy advertisements.	5.2.1.5 IP6-000300	L	R
3-25	When a valid “Neighbor Advertisement” message is received by the product and the product neighbor cache does not contain the target’s entry, the advertisement shall be silently discarded.	5.2.1.5 IP6-000310	L	R
3-26	When a valid “Neighbor Advertisement” message is received by the product and the product neighbor cache entry is in the INCOMPLETE state when the advertisement is received and the link layer has addresses and no target link-layer option is included, the product shall silently discard the received advertisement.	5.2.1.5 IP6-000320	L	R
3-27	When address resolution fails on a neighboring address, the entry shall be deleted from the product’s neighbor cache.	5.2.1.5 IP6-000330	L	R
3-28	The product shall support the ability to configure the product to ignore Redirect messages.	5.2.1.5.1 IP6-000340	L	R
3-29	The product shall only accept Redirect messages from the same router as is currently being used for that destination.	5.2.1.5.1 IP6-000350	L	R
3-30	If “Redirect” messages are allowed, then the product shall update its destination cache in accordance with the validated Redirect message.	5.2.1.5.1 IP6-000360	L	C
3-31	If the valid “Redirect” message is allowed and no entry exists in the destination cache, then the product shall create an entry.	5.2.1.5.1 IP6-000370	L	C
3-32	If redirects are supported, then the device shall support the ability to disable this functionality.	5.2.1.5.1 IP6-000380	L	C
3-33	The product shall prefer routers that are reachable over routers whose reachability is suspect or unknown.	5.2.1.5.2 IP6-000400	L	R
3-34	If the product supports stateless IP address autoconfiguration including those provided for the commercial market, then the product shall support IPv6 Stateless Address Autoconfiguration (SLAAC) for interfaces supporting UC functions in accordance with RFC 4862.	5.2.1.6 IP6-000420	L	C

Table 3-6. IPv6 Requirements (continued)

ID	Requirement	UCR Ref (UCR 2013)	LoC/TP ID	CPE
3-35	If the product supports IPv6 SLAAC, then the product shall have a configurable parameter that allows the function to be enabled and disabled. Specifically, 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 autoconfiguration.	5.2.1.6 IP6-000430	L	C
3-36	If the product supports IPv6 SLAAC, then the product shall have the configurable parameter set not to perform stateless autoconfiguration.	5.2.1.6 IP6-000440	L	C
3-37	While nodes are not required to autoconfigure their addresses using SLAAC, all IPv6 Nodes shall support link-local address configuration and Duplicate Address Detection (DAD) as specified in RFC 4862. In accordance with RFC 4862, DAD shall be implemented and shall be on by default. Exceptions to the use of DAD are noted in the following text.	5.2.1.6 IP6-000450	L	R
3-38	A node MUST allow for autoconfiguration-related variable to be configured by system management for each multicast-capable interface to include DupAddrDetectTransmits where a value of zero indicates that DAD is not performed on tentative addresses as specified in RFC 4862.	5.2.1.6 IP6-000460	L	R
