Res 250

Contract Cover Sheet

Note: Shaded areas are for County Executive review.

Department: Public Safety Communications	Contract/Addendum #: 10607I
1. This contract, grant or addendum: ■ AWARDS ☐ ACCEPTS	Contract / Addendum
2. This contract is discretionary ■ Yes ☐ No	If Addendum, please include original contract number
3. Term of Contract or Addendum: unchanged 1/31/11 - 11/30/16	☐ POS ☐ ☐ Grant ☐ ☐ Co Lease ☐ ☐ Co Lessor ☐ ☐ Intergovernmental ☐ ☐ Purchase of Property ☐ ☐ Property Sale ☐ ☐ Other ☐
4. Amount of Contract or Addendum:	
5. Purpose: Enhance DaneCom subsystems to improve user experience.	

6. Vendor or Funding Source: Harris Corporation
7. MUNIS Vendor Code: 3164
8. Bid/RFP Number: 110100
9. If grant: Funds Positions? ☐ Yes ■ No Will require on-going or matching funds? ☐ Yes ☐ No
10. Are funds included in the budget? ☐ Yes ☐ No
11. Account No. & Amount, Org & Obj. _____ Amount $_____
    Account No. & Amount, Org & Obj. _____ Amount $_____
    Account No. & Amount, Org & Obj. _____ Amount $_____
12. If this contract awards funds, a purchase requisition is necessary. Enter requisition # & year _____
13. Is a resolution needed? ■ Yes ☐ No If yes, please attach a copy of the Resolution.
    If Resolution has already been approved by the County Board, Resolution No. & date of adoption 2016 RES-250, not yet approved
14. Does Domestic Partner equal benefits requirement apply? ■ Yes ☐ No
15. Director's Approval: John E Vogel

Contract Review/Approvals

Initials		Ftnt	Date In	Date Out
MW	Received		9-14-16	
CW	Controller			9/15/16
MM	Corporation Counsel		9-15-16	9/16/16
[illegible]	Risk Management		9/19/16	9/19/16
CW	Purchasing		9/20/16	9/20/16
	County Executive			

Vendor

Vendor Name: Harris Corporation
Contact Person: Chris Chaffee 434-485-7951 cchaffee@harris.com
Phone No.:
E-mail Address:

Footnotes:

1.
2.

Return to:	Name/Title: Rich McVicar / Technical Services Manager. 608-283-2911. mcvicar@ Phone: E-mail Address:	Dept.: Mail Address: CCB Rm 109, 210 MLK, Madison, WI 53703-3342

Certification

The attached contract: *[check as many as apply]*

- ☐ conforms to Dane County's standard Purchase of Services Agreement form in all respects
- ☐ conforms to Dane County's standard Purchase of Services Agreement form with modifications and is accompanied by a revision copy[1]
- ☒ is a non-standard contract which has been reviewed or developed by corporation counsel and which has not been changed since that review/development
- ☐ is a non-standard contract previously review or developed by corporation counsel which has been changed since that review/development; it is accompanied by a revision copy[1]
- ☐ is a non-standard contract not previously reviewed by corporation counsel; it is accompanied by a revision copy
- ☐ contains non-standard/indemnification language which has been reviewed or developed by risk management and which has not been changed since that review/development
- ☐ contains non-standard insurance/indemnification language which has been changed since review/development or which has not been previously seen by risk management; it is accompanied by a revision copy
- ☐ contains non-standard affirmative action/equal opportunity language which has been reviewed or developed by contract compliance and which has not been changed since that review/development
- ☐ contains non-standard affirmative action/equal opportunity language which has been changed since the earlier review/development by contract compliance or which has not been previously seen by contract compliance; it is accompanied by a revision copy[1]

Date: 14 Sep 2016 Signed: John E. Dejung

Telephone Number 608-267-1911 Print Name: John Dejung

Major Contracts Review (DCO Sect. 25.20) This review applies only to contracts which both exceed $100,000 in disbursements or receipts and which require county board review and approval.

Executive Summary (attach additional pages, if needed).

1. ***Department Head*** ☒ Contract is in the best interest of the County.
   Describe any deviations from the standard contracting process and any changes to the standard Purchase of Services Form Agreement.

   Date: 9/14/2016 Signature: John E. Dejung

2. ***Director of Administration*** ☐ Contract is in the best interest of the County.
   Comments:

   Date: _____ Signature: _____

3. ***Corporation Counsel*** ☐ Contract is in the best interest of the County.
   Comments:

   Date: _____ Signature: _____

[1] A revision copy is a copy of the contract which shows the changes from the standard contract or previously revised/developed contract by means of overstrikes (indicating deletions from the standard language) and underlining (showing additions to the standard language).

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AMENDMENT NO. 7
TO SYSTEM PURCHASE AGREEMENT
BETWEEN
HARRIS CORPORATION, ACTING THROUGH ITS RF COMMUNICATIONS DIVISION,
AND
THE COUNTY OF DANE, WISCONSIN

THIS AMENDMENT NO. 7 ("Amendment") is made and entered into this ___ day of _____, 2016, by and between **THE COUNTY OF DANE, WISCONSIN** ("County") and **HARRIS CORPORATION,** a Delaware corporation acting through its RF Communications Division ("Provider").

RECITALS:

WHEREAS, the County and Provider previously entered into that certain System Purchase Agreement dated February 7, 2011, as previously amended (collectively, the "Agreement") for the provision of the System by Provider to the County (a radio communications system as more particularly described in the Agreement and the Statement of Work attached to the Agreement). Unless specifically defined in this Amendment, capitalized words shall have the meaning set forth in the Agreement.

WHEREAS, the original System consisted of 5 subsystems: (1) the Countywide VHF Simulcast Digital P25 Trunking Subsystem (the "P25 Subsystem"); (2) the VHF Conventional Mutual Aid Subsystem (the "Mutual Aid Subsystem"); (3) the Countywide VHF Tone and Voice Paging Subsystem (the "Paging Subsystem"); (4) the UHF Siren Control System (the "Siren Control System"); and (5) the VHF Analog Tactical Subsystem (the "Analog Tactical Subsystem").

WHEREAS, the County and Provider agreed in Amendment 6 to expand and modify the System including, without limitation, by making the following modifications: (1) the P25 Subsystem will be expanded from 8 Tower Sites to 11 Tower Sites; (2) the Tower Sites used in the Mutual Aid Subsystem will be changed; (3) the Paging Subsystem will be expanded with two additional Tower Sites; and (4) the Tower Sites and Hardware used in the Analog Tactical Subsystem will be changed.

WHEREAS, the County and Provider agreed to update Amendment 6 after completion of the Customer Design Review ("CDR") and record those changes in Amendment 7.

WHEREAS, the County and Provider finalized the CDR on October 30, 2015.

NOW, THEREFORE, WITNESSETH, that for and in consideration of the mutual promises contained herein and other good and valuable consideration, the sufficiency and receipt of which is hereby acknowledged, County and Provider amend the Agreement as follows:

1. **Recitals** – The Recitals set forth above are incorporated in this Amendment by reference.

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2. **Scope of Work** – Section 2 of the Agreement, Scope of Work, which was amended in Amendment 6 and finalized during the CDR is further amended and attached hereto and incorporated herein as **Exhibit 7A** – Expansion Statement of Work.

3. **Price** – Section 6 of the Agreement, Price, is amended to include the following language:

a. Amendment 7 Price – The price for the additional Hardware and Services to be furnished, delivered, and installed by Provider is detailed in Exhibit 7B.

4. **Additional Equipment Purchases**

a. During the Term of the Agreement, the County, the County's political subdivisions, or any other legal entity approved by the County to use County's System (collectively "Authorized Buyers") shall receive the following discounts off the then current catalog prices for additional equipment purchases ("Discount Catalog Prices"):

i. Harris Equipment – Authorized Buyers may purchase equipment with equipment codes C, N, NB, S, and P at thirty percent (30%) percent off the then current catalog prices ("Harris Equipment").

ii. Standard Vendor Equipment – Authorized Buyers may purchase equipment with equipment codes V, VC, 77 for ten percent (10%) off the prices listed in the then current catalog ("Standard Vendor Equipment").

iii. Non-Standard Vendor Equipment – Zero percent (0%) off Harris catalog price (Equipment codes XV).

b. Authorized Buyers shall issue a purchase order ("PO") directly to Provider referencing "MBP # 10280". The PO shall be governed by the then current Harris Corporation RF Communications Division Domestic Standard Conditions for Sale ("US Standard Terms and Conditions"), which can be downloaded at the following link: http://pspc.harris.com/Service/CustomerService.aspx.

5. **Full Force and Effect** - Except as modified in this Amendment, all of the terms, conditions and provisions of the Agreement shall remain unchanged and in full force and effect.

