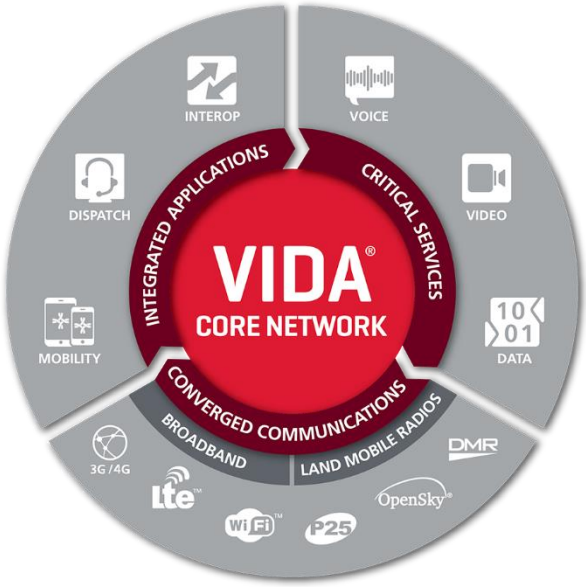
Exhibit A – Statement of Work

Table of Contents

System Description

Overview

Harris Corporation, Communications Systems Division (Harris) is proud to offer the City of Broken Arrow, Oklahoma a Land Mobile Radio (LMR) solution that meets the City's requirements and an upgrade to the Broken Arrow Communications Regional Network (Broken Arrow). As a 1-site, 800 MHz, P25^{IP} Phase 2 addition to the existing Broken Arrow Network, Broken Arrow will enjoy the power of VIDA – Voice, Interoperability and Data Access, and the SR10A.3 upgrade will improve functionality of the network. The Harris VIDA core at Broken Arrow makes use of a unified network architecture that provides one unified IP network, controlled from multiple locations by individual servers.



Broken Arrow has unique needs for communications system equipment and Harris has taken the time to address those needs with the customized solution presented here. The engineered design further leverages Broken Arrow's investment in the Harris VIDA solution.

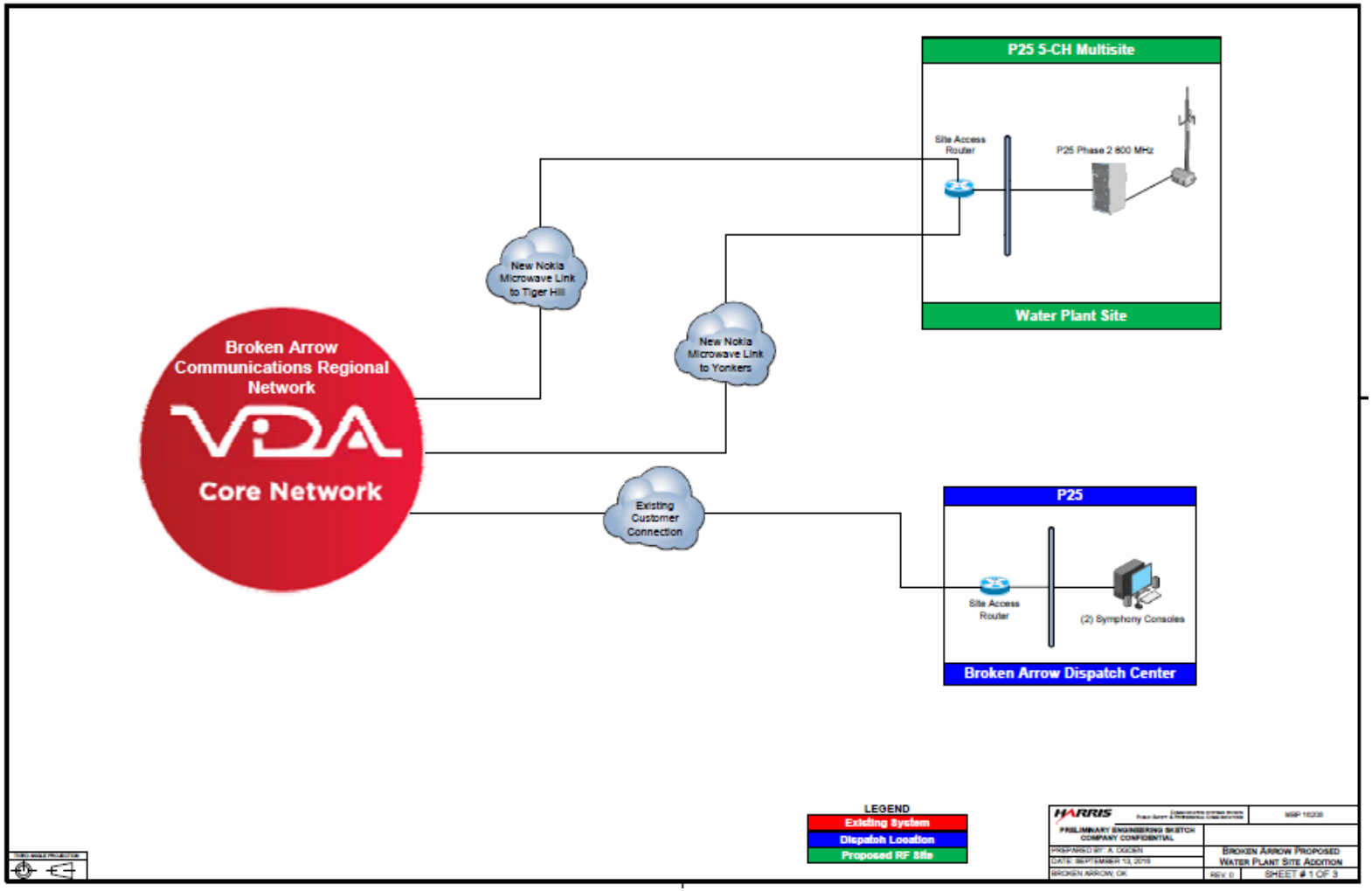
The solution for Broken Arrow includes Harris' P25 compliant MASTR V trunked base station, next generation Symphony Console, portable radios, mobile radios, new primary core, new secondary core, and upgraded site equipment.

The Harris Advantage

With the Harris design, the City of Broken Arrow will gain the following capabilities:

- **Project 25 (P25) Phase 2 –** The P25 base stations (MASTR V), as well as the portable and mobile radios, are P25 Phase 2 ready today.
- **Stability -** Moving to a platform with the latest hardware and software available to ensure system stability and compatibility with new software being released.
- **Availability** - Availability of new system features that are currently not available on the existing platform.
- **Expandable –** The scalability of the P25 equipment allows Broken Arrow to meet emerging needs. The system architecture can easily expand to accommodate additional users, enhance coverage and features as the City's needs change in a cost-effective manner.

Figure 1. Water Plant System Block Diagram



Harris SR10A.3 Upgrade

Harris evaluated the existing Broken Arrow system, and recommends replacing the primary and secondary cores to refresh the underlying hardware platform and provide for a smooth upgrade with minimal disruption to the users. This upgrade provides the City the following benefits:

- Moving to a platform with the latest hardware available to ensure system stability and compatibility with the SR10A.3 software release and extending the lifetime of the system cores
- Availability of new system features not currently available on the existing platform, including:
  - Support for new versions of VMWare and RHEL (Red Hat Linux)
  - New CISCO Routers (ISR 4K) (included with the new core equipment)
  - Radio Unit Monitor (RUM) which allows the dispatcher to listen to a subscriber's surroundings without the user having to key the radio
  - Dispatcher can initiate a Group or Individual Call based RUM session
  - Radio Check which allows the dispatcher to 'ping' a radio to determine if it is registered on the system
  - KMF Support for LTE Devices which allows Over-the-Air Rekeying of the XL-200P over both Wi-Fi and LTE
  - ISSI Auto Roaming Support which adds the ISSI messaging which passes Site Adjacency messages between the connected systems
- A step by step plan that limits downtime and fully tests all equipment to ensure operation

Step 1 – Complete Pre-Upgrade Checklist and System Health Audit

Any upgrade should begin with a complete audit of the existing system to verify all known devices, and their current software revision levels. The system audit confirms that specific software revisions will be compatible with the new core hardware.

Harris will set up a planning meeting to outline the details of the system audit, including timelines and location scheduling. The audit will include all equipment locations, and will result in identification of any necessary replacement hardware. For example, if any Network Sentry Generation 1 or Generation 2 devices still exist, they require upgrade to Network Sentry Generation 4 (CM21874-4000) on Windows 10 (R5B01).

The goal of the system audit is to establish a performance and functional baseline of the existing system. Harris will review RNM alarm logs, any outstanding TAC tickets, and discuss any outstanding punch list items and document all open issues that the system release update will resolve, including tests plans. In addition to the audit, Harris will back up all current system settings, and network configurations.

As system updates progress, there may be some communication impact during each upgrade window, depending on the devices. Harris will provide recommendations for outage windows and work collaboratively with Broken Arrow to schedule them to minimize disruption to the users during the upgrade process.

Step 2 – Perform Network Upgrades

Harris will replace all primary and secondary core equipment with SR10A.3 compliant equipment. Any Cisco routers that are 1900, 2900, or 3000 series are compatible and don't require replacement. If a router or switch device is not compatible with the SR10A.3 system release, Harris will notify the City of the device's location, and identify the unit cost to replace.

The SR10A.3 upgrade will continue to use the same IP scheme currently in place. The next step is to upgrade the Site Routers operating system (IOS) and configurations, and verify connectivity between RF sites and NSCs. We will then upgrade dispatch site router's IOS and network configurations. Harris assumes that all network equipment has current coverage for IOS updates. If not, those updates can be quoted from Cisco at a later date.

Step 3 – Burn-In and Functional Assessment of Network Changes

At this point, the network upgrade is complete and Harris will verify system performance before moving forward with the next step of the overall upgrade process. We will perform Functional testing, as well as network performance testing to confirm normal operation. This configuration will operate for a few days to ensure burn-in is complete and no known issues exist.

Step 4 – Perform NSC-Core Replacement

The Primary NSC at Public Safety Complex Center (PSCC) will be isolated from the rest of the system during its replacement. This means that when the new primary NSC initially goes into service, it will not have a database of currently registered radios and their selected talkgroups. Special procedures are required to re-establish radio registrations on the SR10A.3 voice switch. This is only required during the first cutover from the old backup NSC at Tiger Hill to the new NSC at PSCC. The SR10A.3 NSC at PSCC will sync registration information with the SR10A.3 NSC at Tiger Hill once it has been upgraded.

Harris explored multiple methods to reliably ensure radio registration completes during the upgrade. Harris recommends a tiered approach to forcing radio registrations.

- Tier 1
  - Force more frequent registrations with reduced system registration timer (every 30 min).
  - Seven hours before cutover, reduce this timer from 360 min to 30 min on the NSC at Tiger Hill.
- Tier 2
  - Create critical talk-group demand on sites with virtual users (identify critical groups and define virtual users to create automatic demand for those groups).
  - Four hours before cutover, update station personalities to include virtual user information (up to 80 critical virtual user talk-groups).
- Tier 3
  - Schedule the outage and inform users on expected behaviors, and when to power cycle the radio.
  - One hour before cutover, inform users through dispatch calls, system all calls, or at roll call meetings. Power cycle the radios.

Harris radios are optimized to limit network traffic and don't re-register if they SCAN to, or PTT on, the same site they were on prior to going into CC Scan.

Harris will perform a pre-upgrade coordination meeting and work with Broken Arrow to schedule the quiet time for performing the NSC cutover at PSCC. This should occur at a time to avoid high traffic needs for each agency. Harris will work with Broken Arrow agencies to determine which critical talk-groups will need to create demand at sites with virtual users. Harris will also help Broken Arrow prepare a communication plan for alerting users.

When the core replacement is ready to begin, Harris will failover to the NSC at Tiger Hill, and verify that sites and dispatch are operating on the backup core. Harris will replace the NSC core at PSCC and migrate the database. When complete, Harris will failover to the upgraded NSC at PSCC. This is when the forced registration needs to occur on all P25 radios. Harris will verify call functionality on the upgraded core before proceeding. Once verified, Harris will restore all windows machines to the new AD domain, and then perform the core replacement at Tiger Hill.

Step 5 – Burn-In and Functional Assessment of NSC Performance

At this point, the core equipment upgrade is complete, and Harris will verify system performance before moving forward with the next step of the upgrade process. We will perform Functional testing, including verification that site and dispatch calls are operating normally. The system will operate normally for a couple days to ensure normal operation before proceeding to the next step in the process.

Step 6 – Perform LMR Site Upgrades

The Broken Arrow system has a total of five P25 sites in operation across the metropolitan area that will need upgraded.

- Tiger Hill (City of Broken Arrow)
- Coweta (Wagoner County)
- Courthouse (Wagoner County)
- Yonkers (Wagoner County)
- Leonard (City of Bixby)

The P25 sites for the City of Jenks and City of Glenpool will have their revisions of code evaluated and it will be determined if an upgrade is required.

Harris will upgrade the sites one at a time, with an agreed to schedule with the Broken Arrow agencies. For an individual site, Harris will split the channels into two banks by disabling a subset of channels. Harris will work with each agency on the outage time for each site, and backup operations during that outage. The upgrade consists of software updates to the traffic controller and baseband module. Once we upgrade the channels, we configure them with an invalid WACN ID and verify local repeat functionality. Harris will then replace the Network Sentry and upgrade the MME (if applicable).

The remaining channels are disabled, and the upgraded channels enabled with the original WACN restored. We will then update the remaining traffic controllers and baseband modules. Once complete, Harris will verify functionality. Each agency can schedule the site upgrades to minimize disruptions to its users.

Step 7 – Burn-In and Functional Assessment of System Performance

Harris verifies system performance before moving forward with the next step of the upgrade process. We will perform Functional testing, including verification that site and dispatch calls are operating normally. The system will operate normally for a couple days to ensure normal operation before proceeding to the next step in the process.

Step 8 – Perform Console Upgrades and Verify

Each agency on the Broken Arrow system has dispatch consoles in operation. From our documentation, the following locations have operating dispatch consoles:

- Broken Arrow dispatch (4 Symphony Consoles/2 C3 Maestro^{IP} Consoles)
- Bixby Police Dispatch (2 C3 Maestro^{IP} Consoles)
- Wagoner County Dispatch (3 C3 Maestro^{IP} Consoles)
- City of Wagoner Dispatch (1 Symphony Consoles)
- Jenks Dispatch (2 Symphony Consoles)
- City of Glenpool Dispatch (2 C3 Maestro^{IP} Consoles)

Harris will schedule dispatch center upgrades around each agency's schedule, identifying the outage times that have the least impact on operations. Once the dispatch center is upgraded, we will perform Functional testing, including verification that site and dispatch calls are operating normally.

Step 9 – Identify Release Issues, Enter TRs, Track Resolution

Once all upgrades complete, Harris will perform the mutually agreed upon test procedure to verify system operation. We will document any release issues on an action item log, and Harris personnel will enter appropriate trouble tickets, and track the resolution on these devices.

Step 10 – Customer Acceptance

After resolution of all issues, the City will issue written documentation that outlines acceptance of the SR10A.3 upgrade.

Water Plant Equipment

Harris will provide Broken Arrow communications equipment to build a 1-site, 5-channel, 800 MHz P25 Phase 2 System utilizing the existing geographically-redundant VIDA Core at Broken Arrow. The system block diagram is shown in Figure 1 on page 2. In addition, Harris included two new Symphony IP Consoles, as well as a variety of mobiles and portables. All system components under this contract are new, including the antenna equipment.

Water Plant Site System Components

Harris is including:

- VIDA Core Licenses to accommodate the new equipment on the existing Broken Arrow VIDA Core
- One, 5-Channel 800 MHz P25 Phase 2 site (MASTR V)
- Two, next-generation Symphony IP Dispatch Consoles
- Subscriber devices, including:
  - Portables – (50) XL-200P VHF, UHF, 7/800
    - In-band GPS
    - P25 Over-The-Air-Rekeying (OTAR)
    - P25 Phase 2 TMDA
    - 256-AES, 64-DES Encryption
    - P25 Data
    - P25 Trunking
    - LTE
    - Li-Ion Battery
    - Flex Helical Antenna 136-876 MHz
    - Speaker Microphone, Emergency Button

- Belt Clip
- One Bay Charger

- Portables – (110) XL-200P VHF, UHF, 7/800
  - In-band GPS
  - P25 Over-The-Air-Rekeying (OTAR)
  - P25 Phase 2 TMDA
  - 256-AES, 64-DES Encryption
  - P25 Data
  - P25 Trunking
  - Li-Ion Battery
  - Flex Helical Antenna 136-876 MHz
  - Speaker Microphone, Emergency Button
  - Belt Clip
  - One Bay Charger

- Portables – (82) XL-200P VHF, UHF, 7/800
  - In-band GPS
  - P25 Over-The-Air-Rekeying (OTAR)
  - P25 Phase 2 TMDA
  - 256-AES, 64-DES Encryption
  - P25 Data
  - P25 Trunking
  - Large Fire knob kit
  - Li-Ion Battery
  - Flex Helical Antenna 136-876 MHz
  - Speaker Microphone, Premium Fire NC
  - Belt Clip

- Portables – (5) XG-25P Scan Portables, 7/800 MHz
  - P25 Trunking
  - Phase 2
  - AES Encryption with Over-the-Air-Rekeying (OTAR)
  - Li-Polymer Battery
  - ½ - Wave Antenna
  - Speaker Microphone with Earpiece

- Belt Clip
- One-bay, tri-chemistry charger

- Additional Portable Accessories
  - (9) Six-bay charger
- Mobiles – (3) XG-25M Scan Mobile, 7/800 MHz
  - P25 Trunking
  - Phase 2
  - AES Encryption with OTAR
  - Remote Mount Control Unit
  - Microphone
  - Standard Roof Mount Antenna
- Services including staging and shipping

Site Specific Equipment

Water Plant Site

The following RF site equipment will install at this location:

- (5) 800 MHz MASTR V Phase 2 channels
- (1) Combiner – model number DSCC85
- (1) Multicoupler – model number CP00918
- (1) Tower top amplifier – model number CP00732
- (1) 800 MHz transmit antenna – model number DS7C08F36U
- (1) 800 MHz receive antenna – model number DS7C10F36U
- Coax, cables, and connectors associated with antenna system
- Site Access Router

Dispatch Center

- (2) Symphony IP Dispatch Consoles, Premier Bundle
  - Windows 8 Symphony PC Application
  - Premier Bundle Includes:
    - Local Full Screen
    - Local Baton Software
    - Remote Baton Software
    - I-Call

  - Call Director
  - (16) Patch Definitions, (8) Patch Activations
  - (16) Simulselect Definitions
  - (12) Flexpaths
  - (4) Speaker Licenses
  - (4) User Setups
  - (16) Workspace Tabs
- AES/DES Encryption
- (2) Additional Patch Definitions and (1) Additional Patch Activation
- (2) Additional Simulcast Definitions
- (2) Additional User Setups/Screens
- Paging Capability
- Remote Aux I/O
- Marker Tone
- Call Alert
- (4) Speakers
- Footswitch

Backhaul

For the Harris radio equipment, an additional minimum bandwidth equivalency of (2) T1 links, is required between the Core and the Water Plant transmitter site, and between the Core and the dispatch center. Broken Arrow is to provide this additional bandwidth. The following sections describe the required specifications for this connectivity.

WAN Connectivity Requirements

To guarantee the quality of voice through the VIDA network, all WAN links will need to strictly adhere to the following requirements. All of these requirements are necessary to provide a guaranteed level of service for voice. Failure to adhere to these requirements could result in poor audio for which Harris is not accountable.

Packet Loss

Due to the connectionless nature of UDP, and thus voice packets, minimal packet loss is tolerable in the VIDA network but could result in degraded voice quality or loss of voice. Harris is not responsible for degraded voice quality that comes from the result of packet loss in the customer provided transport network.

Latency

Latency within the system will need to stay constant to avoid jitter. For standard implementations, latency should be less than 150 msec.

Jitter

Overall jitter will average 0 and never build up to more than 60 msec. Streams with excessive jitter will result in packet loss and Harris is not be responsible for voice quality issues due to excess jitter in the customer provided transport network.

Layer 2 Quality of Service Requirements

If Layer 2 WAN services are being provided, the layer 2 WAN should map our layer 3 DSCP markings into the appropriate layer 2 queues that meet the layer 3 requirements.

Layer 3 Quality of Service Requirements

At OSI Layer 3, the network will recognize and forward Harris voice traffic marked using the Differentiated Services Code Point (DSCP) byte and the network will also meet the following requirements:

1. The Platinum (DSCP EF) queue should be treated as a strict priority queue for voice.
2. All other queues should be treated as CBWFQ.
3. All DSCP values should not be manipulated during transport.

Figure 2. QOS Level Summary

Level	DSCP Marking	Bandwidth Reservation	Queuing Method	IP Services
Platinum Plus	CS6	5%	Class Based Weighted Fair Queue	EIGRP Traffic
Platinum	EF	50%	Priority Class Based Weighted Fair Queue	VNIC Voice Traffic VNIC Management Traffic
Gold	AF41	20%	Class Based Weighted Fair Queue	HA Synchronization Traffic P25 Data (OTAP, OTAR, …)
Silver	AF31	15%	Class Based Weighted Fair Queue	RNM ICMP Traffic GoGlobal Windows Remote Desktop (RDC) Secure Shell (SSH)
Bronze	AF11	5%	Class Based Weighted Fair Queue	SNMP Management Traffic SysLog ICMP
Best Effort (Default)	BE (0)	None	None	All Else

Equipment Description

VIDA Core

The VIDA Core is the heart of any Harris P25^{IP}/OpenSky2/Network First packet-switched network. The Premier VIDA Core is made up of one main hardware component; the VIDA Application Server (VAS) that manages the hardware and software components of the networks, and routes calls among users, and standard LAN/WAN networking equipment. Interoperability Gateways -- devices that interface to analog devices (e.g.; legacy radio systems) -- can be either centrally located with the core equipment, or remotely situated (for various reasons such as connectivity consolidation).

The new P25 Phase 2 Water Plant site will connect to the upgraded Broken Arrow VIDA Core. Connectivity from the new Water Plant site to Broken Arrow is the City's responsibility.

MASTR V Base Station

The new MASTR V digital base station powers secure digital trunked radio communications via P25. The MASTR V continues the quality reputation of the MASTR series of repeaters.

The MASTR V incorporates P25 digital voice and data using a digital signal processor for maximum design versatility. P25 digital voice is translated through an on-board voice encoder/decoder in the station to allow immediate access to P25 communications through the user's existing network. The MASTR V station includes a built-in traffic controller module, which enables IP voice and data packets to be sent over the P25^{IP} network and be received at the base station. This setup enables all of the advantages of IP:

- Seamless integration of off-the-shelf IP data applications
- Easy interconnection of peripherals and ancillary equipment such as mobile data terminals, printers, scanners, and video devices for user organizations
- Economical routing and backhaul of network data
- Redundancy benefit of distributed IP architecture

The MASTR V employs an easy-to-use software interface that provides flexibility, simplified setup, and easy field upgrades as well as remote programming. The functional design of the MASTR V base station will allow Broken Arrow and its users to make changes quickly, easily, and affordably. The modular design of the base station makes maintenance and servicing simple and fast.

Symphony Dispatch Console

The Symphony Dispatch Consoles are full-featured dispatch consoles with true IP secure network connectivity. The Symphony console is Harris' latest offering in IP dispatch technology based on the Microsoft Windows operating system. It is the Broken Arrow dispatcher's best weapon in the fight against time. Built upon a proven platform, it is simple, organized, and efficient. The screen layout is easy to learn and operate; maximizing productivity while minimizing training time. Large buttons and intuitive, customized layouts make maneuvering through the console functions easy and straightforward.

A single network connection to a PC replaces the traditional audio switches found in traditional systems. With less equipment and complexity, the Symphony Console is a more robust solution. The core package of the Symphony includes a Central Processing Unit (CPU), monitor, microphone, mouse, and speakers, and can be placed on any standard furniture that has space to accommodate a monitor and the accessories shown in Figure 3. Flat screen LCD monitors are available in sizes of 21.5" through 27" with touch screen options also available.

Figure 3. Symphony Dispatch Console

It utilizes the CPU to perform the digitization of voice, similar to Voice over Internet applications. The Symphony console is an integral part of the VIDA network and does not require any "back room" electronics equipment, as for other systems. This is a great savings in terms of installation cost and space requirements. Because the console is IP based and only requires a network connection to tie into the VIDA network, ad hoc backup dispatch centers can be quickly established as the need dictates.

Figure 4 shows a sample of the Symphony console's user interface. The display screen is composed of panels and communications modules provide dispatchers system status at a glance. The panels appear on every page of the display, and their contents do not change from page to page. Communication modules, on the other hand, are linked to specific pages of the display. Thus, when you switch from page to page, the panels will remain the same and the communication modules will change.

Figure 4. User Display Symphony Dispatch Console

A communication module is the fundamental component for communicating through the console. Each communication module can be individually programmed with a single entity, representing a talk group, a radio unit, a conventional channel, or another console. When an entity is programmed into a module, all audio related to that entity is routed to the console. Modules provide incoming call monitoring and outgoing console-originated call transmissions. On the display screen, rectangular boxes represent the modules. Up to 1,024 communication modules can exist across eight pages of the display.

The Symphony Console comes with several standard features that enable a dispatcher to perform their functions very efficiently.

Figure 5. Symphony Standard Features

Feature Name	Feature Explanation
Select and Unselect Modules	Any programmed module can be selected as the select module for direct communications from the dispatcher. Other programmed modules will be the unselect modules.
Emergency	The consoles are equipped to both declare and clear an emergency. When an emergency is declared from a radio unit, there is both an audible and visual indication on the module. The audible indication is in the form of an alert tone. The visual indication involves both changing the color of the module to “red”, as well as the text “EMER” displaying on the module. The console can be set up so a dispatcher can clear the alarm, to stop the noise and then service the emergency.
Alert Tones	Pulsed, warbled, and alert tones can be transmitted to alert radio units of specific emergency conditions.
Individual Calls (Selective or Unit to Unit Calls)	In a trunked radio system, the console is treated like any other unit and has a unit ID. The console can both make and receive I calls. The I Call Panel and I Call Manager Panel under the Special Calls Menu assist with several features associated with making and receiving I Calls and other statistics.
Intercom Call	Allows two-way personal console-to-console communications.
Call History	Displays the last five select and unselect module call history.

Feature Name	Feature Explanation
Extended Call History	Displays the last hundred select and unselect module calls and other programmed module calls.
Patch	Modules patched together can communicate with one another.
Simulselect	Dispatcher can communicate to the modules simulselected, but cannot communicate with one another.
Encrypted Calls	Encrypted calls between the dispatcher and field units are only un-encrypted at the source and destination, ensuring secured communications as the voice packets travel through the radio network.
Cross Mute	Reduces unnecessary receive audio at the local console by preventing transmissions from other consoles from being heard and prevents audio feedback problems when two or more consoles are placed in nearby vicinity with each other and at least one is equipped with speakers.
Call Director Interface	As an option, Symphony dispatch console can be connected to an external "Call Director" device for telephone interconnect operations. Using this device, standard telephone lines can be accessed by the dispatcher and either used for standard telephone call operations or patched to radio entities in the radio system.

User Equipment

With a proven track record of LMR and battle-tested military tactical radios, Harris offers a wide array of P25 subscriber products to meet user's needs. Every model shares the common attributes of ruggedness, reliable communications, and ease of use. To ensure compatibility among P25 vendors, each of our P25 radio models successfully passed the Compliance Assessment Program (CAP) established by the Department of Homeland Security.