3-39	The product shall support manual assignment of IPv6 addresses.	5.2.1.6 IP6-000470	L	R
3-40	The product shall support the Internet Control Message Protocol (ICMP) for IPv6 as described in RFC 4443.	5.2.1.7 IP6-000520	L	R
3-41	The product shall support the capability to enable or disable the ability of the product to generate a Destination Unreachable message in response to a packet that cannot be delivered to its destination for reasons other than congestion.	5.2.1.7 IP6-000540	L	R
3-42	The product 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.	5.2.1.7 IP6-000550	L	R
3-43	The product shall validate ICMPv6 messages, using the information contained in the payload, before acting on them.	5.2.1.7 IP6-000560	L	R
3-44	The product shall support MLD as described in RFC 2710.	5.2.1.8 IP6-000680	L	R
3-45	If the product uses IPSec, then the product shall be compatible with the Security Architecture for the IPSec described in RFC 4301.	5.2.1.9 IP6-000690	L	C
3-46	If RFC 4301 is supported, then the product shall not support the mixing of IPv4 and IPv6 in a SA.	5.2.1.9 IP6-000700	L	C
3-47	If RFC 4301 is supported, then the product's security association database (SAD) cache shall have a method to uniquely identify a SAD entry.	5.2.1.9 IP6-000710	L	C
3-48	If RFC 4301 is supported, then the product shall implement IPSec to operate with both integrity and confidentiality.	5.2.1.9 IP6-000720	L	C
3-49	If RFC 4301 is supported, then the product shall be capable of enabling and disabling the ability of the product to send an ICMP message informing the sender that an outbound packet was discarded.	5.2.1.9 IP6-000730	L	C
3-50	If an ICMP outbound packet message is allowed, then the product shall be capable of rate limiting the transmission of ICMP responses.	5.2.1.9 IP6-000740	L	C
3-51	If RFC 4301 is supported, then the system's Security Policy Database (SPD) shall have a nominal, final entry that discards anything unmatched.	5.2.1.9 IP6-000750	L	C
3-52	If RFC 4301 is supported, and the product receives a packet that does not match any SPD cache entries, and the product determines it should be discarded, then the product shall log the event and include the date/time, Security Parameter Index (SPI) if available, IPSec protocol if available, source and destination of the packet, and any other selector values of the packet.	5.2.1.9 IP6-000760	L	C
3-53	If RFC 4301 is supported, then the product should include a management control to allow an administrator to enable or disable the ability of the product to send an IKE notification of an INVALID_SELECTORS.	5.2.1.9 IP6-000770	L	C
3-54	If RFC 4301 is supported, then the product shall support the ESP Protocol in accordance with RFC 4303.	5.2.1.9 IP6-000780	L	C
3-55	If RFC 4303 is supported, then the product shall be capable of enabling anti-replay.	5.2.1.9 IP6-000790	L	C

