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System Description

Introduction

Harris is providing vital upgrades to Aurora's current mission critical radio communications system. This includes four key enhancements: 1) Upgraded OpenSky/P25 HA (High Availability)-NSC (Network Switching Center) core, 2) New OpenSky/P25 Symphony IP consoles at the Dispatch Centers, 3) Updated site and interoperability software, and, 4) Updated site networking and monitoring equipment.

In addition to the new NSC Core and consoles, Harris has included the required upgrades for bringing the existing communications equipment current to the latest system release. In addition to the new core and console equipment, Harris has included the necessary software upgrades at the RF base stations. The system upgrades allow Aurora to take advantage of virtualized applications and enhanced system redundancy and resiliency.

The cabinets and associated server network equipment will be changed in the NSC equipment room at the Aurora PD and Fire Station 8 BCC (Backup Control Center). The new NSC cabinets will be assembled and tested in Lynchburg as a drop-in replacement.

There will be no physical changes made to the backhaul connectivity and the current system coverage will not be impacted.

Scope of Work

To upgrade Aurora's system to the current SR10A.4 system release for hardware and software, Harris has included the following detailed scope of services:

- System Engineering
- Project Management
- Installation Services
- Training (SR10A.4 maintenance)
- Staging & Shipping

The Harris Solution

The new equipment and services required to support the Aurora system upgrade including the following:

- Premier SR10A.4 release Virtual Core configured in geo-graphically separated High Availability
- 21 Symphony consoles configured at the Dispatch Centers
- Software updates to the SkyMASTR's and UAC (Unified Audio Card) interop gateways
- Replace Access Routers and Network Sentry's at the eight RF sites
- BeOn Premier Upgrade for 500 users (shared between Naperville and Aurora)

- 25 iOS or Android user licenses (shared between Naperville and Aurora)
- Status Aware – BeOn Integration only (100 end user licenses)

Upon order, Harris will build and configure the new NSC to standard Harris configuration. After successful staging and testing, Harris will ship the equipment to the customer site for installation into the designated equipment rooms.

The Harris team will power up the new equipment and perform a system health audit to verify proper installation and function of the new equipment. The Harris Team will then configure the new VIDA (Voice, Interoperability, Data, and Access) cores and prepare the system for cutover and acceptance testing.

Integration to the SR10A.4 Premier NSC Core

The Symphony Dispatch Platform connects directly to the radio network without the need for a backroom console switch. The Network Switching Center (NSC) cores will remain at the current Aurora PD/911 Center. The NSC core is co-located with dispatch centers that will house the Symphony consoles. During the system cutover, the current talkgroups will be replicated on the new Symphony consoles providing a seamless transition.

THIRD-PARTY ITEMS

While the proposed Harris cores and consoles have been configured to maintain compatibility throughout all the network devices, Harris recognizes that Aurora each have third-party devices that are connected to their individual networks, such as the logging recorders and CAD systems. These third-party devices may require updates to ensure compatibility with the new NSC cores. Aurora will need to contact the manufacturers of these devices to confirm they are operating on their latest system release. Any potential labor for software updates or testing of these devices are not included in the Harris proposal.

Acceptance Testing

Harris will perform system acceptance testing per the attached functional acceptance test plan (FATP). The Harris Upgrade Team will notify Aurora when installation and upgrade activities are complete, and the system is ready for acceptance testing.

Training

Harris will provide console configuration and equipment operator training per the attached training curriculum.

System Documentation

Harris will provide typical as-built documentation for system upgrades which include:

- 21 Symphony consoles configured at the Dispatch Centers
- Technical Manuals and Users Guides for the new components

VIDA Changes to the Existing System

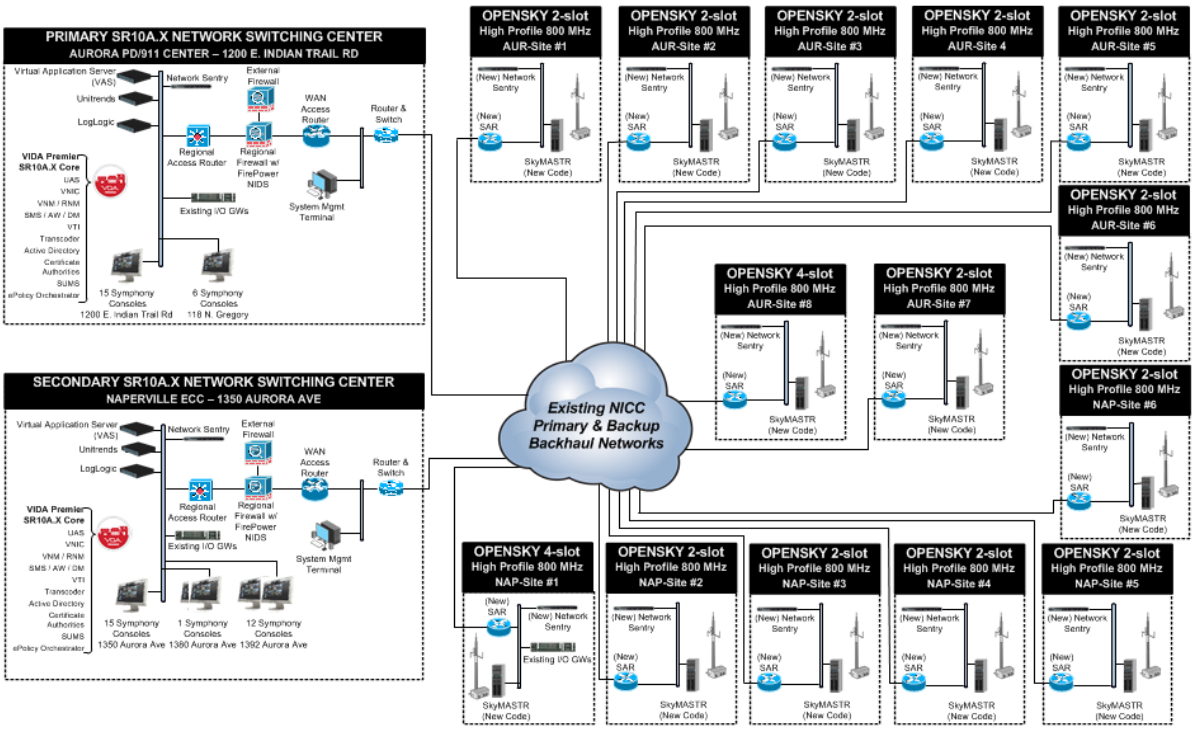
The new NSC core operates on the SR10A.4 system release and will be connected to all existing devices. Harris has included the necessary updates for these devices which require some level of reconfiguration to work on the new SR10A.4 NSC core.

Figure 1. SR10A.4 Upgrades

Existing Equipment	SR10A.4 Upgrade Requirement
VIDA NSC Core (Release SR9A)	Replace core management servers with virtual machines and provide new network routers
C3 Maestro IP Consoles	Replace with new Symphony IP consoles
RF Sites	Replace Network Sentry's, replace Cisco 2911 site access routers, and update software code in the SkyMASTR Base Stations
Subscriber Radios	Firmware updates to the radios are not expected to be required, however if updates are needed for SR10A.4 compatibility, they will be performed by Harris Field Services
VIDA Interoperability Gateway	Update software code for UAC cards in the I/O Gateways
NICE Logging Recorders	Update software code (Customer-maintained)

The designated locations for the geographically-separated NSC's, dispatch centers, and RF sites will continue to reside at the locations configured in the current system design.

Figure 2. System Block Diagram



VIDA Network Architecture

Premier Network Switching Center (NSC) Elements

The following sections provide brief descriptions of the equipment comprising the Premier NSC.

VIDA APPLICATION SERVER (VAS)

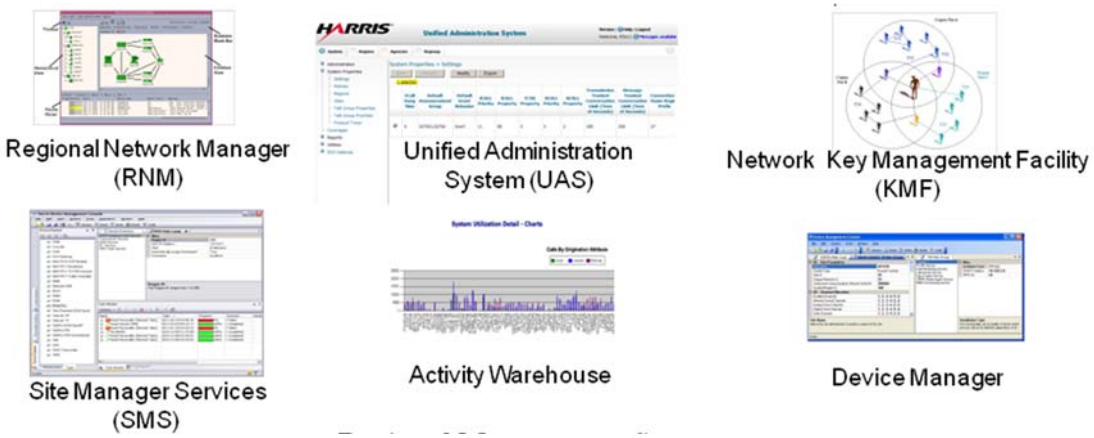
The VAS provides the single point of access for call switching as well as management and administrative tasks for a VIDA network. Powerful virtual machine (VM) technology consolidates several call routing and management applications on a single server (as opposed to running on separate servers).

The VAS routes calls to and from each voice group or mobile data user on a real-time basis. In addition, it regulates voice and data traffic on the network. Each voice user belongs to a voice group of peers. A network administrator assigns the members of a voice group and sets the voice group parameters, including priority, hang time, preferred site, and response time. This governs the functional behavior of user devices operating on the network. The VAS maintains a database of these voice group files. The VAS routes the IP voice traffic of one member to all others of a given voice group.

The VAS is a server workstation running a Red Hat Linux operating system. It hosts a voice controller application performing routing functions for digital trunked voice messages through an IP backbone. By tracking the radio site location of subscriber unit radios and their voice group affiliation, the VAS ensures delivery of voice messages only to those radio sites essential to reach the destined radios. In addition to call routing based on user radio (to site) registration, it is possible to set up the system to force certain talkgroup calls to those locations required for scanning.

The VAS is configured with a separate Storage Array Network (SAN) of hard drives and is designed in an HA (redundant) configuration; increasing the robustness and survivability of the network core equipment. Figure 3 shows the available applications that run on the VAS for the VIDA Premier NSC.

Figure 3. VAS Applications



REGIONAL NETWORK MANAGER (RNM)

The Regional Network Manager (RNM) provides users with powerful tools facilitating effective management of a VIDA network. The radio system manager can monitor the overall health of the Network Switching Server, view real-time diagnostics, monitor call activity of trunking systems, and set system/network configuration parameters.

UNIFIED ADMINISTRATION SYSTEM (UAS)

The Unified Administration System is an integrated real-time administration tool based on client-server architecture allowing multiple authenticated users at any Network Switching Center or remote location. By using the UAS, the administrator can securely modify a user or a group of user's priority, privileges, and encryption properties.