[*End of Text This Page*]

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IN WITNESS WHEREOF, County and Provider have executed this Amendment on the day and year written below.

COUNTY

COUNTY OF DANE, WISCONSIN

By: _____

Name: _____

Title: _____

Date: _____

WITNESS:

By: _____

Name: _____

WITNESS:

By: _____

Name: _____

By: _____

Name: _____

Title: _____

Date: _____

PROVIDER

HARRIS CORPORATION, acting through its RF Communications Division

By: _____

Name: Christopher W. Chaffee

Title: Senior Manager, Contracts

Date: September 13, 2016

WITNESS:

By: _____

Name: Andrew Wilson

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EXHIBIT 7A

EXPANSION STATEMENT OF WORK

The work to be performed to complete the installation and testing of the System, as modified by this Amendment, is described in the following documents, which shall be collectively known as the "Expansion Statement of Work":

Attachment 7A-1: Expanded System Description – Describes the configuration, design considerations, system highlights, and equipment features of the expanded and modified System and sub-systems. Amendment 6 Exhibit A-1-1 is deleted in its entirety and replaced with Amendment 7 Attachment 7A-1.

Attachment 7A-2: Narrative response to RFP sections – No change in Amendment 7.

Attachment 7B: Training – Describes dispatcher training. Attachment B of the original Agreement is deleted in its entirety and replaced with Amendment 7 Attachment 7B.

Attachment 7C: Expanded System Project Schedule – Shows the project schedule and key milestones for the delivery, installation and testing of the System as expanded and modified in this Amendment. Final Acceptance of the System as expanded and modified in this Amendment will occur on or before November 30, 2016. Amendment 6 Exhibit C-1 is deleted in its entirety and replaced with Amendment 7 Exhibit 7C.

Attachment 7D: Expanded System Implementation Plan – Describes the methods and procedures the Provider will use to deliver and implement the System as expanded and modified in this Amendment. The Implementation Plan has a list of the site deliverables and tables describing the site development work remaining to be done at each Tower Site. Amendment 6 Exhibit D-1 is deleted in its entirety and replaced with Amendment 7 Exhibit 7D.

Attachment 7E: Expanded System Acceptance Test Plans ("ATP") – Describes the methods and procedures that will be used to run then remaining acceptance tests for the System and sub-systems (certain Acceptance Tests were previously performed). Amendment 6 did not include the ATP's, as they were to be reviewed, finalized, and mutually agreed during CDR. The ATP's were reviewed, finalized, and mutually agreed during CDR are attached hereto and incorporated herein as the following:

a. **Attachment 7E-1:** SR10A.1 Functional Testing

b. **Attachment 7E-2:** Coverage testing for the P25 Subsystem;

c. **Attachment 7E-3:** Coverage testing for the Mutual Aid Subsystem;

d. **Attachment 7E-6:** Functional and coverage testing for the Paging Subsystem;

e. **Attachment 7E-7:** System Reliability Test;

f. **Attachment E-8:** Functional testing for the ISSI;

Attachment 7F: Expanded System Maps and Drawings – Includes the following two (2) coverage maps:

RAPTR Version 26.4.342 (June 30, 2015) Figure: Analog Tactical - 6dB PTB
RAPTR Version 26.4.342 (June 25, 2015) Figure: Analog Tactical - 6dB PTO

Attachment 7G: Expanded System Responsibility Matrix – The Responsibility Matrix includes a table of the County and Provider responsibilities to be performed to complete the delivery and installation of the System as expanded and modified in this Amendment. Amendment 6 Exhibit G-1 is deleted in its entirety and replaced with Amendment 7 Attachment 7G.

Attachment 7H: Change Control Process – No change in Amendment 7.

Attachment 7I: Expanded System Equipment List – Includes a list of the Additional Hardware to be provided for the expanded and modified System. Amendment 6 Exhibit I-1 is deleted in its entirety and replaced with Amendment 7 Attachment 7I.

a. **Attachment 7I-1: Equipment List**

b. **Attachment 7I-2: Returned Equipment**

c. **Attachment 7I-3: Out of Service**

Exhibit 7B: Expanded System Price – The Amendment 7 Price for the additional Hardware and Services to be furnished, delivered, and installed by Provider is detailed in Exhibit 7B.

Exhibit 7C: Software License Agreement – Exhibit C of the original Agreement was for the System as contracted therein. Amendment 7 modifies the Software License Agreement to be compatible with the Expanded System. Exhibit C of the Agreement is deleted in its entirety and replaced with Amendment 7 Exhibit 7C.

Exhibit 7D: Software FX Agreement – Exhibit D of the original Agreement was modified under Amendment 5. Amendment 7 further modifies the Software FX Agreement to be

compatible with the Expanded System. Exhibit D of the Agreement and the Software FX Agreement in Amendment 5 are hereby deleted in their entirety and replaced with Amendment 7 Exhibit 7D.

Exhibit 7E: Performance Bond – No change in Amendment 7.

Exhibit 7F: System Maintenance Agreement – Exhibit F – System Maintenance Agreement is amended to include the additional three (3) sites, special conditions, and updated statement of work. Exhibit F of the Agreement is deleted in its entirety and replaced with Amendment 7 Exhibit 7F.

Exhibit 7G: Options – No change in Amendment 7.

Dane County Radio System

Amendment 7

Attachment 7A-1: Expanded System Description

Table of Contents

Systems and Architecture

The system design has been modified for the revised project as shown in Figure 1.

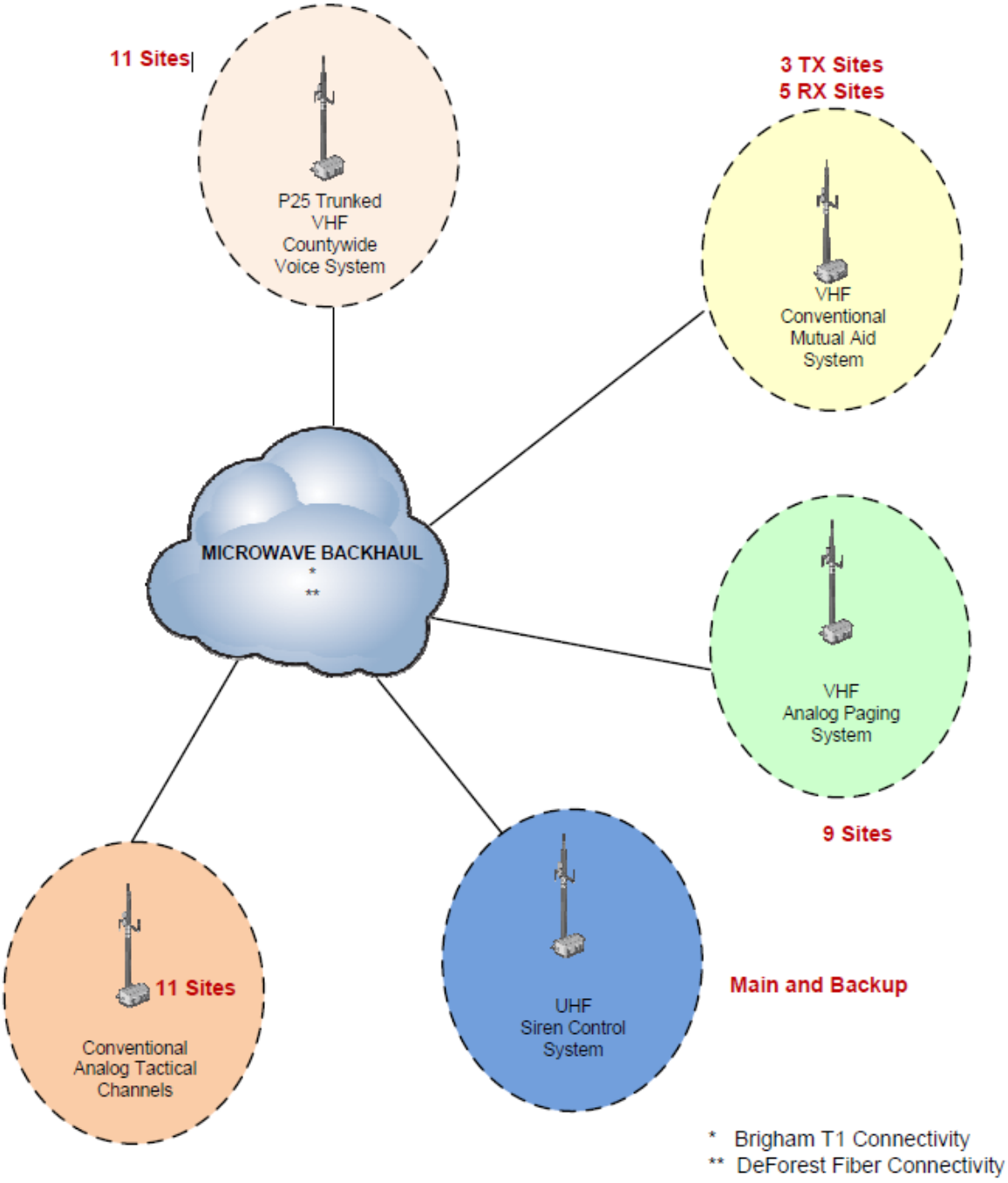


Figure 1: Dane County Interoperable Voice Radio Communications System - Revised

Network Management and Dispatch System

The Network Management system will be the Premier SR10A.1 system software release, and the functionality will be consistent with the original project, except as described in this document. The Network Switching Center is shown in Figure 2.

