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First Responders Group
National Urban Security Technology Laboratory
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Test Report
Conventional Fixed Station Interface for Legacy Base Station Equipment Operational Field Assessment

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National Urban Security Technology Laboratory

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Executive Summary

On November 14, 2013, the Department of Homeland Security's National Urban Security Technology Laboratory, operated by the DHS Science and Technology Directorate, conducted an operational field assessment (OFA) of the Conventional Fixed Station Interface (CFSI) for Legacy Base Station equipment prototype, developed by Christine Wireless Inc. The OFA was held at the Department of Interior (DOI) Radio Laboratory in Denver, Colorado. Federal, state, and local first responders and other stakeholders involved in radio communications systems participated in the OFA.

The CFSI is an aftermarket board that attaches to existing radio base station equipment to allow interconnectivity with new or different manufacturers' dispatch equipment. It is a communications interoperability solution based on the Telecommunications Industry Association (TIA) standard, TIA-102.BAHA. At the OFA, the CFSI successfully connected legacy base station equipment with four different dispatch consoles for audio, data, control, and other functions, as well as with external equipment for testing additional features. Test requirements were derived from planning, design, and grant documents.

The CFSI was tested against two different Motorola base radios and four different consoles. Fifteen different functional capabilities were tested per console. The CFSI performed remarkably well considering the various levels of compliance it needed to achieve with these devices. A few non-compliance issues were found, however. According to the subject matter experts at DOI, some of these non-compliance issues were with the console or the portable radio used for testing. After testing was able to identify some of the issues, the vendor was able to further troubleshoot them and provide solutions.

In summary, the participating first responders reacted positively to the CFSI. The representative for the U.S. Marshals Service was particularly impressed with the autonomous mode recently added, which went beyond the scope of work for the project. This mode allows for firmware to be updated remotely; voice, data, and control information to be sent and controlled over different Internet Protocol addresses; and Over-the-Air Rekeying and capabilities.

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1 Introduction

Interoperable communications among the first responder community is an ongoing challenge. During emergencies and disasters, the ability to exchange vital information saves property and lives. Current first responder radio equipment and networks are typically based on manufacturers' proprietary technology and are not compatible with other manufacturers' equipment. Recognizing this limitation, the public safety communications community and industry manufacturers, through a partnership called Project 25 (P25), developed public safety communications standards for interoperable digital two-way wireless products and systems to meet the needs of federal, state, and local government users. P25 defines eight standardized interfaces that address public safety land mobile radio networks. Thus, products compliant with standards for the applicable interfaces should be interoperable for voice and data communications with other P25-compliant products. It will be many years, however, before all of the existing equipment and infrastructure will be replaced or upgraded with interoperable equipment.

The technology evaluated during the operational field assessment (OFA) provides an incremental solution to the interoperability issue at one interface of a communication network—that is, the interface between fixed base station transceivers and dispatch consoles or other equipment. The specific standard relating to this interface is the Telecommunications Industry Association (TIA) open standard TIA102.BAHA.[1] The product, called CFSI for Legacy Base Station equipment, is an aftermarket board that provides a Voice over Internet Protocol interconnection of base station equipment to multi-vendor dispatch equipment. This board allows an emergency responder organization to keep its existing base station equipment and connect to new or different manufacturers' equipment. Because there are thousands of legacy base stations in use by federal, state, and local organizations that cost between $10,000 and $15,000 each to replace, the savings are significant.

In November 2011, the Department of Homeland Security (DHS) Science and Technology Directorate (S&T), through the Center for Commercialization of Advanced Technology (CCAT), awarded a contract to Christine Wireless Inc. (Christine Wireless) to demonstrate the feasibility of an aftermarket Conventional Fixed Station Interface (CFSI). On November 14, 2013, a prototype CFSI was tested at the Department of Interior (DOI) Radio Laboratory in Denver, Colorado.

1.1 Purpose

The purpose of the OFA was to evaluate a prototype CFSI as a solution for law enforcement and emergency response organizations with legacy base station equipment.