Table 3-6. IPv6 Requirements (continued)

ID	Requirement	UCR Ref (UCR 2013)	LoC/TP ID	CPE
3-56	If RFC 4303 is supported, then the product shall check, as its first check, after a packet has been matched to its SA whether the packet contains a sequence number that does not duplicate the sequence number of any other packet received during the life of the security association.	5.2.1.9 IP6-000800	L	C
3-57	If RFC 4301 is supported, then the product shall support IKEv1 as defined in RFC 2409.	5.2.1.9 IP6-000810	L	C
3-58	To prevent a Denial of Services (DoS) attack on the initiator of an IKE_SA, the initiator shall accept multiple responses to its first message, treat each as potentially legitimate, respond to it, and then discard all the invalid half-open connections when it receives a valid cryptographically protected response to any one of its requests. Once a cryptographically valid response is received, all subsequent responses shall be ignored whether or not they are cryptographically valid.	5.2.1.9 IP6-000820	L	C
3-59	If RFC 4301 is supported, then the product shall support extensions to the Internet IP Security Domain of Interpretation for the Internet Security Association and Key Management Protocol (ISAKMP) as defined in RFC 2407.	5.2.1.9 IP6-000830	L	C
3-60	If RFC 4301 is supported, then the product shall support the ISAKMP as defined in RFC 2408.	5.2.1.9 IP6-000840	L	C
3-61	If the product supports the IPSec Authentication Header Mode, then the product shall support the IP Authentication Header (AH) as defined in RFC 4302.	5.2.1.9 IP6-000850	L	C
3-62	If RFC 4301 is supported, then the product shall support manual keying of IPSec.	5.2.1.9 IP6-000860	L	C
3-63	If RFC 4301 is supported, then the product shall support the ESP and AH cryptographic algorithm implementation requirements as defined RFC 4835.	5.2.1.9 IP6-000870	L	C
3-64	If RFC 4301 is supported, then the product shall support the IKEv1 security algorithms as defined in RFC 4109.	5.2.1.9 IP6-000880	L	C
3-65	If the product uses Uniform Resource Identifiers (URIs) in combination with IPv6, then the product shall use the URI syntax described in RFC 3986.	5.2.1.10 IP6-000990	L	C
3-66	If the product uses the Domain Name Service (DNS) resolver for IPv6 based queries, then the product shall conform to RFC 3596 for DNS queries.	5.2.1.10 IP6-001000	L	C
3-67	For traffic engineering purposes, the bandwidth required per voice subscriber is calculated to be 110.0 kbps (each direction) for each IPv6 call. This is based on G.711 (20 ms codec) with IP overhead (100 kbps) resulting in a 250-byte bearer packet plus 10 kbps for signaling, Ethernet Interframe Gap, and the Secure Real-Time Transport Control Protocol (SRTCP) overhead. Based on overhead bits included in the bandwidth calculations, vendor implementations may use different calculations and hence arrive at slightly different numbers.	5.2.1.11 IP6-001010	L	R
3-68	The product shall forward packets using the same IP version as the version in the received packet.	5.2.1.12 IP6-001040	L	R
3-69	When the product is establishing media streams from dual-stacked appliances for AS-SIP signaled sessions, the product shall use the Alternative Network Address Type (ANAT) semantics for the Session Description Protocol (SDP) in accordance with RFC 4091.	5.2.1.12 IP6-001050	L	R
3-70	If the product is using AS-SIP, and the <addrtype> is IPv6, and the <connection-address> is a unicast address, then the product shall support generation and processing of unicast IPv6 addresses having the following formats: • x:x:x:x:x:x:x:x (where x is the hexadecimal values of the eight 16-bit pieces of the address). Example: 1080:0:0:0:8:800:200C:417A. • x:x:x:x:x:x:d.d.d.d (where x is the hexadecimal values of the six high-order 16-bit pieces of the address, and d is the decimal values of the four low-order 8-bit pieces of the address (standard IPv4 representation). For example, 1080:0:0:0:8:800:116.23.135.22.	5.2.1.13 IP6-001060	L	C
3-71	If the product is using AS-SIP, then the product shall support the generation and processing of IPv6 unicast addresses using compressed zeros consistent with one of the following formats: • x:x:x:x:x:x:x:x format: 1080:0:0:0:8:800:200C:417A. • x:x:x:x:x:x:d.d.d.d format: 1080:0:0:0:8:800:116.23.135.22. • compressed zeros: 1080::8:800:200C:417A.	5.2.1.13 IP6-001070	L	C

Table 3-6. IPv6 Requirements (continued)