NETWORK SWITCHING SERVER (NSS)

The NSS, an application residing on the VAS, routes calls to and from each voice group or mobile data user on a real-time basis. In addition, it regulates voice and data traffic on the network. Each voice user belongs to a voice group of peers (talkgroup). A network administrator assigns the members of a voice group and sets the voice group parameters, including priority, hang time, preferred site, and response time. This governs the functional behavior of user devices operating on the network. The NSS maintains a database of these voice group files. The NSS routes the IP voice traffic of one member to all others of a given voice group.

The NSS application operates on a Red Hat Linux operating system. It is a voice controller application performing routing functions for digital trunked voice messages through an IP backbone. By tracking the radio site location of subscriber unit radios and their voice group affiliation, the NSS ensures delivery of voice messages only to those radio sites essential to reach the destined radios. In addition to call routing based on user radio registration, it is possible to set up the system to force certain talkgroup calls to those locations required for scanning, regardless of user radio affiliations. The highly scalable design of the NSS supports IP networks of various sizes. One NSS supports a single-region network serving the communications needs of city, county, and regional networks.

VIRTUAL MACHINE (VM) TECHNOLOGY

VM technology allows many applications running under separate operating systems to co-exist on a single server. The VM software allocates processor power, Random Access Memory (RAM), and Network Interface resources to each application. It isolates each application and ensures that no application impacts the operation of the others. VM technology also allows the addition of software capabilities on the server. For example, a customer adding encryption to the radio system can easily install the KMF VM software package on the VAS (instead of the conventional installation of a separate server to support that application).

HIGH-AVAILABILITY CONFIGURATION

In addition to the application services running on the VAS, there are an array of internal hard drives that accompany the Cisco UCS servers housed within the VAS. This increases the robustness and survivability of the network core equipment.

Figure 4. Premier NSC Equipment at Aurora

Location	VIDA NSC Equipment	Description
AURORA PD/911 CENTER Primary NSC	- (1) VIDA Application Server 1 (VAS1) - Network Switching Server Application 1 VM (NSS1) - Regional Network Manager 1 VM (RNM1) - Active Directory Server 1 VM (AD1) - BeOn Server 1 VM (BeOn1) - Internet Firewall - (21) Symphony IP Consoles	Geographically separated Network Switching Servers, network management and control applications, network security application, BeOn 4G network interface. Firewall for VPN management access, BeOn access, Email and text messaging alerts.

Network Management and Administration

Users need to view and monitor their radio network in real time. They also need to perform administrative tasks. Region network management and administrative applications and devices enable users to do their job.

The following sections discuss the applications and devices that comprise network management and administration within the proposed radio system.

Regional Site Manager Professional (RSM Pro)

The RSM Pro is a suite of applications which run on the VIDA Application Server (VAS). These applications include the Site Management Services (SMS), Device Manager, and Activity Warehouse.

The SMS provides an interface between the UAS and the Site Management Interface software, which resides on the Network Sentry at the RF sites. The SMS is responsible for distributing the large database of talkgroups and individual user information from the UAS to the RF sites. It consolidates site alarms and call activity to report site faults and alarms to the RNM.

The RSM Pro also includes two system management applications, the Activity Warehouse and the Device Manager. The RSM Pro applications make use of a Storage Array Network (SAN) to store and protect all configuration and activity data. The RSM Pro supports an encrypted database for all the data stored on the SAN. Additionally, the RSM Pro applications support redundancy configurations, whether collocated or geographically separated.

ACTIVITY WAREHOUSE

The Activity Warehouse is a report-generating program used to monitor various aspects of a radio network that comes standard with the RSM Pro. It uses network-accessible web pages for initiating and delivering reports. These reports are based on IP call activity related to RF sites, consoles, gateways, and other devices on the radio network.

The Activity Warehouse performs data searches on call-logging data created and stored by network components. It can search the parameters stored within this data and report them in textual, table, and graphical formats.

This program automatically stores call detail history. Administrators create user accounts allowing users to generate reports from the data. The call information data facilitate creation of several system reports, including:

- Number of inbound and outbound calls (Call Activity Report)
- Percentage of uptime (System Channel Uptime Report)
- Message traffic by agency (User Agency Report)
- Message traffic by transaction type (Call Activity with Events Report)
- Network bandwidth utilization (RNM Network Utilization Report)

VIDA Interoperability Gateway

The Aurora system has Interoperability Gateways deployed in the dispatch center. These gateways do not require new hardware and will therefore not need to be replaced. However, the gateways will require software updates to the UAC cards in order to provide compatibility with the new SR10A.4 NSC core. The gateways will continue to map legacy audio to the active talkgroups on the systems.

There is one Interoperability Gateway chassis equipped on the Aurora system. Additional interoperability can be added to the new system at any time, upon request. Figure 5 illustrates the location and number of talkpaths that are equipped and will be updated in the systems.

Figure 5. Existing Interoperability Gateway Locations

Location	Number of Talkpaths	Number of Chassis
AURORA PD/911 CENTER	12	1

Dispatch Console Replacement

Harris has included new Symphony IP consoles to replace the current obsolete Maestro twenty-one console positions at the Aurora PD/911 Center and BCC/911 Center. The Symphony Dispatch Console represents the next generation of dispatching with an intuitive user interface and the ability to support mapping and video in the future. The console inventory by location is illustrated in Figure 6.

Figure 6. Dispatch Consoles by Location

Location by Address	New Symphony IP Consoles
AURORA PD/911 CENTER - 1200 E. Indian Trail Rd	15
AURORA PD/911 CENTER - 118 N. Gregory	6

Symphony Dispatch Platform

The Symphony Dispatch Platform connects directly to the radio network without the need for a backroom console switch. It uses a solid-state design that makes it completely silent and more reliable than other hardware platforms.

Figure 7. Symphony Dispatch Console

The Symphony also incorporates both the workstation and audio functions into a compact, single rack-unit design. It is capable of managing multiple audio sources in a single headset by utilizing the Call Director interface button. Telephone audio from 911 dispatch phone systems or business phone systems can be connected to the Symphony via 4-wire POTS lines with an off-hook indication. This connection allows the dispatchers to select the audio source for their headset to manage 911 and administration phone calls while dispatching the radio system.

Each dispatch console is typically configured with the following:

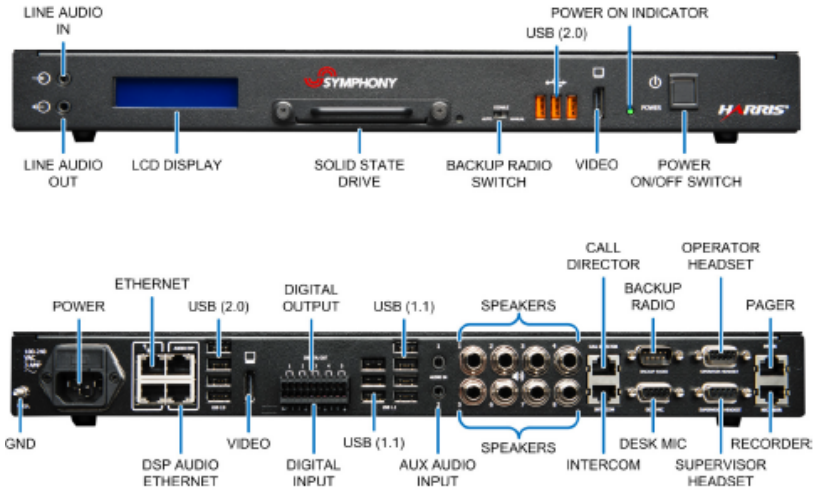
- Symphony Dispatch Platform (SDP) – Premier Bundle includes a local screen and baton, eight patch activations, 16 patch definitions, 16 simul-select definitions, I-calls, four user setups, 16 workspace tabs and a remote Baton.
- Vocoding services
- 24” high definition touchscreen monitors
- Keyboard
- Optical scroll mouse
- Dual footswitch
- Adapter and Jack box
- Headset
- Two Speakers per console position
- AES Encryption
- Spare workstation or spare hard drive

*Consult the Aurora price pages for final console configuration

The consoles are independent of one another, each position utilizing an existing UPS provided by Aurora. Hence, failure of one console does not affect operations of the other consoles. Any other console can be quickly reprogrammed with the functionality of the failed console. Any user can log into any available console and continue dispatching. Likewise, the Symphony console supports individual dispatcher login and personalization to permit dispatch specific settings and common architecture so dispatchers can access their specific settings at any dispatch console location. Harris will work with the Aurora to customize the design of their console screen layout to meet the individual dispatcher needs.

The audio processor is the connecting hub for most of the console accessories. It collects audio from the microphones and other audio inputs and plays received audio in the speakers and headsets. Dispatchers no longer have to make room for a PC and a separate audio tower. Standard PC accessories, such as keyboard, mouse and/or trackball, are used as part of the Symphony Dispatch Platform. In addition, the Symphony Dispatch Platform provides automatic gain control of various inputs and simplifies cabling between the Symphony and all possible peripheral options.

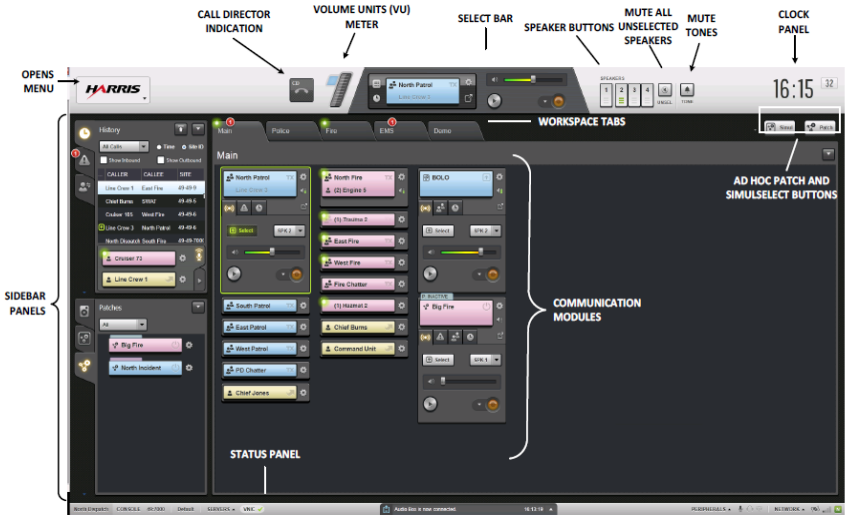
Figure 8. Symphony Dispatch Platform (SDP) Enclosure – Front and Back



DYNAMIC USER INTERFACE

Featuring patent-pending technology, dispatcher workflow is simplified by putting the features they use the most where they need them. This completely customizable user interface allows individual dispatchers to work in a manner that makes sense to them. Standard multi-tabbed modules personalized in 14 different colors allow dispatchers to move audio to different speakers, replay calls, and handle emergency calls. Multiple screen configurations can be created for scenarios ranging from crisis situations to shift/staffing changes. Figure 9 is a typical full screen Symphony display.