[1] TIA 102.BAHA: Project 25 Fixed Station Interface Messages and Procedures, defines a conventional fixed station interface between a conventional fixed station of a fixed station subsystem and a conventional fixed station host.

1.2 Objectives

The objectives of the OFA were to:

- Perform functional tests with the current CFSI for four different vendor dispatch consoles.
- Verify that two issues found during August 2012 testing were corrected (see DHS CFSI Project Concept Demonstration Test Report [1]).
- Evaluate features of the modified CFSI that were not available at the August 2012 test (see productization proposal [2] and Table 1).
- Collect feedback and comments from evaluators as to the CFSI's suitability for interoperable communication with legacy base station equipment.

1.3 Requirements Matrix

The TIA 102.BAHA standard defines the CFSI that provides transport of audio, control signaling, identifications, alerts, and other information between a fixed station subsystem and conventional fixed station host. The prototype CFSI was designed to meet this standard for interoperable communications between a base station and multi-vendor dispatch consoles. Table 1 summarizes the performance capabilities of the prototype. The DHS CFSI Project Concept Demonstration Test Report [1] outlines initial tests performed in August 2012. In September 2012, a productization proposal [2] outlined additional tasks required to improve the equipment's suitability for commercialization. These tasks were modified in a Project Change Proposal [3] on June 2, 2013.

Table 1 – CFSI Requirements Matrix

Capability/Description	Objective
Established Connection	A control user datagram protocol (UDP) connection will be established when the CFSI is connected to a dispatch console.
Voice Testing: Console to Portable Radio	Voice communication from the microphone of the dispatch console to the portable radio speaker is intelligible for individual, group, and encrypted (where supported) calls.
Voice Testing: Portable Radio to Console	Voice communication from the microphone of the portable radio to the dispatch console speaker is intelligible for individual, group, encrypted (where supported), and emergency calls.
Unit Control Functions	Radio check, call alert, radio status, radio inhibit, and radio un-inhibit functions initiated at the dispatch console are correctly indicated at the portable radio. Where applicable, the dispatch console shall receive the correct response for the function.
Remote Control Capability†	Operating modes and channels on the base station equipment can be changed from the dispatch console.
Analog Pulse Code Modulation (PCM) Mode†	Analog voice data will be successfully transmitted to and from the base station and dispatch console using the PCM mode.
Data Mode/Overthe-Air Rekeying (OTAR) Testing†	Data messages will be successfully transmitted and received over Internet Protocol (IP). Legacy base station equipment will be successfully connected in both directions for OTAR data messages.
Independent IP addresses for Control, Voice, and Data†	In anticipation of Version 2 of TIA-102.BAHA, the CFSI supports separate IP addresses for control, voice real-time protocol, and data messaging. This will be tested without the dispatch consoles, which do not support this feature.
Remote Firmware Update†	The CFSI firmware can be remotely updated using the IP connection.

† Denotes a feature not tested in the August 2012 prototype demonstration.

1.4 System Description

Christine Wireless developed the CFSI system. It consists of a prototype hardware unit and prototype firmware. The hardware is a single printed circuit board in aluminum housing (Figure 1), which converts from the manufacturer-unique V.24 synchronous serial data interface to the 100 Base-T Ethernet connection used by the IP network interface to the dispatch consoles.

Figure 1 – CFSI

Portable radios are used to communicate to and from the dispatch consoles through the CFSI for Legacy Base Station equipment. The CFSI will be connected via an Ethernet cable to the local area network, and thus to the dispatch console (directly/via a local network).