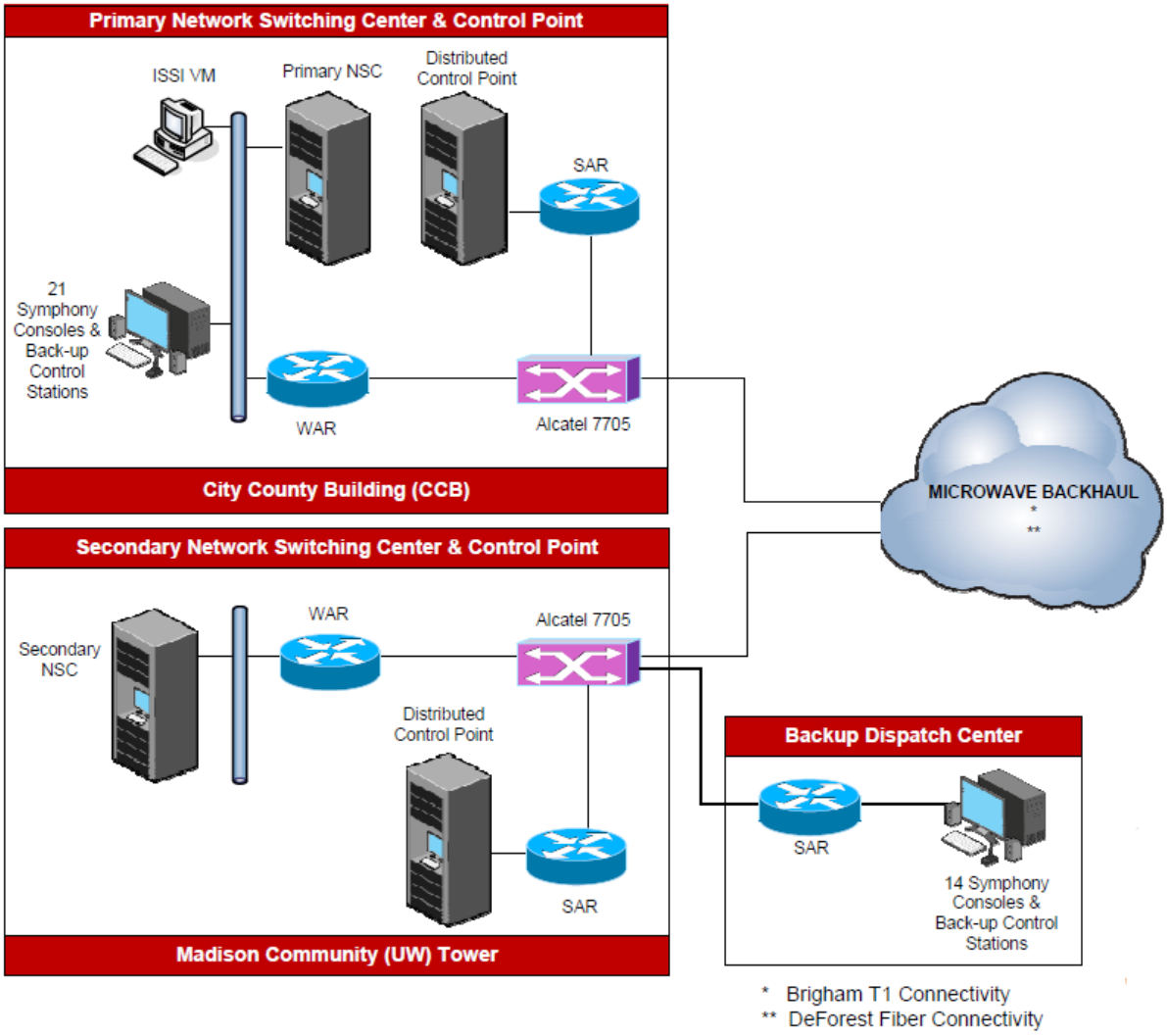


Figure 2: Dane County Network Switching Center – Revised
Note: Backup Dispatch Center will have 10 Symphony Consoles

Digital P25 Trunking Subsystem

The P25 trunked radio system will be expanded from 8 to 11 sites. The new sites will be located at DeForest, Stoughton Water Tower, and WJJO, and the existing Stoughton AT&T will be relocated to Rockdale. The expanded system design will maintain the countywide 95% service area coverage

reliability at a delivered audio quality (DAQ) level of 3.4 for a portable radio used on-hip, in light buildings (6dB, P25 Phase 1) for system talk-in and talk-out. It will also include coverage guarantees as described in the revised coverage Acceptance Test Plan.

The design uses VHF MASTR V base stations that are provided today with P25 Phase 1 software and are upgradeable to the P25 Phase 2 TDMA mode of operation. The system block diagram in Figure 3, below, shows an overview of the VHF P25 system. The 11 VHF sites function together as a single simulcast system.

Coverage Guarantee

The original County-wide coverage guarantee is unchanged from the original contract. There is an additional coverage guarantee of 16 dB building loss (P25 Phase 1) in the identified boundaries near the areas of DeForest, Stoughton, Cambridge, and Deerfield as shown on the coverage maps provided by Harris. Grids will be tested specific to those areas for the 16 dB requirement.