XL-200P Radio

The XL-200P is the first ever device designed to deliver a converged all-band LMR and LTE user experience for public safety use. It is the most versatile handheld radio designed for first responders anywhere on the market today. The XL-200P supports all LMR frequency bands comprising VHF, UHF-L, UHF-H, and 700/800MHz. Positioned for LTE Bands 4, 13, 14 and Wi-Fi support, the radio is uniquely optimized for direct broadband communication. Connect to a wide area LTE network such as FirstNet, or Verizon and take advantage of high bandwidth mission critical data such as streaming video or high resolution images. The radio can function as a hotspot for data devices within its vicinity such as wearable cameras or Bluetooth accessories. The XL-200P is built to combine Bluetooth Smart, Internal GPS, Wireless Wi-Fi Programming, Color Front and Top Display, 4 position and 2 position concentric switches in a simple-to-use, compact and rugged physical form factor. With XL-200P, you just don't have a radio, you have a solution at your hip.

XL-200P Radio

Every XL-200P is built to exceed MIL-STD-810G military standards for ruggedness, including pressure, temperature, shock, radiation, rain, humidity, dust, and vibration. With a cast aluminum frame and tough seals, the XL-200P is capable of operating in harsh and severe environments. In addition to meeting the standard MIL-STD 810G specifications for durability, this radio also meets the MIL-STD 810G Method 504.1/2 for contamination from fluids, allowing the radio to be scrubbed with cleansers and biological sanitizers after exposure to contaminated environments. Additionally, it meets MIL-STD 801G Method 511.5/1 for operation in explosive atmospheres. Optionally, the radio can include certification for IP 68, providing complete protection against dust entry as well as withstanding water immersion at 2 meters deep for 4 hours after surviving drop tests. Lastly, the XL-200P can include certification by Underwriters Laboratories (UL) to ANSI/TIA 4950 for operation in hazardous environments.

Intuitive User Interface

The features of the XL-200P intuitive user interface result in a capable, easy-to-use radio. The two large displays use bold text and graphics for a clear indication of radio status. The displays configure for day or night operation and backlight intensity.

The XL-200P front display features a full-color graphical user interface. It associates color graphics with functionality, making it much faster and more intuitive than text-based menus. The use of colors on the main display also allows users to quickly understand their operational environment. For example, green bar with an arrow on the display indicates incoming calls (see Figure 6), and orange bar with an exclamation mark indicates an emergency (see Figure 7).

Figure 6. XL-200P Graphical User Interface (Incoming Call)

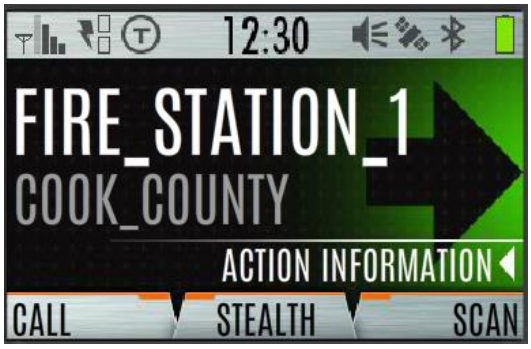


Figure 7. XL-200P Graphical User Interface (Emergency)

In addition to the full color front display, the XL-200P includes a top display with color backlighting, which is configurable so that a user can read it while the radio is in a holster or on the belt, or during handheld operation. The top display features a big bold font to allow easy viewing and intelligent lighting. With our unique Visual Zone Identification feature, users can tag talk-groups with colors to make it easier to choose the proper talk-group quickly and intuitively (see Figure 8). Colors can also be used to notify the user of a radio mode, potential emergencies, or specific events. In addition, it is possible to darken completely the front and top displays to avoid detection during covert operations.

Figure 8. XL-200P Graphical User Interface (Visual Zone Identification)

Superior Audio in High-Noise Environments

The XL-200P is designed to provide an innovative first class audio experience. The "Woofer-Tweeter" audio design leverages two separate speakers for the highest possible audio clarity. This is paired with the most powerful audio amplifier ever offered in a public safety radio.

The radio utilizes the AMBE+2 Vocoder to optimize the quality of communications. The Vocoder controls distortion that may occur from shouting into the microphone. In addition, it allows the radio to send and receive Dual-Tone Multi-Frequency (DTMF) tones over digital P25 networks.

Through multiple audio sources and advanced digital signal processing, the XL-200P utilizes state-of-the-art active noise cancellation algorithm to ensure transmission of intelligible voice communications is possible in high-noise environments. The XL-200P includes three microphones on the front of the radio. Advanced digital signal processing on the voice signal suppresses the background noise prior to being sent through the Vocoder, preventing noise errors with voice encoding. In addition, audio sources such as remote speaker microphones connect to the radio through the universal device connector (UDC) and become the primary microphone for voice, while the secondary microphone picks up the background noise.

Future-Ready

With a future of convergence technology in LMR and LTE, the XL-200P is well positioned to operate efficiently on a traditional LMR network as well as LTE network on bands 4, 13 and 14. The radio can initially deploy with LMR only and later have a LTE modem board installed to support broadband operations when that need arises. The XL-200P is a future-ready investment with its LTE capability.

Bluetooth Technology

The XL-200P incorporates a built-in secure Bluetooth capability that can support wireless audio devices. For example, the radio can operate with a Bluetooth speaker microphone. For security purposes, the radio interface controls pairing management and AES encryption ensures security. The Bluetooth transceiver can be disabled, if desired.

Wi-Fi

The XL-200P includes Wi-Fi capability as a standard feature. Wi-Fi capability provides a means to program the radio without requiring a cable to interface between a computer and the radio. In addition, the Wi-Fi provides the capability of extending access to broadband data capabilities to nearby Wi-Fi enabled devices (e.g. smartphones, laptops, cameras and so on) by serving as a hot spot.

Ergonomic Design

Based on extensive human factors research with First Responders, the XL-200P nestles naturally in user's hands. The radio's controls are shaped and arranged for ease of use and optimum performance, which is particularly important for a compact radio such as the XL-200P.

GPS-Enabled

The XL-200P incorporates a 52-Channel Global Positioning System (GPS) receiver, enabling display of the user's position. In addition, it securely sends the position over the air for personnel position tracking and rapid response for emergencies.

Software-Defined Radio Architecture

Harris has a long history of fielding software-defined radios that support evolving customer requirements through software-only upgrades. The XL-200P features a true software-defined radio architecture built on this experience and expertise. The radio supports P25 Phase 1 **Frequency Division**

Multiple Access (FDMA) and P25 Phase 2 Time Division Multiple Access (TDMA) operation. In addition, the XL-200P provides the agility to scale the frequency band coverage of the radio to provide life cycle cost advantages. For example, an agency can configure its XL-200Ps for single band operation today. If a need arises to interoperate on other public safety bands, additional bands can be easily added via Wi-Fi upgrades to such radios. It is as easy as that.

Multi-mode Operation

As a multi-mode radio, the XL-200P can support a variety of protocols among which include:

- FM analog conventional
- P25 Conventional CAI
- P25 Trunking, Phase 1
- P25 Trunking, Phase 2
- EDACS® and ProVoice™ (Future)
- Long Term Evolution (Future)

XG-75P

The XG-75P portable provides reliable communications with a range of features designed to excel in challenging public safety, utility, transportation, and industrial environments. Ergonomic controls, an enhanced clarity Liquid Crystal Display (LCD), software-based design, and a full complement of audio accessories make the XG-75P an excellent solution for critical communications users. High-quality voice coding, noise canceling, and robust audio components ensure speech clarity, even in noisy environments. The XG-75P is available with menu buttons or full keypad. Users can access different preprogrammed radio functions by using the menu buttons.

Superior Audio in High-Noise Environments

Through high-quality voice coding and robust audio components, the XG-75P provides the loud and clear audio that critical communication users require:

- The enlarged speaker chamber provides extremely powerful audio, delivering up to 3.8 watts.
- The AMBE+2 vocoder optimizes the quality of communications. The vocoder controls distortion that may occur from shouting into the microphone. In addition, it allows the radio to send and receive Dual-Tone Multi-Frequency (DTMF) tones over digital P25 networks.

Through multiple audio sources and advanced digital signal processing, the XG-75P utilizes active noise cancellation so transmission of intelligible voice communications is possible in high-noise environments. The XG-75P includes two microphones, one located on the front of the radio and one on the back. Users speak into the front microphone while the back microphone picks up background noise. Digital signal processing on the voice signal cancels out the background noise prior to being sent through the vocoder, preventing noise errors with voice encoding. In addition, audio sources such as remote speaker microphones connect to the radio through the side accessory connector, which

replaces the front mic as the audio input. In this case, the rear mic disables, and the front mic picks up the background noise.

Ergonomic Design

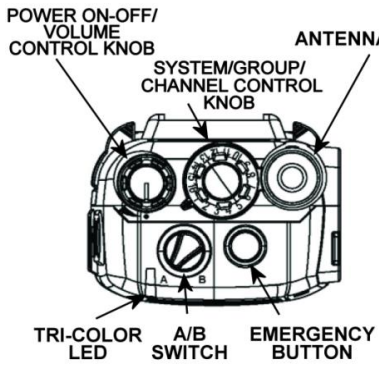
The XG-75P design makes it simple to operate. Users (even if wearing thick gloves) can focus attention on the situation rather than on radio operation.

- The channel selector knob is larger and taller than the volume knob, allowing the user to quickly identify and operate the proper knob by touch while avoiding the need to visually check.
- The central location of the recessed emergency button maintains accessibility in case of emergency while preventing accidental activation.
- The large four-line alphanumeric LCD displays system and group information, status icons, and menu operation. In addition, the display includes a battery-level gauge. A backlight illuminates the display and the keypad for low-light environments. A cover minimizes the risk of damage to the LCD and increases its clarity.

Programmable Indicators

The functions of the dual-position A/B switch are user-definable from a list of programmable options, allowing the user to change quickly from one state to another without looking at the radio. The most common uses of the A/B switch include Bank A/Bank B selection, encryption enable/disable, radio lock/unlock, and noise cancellation enable/disable. The channel knob includes a backlit display, allowing the user to see the knob's specific setting in dark or low-light conditions. The tri-color LED indicates when a radio is transmitting or receiving.

Top View of XG-75P



Equipped for Extreme Conditions

The XG-75P meets MIL-STD-810G specifications for durability in hazardous conditions, such as pressure, temperature, shock, radiation, rain, humidity, dust, sand, and vibration. It has the highest immersion and drop specification standards in the industry to address the two most common hazards encountered by first responders. Each radio carries certification for IP68, withstanding dust-tight and continuous immersion. In addition, it carries an additional certification for water intrusion with water depth of 2 meters for four hours, double that of others in the industry. Along with meeting the MIL-STD for drop shock specifications, the XG-75P carries certification of 1.5 meter-drop shock to concrete, using parameters of TIA-603-C 1.0 meter drop shock with additional height.

The MIL-STD allows a different radio for each environment test. The XG-75P is so rugged that it underwent shock testing of 26 drops from a 48-inch height to wood for MIL-STD-810G drop-shock certification and then underwent MIL-STD-810G immersion testing, achieving certification for in 1 meter for four hours, 2 meters for four hours, and IP68 immersion.

The XG-75P is optionally configurable as Intrinsically Safe and approved by Factory Mutual (FM) or Underwriters Laboratories (UL) for use under hazardous conditions. It meets the stringent requirements for operation in extreme environments and carries a two-year warranty.

Advanced Security

We utilize only standards-based (nonproprietary) encryption algorithms to provide security against scanners while maintaining interoperable communications with other authorized parties. The XG-75P can configure to support the following standards-based encryption schemes:

- AES
- Data Encryption Standard Output-Feedback (DES-OFB)
- FIPS-140-2 and FIPS-197 for AES

Light and Compact

The XG-75P is a light, compact radio, weighing 15.9 ounces with the 16-hour Li-poly battery. In addition, the body of the radio is 5.89 inches tall and 2.44 inches wide, making it one of the most comfortable radios in the market to carry, particularly for first responders already laden with multiple items on their belts or bodies.

Multi-mode Operation

As a multi-mode radio, the XG-75P can support a variety of protocols:

- FM analog conventional
- P25 Conventional CAI
- EDACS/ProVoice
- OpenSky/OpenSky2
- P25 Trunking, Phase 1
- P25 Trunking, Phase 2

Backward Compatible and Future Ready

Because the XG-75P can operate in multiple modes, it is a solid investment that agencies can rely on as transitions occur. For example, they can use it in analog conventional mode, with a smooth migration to P25 Trunking Phase 2 (TDMA) operation without radio replacement.

XG-25P Portable Radio

The XG-25P portable is built to provide excellent performance under adverse conditions. The portable is available in System (full keypad) and Scan (partial keypad) models and weighs 15 ounces with the Lithium Ion battery. The radio meets MIL-STD-810G environmental specifications, TIA/EIA-603C 1-meter drop test, IP66 dust-tight and water jet requirements as well as U.S. Forest Service vibration requirements.

Figure 10. XG-25P Radios

The XG-25P uses a new high-speed digital signal processor and the latest RF components to support multiple applications in one package:

- P25 Trunked with Phase 2 TDMA
- P25 Trunked
- P25 Conventional
- OpenSky2
- EDACS/ProVoice Trunked
- Conventional Analog

Features

- The knobs and buttons of the XG-25P portables are designed to maximize ease of use, even when users are wearing thick gloves. The large push-to-talk (PTT) button and talk-group and volume knobs can be easily identified and operated by touch, avoiding the need to visually check the individual knobs. The central location of the recessed emergency button maintains accessibility in case of emergency while preventing accidental activation.
- The enlarged speaker chamber and 3.8W maximum audio output produces clear, powerful audio levels. The XG-25P features an AMBE + 2™ vocoder for exceptional voice quality and the ability to send and receive Dual-Tone Multi-Frequency (DTMF) tones over digital P25 networks.
- The large 4-line alphanumeric dot matrix LCD supports system and group information, status icons, and menu operation. The display for the XG-25P also includes a battery level gauge. A backlight illuminates the display and the keypad for low light environments. In addition, a cover minimizes the risk of damage to the LCD and increases its clarity.
- The XG-25P operates reliably even in harsh environments. It meets the drop, temperature and pressure extremes, solar radiation, blowing rain, humidity, salt fog, blowing dust, and vibration requirements stated in MIL-STD-810G, TIA/EIA-603C 1-meter drop test, as well as U.S. Forest Service vibration requirements.
- The tri-color LED changes color to indicate radio status and is visible from the top and front of the radio for clear signaling. For covert applications, the LED, display, keypad lights, and tones can all be disabled. In addition, the mode of operation may also help determine what the color of the LED represents.

XG-25M

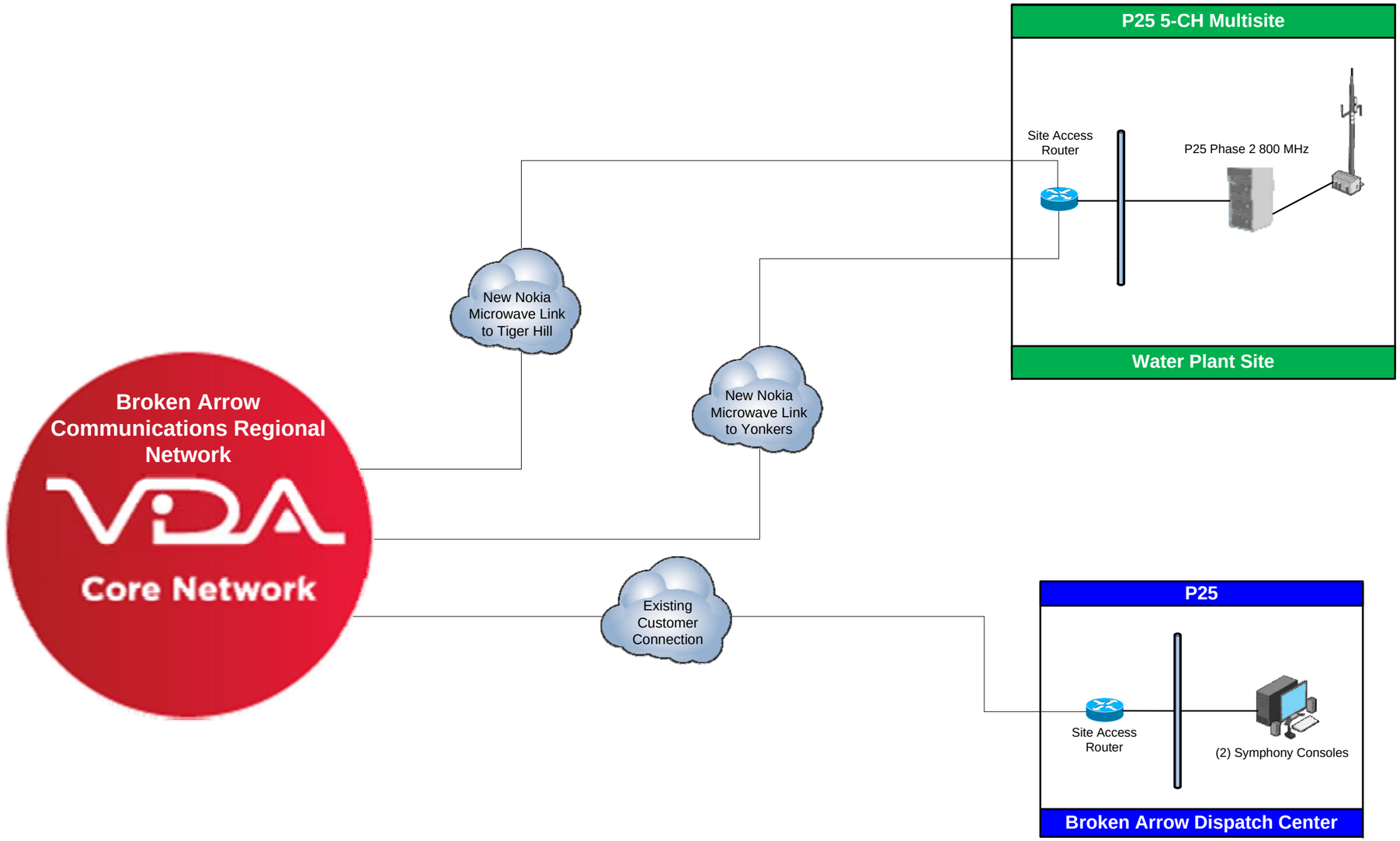
The XG-25M is a compact, economical mobile offering a larger control unit with an easy-to-read display and large buttons for easy operation. The XG-25M integrates impressive performance with durable construction to support a wide range of applications and user requirements. Ergonomic controls, an enhanced clarity LCD, software-based design, and Bluetooth capability for accessory support make the XG-25M an excellent solution for critical communications users. The compact XG-25M is available in either front mount or rear mount configuration with a high-performance internal speaker. The sturdy, compact mechanical package provides high performance and reliable service.

As a multi-mode radio, the XG-25M can support a variety of protocols:

- P25 Trunked with Phase 2 TDMA
- P25 Trunked
- P25 Conventional
- OpenSky2
- EDACS/ProVoice Trunked
- Conventional Analog

Features

- The XG-25M has exceptional audio capacity. The large 3-watt internal speaker delivers extremely powerful audio and the AMBE+2 vocoder optimizes the quality of communications. In high-noise emergency conditions, the mobile delivers loud, clear audio, even with sirens blaring and fire engines running.
- From the oversized display to the large easy-to-read buttons, each feature of the radio provides a better user experience. Simple controls allow users to communicate seamlessly and effectively in a range of surroundings. Since the XG-25M is easy to operate, users can focus attention on the task rather than on radio operation.
- The XG-25M radio has a tough high-contrast alphanumeric LCD. The large four-line alphanumeric display supports system and group information, status icons, and menu operation. The large font improves readability. Lines 1 and 2 indicate the name of the currently selected radio system and group/channel. Line 3 is an icon display showing status such as battery level. Line 4 displays when the radio is in menu mode.



LEGEND

- Existing System
- Dispatch Location
- Proposed RF Site

THIRD ANGLE PROJECTION

HARRIS — Communication Systems Division, Public Safety & Professional Communications

MBP 16208

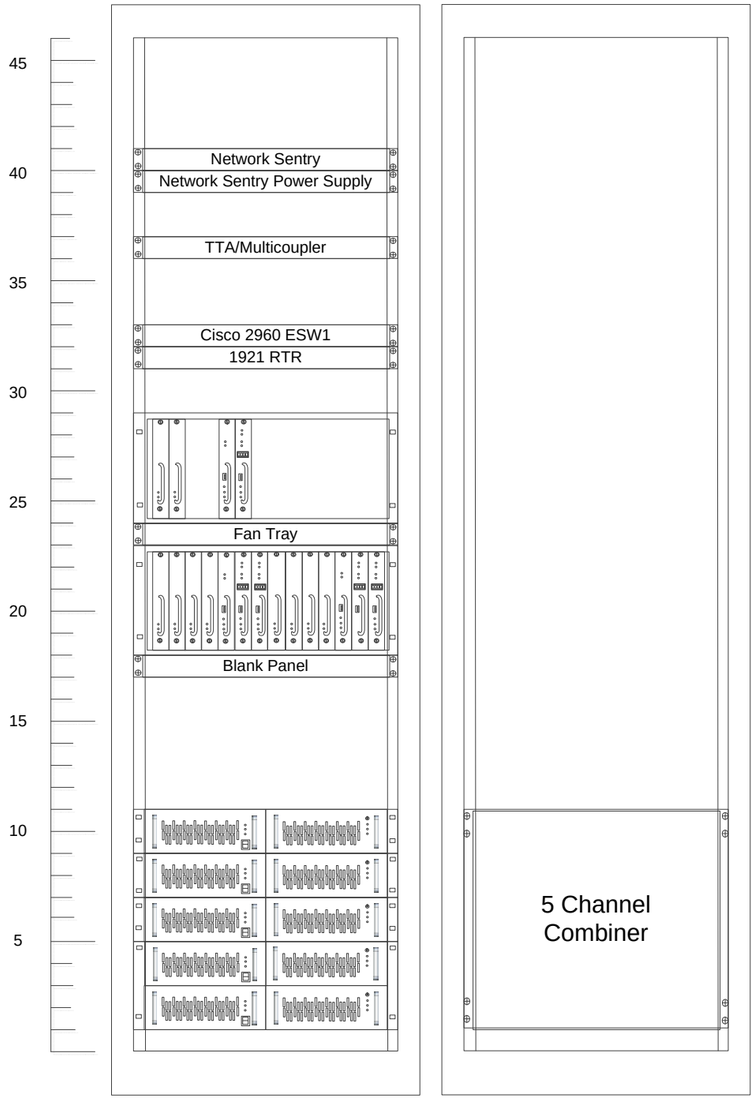
PRELIMINARY ENGINEERING SKETCH
COMPANY CONFIDENTIAL

PREPARED BY: A. OGDEN
DATE: SEPTEMBER 13, 2016
BROKEN ARROW, OK

BROKEN ARROW PROPOSED WATER PLANT SITE ADDITION

REV. 0

SHEET # 1 OF 3

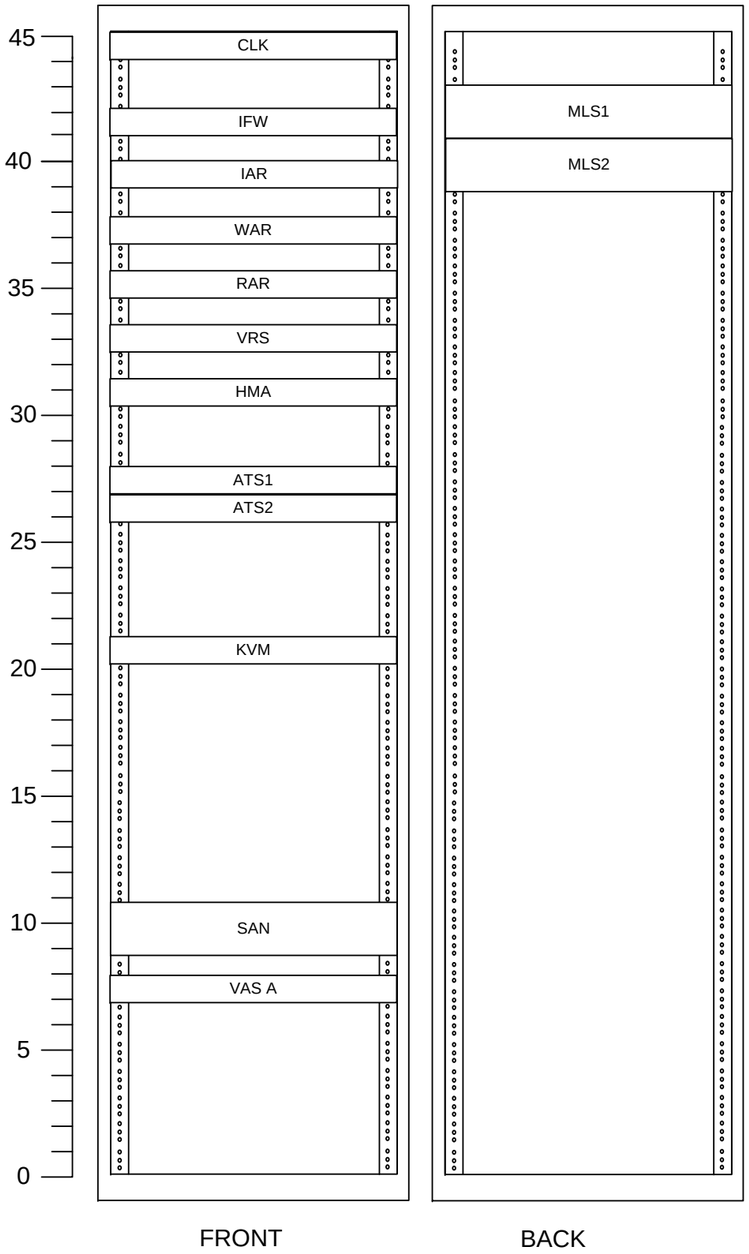


P25 Equipment

Combiner

HARRIS — Communication Systems Division, Public Safety & Professional Communications		MBP 16208
PRELIMINARY ENGINEERING SKETCH **COMPANY CONFIDENTIAL**		
PREPARED BY: A. OGDEN	**WATER PLANT SITE RACKUP**	
DATE: SEPTEMBER 13, 2016		
BROKEN ARROW, OK	REV. 0	SHEET # 2 OF 3

SR10A.3 VIDA Core Rack-up



LOCATION (R.u. No.)	LOCATION IN CABINET (FRONT/REAR)	DESCRIPTION	
44	Front	Spectracom Securesync GPS 1200	
41	*Front*	*ASA 5506 Security Plus Appliance*	
39	Front	Cisco 1921 Router	
37	*Front*	*Cisco 4321 Router with AC Power and Security Bundle*	
35	Front	Switch, Catalyst 3650	
33	Front	Switch, Catalyst 2960	
31	Front	Cisco 1921 Router	
27	*Front*	*Automatic Transfer Switch*	
26	*Front*	*Automatic Transfer Switch*	
20	*Front*	*Monitor/Keyboard/Mouse/KVM Switch*	
9	Front	NetApp SAN FAS2220	
7	Front	VIDA Application Server	
41	*Rear*	*ALCATEL 7705 SAR*	
39	*Rear*	*ALCATEL SAR 16 PORT T1/E1*	

HARRIS COMMUNICATION SYSTEMS DIVISION PUBLIC SAFETY & PROFESSIONAL COMMUNICATIONS | MBP 16208

PRELIMINARY ENGINEERING SKETCH
COMPANY CONFIDENTIAL

PREPARED BY: A. OGDEN

DATE: SEPTEMBER 13, 2016

BROKEN ARROW, OK

SR10A.3 VIDA CORE RACK-UP

REV. 0

SHEET # 3 OF 3

Implementation Plan

Harris' provides design and implementation services for an upgrade to the existing regional network and the manufacturing and shipment of an add-on site equipment package. The System Description details the packages, including system components and site specific equipment. Harris will implement the upgrade expediently and with care, working as a cohesive team in concert with Broken Arrow.

Kick-Off Meeting

The project will initiate with contract signing. Following contract signing, the Harris Team will schedule an introductory conference call with Broken Arrow to kick-off the project implementation.