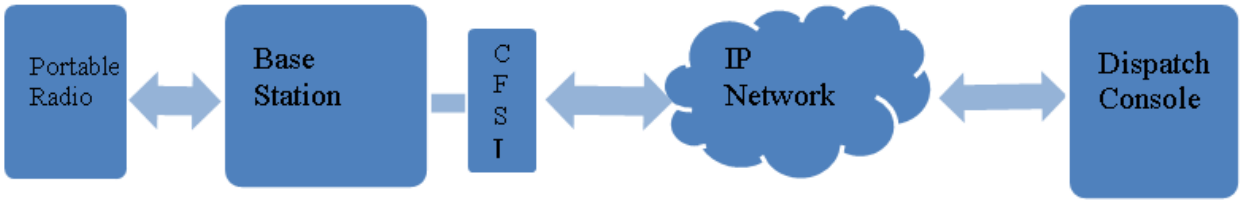

Figure 2 – Relationship among components

The CFSI connects to a base station by cable. Figure 3 and Figure 4 show the external connectors of the CFSI unit.

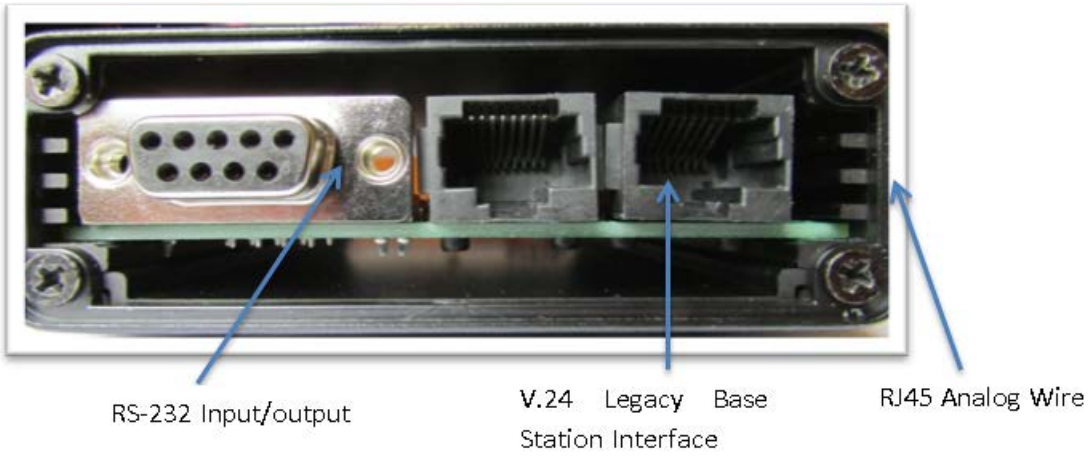

Figure 3 – CFSI external connections

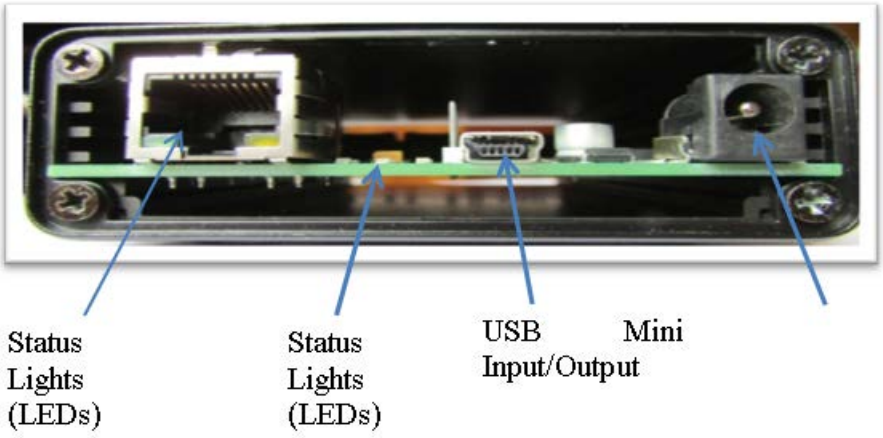

Figure 4 – CFSI external connections

The associated software and firmware of the CFSI provides an interface with particular base station equipment that allows the equipment to connect to a non-proprietary console in accordance with TIA Standard Project 25 Fixed Station Interface Messages and Procedures (TIA-102.BAHA).