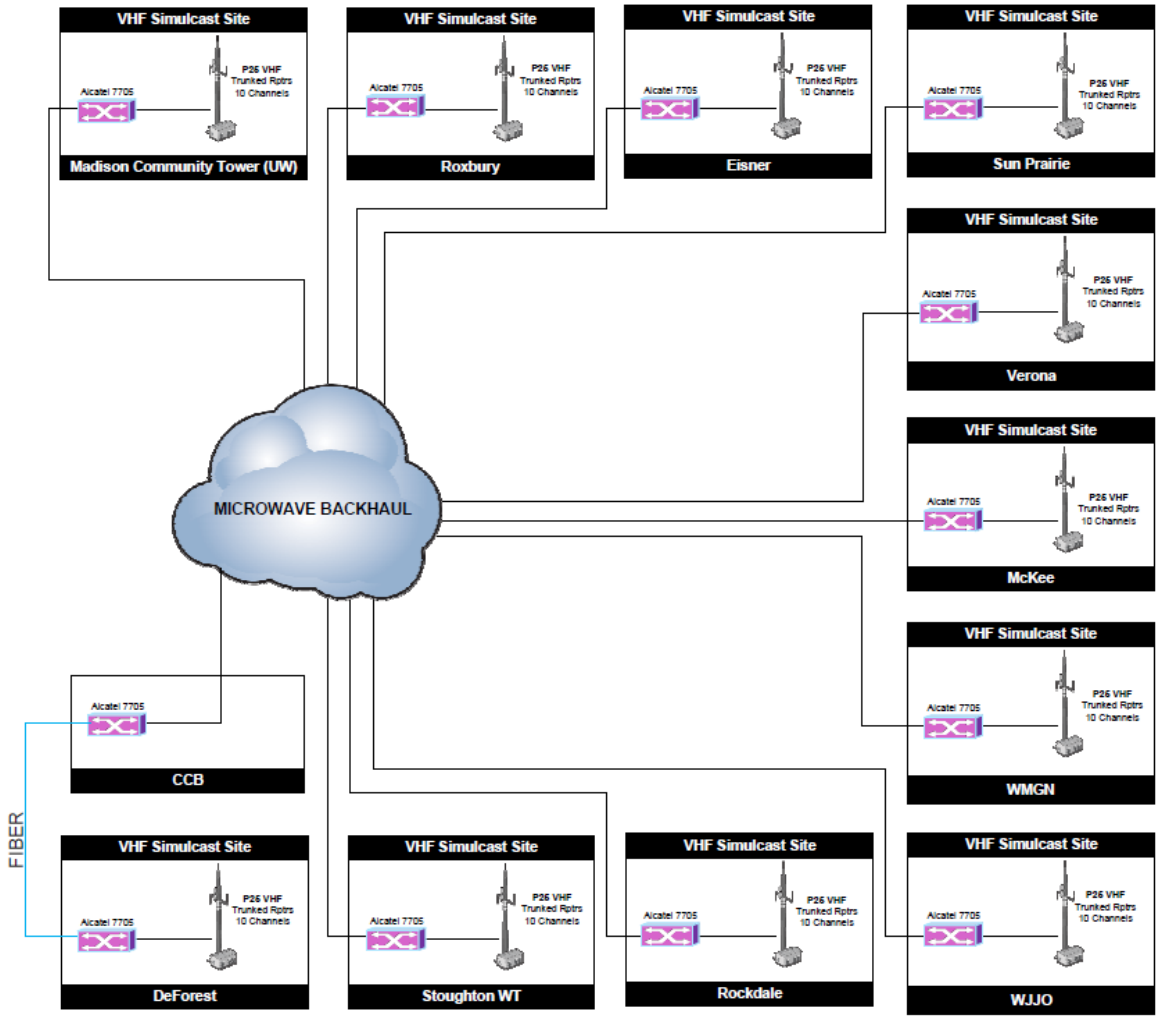


Figure 3: VHF Simulcast Digital P25 Trunking – Expanded System Block Diagram

Mutual Aid System

The revised mutual aid system includes relocation of the Roxbury site to Deerfield and the addition of a new TXRX site at Brigham. The Eisner site will become RX only and steer to the Brigham site. The Stoughton AT&T Mutual Aid equipment will move to Stoughton Water Tank and will become a RX only site steering to Deerfield.

Brigham Antenna Replacement - Two VHF antennas are scheduled for abandonment upon completion of the P25 system. Harris will provide equipment and services to replace these two antennas with two new, similar mutual aid antennas similar in size and function as the antennas to be abandoned. Use existing tower, new shelter, and new T-1 line to UW-Madison for backhaul.

VHF MutualIAid Channels

NAME	TX Freq	RX Freq	CTCSS	Sites
VCALL10	155.7525	155.7525	156.7	UW-Madison, Deerfield, Brigham, Eisner (RX), Stoughton City (RX)
VTAC12	154.4525	154.4525	156.7	UW-Madison, Deerfield, Brigham, Eisner (RX), Stoughton City (RX)
MARC1 & 2	151.280	153.845 151.280	136.5	UW-Madison, Deerfield, Brigham, Eisner (RX), Stoughton City (RX)
IFERN1	154.265	154.265	210.7	UW-Madison, Deerfield, Brigham, Eisner (RX), Stoughton City (RX)
VLAW31	155.475	155.475	156.7	UW-Madison, Deerfield, Brigham, Eisner (RX), Stoughton City (RX)
EMS-B	155.340	155.340	167.9	UW-Madison
Point to Point	155.370	155.370	146.2	Verona

Coverage Guarantee

A DAQ coverage test only will be performed since an RSSI test has practical limitations because of the shared use of the channels.

The revised Coverage Acceptance Test Plan will include 92% coverage for portable outdoor radios.

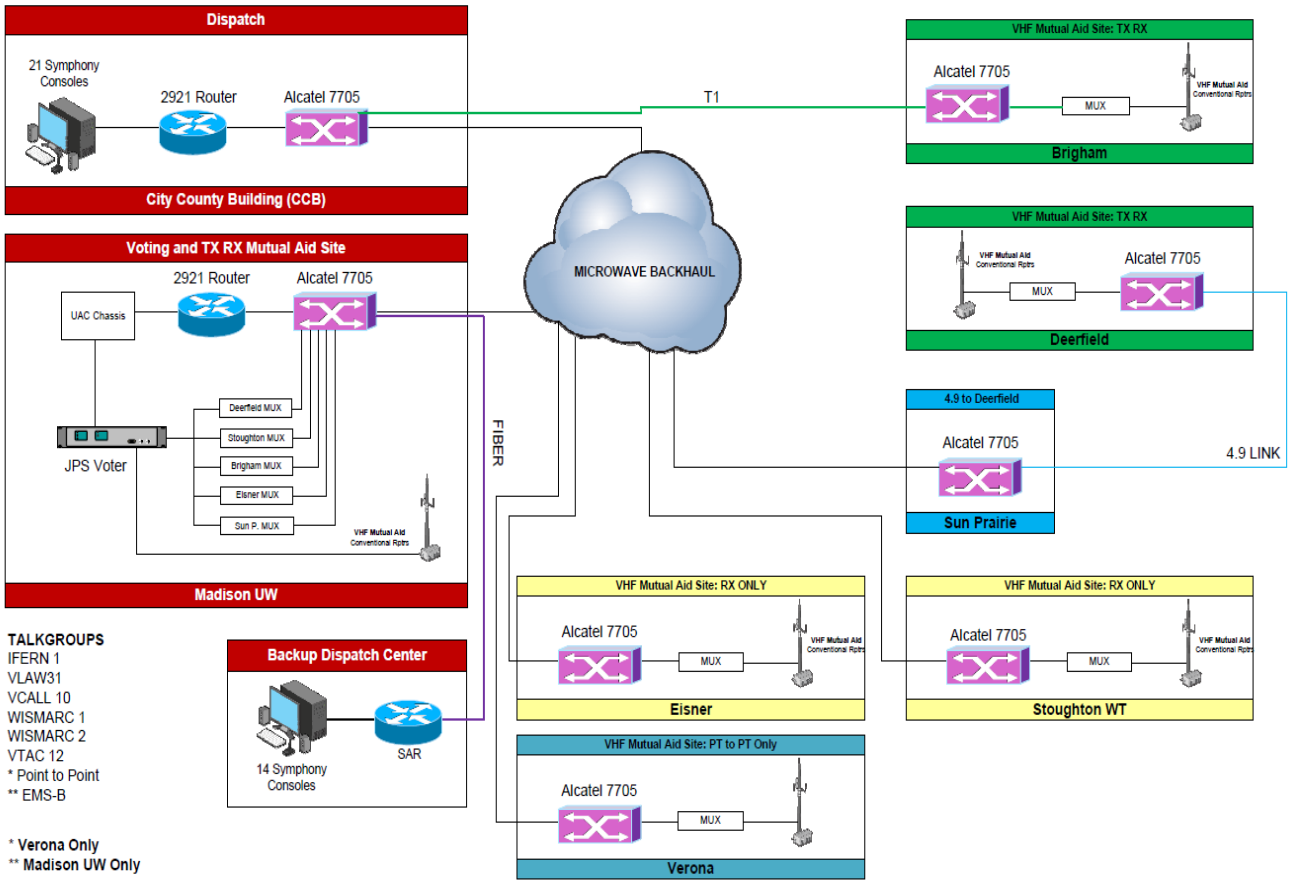


Figure 4: VHF Mutual Aid Subsystem – Revised System Block Diagram

Paging Subsystem

The paging system will be expanded with two additional sites: one at DeForest and one at Stoughton Water Tower. The existing Stoughton AT&T site will be relocated to the Rockdale tower.

Coverage Guarantee

No change from original project. Harris will perform Functional Acceptance Testing on the new portions of the paging system and perform Coverage Acceptance Testing on the paging system.