System Upgrade

Design Review

The Harris Team will use the information obtained from the kick-off meeting, contract documents, and regulatory/engineering documentation, to present a final upgrade plan and system design at the Customer Design Review meeting with Broken Arrow. Broken Arrow will review this documentation and, after Harris responds to all questions, send to Harris an approval of this documentation and authorization to order equipment. Figure 1 provides a responsibility matrix for the Design Review activities that Harris is responsible for and those activities for which Broken Arrow is responsible.

Figure 1. Design Reviews Responsibility Matrix

Tasks	Harris	Broken Arrow	Comments
Kickoff Meeting			
Assemble a project team and coordinate a conference call with Broken Arrow	X		
Present preliminary information on upgrade design, installation plan, and schedule	X		
Schedule dates for the Customer Design Review	X		
Propose dates for the Pre-Upgrade Checklist and System Health Audit	X		See System Description Step #1
Prepare for Customer Design Review			
Finalize the factory staging effort	X		
Finalize plan and schedule for the Pre-Upgrade Checklist and System Health Audit	X		In coordination with Broken Arrow
Prepare drawings and equipment lists for the upgrade	X		
Prepare formal upgrade schedule	X		
Prepare new NSC equipment electrical and heating loads	X		
Prepare Acceptance Test Plan for system upgrade	X		

Tasks	Harris	Broken Arrow	Comments
Customer Design Review			
System Upgrade Block Diagram	X		
List of deliverable equipment	X		
NSC cabinet and rack-up elevation drawings	X		
AC power and BTU requirements for NSC	X		
Acceptance Testing Procedures	X		
Upgrade Plan & Project Schedule	X		
Answer Questions as needed from Broken Arrow on documents	X		
Approve the upgrade design documentation		X	5 Days

Manufacturing

After final approval, the project team will procure material and schedule manufacturing using its Enterprise Resource Planning system. The factory will receive orders to manufacture the Harris equipment and Harris will place orders with vendor/subcontractors. After manufacturing, technicians will inspect and test each component in preparation for the factory staging. Factory specifications define the test for each individual rack of equipment.

Pre-Upgrade Checklist and System Health Audit

As part of the Pre-Upgrade Checklist and System Health Audit, Harris will backup existing system databases, prior to system upgrade, on an external device such as a flash drive for additional protection. Inventory and back-ups performed by Harris will include:

- Router and Switch iOS and Configuration Backups
- Database Backups including the Unified Administration System (UAS), and Regional Network Manager (RNM)
- Personality / Configuration Backups on the Network Switching Server (NSS) including the Voice Network Interface Controller (VNIC), VIDA Device Manager Repository, and High Availability (HA)

With the back-ups complete, system engineers will work with staging technicians to migrate the existing databases into the new core hardware at the factory.

Staging

System engineers will assemble the NSC rack in the factory facility. The system engineers will work with staging technicians to migrate Broken Arrow databases into the core at this time. Technicians will set the Broken Arrow IP addresses in the NSC and complete all software configurations. At the end of staging, the equipment will be prepared for delivery to Broken Arrow. Wrapping the racks in clear plastic wrap and properly securing them ensures safe transportation. Harris arranges to ship equipment and materials to a customer-provided storage area near the point of installation. At the storage area, Harris will inventory the upgrade equipment and prepare for delivery to the installation sites.

Figure 2 provides a responsibility matrix for the manufacturing and staging activities that Harris is responsible for and those activities which Harris believes Broken Arrow is responsible.

Figure 2. Manufacturing and Staging Responsibility Matrix

Tasks	Harris	Broken Arrow	Comments
Insert equipment delivery dates into the material planning system	X		
Place orders with the factory	X		
Place orders with key suppliers	X		
Place orders for supplier items	X		
Manufacture all infrastructure equipment	X		
Assemble equipment in staging area on a per site basis	X		
Copy the UAS Database on the existing Broken Arrow core	X		
Load Broken Arrow Core UAS database on to Harris factory core.	X		
Verify proper network, P25 and dispatch system functional operation	X		
Break down equipment and ship to storage area	X		
Provide temporary storage near Broken Arrow's location		X	
Inventory upgrade equipment and prepare for site delivery	X		

Installation & Optimization

The installation team will install in conjunction with the delivery of equipment after staging and in close coordination with Broken Arrow. Installation of all equipment will be done in a neat and professional manner, employing a standard of workmanship consistent with Harris' installation standards and in compliance with applicable NEC, EIA, FAA, and FCC standards and regulations.

Network upgrades install first, followed by the NSC's, and the site updates finish the effort, as detailed in Steps 1 through 10 in the System Description. Harris' goal in the cutover process will be a seamless transition from the old cores to the new. The upgrade requires shifting operation of the Network Switching Center from the legacy SR10A.0 primary cabinet to the legacy SR10A.0 secondary cabinet, in a process known as failover. After the SR10A.0 primary rack deactivates, technicians will disconnect the power and remove it. With the radio system now effectively functioning on the back-up switch, installers will install the new primary SR10A.3 rack. After connecting the new primary core equipment to the existing network and verifying system stability, the technicians will begin migrating each Broken Arrow site to the new primary switch. For any given site under migration to the new switch, all other sites will be functioning normally. After the system is observed functioning correctly on the primary SR10A.3 core, the installers will repeat the process with the secondary rack. As with any upgrade, there will be brief periods of degraded operation that will have to be accommodated. Harris will make every effort to minimize these periods. A successful upgrade will require the communication and involvement of all users and administrators.

Installation of hardware and software periodically interrupts by periods of quiet time, allowing engineers to observe for system stability. When both Harris and Broken Arrow agree that the system is stable, the installers will proceed to the next step. Harris' installation plan will provide for these pauses and the project schedule anticipates them.

Since Broken Arrow intends to re-use existing facilities, Harris assumes that all existing conduits, cable trays, AC power feeds, and other equipment are in good order and properly grounded. The NSC cabinet's will mount in a 3'6" x 2' footprint and extend 83' high. Harris recommends Broken Arrow provide the desired 36 inches of free aisle space (in front and in the rear) for ease of maintenance.

The Harris Team provides Broken Arrow with rack-up drawings of the new NSC racks and a detailed listing of all equipment delivered to the site, including model numbers, equipment locations, firmware and software versions, and installation date.

Upon installation of infrastructure equipment, Broken Arrow will work with its own on-site technicians to optimize the equipment.

Figure 3. System Installation Responsibility Matrix

Tasks	Harris	Broken Arrow	Comments
Replace networking equipment at NSC locations	X		See System Description Step #2 & #3
Upgrade network equipment IOS and configurations at the sites	X		See System Description Step #2 & #3

Tasks	Harris	Broken Arrow	Comments
Replace Primary NSC while the radio system operates on legacy Secondary NSC	X		See System Description Step #4 & #5
Replace Secondary NSC while the radio system operates on new Primary NSC	X		See System Description Step #4 & #5
Upgrade site equipment code at all RF sites	X		See System Description Step #6
Replace Network Sentries at seven sites	X		
Upgrade all consoles in the system	X		See System Description Step #8
Update ENM mapping	X		
Perform preliminary functional testing	X		

Acceptance Testing

System acceptance testing performs according to the agreed upon final Acceptance Test Plans (ATP) and system contract. The project team will notify Broken Arrow when installation and optimization are complete and the system is ready for acceptance testing. A punch list will document any issues found during the testing. The goal of the team will be their quick resolution. Follow-up documents will show the correction of open items.

Figure 4. Acceptance Testing

Tasks	Harris	Broken Arrow	Comments
Provide appropriate team members to participate in acceptance tests		X	
Inspect each network center, noting discrepancies on the punch list	X		Customer Witness
Submit inspection results	X		
Approve inspection results		X	5-days
Test Final Switch & Router Configurations for SR10A.3 NSC	X		Customer Witness See System Description Step #9 and #10
Perform Field Integration Functional Acceptance Tests for the P25 system on the SR10A.3 switch after each RF site and dispatch location is added to the system	X		Customer Witness See System Description Step #9 and #10
Perform Field Integration Functional Acceptance Tests for the OpenSky system on the SR10A.3 switch after each RF site and dispatch location is added to the system	X		Customer Witness See System Description Step #9 and #10
Submit functional ATP results	X		

Final Acceptance

With the completion of the testing and punch list, the Harris Team submits a Final Design Package Submittal to Broken Arrow. After receipt of the submittal, Broken Arrow will sign the infrastructure acceptance letter.

Figure 5. Final Acceptance Responsibility Matrix

Tasks	Harris	Broken Arrow	Comments
Submit final drawing package	X		
Submit letter of final acceptance	X		
Provide warranty and contact information	X		
Accept final drawing package		X	
Sign letter of final acceptance		X	Within 5 days of letter receipt from Harris

Upgrade Site Responsibility Matrix

The Site Responsibility Matrix:

- Describes the general project responsibilities of both parties to perform that are not associated with any specific site
- Defines the specific equipment installation activities Harris will perform
- Defines the site responsibilities of all parties for the implementation of the technology project

General Requirements

Figure 6 describes the general project responsibilities of both parties to perform which are not specifically associated with any specific site.

Figure 6. General Requirements Responsibility Matrix

Tasks	Harris	Broken Arrow	Comments
Designate a Harris project manager	X		
Designate a Broken Arrow project manager		X	
Manage the Harris project team	X		
Establish project communications protocol and maintain communications log as required	X		
Conduct internal weekly project review meetings and submit weekly status reports	X		
Conduct weekly project update calls	X		
Participate in weekly project update calls		X	
Conduct monthly project reviews	X		

Tasks	Harris	Broken Arrow	Comments
Participate in monthly project reviews		X	
Report project progress as compared to project schedule	X		
Update project schedule monthly	X		
Manage and control the flow of products and equipment from the factory to meet the project schedule	X		
Review change orders with Harris project manager and provide approval		X	
Monitor and manage risks	X		
Review and approve submitted design documents within two weeks or respond with revisions		X	
Provide written approval for major milestones such as CDR, staging, ATP, and final acceptance		X	
Provide timely responses to issues and questions		X	
Coordinate with federal, state, and local government agencies, as required		X	
Designate system administrators		X	
Provide access to all buildings and sites, including temporary ID badges for Harris project team		X	
Provide parking permits for Harris project team for any restricted parking areas		X	
Provide adequate road access for delivery vehicles		X	
Arrange for temporary parking to off-load equipment at all buildings and sites		X	
Clean up site and remove all debris and unwanted material	X		
Remove any hazardous material found on site		X	
Provide microwave backhaul meeting the following specifications: - Physical interfaces will be copper Ethernet at either 100Mbps/full duplex no-negotiation or 1Gbps/full duplex - Multi-Site Latency - Latency within the system will need to stay constant to avoid jitter. For standard implementations, latency should be less than 150 msec. - Multi-Site Jitter - Overall jitter will average 0 and never build up to more than 60 msec. Streams with excessive jitter will result in packet loss and Harris will not be responsible for voice quality issues.		X	

Fixed Equipment Installation

Harris is responsible for the installation of all fixed equipment contained in the following detailed description of work as approved in the CDR. Installation will be scheduled in conjunction with the delivery of equipment after staging and completion of site development work required at each site. Installation of all equipment will be done in a neat and professional manner, employing a standard of workmanship consistent with Harris' installation standards and in compliance with applicable NEC, EIA, FAA, and FCC standards and regulations.

Figure 7. Major System Components

Site Name	Site Purpose
PSCC	Primary NSC
Tiger Hill	Secondary NSC
Wagoner County Courthouse	Network Sentry (x1) Software Updates
Coweta	Network Sentry (x2) Software Updates
Leonard	Network Sentry (x2) Software Updates
Yonkers	Network Sentry (x2) Software Updates
Jenks	Software Updates
Various	Console Upgrades

Harris will furnish all required cables including power, RF, and control. Manufactured control and audio cables with molded connectors that plug into distribution panels will avoid the need for punch block connections. Cable ties will secure each cable run, with excess material folded back and neatly coiled. The final as-built documentation package will include all cables, with each properly labeled.

Harris will rely on the existing UPS, by-pass circuitry and distribution breaker panel at each RF site and switching center. Harris will use 20A circuits to outlets above the new cabinets provided by others.

Installation technicians will properly ground the NSC cabinets to the site's single-point grounding system. Ground connections will be connected using approved irreversible compression connectors or irreversible lugs and splices. All painted surfaces where ground connections are made will be scraped clean of paint. Dissimilar metal connections will require treatment with an anti-oxidant compound.

NSC and RF Site Details

Figure 8 summarizes the specific system installations that Harris will perform at the Network Switching Center and RF site locations, as well as the activities that Harris believes belong to Broken Arrow.

Figure 8. NSC & RF Site Responsibility Matrix

Tasks	Harris	Broken Arrow	Comments
Install new SR10A.3 NSC cabinets	X		
Install new Network Sentry's at sites	X		
Provide floor space for new NSC Racks		X	42" x 24" x 86"
Survey NSC room for any new electrical circuiting requirements and cable ladder/pathways and report at Customer Design Review	X		
Provide electrical circuits		X	Harris recommends L5-30R twist lock receptacles
Provide cable ladder		X	
Provide adequate shelter/equipment room utility AC electrical power, single-point ground system, HVAC, and backup generator power		X	
Prepare and submit electrical permits (if required)		X	
Provide backup power (UPS) for NSC		X	
Provide rack space for replacement Network Sentry		X	Re-use existing slot

Dispatch Site Details

Figure 9 summarizes the specific system installations that Harris will perform at the various Dispatch site locations, as well as the activities that Harris believes belong to Broken Arrow.

Figure 9. Dispatch Site Responsibility Matrix

Tasks	Harris	Broken Arrow	Comments
Upgrade 14 Symphony Consoles with new Symphony software	X		
Upgrade 8 Maestro IP Consoles	X		
Receive, Install, and Integrate 2 new Symphony Consoles		X	
Provide backup power (UPS)		X	
Provide adequate shelter/equipment room utility AC electrical power, single-point ground system, HVAC, and backup generator power		X	

Water Plant Equipment

Harris will present an equipment list at the Customer Design Review for the site add-on package. Broken Arrow will review this documentation and, after Harris responds to all questions, send to Harris an approval of this documentation and authorization to order equipment.

Proposed Major Components of Add-On Site

The major systems Harris will manufacture and ship, in accordance with the System Description, are as follows:

- One, 5-Channel 800 MHz P25 Phase 2 site (MASTR V)
- Two, next-generation Symphony IP Dispatch Consoles

Add-On Site Development Recommendations.

Harris recommends Broken Arrow provide a measurable 5 ohms or less resistance between any connected point on the tower ground bus and earth ground. Grounding should be installed according to Harris grounding standards in the AE/LZT 123 4618 Rev E: Site Grounding and Lighting Protection Guidelines. Harris also recommends a professional engineer evaluate the tower structure to ensure it supports the new antenna system shipped with this offering.

Add-On Site Manufacturing & Shipping

After approval of the equipment list, the project team will procure material and schedule manufacturing using its Enterprise Resource Planning system. The factory will receive orders to manufacture the Harris equipment and Harris will place orders with vendor/subcontractors. Technicians inspect and test each component. Harris loads software with default configurations into the equipment. Any system specific configuration will be loaded into the equipment by Broken Arrow after delivery.

Harris will ship the site add-on racks directly to Broken Arrow after manufacturing. Broken Arrow provides acceptance of the add-on site equipment upon possession at delivery. Harris can provide additional services after delivery, if requested, on a time and material basis.

Figure 10. Site Add-On Site Responsibility Matrix

Tasks	Harris	Broken Arrow	Comments
List of deliverable equipment	X		
Approve the equipment deliverable list		X	
Manufacture equipment	X		
Load default configurations and test	X		
Ship Equipment to Broken Arrow	X		
Accept add-on site upon delivery		X	
Load system specific configurations into equipment software		X	

Schedule

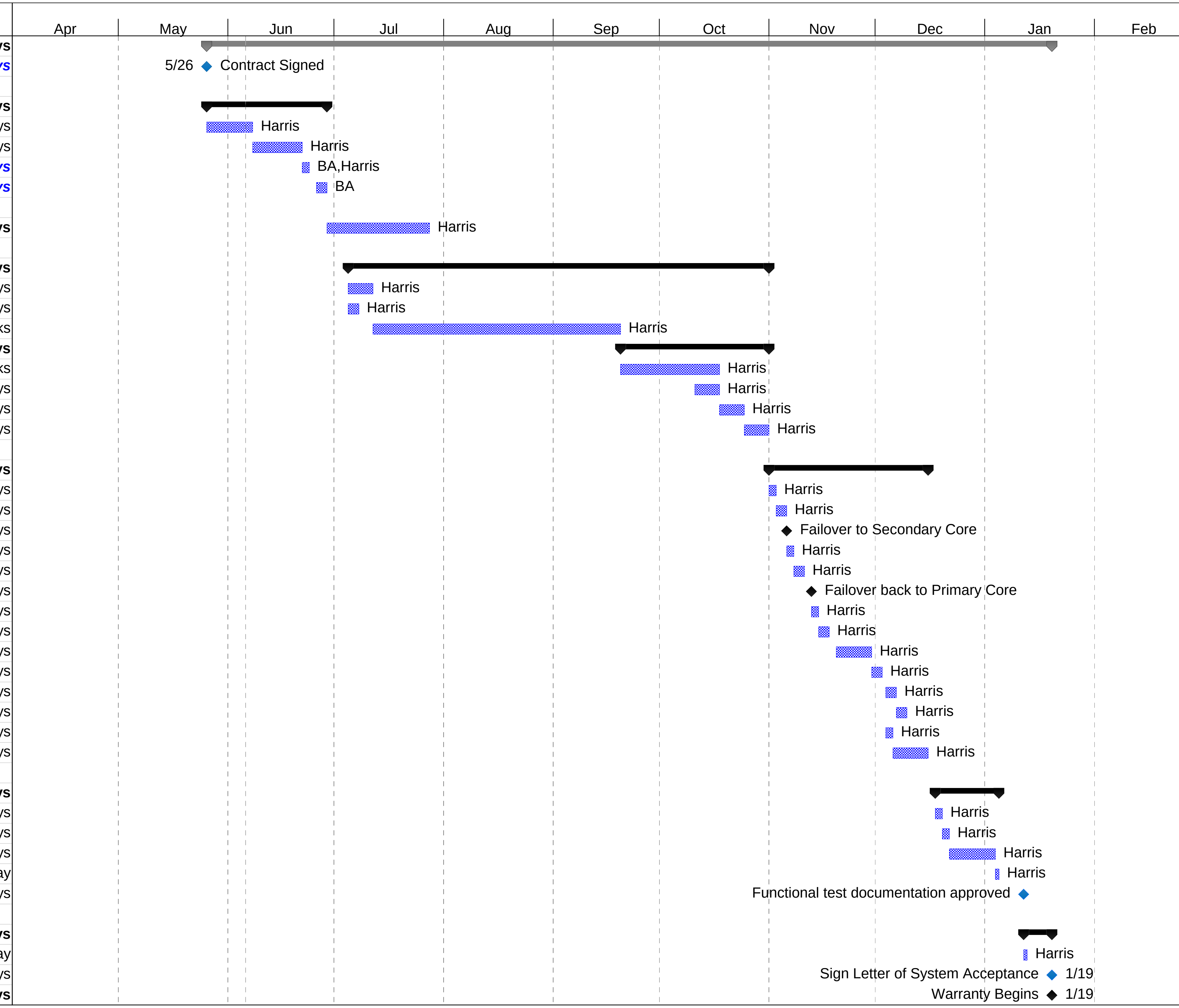
Harris provides a preliminary project schedule as part of this scope of work in the form of a Microsoft Project Gantt chart. The preliminary high-level schedule shows the time frame of each project step. The Harris Team will present a more detailed schedule during the CDR. This schedule will list each major milestone and define each party's responsibility, allowing the reader to quickly understand the timing and required inter-relationships. The detailed schedule will also incorporate the feedback given by the customer during the initial project meetings. Throughout the project, the project manager will review project progress as compared to the schedule. In order to maintain the project schedule, they will take necessary actions to focus on and resolve problems (actual and potential). The customer will receive monthly project updates.

General Assumptions

Unless otherwise noted above, the Harris agreement is based on the following assumptions:

- Harris scope of work for the Water Plant site add-on completes at delivery of equipment to Broken Arrow. No additional services are included by Harris in this offering, including but not limited to:
  - Site Surveys.
  - Network engineering
  - Site drawings (including site plots, shelter floor plans, and electrical layout plans).
  - Antenna placement drawings, antenna hanging, or as-built documentation.
  - Coverage maps.
  - Frequency research and planning.
  - Installation
  - Coverage and functional testing.
  - Cutover planning.
- No construction, site development, or other site preparatory work included.
- Harris recommends the site grounding should have a single point ground system. The soil at each site should allow for a constructed ground system that can achieve a ground resistance of 5 ohms or less.
- Site-access roads are adequate for trucks that will travel to the site.
- No prevailing wages, mandatory union workers, or mandatory minority business are required for the project.

ID	Resource Names	Task Name	Duration
0		**Broken Arrow System Upgrade**	**161 days**
1		***Contract Signed***	***0 days***
2			
3		**Prepare for Customer Design Review (CDR)**	**23 days**
4	Harris	Internal Project Review Meetings	8 days
5	Harris	Kick-off Meeting and CDR Preparation	10 days
6	***BA,Harris***	***Customer Design Review***	***2 days***
7	***BA***	***Customer Design Review Approval***	***3 days***
8			
9	**Harris**	**System Audit and Health Check**	**20 days**
10			
11		**Manufacturing & Staging**	**85 days**
12	Harris	Place orders on factory	5 days
13	Harris	Place orders on vendors	3 days
14	Harris	Manufacture P25 Equipment	10 wks
15		**Factory Staging**	**30 days**
16	Harris	Assemble & Stage	4 wks
17	Harris	Prepare ENM Mapping	5 days
18	Harris	Break down and pack for shipping	5 days
19	Harris	Deliver Upgrade Hardware/Software to Customer	5 days
20			
21		**System Upgrade Installation**	**31 days**
22	Harris	Core Network Upgrades	2 days
23	Harris	Stabilization Period	3 edays
24	Harris	Failover to Secondary Core	0 days
25	Harris	Install New Primary NSC Cabinet	2 days
26	Harris	Stabilization Period	3 edays
27	Harris	Failover back to Primary Core	0 days
28	Harris	Install Secondary NSC Cabinet	2 days
29	Harris	Stabilization Period	3 edays
30	Harris	Upgrade Sites	6 days
31	Harris	Stabilization Period	3 edays
32	Harris	Upgrade Consoles	3 days
33	Harris	Stabilization Period	3 edays
34	Harris	Finalize ENM Mapping to System	2 days
35	Harris	Preliminary Functional Testing	10 edays
36			
37		**Acceptance Tests**	**8 days**
38	Harris	System Functional ATP Test	2 days
39	Harris	Dispatch Functional Testing	2 days
40	Harris	Resolve Punch List Items	3 days
41	Harris	Submit Functional test documentation	1 day
42	BA	***Functional test documentation approved***	0 days
43			
44		**System Acceptance**	**6 days**
45	Harris	Submit final documentation	1 day
46	BA	***Sign Letter of System Acceptance***	0 days
47		**Warranty Begins**	**0 days**



Functional Acceptance Test Plan
for
City of Broken Arrow, Oklahoma

SR10A.3 Testing

Table of Contents

ABOUT THIS DOCUMENT

This document was specifically prepared for the customer shown below. Each section of this document is individually maintained in the Harris document control system.

Customer: City of Broken Arrow, OK

Prepared By: L. Dobbins

DOCUMENT USAGE

Many of the tests in this document will need to be run on multiple pieces of equipment. For tests that need to be run multiple times, log in the comment section of the result box the identifier of the equipment tested. Although specific tests are not included relating to electrical measurements or timing parameters of equipment, these tests and levels are conducted and recorded as part of Harris' standard production and/or installation practices. These parameters include but are not limited to:

- Transmit Frequency and Deviation
- Output and Reflected Power
- Receiver Sensitivity
- Receiver Multicoupler Gain (if applicable)
- Receiver Preamplifier Gain (if applicable)
- Combiner Loss (if applicable)

SUBSCRIBER UNIT USAGE

All tests for subscriber (terminal) units in this document will be performed with Harris subscriber units unless the test setup identifies another Vendor's subscriber unit to be used.

1. CUSTOMER APPROVAL

These Test Procedures have been read and approved for use as the Acceptance Test Plan (ATP).

Customer Representative	**Harris Corporation Representative**
Signature and Date	Signature and Date
Printed name and title	Printed name and title

2. SYSTEM ACCEPTANCE

This Acceptance Test Plan (ATP) has been fully and successfully completed with all action items resolved.

Customer Representative	**Harris Corporation Representative**
Signature	Signature
Printed name and title	Printed name and title
Date	Date

FUNCTIONAL TESTING CLARIFICATION

Equipment inspection and testing in addition to staging acceptance testing is performed at the Harris staging facility. Staging tests as detailed in this matrix verifies basic equipment functionality in addition to its functionality as part of an overall system. Equipment as received from Harris and third party manufacturing suppliers is supplied with manufacturer test results, as applicable. Test results documentation will be that from the staging functional acceptance tests. Equipment tests will be performed in the field after installation both as part of equipment commissioning and overall final functional acceptance testing. Test results documentation will be from the final functional acceptance tests.

1. Facility Test

1.1 Visual Inspection

Purpose: **Verify the system has been installed following Harris installation standards.**

Expected Results: **The installation should look clean and the documentation should reflect the installation.**

Setup:

None

Execution:

- ☐ Verify the area is clean and that all cabinets and racks are both clear of debris and clean.
- ☐ Verify all equipment racks are spaced per the drawings, secured and grounded.
- ☐ Verify all nameplates and labels are in place.
- ☐ Verify all protective foam, tape, and packing material has been removed.
- ☐ Verify all punchblocks are labeled.

Results		(Pass/Fail)	_____
Tester:	_____	Date:	_____
Comments:	_____		
	_____		
	_____		

1.2 Power Backup / UPS Verification

Purpose: **To verify that the site can run on the UPS without interruptions.**

Expected Results: **Radio communication should not be interrupted during the transition.**

Setup: **Prior to the execution of this test, ensure any computers or other devices with volatile memory are backed up or are on power circuits not affected by this test.**

Notes: **Harris will perform this test at all locations. Harris is not responsible for test failures due to inadequate backup power equipment that is under the county's responsibility to provide. Any such failures of county provided backup power equipment will not delay system acceptance. Record in the comments section the names of locations tested and who has provided the backup power equipment (Harris or the county).**

Execution:

1. From the facility circuit breaker panel, disconnect main power.
   - ☐ Verify communication is uninterrupted.
2. After predetermined extent of designed backup power, reapply power.
   - ☐ Verify communication is uninterrupted.