2 Test Design

This section discusses the details of the test, including the initial overall design and deviations from the test plan. For a full set of procedures and further detail, please see the "Conventional Fixed Station Interface for Legacy Base Station Equipment Operational Field Assessment Plan". Testing was comprised of functionally testing the CFSI with dispatch consoles from four different manufacturers, testing additional features with other equipment, and collecting user feedback.

2.1 Functional Tests with Dispatch Consoles

With the CFSI connected to a legacy base station, voice and radio control messages were tested for four different dispatch consoles. Correction of two deficiencies identified in the September 2012 Project Concept Demonstration [1] were verified. These were:

1. The CFSI prototype did not automatically re-establish the Control UDP connection when switching between different consoles and had to be power-cycled to re-establish the connection when tested with all three consoles.
2. An audible chirp occurred at the start of inbound (to the console) encrypted communications when tested with Modular Communication Systems Inc. (ModUcom) and Avtec consoles. This was believed to be due to a problem with the format of Project 25 Header Data Units 1 and 2 that caused the dispatch console to miss the initial encryption synchronization information contained therein. The result was a "Late Entry" for the encrypted communication producing 360 milliseconds of audible chirping.

2.1.1 Autonomous Mode

Some features could not be tested using the dispatch consoles, namely, demonstrating the remote firmware update and the capability to route voice, data, and control information to different IP addresses. In these cases, additional equipment was used to establish the conditions needed for testing. The remote firmware update required a PC with a Web browser to connect to the CFSI via IP and to upload firmware and associated authentication files to the CFSI.

To date, no commercially available dispatch console incorporates the IP communication features that are outlined in the projected standard TIA-102.BAHA-A.[2] As a result, several of the features were tested using firmware incorporated into the CFSI that allows the CFSI to act autonomously without a dispatch console. This autonomous mode also permitted the IP interconnection of multiple base stations for voice, radio control, and data without requiring a dispatch console. The autonomous mode allows voice and data from one base station to be routed via IP to two different CFSI/base stations at different IP addresses.

The autonomous node capability to communicate with the base station for data messages has permitted the development of an OTAR capability in a Tactical Key Management Device (TKMD). This capability combines CFSI firmware with OTAR firmware, also developed by Christine Wireless. The TKMD uses the same hardware platform as the CFSI aside from the addition of a key fill connector.

2.1.2 Deviations from the Test Plan

There were no deviations from the test plan.

[2] Efforts are underway in the Association of Public-Safety Communications Officials Project 25 Interface Committee Fixed Station Interface Task Group to combine two draft documents [6, 7] and forward the consolidated document to the TIA Fixed Station Interface Committee (TR-8.19) for consideration and publication as TIA 102-BAHA-A.

2.1.3 Summary of Events

Prior to the assessment, Christine Wireless and DOI personnel prepared the equipment. The base station and portable radios were programmed to frequencies currently in use at the DOI Radio Lab, and the CFSI prototype was programmed to use IP address and port numbers matching those of the dispatch consoles in use at the DOI Radio Lab.

On November 13, 2013, Test Director Bhargav Patel (DHS S&T), Program Manager Christine Lee (DHS S&T), Richard Brockway (Christine Wireless), Noel Newberg (DOI), Ken Monington (DOI), Dr. Yacine Dalichaouch (CCAT), James Burack (Milliken [Colorado] Police Department), Christopher Siebert (U.S. Marshals Service), Mike Kionka (Radio Communications, State of Colorado), Todd Simkins (Federal Protective Service), and Glenn Cascino (DOI) convened at the DOI Radio Laboratory in Denver, Colorado. Christine Lee and Bhargav Patel briefed the group and explained the OFA goals and objectives. Richard Brockway then explained the technical background and overview of the prototype to be tested.
Richard Brockway, Ken Monington, and Noel Newberg set up the CFSI with the Motorola Quantar base station radio, and the Avtec dispatch console using a Thales portable radio. This was the first dispatch console to be tested among the four consoles that were evaluated. The functional checklist (Table 3) was used to assess the compatibility and functionality of the CFSI with the dispatch consoles. A few issues were noted:
Console Issue: The Avtec console does not properly support sending encrypted messages. As explained by Richard Brockway and Ken Monington, the Avtec console is unable to read the initial zero signals sent by the CFSI and thus cannot properly enable encrypted communications.
Radio Status Check Issue: Testers were unable to conduct a radio status check. This issue was specific to the portable Thales radio being used and was consistent across consoles.
The Bosch, ModUcom, and Zetron consoles all tested against the Motorola Quantar. This round of testing was repeated using the Motorola GTR 8000 Base Radio as well. The full results can be found in section 4.