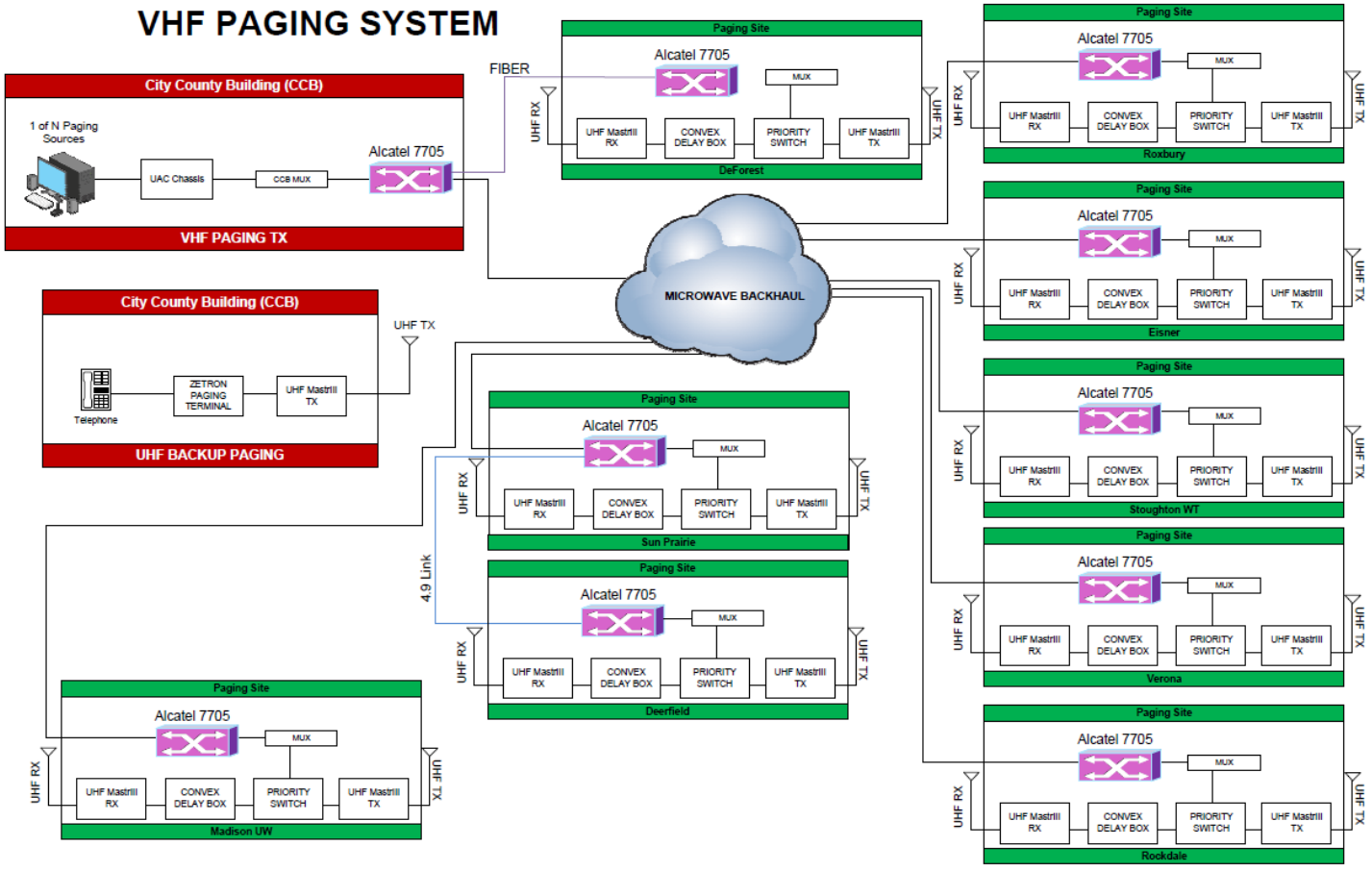


Figure 5: Countywide VHF Paging Subsystem- System Block Diagram

Radio Interconnection Subsystem for the Dane County Siren System

This portion of the original contract was completed and is not part of the revised scope.

Analog Tactical Subsystem

The analog tactical system will be modified to include the sites shown in Figure 6, and each location will be modified to include two repeated basestations. The voted receive, transmitter steered design has been expanded from the original project.

Coverage Guarantee

No change from original project. Harris will perform Functional Acceptance Testing on the new portions of the analog tactical system.

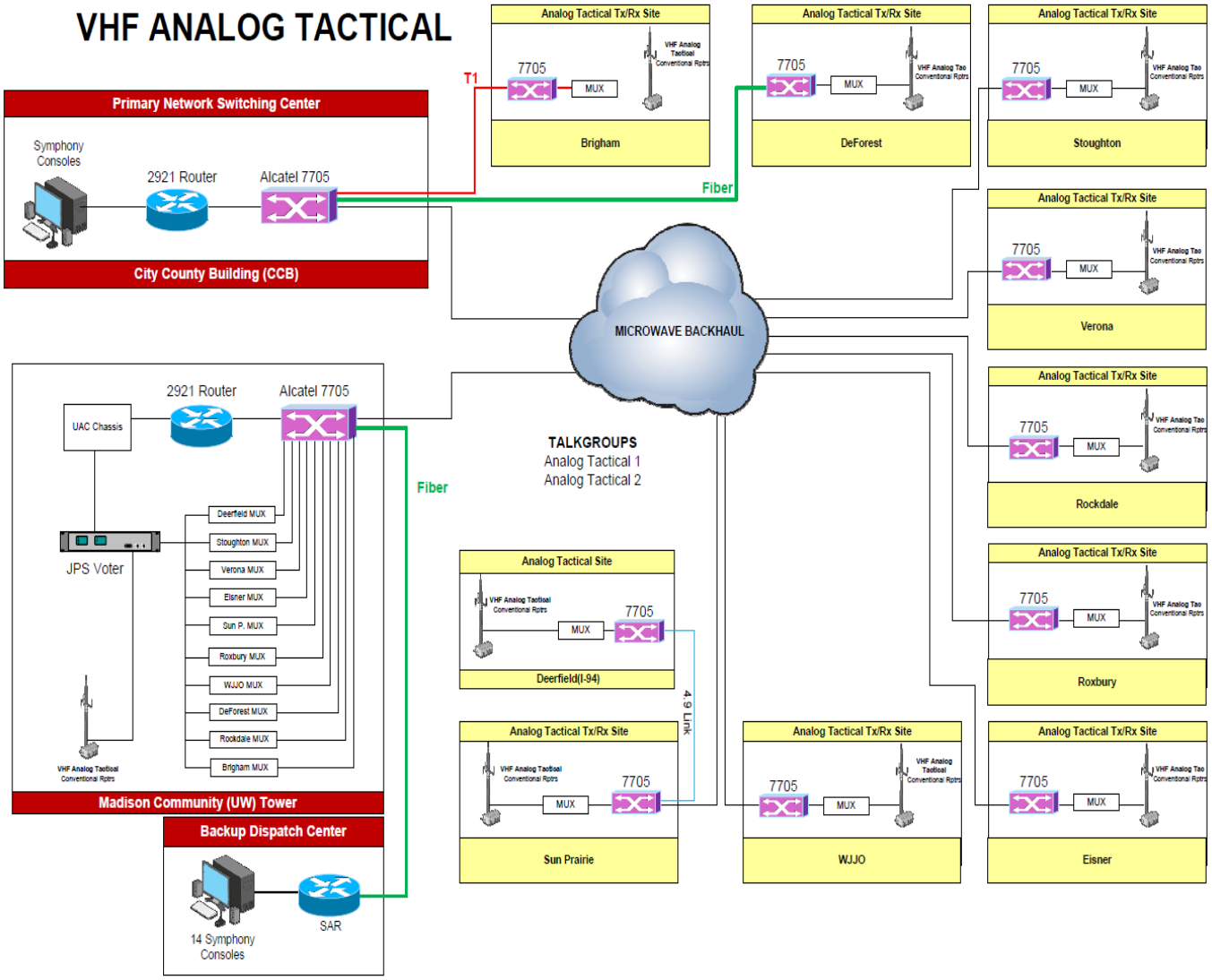


Figure 6: VHF Analog Tactical Subsystem - System Block Diagram

Dispatch Subsystem

The 27 Maestro consoles (21 at main dispatch, 6 that were formerly used as training consoles) will be upgraded to Symphony consoles. Once the SR10A.1 upgrade and other new site work has been completed, the Functional Acceptance Test will be re-performed on the Dispatch Subsystem equipment.

An additional 4 consoles will be installed at the Backup Communications Center.

Zetron iRIM solution:

The Zetron iRIM equipment has been installed at CCB, but will be moved to the Backup Dispatch Center. Once the SR10A.1 upgrade and other new site work has been completed, the Functional Acceptance Test will be re-performed on the Zetron iRIM solution.

Duet Audio Solution

The Duet Audio Solution will be connected to the City of Madison MCC7500 as part of the Symphony upgrade. Once the SR10A.1 upgrade and other new site work has been completed, the Functional Acceptance Test will be re-performed on the Duet Audio Solution.

Coverage Compliance of Subsystems

Except as specifically provided below, the minimum coverage guarantees from the original agreement are retained. P25 testing will be in Phase 1 mode only. Phase 2 operation is available but not guaranteed. The coverage guarantees were generated with 95% reliability and detailed coverage maps showing the site locations and coverage for each subsystems as shown in the Coverage Maps. For each prediction, project sensitivity was established at -99 dBm, hip loss was 14 dB, and head loss was 8 dB. Project sensitivity for paging was -94 dBm to account for the lower antenna gain of a pager.