Results		(Pass/Fail)	_____
Tester:	_____	Date:	_____
Comments:	_____		
	_____		
	_____		

2. VIDA UNIVERSAL ADMINISTRATION SERVER (UAS)

2.1 Create an Agency Level Administrator Account in the UAS

Purpose: **Demonstrate the capability to create Agency Admin Accounts in the UAS.**

Expected Results: **This test will demonstrate that a UAS user has the ability to create a new UAS user account.**

Setup: **The user will need system level access to an UAS.**

Execution:

1. Browse to the UAS at the address of 'https://s0u1uas.vida.local:8443/nas'
2. Log in with UAS administrator level account.
   - Verify that default accounts are created (see list below) and verify a default agency administrative class exists by selecting System/Administration/Admin User.
3. Select "Add" to display the Administration User Detail screen.
4. Enter a name (e.g., TestUser) description, and password.
5. Select save to download, and click 'OK'
6. Log out of the default account.
7. Log in as the new TestAgencyAdmin
   - Verify access with TestAgencyAdmin
8. Log out of the Test AgencyAdmin.
9. Log in with the default account and delete the TestAgencyAdmin

Admin User	Admin Class	Description
agency998	Agency998	Agency 998 Access
Vida	RSA	RSA
ProvTool	RSA	Provtool
vida2	RSA	vida2
Hp	RSA	Hao for Testing
Provtool2	RSA	Provtool
Provtool3	RSA	Provtool
Provtool4	RSA	Provtool
Kc	RSA	Kc

Results (Pass/Fail) _____

Tester: _____ Date: _____

Comments: _____

_____

2.2 Provision Agency with Talk Groups and Subscriber Units in the UAS

Purpose: **Demonstrate the capability to add talk-groups and users to the Agency accounts in the UAS.**

Expected Results: **This test will show that a user can add a new talk group and users to the system.**

Setup: **System/Region/Agency level access to the UAS or a UAS client.**

Talk Groups				
Name	Description	SPNI	Property Id	Priority Id
64000ALL	TG64000 P25	Full Rate All Call	1	3
64100ALL	TG64100 P25	Full Rate All Call	1	3
64101TCL	TG64101 P25	Full Rate Conf Med Priority	1	4
64102TCM	TG64102 P25	Full Rate Conf Med Priority	1	4
64103TCM	TG64103 P25	Full Rate Conf Med Priority	1	4
64104TCM	TG64104 P25	Full Rate Conf Med Priority	1	4
64105TCM	TG64105 P25	Full Rate Conf Med Priority	1	4
64106TCH	TG64106 P25	P25 Full Rate Conf High Priority	1	4

Radios						
Description	RSI	Protocol Mask	Status	Sub Type	Assigned End User	Algorithm Support
Radio1	9980001	P25	Enabled Unit	Harris P5400	010:998:0001	AES
Radio2	9980002	P25	Enabled Unit	Harris P5400	010:998:0002	AES
Radio3	9980003	P25	Enabled Unit	Harris XG-75 Portable	010:998:0003	AES
Radio4	9980004	P25	Enabled Unit	Harris XG-75 Portable	010:998:0004	AES
Console9101	9989101	P25	Enabled Unit	Maestro Console	010:998:9101	AES
Radio5	9980005	P25	Enabled Unit	Harris XG-75 Portable	010:998:0005	AES
Radio6	9980006	P25	Enabled Unit	Harris XG-75 Portable	010:998:0006	AES
Radio7	9980007	P25	Enabled Unit	Harris XG-75 Portable	010:998:0007	AES
Radio8	9980008	P25	Enabled Unit	Harris XG-75 Portable	010:998:0008	AES
Radio9	9980009	P25	Enabled Unit	Harris XG-75 Portable	010:998:0009	AES
Radio10	9980010	P25	Enabled Unit	Harris XG-75 Portable	010:998:0010	AES

Execution:

1. Browse to the UAS at the address of 'https://s0u1uas.vida.local:8443/nas'

2. Log into the UAS with one of the default accounts.

3. Under agency 998 create a talk group by select 'R/W Talk Group' , select Agency/ "agency name"/ R/W Talk Group.

4. Click 'Add' and then on the Talkgroup Detail screen input the TG ID in the table below. All setting not listed use auto setting for setting not listed. Click OK and download.

   - Verify the talk group has been added to the list of Talkgroups

5. Using Putty on an SMT log into one traffic controller at each control point for simulcast and each site for multisite and issue the command 'show gdb'

   - Verify that group 64454 exits in the traffic controllers data base.

6. Once the group has been verified, delete it from the UAS.

TG Id	Name	Description	SPNI	Property Id
64454	64454ANA	Half Rate Low Priority	1	3

Priority Id	Coverage	Valid Coverage
5	P25Sites_PSAPs	P25Sites_PSAPs

Results (Pass/Fail) _____

Tester: _____ Date: _____

Comments: _____

_____

_____

2.3 Dynamic Regroup from the UAS

Purpose: **Demonstrate the ability to dynamically regroup Subscriber units from the UAS.**

Expected Results: **This test will combine selected talk groups into a single interop group.**

Setup: **Radios must have "Allow P25T Unsolicited Dynamic Regroup" checked in the radio personality under General Options.**

Radio Description	Radio Lid	Talk Group Description	Talk Group ID
Radio 1	9980001	TG64051 P25	64001
Radio 2	9980002	TG64052 P25	64002
Radio 3	9980003	TG64053 P25	64003

Execution:

1. From the UAS, select the 'Regroup' tab and select 'Regroup Profile'

2. Click 'Add' to add the profile detail, name the group 'Regroup1' and use 'Regoup1 test' for the description. Define a regroup profile by adding a regroup description and select talk group TG64003 P25. Select 'OK' and then save the changes to the UAS

3. Click 'End User Group' and click 'Add'. Name the group 'Regroup1' and enter the description of 'Regroup1 test'. Select the 998 agency from the 'Select a Scope' drop down box. Add Radio 1 and Radio 2 to the 'Selected' windows and select 'OK' to close the 'End User Group Detail'. Then click the 'Save' button to down load the new regroup.

4. Click 'Define Regroup' and click 'Add' Name the regroup 'Regoup1' and make the description 'Regroup1 test'. Change the 'Profile Name' to 'Regroup1' and change the 'End User Group id to 'Regroup1'. Click 'OK' and save to click 'Save' the changes to the UAS.

5. Click 'Manage Regroup' check the box for 'Regoup1' and select the button for 'Regroup' and click 'Save' to start the regroup.

   - Verify that Radio 1 and Radio 2 are forced to TG64003 P25.

6. At Radio 1 and Radio 2, attempt to change talk groups away from TG64003 P25. Verify that both radios are forced to remain on TG64103 P25.

7. PTT Radio 1 on TG64003 P25. Verify that Radio 3 hears audio on TG64003 P25 and can respond.

8. Clear the dynamic regroup from the UAS client. Verify that both Radio 1 and Radio 2 are no longer forced to TG64003 P25 (i.e., they can select other predefined Talk-Groups).

Results		(Pass/Fail)	_____
Tester:	_____	Date:	_____
Comments:	_____		
	_____		
	_____		

2.4 Unit Deregistration

Purpose: **Demonstrate that Subscriber units will automatically deregister after a period of inactivity.**

Expected Results: **This test will show that inactive radios will not create traffic load demand.**

Setup: **Only the radio for this test should be on talk group TG64001 P25. All other radios should be on other talk groups or off.**

Radio Description	Radio Lid	Talk Group Description	Talk Group ID
Radio 1	9980001	TG64001 P25	64001
Console 9101	9989101	TG64001 P25	64001

Execution:

1. PTT Console 9101 on TG64001 and verify it communicates on the system to Radio 1. Return call from Radio 1 to Console 9101 on TG64001.

2. Turn off radio 1 and wait for expiration of the radio timeout period.

3. PTT Console 9101 on talk group on TG64001

   - Verify no channels are brought up at the sites, because there is no demand for it at the sites.

Results (Pass/Fail) _____

Tester: _____ Date: _____

Comments: _____

_____

_____

2.5 Unit Enable/Disable from the UAS

Purpose: **Demonstrate the ability to disable a lost/stolen radio from the UAS.**

Expected Results: **This test will disable & re-enable a designated radio.**

Setup: **Obtain 2 radios switched to the same unencrypted group and note the IDs. Switch on the radios and ensure that they communicate. Verify all sites are connected to the NSC.**

Note: **The test will automatically delete the encryption key from the radio (if applicable). To restore unit encrypted functionality, the radio must have the key re-installed.**

Execution:

1. Select TG64001 P25 on both radios

   - Verify that the radios can communicate.

2. From the UAS:
   a. Click UNIT 9880004 ENABLE/DISABLE.
   b. Under the UNIT Enable/Disable tab, enter the ID of radio 1 to be modified.
   c. Select the DISABLE button and check the status.

   - Attempt to PTT Radio 9880004 and verify that it will not communicate with the other encrypted radios.

   - PTT radio 9880001 and verify that radio 9880005 cannot receive the call.

3. Enable the ID of radio 9880005.

   - Verify that the Enable/Disable screen indicates that the Current State of the radio is enabled.

   - Confirm that the radios can communicate in unencrypted mode.

4. Switch off radio 9880005 and disable it from the Enable/Disable screen.

   - ☐ Verify that the desired state is Disabled and the Current State is Enabled.
   - ☐ Switch on the radio and verify that, it becomes disabled.
   - ☐ Verify that the State settings change to Disabled and that the radios cannot communicate.

5. Enable the radios

   - ☐ Verify that radios can communicate in unencrypted mode.

Results		(Pass/Fail)	
Tester:		Date:	
Comments:			

2.6 UAS Site Adjacency Configuration

Purpose: **Demonstrate the capability to configure site adjacencies in the UAS.**

Expected Results: **Site adjacencies will be successfully configured and modified.**

Setup: **UAS installed and functioning on System network.**

Execution: Basic test is to follow the manual and SRN instructions to configure site adjacencies using the new graphical interface.

1. Log onto UAS.
2. Go to System > System Properties > Site adjacency.
3. Select a site on the left side to configure for adjacency information.
4. Use the left hand side to add adjacencies for the site.
   - Confirm the adjacent sites are removed from the non-adjacent site list and display correctly on the right side.
5. Use the right hand side to remove a site adjacency.
   - Confirm the removed adjacency disappears on the right side and is displayed as a non-adjacent site on the left side.

Results	(Pass/Fail) _____
Tester: _____	Date: _____
Comments: _____	
_____	
_____	

2.7 Radio Detach

Purpose:	**Confirms the site will send a radio detach command when its configured registration timer expires.**
Expected Results:	**The radio reregisters on the site in response to the radio detach command.**
Setup	**Program site with a radio registration age timer (in UAS under system> Protocol timer > radio re registration timer) set to 5 minutes and two radios programmed for operation on the site.**

Execution:

1. Power up site
2. Power up one radio
   - ☐ Confirm the radio registers on the site.
3. After two minutes power up the second radio
   - ☐ Confirm the radio registers on the site.
4. Wait three minutes
   - ☐ Confirm the first radio registers on the site again.
5. Wait two minutes
   - ☐ Confirm the second radio registers on the site.
6. Reprogram the site for the default registration timer setting.

Results		(Pass/Fail)	_____
Tester:	_____	Date:	_____
Comments:	_____		
	_____		
	_____		

3. ENCRYPTION

3.1 Data on a Unencrypted Radio with Unencrypted Radio

Purpose: **Confirm the when a radio does not have the encryption key it does not communicate with the Encrypted Data Terminal. This proves that the EDT will only communicate with an encrypted radio using encrypted communications.**

Expected Results: **The radio can't be pinged and the radio personality can't be read/programmed.**

Setup: **This test requires: section 'Unit Enable/Disable from the UAS' has been performed, radio 9880005 is enabled but not encrypted, needs to run from edata terminal, edata setup not set to best effort.**

Execution:

1. From the edata terminal.

   - ☐ Verify that a host can't ping the radio.
   - ☐ Verify the radio personality can't be read.

Results		(Pass/Fail)	
Tester:		Date:	
Comments:			

3.2 Data on a Unencrypted Radio with Encrypted Radio

Purpose:	**Confirm the when a radio does have the encryption key it can communicate with the Encrypted Data Terminal.**
Expected Results:	**The radio can be pinged and the radio personality can be read/programmed.**
Setup:	**This test requires: Radio 9880004 is enabled and encrypted, needs to run from edata terminal, edata setup not set to best effort.**

Execution:

2. From the edata terminal.

   - ☐ Verify that a host can ping the radio.
   - ☐ Verify the radio personality can be read.

Results		(Pass/Fail)	_____
Tester:	_____	Date:	_____
Comments:	_____		
	_____		
	_____		

4. OVER THE AIR REKEYING (OTAR)

4.1 UKEK a Radio

Purpose: **This test is setup to verify the KMFs ability to make UKEK files the radios can use.**

Expected Results: **The radio should accept the UKEK file developed by the KMF.**

Setup: **This test requires a computer that is on the IP network and has 'Harris Key Manager' installed and running. This test also requires three radios programmed with a talk group utilizing an AES encryption key. All radios should be feature encrypted and enabled for OTAR operation. Two radios should have keys and one radio should not have keys.**

Execution:

1. Log into the KMF with the administrator level Active Directory Account
2. Open the 'Network KMF Management'
3. Select the UKEK tab
4. Change the 'Save As' text field to '\\fileshare\fileshare\kmf_files\radio_ukek'
5. Generate the UKEK file by selecting the 'Export UKEK' button
6. Select the 'SLN Bindings' tab
7. Change the 'Save As' text field to '\\fileshare\fileshare\kmf_files\radio_bindings'
8. Generate the bindings by selecting 'Generate SLN Bindings Report'. This file will be used in a later test.
9. On a computer with 'Harris Key Manager' installed, save the files '\\fileshare\fileshare\kmf_files\radio_bindings' and '\\fileshare\fileshare\kmf_files\radio_ukek' to the local computer.
10. Start 'Harris Key Manager' and connect the radio to the local computer.
11. Select 'Tools' -> 'Key Load Wizard' to open key load wizard

12. Select ‘Next’ -> Load a UKEK file into one or more devices” and open the UKEK file in step 9 and select ‘Next’

13. Once the UKEKs are loaded select ‘Next’

14. Choose the com port

15. Power on the radio and put the radio into Key Load Mode

16. Select ‘Load’ to load UKEK into the radio

17. Perform steps 7 – 13 for all radios that need keys.

- ☐ Verify all radio can communicate using an encrypted talk group.

Results		(Pass/Fail)	_____
Tester:	_____	Date:	_____
Comments:	_____		
	_____		
	_____		

4.2 Warm starting a radio from the UAS Key Management Application

Purpose:	**This will test the system's ability to push encryption keys to a radio and the radio to hear other radios on the encrypted talk group.**
Expected Results:	**The radio will accept the keys from the system and be able to communicate with other encrypted radios on an encrypted talk group.**
Setup:	**This test requires three radios programmed with a talkgroup utilizing an AES encryption key. The radios and talkgroup need to be in a test crypto net in the UAS Key Management Application. The radios should be both feature encrypted and enabled for OTAR operation. The radios being used in this test should have their UKEK's loaded but not have any traffic encryption keys. (Delete Keys if required)**

Execution

1. PTT all three radios

   - ☐ Verify all three radios show "No Key 0" when they are PTT'ed.

2. Put all three radios on the encrypted talk group but power off Radio 3.

3. From the UAS, warm start radios 1, 2, and 3.

   - ☐ The UAS will report "Warm Starting" for all three radios.

4. After the operation is complete, refresh the UAS screen.

   - ☐ Verify the UAS reports "Warm Started Success" for radios 1 and 2 and "Warm Start Failed" for Radio 3.

5. Turn on Radio 3. PTT radio 1 on the encrypted talk group and talk.

   - ☐ The transmit (TX) indicator should turn on and be amber at radio 1.

   - ☐ Verify that radio 2 decrypts the call's audio.

   - ☐ Radio 3 should hear garbled audio.

6. From the UAS, warm start Radio 3 again.

- ☐ The UAS will report “Warm Starting” for Radio 3.

7. Again PTT radio 1 on the encrypted talk group and talk.

   - ☐ Radio 1’s transmit (TX) indicator should turn on and be amber.
   - ☐ Verify that radio 2 and 3 now decrypt the call’s audio.

Results	(Pass/Fail) _____
Tester: _____	Date: _____
Comments: _____	
_____	
_____	

4.3 Rekeying and Changing Over a Crypto Net from the UAS

Purpose: **This test will show that the system can change the encryption keys to a new set of keys.**

Expected Results: **After this tests is complete the radio will be able to communicate with the new set of keys sent by the system**

Setup: **This test requires three radios programmed with a talk group utilizing an AES encryption key. The radios and talk group need to be in a test crypto net in the UAS Key Management Application. All radios should be feature encrypted and enabled for OTAR operation. The radios should have been warm started previously. If a console and/or GWB are present in the system, then these devices should be included in this test also. They need to be in the same test crypto net as the radios and be programmed with the test talk group. They should have been warm started previously.**

Execution:

1. Put radios 1, 2 and 3 on the encrypted talk group.
   - Verify that all 3 radios and any consoles and/or GWB's can transmit and receive on the encrypted talk group.
2. Leave radios 1 and 2 powered on and power off Radio 3.
3. From the UAS, rekey the crypto net. The UAS will report "Rekeying" for the crypto net.
4. Select the report icon for the crypto net.
   - Radios 1 and 2 should be shown as "Rekeyed."
   - Any consoles and/or GWB's should also be shown as "Rekeyed."
   - Radio 3 should be shown as "Rekey Failed."
5. From the UAS, change over the crypto net. It should report "Changing Over" for the crypto net.
6. After the operation is complete, refresh the UAS screen. It should report "Changing Over Complete" for the crypto net

7. Turn on Radio 3. PTT radio 1 on the encrypted talk group and talk. The transmit (TX) indicator should turn on and be amber at radio 1.

    - Verify that radio 2 but not 3 decrypt the call's audio.
    - Verify that any consoles and/or GWB's decrypt the call's audio also.

8. PTT Radio 3 on the encrypted talk group and talk.

    - The transmit (TX) indicator should turn on and be amber at Radio 3.
    - Verify that radios 1 and 2 decrypt the call's audio.
    - Verify that any consoles and/or GWB's decrypt the call's audio.

9. From the UAS, do an end user level rekey on Radio 3 for that crypto net.

    - The UAS will report "Rekeying" for Radio 3.

10. After the operation is complete, refresh the UAS screen. It should now show "Rekeyed" for Radio 3.

    - Select the report icon for the crypto net. Radios 1, 2, and 3 will be shown as "Rekeyed."
    - From the UAS, do an end user change over on Radio 3 for the test crypto net. The UAS will report "Changing Over" for Radio 3.

11. Again PTT radio 1 on the encrypted talk group and talk.

    - Verify that Radio 1's transmit (TX) indicator turns amber.
    - Verify that radio 2 and 3 decrypt the call's audio.
    - Verify that any consoles and/or GWB's decrypt the call's audio also.

Results		(Pass/Fail)	
Tester:		Date:	
Comments:			

4.4 Zeroizing a Radio from the UAS Key Management Application

Purpose: **This test will verify the system's ability to delete the keys out of a radio that was encrypted.**

Expected Results: **The test will take a radio that has keys and can communicate with other encrypted radios, and remove the keys so the radio cannot communicate with other encrypted radios.**

Setup: **This test requires three radios programmed with a talk group utilizing an AES encryption key. The radios and talk group need to be in a test crypto net in the UAS Key Management Application. All radios should be feature encrypted and enabled for OTAR operation. The radios should have been warm started previously.**

Execution:

1. Put radios 1, 2 and 3 on the encrypted talk group.

   - ☐ Verify that all 3 radios can transmit and receive on the encrypted talk group.

2. From the UAS, zeroize Radio 3.

   - ☐ The UAS will report "Zeroizing" for Radio 3 with the date and time updating to reflect the date and time the operation was initiated.

   - ☐ After the operation is complete, refresh the UAS screen. Verify the UAS reports "Zeroized" for Radio 3.

3. PTT radio 1 on the encrypted talk group and talk.

   - ☐ The transmit (TX) indicator should turn on and be amber at radio 1.

   - ☐ Verify that radio 2 decrypts the call's audio.

- Radio 3 should hear garbled audio.
- Verify the receive indicator is amber on both radios and the ID of radio 1 should be seen at both radios 2 and 3.
- Verify Radio 3 shows “No Key 0” when it is PTT’ed on the encrypted talk group.

Results		(Pass/Fail)	_____
Tester:	_____	Date:	_____
Comments:	_____		
	_____		
	_____		

4.5 Rekey A Radio From the Radio

Purpose: **This test will test the system's ability to send keys to a radio when the radio requests the keys.**

Expected Results: **The test will take a radio that has keys and can't communicate with other encrypted radios, and add keys to the radio so it can communicate with the system.**

Setup: **This test requires three radios programmed with a talk group utilizing an AES encryption key. The radios and talk group need to be in a test crypto net in the UAS Key Management Application. All radios should be feature encrypted and enabled for OTAR operation. One of the radios should be the radio that was zeroized in the previous test.**

Execution:

1. Key Radio 1 on an encrypted talk group.

   - Radio 1 should display 'No key' Radio 2, and 3 should not here the call.

2. From the menu on Radio 1 select 'Rekey' to request new key for Radio 1.

   - Once the radio receives the encryption keys, key radio 1 and verify Radio 2, and 3 hear the call.

Results		(Pass/Fail)	
Tester:		Date:	
Comments:			

4.6 UKEK and Console

Purpose: **This test is setup to test the KMFs ability to make UKEK files the console can use.**

Expected Results: **The console should accept the UKEK file developed by the KMF.**

Setup: **This test requires three radios programmed with a talk group utilizing an AES encryption key. All radios should be feature encrypted and enabled for OTAR operation.**

Execution:

1. Log into the KMF with the administrator level Active Directory Account
2. Open the 'Network KMF Management'
3. Select the UKEK tab
4. Change the 'Save As' text field to a '\\fileshare\fileshare\kmf_files\console_ukek'
5. Generate the UKEK file by selecting the 'Export UKEK' button
6. Select the 'SLN Bindings' tab
7. Change the 'Save As' text field to a '\\fileshare\fileshare\kmf_files\console_bindings'
8. Generate the bindings by selecting 'Generate SLN Bindings Report' this file will be used in a later test.
9. On a console download and save the files '\\fileshare\fileshare\kmf_files\console_bindings' and '\\fileshare\fileshare\kmf_files\console_ukek' to the local console.
10. Start the console application.
11. With an encrypted radio make a call on an encrypted talkgroup,
    - the radio with encryption should play the call,
    - the console will not because it does not have keys.
12. Select 'Maestro Man Application' from the lower right hand side to the console desktop.

13. Select ‘Load Encryption’ this will bring up a window were the binding and UKEK can be loaded into the console

14. Select the button next to the ‘UKEK’ text field and select the ukek saved in step 10.

15. Select the button next to the ‘binding’ text field and select the binding saved in step 10.

16. Close the ‘Load Encryption’ pop up.

17. With an encrypted radio make a call on an encrypted talkgroup, the radio with encryption should play the call, the console now has keys so it should play the call also.

18. Choose the talkgroup that the radios are on and select the ‘Private’ button, this will make the console switch the talkgroup to encrypted mode, the console will display ‘PVT’ on the talkgroup button.

19. PTT the console the call should be heard on the encrypted radios.

Results		(Pass/Fail)	_____
Tester:	_____	Date:	_____
Comments:	_____		
	_____		
	_____		

4.7 Warm Starting a Console from the UAS Key Management Application

Purpose: **This will test the system's ability to push encryption keys to a console.**

Expected Results: **The UAS will push keys to the console to allow for communicate on an encrypted talk group.**

Setup: **This test requires three radios programmed with a talkgroup utilizing an AES encryption key. The radios and talkgroup need to be in a test crypto net in the UAS Key Management Application. All radios should be feature encrypted and enabled for OTAR operation. The radios should have their UKEK's loaded but not have any traffic encryption keys. (Delete Keys if required)**

Execution:

1. Attempt to switch a talk group to encrypted mode by selecting the talk group and selecting the private button.

   - Verify that console will not allow you to encrypt the talkgroup because the console does not have the encryption keys.

2. From the UAS, warm start the console. After the operation is complete, refresh the UAS screen.

   - The UAS will report "Warm Started Success" the console.

3. Attempt to switch a talk group to encrypted mode by selecting the talk group and selecting the private button.
   - The console will now allow you to encrypt the talkgroup because the console has the encryption keys.

4. PTT the console and the encrypted radios should hear the call.

Results	(Pass/Fail) _____
Tester: _____	Date: _____
Comments: _____	
_____	
_____	

4.8 Single Site Encrypted Group Test Call

Purpose: **The Group Test Call will show that the site will allow a radio to communicate using a group call**

Expected Results: **The test will demonstrate that all radios assigned to a common group will hear a call and all radios assigned to an uncommon group will not hear the call**

Setup: **Set Radios 1, 2, and 3 to (Group A) per test group structure. Make sure Scan is turned OFF. All radios should not be in encrypted mode but have encryption keys.**

Radio Description	Radio Lid	Talk Group Description	Talk Group ID
Radio 1	998001	TG64001 P25	64001
Radio 2	998002	TG64001 P25	64001
Radio 3	998003	TG64001 P25	64001

Execution:

1. PTT Radio 1 and talk.
   - The transmit (TX) indicators should turn on at Radio 1.
   - Audio should be heard in Radios 2 and 3.
   - The ID of Radio 1 should be seen on Radios 2 and 3.
2. Set Radio 3 to (TG64002 P25). PTT on Radio 1 and talk.
3. The transmit (TX) indicators should turn on at Radio 1.
   - Audio should be heard in Radio 2 only.
   - The ID of Radio 1 should be seen at Radio 2 only.
4. Repeat sets 1-4 for encrypted mode

Results		(Pass/Fail)	_____
Tester:	_____	Date:	_____
Comments:	_____		
	_____		
	_____		

4.9 Single Site Encrypted Individual (Private) Call

Purpose: **The Individual Call test will verify that the site will allow two radios to communicate on a private call**

Expected Results: **This test will demonstrate that two radios can communicate on an individual call and other radios will not hear the private conversation.**

Setup: **Set Radios 1, 2, and 3 to (TG64001) per test group structure. All radios should not be in encrypted mode but have encryption keys.**

Radio Description	Radio Lid	Talk Group Description	Talk Group ID
Radio 1	998001	TG64001 P25	64001
Radio 2	998002	TG64001 P25	64001
Radio 3	998003	TG64001 P25	64001

Execution:

1. Using the Radio 1, select the pre-stored ID of Radio 2 or enter the Radio 2 ID directly from the keypad, and PTT Radio 1.

    - Verify that Radio 2 receives the call and displays the ID of Radio 1. Verify that Radio 3 remains idle.

2. Release the PTT on Radio 1 and immediately PTT on Radio 2.

    - Verify that Radio 1 receives the call and displays the ID of Radio 2.

    - Verify Radio 3 remains idle.

3. Using the Radio 1, select the pre-stored ID of Radio 3 or enter the Radio 3 ID directly from the keypad, and PTT Radio 1.

    - Verify that Radio 3 receives the call and displays the ID of Radio 1.

    - Verify that Radio 6 remains idle.

4. Release the PTT on Radio 1 but do not immediately PTT Radio 3.

    - ☐ Verify that Radio 3 gives a Call Back Alert (WHC-"Who Has Called") Indication.

5. Make a return call from Radio 3 back to Radio 1.

    - ☐ Verify that Radio 1 receives the call and displays the ID of Radio 3.

    - ☐ Verify Radio 2 remains idle.

6. Repeat steps 1-8 for encrypted mode.

Results		(Pass/Fail)	
Tester:		Date:	
Comments:			

4.10 Multi-Site Encrypted Group Test Call

Purpose: **The Group Test Call will show that the site will allow a radio to communicate using a group call**

Expected Results: **The test will demonstrate that all radios assigned to a common group will hear a call and all radios assigned to an uncommon group will not hear the call**

Setup: **Set Radios 1, 2, and 3 to (Group A) per test group structure. Make sure Scan is turned OFF. All radios should not be in encrypted mode but have encryption keys.**

Radio Description	Radio Lid	Talk Group Description	Talk Group ID
Radio 1	998001	TG64001 P25	64001
Radio 2	998002	TG64001 P25	64001
Radio 3	998003	TG64001 P25	64001

Execution:

1. PTT Radio 1 and talk.
   - The transmit (TX) indicators should turn on at Radio 1.
   - Audio should be heard in Radios 2 and 3.
   - The ID of Radio 1 should be seen on Radios 2 and 3.
2. Set Radio 3 to (TG64002 P25), PTT on Radio 1 and talk.
   - The transmit (TX) indicators should turn on at Radio 1.
   - Audio should be heard in Radio 2 only.
   - The ID of Radio 1 should be seen at Radio 2 only.
3. Repeat sets 1-4 for encrypted mode

Results		(Pass/Fail)	
Tester:		Date:	
Comments:			

4.11 Multi-site Encrypted Individual (Private) Call

Purpose: **The Individual Call test will verify that the site will allow two radios to communicate on a private call**

Expected Results: **This test will demonstrate that two radios can communicate on an individual call and other radios will not hear the private conversation.**

Setup: **Set Radios 1, 2, and 3 to (TG64001) per test group structure. All radios should not be in encrypted mode but have encryption keys.**

Radio Description	Radio Lid	Talk Group Description	Talk Group ID
Radio 1	998001	TG64001 P25	64001
Radio 2	998002	TG64001 P25	64001
Radio 3	998003	TG64001 P25	64001

Execution:

1. Using the Radio 1, select the pre-stored ID of Radio 2 or enter the Radio 2 ID directly from the keypad, and PTT Radio 1.

