DEFENSE INFORMATION SYSTEMS AGENCY
P. O. BOX 549
FORT MEADE, MARYLAND 20755-0549

IN REPLY REFER TO: Joint Interoperability Test Command (JTE) 26 Apr 16

MEMORANDUM FOR DISTRIBUTION

SUBJECT: Joint Interoperability Certification of the System Engineering Technologies (SyTech) RIOS 3.44

References: (a) Department of Defense Instruction 8100.04, "DoD Unified Capabilities (UC)," 9 December 2010
(b) Office of the Department of Defense Chief Information Officer, "Department of Defense Unified Capabilities Requirements 2013, Errata 1," 1 July 2013
(c) through (d), see Enclosure

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 SyTech RIOS version 3.44; hereinafter referred to as the System Under Test (SUT), meets the minimum critical requirements of the Unified Capabilities Requirements (UCR), Reference (b), and is certified for joint use as a Radio Gateway with conditions (see Table 1). The SUT was also successfully tested and certified for use with the Cisco ASA 5505 Virtual Private Network (VPN), the Windows 2008 R2 VPN server, TLS-based VPN, and ASLAN network switches Cisco 2920, Cisco 4506, and Juniper MX480. Additionally, the SUT is certified with any Very High Frequency/Ultra High Frequency (VHF/UHF) radio transceivers, but was tested with the ICOM models IC-F33GT, IC-F43GT, and IC-T7H, the Harris RF-5800M, the Motorola models XTS-3000R and APX-6000, and the EF Johnson 5100 VHF/UHF radio transceivers. This certification expires upon changes that affect interoperability, but no later than three years from the date of the UC APL memorandum.

Table 1. Conditions

Condition	Operational Impact	Remarks
UCR Waivers		
None		
Conditions of Fielding (See note 2.)		
TDR#: SYT-0545-001 The SUT is only certified for the 4 wire configuration. Even though the vendor's LoC indicates that they support both 4 and 2 wire, the SUT was only configured and tested in the 4 wire configuration.	Minor	DISA has adjudicated this discrepancy as having a minor operational impact with this condition of fielding.

Table 1. Conditions (continued)

Open Test Discrepancies		
None		

NOTE: From previous adjudications, both 4 wire and 2 wire are not mandatory. There is a proposed change require to make this an 'OR' requirement. If vendor demonstrates 2 wire configuration in the future, the certification will be updated and remove the CoF.

LEGEND:

CoF	Condition of Fielding	SUT	System Under Test
DISA	Defense Information Systems Agency	SYT	SyTech
LoC	Letter of Compliance	UCR	Unified Capability Requirement

3. **Interoperability Status.** Table 2 provides the SUT Interface Status and Table 3 provides the Capability Requirements (CR) and Functional Requirements (FR) Status. Table 4 provides a UC Approved Products List (APL) Product Summary.

Table 2. Interface Status

Interface	Threshold CR/FR Requirements (See note 1.)	Status	Remarks
Analog Interfaces (Radio Function)			
2 Wire (Required)	1, 2, 7, 12	Not Tested	See note 2.
4 Wire (Required)	1, 2, 7, 12	Met	
Network Interfaces (Telephony and Stream Functions)			
IEEE 802.3-2002 Ethernet (Required)	1, 3, 4, 5, 6, 7, 8, 9, 10, 12	Met	See note 3.
10 Base-X (Required)	1, 3, 4, 5, 6, 7, 8, 9, 10, 12	Met	See note 4.
100 Base-X (Required)	1, 3, 4, 5, 6, 7, 8, 9, 10, 12	Met	See note 4.
1000 Base-X (Required)	1, 3, 4, 5, 6, 7, 8, 9, 10, 12	Met	See note 4.
Network and Serial Interfaces (Management Functions)			
IEEE 802.3-2002 Ethernet (Optional)	1, 11, 12	Met	
ITU-T Recommendation V.35 (Optional)	1, 11, 12	Not Tested	See note 5.
TIA-232-F (Optional)	1, 11, 12	Not Tested	See note 5.
EIA-449-1 (Optional)	1, 11, 12	Not Tested	See note 5.
TIA-530-A (Optional)	1, 11, 12	Not Tested	See note 5.

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. The SUT met the requirement for analog interface requirements with conditions (see Table 1).
3. The IEEE 802.3-2002 Ethernet interface requirement was met with the vendor's LoC and testing.
4. The 10-, 100-, and 1000-Base-x Ethernet type requirement was met with testing and the vendor's LoC.
5. The SUT does not support this interface. Therefore, it is not included in the certification.

LEGEND:

APL	Approved Products List	ITU-T	International Telecommunication Union-Telecommunication Standardization Sector
CR	Capability Requirements		
DISN	Defense Information Systems Network	LoC	Letters of Compliance
EIA	Electronic Industries Alliance	RG	Radio Gateway
FR	Functional Requirements	SUT	System Under Test
ID	Identification	TIA	Telecommunications Industry Association
IEEE	Institute of Electrical and Electronics Engineers	UC	Unified Capabilities

Table 3. SUT Capability Requirements and Functional Requirements Status

CR/FR ID	UCR Requirement (High-Level) (See note 1.)	UCR 2013 Errata-1 Reference	Status
1	Interfaces	A.8.2	Partially Met (See note 2.)
2	Functional Requirements	A.8.3	Met
3	Telephony Functions	A.8.4	Not Tested (See note 3.)
4	Authentication	A.8.5	Not Tested (See note 4.)
5	Dial Plan and Routing Requirements	A.8.6	Not Tested (See note 4.)
6	Streaming Functions	A.8.7	Met
7	Bridge Functions	A.8.8	Met (See note 5.)
8	Bearer Traffic	A.8.9	Met
9	Quality of Service	A.8.10	Met
10	Internet Protocol Version 6	A.8.11	Met
11	NMFCAPS	A.8.12	Met
12	Information Assurance	A.8.13	Met (See note 6.)

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 the requirements with the conditions noted in Table 1. DISA adjudicated these exceptions as minor.
3. The SUT does not support the conditional telephony requirements.
4. The SUT does not support conditional telephony requirement. The authentication and dial plan requirements are associated with the telephony requirements; therefore, these requirements were not tested and are not included in this certification.
5. The SUT does not support optional telephony and the streaming configuration bridging functions. Therefore, the certification only includes the local configuration bridging function.
6. Information Assurance was verified by the vendor's LoC and testing conducted by the JITC-led Information Assurance test teams with the results published in a separate report, Reference (d).

LEGEND:

CR	Capability Requirements	NMFCAPS	Network Management Fault, Configuration, Accounting, Performance, and Security
EI	End Item		
E&M	Ear and Mouth	PTT	Push To talk
FR	Functional Requirements	RG	Radio Gateway
ID	Identification	SIP	Session Initiation Protocol
JITC	Joint Interoperability Test Command	SUT	System Under test
LoC	Letters of Compliance	UCR	Unified Capabilities Requirements

Table 4. UC APL Product Summary

Product Identification			
Product Name	SyTech RIOS		
Software Release	Version 3.44		
UC Product Type(s)	Radio Gateway		
Product Description	Software application suite that allows intercommunication between two-way radios		
Product Components (See note 1.)	**Component Name**	**Version**	**Remarks**
Radio InterOperability System (RIOS)	RIOS RM Radio Gateway	RIOS 3.44	includes 16 port IP Chassis
	RIOS TAC2 Radio Gateway	RIOS 3.44	includes 8 port USB Chassis
	VPN Server	Windows 2008 R2	Optional Windows VPN (See note 2.)
	CISCO ASA 5505 VPN	Cisco IOS 8.4	Optional Cisco VPN (See note 2.)
	TLS-based VPN	TLS 1.2	Optional TLS-based VPN (See note 2.)