Table 1: Coverage Compliance of Dane County Subsystems

System	Coverage Type	Boundary	Guarantee	Status
VHF Simulcast Digital P25 Trunked Subsystem	Portable Indoor 6 dB Loss, at hip	GAOC[1]	95% DAQ3.4	To be retested
VHF Simulcast Digital P25 Trunked Subsystem	Portable Indoor 16 dB Loss, at hip	16 dB Boundaries[2]	95% DAQ3.4	To be tested
VHF Mutual Aid	Portable Outdoor, at head	GAOC[1]	92% DAQ3.4	To be tested
VHF Mutual Aid (Point to Point & EMS-B)	Control Station (PtP) Mobile (EMS-B)	GAOC[1]	95% DAQ3.4	EMS-B only to be tested
Analog Tactical Subsystem	Portable Indoor 6 dB Loss, on hip	Incorporated Areas of Dane County	95% DAQ3.4	Completed
VHF Paging Subsystem	Indoor 12 dB Loss, on hip	GAOC[1]	95% DAQ3.4	To be retested

[1]The Geographic Area of Concern (GAOC) is defined as:

- Dane County proper
- In Columbia County - Town of Leeds: S 1/2 21-23, 24-29, 31-36
- In Columbia County - Town of Hampden: 29-33
- In Jefferson County - Town of Lake Mills: 19, W 1/2 20, SW 1/4 28, NW 1/4 29, S 1/2 39, 30-33
- In Jefferson County - Town of Oakland: 1-10, 15-22, 27-34
- In Rock County - Town of Union: 4-7, N 1/2 8
- In Green County - Town of Brooklyn: 1-18, 20-24, N 1/2 25-27
- In Green County - Town of Exeter: 1-29, 33-36

[2]The 16 dB Boundaries shown on the P25 coverage maps as three rectangles have the following coordinates:

- DeForest / Windsor area
  43dN 17' 19" 89dW 19' 18"
  43dN 11' 35" 89dW 17' 02"
  43dN 10' 35" 89dW 21' 16"
- Stoughton Area
  42dN 57' 07" 89dW 10' 14"
  42dN 53' 33" 89dW 10' 15"
  42dN 53' 34" 89dW 15' 31"
- Deerfield Area
  43dN 04' 53" 89dW 01' 43"
  42dN 58' 12" 88dW 58' 44"
  42dN 56' 59" 89dW 03' 34"

43dN 16' 25" 89dW 23' 40" 42dN 57' 08" 89dW 15' 30" 43dN 03' 37" 89dW 06' 47"

Traffic Calculations

No change from original project.

Frequency Analysis

The expanded system includes currently licensed Part 90 frequencies, supplemented by frequencies from the NTIA frequency pool. The frequency set is shown below in Table 2.

Table 2: Dane County Frequency

Service	TX	RX
P25-1	172.5000	165.0500
P25-2	172.0750	164.5750
P25-3	171.3500	164.4250
P25-4	154.8225	164.3750
P25-5	154.9725	164.3125
P25-6	155.2425	159.0450
P25-7	154.0925	159.2775
P25-8	155.5275	159.3075
P25-9	154.1225	158.7750
P25-10	155.1825	159.2100
AT-1	172.1000	166.0250
AT-2	172.5875	166.2375

Green = FCC Part 90 frequency pool
Yellow & Blue = NTIA frequency pool

System Settings

Table 3: Default P25 Trunked IDEN Set

Base Frequency (MHz)	TX Offset (MHz)	Channel Spacing/Step Size (KHz)	Channel Bandwidth (KHz)	Modulation & Signaling
138.0000	0	12.5	12.5	Phase 1, Simulcast, CQPSK, FDMA, Full Rate Vocoder
150.8150	0	7.5	12.5	Phase 1, Simulcast, CQPSK, FDMA, Full Rate Vocoder
154.6500	0	7.5	12.5	Phase 1, Simulcast, CQPSK, FDMA, Full Rate Vocoder
162.0000	0	12.5	12.5	Phase 1, Simulcast, CQPSK, FDMA, Full Rate Vocoder

Table 4: P25 Network Settings

Setting	Value in hex	Value in decimal
NAC	130	304
WACN	1	1
Sys ID	130	304
RFSS ID	82	130
Site ID	82	130

Dane County Backhaul Network Map

The revised backhaul network is shown in Figure 7. The existing management system will be retained, and the links will be expanded as shown by the red and blue lines below. Functional verification tests will be performed on added and changed links, and the reliability of the entire microwave network will be validated.

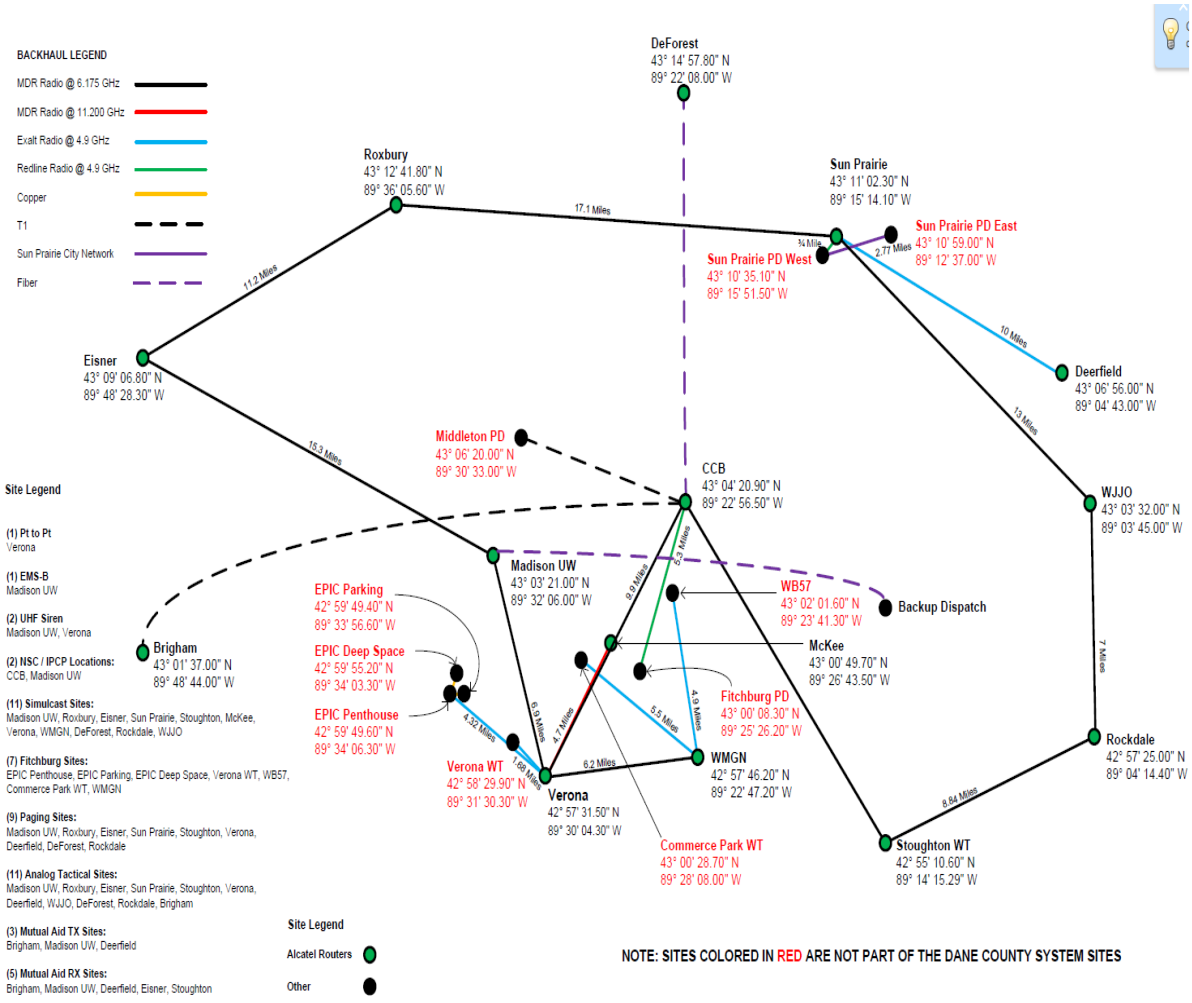


Figure 7: Dane County Backhaul Network

Attachment 7B: Training

Dispatcher Training

Dispatch personnel are at the core of effective and efficient implementation of a radio system. While the time required for training is minimal, the payback is immense. On-site, instructor-led training sessions on the Symphony Dispatch Console would be four hours in length and conducted in the dispatch facility using the installed equipment. Two sessions can be conducted in a single day. The training would be conducted with small groups of no more than two people on an operating console. This maximizes the effectiveness of the hands-on portion of the training. Tasks covered include the following:

- Pick and select communication modules.
- Transmit and receive group and individual calls.
- Transmit, receive and clear emergency calls.
- Review call history.
- Modify communication modules.
- Create, modify and transmit on patches and simulselects.
- Initiate and receive intercom calls.
- Change console setups.
- Use special and enhanced console features.
- Operation of the back-up control stations.