Figure 9. Symphony Functional Tab



SYSTEM ADMINISTRATION

Symphony offers several administration models. An administration model is a combination of settings that control:

- How parts of the Symphony configuration are shared among dispatchers
- Controlling who is allowed to change configuration items

Controlling who can change configuration items allows administrators and supervisors to lock down the console configuration so that some or all of it cannot be changed by dispatch users. Symphony leverages Microsoft Windows security to control access to configuration. Many of the configuration items can only be changed by Windows administrators. The configuration tools themselves are compatible with User Account Control (UAC), which means they will prompt non-Administrator users for an administrator password before they are run.

There are four basic configuration models that Symphony supports: default, local controlled, power user, and networked. It is also possible to mix and match aspects of these models to support more advanced scenarios. All these models are primarily concerned with controlling which users can change the screen layout and other GUI settings.

CONSOLE FEATURES

In addition to classic dispatch functions such as patch, simul-select, emergency, and call history, Symphony provides many advanced features such as an integrated call check recorder, digital audio technology providing end-to-end encrypted communications that are free from unauthorized access. AES encryption on each of the console positions is included.

The following are a list of features available on the Symphony Dispatch console.

- **Patches** – Each dispatcher can define a minimum of two Patches, also referred to as definitions; however only one patch can be active. The maximum number of active patches available per operator position is eight.

- **Simul-select** – Each dispatcher can define a minimum of two Simul-selects, also referred to as definitions; only one simul-select can be active. The maximum number of active patches available per operator position is eight.
- **Paging** – An on-screen encoder or an external encoder are available for paging.
- **Aux I/O** – Up to six opto-coupler auxiliary inputs and up to five outputs are available.
- **User Setups** – The Symphony console is capable of storing up to 12 setups. Each licensed setup can be unique in terms of communication module programming.

SIGNALING CAPABILITIES

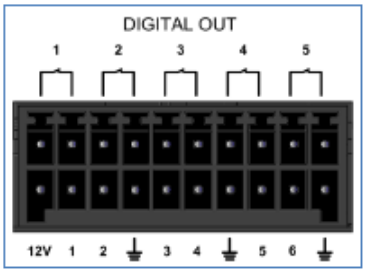
Alert Controls allows a dispatcher to choose the type of alert tone from a drop-down list and transmit the tone to the module entity. Typically, alert tones are utilized during emergency operations to signal radio units of various pre-defined emergency conditions, with voice transmissions following. When a tone is transmitted from the console, it is simultaneously heard in a speaker at the console. To prevent voice interference, all console microphone audio is muted during transmissions. Three distinctive alert tones transmitted from the console include:

- Alert Tone (A) – a steady medium-frequency tone (1000 Hz) that sounds while the respective button is depressed.
- Warble Tone (W) – a repeating sequence of a medium-frequency tone followed by a higher frequency tone that sounds while the respective button is depressed.
- Pulse Tone (P) – Medium-frequency tones (1000 Hz) that turns on and off repeatedly while the respective button is depressed.

AUXILIARY INPUT/OUTPUT CONNECTIONS

Auxiliary input and output connections are made using the Auxiliary I/O Connector, which is located on the Symphony Dispatch Platform's rear panel. The connector has six optocoupler auxiliary input lines (bottom row) and five output lines (top row) that can be used for interfacing with two-state external devices.

Figure 10. Auxiliary Input/Output Connections



The Symphony console can be configured in "demo" mode to enable the supervisor to conduct training on the dispatch console without interruption to the live system.

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Introduction

Harris excels in the multifaceted implementation of mission critical radio systems to fulfill the specific needs of our customers and support their vital public safety operations. The flowchart below shows the steps necessary to deliver a radio system that will replace components of Aurora and Naperville's (Aurora/Naperville) legacy system. The process starts with the system design, and culminates with acceptance of the new Harris DMR/P25 radio system.

1	2	3	4	5	6
SYSTEM DESIGN	FACTORY ACCEPTANCE TEST	SYSTEM IMPLEMENTATION	FIELD ACCEPTANCE TEST	SYSTEM CUTOVER	FINAL SYSTEM ACCEPTANCE

System Design

Kick-Off Meeting and Preliminary Design Review

The project manager initiates project implementation with a Project Kick-Off Meeting, followed by a Preliminary Design Review. The Harris Team, and Aurora/Naperville, will mutually agree on the timing of these meetings. The objectives of the meeting include:

- Introduction of all project participants
- Review of the roles of the project participants
- Review of the overall project scope, objectives, and deliverables
- Review of the current site status

- Review of customer owned site documentation
- Review of the preliminary project schedule
- Schedule site surveys with Aurora/Naperville, and/or site owner designated representatives.

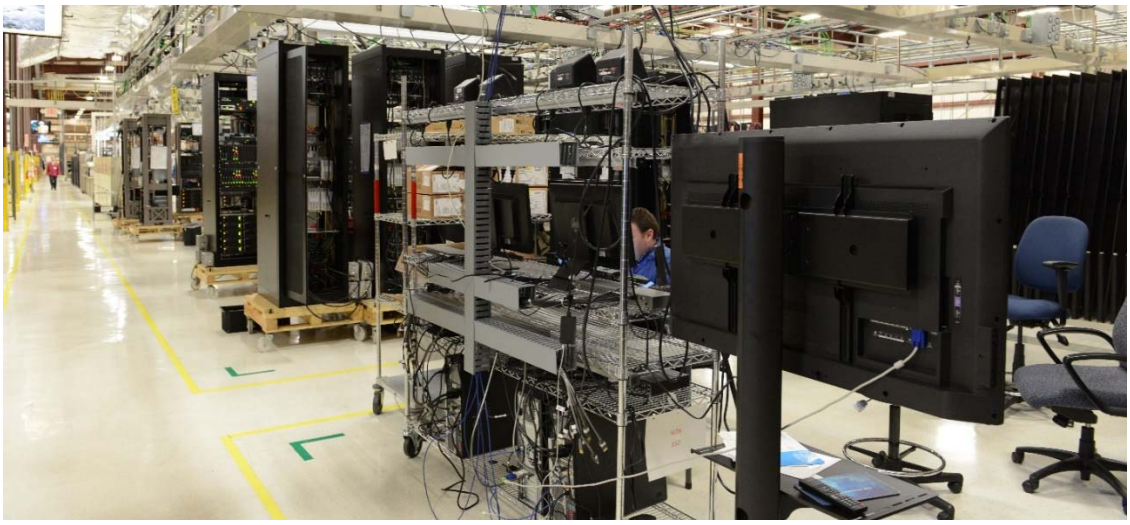
Customer Design Review (CDR)

The Harris Team uses the information obtained during the kick-off meeting, preliminary design review, and site surveys, along with the regulatory and engineering documentation, to deliver the final system design at the CDR. The Harris Team presents design drawings and documentation during the CDR with Aurora/Naperville.

Figure 1. Customer Design Review Responsibility Matrix

Tasks	Harris	Aurora/Naperville
Prepare for Customer Design Review		
Assemble project team and travel to the Aurora/Naperville's location	X	
Assemble customer team for kick-off meeting		X
Provide location in appropriate conference room or training facility		X
Present preliminary information on sites and design	X	
Provide information and status on sites		X
Provide a team and propose a schedule for site surveys	X	
Arrange access to sites and confirm site survey schedule		X
Provide site-knowledgeable personnel (customer and site owner reps, as appropriate) to accompany the project team on site surveys		X
Conduct site surveys (if required)	X	
Provide site plans and applicable electrical and layout plans		X
Provide up-to-date drawings along with a current mapping of installed antennas and cabling		X
Perform grounding analyses	X	
Develop required drawings	X	
Develop network plans and IP backhaul requirements	X	
Develop site electrical loads	X	
Develop preliminary cutover plan	X	
Develop formal project schedule	X	
Prepare acceptance test procedure (ATP) documents	X	
Customer Design Review Deliverables		
System block diagrams	X	
List of deliverable equipment for each site	X	
Rack elevation drawings	X	

Tasks	Harris	Aurora/Naperville
Preliminary cutover plan	X	
ATP	X	
Project schedule	X	
Customer Design Review		
Provide deliverables for review	X	
Review documents		X
Provide location for CDR meeting		X
Approve the design following CDR meeting (within 5 business days)		X



1	2	3	4	5	6

Factory Acceptance Test

System Integration and Test – Factory Staging

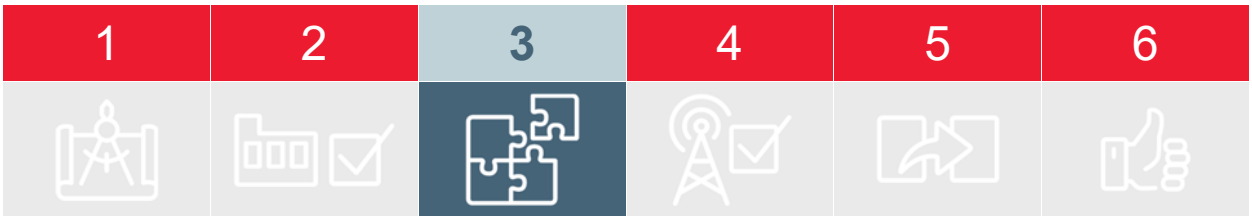
Immediately following customer approval of the final design, the Harris Team procures material and schedules system integration and test using its' material requirements planning (MRP) system. Our Eagle Focus Factory assembles the RF equipment, integrates it with the key supplier items, and then tests each rack of equipment.

After assembly and test, each RF site rack will go through configuration, which consists of loading customer specific parameters and personalities into each applicable piece of equipment. The network switching center (NSC) will undergo an imaging process. After imaging is complete, a Staging technician will perform a build and validation check against the NSC image. The Staging technicians make all network connections for each site's equipment including NSC, dispatch,. Ethernet and/or fiber cable connections are made to simulate backhaul networks and ensure the equipment connects to the network switches. The Staging Team verifies system levels and tests all features to confirm the system is ready for factory acceptance test (FAT). Once a dry run FAT completes by the Staging Team, the system transitions over to the system engineer for a week-long dry run of the FAT.

Running the FAT demonstrates the radio system functionality. The FAT uses the functional acceptance test plan (ATP) tests appropriate to run in the factory staging environment. The ATP defines each test, with instructions on how to set up and run the test, and compares the actual results to the expected results. The responsibility matrix shown in Figure 2 provides the Staging activities that the Harris Team is responsible for, and those activities that are the responsibility of Aurora/Naperville.

Figure 2. System Integration and Test - Staging Responsibility Matrix

Tasks	Harris	Aurora/Naperville
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	
Run FAT	X	



Shipping, Warehousing, and Inventory

After a successful factory acceptance test (FAT), the Harris Team packages all system elements using established procedures depending on the mode of transportation. The Team engages appropriate freight carrier services to deliver the system to the address designated in the sales order.

Figure 3 shows the shipping and inventory activities that the Harris Team is responsible for, and those activities that are the responsibilities of Aurora/Naperville.