Table 4. UC APL Product Summary (continued)

Product Components (See note 1.)	Component Name	Version	Remarks
I/O Modules	**RIOS Sixteen Channel I/O Module**	Not Applicable (The I/O modules don't have software or firmware)	The I/O module is included in the RIOS RM Radio Gateway (See note 3.)
	RIOS Eight-Port TAC2 I/O Module		The I/O module is included RIOS TAC2 Radio Gateway (See note 3.)
	RIOS One Port SuperRIB I/O Module		The I/O modules not bolded and underlined are certified by similarity. (See note 3.)
	RIOS Two Port (2) SuperRIB I/O Module		
	RIOS Six Port (6) SuperRIB I/O Module		

NOTES:
1. The detailed component and subcomponent list is provided in Enclosure 3.
2. The SUT was tested and certified with the Cisco ASA 5505 Virtual Private Network (VPN), the Windows 2008 R2 VPN server, and the TLS-based VPN.
3. I/O modules that are bolded and underlined were tested and are included in the certification. The remaining I/O modules are certified by similarity and are included in the certification. The modules certified by similarity are identical to the 16 chassis and the 8 port I/O module used in the test. The only difference is the number of available ports.

LEGEND:

APL	Approved Product List	TAC2	Tactical 2
I/O	Input/Output	TLS	Transport Layer Security
IP	Internet Protocol	UC	Unified Capabilities
JITC	Joint Interoperability Test Command	USB	Universal Serial Bus
RIOS	Radio Interoperability System	VPN	Virtual Private Network
SyTech	System Engineering Technologies		

4. **Test Details.** This certification is based on interoperability testing, review of the vendor's Letters of Compliance (LoC), and 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 1 through 5 February 2016 using test procedures derived from Reference (c). Review of the vendor's LoC was completed on 3 February 2016. Information Assurance testing was conducted by JITC-led Information Assurance (IA) test teams and the results published in a separate report, Reference (d). 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 1512601.

FOR THE COMMANDER:

3 Enclosures a/s

for RIC HARRISON
Chief
Networks/Communications and UC Division

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

ADDITIONAL REFERENCES

(c) Joint Interoperability Test Command, "Radio Gateway (RG) Test Procedures Version 1.0 For Unified Capabilities Requirements (UCR) 2013 Errata 1," June 2014
(d) Joint Interoperability Test Command, "Information Assurance (IA) Information Assurance Assessment Report For System Engineering Technologies (SyTech) RIOS 3.44 (Tracking Number 1512601)," 31 March 2016

CERTIFICATION SUMMARY

1. SYSTEM AND REQUIREMENTS IDENTIFICATION. The System Engineering Technologies (SyTech) Radio Interoperability System (RIOS) version 3.44 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	Air National Guard
Sponsor Point of Contact	Creasy, Lucas, Illinois Air National Guard (IL ANG)/ Naval Air Warfare Center – Aircraft Division (NAWCAD), Telephone: (309) 633-5829, e-mail: lucas.creasy@ang.af.mil.
Vendor Point of Contact	Staples, Ted, 6121 Lincolnia Road, Suite 200, Alexandria, Virginia 22312, Telephone: 703-941-7887, e-mail: tstaples@sytechcorp.com
System Name	Systems Engineering Technologies (SyTech) RIOS
Increment and/or Version	3.44
Product Category	Radio Gateway
System Background	
Previous certifications	N/A
Tracking	
UCCO ID	1512601
System Tracking Program ID	5171
Requirements Source	
Unified Capabilities Requirements	Unified Capabilities Requirements 2013, ERRATA-1
Remarks	
Test Organization(s)	JITC, Fort Huachuca, Arizona
LEGEND: ID Identification JITC Joint Interoperability Test Command N/A Not Applicable RIOS Radio Interoperability System UCCO Unified Capabilities Connection Office	

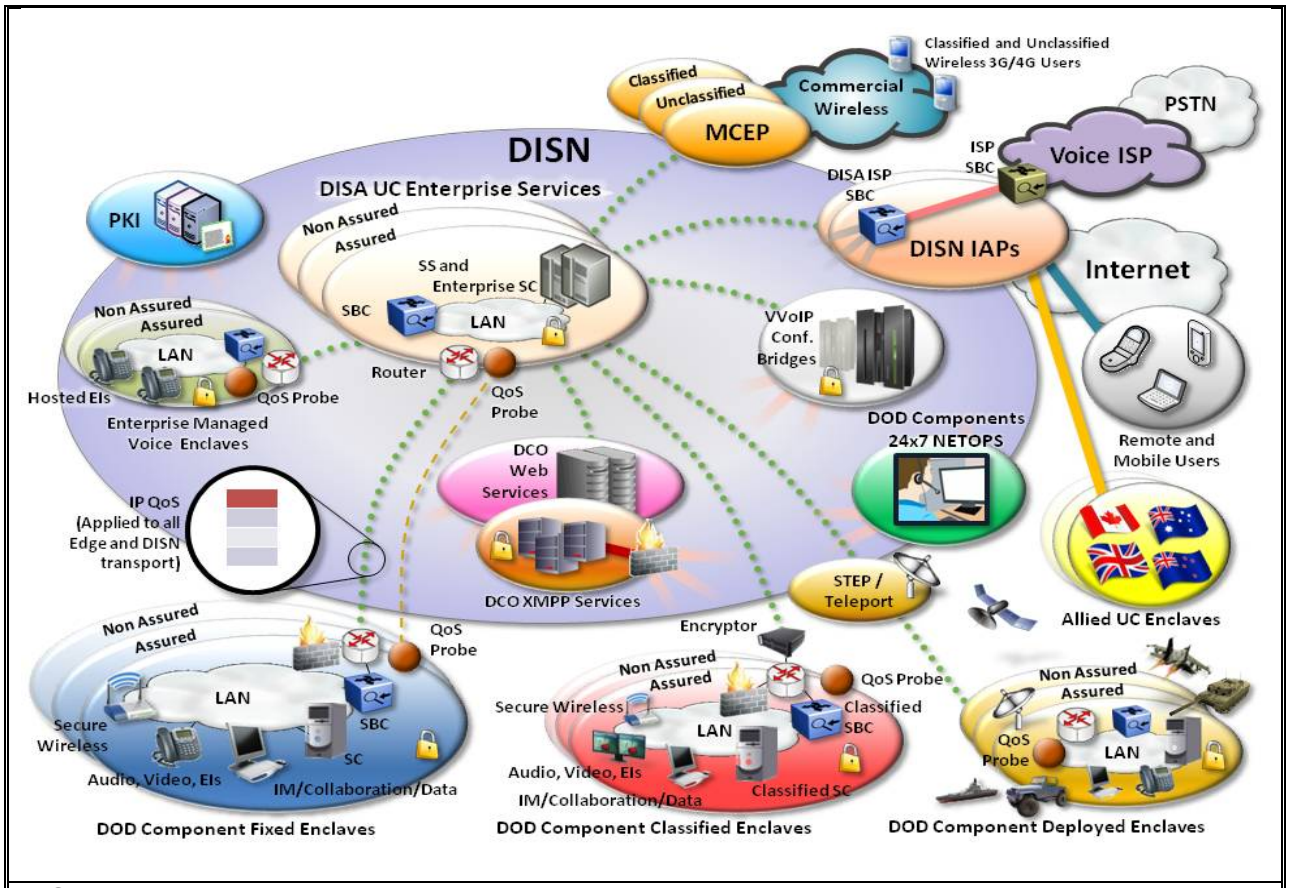
2. SYSTEM DESCRIPTION.