   - Verify that Radio 2 receives the call and displays the ID of Radio 1.
   - Verify that Radio 3 remains idle.

2. Release the PTT on Radio 1 and immediately PTT on Radio 2.

   - Verify that Radio 1 receives the call and displays the ID of Radio 2.
   - Verify Radio 3 remains idle.

3. Using the Radio 1, select the pre-stored ID of Radio 3 or enter the Radio 3 ID directly from the keypad, and PTT Radio 1.

   - Verify that Radio 3 receives the call and displays the ID of Radio 1.

- ☐ Verify that Radio 6 remains idle.

4. Release the PTT on Radio 1 but do not immediately PTT Radio 3.

   - ☐ Verify that Radio 3 gives a Call Back Alert (WHC-"Who Has Called") Indication.
   - ☐ Then make the return call from Radio 3 back to Radio 1.
   - ☐ Verify that Radio 1 receives the call and displays the ID of Radio 3.
   - ☐ Verify Radio 2 remains idle.

5. Repeat steps 1-8 for encrypted mode.

Results	(Pass/Fail) _____
Tester: _____	Date: _____
Comments: _____	
_____	
_____	

4.12 Console Encrypted Group Test Call

Purpose: **The Group Test Call will show that the site will allow a radio to communicate using a group call**

Expected Results: **The test will demonstrate that all radios assigned to a common group will hear a call and all radios assigned to an uncommon group will not hear the call**

Setup: **Set Radios 1, 2, and 3 to (Group A) per test group structure. Make sure Scan is turned OFF. All radios should not be in encrypted mode but have encryption keys.**

Radio Description	Radio Lid	Talk Group Description	Talk Group ID
Radio 1	998001	TG64001 P25	64001
Radio 2	998002	TG64001 P25	64001
Radio 3	998003	TG64001 P25	64001

Execution:

1. PTT Radio 1 and talk.
   - The transmit (TX) indicators should turn on at Radio 1.
   - Audio should be heard in Radios 2 and 3.
   - The ID of Radio 1 should be seen on Radios 2 and 3.
2. Set Radio 3 to (TG64002 P25). PTT on Radio 1 and talk.
   - The transmit (TX) indicators should turn on at Radio 1.
   - Audio should be heard in Radio 2 only.
   - The ID of Radio 1 should be seen at Radio 2 only.
3. Repeat sets 1-4 for encrypted mode

Results		(Pass/Fail)	_____
Tester:	_____	Date:	_____
Comments:	_____		
	_____		
	_____		

4.13 Console Encrypted Individual (Private) Call

Purpose: **The Individual Call test will verify that the site will allow two radios to communicate on a private call**

Expected Results: **This test will demonstrate that two radios can communicate on an individual call and other radios will not hear the private conversation.**

Setup: **Set Radios 1, 2, and 3 to (TG64001) per test group structure. All radios should not be in encrypted mode but have encryption keys.**

Radio Description	Radio Lid	Talk Group Description	Talk Group ID
Radio 1	998001	TG64001 P25	64001
Radio 2	998002	TG64001 P25	64001
Radio 3	998003	TG64001 P25	64001

Execution:

1. Using the Radio 1, select the pre-stored ID of Radio 2 or enter the Radio 2 ID directly from the keypad, and PTT Radio 1.

2. Verify that Radio 2 receives the call and displays the ID of Radio 1. Verify that Radio 3 remains idle.

3. Release the PTT on Radio 1 and immediately PTT on Radio 2.

4. Verify that Radio 1 receives the call and displays the ID of Radio 2. Verify Radio 3 remains idle.

5. Using the Radio 1, select the pre-stored ID of Radio 3 or enter the Radio 3 ID directly from the keypad, and PTT Radio 1.

6. Verify that Radio 3 receives the call and displays the ID of Radio 1. Verify that Radio 6 remains idle.

7. Release the PTT on Radio 1 but do not immediately PTT Radio 3. Verify that Radio 3 gives a Call Back Alert (WHC-"Who Has Called") Indication. Then make the return call from Radio 3 back to Radio 1.

8. Verify that Radio 1 receives the call and displays the ID of Radio 3. Verify Radio 2 remains idle.

9. Repeat steps 1-8 for encrypted mode.

Results		(Pass/Fail)	_____
Tester:	_____	Date:	_____
Comments:	_____		
	_____		
	_____		

5. High Availability Wide Area Router Failure

Purpose: **Demonstrate the capabilities of the system to work after a WAR failure**

Expected Results: **System components that are set-up with High Availability will continue to work after a WAR failure.**

Setup: **These tests are setup to be run twice, once on each router. So after completing step 4 restart the WAR router if not already running wait 20 minutes, and rerun the tests for the second router. These tests will simulate a WAR failure by disconnecting it from the Wide Area Network, so the WAR to WAN connection will need to be known.**

1. Use Radio 1 to initiate a call
   - Verify that the call is heard on the Radio 2. Keep the call active during fail-over.
2. Use Radio 3 to initiate a call
   - Verify that the call is heard on Radio 4. Keep the call active during fail-over.
3. Log in to s0u1nss and s0u2nss, and change your user to the root user by typing ‘su –‘and entering the password.
4. Type ‘HArunning’ into both NSSs, one will report that it is the ‘Stand By’ and one will report that it is the ‘Primary’ log the information in the chart below.

	Name Of Primary NSS	Name of Primary WAR	Name of Primary RNM	Name of Primary RSM	Shutdown Time
Test 1					
Test 2					

5. Log into the 'Primary' WAR that is associated with the 'Primary' NSS. Shut off the connection to the WAN by performing a shut on the necessary ports.

   - The call from Radio 3 to Radio 4 will be dropped.
   - The call from radio 1 to 2 will continue and the console will lose connectivity to the VNIC.
   - Verify that after a short delay, the Backup server NSS2 automatically takes over as the primary server.

Results		(Pass/Fail)	_____
Tester:	_____	Date:	_____
Comments:	_____		
	_____		
	_____		

5.1 UAS Site Access Control for Invalid User ID

Purpose: **This test will demonstrate access control for Subscriber units with invalid radio IDs and High Availability of the RSM.**

Expected Results: **This test will deny a radio with an invalid Subscriber ID access to the system. Once the radio is added to the system the primary RSM will download it to the sites and allow the radio access. When the primary RSM is turned off and the radio is deleted from the UAS the secondary RSM will delete the radio from the system. Once the radio is deleted from the system the radio will again be denied access.**

Setup: **Use the table below to set up the new radio in the UAS**

Voice End User								
User Id	**Name**	**Description**	**Personality**	**User Privilege**	**Enable P25 AES OTAR**	**Manually -Keyed**	**P25 Voice Auth**	**Preferred Vocoder**
010:998:9150	Rad9150	Radio9150	Pers1	998_10_supervisor	FALSE	FALSE	FALSE	P25 Full Rate
OS Voice Auth	**Transc Allowed Flag**							
FALSE	TRUE							

Subscriber Unit							
Description	**RSI**	**Electronic Serial Number**	**Protocol Mask**	**Status**	**Sub Type**	**Assigned End User**	**Algorithum Support**
Radio9150	99899150	109989150	P25	Enabled Unit	Harris P5400	010:998:9105	AES

Execution:

1. Loin into a site traffic controller issue a “show udb 109989150

    - Verify the radio is not present in the traffic controller database

2. Program Radio 9801 with an ID 9989150.

3. Attempt to PTT Radio 9150.

   - ☐ Verify access to the site is denied and audio is not heard on Radio 2.

   - ☐ Verify the system is still functional by PTT Radio 2 and verify the audio is heard on Radio 3.

4. Use the supplied table to enter radio 109989150 in to the UAS database.
   a. Select Agency/"agency name"/Voice End User. Click Add Entry and then on the End User Detail screen input the User ID, password ("p25user"), Name, Description, etc. of the user. Click OK and download.
      - ☐ Verify the user ID has been added to the list of users
   b. Select Agency/"agency name"/Subscriber Unit and enter the appropriate User ID, IP Address, and ESN for the user created in step 7. Click OK and download.

5. Loin into a site traffic controller issue a "show udb 109989150

   - ☐ Verify the radio is now present in the traffic controller database

6. Key radio 9150

   - ☐ Verify access to the site is permitted and audio is heard on radio.

7. Restart radio 9150 and PTT the radio

   - ☐ Verify access to the site is permitted and audio is heard on radio 9012.

8. Delete 10998999150 from the UAS database

9. Key radio 9150 from UAS

   - ☐ Verify access to the site is not permitted and audio is not heard.

Results		(Pass/Fail)	_____
Tester:	_____	Date:	_____
Comments:	_____		
	_____		
	_____		

5.2 Site Activity using the Activity Warehouse

Purpose: **Demonstrate the capability to create various Agency level system usage reports.**

Expected Results: **This test will create an Agency level user reports.**

Setup: **Ensure radio traffic has occurred across the network recently. If necessary or desired, place some calls with a known radio ID on multisite talk groups prior to running the test for reference during the test.**

Execution:

1. Log into the SMT PC as a System level administrator.
2. Open Internet Explorer and Browse to 'https://*'hostname of RSM'*/reports' and log in with active directory credentials.
3. Select 'Call Activity' enter the time to run the report for two hours before this test.
4. Enter additional report information required.
5. Click on "View Report"

    - Check to make sure that there is call activity. These reports can be up to 2 hours behind.

Results		(Pass/Fail)	
Tester:		Date:	
Comments:			

5.3 VIDA REGIONAL NETWORK MANAGER (RNM)

Purpose: **Demonstrate the capability to monitor real-time call activity from the RNM.**

Expected Results: **This test will show active call traffic on specific talk groups and SIDs.**

Setup: **Administrator access to the RNM.**

Execution:

1. On a client computer, open the windows Internet Explorer and browse to https://s0u1rnm.vida.local/nmc and log in with an Active Directory account.

2. Choose the system map and select the ‘Launch Application’ button.

3. Open the Real-time tab and Click Site Calls.

4. Select the site and expand.

5. Check the box next to the channels and select to add the channels to the target list. Select the ‘ok’ button to launch the application.

6. Place a group call from Radio 1 to Radio 2 on the site.

   - Verify that the event viewer displays the talkgroup ID and calling party ID.
   - Verify the state changes from Free to Talk.
   - Verify the TG Alias displays the Group Number.

7. Use Internet Explorer to browse to https://s0u2rnm.vida.local/nmc and repeat test steps 1-6 for the second RNM.

Results		(Pass/Fail)	_____
Tester:	_____	Date:	_____
Comments:	_____		
	_____		
	_____		

5.4 Regional Network Manger Test

Purpose: **Demonstrate the capability to monitor system alerts from the RNM.**

Expected Results: **This test will show system level equipment icons.**

Setup: **Administrator access to the RNM.**

Execution:

1. On a client computer, open the windows Internet Explorer and browse to https://s0u1rnm.vida.local/nmc and log in with the active directory account.

2. Choose the system map and select the ‘Launch Application’ button. Select the ‘Network’ tab and expand the tree in the left hand panel until you can see a site in the right hand panel.

   - ☐ Verify the Infrastructure is presented.

   - ☐ Select an object and right click to select properties to view information related to the object.

3. Substitute https://s0u2rnm.vida.local/nmc and repeat test steps 1-3 for the second RNM.

Results		(Pass/Fail)	_____
Tester:	_____	Date:	_____
Comments:	_____		
	_____		
	_____		

5.5 RF System Alarms Indications are reported to the RNM

Purpose: **Demonstrate the capability to monitor system faults & alarms at the RNM.**

Expected Results: **System level equipment will indicate faults & alarms at the RNM.**

Setup: **Access to the site under test and the regional RNM. The alarm will need to be generated by equipment being physically powered-down. Note the time of the alarm condition for later tests. Call up the RNM Domain screen and verify that all map icons are either green or blue. On the Fault Browser screen delete any prior alarms. Internal Note: Harris should create a comprehensive table of specific system alarms to verify.**

Execution:

1. On a client computer, open the windows Internet Explorer and browse to https://s0u1rnm.vida.local/nmc and log in with an Active Directory account.

2. Choose the system map and select the 'Launch Application' button.

3. Select the 'Network' tab and expand the tree in the left hand panel until you can see a site in the right hand panel.

4. Generate an alarm on a device (see chart) by powering down or otherwise disabling the device.

   - Verify that the RNM indicates a site alarm for the affected device.

5. Turn the device back ON.

   - Verify that the device alarm clears and displays green.

6. Review alarm details by performing a Right Mouse Click on an Object. Select the desired menu option.

7. Repeat steps 1-4 for all equipment listed in the below chart.

8. Substitute https://s0u2rnm.vida.local/nmc and repeat test steps 1-5 for the second RNM.

Record the results below for each site. (Note: This form can be modified to reflect actual as-built alarms

Tester:		Results:	Date:	
Alarm #	Name	Pass/Fail	Remarks	
1	Traffic Controller			
2	Router			
3	Switch			
4	Network Sentry			
5	MME			

Results (Pass/Fail) _____

Tester: _____ Date: _____

Comments: _____

_____

_____

5.6 Network Sentry Site Alarm Indications are reported to the RNM

Purpose: **Demonstrate the capability to monitor site faults & alarms at the RNM.**

Expected Results: **Site level equipment will indicate faults & alarms at the RNM.**

Setup: **This test verifies that the Site & Shelter Alarms are connected to the new system and alarm names are programmed to show the alarm types and locations. Site specific digital alarm inputs connected to the alarm management system (NetGuardian or Network Sentry) alarm unit.**

Execution:

1. On a client computer, open the windows Internet Explorer and browse to https://s0u1rnm.vida.local/nmc and log in with the Active Directory account.

2. Choose the system map and select the 'Launch Application' button.

3. Select the 'Network' tab and expand the tree in the left hand panel until you can see a site in the right hand panel.

4. Select a physical site to test alarm inputs.

5. Create a condition that will either simulate an alarm (jumper alarm contacts) or the actual event to trigger each alarm.

    - Verify that the alarm is detected and displayed in the RNM Network Viewer and is listed in the Fault Browser

6. Clear the alarm condition

    - Observe that the alarm indication has cleared in both the Network Viewer and the Fault Browser

7. Repeat for each alarm and for each site in the system

8. Record the results below for each site.

Site #:			Site Name	
Tester:		Results:	Date:	
Alarm #	Name	Pass/Fail	Remarks	
1	Door			
2	Smoke Detector			
3	Heat Detector			
4	Building Low Temp			
5	Building High Temp			
6	Main Power Fail			
7	ATS Normal			
8	ATS Emergency			
9	Generator Low Oil			
10	Generator Over Temp			
11	Generator Over Crank			
12	ACH1 L.O.			
13	ACH2 L.O.			
14	Surge Arrestor 1			
15	Surge Arrestor 2			
16	Multicoupler Top			
17	Multicoupler Bottom			

Results		(Pass/Fail)	_____
Tester:	_____	Date:	_____
Comments:	_____		
	_____		
	_____		

5.7 Enterprise Network Manager (ENM)

Purpose: **Demonstrate the capability to monitor the Service enterprise system using the ENM.**

Expected Results: **Equipment will indicate faults & alarms at the ENM.**

Setup: **Valid domain account and System Management Terminal (SMT) access.**

1. Log on to the SMT using a valid domain account.
2. Log into S0U1ENM through the web service.
3. Choose the Explorer menu in the left panel.
4. Expand the NSC1 folder.
5. Click on the S0U1XCD object.
6. Verify X0U1XCD is online and functioning.
7. Log into the VMWare thick client.
8. Navigate to the S0U1XCD server.
9. In the management screen, click the suspend server option to temporarily take the server offline.
10. Go back to the ENM web page and refresh the S0U1XCD object in the right panel.
11. Verify through the alerts that the S0U1XCD has gone offline.
12. In the VMWare client, start the S0U1XCD server.
13. On the ENM Webpage, verify S0U1XCD is online and functioning.

Results		(Pass/Fail)	_____
Tester:	_____	Date:	_____
Comments:	_____		
	_____		
	_____		

5.8 Trouble Ticket Reporting – Opening Ticket

Purpose: **Demonstrate the capability to create trouble tickets for reported system issues.**

Expected Results: **Generation of trouble ticket and work order.**

Setup: **AMMS subsystem configured for new Service system. Proper authentication for AMMS.**

1. Create a test ticket by first opening the AMMS software application.
2. Click into “Open Work Orders”.
3. Click on the “new record” icon in toolbar.
4. Type X404 into equipment number field.
5. Click out of equipment number field.
6. Verify the work order auto populates with basic info.
7. Select work category from the drop down menu.
8. Use Minor Alarm definition.
9. Click into Problem field drop down menu.
10. Select Headset not working.
11. Select Tech from drop down.
12. Click on Save.
13. Verify the work order is created and is assigned a WO number.

Results		(Pass/Fail)	_____
Tester:	_____	Date:	_____
Comments:	_____		
	_____		
	_____		

5.9 Trouble Ticket Reporting – Closing Work Order

Purpose:	**Demonstrate the capability to close Work Orders for reported system issues.**
Expected Results:	**Closure of work order after issue has been resolved.**
Setup:	**AMMS subsystem configured for new Service system. Proper authentication for AMMS.**

1. Open AMMS and go to Open Work order.
2. Click on the open work order icon in toolbar.
3. Fill in the Tech Enroute, Tech On Site and Date completed fields.
4. Select repair code “Fixed” from drop down menu.
5. Copy and paste problem to problem tab.
6. Add/Annotate text in resolution tab. Example “011617 2015 GJR – Headset replaced”.
7. Click on save icon.
8. Select Open Work Orders.
9. Click on Go To Record Icon.
10. Enter the work order number created.
11. Click on Close work order “Close WO” in toolbar.

Results		(Pass/Fail)	_____
Tester:	_____	Date:	_____
Comments:	_____		
	_____		
	_____		

5.10 Trouble Ticket Reporting – Verifying Work Order Closure

Purpose: **Demonstrate the capability to verify a Work Order for a reported system issue has been closed.**

Expected Results: **Closure of work order after issue has been resolved.**

Setup: **AMMS subsystem configured for new Service system. Proper authentication for AMMS.**

1. Open AMMS and go to All Work Orders.
2. Click on go to Record and enter the work order number created.
3. Click OK.
4. When the work order comes up on screen, cycle through the fields to confirm correct data entry.
5. Close the AMMS subsystem.

Results		(Pass/Fail)	_____
Tester:	_____	Date:	_____
Comments:	_____		
	_____		
	_____		

5.11 P25 Station Reconfiguration using the Device Manger (Internal Test)

Purpose: **Demonstrate the capability to make configuration changes to the P25 stations.**

Expected Results: **This test will change the control channel parameter in a P25 MASTR V station.**

Setup: **Administrator access to the RSM and a site under test with at least 3 channels.**

Note: **Reconfiguration of a site requires using the Device Manager application to make changes. The Device Manager application runs under Microsoft Windows operating system, which may reside on various hardware platforms such as a Laptop PC, or system management terminal (SMT). Changes to site parameters for this test procedure will be executed from the RSM server using Device Manager.**

Execution:

1. Use remote desktop to log into the RSM as a System level administrator and launch the Device Manager application.

2. Access the screen to configure channel parameters.

3. Make a site configuration change, such as forcing the Control Channel to operate on just channels 1 & 2 of the site. Download changes to the site.

4. Force the Control Channel to rotate from Channel 1 to Channel 2 by pressing the reset button on the Traffic Controller card. Optionally reset one of the channels using Device Manager and observe the channel rotation.

    - Observe that the Control Channel rotates to Channel 2.

5. Once Channel 1 has rebooted, force the Control Channel to rotate from Channel 2 by pressing the reset button on Channel 2 Traffic Controller card. Optionally reset one of the channels using Device Manager and observe the channel rotation.

   - Observe that the Control Channel rotates back to Channel 1, rather than to Channel 3.

Results	(Pass/Fail) _____
Tester: _____	Date: _____
Comments: _____	
_____	
_____	

6. NSS SWITCHOVER

6.1 Unit 1 NSS Switchover

Purpose: **This test will verify if the primary NSS losses power it will fail over to the second NSS, the secondary NSS with take over the function of the primary NSS and restart multi-site call traffic.**

Expected Results: **The test will simulate NSS failure and show that the redundant NSS will restart call handing functionality. The calls between the radios (1 & 2) on the made site will operate normally during the failover, call between radio on separate sites (3 & 4) will drop for about 40 seconds. During the failover the console will lose connectivity to the system for about 40 seconds.**

Setup: **To start this test the VNIC needs to be on s0u1nss if it is not start with test 6.2 and perform this test after 6.2. Open a terminal screen. For single site simulcast system only ignore radios 1 and 2.**

Radio Description	Radio Lid	Talk Group Description	Talk Group ID	Site
Radio 1	9980001	TG64001 P25	64001	1
Radio 2	9980002	TG64001 P25	64001	1
Radio 3	9980003	TG64001 P25	64002	1
Radio 4	9980004	TG64001 P25	64002	2
Console 9101	9989101	TG64001 P25	64001 & 6002	

Execution:

1. Log into both NSS's
2. Open a terminal window and type 'su –' and type in the password to get root level access
3. Type 'HArunning' in to both terminal windows. The server that displays 'Running as Primary' is the primary.
4. Start calls with Radio 1, 3, listen to the calls with Radios 2, 3 and the Console.

5. Create power failure on Primary Network Switching Server by initiating a power off command in the NSS terminal window:
   a. For systems with NSS on Linux use 'shutdown –r now'
   b. For systems with NSS on Unix use 'shutdown –i6 –g0 –y'

   ☐ Primary NSS gives an alert message and goes down. After about 15 minutes the server will reboot.

   ☐ The call from Radio 3 to Radio 4 will be dropped. The call from radio 1 to 2 will continue and the console will lose connectivity to the VNIC.

   ☐ Verify that after a short delay, the Backup server NSS2 automatically takes over as the primary server.

6. On the RNM, verify that the;
   ☐ NSS1, MDIS, and VNIC icons turn red.
   ☐ NSS2, MDIS, and VNIC icons turn green.
   ☐ RNM reports NSS1, MDIS, and VNIC failure messages.

   ☐ Verify that the call between Radio 1 and Radio 2 continues to be heard on Radio 2 then drop the test call.

   ☐ After failover, verify that multi-site Group and Individual radio calls can be made between Radio 3 and Radio 4.

   ☐ Verify that NSS found in step 5 comes back into standby operation.

   ☐ Verify that the NSS1 Icon turns blue on RNM.

7. Wait 20 minutes for the two NSS servers to synchronize and replicate their databases.

Results	(Pass/Fail) _____
Tester: _____	Date: _____
Comments: _____	
_____	
_____	

6.2 Unit 2 NSS Switchover

Purpose: **This test will verify that if the secondary NSS losses power it will fail over to the primary NSS, the primary NSS with take over the function of the secondary NSS and restart multi-site call traffic.**

Expected Results: **The test will simulate NSS failure and show that the redundant NSS will restart call handing functionality. The calls between the radios (1 & 2) on the same site will operate normally during the failover, the call between radios (3 & 4) on separate sites (3 & 4) will drop for about 40 seconds. During the failover the console will lose connectivity to the system for about 40 seconds.**

Setup: **To start this test the VNIC needs to be on s0u2nss if it is not start with test 6.1 and perform this test after 6.1. Open a terminal screen. For single site simulcast system only ignore radios 1 and 2.**

Radio Description	Radio Lid	Talk Group Description	Talk Group ID	Site
Radio 1	9980001	TG64001 P25	64001	1
Radio 2	9980002	TG64001 P25	64001	1
Radio 3	9980003	TG64001 P25	64002	1
Radio 4	9980004	TG64001 P25	64002	2
Console 9101	9989101	TG64001 P25	64001 & 6002	
VCE Console		TG64001 P25	64001 & 6002	

Execution:

1. Log into both NSS's
2. Open a terminal window and type 'su –' and type in the password to get root level access
3. Type 'HArunning' in to both terminal windows. The server that displays 'Running as Primary' is the primary.
4. Start calls with Radio 1, 3, listen to the calls with Radios 2, 3 and the Console.
5. Create power failure on Primary Network Switching Server by initiating a power off command in the NSS terminal window:
    a. For systems with NSS on Linux use 'shutdown –r now'
    b. For systems with NSS on Unix use 'shutdown –i6 –g0 –y'

- ☐ Primary NSS gives an alert message and goes down. After about 15 minutes the server will reboot.

- ☐ The call from Radio 3 to Radio 4 will be dropped. The call from radio 1 to 2 will continue and the console will lose connectivity to the VNIC.

- ☐ Verify that after a short delay, the Backup server NSS2 automatically takes over as the primary server.

6. On the RNM, verify that the;
   - ☐ NSS1, MDIS, and VNIC icons turn red.
   - ☐ NSS2, MDIS, and VNIC icons turn green.
   - ☐ RNM reports NSS1, MDIS, and VNIC failure messages.

   - ☐ Verify that the call between Radio 1 and Radio 2 continues to be heard on Radio 2 then drop the test call.

   - ☐ After failover, verify that multi-site Group and Individual radio calls can be made between Radio 3 and Radio 4.

   - ☐ Verify that NSS found in step 5 comes back into standby operation.

   - ☐ Verify that the NSS1 Icon turns blue on RNM.

7. Wait 20 minutes for the two NSS servers to synchronize and replicate their databases.

Results	(Pass/Fail) _____
Tester: _____	Date: _____
Comments: _____	
_____	
_____	

7. P25 TRUNKED CALLS AND SITE FEATURES

Purpose: **These tests will verify that the site can provide radio communications at the site level.**

Expected Results: **These tests will demonstrate that the site can provide communications for radios.**

Setup: **All tests in this section assume that the UAS setup matches the configuration in this test. All testing in this section is to be done with phase 1 radios.**

7.1 Transmit Grant Tone

Purpose: **Demonstrate the system channel grant tone is heard on the radio.**

Expected Results: **This test will show that the radio will play a grant tone when the radio is assigned a working channel.**

Setup: **One radio with valid ID and a valid group on selected system. Grant tone (Ready to Talk tone) enabled in radio personality as applicable for specific radio type being tested.**

Execution:

1. Press PTT button on radio with valid group selected.

2. Verify grant tone is heard at radio when working channel access is granted.

Note: If the call is queued, the grant tone will be delayed until the call is assigned a working channel.

Results		(Pass/Fail)	
Tester:		Date:	
Comments:			

7.2 Transmission Trunking

Purpose: **This test will demonstrate that the system is working as a transmission trunking system.**

Expected Results: **The tests verify that the Control Channel will assign a working channel to the radio and that the radio and site will work as a trunking set.**

Setup: **Radio 1, 2, and 3 should be the only radios on the system.**

Radio Description	Radio Lid	Talk Group Description	Talk Group ID
Radio 1	998001	TG64001 P25	64001
Radio 2	998002	TG64001 P25	64001
Radio 3	998003	TG64001 P25	64001

Execution:

1. PTT Radio 1 and talk.
   - ☐ The transmit (TX) indicators should turn on at Radio 1.
   - ☐ Verify the number of the channel assigned.
2. PTT Radio 2 and talk.
   - ☐ The transmit (TX) indicators should turn on at Radio 2.
   - ☐ Verify the next channel is assigned.

3. PTT Radio 3 and talk.

- The transmit (TX) indicators should turn on at Radio 3.
- Verify the next channel is assigned.