Figure 3. Shipping & Inventory Responsibility Matrix

Tasks	Harris	Aurora/Naperville
Break down equipment and ship to storage area	X	
Provide temporary storage near Aurora/Naperville's location		X
Inventory equipment	X	
Validate Harris equipment inventory		X
Sort equipment in preparation for site delivery and installation	X	

System Implementation

Site Development

All site development activities shall be the responsibility of Aurora/Naperville. This includes space, electrical, HVAC, backup power, etc.

Shelters/Equipment Rooms

EXISTING SHELTERS/EQUIPMENT ROOMS

Existing shelters/equipment rooms shall be physically inspected and floor space calculations performed to verify that there is adequate space to install new equipment racks without removing existing equipment racks. Inadequate space in existing shelters/equipment rooms shall result in additional fees.

General and Site Development Responsibility Matrices

The general responsibility matrix in Figure 4 describes the general project responsibilities of both parties that are not associated with any specific site.

Figure 4. General Responsibility Matrix

Tasks	Harris	Aurora/Naperville
Coordinate with federal, state, and local government agencies, as required		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 installation debris	X	
Remove any hazardous material found on site		X
Ensure that no utility transformers additions or upgrades will be		X

Tasks	Harris	Aurora/Naperville
required to provide the adequate AC power needed for each site		
Develop sites		X
Provide final backhaul requirements to the Aurora/Naperville	X	
Provide backhaul which meets the final backhaul requirements provided by Harris		X

The site responsibility matrices in Figure 5 define the responsibilities of both parties for the implementation of the P25 Project.

Figure 5. Existing Customer-Owned Sites Responsibility Matrix

Tasks	Harris	Aurora/Naperville
Customer-Owned Site Tasks		
Obtain any necessary zoning approval for site changes		X
Provide existing site plans		X
Perform grounding analysis	X	
Provide Aurora/Naperville site survey results reports and recommendations	X	
Existing Shelter/Equipment Rooms		
Provide floor space in existing RF shelter/equipment rooms for new equipment racks used in the new design		X
Provide adequate shelter/equipment room utility AC electrical power, single-point ground system HVAC, and backup generator power		X
Upgrade existing interior ground system (if required)		X
Provide additional cable ladder for new equipment row		X
Prepare and submit electrical permits on behalf of the customer		X
Provide floor space at the dispatch center and network center for new system equipment		X
Provide backup power (UPS) for NSC		X
Provide backup power (UPS) for consoles		X
Provide demarcation blocks for connection to existing legacy radios to be used in interoperability system		X

Infrastructure Installation

The Harris Team develops the installation plan during the detailed design phases of the project and presents it to Aurora/Naperville for review and approval. The installation plan includes floor plan drawings, equipment rack-up drawings, and installation procedures based on site surveys conducted by the Team, or designated subcontractors. The installation plan coordinates all activities of the project team, minimizing installation conflicts, and ensures that system implementation proceeds efficiently. The project team takes great care to ensure there is minimal

disruption in service when installing the new P25 VIDA core and network equipment in existing equipment locations.

Harris assumes that Aurora/Naperville-provided shelters/equipment rooms will accommodate the height of open racks and allow them to position to maintain the desired 36 inches of free aisle space (in front and in the rear). Racks and cabinets anchor to the floor using at least four anchor points.

Once the infrastructure racks secure in place, we ground and connect them to power, and technicians verify proper levels and settings, preparing the site for the acceptance test.

Site equipment installations follow industry standards, including Harris Grounding and Lightning Protection. The Team reviews the installation work to ensure implementation of these standards.

Infrastructure Equipment

Upon completion of the VIDA core work, system engineers (or maintenance technicians) upgrade the OpenSky base-stations, and associated equipment.

Aurora/Naperville personnel and/or their representatives are given advanced notice to prepare for their participation in acceptance testing.

Installation crews also install and commission the network switches and dispatch consoles per the detailed implementation plan.

Figure 6 provides a system installation responsibility matrix the infrastructure equipment. This matrix shows those tasks that Harris is responsible for, and those activities that are the responsibility of Aurora/Naperville.

Figure 6. System Infrastructure Installation Responsibility Matrix

Tasks	Harris	Aurora/Naperville
Deliver equipment to each site	X	
Install equipment, connect to ground system and apply power	X	
Interface to network, verify network connectivity	X	

System Optimization

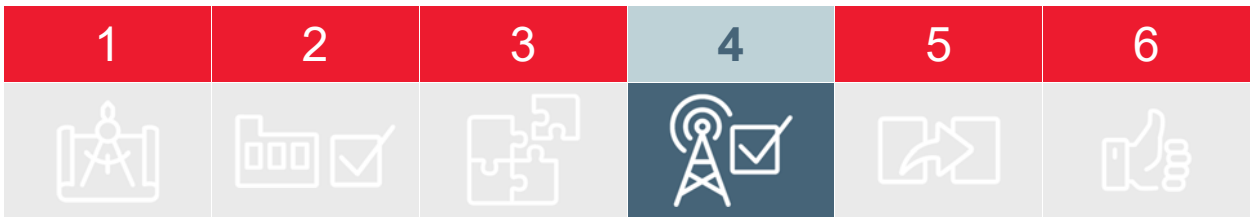
Upon installation of infrastructure equipment, the system engineer(s) works with the on-site technicians to optimize the equipment in preparation for acceptance testing.

Harris will conduct a preliminary acceptance test to determine that the systems are fully optimized and ready for the acceptance test with Aurora/Naperville.

Figure 7. System Optimization Matrix

Tasks	Harris	Aurora/Naperville
Prepare all installed sites for site inspections	X	

Tasks	Harris	Aurora/Naperville
Verify microwave/backhaul system is functional and meets reliability specifications		X
Provide frequencies to use for optimization and testing (if frequencies are currently in use in existing system)		X
Verify P25 system alarm and system monitoring system are operational	X	
Verify system database is installed and operating correctly	X	
Verify proper dispatch operation	X	
Verify proper network switching operation	X	



Functional Acceptance Test

Acceptance Testing

We will perform systems acceptance testing per the agreed upon acceptance test plan (ATP). The Harris Team notifies Aurora/Naperville when installation and optimization are complete, and the system is ready for acceptance testing.

The system engineer provides documentation defining each of the test areas. The ATP procedures contain a short description, test methodology, and a record form for logging results and acceptance signatures for each test. The Harris Team uses a punch list to document any issues found, so the team can quickly resolve them. Follow-up documents will show the correction of open items. Upon satisfactory completion of each testing phase, the project manager will present the system acceptance documentation to Aurora/Naperville's project manager(s). With Aurora/Naperville's approval, the project team, and Aurora/Naperville, can proceed with cutover.

Figure 8 provides a detailed listing of those acceptance testing activities performed by Harris, and those activities to be performed by Aurora/Naperville.

Figure 8. Acceptance Testing Responsibility Matrix

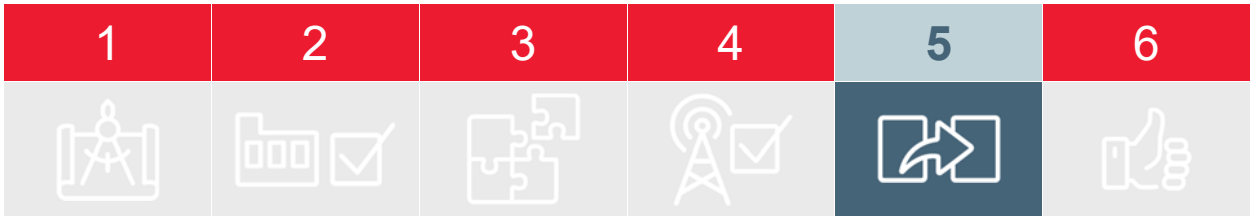
Tasks	Harris	Aurora/Naperville
Provide appropriate team members to participate in acceptance tests		X
Inspect each site with newly installed equipment, noting discrepancies on the punch list	X	
Inspect each dispatch center, noting discrepancies on the punch list	X	
Inspect each network switching center, noting discrepancies on the punch list	X	
Submit site inspection results	X	
Approve site inspection results within 5 business days		X
Perform functional ATP on radio system, dispatch consoles, and network monitoring	X	
Submit functional ATP results	X	
Approve functional ATP results (within 5 business days)		X

Conditional System Acceptance

Harris will submit initial system acceptance documentation for Aurora/Naperville to sign, marking the successful conclusion of acceptance testing, and readiness for system cutover.

Figure 9. System Acceptance Responsibility Matrix

Tasks	Harris	Aurora/Naperville
Submit letter of system acceptance	X	
Sign letter of final system acceptance (within 5 business days)		X
Approve Cutover Plan		X
Notify users of system cutover date		X
Proceed with System Cutover according to Cutover Plan	X	



System Cutover

Cutover Plan

Cutover will be closely tied to the construction sequence and site build out. The complexity, and interdependence of support systems involved, and the large number of subscribers need to be taken into consideration during the planning of cutover. Harris is certain that Aurora/Naperville and Harris share the same overarching goals in the process – that there are no lost calls, and that each agency maintains departmental communications during the process.

We will collaboratively plan cutover from the existing radio systems to the new radio system to minimize disruption to operations of the participating agencies. Cutover generally occurs at a mutually agreeable time during a relatively quiet period where any cutover disruptions would have little effect on operations. For the cutover to progress as rapidly as possible, the plan will consider:

- Fixed equipment cutover
- Interfaces with and transfer of control to or from existing systems/equipment
- Dispatching transitions
- Special sequences
- Scheduled downtime
- Dual operation as necessary
- Personnel schedules

Harris will provide a detailed cutover plan to Aurora/Naperville for approval prior to beginning acceptance testing. Cutover will occur only after the cutover plan approval by Aurora/Naperville, acceptance testing completion.

To make cutover a success, careful planning, and good communication of the plan, must take place to ensure everything, and everyone, is ready, scheduled and coordinated. Dispatcher training is critical to a successful cutover and will occur just before the selected cutover date and time.

Cutover Plan Development

Harris and Aurora/Naperville will work together to prepare a mutually agreed upon cutover plan 90-120 days before the system is available for user integration.

Other than the bulleted items below, the cutover plan may also include topics such as the timing of the cutover, systematic fleet-by-fleet or agency-by-agency users' cutover, initial trial window or live system test window for the first batch of migrated users, milestones during cutover process, and finally, a fallback plan in case of any uncertainty. The entire cutover plan would be broken into multiple phases to ensure the smooth transition to new system.

The cutover plan will address:

- **Dispatch Support During Cutover** – During NSC cutover, it may be required that users communicate on backup radio channels for a brief maintenance window. A solution will be created where the dispatcher positions can talk to field units on the backup system during the transition phase.
- **Dispatch Center Cutover** – Operation of the new consoles will be verified before cutover is to begin. Harris will work closely with the Aurora/Naperville's Project Manager to coordinate the Dispatch Center cutover soon after the Aurora/Naperville NSC cutover.
- **Dispatcher Training** – Radio users will need to be trained on the new subscriber radios' operation. Our Harris training team will provide the City of Aurora quick-reference materials per trainee and produce seminar-oriented train-the-trainer materials per trainee to facilitate this.