General Description. The SyTech RIOS gateway combines radios, computers, smartphones, and VoIP assets within an icon based user friendly interface designed for interoperable group communications in a fully distributed network design. Smartphones and Voice over Internet Protocol (VoIP) assets were not tested; therefore, they are not included in this certification. Each RIOS gateway is comprised of two key components: The RIOS Input/Output (I/O) chassis and the RIOS Server computer. The RIOS I/O chassis acts as the physical interface to the user's radio system. The RIOS I/O chassis can be configured for 1 up to 32 ports. The RIOS I/O chassis offers a variety of signaling interfaces via D-Sub 26-pin connectors. The RIOS I/O chassis physically connects to the interoperable communications switch, the RIOS Server computer. The RIOS Server computer runs the RIOS Server software, a background service operational within the Windows operating-system environment. RIOS Client, the control program of the RIOS gateway, runs locally on the RIOS Server computer or on RIOS Client PC workstations connected to the RIOS server computer via network connection. Together, these components comprise the SyTech RIOS gateway system.

3. OPERATIONAL ARCHITECTURE. The Unified Capabilities (UC) architecture is a two-level network hierarchy consisting of Defense Information Systems Network (DISN) backbone switches and Service/Agency installation switches. The Department of Defense (DoD) Chief Information Officer (CIO) 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 in which the SUT may be used and Figure 2-2 depicts the Radio Gateway functional model.

4. TEST CONFIGURATION. The SUT was tested at Joint Interoperability Test Command (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 configuration depicted in Figure 2-3 through Figure 2-5. Information Assurance testing used the same configuration. The SUT was successfully tested and certified for use with the Cisco ASA 5505 Virtual Private Network (VPN), the Windows 2008 R2 VPN server, and the TLS-based VPN. The Cisco ASA 5505 VPN test configuration is depicted in Figure 2-3. The Windows 2008 R2 VPN server test configuration is depicted in Figure 2-4. The TLS-based VPN test configuration is depicted in Figure 2-5.

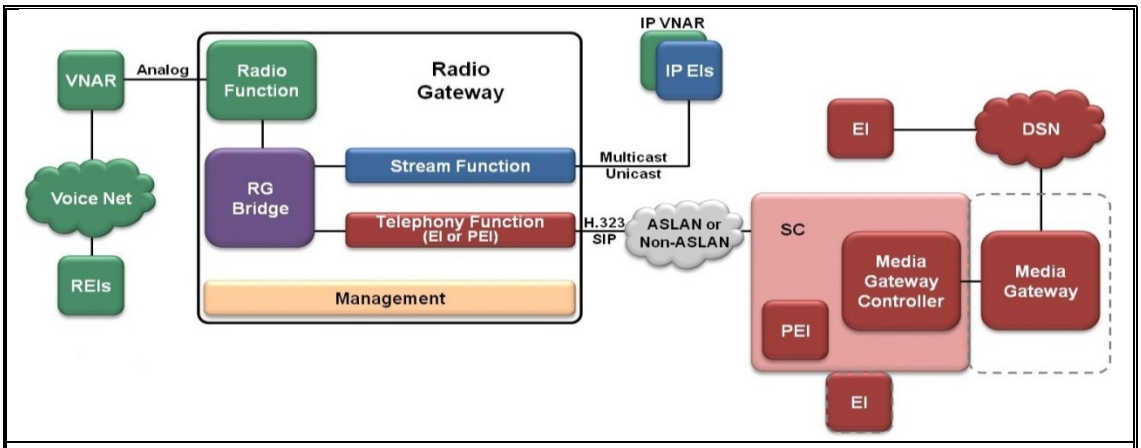
5. METHODOLOGY. Testing was conducted using Radio Gateway (RG) requirements derived from the Unified Capabilities Requirements (UCR) 2013, Reference (c), and Radio Gateway test procedures, Reference (d). Any discrepancy noted in the operational environment will be evaluated for impact on the existing 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	PTSN	Public Switch Telephone Network
DoD	Department of Defense	QoS	Quality of Service
EI	End Instrument	SBC	Session Border Controller
IAP	Integrated Access Point	SC	Session Controller
IM	Instant Message	SS	Soft Switch
IP	Internet Protocol	STEP	Standardized Tactical Entry Point
ISP	Internet Service Provider	UC	Unified Capabilities
LAN	Local Area Network	VLAN	Virtual Local Area Network
MCEP	Multi-Carrier Entry Point	XMPP	Extensible Messaging and Presence Protocol

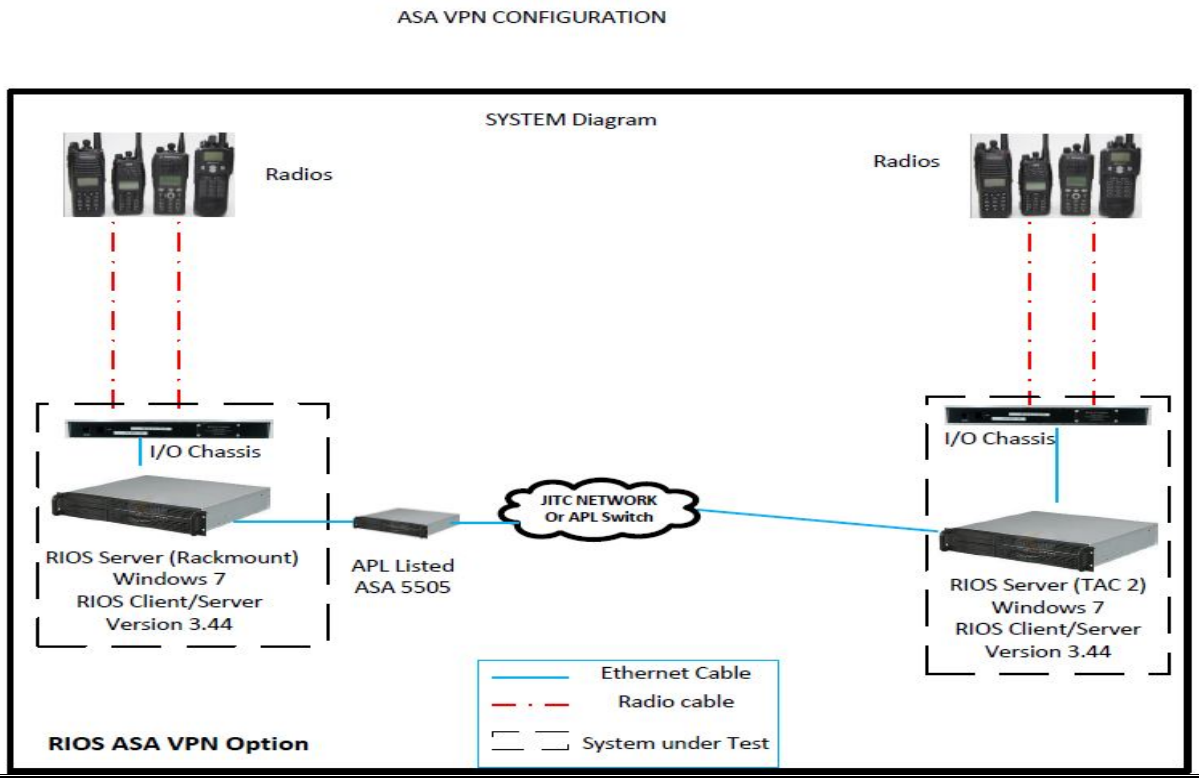
Figure 2-1. Notional UC Network Architecture



LEGEND:

ASLAN	Assured Services Local Area Network	RG	Radio Gateway
DSN	Defense Switched Network	SC	Session Controller
EI	End Instrument	SIP	Session Initiation Protocol
IP	Internet Protocol	UC	Unified Capability
PEI	Proprietary End Instrument	VNAR	Voice Net Access Radio
REI	Radio End Instrument		