ID	Requirement		UCR Ref (UCR 2013)	LoC/TP ID	CPE
3-72	If the product is using AS-SIP, and the <addrtype> is IPv6, and the <connection-address> is a multicast group address (i.e., the two most significant hexadecimal digits are FF), then the product shall support the generation and processing of multicast IPv6 addresses having the same formats as the unicast IPv6 addresses.		5.2.1.13 IP6-001080	L	C
3-73	If the product is using AS-SIP, and the <addrtype> is IPv6, then the product shall support the use of RFC 4566 for IPv6 in SDP as described in AS-SIP 2013, Section 4, SIP Requirements for AS-SIP Signaling Appliances and AS-SIP EIs.		5.2.1.13 IP6-001090	L	C
3-74	If the product is using AS-SIP, and the <addrtype> is IPv6, and the <connection-address> is an IPv6 multicast group address, then the multicast connection address shall not have a Time To Live (TTL) value appended to the address as IPv6 multicast does not use TTL scoping.		5.2.1.13 IP6-001100	L	C
3-75	If the product is using AS-SIP, then the product shall support the processing of IPv6 multicast group addresses having the <number of address> field and may support generating the <number of address> field. This field has the identical format and operation as the IPv4 multicast group addresses.		5.2.1.13 IP6-001110	L	C
3-76	The products shall support Differentiated Services as described in RFC 2474 for a voice and video stream in accordance with Section 2, Session Control Products, and Section 6, Network Infrastructure End-to-End Performance, plain text DSCP plan.		5.2.1.14 IP6-001150	L	R
3-77	If the product acts as an IPv6 tunnel broker, then the product shall support the function as defined in RFC 3053.		5.2.1.14 IP6-001160	L	C
3-78	If the CPE has an IP interface, then the CPE must be IPv6-capable. Use guidance in Table 5.2-4 for NA/SS.		Table 5.2-1	L	R
	RFC 2407	The Internet IP Security Domain of Interpretation for ISAKMP	Table 5.2-4	L	C
	RFC 2408	Internet Security Association and Key Management Protocol (ISAKMP)	Table 5.2-4	L	C
	RFC 2409	The Internet Key Exchange (IKE)	Table 5.2-4	L	C
	RFC 2460	Internet Protocol, Version 6 (IPv6) Specification	Table 5.2-4	L	R-2
	RFC 2464	Transmission of IPv6 Packets over Ethernet Networks	Table 5.2-4	L	R-3
	RFC 2474	Definition of the Differentiated Services Field (DS Field) in the IPv4 and IPv6 Headers	Table 5.2-4	L	R-4
	RFC 2710	Multicast Listener Discovery (MLD) for IPv6	Table 5.2-4	L	R-8
	RFC 3053	IPv6 Tunnel Broker	Table 5.2-4	L	C
	RFC 3315	Dynamic Host Configuration Protocol for IPv6 (DHCPv6)	Table 5.2-4	L	C
	RFC 3596	DNS Extensions to Support IPv6	Table 5.2-4	L	C
	RFC 3986	Uniform Resource Identifier (URI): Generic Syntax	Table 5.2-4	L	C
	RFC 4007	IPv6 Scoped Address Architecture	Table 5.2-4	L	R
	RFC 4091	The Alternative Network Address Types (ANAT) Semantics for the Session Description Protocol (SDP) Grouping Framework	Table 5.2-4	L	R
	RFC 4092	Usage of the Session Description Protocol (SDP) Alternative Network Address Types (ANAT) Semantics in the Session Initiation Protocol (SIP)	Table 5.2-4	L	R
	RFC 4109	Algorithms for Internet Key Exchange Version 1 (IKEv1)	Table 5.2-4	L	C
	RFC 4213	Basic Transition Mechanisms for IPv6 Hosts and Routers	Table 5.2-4	L	R-1
	RFC 4291	IP Version 6 Addressing Architecture	Table 5.2-4	L	R
	RFC 4301	Security Architecture for the Internet Protocol	Table 5.2-4	L	C
	RFC 4302	IP Authentication Header	Table 5.2-4	L	C
	RFC 4303	IP Encapsulating Security Payload (ESP)	Table 5.2-4	L	C
	RFC 4443	Internet Control Message Protocol (ICMPv6) for the Internet Protocol Version 6 (IPv6) Specification	Table 5.2-4	L	R
	RFC 4566	SDP: Session Description Protocol	Table 5.2-4	L	C

Table 3-6. IPv6 Requirements (continued)

ID	Requirement		UCR Ref (UCR 2013)	LoC/TP ID	CPE
	RFC 4835	Cryptographic Algorithm Implementation Requirements for Encapsulating Security Payload (ESP) and Authentication Header (AH)	Table 5.2-4	L	C
	RFC 4861	Neighbor Discovery for IP Version 6 (IPv6)	Table 5.2-4	L	R
	RFC 4862	IPv6 Stateless Address Autoconfiguration	Table 5.2-4	L	C
	RFC 5095	Deprecation of Type 0 Routing Headers in IPv6	Table 5.2-4	L	R

LEGEND:

C	Conditional	L	LoC Item
CPE	Customer Premise Equipment	LoC	Letter(s) of Compliance
DoD	Department of Defense	LSSGR	Local Access and Transport Area (LATA) Switching Systems Generic Requirements
DSN	Defense Switched Network		
DTMF	Dual Tone Multi Frequency	MLPP	Multi-level Precedence and Preemption
EIA	Electronic Industries Alliance	R	Required
FCC	Federal Communications Commission	RFC	Request For Comment
GR	Generic Requirement	TIA	Telecommunications Industry Association
ID	Identification	TP	Test Plan
IEEE	Institute of Electrical and Electronics Engineers	UC	Unified Capabilities
ITU	International Telecommunication Union	UCR	Unified Capabilities Requirements