Because the new system would have already undergone extensive testing the probability the new system must be taken down for repairs will be very low. However, provisions and plans for reverting to the old legacy system will be established in the event it becomes necessary. These plans will be worked out with the Aurora/Naperville and put into action only with proper consent of the Aurora/Naperville's Project Director.

Reaching a final cutover plan is typically the result of several customer meetings that include the Aurora/Naperville's representatives, and department heads.

Cutover Methodology

To minimize downtime Harris will install and test the new VIDA core and network equipment at the site locations while the legacy system is still in operation. Once the equipment is installed Harris will coordinate with Aurora/Naperville to cut the sites over to the new VIDA core. Harris will then coordinate with the Aurora/Naperville dispatch centers to install the Symphony consoles.

NSC Cutover

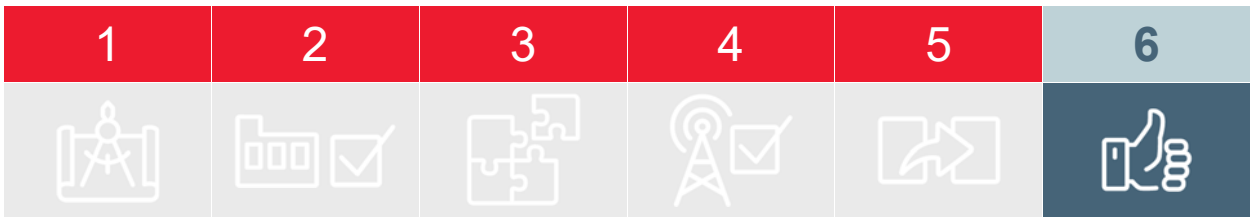
After completion of cutover planning, the Harris Team and Aurora/Naperville agree on a day and time for cutover to begin. The Team is present with Aurora/Naperville to provide any last-minute answers to users as they go live on the new system. The Team also stations dispatch-knowledgeable personnel in the dispatch center to be available if any questions arise.

Figure 10. Cutover Responsibility Matrix

Tasks	Harris	Aurora/Naperville
Identify system administrators		X
Provide administrator training	X	
Attend system administrator training		X
Develop dispatcher training plan and schedule with Harris (collaborative effort)		X
Develop console programming profiles		X
Migrate system database to SR10A.X	X	
Define which conventional (backup) channels are desired during cutover		X
Provide dispatcher training	X	
Attend dispatcher training		X

Symphony Console Cutover

Symphony console installation will ocurr after the NSC cutover has been completed. After collaborative planning with the dispatch managers for both Aurora and Naperville, the console installation will be scheduled in a manner that is least disruptive for dispatch operations. Ideally, installation will occur promptly after console training has been completed.



Final System Acceptance

Harris will submit initial system acceptance documentation for Aurora/Naperville to sign, marking the successful conclusion of cutover.

Final System Acceptance

Upon the completion of acceptance test plan (ATP) tests, cutover, and submission of the final drawing package, the project manager submits the final system acceptance letter for Aurora/Naperville to sign. With the final acceptance, the project manager arranges a meeting with the Field Service team to review maintenance support during the warranty period. The Harris Team provides the contact information and procedures used to obtain service during the warranty period.

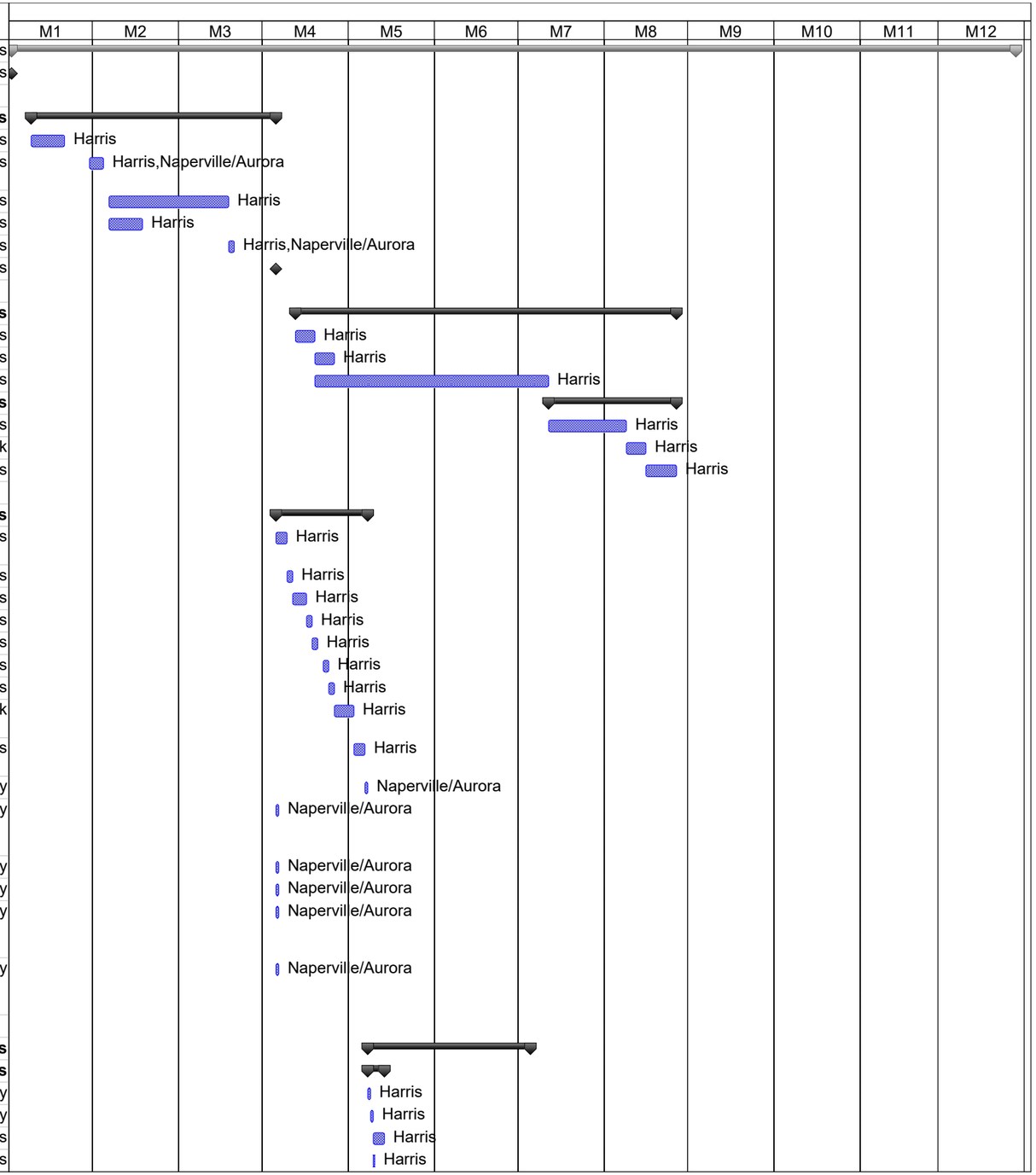
Figure 11. Final Acceptance Responsibility Matrix

Tasks	Harris	Aurora/Naperville
Removal of decommissioned legacy network, console, or site infrastructure equipment	X	
Submit final drawing package	X	
Submit letter of final system acceptance	X	
Provide warranty and contact information	X	
Meet with Harris to review warranty contact procedures		X
Meet with Harris to outline system support and services requirements		X
Accept final drawing package (within 5 business days)		X
Sign letter of final system acceptance (within 5 business days)		X