Figure 2-2. Radio Gateway Functional Reference Model

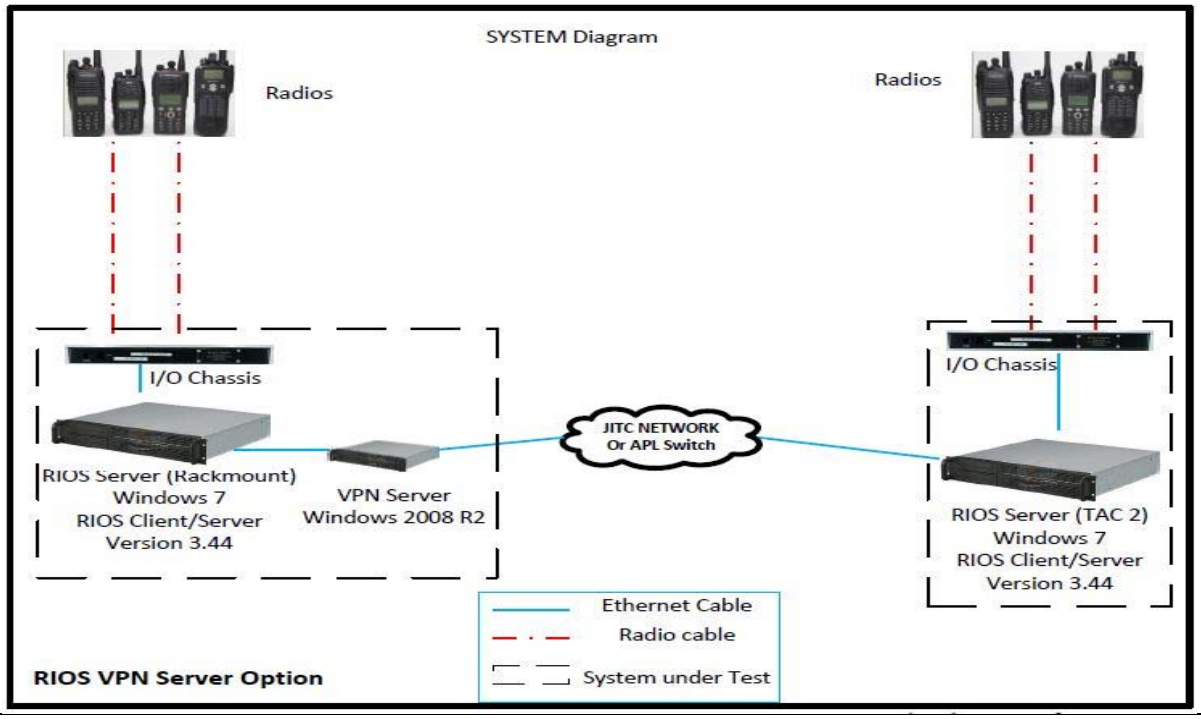


NOTE:
The SUT was successfully tested and certified for use with the Cisco ASA 5505 VPN, and ASLAN network switches: Cisco 2920, Cisco 4506, and Juniper MX480.

LEGEND:

ASA	Adaptive Security Appliance	JITC	Joint Interoperability Test Command
APL	Approved Product List	RIOS	Radio Interoperability System
ASLAN	Assured Services Local Area Network	VPN	Virtual Private Network
I/O	Input/Output		

Figure 2-3. SUT Cisco ASA 5505 VPN Test Configuration

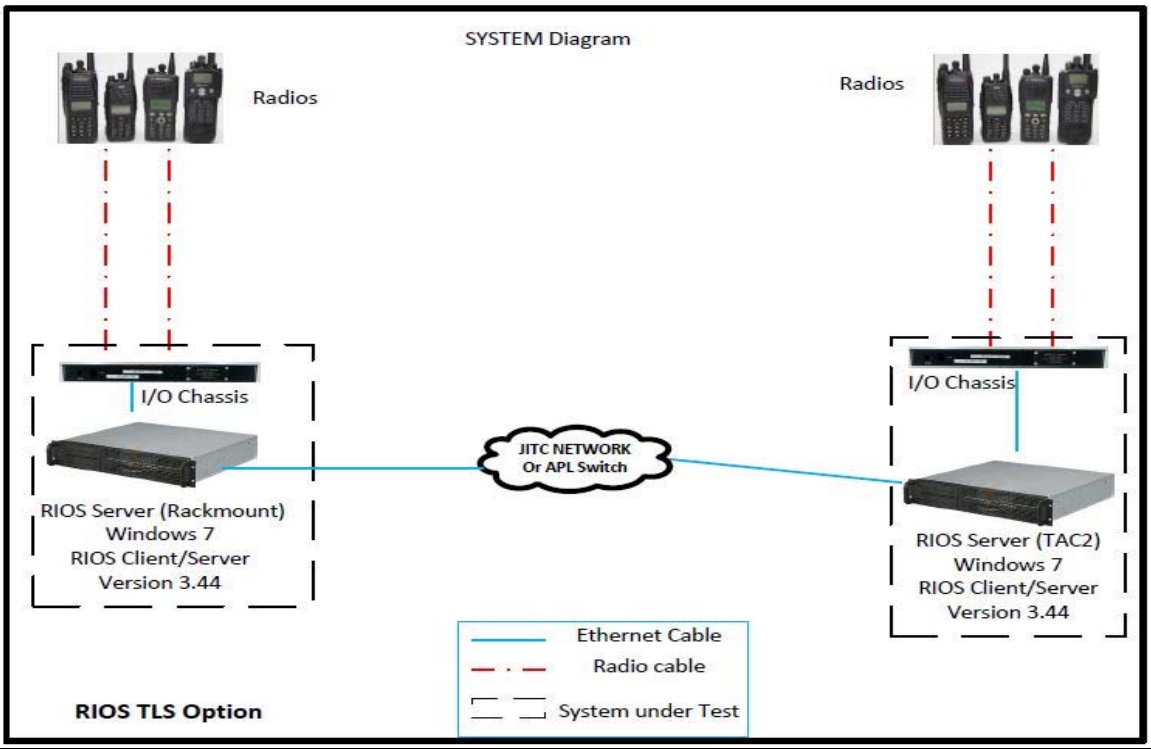


NOTE:
The SUT was successfully tested and certified for use with the Windows 2008 R2 VPN Server, and ASLAN network switches Cisco 2920, Cisco 4506, and Juniper MX480.

LEGEND:

ASA	Adaptive Security Appliance	JITC	Joint Interoperability Test Command
APL	Approved Product List	R2	Release 2
ASLAN	Assured Services Local Area Network	RIOS	Radio Interoperability System
I/O	Input/Output	VPN	Virtual Private Network

Figure 2-4. SUT Windows 2008 R2 VPN Server Test Configuration



NOTE:
The SUT was successfully tested and certified for use with TLS and ASLAN network switches Cisco 2920, Cisco 4506, and Juniper MX480.

LEGEND:

ASA	Adaptive Security Appliance	JITC	Joint Interoperability Test Command
APL	Approved Product List	R2	Release 2
ASLAN	Assured Services Local Area Network	RIOS	Radio Interoperability System
I/O	Input/Output	TLS	Transport layer Security

Figure 2-5. SUT TLS-based VPN Test Configuration

6. INTEROPERABILITY REQUIREMENTS, RESULTS, AND ANALYSIS. The interface, Capability Requirements (CR) and Functional Requirements (FR), Information Assurance (IA), and other requirements for Radio Gateway are defined by UCR 2013 Errata-1, section A.8.

a. Interfaces Requirements

(1) Analog Interface (Radio Function)

(a) Analog Interface. Section A.8.2.1, states that the Radio Gateway (RG) shall contain an analog interface. The SUT met this requirement with testing and the vendor's Letter of Compliance (LoC). The requirement was verified by visually inspecting the analog SUT to Voice Net Access Radio (VNAR) interface and testing communications between the VNAR and the Radio End Instrument (REI) using an attenuated configuration.