Results		(Pass/Fail)	
Tester:		Date:	
Comments:			

7.3 Group Test Call

Purpose: **The Group Test Call will show that the site will allow a radio to communicate using a group call**

Expected Results: **The test will demonstrate that all radios assigned to a common group will hear a call and all radios assigned to an uncommon group will not hear the call**

Setup: **Set Radios 1, 2, and 3 to (Group A) per test group structure. Make sure Scan is turned OFF. All radios should not be in encrypted mode but have encryption keys.**

Radio Description	Radio Lid	Talk Group Description	Talk Group ID
Radio 1	998001	TG64001 P25	64001
Radio 2	998002	TG64001 P25	64001
Radio 3	998003	TG64001 P25	64001

Execution:

1. PTT Radio 1 and talk.
   - The transmit (TX) indicators should turn on at Radio 1.
   - Audio should be heard in Radios 2 and 3.
   - The ID of Radio 1 should be seen on Radios 2 and 3.
2. Set Radio 3 to (TG64002 P25). PTT on Radio 1 and talk.
   - The transmit (TX) indicators should turn on at Radio 1.
   - Audio should be heard in Radio 2 only.
   - The ID of Radio 1 should be seen at Radio 2 only.
3. Repeat sets 1-4 for encrypted mode

Results		(Pass/Fail)	_____
Tester:	_____	Date:	_____
Comments:	_____		
	_____		
	_____		

7.4 Individual (Private) Call

Purpose: **The Individual Call test will verify that the site will allow two radios to communicate on a private call**

Expected Results: **This test will demonstrate that two radios can communicate on an individual call and other radios will not hear the private conversation.**

Setup: **Set Radios 1, 2, and 3 to (TG64001) per test group structure. All radios should not be in encrypted mode but have encryption keys.**

Radio Description	Radio Lid	Talk Group Description	Talk Group ID
Radio 1	998001	TG64001 P25	64001
Radio 2	998002	TG64001 P25	64001
Radio 3	998003	TG64001 P25	64001

Execution:

1. Using the Radio 1, select the pre-stored ID of Radio 2 or enter the Radio 2 ID directly from the keypad, and PTT Radio 1.

   - Verify that Radio 2 receives the call and displays the ID of Radio 1.
   - Verify that Radio 3 remains idle.

2. Release the PTT on Radio 1 and immediately PTT on Radio 2.

   - Verify that Radio 1 receives the call and displays the ID of Radio 2.
   - Verify Radio 3 remains idle.

3. Using the Radio 1, select the pre-stored ID of Radio 3 or enter the Radio 3 ID directly from the keypad, and PTT Radio 1.

   - Verify that Radio 3 receives the call and displays the ID of Radio 1.

- ☐ Verify that Radio 6 remains idle.

4. Release the PTT on Radio 1 but do not immediately PTT Radio 3.

   - ☐ Verify that Radio 3 gives a Call Back Alert (WHC-"Who Has Called") Indication.

5. Make the return call from Radio 3 back to Radio 1.

   - ☐ Verify that Radio 1 receives the call and displays the ID of Radio 3.

   - ☐ Verify Radio 2 remains idle.

6. Repeat steps 1-8 for encrypted mode.

Results	(Pass/Fail) _____
Tester: _____	Date: _____
Comments: _____	
_____	
_____	

7.5 Unit to Unit Call Alert Paging

Purpose: **To demonstrate that a radio can send a page to a different radio on the system.**

Expected Results: **This test will verify that radio 1 can send a page to radio 2**

Setup: **Radio 1 with Call Alert programmed into a button ("PAGE") and Radio 2's ID programmed into its Individual Call list. Radio 1 and Radio 2 on the same site.**

Execution:

1. Select the PAGE function from the MENU on Radio 1. Select Radio 2 from the preprogrammed list of radios and PTT Radio 1.

   - ☐ Verify Radio 1 displays "*TX PAGE" on the second line.
   - ☐ Verify Radio 2 displays the ID of Radio 1 on its first line and "*RX PAGE" on the second line.
   - ☐ Verify Radio 2 beeps multiple times to indicate a received page.
   - ☐ Verify Radio 1 beeps multiple times to indicate the page was successfully sent.

Results	(Pass/Fail) _____
Tester: _____	Date: _____
Comments: _____	
_____	
_____	

7.6 Multi-site Announcement Group Call

Purpose: **This test will demonstrate that the system will allow a group call to function in a multi-site environment**

Expected Results: **The test will demonstrate that all radios assigned to a common group will hear a call even though some of the radios are at distant sites and all radios assigned to an uncommon group will not hear the call**

Setup: **Groups 64101 and 64102 are in Announcement Group 64107 per test group structure. Ensure Scan is turned OFF.**

Radio Description	Radio Lid	Talk Group Description	Talk Group ID
Radio 1	998001	TG64001 P25	64001
Radio 2	998002	TG64002 P25	64002
Radio 3	998002	TG64003 P25	64003

Execution:

1. PTT Radio 1 and talk.
2. The transmit (TX) indicators should turn on at Radio 1.

- ☐ Audio should be heard on Radios 2 and 3.
- ☐ ANNOUNCE should be displayed on Radios 2 and 3.

Results	(Pass/Fail) _____
Tester: _____	Date: _____
Comments: _____	
_____	
_____	

7.7 Multisite Emergency Group Call

Purpose: **Demonstrate the capability of the system to process an emergency group call**

Expected Results: **This test will verify that when a radio indicates an emergency group call. All other radios in the group indicate an emergency and the emergency can be cleared by an administrator radio.**

Setup: **Program three Radios with the same emergency home group. Set the supervisor radio (Radio 1) and Radio 2 to the home group. Set Radio 3 to a different group (not home group). The radios must remain logged onto different sites.**

Execution:

1. Press the Emergency call button on Radio 1 and talk within the pre-defined Emergency Auto-key time, and/or PTT Radio 1 during or just after that time.

   - ☐ Verify that Radio 1 indicates the “TX EMER” declaration and that it reverts to the home group.

   - ☐ Verify that Radio 1 (on Site 1) and Radio 2 (on Site 2) indicate a “RX EMER” and hear audio on the emergency home group.

2. Clear the emergency with the Supervisor Radio (Radio 1).

   - ☐ Verify the emergency clears in the radios.

3. Repeat the previous steps for encrypted voice.

Results	(Pass/Fail) _____
Tester: _____	Date: _____
Comments: _____	
_____	
_____	

7.8 System All Call

Purpose: **Demonstrate the capability of the system to route a call to all radios on the system.**

Expected Results: **This test will demonstrate the system's ability to route a single call to all available radios on the system.**

Setup:

Radio Description	Radio Lid	Talk Group Description	Talk Group ID
Radio 1	998001	TG64000 P25	64000
Radio 2	998002	TG64001 P25	64101
Radio 3	998003	TG64002 P25	64102

Execution:

1. With Radio 1 place an Individual call to talk group 64000 (All Call Talk Group)

   - Audio should be heard at Radios 2 and 3.

2. Repeat the previous steps for encrypted voice, if applicable.

Results	(Pass/Fail) _____
Tester: _____	Date: _____
Comments: _____	
_____	
_____	

7.9 Transmit Denied (for Invalid radio ID)

Purpose:	**This test is set up to demonstrate that a radio can be denied transmission on a site**
Expected Results:	**This test will verify the system's ability to deny a radio to transmit on one site and allow the radio to work on a different site.**
Setup:	**Program system so that radio ID is not valid on the site under test. Download database to site.**

Execution:

1. Program Radio 1 with an invalid ID
2. PTT Radio 1
   - Verify the radio is prohibited access to system.
3. Reprogram the radio to the original personality.

Results		(Pass/Fail)	_____
Tester:	_____	Date:	_____
Comments:	_____		
	_____		
	_____		

7.10 Single Site Call Queue Declaration Alert

Purpose: **This test will demonstrate the system queuing.**

Expected Results: **This test will verify that the system will assign users in a queue when the system has no available channels and assign users a working channel when the system has an available channel.**

Setup: **This test requires four radios and two working channels. Disable channels (if necessary) until there are two working channels at the site. This test is to be run with no other users on the system.**

Execution:

1. Busy up all talk paths on the system with radio 1, and 2 by pressing and holding the PTT button.

2. With all talk paths busied, momentarily press and release the PTT button on test Radio 3

   - ☐ Verify that a Call Queued tone is heard at the radio.

3. Unkey (release PTT button) radio 2.

   - ☐ Verify that Radio 3 is assigned to the free talk path.

4. The grant tone is heard at the radio, without having to rekey the radio (repressing the PTT button).

5. Press the PTT button on Radio 3 within the auto key time applicable to the radio type (approx. 2 seconds) to keep the assigned channel.

   - ☐ Verify that audio from Radio 3 is heard at Radio 4.

6. Unkey all radios.

Results	(Pass/Fail) _____
Tester: _____	Date: _____
Comments: _____	
_____	
_____	

7.11 Recent User Priority

Purpose: **This test is set up to demonstrate the system's ability to allow users that have recently used the system to have a slightly higher priority than users that have not recently used the system.**

Expected Results: **This test will verify that a user that has recently used the system will get a half set higher priority over a user that has not recently used the system. This will allow the recent user to come out of the queue before the user that has not used the system. In this test the radio 1 should get the first available channel even though radio 2 entered the queue first.**

Setup: **This test requires four radios and two working channels. Disable channels (if necessary) until there are two working channels at the site. Set the radio according to the table below. This test is to be run with no other users on the system and at intervals as set in the Recent Caller Interval (a time of greater than 10 seconds is recommended for the test which is configurable in the Traffic Controller module). This will only work if preformed quickly.**

Radio Description	Radio Lid	Talk Group Description	Talk Group ID
Radio 1	9980001	TG64001 P25	64004
Radio 2	9980002	TG64002 P25	64002
Radio 3	9980003	TG64003 P25	64003
Radio 4	9980004	TG64004 P25	64001

Execution:

1. PTT and release Radio 1 (establish a recent user entry).
2. PTT Radios 3 and 4 and hold on transmit to busy both working channels.
3. PTT and release Radio 2 (queue a call less recent than Radio 1).
4. PTT and release Radio 1 (queue the recent user).

5. Unkey Radio 4

   - Verify that Radio 1 un-queues and transmits.

6. Unkey all radios.

Results		(Pass/Fail)	
Tester:		Date:	
Comments:			

7.12 Call Priority for Group IDs

Purpose: **This test is set up to demonstrate the system's ability to allow a user with a higher priority to get assigned a channel before a user with a lower priority despite who enter the queue first.**

Expected Results: **This test will verify that a user that has a higher priority will get assigned a channel before users with a lower priority regardless of who entered the queue first. In this test radio 4 should get the first available channel, because it has a higher priority, and radio 3 will get assigned a channel next because it has a lower priority.**

Setup: **This test requires two working channels on the site. Disable channels (if necessary) until there are two working channels on the site. Setup the radio according to the table below. This test is to be run with no other users on the system.**

Radio Description	Radio Lid	Talk Group Description	Talk Group ID
Radio 1	9980001	TG64001 P25	64001
Radio 2	9980002	TG64002 P25	64002
Radio 3	9980003	TG64004 P25	64003
Radio 4	9980004	TG64003 P25	64004

Execution:

1. PTT Radios 2 and 4 and hold on transmit to busy both working channels.
2. PTT and release Radio 1 (medium priority entry into the queue).
3. PTT and release Radio 3 (high priority entry into the queue).
4. Un-key Radio 4
   - Verify that Radio 3 un-queues and keys.
5. Un-key Radio 2
   - Verify that Radio 1 un-queues and keys.
6. Un-key all radios.

Results		(Pass/Fail)	_____
Tester:	_____	Date:	_____
Comments:	_____		
	_____		
	_____		

7.13 Emergency Call Priority for Group IDs

Purpose: **This test is set up to demonstrate the system's ability to allow a user that declare an emergency to be assigned a channel before other users despite queue entry sequence or priority level.**

Expected Results: **This test will verify that radio 1 gets assigned a channel before radio 2 despite the fact that radio 2 has a higher priority and entered the queue first.**

Setup: **This test requires four radios and two working channels on the site. Disable channels (if necessary) until there is only two working channels on the site.**

Execution:

1. PTT Radios 4 and 3 and hold on transmit to busy both working channels.
2. PTT and release Radio 2 (high priority entry into the queue).
3. Declare an emergency on Radio 1 (medium priority entry into the queue but now at Emergency Priority).
4. Un-key Radio 4
   - Verify that Radio 1 un-queues and is assigned a channel without having to PTT. (Key the radio within the specified auto key time in order to keep the channel.)
5. Un-key all radios and clear the emergency with the Radio 1.

Results	(Pass/Fail) _____
Tester: _____	Date: _____
Comments: _____	
_____	
_____	

7.14 Group Scan

Purpose: **This test will demonstrate the radios ability to scan different talk groups.**

Expected Results: **In this test the radio will play calls from multiple talk groups while scan is enabled**

Setup: **All radios for this test need to have scan ability. Radio 1 set up with TG64001 P25 and TG64002 P25 in the scan list, TG64001 P25 selected, and group scan initially disabled.**

Radio Description	Radio Lid	Talk Group Description	Talk Group ID
Radio 1	998001	TG64001 P25	64001
Radio 2	998002	TG64002 P25	64001

Execution:

1. Place a call from Radio 2 on talk TG64001 P25.

   - ☐ Verify the call is received and audio is heard on Radio 1.

2. Place a call from Radio 2 on talk TG64002 P25.

   - ☐ Verify the call is not received by Radio 1.

3. Enable group scan on Radio 1.

4. Place another call from Radio 2 on talk TG64002 P25.

   - ☐ Verify that the call is now received and audio is heard on Radio 1.

Results (Pass/Fail) _____

Tester: _____ Date: _____

Comments: _____

_____

_____

7.15 Priority Scan

Purpose: **This test will demonstrate the radios ability to set up scans lists with different levels of priorities.**

Expected Results: **In this test the radio will play calls with a higher level of priority.**

Setup: **Set Radio 1 to priority scan TG641001 P25 and scan (at lower priority – 3 bars) TG641002 P25. Set radio 1 to Group C. Have scan enabled on radio 1.**

Radio Description	Radio Lid	Talk Group Description	Talk Group ID
Radio 1	998001	TG64001 P25	64001
Radio 2	998002	TG64002 P25	64002
Radio 3	998003	TG64003 P25	64001

Execution:

1. Place a call from Radio 2 on TG641002 P25, hold the call until the end of this test.

   - Verify Radio 1 scans to TG64002 P25 and hears audio from Radio 2.

2. Place a call from Radio 3 on TG64001 P25.

   - Verify Radio 1 priority scans to TG641001 P25 and hears audio from Radio 3.

3. Turn off scan on all radios.

Results (Pass/Fail) _____

Tester: _____ Date: _____

Comments: _____

_____

_____

7.16 Transmit Busy Lockout

Purpose: **This test is setup to demonstrate that a radio can't transmit on a talk group while a different radio is transmitting on the same talk group.**

Expected Results: **This test will show that a radio will not be allowed to transmit on a talk group while a different radio is transmitting on the same talk group.**

Setup: **Talk group used for test must be set up as transmission trunked. This feature does not apply to message trunked calls.**

Radio Description	Radio Lid	Talk Group Description	Talk Group ID
Radio 1	998001	TG64001 P25	64001
Radio 2	998002	TG64001 P25	64001

.

Execution:

1. Place a call from Radio 1 on selected talk group by pressing and holding the PTT button.

   - Verify the call is received and audio is heard on Radio 2.

2. While the call is in progress, press the PTT button on Radio 2.

   - Verify that Radio 2 does not transmit over (step on) the call in progress.

Results (Pass/Fail) _____

Tester: _____ Date: _____

Comments: _____

_____

_____

7.17 Continuous Control Channel Update

Purpose: **This test will demonstrate that a radio will join a call that is already in progress**

Expected Results: **This test will verify that a radio will join a call that is already in progress.**

Setup:

Radio Description	Radio Lid	Talk Group Description	Talk Group ID
Radio 1	998001	TG64001 P25	64001
Radio 2	998002	TG64001 P25	64001

Execution:

1. Set both radios to the test group.
2. Turn radio 2 OFF.
3. Key radio 1 and hold. Turn ON the radio 2 (and set it to the test group if necessary).
   - Verify that the second radio joins the call in progress and hears audio from the call in progress.
4. Unkey radio 1.

Results (Pass/Fail) _____

Tester: _____ Date: _____

Comments: _____

_____

_____

7.18 Convert To Callee

Purpose: **This test will demonstrate that the site will only allow one radio to transmit on a talk group.**

Expected Results: **The test will verify that a site will only allow one radio to transmit on a talk group**

Setup: **Radio 1 and Radio 2 should be on the same site.**

Radio Description	Radio Lid	Talk Group Description	Talk Group ID
Radio 1	998001	TG64001 P25	64001
Radio 2	998002	TG64001 P25	64001

Execution:

1. Set two radios to the same site and group.
2. Key both radios at the same time.
   - Verify that one radio ends up transmitting and the other ends up receiving.
   - Verify that the call audio is routed.

Results (Pass/Fail) _____

Tester: _____ Date: _____

Comments: _____

_____

_____

7.19 Multi-site Routing (for Multi-site Logout)

Purpose: **This test will demonstrate the system will not route a call to a site if all the radios logged into the site have moved to a different site.**

Expected Results: **This test will verify that when the radio moves away from the site the system will not route calls to the site that it has roamed away from.**

Setup: **Site 1 and 2 should be selected such that Radio 2 can log into Site 1 and then Site 2. If coverage prevents this, then program a third radio with the ID of Radio 2. Use the third radio to key on Site 1 with the ID of Radio 2 whenever the test procedure calls for this. The primary objective of this test is to demonstrate that the system routes calls to Site 2 whenever a unit (i.e. radio 2) is logged onto Site 2 and does not route calls to Site 2 when no units are logged into Site 2. Radio 1 logged in to Site 1 and Radio 2 logged into Site 2.**

Radio Description	Radio Lid	Talk Group Description	Talk Group ID
Radio 1	998001	TG641001 P25	64001
Radio 2	998002	TG641001 P25	64001

Execution:

1. Key Radio 1 on Site 1.
   - ☐ Verify channel assignments occur on Site 2. Un-key radio.
2. Switch Radio 2 to site 1.
3. Key Radio 1 on site 1.
   - ☐ Verify no channel assignment on site 2

Results (Pass/Fail) _____

Tester: _____ Date: _____

Comments: _____

_____

_____

7.20 Unconfirmed Call (Multisite Late-Enter)

Purpose: **This test will demonstrate that if two user demand talk group access the user that has an available channel will get the channel access first.**

Expected Results: **The test will verify the system's ability to grant talk group access to the user that has an available channel.**

Setup: **Site 1 should only have one working channel, disable all other working channels at site 1.**

Radio Description	Radio Lid	Talk Group Description	Talk Group ID	Site #
Radio 1	998001	TG64001 P25	64001	1
Radio 2	998002	TG64002 P25	64002	1
Radio 3	998003	TG64001 P25	64001	2
Radio 4	998004	TG64001 P25	64001	2

Execution:

1. Key up radio 2 on site 1, and hold the call up.

2. Key up Radio 3 on TG64001 on Site 2, and hold the call up.

   - Verify that Radio 3 should get the grant tone and the call should go through to Radio 4 on Site 2.

   - Since Site 1 has no channels available, the call should not go through to Radio 1 on Site 1.

3. While Radio 2 is still keyed up, free up a channel on Site 1 by unkeying radio 2.

   - ☐ Verify that the call gets routed to Site 1 and that Radio 1 late-enters into the call on that site.

Results	(Pass/Fail) _____
Tester: _____	Date: _____
Comments: _____	
_____	
_____	

8. Emergency

8.1 Local Emergency Multisite FDMA

Purpose: **This test is set up to demonstrate the multisite FDMA emergency.**

Expected Results: **This test will verify that the system will not drop a channel to assign a channel an emergency in FMDA mode.**

Setup: **This test requires six radios and two working talk paths on the site. Disable channels (if necessary) until there is only two working talk paths on the site.**

Radio Description	Radio Lid	Talk Group Description	Talk Group ID	Site #
Radio 1	998001	TG641001 P25	64101	1
Radio 2	998002	TG641002 P25	64102	1
Radio 3	998003	TG641003 P25	64103	1
Radio 4	998004	TG641001 P25	64101	2
Radio 5	998005	TG641002 P25	64102	2
Radio 6	998006	TG641003 P25	64103	2

Execution:

1. Disable channels at site 1 and 2 so that only the site only has two working FDMA talk paths.
2. PTT Radio 1 & 2 to busy up the sites.
3. Declare an emergency on Radio 3.

    - Radio 3 Should enter the Que

4. Un-key Radio 4

   - ☐ Verify Radio is assigned the call

5. Un-key all radios and clear the emergency with the Radio 1.

Results		(Pass/Fail)	_____
Tester:	_____	Date:	_____
Comments:	_____		
	_____		
	_____		

8.2 Local Emergency Multisite TDMA

Purpose: **This test is set up to demonstrate the multisite TDMA local emergency.**

Expected Results: **This test will verify that the system will drop a local channel to assign a channel an emergency in TDMA mode.**

Setup: **This test requires six radios and two working talk paths on the site. Disable channels (if necessary) until there is only two working talk paths on the site.**

Radio Description	Radio Lid	Talk Group Description	Talk Group ID	Site #
Radio 1	998001	TG641151 P25	64151	1
Radio 2	998002	TG641152 P25	64152	1
Radio 3	998003	TG641153 P25	64153	1
Radio 4	998004	TG641151 P25	64151	2
Radio 5	998005	TG641152 P25	64152	2
Radio 6	998006	TG641153 P25	64153	2

Execution:

1. Disable channels at site 1 and 2 so that only the site only has two working TDMA talk paths.
2. PTT Radio 1 & 2 to busy up the sites.

3. Declare an emergency on Radio 3.

- ☐ Verify call is dropped to Radio 1 and tone is heard
- ☐ Verify Radio 3 is assigned a channel
- ☐ Verify a console hears calls from Radio 2 and 3

4. Un-key all radios and clear the emergency with the Radio 1.

Results		(Pass/Fail)	_____
Tester:	_____	Date:	_____
Comments:	_____		
	_____		
	_____		

8.3 Remote Emergency Multisite TDMA

Purpose: **This test is set up to demonstrate the multisite TDMA local emergency.**

Expected Results: **This test will verify that the system will not drop a remote channel to assign a channel an emergency in TDMA mode.**

Setup: **This test requires six radios and two working talk paths on the site. Disable channels (if necessary) until there is only two working talk paths on the site.**

Radio Description	Radio Lid	Talk Group Description	Talk Group ID	Site #
Radio 1	998001	TG641151 P25	64151	1
Radio 2	998002	TG641152 P25	64152	1
Radio 3	998003	TG641153 P25	64153	1
Radio 4	998004	TG641151 P25	64151	2
Radio 5	998005	TG641152 P25	64152	2
Radio 3	998006	TG641153 P25	64153	2

Execution:

1. Disable channels at site 1 and 2 so that only the site only has two working TDMA talk paths.
2. PTT Radio 4 & 5 to busy up the sites.

3. Declare an emergency on Radio 3.

- ☐ Verify audio is dropped to Radio 1
- ☐ Verify calls from radio 4 and 5 continue
- ☐ Verify Radio 3 is assigned a channel
- ☐ Verify a console hears calls from Radio 3, 4 and 5

4. Un-key all radios and clear the emergency with the Radio 1.

Results		(Pass/Fail)	_____
Tester:	_____	Date:	_____
Comments:	_____		
	_____		
	_____		

9. TRANSCODER TEST

Purpose: **This test will demonstrate the transcoder ability to transcode calls made with different vocoders**

Expected Results: **This test will verify that the transcoder is needed to transcode a call, and each transcoder will transcode calls.**

Setup:

Radio Description	Radio Lid	Talk Group Description	Talk Group ID
Radio 1	9980001	TG 64400OS	64400
Console 9110	9989110	TG 64400OS	64400

Execution:

1. Shutdown s0u1xcda.vida.local, s0u2xcda.vida.local and s0u1xcdb.vida.local.

Transcoder	State
s0u1xcda.vida.local	Off
s0u2xcda.vida.local	Off
s0u1xcdb.vida.local	Off

2. From the console place a call on talk group 64400OS

   - Verify that the call is not heard on a P25 radio on talk group 6400OS, this called failed because there is no working transcoder.

3. Restart s0u1xcda.vida.local.

Transcoder	State
s0u1xcda.vida.local	On
s0u2xcda.vida.local	Off
s0u1xcdb.vida.local	Off

4. From the console place a call on talk group 64400OS

   - Verify that the call is heard on a P25 radio

5. Restart s0u2xcda.vida.local wait for 15 minutes for services to start

6. Shutdown s0u1xcda.vida.local.

Transcoder	State
s0u1xcda.vida.local	Off
s0u2xcda.vida.local	On
s0u1xcdb.vida.local	Off

7. From the console place a call on talk group 64400OS

   - Verify that the call is heard on a P25 radio on talk group 6400OS this call is using s0u2xcda.vida.local.

8. Restart s0u1xcdb.vida.local

9. Shutdown s0u1xcda.vida.local

Transcoder	State
s0u1xcda.vida.local	Off
s0u2xcda.vida.local	Off
s0u1xcdb.vida.local	On

10. From the console place a call on talk group 64400OS

    - Verify that the call is heard on a P25 radio on talk group 6400OS this call is using s0u3xcda.vida.local.

11. Restart s0u2xcda.vida.local and s0u1xcda.vida.local

12. From the console place a call on talk group 64400OS verify that the call is heard on a P25 radio on talk group 6400OS

Transcoder	State
s0u1xcda.vida.local	On
s0u2xcda.vida.local	On
s0u1xcdb.vida.local	On

Results (Pass/Fail) _____

Tester: _____ Date: _____

Comments: _____

_____

_____

10. P25 PHASE 2 FUNCTIONALITY

Purpose: **The tests will show that the system will allow radios that are on different sites to communicate while the radios are on different phases on P25.**

Expected Results: **This test will verify that the system will allow Phase 1 and Phase 2 radio to inter communicate.**

Setup: **In the following tests, portables 1 and 2 will be set up as Phase 1 only. Portables 3 and 4 will be set up as Phase 2 and Phase 1 capable, depending upon talk-group. FDMA refers to Phase 1 and TDMA refers to Phase 2. Start a session on the RNM and setup to watch channel assignments using the real time viewer function.**

On a client computer, open the windows internet explorer and browse to https://s0u1rnm.vida.local/nmc and log in with an Active Directory account. Choose the system map and select the 'Launch Application' button. Open the Real-time tab and Click Site Calls. Select the site and expand. Check the box next to the channels and select to add the channels to the target list. Select the 'ok' button to launch the application.

Place a group call from Radio 1 to Radio 2 on the site, and verify that the event viewer displays the talk-group ID and calling party ID. Verify the state changes from Free to Talk. Verify the TG Alias displays the Group #.

Radio Description	Radio Lid	Talk Group Description	Talk Group ID	System	Site	On/Off
Radio 1	998001	TG64051 P25	64051	MAC PH 1	1	On
Radio 2	998002	TG64051 P25	64051	MAC PH 1	1	On
Radio 3	998003	TG64051 P25	64051	MAC PH 2	2	On
Radio 4	998004	TG64051 P25	64051	MAC PH 2	2	On

10.1 Mixed Mode site to Mixed Mode site Call Phase 1- Phase 1

Purpose: **Demonstrates that a Phase 1 call work on a Phase 2 system**

Expected Results: **This will verify that a P25 Phase 1 call will work on a Phase 2 system**

Setup: **Turn off radios 3 and 4.**

Radio Description	Radio Lid	Talk Group Description	Talk Group ID	System	Site	On/Off
Radio 1	998001	TG64051 P25	64051	MAC PH 1	1	On
Radio 2	998002	TG64051 P25	64051	MAC PH 1	1	On
Radio 3	998003	TG64051 P25	64051	MAC PH 2	2	Off
Radio 4	998004	TG64051 P25	64051	MAC PH 2	2	Off

Execution:

1. PTT Radio 1 and talk.

   - ☐ The transmit (TX) indicators should turn on at Radio 1
   - ☐ Verify that the call is assigned as an FDMA at site 2 by viewing the Real Time Viewer Site Activity on the RNM.
   - ☐ Verify Radios 2 can hear Radio 1.