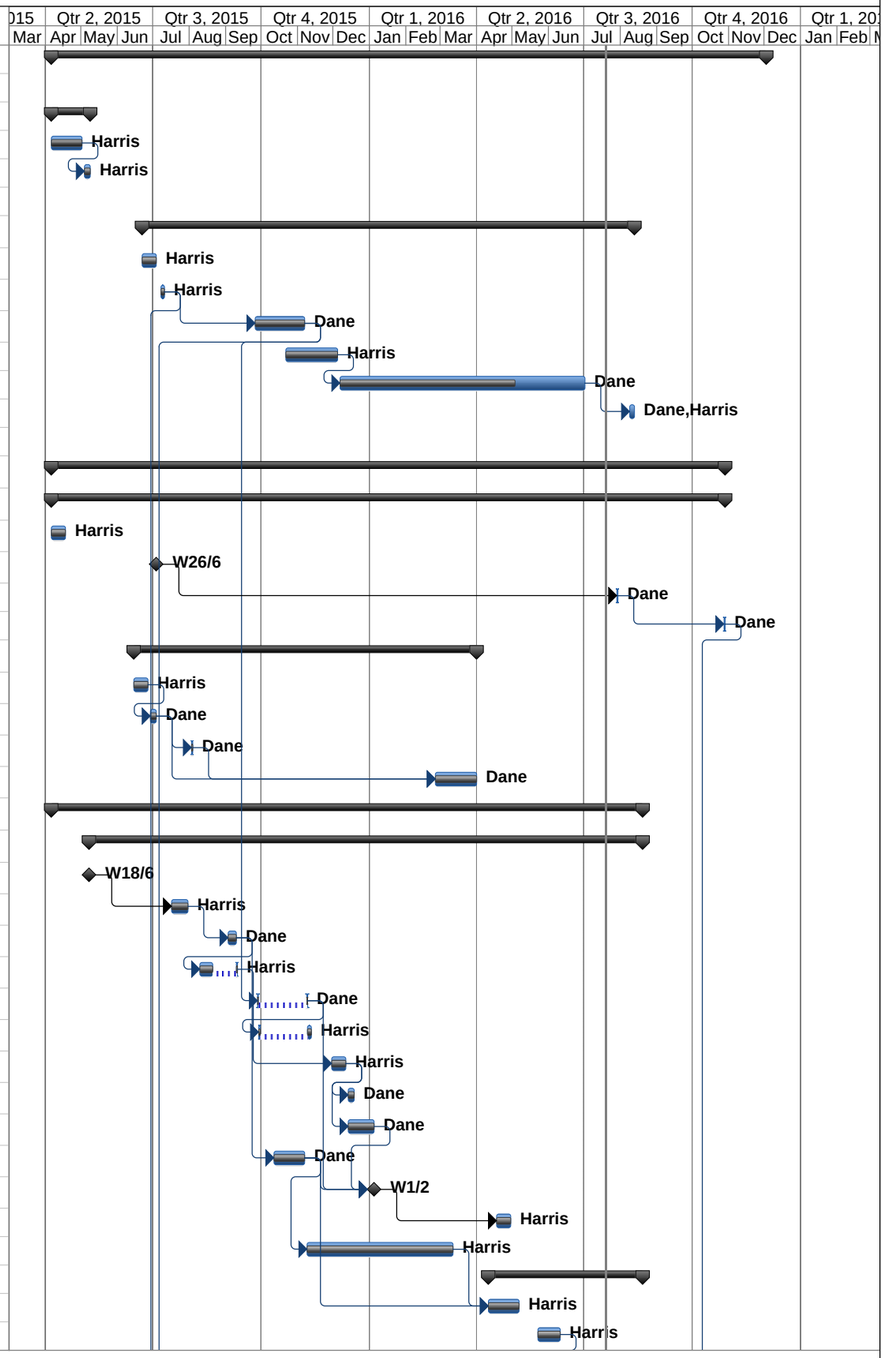
The number of training sessions required can be determined based on the number of consoles available for training, the number of dispatch personnel to be trained, and limiting the number of students to no more than two per console. These sessions would be scheduled just prior to implementation to allow participants to promptly begin using the skills learned. Each student would receive a quick reference manual for the operation of the Symphony Dispatch Console.

This plan includes:

Training	Qty of Students	Location
Dispatcher/Console Training	85	Dane Co.

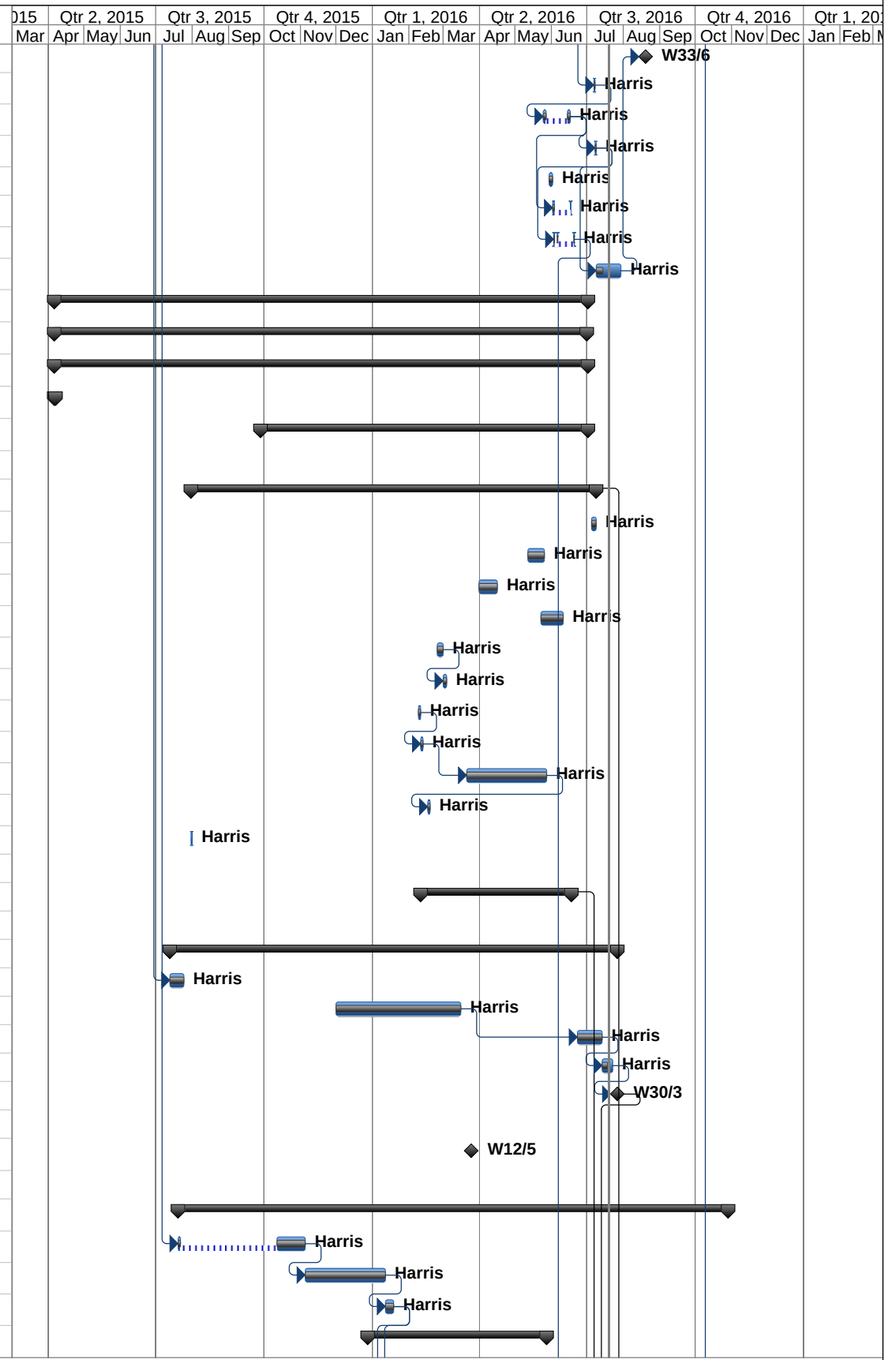
Attachment 7C Expanded System Project Schedule