Figure 5 – ModUcom console display

The CFSI units were set up in a daisy chain (such that they were connected to each other; see Figure

1Figure 6) arrangement to test the newly added autonomous mode functions that had been added beyond the scope of the project. One of the key features of this mode is the ability to remotely update the firmware to legacy base station radios. Oftentimes the radio base stations are at secluded remote environments (e.g., mountain tops), which allows for new software to be pushed to the radios without the need to physically drive to them. Another functionality that this update provides is OTAR, which is a method of changing or updating encryption keys over the radio channel. The results can be found in section 4.

Figure 6 – Autonomous mode setup

3 Data Analysis

This section includes data collection methods, forms, and methods of analysis. Data was collected using the surveys listed, as well as through notes taken by the test director and data collector.

3.1 Functional Tests with Dispatch Consoles

Table 2 describes details of the equipment used for the functional tests. Table 3 was used to record the functional testing with dispatch consoles (results in section 4). During the OFA, a separate checklist was used for each dispatch console. Results are consolidated in Table 2. Items were rated on a pass/fail basis (P=pass/F=fail). Additional notes recorded by the test director and data collector are discussed in section 4.

Table 2 – Test Equipment

Item	Manufacturer	Model Name/Version
CFSI Unit	Christine Wireless	Firmware Version
Base Station 1	Motorola	Quantar
Base Station 2	Motorola	Quantar
Base Station 3	Motorola	GTR 8000
Dispatch Console 1	Avtec	Scout
Dispatch Console 2	Bosch	C-Soft
Dispatch Console 3	ModUcom	Ultra-Com
Dispatch Console 4	Zetron	Max
Portable Radio 1	Thales	

Table 3 – Functional Tests with Dispatch Consoles

	Question	Additional Information	Avtec (P/F)	Bosch (P/F)	ModUcom (P/F)	Zetron (P/F)	Notes
1	Connection Established Confirm connection without power cycling						
2	Talk Group Call Unencrypted (Voice)	Dispatch Console to/from Portable Radio					
3	Individual Call Unencrypted (Voice)	Dispatch Console to/from Portable Radio					
4	Talk Group Call Data Encryption Standard (DES)	Dispatch Console to/from Portable					

	Question	Additional Information	Avtec (P/F)	Bosch (P/F)	ModUcom (P/F)	Zetron (P/F)	Notes
	Encrypted Confirm absence of audible chirp	Radio					
5	Individual Call DES Encrypted Confirm absence of audible chirp	Dispatch Console to/from Portable Radio					
6	Talk Group Call Advanced Encryption Standard (AES) Encrypted Confirm absence of audible chirp	Dispatch Console to/from Portable Radio					
7	Individual Call AES Encrypted Confirm absence of audible chirp	Dispatch Console to/from Portable Radio					
8	Radio Check						
9	Call Alert						
10	Radio Status						
11	Radio Inhibit						
12	Radio Un-Inhibit						
13	Emergency Alert						

	Question	Additional Information	Avtec (P/F)	Bosch (P/F)	ModUcom (P/F)	Zetron (P/F)	Notes
14	Remote Control	Channel; repeater; monitor function					
15	Analog PCM	Dispatch Console to/from Base Station					

3.2 Autonomous Mode

Table 4 was used to record the results of features that do not require the use of dispatch consoles (results in section 4). Items were rated on a pass/fail basis (P=pass/F=fail).