Results (Pass/Fail) _____

Tester: _____ Date: _____

Comments: _____

_____

_____

10.2 Mixed Mode site to Mixed Mode site Call - Phase 1 and Phase 2

Purpose: **Demonstrates that a mixed mode call can function on a Phase 2 system**

Expected Results: **This test will verify that Phase 2 radios will hear a call from a Phase 1 radio.**

Setup: **Turn on Radios 1, 2, 3, 4**

Radio Description	Radio Lid	Talk Group Description	Talk Group ID	System	Site	On/Off
Radio 1	998001	TG64051 P25	64051	MAC PH 1	1	On
Radio 2	998002	TG64051 P25	64051	MAC PH 1	1	On
Radio 3	998003	TG64051 P25	64051	MAC PH 2	2	On
Radio 4	998004	TG64051 P25	64051	MAC PH 2	2	On

Execution:

1. PTT Radio 1 and talk.

   - The transmit (TX) indicators should turn on at Radio 1
   - Verify that the call is assigned as an FDMA at site 2 by viewing the Real Time Viewer Site Activity on the RNM.
   - Verify Radios 2, 3 and 4 can hear Radio 1.

Results		(Pass/Fail)	
Tester:		Date:	
Comments:			

10.3 Mixed Mode site to Mixed Mode site Call - Phase 1

Purpose: **Demonstrates that a mixed mode call can function on a Phase 2 system.**

Expected Results: **This test will verify that a Phase 1 radio will hear a call from a Phase 2 radio.**

Setup: **Turn on Radios 1, 2, 3, 4**

Radio Description	Radio Lid	Talk Group Description	Talk Group ID	System	Site	On/Off
Radio 1	998001	TG64051 P25	64051	MAC PH 1	1	On
Radio 2	998002	TG64051 P25	64051	MAC PH 1	1	On
Radio 3	998003	TG64051 P25	64051	MAC PH 2	2	On
Radio 4	998004	TG64051 P25	64051	MAC PH 2	2	On

Execution:

1. PTT Radio 3 and talk.

   - ☐ The transmit (TX) indicators should turn on at Radio 3
   - ☐ Verify that the call is assigned as an FDMA at site 2 by viewing the Real Time Viewer Site Activity on the RNM.
   - ☐ Verify Radios 1, 2 and 4 can hear Radio 3.

Results		(Pass/Fail)	
Tester:		Date:	
Comments:			

10.4 Phase 2 site Call

Purpose: **Demonstrates that a Phase 2 call work on a Phase 2 system**

Expected Results: **This verify that a P25 Phase 2 call will work on a Phase 2 system**

Setup: **Turn off Radios 1, and 2**

Radio Description	Radio Lid	Talk Group Description	Talk Group ID	System	Site	On/Off
Radio 1	998001	TG64051 P25	64051	MAC PH 1	1	Off
Radio 2	998002	TG64051 P25	64051	MAC PH 1	1	Off
Radio 3	998003	TG64051 P25	64051	MAC PH 2	2	On
Radio 4	998004	TG64051 P25	64051	MAC PH 2	2	On

Execution:

1. PTT Radio 3 and talk.

   - The transmit (TX) indicators should turn on at Radio 3
   - Verify that the call is assigned as a TDMA at site 2 by viewing the Real Time Viewer Site Activity on the RNM.

- Verify Radios 4 can hear Radio 1.

Results		(Pass/Fail)	
Tester:		Date:	
Comments:			

11. SYMPHONY DISPATCH FEATURE SET

All Testing done in this section should be done with a user that is in the 'Console' User Group.

11.1 Transmitting With a Microphone (Group Calls, I Calls)

Purpose: **Confirms the console operator can initiate communication with a terminal radio using the console select functions and foot pedal, for both Group and I Calls.**

Expected Results: **Confirms communication with the terminal radio**

Setup: **Radio set to TG64001 P25 and console programmed with talk groupTG64001 P25**

Execution:

1. Press the INSTANT TX function (for example right mouse button) on the module with the test group. Verify
   - that a channel access tone is heard, a
   - ripple effect on the 'TX' indicator is displayed
   - that the call is heard on the radio.

2. Release the Instant TX key

3. Right click on the gear symbol for TG64002 and select 'Select' to make TG64002 the selected talk group. Verify
   - that the module for TG64002 is highlighted indicating that it is the selected talk group
   - the module at the top center of the screen changes to 'TG64002'

4. Make call on 64002TG by:
   a. Press the PTT foot pedal.
      - verify that a channel access tone is heard,
      - the halo around the 'TX' indicator is displayed
      - that the call is heard on the radio
      - verify audio is head at a radio on talk group 64002TG

      i. Release the foot pedal to end the call
   b. Press the headset button.
      - verify that a channel access tone is heard
      - the halo around the 'TX' indicator is displayed
      - that the call is heard on the radio
      - verify audio is head at a radio on talk group 64002TG

      i. Release the headset button to end the call.
   c. Select the 64002TG button with the mouse.
      - verify that a channel access tone is heard
      - the halo around the 'TX' indicator is displayed
      - that the call is heard on the radio
      - verify audio is head at a radio on talk group 64002TG

      i. Release the mouse button to end the call.

Results		(Pass/Fail)	_____
Tester:	_____	Date:	_____
Comments:	_____		
	_____		
	_____		

11.2 Receiving Calls (Unit ID Display, Talk group ID Display, Aliasing)

Purpose:	**Confirm the console operator can receive communications from a terminal radio, using both talkgroup and individual calling.**
Expected Results:	**Communications are initiated and received on the appropriate speaker (select or unselect) and the radio's ID is displayed.**
Setup:	**Console should have talk groups 64001TU and 64002TU programmed with 64002TU selected and Radio set to TG64001 P25**

11.2.1 Talk Group Call

Execution:

1. Key the radio and verify
   - ☐ That the call is heard at the unselect speaker
   - ☐ That the calling radio ID is displayed on the module for TG64001
   - ☐ A green light id displayed indicating an incoming call on module TG64001
2. Switch the radios talk group to 64002TU and key the radio.
   - ☐ That the call is heard at the select speaker
   - ☐ That the calling radio ID is displayed on the module for TG64002
   - ☐ A green light id displayed indicating an incoming call on module TG64002

Results		(Pass/Fail)	_____
Tester:	_____	Date:	_____
Comments:	_____		
	_____		
	_____		

11.2.2 Individual Call (Unit – Unit)

Execution:

1. Right click on the 'Harris' box on the top left hand side of the screen.
2. Select 'Open Directory' this will open a pop up window for the 'Directory'
3. Select the 'Users' tab
4. Select 'Radio 1' under the "ALIAS' column
5. Press the 'Radio 1' button the right side to the screen to place an individual call to radio 1.
   - ☐ Verify the ripple effect on the 'TX' indicator is displayed
   - ☐ Verify a ringing tone will be heard at the console and the radio
   - ☐ Verify radio displays 'INDV' and consoles 'ID"
6. Respond to the console by PTTing the radio
   - ☐ Verify that the call is heard on the console and that the calling radio's ID and the Call Indicator are displayed.

Results	(Pass/Fail) _____
Tester: _____	Date: _____
Comments: _____	
_____	
_____	

11.3 Emergency Call and Emergency Alarm

Purpose: **Confirms the console indicates an emergency declared by a terminal radio and can reset and clear the emergency.**

Expected Results: **The console indicates and can clear the emergency.**

Setup: **This test requires a test radio capable of generating and clearing an emergency (i.e. Supervisor Radio).**

Radio Description	Radio Lid	Talk Group Description	Talk Group ID
Radio 1	998001	TG64001 P25	64001

Execution:

1. Select the 64002TG in the console. Using the test radio, declare an emergency on 64001TG.
   - Verify the module for '64001TG' turns red,
   - Verify the ID/Name of the test radio is displayed
   - Verify emergency alert tone is heard on the console.
2. Select the triangle with a '!' to access the emergency menu.
   - the acknowledge 'Ack' button is red
   - the check box is red
3. Using the radio, transmit on the talk group
   - Verify that the call is received by the console.
4. With the console, transmit on the group with the emergency.
   - Verify the test radio receives the call, and is still in emergency mode.
5. Acknowledge the emergency by selecting the 'Ack' button
   - Verify the button changes from 'Ack' to clear

- ☐ verify the radio and the console are still in emergency mode

6. Clear the emergency by selecting the 'Clear X' button

   - ☐ Verify the console clears the emergency
   - ☐ Verify the radio clears the emergency

7. Transmit on the radio
8. Verify the emergency is cleared and normal group calls have resumed.
9. Select 64001TG group selected on the console, declare an emergency on the test group by pressing the 'Emer Declare'.

   - ☐ Verify the console and radio have the same indications as steps 2 to 4.

10. Acknowledge by hitting 'Ack' in step 4
11. Clear the emergency with the console.

Results		(Pass/Fail)	
Tester:		Date:	
Comments:			

11.4 System Wide Call (All Call & Announcements)

Purpose: **Confirm the console can initiate system wide calls.**

Expected Results: **The console can initiate both All Calls and Announcement Calls.**

Setup: **Program console modules with the 'TG64000 P25' talk group**

Radio Description	Radio Lid	Talk Group Description	Talk Group ID
Radio 1	998001	TG64051 P25	64051
Radio 2	998002	TG64052 P25	64052
Radio 3	998003	TG64001 P25	64001
Radio 4	998004	TG64001 P25	64002

Execution:

1. Press INSTANT TX on the module with 'TG64000 P25'.
   - Verify that a channel access tone is heard,
   - Verify the ripple effect on the 'TX' indicator is displayed
   - Verify that the call is heard at all radios
2. Release the Instant TX key.
3. Press INSTANT TX on the module with 'TG64051 P25'.
   - Verify that a channel access tone is heard,
   - Verify the ripple effect is displayed
   - Verify the call is heard at Radios 1. Verify Radios 2, 3
   - Verify radio 4 did not hear the audio.
4. Release the Instant TX key.

5. Press INSTANT TX on the module with ‘TG64001 P25’.

   - Verify that a channel access tone is heard,
   - The ripple effect is displayed,
   - The call is heard at Radios 3.
   - Verify that Radios 1 2
   - Radio 4 did not hear the audio.

6. Release the Instant TX key.

Results		(Pass/Fail)	
Tester:		Date:	
Comments:			

11.5 Alert Tones

Purpose: **Confirm the console can initiate alert tones which can be heard at the terminal radio.**

Expected Results: **The tones can be initiated and heard.**

Setup: **Console 1 programmed with TG64052 and TG64051 selected.**

Radio Description	Radio Lid	Talk Group Description	Talk Group ID
Radio 1	998001	TG64001 P25	64001
Radio 2	998002	TG64002 P25	64002

Execution:

1. Make TG64001 P25 the selected talk group.
2. Select the tones tab on the talk group module.
3. Key the console with a method other than the mouse.
4. Radio 1 will receive the call.
   - While still transmitting, select one of the three ALERT TONE keys by selecting the drop down list next to the orange button.
5. Test that all three alert tones can be heard on the radio.
   - Verify the ALERT TONE is received by Radio 1 and also heard on the console (to hear the tones on the console, press and hold the foot pedal and listen for the tone on the SELECT speaker).
6. While not transmitting, press and hold one of the ALERT TONE keys.
   - Verify the console transmits on talkgroup, TG64051 P25, Radio 1 receives the call, and the alert tone is heard by Radio 1 and the console (to hear the tone on the console, press and hold one of the alert tone keys and listen for the tone on the SELECT speaker).

7. When the ALERT TONE key is released

   - ☐ Verify the call on Radio 1 drops

Results		(Pass/Fail)	
Tester:		Date:	
Comments:			

11.6 Console Pre-Empt

Purpose: **Confirm the console can pre-empt an ongoing call between terminal radios.**

Expected Results: **The call started by the radio will be interrupted by the console.**

Setup: **Console 1 programmed with talk-group TG64051 P25**

Radio Description	Radio Lid	Talk Group Description	Talk Group ID
Radio 1	998001	TG64001 P25	64001
Radio 2	998001	TG64001 P25	64001

Execution:

1. Key Radio 1 on the TG64001 and hold the call up. Verify that audio is heard at Radio 2 and the console.

2. Key the console on TG64001and hold the while continuing to hold the call up on Radio 1

   - Verify the console pre-empts
   - Verify that the transmit indicator is displayed along with the pre-empted caller LID and CALL indicator
   - Verify that the second radio begins to hear the console audio and not the first radio call.
   - Verify that the pre-empted radio audio is still heard on the pre-empting console.

3. Un-key the first Radio.

   - Verify that the pre-empted caller LID and CALL indicators are removed and the pre-empted radio audio is no longer heard on the pre-empting console.

4. Un-key the console.

Results		(Pass/Fail)	
Tester:		Date:	
Comments:			

11.7 Simulselect

Purpose: **Confirms operation of the console Simulselect feature, which allows multiple talk groups to be selected for communication simultaneously.**

Expected Results: **The console can select multiple talk groups and communication is allowed.**

Setup **Console 1 programmed with talk groups TG64051 P25, TG64052 P25, TG64053 P25, and TG64054 P25.**

Radio Description	Radio Lid	Talk Group Description	Talk Group ID
Radio 1	998001	TG64051 P25	64051
Radio 2	998002	TG64052 P25	64052
Radio 3	998003	TG64001 P25	64001
Radio 4	998004	TG64001 P25	64002

Execution:

1. Create simulselect group on the 4 test group modules
2. Place a call from the console on the simulselect group
   - Verify that the call is heard all four radios
3. Place a call from each radio
   - Verify that only the console hears the calls
   - Verify only the radios on similar talk groups here the call
4. Deactivate the simulselect group.

Results		(Pass/Fail)	_____
Tester:	_____	Date:	_____
Comments:	_____		
	_____		
	_____		

11.8 Patch

Purpose: **Confirms the console patch feature creates shared communication between multiple selected talk groups.**

Expected Results: **The patched talk groups can communicate.**

Setup **Console 1 programmed with talk groups TG64051 P25, TG64052 P25, TG64053 P25, and TG64054 P25.**

Radio Description	Radio Lid	Talk Group Description	Talk Group ID
Radio 1	998001	TG64051 P25	64051
Radio 2	998002	TG64052 P25	64052
Radio 3	998003	TG64001 P25	64001
Radio 4	998004	TG64001 P25	64002

Execution:

1. Create patch on PATCH 1 with all four groups above.
2. Place a call from the newly created patch
   - Verify that the call is heard on all the radios
3. Place a call from each radio
   - Verify that the call is heard on the console and each radio.
4. Deactivate the patch.

Results		(Pass/Fail)	_____
Tester:	_____	Date:	_____
Comments:	_____		
	_____		
	_____		

11.9 Console to Console Cross-mute

Purpose: **Confirm creation of a cross-mute of another console to quiet the muted consoles audio on the local console.**

Expected Results: **The cross-muted console's audio cannot be heard on the local console.**

Setup: **Establish two consoles (A and B) to test the Cross-mute function. The Consoles must be on the same NSC. Program and select a test group on both consoles.**

Execution:

1. Place a call on console A on the test group.

   - ☐ Verify that console B can hear console A.

2. Open the Symphony Configuration Utility for console B in the 'General' section add the ID for console A to the 'Cross Mute' list.

3. Select 'Apply' to save the changes.

4. Place a call on console A on the test group

   - ☐ Verify the call can't be heard at console B.

5. Restore the desired cross mute setup.

Results		(Pass/Fail)	
Tester:		Date:	
Comments:			

11.10 Call History

Purpose: **Confirms a history of calls processed at the console.**

Expected Results: **The history is accessible and valid.**

Setup: **This test compares programmed module call activity to the history scroll lists. Utility page, dispatch menu will be selected. Select either the "Select History" or "Unselect History".**

Execution:

1. Press the 'Scroll Up' and 'Scroll Down' buttons to scroll through the Unselect call history list.
   - Compare these calls with known activity.
2. Press the 'Scroll Up' and 'Scroll Down' buttons to scroll through the selected call history list.
   - Compare these calls with known activity.
3. Press the 'Esc' button to exit the history scroll mode.
4. To monitor call history on a single group use the 'module history' button on the 'module modify' menu.
5. Use the 'scroll up' and 'scroll down' buttons to scroll through the calls for the picked module.
   - Compare these calls with known activity.

Results		(Pass/Fail)	_____
Tester:	_____	Date:	_____
Comments:	_____		
	_____		
	_____		

12. BEON FEATURES

Purpose: **These will test the BeOn features.**

Expected Results: **This test will demonstrate that BeOn works as designed.**

Setup: **This test will show that the BeOn system allows a smartphone to communicate with the radio system.**

12.1 Transmit Grant Tone

Purpose: **This test will demonstrate the grant tone on BeOn.**

Expected Results: **When the smartphone PTTs on the BeOn app it will play a grant tone.**

Setup: **Grant tone (Ready to Talk tone) enabled in smartphone radio personality.**

Radio Description	Radio Lid	Talk Group Description	Talk Group ID
BeOn_202	998202	TG64151 P25	64151
BeOn_203	998203	TG64151 P25	64151
BeOn_204	998204	TG64151 P25	64151

Execution:

1. Press PTT button on smartphone with valid group selected.

   - Verify grant tone is heard at smartphone when working channel access is granted.

Note: If the call is queued, the grant tone will be delayed until the call is assigned a working channel.

Results (Pass/Fail) _____

Tester: _____ Date: _____

Comments: _____

_____

_____

12.2 Group Call

Purpose: **Confirms the scan function which allows a smartphone to hear audio on selected talk-groups other than the current talk-group.**

Expected Results: **Selected talk-group call audio is heard.**

Setup: **Set smart-phones 1, 2, & 3 to (Group A) per test group structure. Make sure Scan is turned OFF.**

Radio Description	Radio Lid	Talk Group Description	Talk Group ID
BeOn_202	998202	TG64151 P25	64151
BeOn_203	998203	TG64151 P25	64151
BeOn_204	998204	TG64151 P25	64151

Execution:

1. PTT on BeOn_202 and talk.
   - The transmit (TX) indicators should turn on at BeOn_202.
   - Audio should be heard in BeOn_203, and BeOn_204.
   - The ID of BeOn_202 should be seen at BeOn_203, and BeOn_204.
2. Set BeOn_204 to TG64152 P25. PTT on BeOn_202 and talk.
   - The transmit (TX) indicators should turn on at BeOn_202.
   - Audio should be heard in BeOn_203 only.
   - The ID of BeOn_202 should be seen at BeOn_203 only.

Results		(Pass/Fail)	
Tester:		Date:	
Comments:			

12.3 Individual (Private) Call

Purpose: **Confirms individual calls can be initiated using BeOn enabled smartphones.**

Expected Results: **Individual calls are confirmed.**

Setup:

Radio Description	Radio Lid	Talk Group Description	Talk Group ID
BeOn_202	998202	TG64151 P25	64151
BeOn_203	998203	TG64151 P25	64151
BeOn_204	998204	TG64151 P25	64151

Execution:

1. Using the BeOn_202, select the pre-stored ID of BeOn_203 or enter the BeOn_203 ID directly from the keypad, and PTT smartphone 1.

   - ☐ Verify that BeOn_203 receives the call and displays the ID of smartphone 1.
   - ☐ Verify that BeOn_204 remains idle.

2. Release the PTT on BeOn_202 and immediately PTT on BeOn_203.

   - ☐ Verify that BeOn_202 receives the call and displays the ID of BeOn_203.
   - ☐ Verify BeOn_204 remains idle.

Results		(Pass/Fail)	
Tester:		Date:	
Comments:			

12.4 Group Scan

Purpose: **Confirms the scan function which allows a smartphone to hear audio on selected talk-groups other than the current talk-group.**

Expected Results: **Selected talk-group call audio is heard.**

Setup: **BeOn_202 set up with TG64151 P25 and TG64152 P25 in the scan list, TG64151 P25 selected, and group scan initially disabled.**

Radio Description	Radio Lid	Talk Group Description	Talk Group ID
BeOn_202	998202	TG64151 P25	64151
BeOn_203	998203	TG64151 P25	64151
BeOn_204	998204	TG64151 P25	64151

Execution:

1. Place a call from BeOn_203 on TG64151 P25.

   - ☐ Verify the call is received and audio is heard on BeOn_202.

2. Place a call from BeOn_203 on TG64152 P25.

   - ☐ Verify the call is not received by BeOn_202.

3. Enable group scan on BeOn_202.

4. Place another call from BeOn_203 on TG64152 P25.

   - ☐ Verify that the call is now received and audio is heard on BeOn_202.

Results		(Pass/Fail)	_____
Tester:	_____	Date:	_____
Comments:	_____		
	_____		
	_____		

12.5 Emergency Group Call

Purpose: **Confirms an emergency can be declared, recognized and cleared by a smartphone.**

Expected Results: **The emergency is declared, recognized and cleared.**

Setup:

Radio Description	Radio Lid	Talk Group Description	Talk Group ID
BeOn_202	998202	TG64151 P25	64151
BeOn_203	998203	TG64152 P25	64152
BeOn_204	998204	TG64153 P25	64153

Execution:

1. Press the Emergency call button on BeOn_204 and then PTT BeOn_204.

   - ☐ Verify that BeOn_204 indicates the “TX EMER” declaration and that it reverts to the home group.

   - ☐ Verify that BeOn_202 and BeOn_203 indicate a “RX EMER” and hear audio on the emergency home group.

2. Clear the emergency with the Supervisor smartphone (BeOn_202).

   - ☐ Verify the emergency clears in the smartphones.

Results (Pass/Fail) _____

Tester: _____ Date: _____

Comments: _____

_____

_____

13. TRUNKED LOGGING RECORDER

13.1 Group Call

Purpose: **Confirms group call audio is captured, recorded and accessible on the logging recorder**

Expected Results: **Calls are captured, recorded and accessible.**

Setup:

Radio Description	Radio Lid	Talk Group Description	Talk Group ID
Radio 1	998001	TG64051 P25	64051
Radio 2	998002	TG64051 P25	64051
Radio 3	998003	TG64051 P25	64051

1. PTT radio 1 and talk.

   - Audio should be heard on radio 2. Note the Start time of the call and the approximate duration.

2. Retrieve the call from the Logging Recorder.

   - Verify the Caller, Callee, Start Time, and duration.

   - The Caller should be the LID for Radio 1 and the Callee should be the GID for 64051. Verification should include the LID/GID and its Alias as defined by the UAS.

   - Verify that the call is identified as a Group Call.

3. Playback the audio

   - Confirm that the playback audio is all recorded and intelligible.

4. Repeat using Encryption.

Results		(Pass/Fail)	
Tester:		Date:	
Comments:			

13.2 Emergency Group Call

Purpose: **Confirms emergency group call audio is captured, recorded and accessible on the logging recorder**

Expected Results: **Calls are captured, recorded and accessible.**

Setup:

Radio Description	Radio Lid	Talk Group Description	Talk Group ID
Radio 1	998001	TG64051 P25	64051
Radio 2	998002	TG64051 P25	64051
Radio 3	998003	TG64051 P25	64051

Execution:

1. Press the Emergency call button on radio 2. Talk during the Hot Mic transmit time.
2. Clear the emergency with the radio 1.
3. Retrieve the call from the Logging Recorder.
   - Verify the Caller
   - Verify the Callee
   - Verify the start time
   - Verify the duration
   - The Caller should be the LID for Radio 2 and the Callee should be the GID for the Home Group.
   - Verification should include the LID/GID and its Alias as defined by the UAS.
   - Verify that the call is identified as an Emergency.
   - Playback the audio and confirm that it is all recorded and intelligible.

Results		(Pass/Fail)	_____
Tester:	_____	Date:	_____
Comments:	_____		
	_____		
	_____		

14. VIDA INTER-OPERABILITY GATEWAY TEST

14.1 Local Interoperability

Purpose: **The purpose of this test is to verify correct functionality of the Interoperability Gateway.**

Expected Results: **Verify that the**

Setup: **The Interoperability Gateway connects via 4-wire audio connections in its Universal Access Cards (UAC) cards to interoperability radio units (mobile or desktop). The Gateway also connects to a router and the Network Switching Center (NSC) to provide call functionality across the network.**

Execution:

1. Select Inter-op group 1 on the radio.
2. Initiate a call from the radio to group 1
   - ☐ Verify that audio is heard on inter-op group 1 radio.
3. Initiate a call from the inter-op group 1 radio to group 1
   - ☐ Verify that audio is heard on the radio.

Results		(Pass/Fail)	_____
Tester:	_____	Date:	_____
Comments:	_____		
	_____		
	_____		

15. INFORMATION ASSURANCE (IA) TESTING

For the purpose of this submission, it is anticipated that the supporting IP network transport sub-system is in place and usable for interconnection of the LMR equipment at the various locations. It is also anticipated that the configurations are setup and functioning for authentication and authorizing all users to enforce the necessary security policies, backups, and updates.

Given the general premise that only those functions that have become available as a result of field installation will be tested, the following procedural topics will be examined:

- Security verification (Information Assurance Testing)
    - Active Directory (AD)
    - Patch Management (SUMS)

15.1 Active Directory

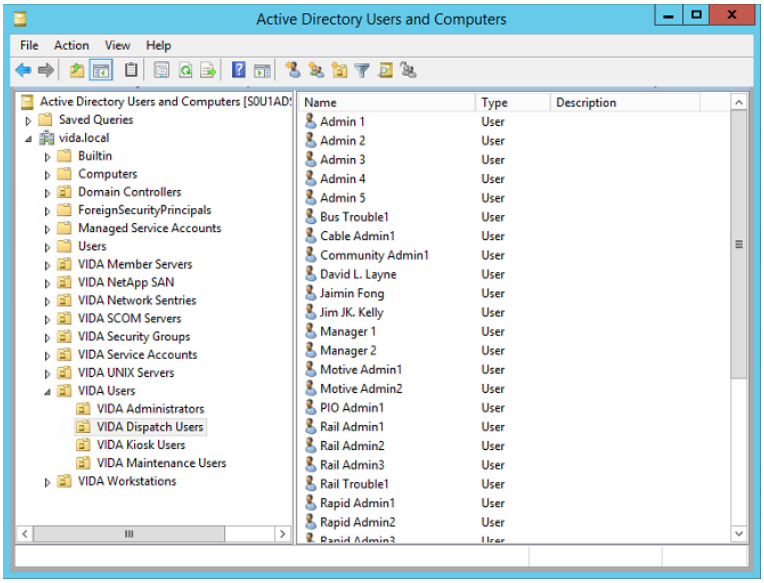
Purpose: **The purpose of this test is to view the GPO structure on an Active Directory server while using VIDA credentials.**

Expected Results: **Logins are allowed using VIDA credentials on VIDA equipment and the GPO structure is valid.**

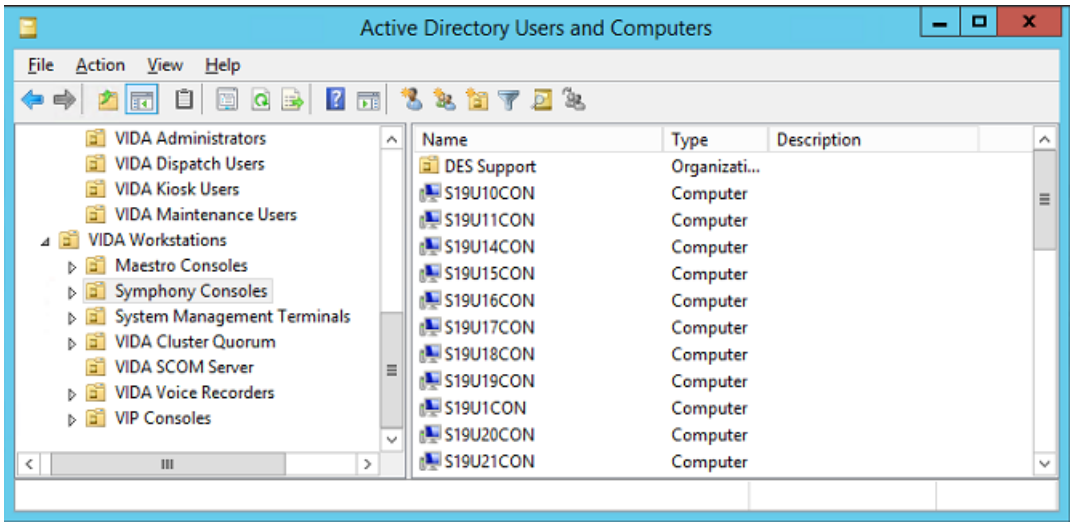
Setup: **None**

Execution:

1. Remote desktop login to the Active Directory (AD) Server (i.e. s0u1adsa) using VIDA credentials.
2. Open 'Administrator Tools' and select 'Active Directory Users and Computers'. Select 'VIDA Users'. Show that VIDA Administrators, VIDA Dispatch Users, VIDA Kiosk Users, and VIDA Maintenance Users accounts are present.