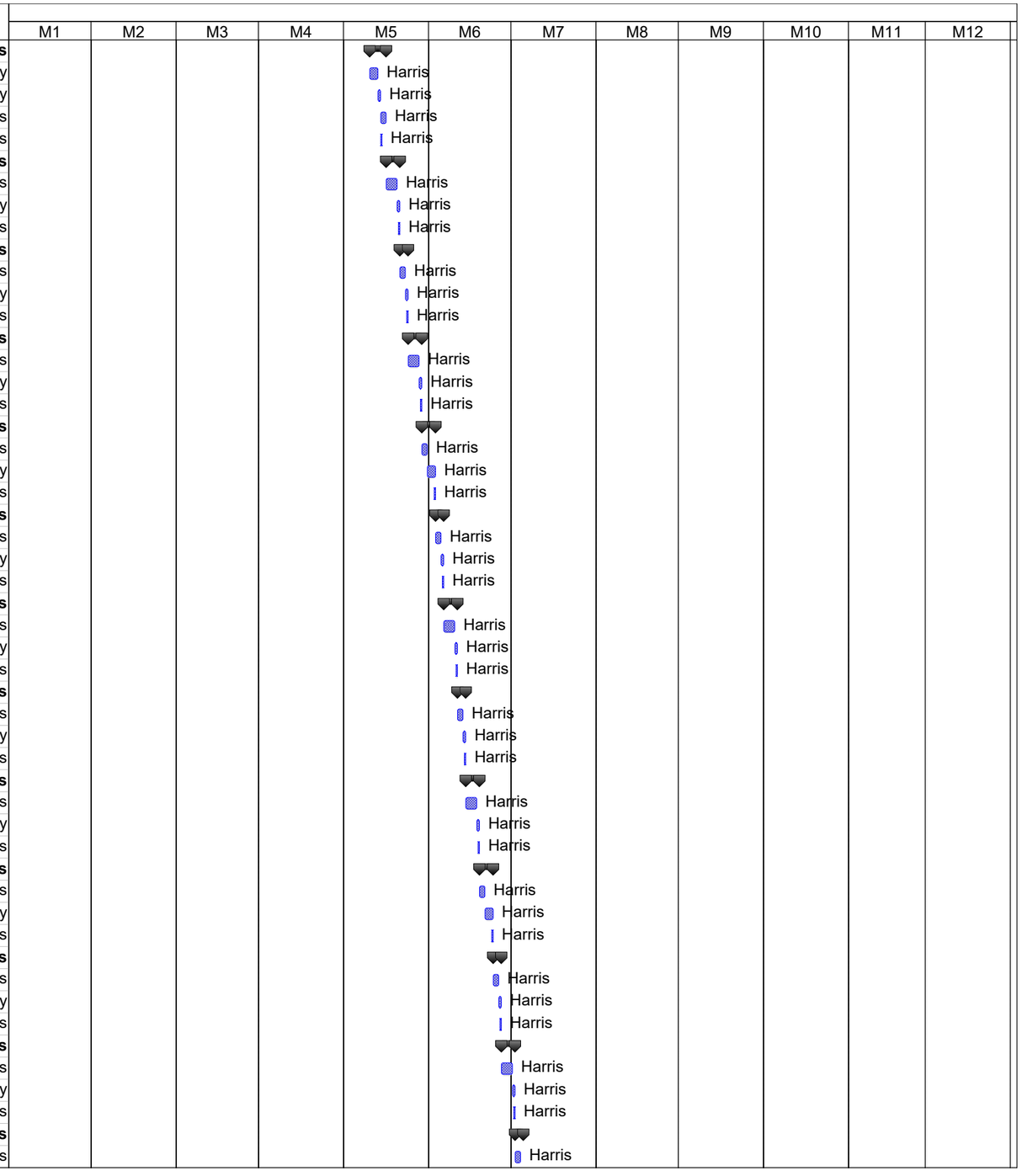
Attachment 1 – Transition Plan

Pre-Cutover Preparations
Replace SR9 NSC to SR10A.4 NSC cores
Update subscriber equipment software to highest level supported by current system.
Update base station software to highest level supported by current system.
Update UAC software to SR10A.4 release.
Attach test RF site to SR10A.4 core at Aurora for training.
Attach test Symphony console to SR10A.4 core at AURORA.
Verify RF functionality through Aurora SR10A.4 test site.
Verify console functionality through Aurora SR10A.4 core.
Verify SR10A.4 WAR#1 to WAR#2 connectivity.
Verify NICE VLR upgrade to v6.6.2 has been performed by customer
Verify VLR operates with both SR10A.4 cores.
SR10A.4 Core Cutover
Migrate UAS database to SR10A.4
Perform full NPS provisioning on SR10A.4
Force Aurora SR10A core to be primary
Configure Naperville OR9 console network link to SR10A.
Disconnect test site and console from Aurora SR10A.
Perform test RF calls through local site on a talk group programmed onto one or more consoles.
Verify multisite operation between local site and local consoles through Aurora SR10A.4 core.
Perform a manual switch over from Aurora to Naperville SR10A.4 core.
Verify multisite operation between local site and consoles through Naperville SR10A.4 core.
Verify that all test calls have been recorded on both Aurora and Naperville VLR's.
Symphony Console Cutover
Extract existing Maestro console credentials and configuration parameters (user ID, PSAP)
Take existing console OFFLINE, and verify AMBE+2 vocoder on all talkgroups.
Assemble new Symphony console in parallel at dispatch position.
Program replacement Symphony console with extracted parameters.
Clone module arrangement and talk group assignment.
Verify connectivity of Symphony to SR10A.4 system.
RF Site Cutover
Turn down sites one at a time: 1) replace 2811's with 1921's, 2) replace Network Sentry, and 3) update base station(s) software. Projected down-time 2 hours per site.
RF Site Cutover
Connect sites to new SR10A.4 cores
Verify OpenSky base station configurations are modified for default AMBE+2

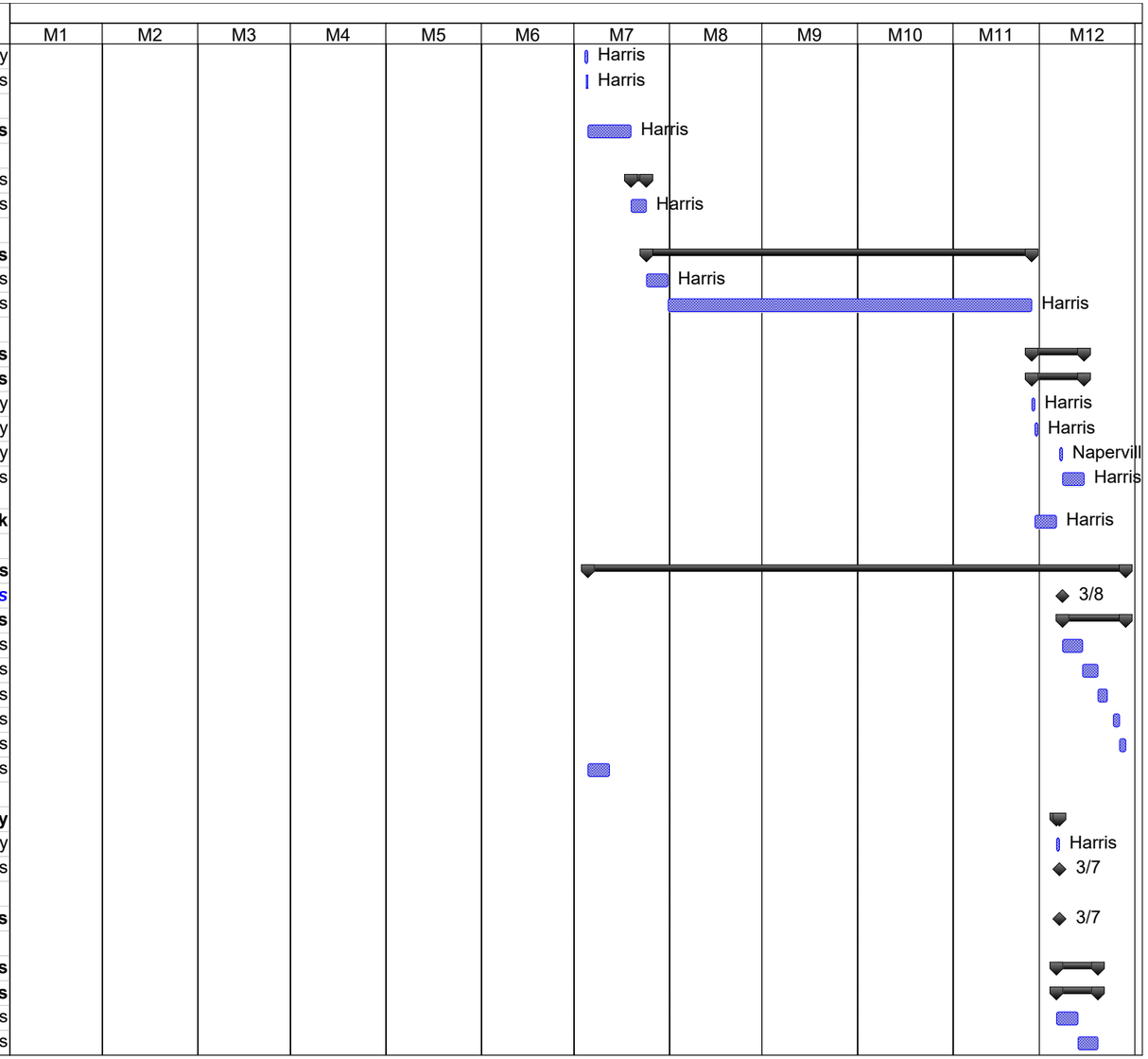
ID	Resource Names	Task Mode	Task Name	Duration
0			**Naperville/Aurora System Upgrade**	248 days
1			***Contract Signed***	0 days
2				
3			**Prepare for Customer Design Review (CDR)**	**62 days**
4	Harris		Internal Project Review Meetings	10 days
5	Harris,Naperville/Aurora		Kick-off Meeting & Preliminary Design Review w/ Customer, Site Surveys	5 days
6	Harris		Prepare for Customer Design Review	30 days
7	Harris		Prepare site drawings, floor plan & Rack drawings	10 days
8	Harris,Naperville/Aurora		***Customer Design Review***	2 days
9	Harris,Naperville/Aurora		***Customer Design Review Approval***	0 days
10				
11			**LMR Manufacturing and Staging Process**	**95 days**
12	Harris		Place orders on factory	5 days
13	Harris		Place orders on vendors	5 days
14	Harris		Manufacture P25 Radio System	12 wks
15			**Factory Staging**	**30 days**
16	Harris		Assembly and Staging	4 wks
17	Harris		Audit, Teardown, Paperwork, and Pack	1 wk
18	Harris		Deliver equipment to customer	5 days
19				
20			**System Readiness**	**23 days**
21	Harris		Check UAS (fleetmap, registration timers, coverage classes, ect)	2 days
22	Harris		Check RNM (review alarms, completeness of domain, ect)	2 days
23	Harris		Conduct network audit	3 days
24	Harris		Conduct base station audit	2 days
25	Harris		Conduct site performance audit	2 days
26	Harris		Review network diagram and IP plan with customer	2 days
27	Harris		Review failure modes with customer	2 days
28	Harris		Analyze network for compatibility with SR10A and define the required changes	1 wk
29	Harris		Analyze RF network and confirm latest design with customer	2 days
30	Naperville/Aurora		***Correct any RF performance issues***	1 day
31	Naperville/Aurora		***Update base station code to minimum version required (if necessary); Review configuration; Review programming***	1 day
32	Naperville/Aurora		***Update UAC's to SR10A code (if necessary)***	1 day
33	Naperville/Aurora		***Upgrade logging recorder to accommodate SR10A.4***	1 day
34	Naperville/Aurora		***Customer to have adequate floor space, emergency backed power (i.e. UPS/generator), HVAC, and backhaul at each applicable site prior to installation***	1 day
35	Naperville/Aurora		***Customer to have existing radio system and equipment updated and tested (ie, all software updates and patches applied and all system alarms resolved)***	1 day
36				
37			**Infrastructure Installation**	**42.5 days**
38			**P25 Network Switching Center**	**4 days**
39	Harris		Install Primary Network Switching Center	1 day
40	Harris		Ground all equipment and connect to backhaul	1 day
41	Harris		Apply power and test NSC network	2 days
42	Harris		Final site clean up	0.5 days



ID	Resource Names	Task Mode	Task Name	Duration
43			**P25 Network Switching Center**	**4 days**
44	Harris		Install Secondary Network Switching Center	1 day
45	Harris		Ground all equipment and connect to backhaul	1 day
46	Harris		Apply power and test NSC network	2 days
47	Harris		Final site clean up	0.5 days
48			**OpenSky RF Site**	**3 days**
49	Harris		Install 1921 Router and Network Sentry	2 days
50	Harris		Preliminary Functional Testing	1 day
51	Harris		Final site clean up	0.5 days
52			**OpenSky RF Site**	**3 days**
53	Harris		Install 1921 Router and Network Sentry	2 days
54	Harris		Preliminary Functional Testing	1 day
55	Harris		Final site clean up	0.5 days
56			**OpenSky RF Site**	**3 days**
57	Harris		Install 1921 Router and Network Sentry	2 days
58	Harris		Preliminary Functional Testing	1 day
59	Harris		Final site clean up	0.5 days
60			**OpenSky RF Site**	**3 days**
61	Harris		Install 1921 Router and Network Sentry	2 days
62	Harris		Preliminary Functional Testing	1 day
63	Harris		Final site clean up	0.5 days
64			**OpenSky RF Site**	**3 days**
65	Harris		Install 1921 Router and Network Sentry	2 days
66	Harris		Preliminary Functional Testing	1 day
67	Harris		Final site clean up	0.5 days
68			**OpenSky RF Site**	**3 days**
69	Harris		Install 1921 Router and Network Sentry	2 days
70	Harris		Preliminary Functional Testing	1 day
71	Harris		Final site clean up	0.5 days
72			**OpenSky RF Site**	**3 days**
73	Harris		Install 1921 Router and Network Sentry	2 days
74	Harris		Preliminary Functional Testing	1 day
75	Harris		Final site clean up	0.5 days
76			**OpenSky RF Site**	**3 days**
77	Harris		Install 1921 Router and Network Sentry	2 days
78	Harris		Preliminary Functional Testing	1 day
79	Harris		Final site clean up	0.5 days
80			**OpenSky RF Site**	**3 days**
81	Harris		Install 1921 Router and Network Sentry	2 days
82	Harris		Preliminary Functional Testing	1 day
83	Harris		Final site clean up	0.5 days
84			**OpenSky RF Site**	**3 days**
85	Harris		Install 1921 Router and Network Sentry	2 days
86	Harris		Preliminary Functional Testing	1 day
87	Harris		Final site clean up	0.5 days
88			**OpenSky RF Site**	**3 days**
89	Harris		Install 1921 Router and Network Sentry	2 days
90	Harris		Preliminary Functional Testing	1 day
91	Harris		Final site clean up	0.5 days
92			**OpenSky RF Site**	**3 days**
93	Harris		Install 1921 Router and Network Sentry	2 days