Table 4 – Autonomous Mode Test

No.	Question	Additional Information	P/F	Notes
16	Independent IP Addresses	Control		
		Voice		
		Data		
17	Data/OTAR	Data Messages		
		OTAR Messages		
		OTAR/TKMD		
18	Remote Firmware Update			

3.3 User Input

During the assessment, comments and feedback were captured as to overall impressions of the CFSI and its suitability and ease of use for law enforcement and emergency responder organizations. In general, the participants felt that the CFSI would be a major benefit to them. It would reduce the need to purchase and update already expensive equipment. Additionally, the new autonomous features look to positively alter communication maintenance procedures. The U.S. Marshals Service expressed a deep interest in seeing this project move forward and being able to field test the CFSI prior to commercialization. The feedback from the U.S. Marshals Service involved additional developments to the autonomous feature. The ability to add a secured (https:// and SSL) connection to the Web interface was an issue of importance. Another

desired feature was the ability to multicast, or send out information to multiple groups/destinations. This feature could allow the proper flow of information from a tactical resource in the field back to headquarters, add additional dispatch resources, or tie in additional repeaters. Additionally, a simple network management protocol is also highly desirable to better manage the added functions provided by the autonomous features.

Prior to this OFA, external parties evaluated successive iterations of the CFSI prototype. Several dispatch console, system integration, and radio manufacturing companies, as well as several U.S. government organizations[3] were provided with prototype CFSI units beginning in May 2013. Issues they identified were corrected in the version of the CFSI used for the OFA.

4 Results

This section discusses the results of testing. It includes observations made by participants and the test team, feedback from participants about the system's operational suitability, documentation provided by the vendor, and an analysis of the how the system met the requirements. The results of this section are not an endorsement or rejection of the product or vendor. The goal is to provide an objective understanding of the system's performance and capabilities.

4.1 Functional Check List Results

Table 5 – Functional Test for the Motorola Quantar Radio

Motorola Quantar Radio		Console			
No.	Question	Avtec	Bosch	ModUcom	Zetron
1	Connection Established Confirm connection without power cycling				
2	Talk Group Call Unencrypted (Voice)				
3	Individual Call Unencrypted (Voice)				
4	Talk Group Call DES Encrypted Confirm absence of audible chirp	Issue with Avtec console. It does not read initial zeroes and thus experiences issues with	Issue with Bosch console. Does not support encryption.		
5	Individual Call DES Encrypted Confirm absence of				Console does not support

[3] A list of participating organizations can be found in the Monthly Status Report – Productization of the Conventional Fixed Station Interface (CFSI) for Legacy Base Station Equipment, July 1, 2013 – July 31, 2013 [5].

Motorola Quantar Radio		Console			
No.	**Question**	**Avtec**	**Bosch**	**ModUcom**	**Zetron**
	audible chirp	encrypted communications.			encrypted individual talk
6	Talk Group Call AES Encrypted Confirm absence of audible chirp			Pass	[Pass; Fail] - Failed from console to radio
7	Individual Call AES Encrypted Confirm absence of audible chirp			Pass	Console does not support this function
8	Radio Check	Pass	Pass	Pass	
9	Call Alert	Pass	Pass	Pass	
10	Radio Status	N/A (limitation is due to Thales radios)	N/A (limitation is due to Thales radios)	N/A (limitation is due to Thales radios)	
11	Radio Inhibit	Pass	Pass	Pass	
12	Radio Un-inhibit	Pass	Pass	Pass	
13	Emergency Alert	Pass	Pass	Pass	
14	Remote Control [Channel; Repeater; Monitor Function]	[Pass; Pass; N/A] Console does not support monitor function	[Pass; Pass; Pass]	[N/A; Fail; Fail]	
15	Analog PCM [Dispatch Console to/from Base Station]	Pass; Pass – Had to reboot for base station to console to work	Pass; Pass	[Pass; Fail] – Console to radio failed	