(b) Analog 4 and 2 Wire Configurations. Section A.8.2.1, states that RG analog interface shall support 4 and 2 wire Ear&Mouth (E&M) analog configurations. The SUT partially met this requirement with testing and the vendor's LoC. Audio was successfully transmitted and received using the 4 wire analog configuration for radios. DISA has adjudicated this discrepancy as having a minor operational impact with this condition of fielding.

(c) Impedance of 600Ω Balanced or Unbalanced. Section A.8.2.1, states that the RG's analog interface shall support an impedance of 600Ω balanced or unbalanced. The SUT met this requirement with the vendor's Letters of Compliance (LoC).

(d) Impedance of 47kΩ. Section A.8.2.1, states that the RG's analog interface shall support an impedance of 47kΩ. The SUT met this requirement with the vendor's LoC.

(e) Support High Impedance. Section A.8.2.1, states that the RG's analog interface may support high impedance dictated by the radio being connected to the RG. The SUT met this requirement with the vendor's LoC.

(2) Network Interface (Telephony and Stream Functions)

(a) Ethernet Interfaces. Section A.8.2.2, states that Ethernet interfaces shall be in accordance with Institute of Electrical and Electronics Engineers (IEEE) 802.3-2001. The SUT met this requirement with the vendor's LoC.

(b) Ethernet Types. Section A.8.2.2, states that the RG shall support the following Ethernet types in accordance with IEEE 802.3-2002: The 10-, 100-, and 1000-Base-x. The SUT met this requirement with testing and the vendor's LoC. Each Ethernet configuration was verified.

(3) Network and Serial Interface (Management Functions)

(a) Management Interface. Section A.8.2.3, states that the RG's management interface shall be provided by one or more serial or Ethernet interfaces. The SUT met this requirement with testing and the vendor's LoC for the Ethernet interface.

(b) Ethernet and Serial Management Interface. Section A.8.2.3, states that the RG's management interface may support Serial or Ethernet interfaces. Ethernet interfaces shall be in accordance with IEEE 802.3-2002. Serial interfaces shall be in accordance with one of the following standards: International Telecommunication Union Standardization (ITU-T) Recommendation V.35, Telecommunications Industry Alliance (TIA)-232-F, Electronic Industries Alliance (EIA)-449-1, or TIA-530-A. The SUT met this requirement for the Ethernet interfaces with testing and the vendor's LoC.

b. Functional Requirements

(1) Voice Network Access Radio (VNAR) Push To Talk (PTT).

(a) Ear and Mouth (E&M) PTT Signaling. The RG shall support E&M PTT signaling in accordance with "MILSTD 188.141C" for connecting to the VNAR. This requirement was unable to be tested as the standard referenced in the UCR 2013 Errata-1 is incorrect; however, the required E&M PTT signaling was verified through testing.

(b) In-band PTT Signaling. The RG shall support in-band PTT signaling for connecting to the VNAR. This requirement was met by successfully transmitting audio from the RG microphone through the VNAR to the REI.

(c) Pass-through. Pass-through is an RG method that, when bearer traffic is received from a remote EI, the traffic is passed to the VNAR with no special RG PTT signaling. The PTT mechanisms are all internal to the radio (i.e., voice [VOX]). This requirement was met with the vendor's LoC and by transmitting a 10-count (i.e., 1, 2, 3, etc.) from one REI connected to a VNAR via the RG to a second REI.

(d) Voice Activated Transmission (VOX). When configured to support VOX, the RG shall not clip the beginning of the audio received. This requirement was met with the vendor's LoC and by transmitting a 10-count (i.e., 1, 2, 3, etc.) from one REI connected to a VNAR without clipping the beginning of the audio.

(e) Configurable Tone Signaling. The RG shall support configurable tone signaling. The SUT met this requirement with the vendor's LoC.

(f) Configurable Tone Signaling between the 0Hz and 3201Hertz (Hz). The RG may support tone signaling configurable between the 0Hz and 3201Hz frequency range. The SUT met this requirement with the vendor's LoC.

(g) Configurable decibel (dB) Level or Amplitude tone signal. The RG may support a dB level or amplitude tone signal configurable at or between -50 and 3dB. The SUT met this requirement with the vendor's LoC.

(h) Configurable Tone Duration. The RG may support tone duration configurable at or between 10 and 2000 milliseconds (ms). The SUT met this requirement with the vendor's LoC.

(i) Infinite Guard Tone Duration. The RG shall support guard tones configurable for an infinite duration. The SUT met this requirement with the vendor's LoC.

(j) Sequential Order Tone Patterns. The RG shall support sequential order tone patterns. The SUT met this requirement with the vendor's LoC.

(k) Minimum of 8 Signaling Tones. The RG shall support a minimum of 8 signaling tones. The SUT met this requirement with the vendor's LoC.

(l) Analog Interface for 2/4-wire Type III E&M signaling. The RG analog interface may support 2/4-wire Type III E&M signaling. The SUT does not support this optional requirement, therefore, it is not covered under this certification.

(m) Analog Interface for 2/4-wire Type V E&M signaling. The RG analog interface may support 2/4-wire Type V E&M signaling. The SUT does not support this optional requirement, therefore, it is not covered under this certification.

(2) Carrier Operated Relay (COR), Carrier Operator Switch (COS), and Voice Activated Detection (VAD). Section A.8.3.2, includes the following requirements for Carrier Operated Relay (COR), Carrier Operated Switch (COS), and Voice Activity Detection (VAD).

(a) The RG shall support COR or COS signaling. This requirement was met with testing and the vendor's LoC.

(b) The RG shall be capable of inspecting the incoming VNAR Radio Frequency (RF) audio stream to determine if it is valid audio traffic or refuse the propagation of noise. This requirement was met with testing and the vendor's LoC.

(c) The RG shall be capable of inspecting the incoming VNAR RF audio stream to determine if it is valid audio traffic or refuse the propagation of noise. This requirement was met with testing and the vendor's LoC.

(3) Audio Manipulation. Section A.8.3.3, includes the following requirements for Audio Manipulation.

(a) Half-Duplex and Full Duplex Signaling. The RG shall support the capability of performing both half-duplex and full duplex signaling. This requirement was met with testing and the vendor's LoC.

(b) Lower or Raise Audio Stream Amplitude Levels. The RG shall support the ability to lower or raise the amplitude of the transmitted or receive audio stream within the

minimum range of 0 and 10dB. The SUT met this requirement with testing. This requirement was tested by verifying the amplitude of audio tones set to 0dB and 10dB.

(c) Configurable Audio Timeout. The RG shall support the ability to configure from 0ms to 2000ms receive audio timeout after transmitted audio to the VNAR has ceased. The SUT met this requirement with testing and the vendor's LoC. The receive audio timeout intervals tested were 0 ms (no audio time out), 1000ms, and 2000ms.

(d) Configurable dB Threshold. The RG shall support relay of audio signals that are above a configurable dB threshold. This requirement was met with testing and the vendor's LoC. This requirement was tested by performing a 10 count (i.e., 1…2…3…4…etc) and listening to the received audio. The SUT only relayed the audio signals above its configurable dB threshold and did not relay the audio signals above its configurable dB threshold.

c. Telephony Functions

(1) Telephony End Item (EI) PTT Instruction Functionality. Section A.8.4.1, includes the following conditional requirements for Telephony EI PTT Instruction Functionality. The SUT does not support the conditional Telephony EI PTT functional requirements; therefore, the Telephony requirements listed below were not tested and are not covered under this certification.