3. In 'Active Directory Users and Computers' select VIDA Workstations → Symphony Consoles. Verify consoles workstations are present and configured in AD. Close the 'Active Directory Users and Computers' window.



4. On 'Administrative Tools', open "Group Policy Management" and show the various VIDA GPO Structures are present.

5. Log out of the AD Server and end the remote desktop session.

6. Using remote desktop, log into a Windows server (i.e. s0u1rca). Verify installation of GPOs by issuing the following command: "Netdom verify localhost /domain:vida.local /UserO:vida\vida /PasswordO:*password*" where localhost = s0u1adsa.vida.local. Log out.

7. Log into a Cisco device (i.e. s0u1rar) to show success (NPS). Log out.

8. Log into a Linux server (i.e. s0u1nss) to show success (QAS). Log out.

Results	(Pass/Fail) _____
Tester: _____	Date: _____
Comments: _____	
_____	
_____	

15.2 Security Update Management Service (SUMS)

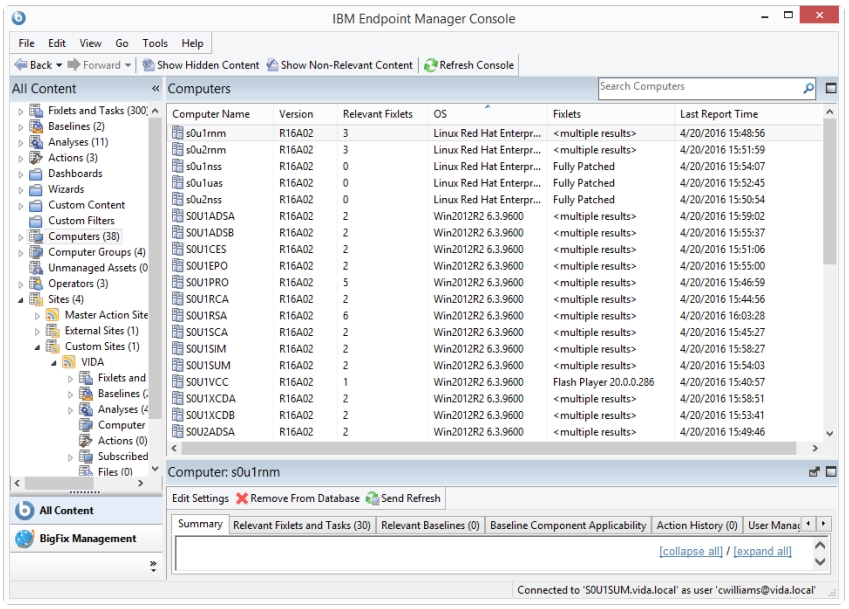
Purpose: **To demonstrate that the SUMS server is configured, communicating with all the devices that can be software upgraded or patched.**

Expected Results: **Logging into the SUMS server will show the list of devices that can have software upgrades/patches pushed to them. Devices can be patched by SUMS.**

Setup: **Load a test laptop with a vulnerability scanning utility, such as Retina or Nessus.**

Execution:

1. Log in with Remote Desktop to the SUMS server (https://s0u1sum.vida.local) using the system administrator credentials.
2. On the desktop, double-click the 'IBM EndPoint Manager Console' icon. This will bring up the SUMS application login screen. Accept the default login credentials by clicking the 'Login" button.
3. Select 'Computers' in the left-hand navigation tree. The list of entities will appear in the right 'Computers' pane.

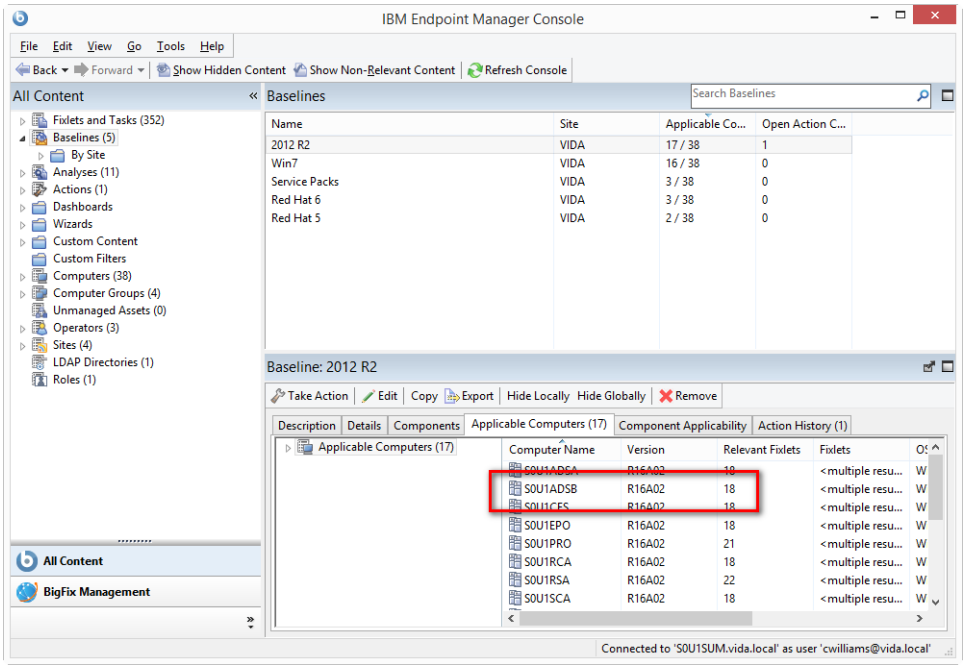


4. Verify each Windows server, Linux server and Windows workstation in the system is listed. These will include:

Computer Name	OS
s0u1rnm	Linux Red Hat Enterprise Server 5.11 (2.6.18-407.el5)
s0u2rnm	Linux Red Hat Enterprise Server 5.11 (2.6.18-407.el5)
s0u1nss	Linux Red Hat Enterprise Server 6.6 (2.6.32-573.12.1.el6.x86_64)
s0u1uas	Linux Red Hat Enterprise Server 6.6 (2.6.32-573.12.1.el6.x86_64)
s0u2nss	Linux Red Hat Enterprise Server 6.6 (2.6.32-573.12.1.el6.x86_64)
S0U1ADSA	Win2012R2 6.3.9600
S0U1ADSB	Win2012R2 6.3.9600
S0U1CES	Win2012R2 6.3.9600
S0U1EPO	Win2012R2 6.3.9600
S0U1PRO	Win2012R2 6.3.9600
S0U1RCA	Win2012R2 6.3.9600
S0U1RSA	Win2012R2 6.3.9600
S0U1SCA	Win2012R2 6.3.9600
S0U1SIM	Win2012R2 6.3.9600
S0U1SUM	Win2012R2 6.3.9600
S0U1VCC	Win2012R2 6.3.9600
S0U1XCDA	Win2012R2 6.3.9600
S0U1XCDB	Win2012R2 6.3.9600
S0U2ADSA	Win2012R2 6.3.9600
S0U2PRO	Win2012R2 6.3.9600
S0U2SCA	Win2012R2 6.3.9600
S0U2XCDA	Win2012R2 6.3.9600
S11U1NWS	Win7 6.1.7601
S13U1NWS	Win7 6.1.7601
S17U1NWS	Win7 6.1.7601
S19U14CON	Win7 6.1.7601
S19U18CON	Win7 6.1.7601
S19U19CON	Win7 6.1.7601
S19U20CON	Win7 6.1.7601
S19U21CON	Win7 6.1.7601
S19U23CON	Win7 6.1.7601
S19U24CON	Win7 6.1.7601
S19U25CON	Win7 6.1.7601
S19U26CON	Win7 6.1.7601
S19U27CON	Win7 6.1.7601
S19U28CON	Win7 6.1.7601
S9U1NWS	Win7 6.1.7601

5. Check to make sure that each computer has reported to the SUMS server with in the last 30 minutes by checking the 'Last Report Time' column.

6. Identify candidate systems with more than 12 relevant fixlets:

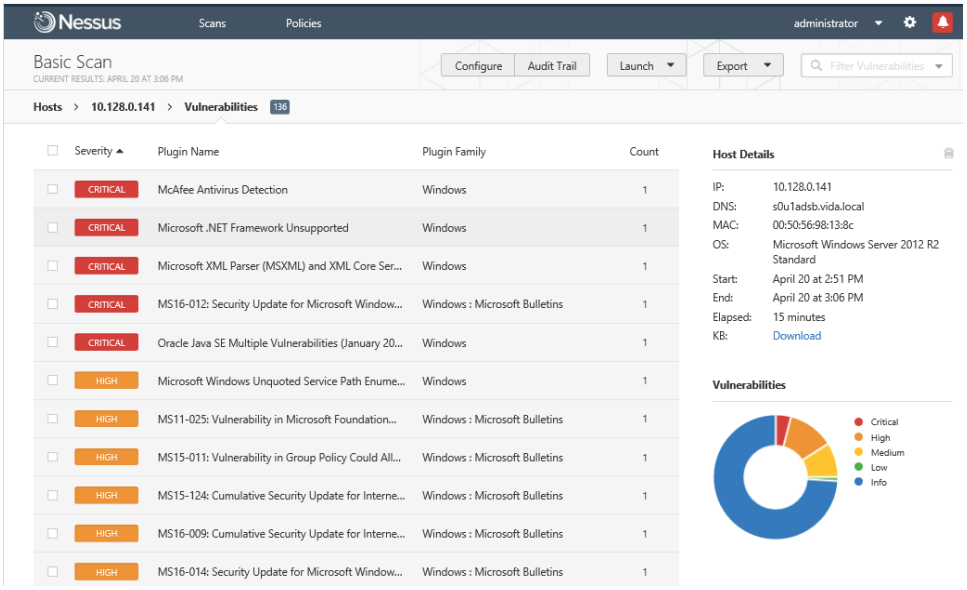


Windows server: _____

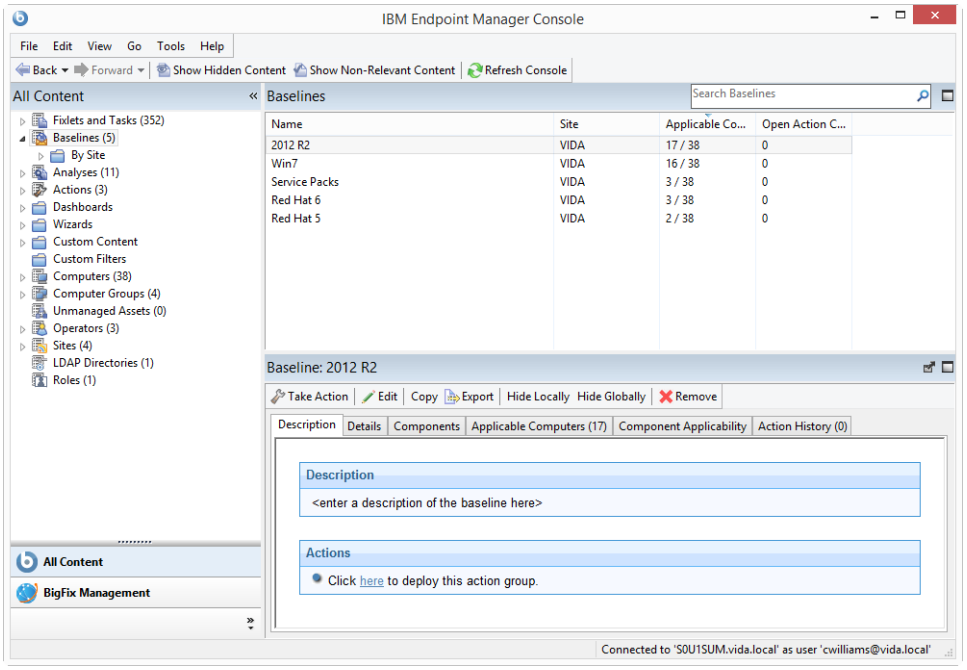
Linux server: _____

Windows workstation: _____

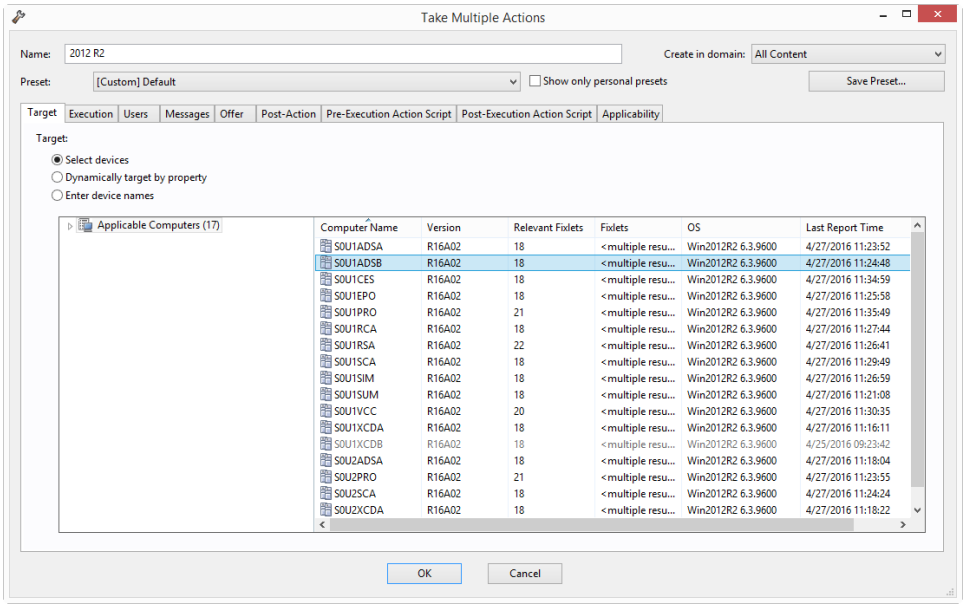
7. Plug the test laptop in a technician port. Scan the candidate systems for vulnerabilities with the vulnerability scanning utility:



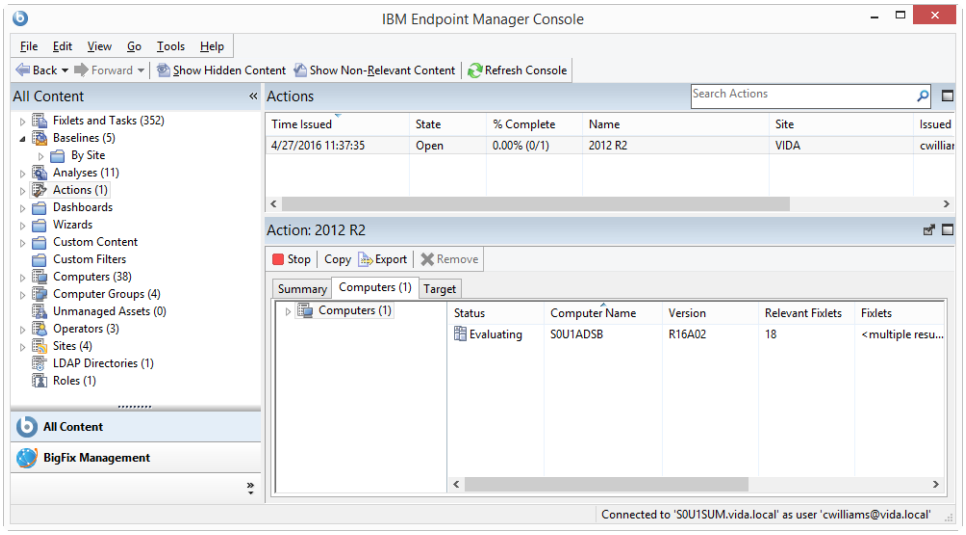
8. In the IBM Endpoint Management Console, select the appropriate baseline for the system to be patched:



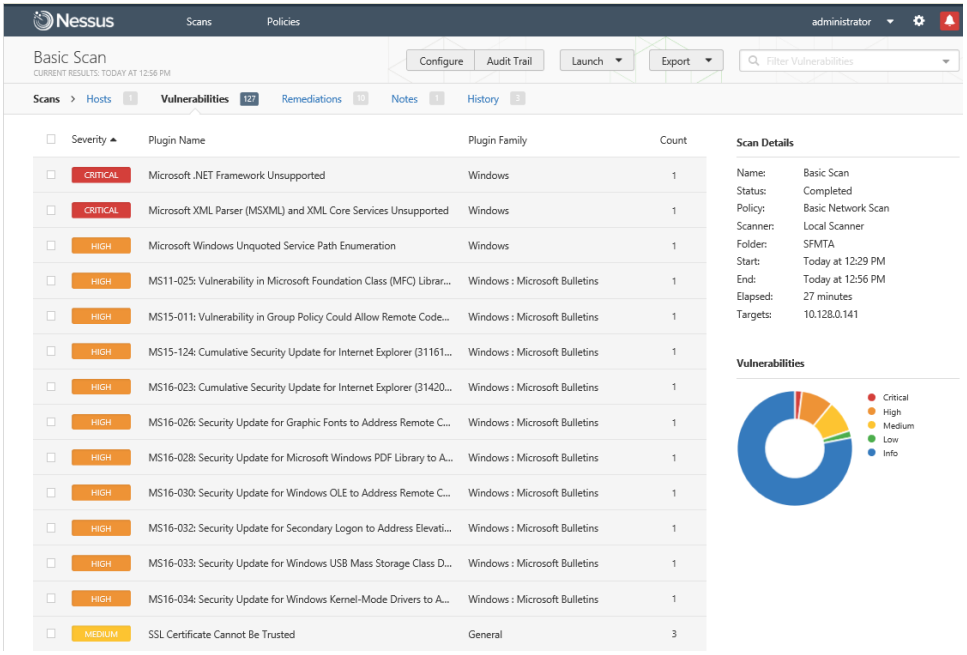
9. Click “Take Action”. In the “Take Multiple Actions” window, select the system(s) to be patched, then click “OK”



10. Click “Actions” to monitor the status of the patching. The patching process will take 30-60 minutes. Restart the systems, if indicated.



11. When the status is shown as “Completed”, rescan with the vulnerability scanning utility. Verify the vulnerabilities patches by SUMS are no longer open.



Results		(Pass/Fail)	_____
Tester:	_____	Date:	_____
Comments:	_____		
	_____		
	_____		

16. IN-CALL STATUS REPORTING

16.1 In-Call Location Reporting Radio

Purpose: **This test will demonstrate system ability to send location status from a radio.**

Expected Results: **The system will display the radio location, and the location will change when the radio moves.**

Setup: **The system and CLTsim need to be setup using the 'In-Call Status Reporting Manual'. This test should be executed outdoors in order for the radio to achieve GPS lock.**

Execution:

1. Log into CLTsim and open two terminal windows
   a. In terminal windows 1 type './cltsim –ccltsim.cfg' do not close the window
   b. In terminal windows 2 type
   'cltcmd -1 10.128.1.209 –u 21225 –s –j ipv4.10.128.79.1@vida.local –n location –n userStatus

2. PTT radio 1 for at least 3 seconds

3. Terminal window 1 will show the output of the GPS data.

   ☐ Check to make sure GPS data is displayed.

4. Move radio 1 about 50 feet and PTT again for 3 seconds

   ☐ Verify GPS Data changes.

Results		(Pass/Fail)	_____
Tester:	_____	Date:	_____
Comments:	_____		
	_____		
	_____		

16.2 In-Call Status Reporting Radio

Purpose: **This test will demonstrate system ability to send status from a radio.**

Expected Results: **The system will display the status from a radio.**

Setup: **The system and CLTsim need to be setup using the 'In-Call Status Reporting Manual'.**

Execution:

1. Use terminal windows from previous test
   a. In terminal window type
   'cltcmd -1 10.128.1.209 –u 21225 –s –j vuid.99999.10.998.6401@harris.com –n groupAlert –n userStatus

2. PTT radio 1 for at least 3 seconds

3. Terminal window 1 will show the status of radio 1.

   ☐ Check to make sure radio 1 status is 'Open'.

Results		(Pass/Fail)	
Tester:		Date:	
Comments:			

16.3 In-Call Emergency Reporting Radio

Purpose: **This test will demonstrate system's ability to send Emergency status from a radio.**

Expected Results: **The system will display the radio emergencies.**

Setup: **The system and CLTsim need to be setup using the 'In-Call Status Reporting Manual'. This test should be executed outdoors in order for the radio to achieve GPS lock.**

Execution:

1. Use terminal windows from previous test
    a. In terminal windows type
    'cltcmd -1 10.128.1.209 –u 21225 –s –j vuid.99999.10.998.6401@harris.com –n groupAlert –n userStatus

2. Create emergency on Radio1.

    - ☐ Check to make sure Emergency is displayed as '1'.

3. Clear emergency on Radio 1
    - ☐ Check to make sure Emergency is changed to '0'

Results		(Pass/Fail)	_____
Tester:	_____	Date:	_____
Comments:	_____		
	_____		
	_____		

16.4 In-Call Location Reporting Be-On

Purpose: **This test will demonstrate system ability to send location status from a BeOn terminal.**

Expected Results: **The system will display the radio location, and the location will change when the radio moves.**

Setup: **The system and CLTsim need to be setup using the 'In-Call Status Reporting Manual'. This test should be executed outdoors in order for the BeOn terminal to achieve GPS lock.**

Execution:

1. Log into CLTsim and open two terminal windows
   a. In terminal window 1 type './cltsim –ccltsim.cfg' do not close the window
   b. In terminal window 2 type
   'cltcmd -1 10.128.1.209 –u 21225 –s –j ipv4.10.128.79.1@vida.local –n location –n userStatus

2. PTT BeOn terminal 1 for at least 3 seconds

3. Terminal window 1 will show the output of the GPS data.

   ☐ Check to make sure GPS data is displayed.

4. Move BeOn terminal 1 about 50 feet and PTT again for 3 seconds

   ☐ Verify GPS Data changes.

Results	(Pass/Fail) _____
Tester: _____	Date: _____
Comments: _____	
_____	
_____	

16.5 In-Call Status Reporting Be-On

Purpose: **This test will demonstrate system ability to send status from a BeOn terminal.**

Expected Results: **The system will display the status from a BeOn terminal.**

Setup: **The system and CLTsim need to be setup using the 'In-Call Status Reporting Manual'.**

Execution:

1. Use terminal windows from previous test
   a. In terminal window type
   'cltcmd -1 10.128.1.209 –u 21225 –s –j vuid.99999.10.998.6401@harris.com –n groupAlert –n userStatus

2. PTT BeOn terminal 1 for at least 3 seconds

3. Terminal window 1 will show the status of BeOn terminal 1.

   ☐ Check to make sure BeOn terminal 1 status is 'Open'.

Results		(Pass/Fail)	_____
Tester:	_____	Date:	_____
Comments:	_____		
	_____		
	_____		

16.6 In-Call Emergency Reporting Be-On

Purpose: **This test will demonstrate system's ability to send Emergency status from a BeOn terminal.**

Expected Results: **The system will display the BeOn terminal's emergencies.**

Setup: **The system and CLTsim need to be setup using the 'In-Call Status Reporting Manual'.**

Execution:

1. Use terminal windows from previous test
    a. In terminal window type
    'cltcmd -1 10.128.1.209 –u 21225 –s –j vuid.99999.10.998.6401@harris.com –n groupAlert –n userStatus

2. Create emergency on BeOn terminal 1.

    ☐ Check to make sure Emergency is displayed as '1'.

3. Clear emergency on BeOn terminal 1

    ☐ Check to make sure Emergency is changed to '0'

Results		(Pass/Fail)	_____
Tester:	_____	Date:	_____
Comments:	_____		
	_____		
	_____		

17. ACTION ITEMS

Test #	Page #	Action/Issue
_____	_____	_____
_____	_____	_____
_____	_____	_____
_____	_____	_____
_____	_____	_____
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_____	_____	_____

Broken Arrow OK Pricing

Equipment Description	Unit Sale	Qty	Ext Sale
Network Switching Center - Premier Core • Firewall • ISSI Router • StatusAware Software • Network Sentry	**$327,473.00**	1	**$327,473.00**
Water Plant P25 Site Equipment - 5 channels • Site Interface Equipment • Network Sentry • Qty (5) MASTR V P25 Base Station • Antenna Equipment	**$287,902.00**	1	**$287,902.00**
Symphony Dispatch Consoles , including: • Computer, with System Interface Equipment • Feature Licenses Kit • Single Footswitch • Four (4) Nano Speakers	**$29,000.00**	2	**$58,000.00**
Installation, Engineering, Program Management	**$449,841.00**	1	**$449,841.00**
Additional Infrastructure Discount			-$575,776.00
SubTotal - Infrastructure and Services			**$547,440.00**
Police Department Radios			
Mobile Radio Upgrades • P25 Trunking, Phase 2, OTAR, and AES Feature Package	**$1,972.50**	164	**$323,490.00**
Portable Radios (w/LTE) • XL-200P VHF/UHF/700/800 MHz Portable • P25 Trunking, Phase 2, OTAR, AES, GPS, LTE Feature Package • Speaker Mic • Li-Ion 3100mAH Battery • Belt Clip and Charger • Flex Antenna	**$7,203.75**	50	**$360,187.50**
Portable Radios (w/o LTE) • XL-200P VHF/UHF/700/800 MHz Portable • P25 Trunking, Phase 2, OTAR, AES, GPS, Feature Package • Speaker Mic • Li-Ion 3100mAH Battery • Belt Clip and Charger • Flex Antenna	**$6,465.00**	110	**$711,150.00**
Additional Radio Quantity Discount			-$844,827.50
SubTotal - Police Dept. Radios			**$550,000.00**

Broken Arrow OK Pricing

Equipment Description	Unit Sale	Qty	Ext Sale
Fire Department Radios			
Mobile Radio Upgrades • P25 Trunking, Phase 2, OTAR, and AES Feature Package	**$1,972.50**	59	**$116,377.50**
Portable Radios (w/LTE) • XL-200P VHF/UHF/700/800 MHz Portable • P25 Trunking, Phase 2, OTAR, AES, GPS, LTE Feature Package • Premium Fire Speaker Mic • Li-Ion 3100mAH Battery • Belt Clip • Flex Antenna	**$7,433.00**	82	**$609,506.00**
Portable Radio Accessories			
• Spare Batteries	**$131.25**	15	**$1,968.75**
• Single Bay Charger	**$112.50**	11	**$1,237.50**
• Six Bay Charger	**$596.25**	9	**$5,366.25**
• Vehicular Charger	**$131.25**	2	**$262.50**
Additional Radio Quantity Discount			-$384,718.50
SubTotal - Fire Dept. Radios			**$350,000.00**
Water Department Radios			
Portable Radios • XG-25P 700/800 MHz Portable • P25 Trunking, Phase 2, OTAR, AES, GPS Feature Package • Speaker Mic • Li-Ion 2400mAH Battery • Belt Clip and Charger • Enhanced Whip Antenna	**$3,292.50**	5	**$16,462.50**
Mobile Radios • XG-25M 700/800 MHz Mobile Remote Mount • P25 Trunking, Phase 2, OTAR, AES, GPS Feature Package • Standard Microphone • Standard Roof Mount Antenna	**$3,900.00**	3	**$11,700.00**
Additional Radio Quantity Discount			-$19,602.50
SubTotal - Water Dept. Radios			**$8,560.00**
Grand Total - Broken Arrow			**$1,456,000.00**