Table 6 – Functional Test for Motorola GTR 8000 Radio

Motorola GTR 8000 Radio		Console			
No.	**Question**	**Avtec**	**Bosch**	**ModUcom**	**Zetron**
1	Connection Established Confirm connection without power cycling	Pass	Pass	Pass	Pass
2	Talk Group Call Unencrypted (Voice)	Pass	Pass	Pass	Pass
3	Individual Call Unencrypted (Voice)	Pass	Pass	Pass	[Pass; N/A] – Console to radio does not work (due to console issue)
4	Talk Group Call DES Encrypted Confirm absence of audible chirp	Issue with Avtec console. It does not read initial zeroes and thus experiences issues with encrypted communications.	Issue with Bosch console. Does not support encryption.	Pass	[Pass; N/A] – Console to radio does not work (due to console issue)
5	Individual Call DES Encrypted Confirm absence of audible chirp			Pass	[Pass; N/A] – Console to radio does not work (due to console issue)
6	Talk Group Call AES Encrypted Confirm absence of audible chirp			Pass	[Pass; N/A] – Console to radio does not work (due to console issue)
7	Individual Call AES Encrypted Confirm absence of			Pass	[Pass; N/A] – Console to radio does

Motorola GTR 8000 Radio		Console			
No.	**Question**	**Avtec**	**Bosch**	**ModUcom**	**Zetron**
	audible chirp				not work (due to console issue)
8	Radio Check	Pass	Pass	Pass	Console does not support this function
9	Call Alert	Pass	Pass	Pass	
10	Radio Status	N/A (limitation is due to Thales radios)	N/A (limitation is due to Thales radios)	N/A (limitation is due to Thales radios)	
11	Radio Inhibit	Pass	Pass	Pass	
12	Radio Un-inhibit	Pass	Pass	Pass	
13	Emergency Alert	Pass	Pass	Pass	
14	Remote Control [Channel; Repeater; Monitor Function]	[Pass; Pass; N/A] Console does not support monitor function	[Pass; Pass; Pass]	[N/A; Pass; Pass]	
15	Analog PCM [Dispatch Console to/from Base Station]	[Pass; Fail] – Console to radio failed	Pass;Pass	[Pass; Fail] – Console to radio failed	

Given the time limitations of the OFA, the team was unable to troubleshoot reported issues to explore the root causes. After testing was completed, however, Christine Wireless attempted to investigate some of the issues experienced. These included:

1. The inability to operate in the analog PCM mode from the portable radio to the Zetron console;
2. The Zetron console's inability to operate in an encrypted digital voice mode, particularly from the console to a portable radio; and
3. The Avtec console's inability to operate in an encrypted digital voice mode.

When examining the analog PCM issue with the Zetron console, Christine Wireless found that the Zetron console requires the use of "Wildcard tables" instead of the normal default settings that work with other consoles. Changing this interface setting allows for the Zetron to function and for other consoles to operate without issue. Christine Wireless was also able to solve the issue with encrypted communications using the Zetron console. This console configuration issue was remedied by changing the default encryption channels from a varied setting to a single encryption channel for the Zetron console.

The Avtec console was unable to operate in an encrypted digital voice mode. Christine Wireless discovered that this was an oversight in changing an important keyset number in the console's configuration. After the keyset was updated, the Avtec console was able to operate in an encrypted digital voice mode.

4.2 Autonomous Mode Results

Table 7 displays the results of the autonomous mode tests that were conducted. This functionality was not part of the original requirement. The autonomous mode passed all basic function checks using the Motorola Quantar base station radio.

Table 7 – Autonomous Mode Function Test

No.	Question	Additional Information	P/F	Notes
16	Independent IP addresses	Control	P	
		Voice	P	
		Data	P	
17	Data/OTAR	Data Messages	P	Client configuration screen, key type, name, etc.
		OTAR Messages	P	Sent warm start key
		OTAR/TKMD	P	DES Key, Inventory, Key Summary
18	Remote Firmware Update		P	Hex File + .mdn file required

4.3 Requirements Compliance

As stated earlier, requirements were added as the program progressed. Table 8 shows that the prototype system under test complied with the documented requirements. Not every console was able to achieve 100 percent compliance on all capabilities due primarily to console settings, not the CFSI; caveats are denoted with an asterisk.