(a) If the RG supports SIP Instructions from the EI, then the RG shall support one the following:

1. In-Band PTT instructions ("start" and "stop") by receiving EI generated Dual-Tone Multi-Frequency (DTMF) tones over the Real-time Transport Protocol (RTP) audio bearer per Request for Comments (RFC) 4733, RTP Payload for DTMF Digits, Telephony Tones, and Telephony Signals. The SUT does not support this conditional capability, it was not tested; therefore, it is not covered under this certification.

2. Out-of-band EI PTT instructions ("start" and "stop") be receiving Key Press Stimulus Protocol (KPML) DTMF events as defined by RFC 4730, A Session Initiation Protocol (SIP) Event Package for KPML. The SUT does not support this conditional capability, it was not tested; therefore, it is not covered under this certification.

(b) If the RG supports H.323 instructions from the EI, then the RG shall support one the following:

1. In-Band EI PTT instructions ("start" and "stop") by receiving the DTMF tones over the RTP audio bearer per RFC 4733 RTP Payload for the DTMF Digits, Telephony Tones, and Telephony Signals. The SUT does not support this conditional capability, it was not tested; therefore, it is not covered under this certification.

2. Out-of-Band alphanumeric user input messages as defined by the ITU H.245 Standard. The SUT does not support this conditional capability, it was not tested; therefore, it is not covered under this certification.

(2) Audio Manipulations. Section A.8.4.2, includes the following requirements for Audio Manipulations. The SUT does not support the conditional Telephony requirements; therefore, Audio Manipulations requirements are not covered under this certification.

(a) The RG shall support a buffer that can withstand a variable delay of received voice segments of at least 1500ms. The SUT does not support this conditional capability, it was not tested; therefore, it is not covered under this certification.

(b) The RG shall support the ability to provide a unique telephone number or Dial-in Number for each telephony function. The SUT does not support this conditional capability, it was not tested; therefore, it is not covered under this certification.

(c) If the RG supports more than one telephony function; then, the RG shall support one the following:

1. Direct-Inward-Dial (DID). This method connects the caller directly to a Telephony Function with no voice prompt requesting the user for selection. The SUT does not support this conditional capability, it was not tested; therefore, it is not covered under this certification.

2. The RG may support Interactive Voice Response (IVR). This method uses voice prompts to request that the caller select a Telephony Function by entering the Dial-in Number or extension of the Telephony Function. The SUT does not support this conditional capability, it was not tested; therefore, it is not covered under this certification.

3. Operator/Attendant Routing. This method allows an authorized operator/attendant to route a caller to the appropriate Telephony Function. This routing may be accomplished locally (e.g., using direct RG controls) or remotely (e.g., using an RG administrative network connection). The SUT does not support this conditional capability, it was not tested; therefore, it is not covered under this certification.

d. Authentication. The UCR 2013 Errata-1, section A.8.5, includes the following requirements for Authentication. The SUT does not support the conditional authentication telephony requirements listed below. The requirements were not tested; therefore, they are not covered under this certification.

(1) The RG shall support authentication of inbound callers before allowing access to each connected Radio Bridge. The SUT does not support the conditional requirement; therefore, this requirement was not tested and is not covered under this certification.

(2) The RG may support a Participant Code function. This code is required, before allowing a caller access to the connected Radio Bridge. The SUT does not support the conditional requirement; therefore, this requirement was not tested and is not covered under this certification.

(3) The RG may support Operator/Attendant Authentication. Each Telephony Function may be configured to allow a live operator/attendant to authenticate a caller by offline means before allowing access to the connected Radio Bridge. The SUT does not support the conditional requirement; therefore, this requirement was not tested and is not covered under this certification.

(4) The RG shall support an audible tone of IVR voice message to the caller if the authentication process determines that the caller is unauthorized. The SUT does not support the conditional requirement; therefore, this requirement was not tested and is not covered under this certification.

(5) The RG shall support a configurable parameter-determined period in which the system will terminate the call if the unauthorized caller does not hang up. The SUT does not support the conditional requirement; therefore, this requirement was not tested and is not covered under this certification.

(6) The RG shall support an audible tone or IVR voice message to the caller acknowledging successful entry into the Radio Bridge. The SUT does not support the conditional requirement; therefore, this requirement was not tested and is not covered under this certification.

e. Dial Plan and Routing Requirements. Section A.8.6, states that each telephony function shall be assigned a routable user identity, which can be one of the following: DSN number, Tel-Uniform Resource Identifier (URI), SIP-URI, Fully Qualified Domain Name (FQDN), or internal ID. The SUT does not support the conditional Dial Plan and Routing Requirements for telephony; therefore, these requirements are not covered under this certification.

f. Streaming Functions

(1) The UCR 2013 Errata-1, section A.8.7.1, includes the following requirements for IP VNAR PTT functionality.

(a) If the RG supports an IP VNAR, then the RG shall support one of the requirements in the subparagraphs below. The SUT met this conditional requirement with testing and the vendor's LoC.

1. Pass-through is an RG method that, when bearer traffic is received from a remote EI, the traffic is passed to the VNAR with no special RG PTT signaling. The PTT mechanisms are all internal to the radio. The SUT met this conditional requirement with testing and the vendor's LoC.

2. DTMF Signaling the IP VNAR will accept the bearer traffic.

(b) If the IP VNAR accepts SIP DTMF tones, then the RG shall support one of the requirements in the subparagraphs below. The SUT does not support this conditional requirement, it was not tested; therefore, it is not covered under this certification.

1. In-Band PTT signaling by transmitting the DTMF tone over the RTP audio bearer per RFC 4733, RTP Payload for DTMF Digits, Telephony Tones, and Telephony Signals. The SUT does not support this conditional requirement, it was not tested; therefore, it is not covered under this certification.

2. Out-of-Band PTT signaling by transmitting KPML DTMF events to the IP VNAR as defined by RFC 4730, A Session Initiated Protocol (SIP) Event Package for Key Press Stimulus (KPML). The SUT does not support this conditional requirement, it was not tested; therefore, it is not covered under this certification.

(c) The UCR 2013 Errata-1, section A.8.7.1, states that if the IP VNAR accepts H.323 signaling, then the RG shall support one of the requirements in the subparagraphs below. The SUT does not support this conditional requirement, it was not tested; therefore, it is not covered under this certification.

1. In-Band PTT signaling by transmitting the DTMF tone over the RTP audio bearer per RFC 4733 RTP Payload for DTMF Digits, Telephony Tones, and Telephony Signals. The SUT does not support this conditional requirement, it was not tested; therefore, it is not covered under this certification.

2. Out-of-Band alphanumeric user input messages, as defined by the ITU H.245 Standard. The SUT does not support this conditional requirement, it was not tested; therefore, it is not covered under this certification.

(2) The UCR 2013 Errata-1, section A.8.7.2, includes the following requirements for IP EI PTT Instruction Functionality.

(a) Inspecting Incoming EI Audio. The RG may support the capability of inspecting the incoming EI audio to determine if it is valid audio traffic or refuse the propagation of noise. The SUT met this optional requirement with the vendor's LoC.

(b) Sending IP EI In-Band Generated Tones. The RG may support the capability of sending IP EI In-band Generated Tones to the VNAR with no voice inspection. The SUT met this optional requirement with the vendor's LoC.

(c) Generating and Mixing Incoming Bearer Traffic. The RG may support the capability of generating and mixing the necessary tones with the incoming bearer traffic to the VNAR upon the detection of an IP EI voice stream. The SUT met this optional requirement with the vendor's LoC.

(3) Audio Manipulation. The UCR 2013 Errata-1, section A.8.7.3, states that the RG shall support a Jitter Buffer capable of withstanding a variable delay of received voice segments of at least 150ms. The SUT met this requirement with testing. This requirement was tested by inducing jitter on the network with an Anuē Network Emulator.