ID	Resource Names	Task Mode	Task Name	Duration
94	Harris		Preliminary Functional Testing	1 day
95	Harris		Final site clean up	0.5 days
96				
97	Harris		**Final Optimization**	**10 days**
98				
99			**Cutover**	3 days
100	Harris		**Cutover VIDA Core**	3 days
101				
102			**OTHER INSTALLS**	**80 days**
103	Harris		Install CADLink Server	5 days
104	Harris		Symphony Consoles	75 days
105				
106			**Acceptance Tests**	**13 days**
107			**System ATP Test**	**13 days**
108	Harris		Run Functional Test at Dispatch Center	1 day
109	Harris		Submit Functional test documentation	1 day
110	Naperville/Aurora		***Functional test documentation approved***	1 day
111	Harris		Submit System documentation and final as-built drawings	5 days
112	Harris		**Resolve punch list items**	**1 wk**
113				
114			**Training**	**115.5 days**
115	***Naperville/Aurora***		***Select System Administrator(s)***	***0 days***
116			**System Manager Training**	**14.5 days**
117			P25IP System Administration Course	4.5 days
118			P25IP Structuring Workshop	3 days
119			Implementation Support	3 days
120			Unified Administration System Course	2 days
121			Regional Network Manager Course	2 days
122			Symphony Console Training	5 days
123				
124			**System Acceptance**	**1 day**
125	Harris		Submit final documentation	1 day
126	Naperville/Aurora		***Sign Letter of System Acceptance***	0 days
127				
128			**Warranty Begins**	**0 days**
129				
130			**Training**	**9.5 days**
131			**Maintenance Training**	**9.5 days**
132			P25 System Maintenance	5 days
133			RF Maintenance	4.5 days



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Training

Console Configuration Training

Harris will conduct a two-day Console Configuration course that will be jointly attended by designated dispatch supervisors from the City of Aurora and the City of Naperville. The course will provide participants with the knowledge and skills to configure the Symphony Dispatch Console to meet operational needs. The training will include a detailed operational overview that introduces the various features and capabilities of the console. Dispatch supervisors will work within the Configuration Utility to explore the various settings and how these settings impact the operation of the console. With an understanding of the Configuration Utility settings, the supervisors will have the requisite knowledge to define the parameters that best suit their operational needs. Harris will save these settings and use them as a template to set up additional consoles. Participants will also be trained to perform the following tasks:

- Add, rename and delete workspace tabs
- Design communications modules (i.e., entities, colors, sizes, etc.)
- Add, delete and move communication modules
- Change the sidebar panel layout
- Create, switch, delete and password protect console setups
- Set encryption indicators and controls (if applicable)

Harris will introduce the Audio Box Configuration Tool, which manages audio and voice input and output attributes, with the caveat that this tool is only for use in consultation with system engineers and/or technicians. Detailed settings controlled by this tool will be set in conjunction with system engineers and/or technicians. Harris will also explain the relationship between the consoles and Active Directory, cloning of consoles, and the connectivity to the Voice Network Interface Controller.

This training will take place after the Symphony Dispatch Consoles are installed and made operational but prior to console operational training and cutover. Each dispatch supervisor will receive a copy of the training presentation and any applicable technical documentation. Harris will conduct this course one (1) time for up to six (6) participants at a designated dispatch facility.

Console Operation Training

Instructor-led, hands-on training sessions on the operation of the Symphony Dispatch Console will be four (4) hours in length. This training will use operational consoles installed at the designated dispatch center. Harris recommends limiting each training session to no more than two (2) dispatchers per console to maximize the hands-on training. The training will include the following tasks performed using the Symphony Dispatch Console, as applicable:

- Select communication modules
- Transmit and receive group and individual calls

- Transmit, receive and clear emergency calls
- Review call history and play back audio
- Modify communication modules
- Create, modify and transmit on patches and simulselects
- Control conventional channels
- Use the paging function
- Change console setups
- Use special and enhanced console features

Harris will conduct a total of ten (10) console operational training sessions over five (5) consecutive days that will be attended by dispatchers from both the City of Aurora and the City of Naperville. Harris will schedule these sessions just prior to implementation to allow participants to promptly begin using the skills learned. Each participant will receive a Harris published/produced hardcopy of the Symphony Dispatch Console Operation Quick Reference Guide.

Pricing

SR10A.4 Upgrade and Symphony Consoles	Qty	Total Price
Symphony Dispatch Consoles	**21**	**$1,114,305.90**
ROUTER,ISR4221/K9	1	$1,700.00
KIT, CISCO 4221 ROUTER, SITE MTG	1	$59.00
MODULE,NIM 4PORT LAYER2 GE	2	$1,134.00
SWITCH,CISCO 2960 PLUS	1	$1,454.57
KIT,MTG HDWR,CISCO 2960 MASTR III/V CAB	1	$69.88
ROUTER,ISR4221/K9	1	$1,700.00
KIT, CISCO 4221 ROUTER, SITE MTG	1	$59.00
SWITCH,CISCO 2960 PLUS	1	$1,454.57
KIT,MTG HDWR,CISCO 2960 MASTR III/V CAB	1	$69.88
SW,SYMPHONY PC APP & WIN 10 IMAGE	1	$200.00
SOFTWARE,REMOTE BATON	1	$110.00
CONSOLE,BUNDLE,PREMIER,WIN10	15	$598,425.00
LICENSE,AES AND DES LEVEL ENCRYPTION	15	$127,500.00
SPEAKER, NANO, SYMPHONY	30	$8,850.00
MONITOR, 24" CLASS, TOUCHSCREEN, HD	15	$41,250.00
CABLE,DISPLAYPORT TO DVI-D,10FT	15	$600.00
MOUSE, OPTICAL, USB, SCROLL WHEEL	15	$225.00
KEYBOARD, 104 KEY, USB	15	$2,775.00
DUAL FOOTSWITCH, USB, SYMPHONY	4	$1,980.00
Headset,Ear Bud Style	15	$4,200.00
License,Vocoder	15	$1,500.00
MANUAL,OP/INSTA/CONFIG,SYMPHONY,CD	15	$375.00
CONSOLE,BUNDLE,PREMIER,WIN10	6	$239,370.00
LICENSE,AES AND DES LEVEL ENCRYPTION	6	$51,000.00
SPEAKER, NANO, SYMPHONY	12	$3,540.00
MONITOR, 24" CLASS, TOUCHSCREEN, HD	6	$16,500.00
CABLE,DISPLAYPORT TO DVI-D,10FT	6	$240.00
MOUSE, OPTICAL, USB, SCROLL WHEEL	6	$90.00
KEYBOARD, 104 KEY, USB	6	$1,110.00
SINGLE FOOTSWITCH, USB, SYMPHONY	17	$4,335.00
Headset,Ear Bud Style	6	$1,680.00
License,Vocoder	6	$600.00
MANUAL,OP/INSTA/CONFIG,SYMPHONY,CD	6	$150.00
VIDA Premier Core upgrade - Hardware and Software		**$275,360.94**
SERVER, DELL R640, PREMIER	0.50	$27,800.00
SERVICE,SYBASE LICENSE	1	$2,677.00
CABINET,NSS,42 RU,120V	0.50	$3,225.00
POWER KIT,SR10A.4,LOC HA/UNITE,110VAC	0.50	$97.50

SR10A.4 Upgrade and Symphony Consoles	Qty	Total Price
CABLE KIT,SR10A.4,LOCATION HA/UNITE	0.50	$97.50
Netclock,GPS Master Clock	0.50	$2,975.00
Kit,GPS Antenna,Outdoor,For Netclock	0.50	$512.50
Cable,GPS Ant Outdoor,100ft/Netclock	0.50	$397.50
DRAWINGS,PREMIER,SR10A.4	0.50	$0.50
SOFTWARE,PREMIER CORE,VM	0.50	$34,350.00
VIDA Security, NSC	0.50	$547.79
License,Quest Authentication,Server	6.50	$2,957.50
LICENSE,QUEST AUTHENTICATION,USER,QTY 6	0.50	$26.00
ROUTER,ISR4321,APPX LIC	0.50	$1,732.30
KIT, CISCO 4321 ROUTER, NSC MTG	0.50	$32.50
FIREWALL,ASA5508-X W/SEC+	0.50	$2,413.64
SERVER,UNITRENDS RS606 BACKUP APPLIANCE	0.50	$10,000.00
FIREWALL, ASA5506-X W/SEC+/ANYCON-25USR	0.50	$1,413.00
KIT, RACKMNT, 5506	0.50	$152.00
MODULE,NIM 4PORT LAYER2 GE	0.50	$283.50
SWITCH,CATALYST 3650 24P IP	0.50	$2,656.32
Software, Epolicy Orch VM	0.50	$1,000.00
LICENSE,SUMS,ENDPOINT	32.50	$2,762.50
LICENSE,SUMS,CORE	25	$1,200.00
LICENSE,HOST SECURITY,AV,EPO,QTY 51-100	46	$5,625.34
LICENSE, ENM P-RTU, + 3 YR SUPP, BASE	125	$7,000.00
LICENSE,ENM P-RTU,+3YR SUPP,GEO-HA	0.50	$1,650.00
LICENSE,VMWARE,VCENTER,FOUNDATION	0.50	$1,450.00
LICENSE,VMWARE,VCENTER,FOUNDATION,3YR	0.50	$1,650.00
LICENSE,ADVANCED CYBER REQTS	0.50	$33,450.00
SERVER, DELL R440, VMT	0.50	$5,025.00
Kit,1RU Monitor,Key Board,Mouse,KVM	0.50	$987.50
SERVER, DELL R640, PREMIER	0.50	$27,800.00
SERVICE,SYBASE LICENSE	1.00	$2,677.00
CABINET,NSS,42 RU,120V	0.50	$3,225.00
POWER KIT,SR10A.4,LOC HA/UNITE,110VAC	0.50	$97.50
CABLE KIT,SR10A.4,LOCATION HA/UNITE	0.50	$97.50
Netclock,GPS Master Clock	0.50	$2,975.00
Kit,GPS Antenna,Outdoor,For Netclock	0.50	$512.50
Cable,GPS Ant Outdoor,100ft/Netclock	0.50	$397.50
SOFTWARE,PREMIER CORE,VM	0.50	$34,350.00
VIDA Security, NSC	0.50	$547.79
ROUTER,ISR4321,APPX LIC	0.50	$1,732.30
KIT, CISCO 4321 ROUTER, NSC MTG	0.50	$32.50
FIREWALL,ASA5508-X W/SEC+	0.50	$2,413.64
SERVER,UNITRENDS RS606 BACKUP APPLIANCE	0.50	$10,000.00
FIREWALL, ASA5506-X W/SEC+/ANYCON-25USR	0.50	$1,413.00