Table 8 – Requirements Compliance Matrix

Capability/Description	Objective	Compliance
Establish Connection	A control UDP connection will be established when the CFSI is connected to a Dispatch Console.	Complied
Voice Testing: Console to Portable Radio	Voice communication from the microphone of the Dispatch Console to the portable radio speaker is intelligible for individual, group, and encrypted (where supported) calls.	Complied*
Voice Testing: Portable Radio to Console	Voice communication from the microphone of the portable radio to the Dispatch Console speaker is intelligible for individual, group, encrypted (where supported), and emergency calls.	Complied*

Capability/Description	Objective	Compliance
Unit Control Functions	Radio Check, Call Alert, Radio Status, Radio Inhibit and Un-Inhibit functions initiated at the Dispatch Console are correctly indicated at the portable radio. Where applicable, the Dispatch Console shall receive the correct response for the function.	Complied*
Remote Control Capability†	Operating modes and channels on the Base Station equipment can be changed from the Dispatch Console.	Complied*
Analog PCM mode†	Analog voice data will be successfully transmitted to and from the Base Station and Dispatch Console using the PCM mode.	Complied*
Data Mode/OTAR Testing†	Data messages will be successfully transmitted and received over IP. Legacy Base Station equipment will be successfully connected in both directions for OTAR data messages.	Complied
Independent IP addresses for Control, Voice, and Data†	In anticipation of Version 2 of TIA-102.BAHA, the CFSI supports separate IP addresses for control, voice real-time protocol, and data messaging. This will be tested without the Dispatch Consoles, which do not support this feature.	Complied
Remote Firmware Update†	The CFSI firmware can be remotely updated using the IP connection.	Complied

† Denotes a feature not tested in the August 2012 prototype demonstration.

* See results section for greater detail.

5 References

[1] Department of Homeland Security Conventional Fixed Station Interface Project Concept Demonstration Test Report (DHS, September 5, 2012)
[2] Proposal for: Conventional Fixed Station Interface (CFSI) for Legacy Base Station Equipment Productization (Christine Wireless Inc., Revised September 6, 2012)
[3] Project Change Proposal (Christine Wireless Inc., June 2, 2013)
[4] Conventional Fixed Station Interface (CFSI) for Legacy Base Station Equipment General Information, (Christine Wireless Inc., May 17, 2013)
[5] Monthly Status Report – Productization of the Conventional Fixed Station Interface (CFSI) For Legacy Base Station Equipment (July 1, 2013 – July 31, 2013) (Christine Wireless Inc, August 1, 2013.)
[6] Draft TIA-102.BAHA-A Fixed Station Interface Messages and Procedures (13-017 Fixed station interface Messages and Procedures Revised without Packet Data)
[7] Fixed station interface Packet Data Service (Issue F) 13-020 Fixed Station Interface Task Group

Please contact Christine.lee@hq.dhs.gov for access to documents 1 through 5.

Please contact Fixed Station Interface Task Group chairperson Randy Richmond rrichmond@zetron.com for access to documents 6 and 7.

6 Acronym List

AES	Advanced Encryption Standard
CCAT	Center for Commercialization of Advanced Technology
CFSI	Conventional Fixed Station Interface
DES	Data Encryption Standard
DHS	Department of Homeland Security
DOI	Department of Interior
IP	Internet Protocol
OFA	Operational Field Assessment
OTAR	Over-the-Air Rekeying
P25	Project 25
PCM	Pulse Code Modulation
S&T	Science and Technology Directorate
TIA	Telecommunications Industry Association
TKMD	Tactical Key Management Device
UDP	User Datagram Protocol