(4) Multicast. The UCR 2013 Errata-1, section A.8.7.4, states that if the RG supports streaming RTP traffic between the Stream Function and a remotely connected EI, via multicast. The SUT does not support this conditional requirement; it was not tested; therefore, it is not covered under this certification.

(a) The RG shall support the Internet Group Management Protocol, Version 3 (IGMPv3) for IPv4 multicast management and multicast group membership reporting to neighboring multicast NE as defined by RFC 3376. The SUT does not support this conditional requirement; it was not tested; therefore, it is not covered under this certification.

(b) The RG shall support Multicast Listener (MLD), Version 2 for IPv6 multicast NEs to discover the presence of multicast listeners as defined by RFC 4604. The SUT does not support this conditional requirement; it was not tested; therefore, it is not covered under this certification.

(c) The RG shall support administratively scoped addresses (239/8) and multicast administrative boundaries as described in RFC 2365. The SUT does not support this conditional requirement; it was not tested; therefore, it is not covered under this certification.

g. Bridge Functions

(1) The UCR 2013 Errata-1, section A.8.8, states that the RG shall support the capability of, at a minimum, bridging a connected VNAR or IP VNAR in one of the following configurations:

(a) Local Configuration. A local configuration connects more than one conventional VNAR together through the RG's backplane or internal processes. The SUT met this requirement with testing. Testing included the exchange of audio between radio end instruments on separate voice nets by connecting the VNARs from the separate voice nets via the SUT.

(b) Telephony Configuration. The telephony configuration connects a VNAR or IP VNAR to a SIP/H.323 EI, remote IP VNAR, or trunk. The SUT does not support this optional requirement; it was not tested; therefore, it is not covered under this certification.

(c) Stream Configuration. The stream configuration connects a VNAR or IP VNAR to a unicast or multicast voice EI or remote IP VNAR. The SUT does not support this optional requirement; it was not tested; therefore, it is not covered under this certification.

(2) The UCR 2013 Errata-1, section A.8.8, states that the RG shall support the capability of decoding RTP traffic. The SUT does not support this requirement; it was not tested; therefore, it is not covered under this certification. This requirement is not applicable for the local configuration bridging function.

(3) The UCR 2013 Errata-1, section A.8.8, states that the RG shall support the capability of receiving multiple RTP streams, mixing these streams, and sending the single mixed RTP stream to an EI or VNAR (conventional or IP). The SUT does not support this

requirement; it was not tested; therefore, it is not covered under this certification. This requirement is not applicable for the local configuration bridging function.

h. Bearer Traffic

(2) The UCR 2013 Errata-1, section A.8.9, states that the RG shall support the following DSN Approved Codecs: G.711 and G.729 or G.729A. The SUT met this requirement with testing and the vendor's LoC.

(2) The UCR 2013 Errata-1, section A.8.9, states that in addition to the DSN Approved Codecs, the IP EI may support additional codecs. The SUT met this optional requirement with the vendor's LoC.

i. Quality of Service

(1) The UCR 2013 Errata-1, section A.8.10, states that the RG shall support Differentiated Services (DiffServ) per hop behaviors (PHBs) and traffic conditioning IAW RFCs 2474, 2597, 2598, 3140, and 3246. The SUT met this requirement with testing and the vendor's LoC.

(2) The UCR 2013 Errata-1, section A.8.10, states that the RG shall support a configurable mechanism to mark DSCPs in the header of IP packets. The default marking shall be as defined in UCR Section 6, Network Infrastructure End-to-End Performance Requirements. The SUT met this requirement with testing and the vendor's LoC.

(3) The UCR 2013 Errata-1, section A.8.10, states that the RG shall support a configurable fail-safe mechanism to prevent a VoIP EI from streaming continuous voice traffic to a PTT-based Voice Net. The SUT does not support this optional telephony requirement; it was not tested; therefore, it is not covered under this certification.

(4) The UCR 2013 Errata-1, section A.8.10, states that the RG fail-safe mechanism shall only reinstate transmissions based on completion of a configurable specific, positive action by the EI. The SUT met this requirement with testing.

j. Internet Protocol version 6 (IPv6). The UCR 2013 Errata-1, section A.8.11, states that the RG shall support the IPv6 requirements as defined for NA/SS in UCR Section 5, IPv6. The SUT partially met this requirement with the vendor's LoC. The SUT met this requirements with the vendor's LoC.

k. Network Management Fault, Configuration, Accounting, Performance, and Security (NMFCAPS). The UCR 2013 Errata-1, section A.8.12, states that the RG shall support General Network Management requirements as specified in UCR Section 15, Enterprise and Network Management Systems. The SUT met this requirement with testing and the vendor's LoC.

l. Information Assurance. The UCR 2013 Errata-1, section A.8.13, includes the IA requirements in the subparagraphs below.

(1) The RG shall support the Information Assurance (IA) requirements for a LAN Switch as defined in UCR Section 4, Information Assurance. The SUT met this requirement with the vendor's LoC.

(2) The RG shall apply the appropriate STIGs for an NA/SS. Security is verified by the vendor's LoC and testing accomplished by JITC-led Information Assurance test teams and the results published in a separate report, Reference (d).

7. 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.

8. TESTING LIMITATIONS. JITC test teams noted the following testing limitations including the impact they may have on interpretation of the results and conclusions. The VNAR and REI did not radiate in an actual over the air environment. Coax cabling and attenuators were used to simulate the RF environment. JITC analysis determined there is no operational impact because the simulated RF environment didn't affect any of SUT test requirements.

9. CONCLUSION(S). The SUT meets the critical interoperability requirements for a Radio Gateway in accordance with the UCR 2013 Errata-1, and is certified for joint use with other UC Products listed on the Approved Products List (APL). The SUT was also successfully tested and certified for use with the Cisco ASA 5505 VPN, the Windows 2008 R2 VPN server, TLS VPN, and ASLAN network switches Cisco 2920, Cisco 4506, and Juniper MX480. Additionally, the SUT is certified with any Very High Frequency/Ultra High Frequency (VHF/UHF) radio transceivers, but was tested with the ICOM models IC-F33GT, IC-F43GT, and IC-T7H, the Harris RF-5800M, the Motorola models XTS-3000R and APX-6000, and the EF Johnson 5100 VHF/UHF radio transceivers. This certification expires upon changes that affect interoperability, but no later than three years from the date of the UC APL memorandum.

DATA TABLES

Table 3-1. Interface Status

Interface	Threshold CR/FR Requirements (See note 1.)	Status	Remarks
Analog Interfaces (Radio Function)			
2 Wire (Required)	1, 2, 7, 12	Not Tested	
4 Wire (Required)	1, 2, 7, 12	Met	
Network Interfaces (Telephony and Stream Functions)			
IEEE 802.3-2002 Ethernet (Required)	1, 3, 4, 5, 6, 7, 8, 9, 10, 12	Met	See note 2.
10 Base-X (Required)	1, 3, 4, 5, 6, 7, 8, 9, 10, 12	Met	See note 3.
100 Base-X (Required)	1, 3, 4, 5, 6, 7, 8, 9, 10, 12	Met	See note 3.
1000 Base-X (Required)	1, 3, 4, 5, 6, 7, 8, 9, 10, 12	Met	See note 3.
Network and Serial Interfaces (Management Functions) (See note 4.)			
IEEE 802.3-2002 Ethernet (Optional)	1, 11, 12	Met	
ITU-T Recommendation V.35 (Optional)	1, 11, 12	Not Tested	
TIA-232-F (Optional)	1, 11, 12	Not Tested	
EIA-449-1 (Optional)	1, 11, 12	Not Tested	
TIA-530-A (Optional)	1, 11, 12	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. The IEEE 802.3-2002 Ethernet interface requirement was met with the vendor's LoC and testing.
3. The 10-, 100-, and 1000-Base-x Ethernet type requirement was met with testing and the vendor's LoC.
4. The SUT does not support this interface. Therefore, it is not included in the certification.