SR10A.4 Upgrade and Symphony Consoles	Qty	Total Price
KIT, RACKMNT, 5506	0.50	$152.00
MODULE,NIM 4PORT LAYER2 GE	0.50	$283.50
SWITCH,CATALYST 3650 24P IP	0.50	$2,656.32
License,Quad Mode Vocoder	0.50	$17.50
LICENSE, SQL SERVER 2016 STD, BASE 4CORE	0.50	$2,025.00
PC,SYSTEM MANAGEMENT TERMINAL	0.50	$612.50
MONITOR, 21.5 INCH LED, 16:9 ASPECT	0.50	$102.50
FEATURE,NO AES ENCRYPTION	0.50	$0.01
Network Sentry,w/ Xconn Panel,OpenSky	1.00	$20,000.00
Alcatel 7705 SAR Power Supply	1.00	$1,085.15
Switch,T1/E1 Alcatel,SAR 16 port	1.00	$4,007.88
RF Site Upgrades	**7**	**$175,743.54**
Module,Cisco HWIC-16A	7	$16,341.50
Cable,CAB-HD8-Async	14	$2,131.50
KIT,MOUNTING HARDWARE,1921 ROUTER	7	$460.04
Network Sentry,w/ Xconn Panel,OpenSky	7	$140,000.00
ROUTER,1921,AC,NO ENCRYPTION,CISCO	7	$11,376.75
Cisco IOS Security License	7	$5,433.75
Services (Engineering, Prog Mgmt, Install, Test)	**1 Lot**	**$226,897.50**
Console Spares-Audio Board & Hard Drive	**1 Lot**	**$11,190.00**
CONSOLE WRKSTN,W/ PC,AUDIO BOARD	1.00	$8,800.00
HARD DRIVE,SDP,BLANK	2.00	$2,390.00
UPS Batteries for sites	1.00	**$16,513.98**
System Discount including trade-in credit for existing Core	1 Lot	-$914,344.30
Installation Services Credit	1 Lot	-$130,000.00
PROJECT TOTAL		***$775,667.56***

Payments Terms

Contract Mobilization	20%
Detailed Design Review	20%
Equipment Shipment	20%
Installation	20%
System Upgrade Acceptance	20%
Total Milestone Payments	***100%***

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Warranty

Warranty Support

Harris provides a one-year warranty on infrastructure equipment. The warranty period begins after the final system acceptance date and runs concurrent for 12 consecutive months. Warranty includes all necessary parts, labor, shipping to the customer, and other items normally required and/or consumed in maintaining the proposed network in order to meet original factory specifications, at no additional cost to Aurora, IL (The City).

Subscriber radios come with a two-year warranty. Warranty coverage includes all necessary parts, labor, shipping both ways, and other items normally required and/or consumed in maintaining the proposed subscriber radios and accessories in order to meet original factory specifications at no cost to The City. The warranty period will begin either after final system acceptance, or immediately after delivery of the radio if purchased after system acceptance.

Standard warranty response times are 8:00 a.m. to 5:00 p.m. on business days. All warranty labor will be performed by Harris at our facility, for mobile or portable equipment.

Warranty provides that the hardware and installation services furnished by Harris shall be free from defects in material and workmanship.

During the Warranty if any Hardware component or portion of the installation Services fails to meet the warranty, Harris will remedy by: (1) repairing any defective component of the Hardware, or (2) by furnishing any necessary repaired or replacement parts, or (3) by correcting the faulty installation at no additional cost to The City.

During the warranty, if the Harris licensed software does not successfully operate, the error or defect will be corrected free of charge or replaced with a substitute program.

Software Warranty provides corrections to software defects and known issues reported to Harris' Technical Assistance Center (TAC) during the warranty period at no additional cost to The City.

Third-Party Warranties

Harris will ensure that warranty on any third-party Original Equipment Manufacturer (OEM) equipment and services sold by Harris meets the same warranty requirements and we will act on behalf of The City to coordinate and settle all warranty issues with any integrated third-party equipment or software companies throughout the entire warranty period.

Harris will transfer third-party warranties provided directly from equipment manufacturers to The City as part of the final acceptance. In the event that any third-party manufacturer warranty period is greater than one-year, we will recognize the OEM warranty for the specified equipment.

Warranty Returns Process

Once the determination is made that equipment is in need of repair or replacement, we will follow these steps:

1. Technical Support creates a support case and will verify product part numbers, serial numbers and reasons for return and forward the approved request for processing.
2. A Customer Care Representative reviews all requests. We will provide an RMA number, required prior to return, along with a warranty replacement sales order number and instructions for return of the equipment.
3. Defective equipment ships back to Harris Depot Repair and Return.
4. Harris will repair or replace any equipment under warranty free of charge unless there is evidence of abuse or damage beyond the terms of the warranty.
5. Repaired or replaced unit ships back to The City.
6. We will close the RMA and update the tracking database

Requests for out of warranty repairs will require a purchase order. Out of warranty repairs are subject to a flat rate per unit fee regardless of fault found with the equipment.

Turn-around time for equipment repair or replacement is generally 10 business days.

Demand Services

Demand Services consists of those services not included in our Scope of Work and shall be invoiced directly to The City on a time and materials basis. Such Demand Services include, but are not limited to the following:

- Installation or removal of mobile radio equipment after initial installation.
- Repair of equipment damaged by vandalism to the extent such equipment damage is not caused by Harris or any of its agents.
- Repair of equipment damaged by abuse or physical neglect to the extent such abuse or physical neglect is not caused by Harris or any of its agents.
- Damages due to acts of God or other uncontrollable events.

Exclusions

Standard exclusions apply as referenced in the following documents:

- Standard Conditions of Sale
- U.S. Equipment Warranty
- U.S. Battery Warranty

FUNCTIONAL ACCEPTANCE TEST PLAN

Console Upgrade
City of Aurora, Illinois

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CUSTOMER APPROVAL

These Test Procedures have been read and approved for use as the Functional System Acceptance Test.

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

1. SYSTEM ACCEPTANCE

This Acceptance Test Procedure 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.

2. Facility Test (Field Tests)

2.1 Visual Inspection (Field Tests)

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:	_____		
	_____		
	_____		

2.2 Power Backup / UPS Verification (Field Tests)

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 City of Aurora's responsibility to provide. Any such failures of the City of Aurora 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 City of Aurora).**

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:	_____		
	_____		
	_____		

3. VIDA UNIVERSAL ADMINISTRATION SERVER (UAS)

3.1 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: _____

_____

3.2 Updating of OpenSky Radio Personalities from the UAS (Opensky)

Purpose: **The purpose of this test is to demonstrate a download of system parameters from the UAS to the sites and OpenSky radios.**

Expected Results: **This test will verify dynamic personality allocation to OpenSky radios.**

Setup: **Use OS_Radio_02 as the test radio.**

Execution:

1. Browse to the UAS using Internet Explorer and the address of 'https://s0u1uas.vida.local:8443/nas'
2. Create a new voice group for the agency under test in the UAS.
3. Select 'Personality' to bring up the radio personalities.
4. Check the box next to 'OS_Pers' and select modify.
5. On drop down 'Profile 05 Name' select 'Prof1' and select ok.
6. Select 'Save' to download the new personality.

- Verify the test radio received the updated voice group in the designated profile and is able to place a call on the new voice group.

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

3.3 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: _____	
_____	
_____	

3.4 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: _____	
_____	
_____	

4. 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
   - o 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
   - o 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.
   - o The call from Radio 3 to Radio 4 will be dropped.
   - o 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:	_____		
	_____		
	_____		

4.1 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	9989915 0	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- ("OpenSkyuser") 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: _____	
_____	
_____	

4.2 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:			

4.3 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 Realtime 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: _____	
_____	
_____	

4.4 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: _____	
_____	
_____	

4.5 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 (N/A)			
2	Router			
3	Switch			
4	Network Sentry			
5	MME (N/A)			

Results (Pass/Fail) _____

Tester: _____ Date: _____

Comments: _____

_____

_____

4.6 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 (Network Sentry or NetGuardian) alarm unit. Internal Note: This is a field test. Should we configure a single simple site alarm for general test purposes?**

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. (Note; This form can be modified to reflect actual as-built alarms).

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. SYMPHONY DISPATCH FEATURE SET

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

5.1 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 OpenSky and console programmed with talk group TG64001 OpenSky)**

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: _____	
_____	
_____	

5.2 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 [OPENSKY]**

5.2.1 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: _____	
_____	
_____	

5.2.2 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:	_____		
	_____		
	_____		

5.3 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 [OPENSKY]	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:			

5.4 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 OPENSKY' talk group**

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

Execution:

1. Press INSTANT TX on the module with 'TG64000 OPENSKY'.
   - 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 OPENSKY'.
   - 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.

Press INSTANT TX on the module with ‘TG64001 OPENSKY’.

- 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.

5. Release the Instant TX key.

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

5.5 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 [OPENSKY]	64001
Radio 2	998002	TG64002 [OPENSKY]	64002

Execution:

1. Make TG64001 OPENSKY 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 OPENSKY, 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:			

5.6 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 [OPENSKY]**

Radio Description	Radio Lid	Talk Group Description	Talk Group ID
Radio 1	998001	TG64001 [OPENSKY]	64001
Radio 2	998001	TG64001 [OPENSKY]	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: _____

_____

_____

5.7 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 [OPENSKY], TG64052 [OPENSKY], TG64053 [OPENSKY], and TG64054 [OPENSKY].**

Radio Description	Radio Lid	Talk Group Description	Talk Group ID
Radio 1	998001	TG64051 [OPENSKY]	64051
Radio 2	998002	TG64052 [OPENSKY]	64052
Radio 3	998003	TG64001 [OPENSKY]	64001
Radio 4	998004	TG64001 [OPENSKY]	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: _____

_____

_____

5.8 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 [OPENSKY], TG64052 [OPENSKY], TG64053 [OPENSKY], and TG64054 [OPENSKY].**

Radio Description	Radio Lid	Talk Group Description	Talk Group ID
Radio 1	998001	TG64051 [OPENSKY]	64051
Radio 2	998002	TG64052 [OPENSKY]	64052
Radio 3	998003	TG64001 [OPENSKY]	64001
Radio 4	998004	TG64001 [OPENSKY]	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: _____

_____

_____

5.9 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 Crossmute 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:			

5.10 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: _____	
_____	
_____	

6. VIDA INTER-OPERABILITY GATEWAY TEST

6.1 Local Interoperability

Purpose: **The purpose of this test is to verify correct functionality of the Interoperability Gateway.**

Expected Results: **Verify that the Gateway audio is properly routed to radio units**

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: _____	
_____	
_____	

7. ACTION ITEMS

Test #	Page #	Action/Issue	Date Resolved	Resolution