LEGEND:

APL	Approved Products List	ITU-T	International Telecommunication Union-Telecommunication Standardization Sector
CR	Capability Requirements		
DISN	Defense Information Systems Network	LoC	Letters of Compliance
EIA	Electronic Industries Alliance	RG	Radio Gateway
FR	Functional Requirements	SUT	System Under Test
ID	Identification	TIA	Telecommunications Industry Association
IEEE	Institute of Electrical and Electronics Engineers	UC	Unified Capabilities

Table 3-2. Capability and Functional Requirements and Status

CR/FR ID	Capability/Function	Applicability (See note 1.)	UCR Reference	Status
1	**Interfaces**			
	Analog Interface (Radio Function)	Required	A.8.2.1	Partially Met (See note 2.)
	Network Interface (Telephony and Stream Functions)	Required	A.8.2.2	Met
	Network & Serial Interface (Management Functions)	Required	A.8.2.3	Met (See note 3.)
2	**Functional Requirements**			
	VNAR PTT	Required	A.8.3.1	Met
	COR, COS, and VAD	Required	A.8.3.2	Met
	Audio Manipulation	Required	A.8.3.3	Met
3	**Telephony Functions**			
	Telephony EI PTT Instruction Functionality	Conditional	A.8.4.1	Not Tested (See note 4.)
	Audio Manipulations	Required	A.8.4.2	Not Tested (See note 4.)
4	**Authentication**			
	Authentication	Required	A.8.5	Not Tested (See note 5.)
5	**Dial Plan and Routing Requirements**			
	Dial Plan and Routing Requirements	Required	A.8.6	Not Tested (See note 5.)
6	**Streaming Functions**			
	IP VNAR PTT Functionality	Conditional	A.8.7.1	Met (See note 6.)
	IP EI PTT Instruction Functionality	Optional	A.8.7.2	Met
	Audio Manipulation	Required	A.8.7.3	Met
	Multicast	Conditional	A.8.7.4	Not Tested (See note 7.)
7	**Bridge Functions**			
	Bridge Functions	Required	A.8.8	Met (See note 8.)
8	**Bearer Traffic**			
	Bearer Traffic	Required	A.8.9	Met
9	**Quality of Service**			
	Quality of Service	Required	A.8.10	Met (See note 9.)
10	**Internet Protocol Version 6**			
	Internet Protocol Version 6	Required	A.8.11	Met
11	**NMFCAPS**			
	NMFCAPS	Required	A.8.13	Met
12	**Information Assurance**			
	Information Assurance	Required	A.8.13	Met (See note 10.)

Table 3-2. Capability and Functional Requirements and Status (continued)

NOTES:

1. The annotation of 'required' refers to a high-level requirement category. The system under test does have to support conditional and optional requirements. However, if an optional or conditional capability is provided, it must function according to the specified requirements.
2. The SUT met the requirement for analog interface requirements with conditions (see Table 1).
3. The SUT was tested and certified for the Ethernet interface. The SUT does not support a serial interface.
4. The SUT does not support conditional telephony requirement. The audio manipulations requirements are associated with the telephony requirements; therefore, these requirements were not tested and are not included in this certification.
5. The SUT does not support conditional telephony requirement. The authentication and dial plan requirements are associated with the telephony requirements; therefore, these requirements were not tested and are not included in this certification.
6. The SUT was tested and certified for the Pass-through method. The SUT does not support conditional SIP DTMF tones or H.323 signaling; therefore, these conditional requirement are not covered under this certification.
7. The SUT does not support the conditional streaming RTP requirement. Therefore, the conditional requirements are not included in this certification.
8. The local configuration bridging requirements were successfully tested. The SUT does not support the telephony and stream bridging configurations; therefore, they were not tested and are not included in this certification.
9. The SUT does not support VoIP EIs. Therefore, the fail-safe mechanism to to prevent VoIP EI streaming continuous traffic requirement was not tested and is not included in this certification.
10. Information Assurance was verified by the vendor's LoC and testing conducted by the JITC-led Information Assurance test teams with the results published in a separate report, Reference (e).

LEGEND:

COR	Carrier Operated Relay
COS	Carrier Operated Switch
CR	Critical Requirement
DTMF	Dual-tone Multi Frequency
E&M	Ear and Mouth
EI	End Instrument
FR	Functional Requirement
IEEE	Institute of Electrical and Electronics Engineers
IP	Internet Protocol
JITC	Joint Interoperability Test Command
LoC	Letter of Compliance
MILSTD	Military Standard
NMFCAPS	Network Management Fault, Configuration, Accounting, Performance, and Security
PTT	Push to Talk
RTP	Real-time Transport Protocol
SIP	Session Initiation Protocol
SUT	System Under Test
UCR	Unified Capabilities Requirement
VAD	Voice Activity Detection
VNAR	Voice Net Access Radio
VoIP	Voice over IP

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

Product Identification			
Product Name	SyTech RIOS		
Software Release	Version 3.44		
UC Product Type(s)	Radio Gateway		
Product Description	Software application suite that allows intercommunication between two-way radios		
Product Components (See note 1.)	**Component Name (See note 2.)**	**Version**	**Remarks**
Radio InterOperability System (RIOS)	RIOS RM Radio Gateway	RIOS 3.44	includes 16 port IP Chassis
	RIOS TAC2 Radio Gateway	RIOS 3.44	includes 8 port USB Chassis
	VPN Server	Windows 2008 R2	Windows VPN
	CISCO ASA 5505 VPN	Cisco IOS 8.4	CISCO VPN
	TLS-based VPN	TLS 1.2	TLS-based VPN
I/O Modules	**RIOS Sixteen Channel I/O Module**	Not Applicable (The I/O modules don't have software or firmware)	The I/O module is included in the RIOS RM Radio Gateway (See note 3.)
	RIOS Eight-Port TAC2 I/O Module		The I/O module is included RIOS TAC2 Radio Gateway (See note 3.)
	RIOS One Port SuperRIB I/O Module		The I/O modules not bolded and underlined are certified by similarity. (See note 3.)
	RIOS Two Port (2) SuperRIB I/O Module		
	RIOS Six Port (6) SuperRIB I/O Module		

NOTES:
1. The detailed component and subcomponent list is provided in Enclosure 3.
2. The SUT was tested and certified with the Cisco ASA 5505 Virtual Private Network (VPN), the Windows 2008 R2 VPN server, and the TLS-based VPN.
3. I/O modules that are bolded and underlined were tested and are included in the certification. The remaining I/O modules are certified by similarity and are included in the certification. The modules certified by similarity are identical to the 16 chassis and the 8 port I/O module used in the test. The only difference is the number of available ports.

LEGEND:

APL	Approved Product List	TAC2	Tactical 2
I/O	Input/Output	TLS	Transport Layer Security
IP	Internet Protocol	UC	Unified Capabilities
JITC	Joint Interoperability Test Command	USB	Universal Serial Bus
RIOS	Radio Interoperability System	VPN	Virtual Private Network
SyTech	System Engineering Technologies		

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		
Juniper MX480	IOS 12.2R5.3	Network Switch
Cisco 2960	IOS 12.2(44)SE5	Network Switch
Cisco 4506	IOS 15.0 (2) SG5	Network Switch
Radio End Instruments		
ICOM	IC-F33GT	
ICOM	IC-F43GT	
ICOM	IC-T7H	
Harris	RF-5800M HH 104	
Motorola	XTS-3000R	
EF Johnson	5100	

LEGEND:
IOS Internetwork Operating System