ID	Resource Names	Task Name	Duration	Start	Finish	Predecessors	Successors	% Complete
1		**DANE COUNTY RADIO PROJECT**	**427 days?**	**Mon 4/6/15**	**Fri 12/2/16**			**86%**
2								
3		**Customer Design Review (pre-amendment)**	**25 days**	**Mon 4/6/15**	**Fri 5/8/15**			**100%**
4	Harris	Prepare for CDR	4 wks	Mon 4/6/15	Fri 5/1/15		5	100%
5	Harris	Present CDR	1 wk	Mon 5/4/15	Fri 5/8/15	4	116	100%
6								
7		**Customer Design Review (final)**	**292 days**	**Mon 6/22/15**	**Fri 8/12/16**			**79%**
8	Harris	Prepare for CDR	2 wks	Mon 6/22/15	Fri 7/3/15			100%
9	Harris	Present CDR	3 days	Wed 7/8/15	Fri 7/10/15		10,157	100%
10	Dane	Approve CDR	6 wks	Fri 9/25/15	Fri 11/6/15	9	167,32,58,78,103,116	100%
11	Harris	Prepare documents for Amendment 7 (incl Imp Plan)	30 days	Thu 10/22/15	Fri 12/4/15		12	100%
12	Dane	Negotiate/finalize Amendment 7	144 days	Mon 12/7/15	Fri 7/1/16	11	13	70%
13	Dane,Harr	Sign Amendment 7	4 days	Tue 8/9/16	Fri 8/12/16	12		0%
14								
15		**Licensing**	**402 days**	**Mon 4/6/15**	**Fri 10/28/16**			**96%**
16		**NTIA Frequencies**	**402 days**	**Mon 4/6/15**	**Fri 10/28/16**			**83%**
17	Harris	Prepare License Applications with NTIA & WISCOM	2 wks	Mon 4/6/15	Fri 4/17/15			100%
18	Dane	New frequencies available for test	0 wks	Fri 7/3/15	Fri 7/3/15		19	100%
19	Dane	WISCOM applies for FCC licenses	1 day	Fri 7/29/16	Fri 7/29/16	18	20FS+90 edays	0%
20	Dane	New frequencies avaialble for beneficial use	1 day	Fri 10/28/16	Fri 10/28/16	19FS+90 edays	249	0%
21		**Part 90 Frequencies (dependent on site approvals)**	**201 days**	**Mon 6/15/15**	**Thu 3/31/16**			**100%**
22	Harris	Prepare License Applications	2 wks	Mon 6/15/15	Fri 6/26/15		23	100%
23	Dane	Submit to Coordinator	1 wk	Mon 6/29/15	Fri 7/3/15	22	25FS+6 wks,24FS+1	100%
24	Dane	Submit License Applications to FCC	1 day	Mon 8/3/15	Mon 8/3/15	23FS+1 mon	25FS+28 wks	100%
25	Dane	New frequencies available for use	5 wks	Fri 2/26/16	Thu 3/31/16	24FS+28 wks,23FS+6 wks		100%
26		**Site Development**	**352 days?**	**Mon 4/6/15**	**Fri 8/19/16**			**99%**
27		**WJJO**	**328 days**	**Fri 5/8/15**	**Fri 8/19/16**			**95%**
28	Harris	Owner approval of Final Antenna Positions	0 days	Fri 5/8/15	Fri 5/8/15		29	100%
29	Harris	Perform Structural Analysis (by owner)	2 wks	Fri 7/17/15	Thu 7/30/15	28	30	100%
30	Dane	Obtain owner permission to proceed with site lease	1 wk	Thu 9/3/15	Wed 9/9/15	29	31,37	100%
31	Harris	Prepare site construction drawings	10 days	Mon 8/10/15	Thu 9/10/15	30	34	100%
32	Dane	CDR Approval	1 day	Mon 9/28/15	Mon 11/9/15	10	33,38	100%
33	Harris	Order shelter and equipment	5 days	Tue 9/29/15	Thu 11/12/15	32		100%
34	Harris	Prepare Permit Applications	2 wks	Mon 11/30/15	Fri 12/11/15	31	35,36	100%
35	Dane	Submit Permit Applications	1 wk	Mon 12/14/15	Fri 12/18/15	34		100%
36	Dane	Permit Application Processing	2 wks	Mon 12/14/15	Mon 1/4/16	34	38	100%
37	Dane	Dane - Midwest Family Broadcasting Lease Complete	4 wks	Mon 10/12/15	Fri 11/6/15	30	38,40,42	100%
38	Dane	Notice to Proceed from Dane County	0 days	Mon 1/4/16	Mon 1/4/16	37,36,32	39FS+2 wks	100%
39	Harris	Order site utilities	2 wks	Mon 4/18/16	Fri 4/29/16	38FS+2 wks		100%
40	Harris	Complete FCC, FAA, NEPA/SHPO, soil boring	16.4 wks	Mon 11/9/15	Fri 3/11/16	37	42	100%
41	**Harris**	**Construct new tower**	**95 days**	**Mon 4/11/16**	**Fri 8/19/16**			**99%**
42	Harris	Pour tower and shelter foundations	4 wks	Mon 4/11/16	Fri 5/6/16	37,40		100%
43	Harris	Erect tower, install lighting, cable ladder, ect.	3 wks	Mon 5/23/16	Fri 6/10/16		45	100%



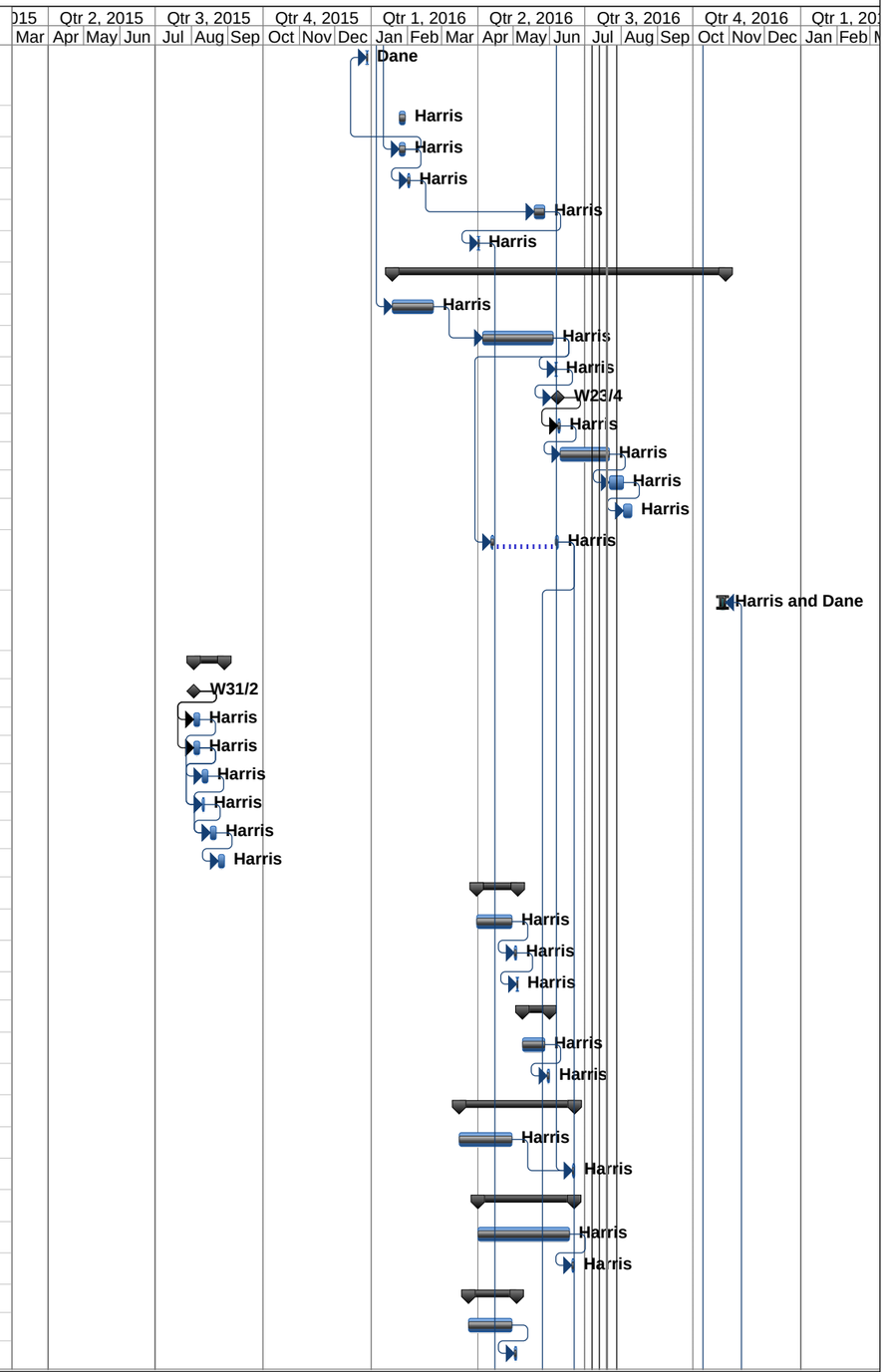
Attachment 7C Expanded System Project Schedule

ID	Resource Names	Task Name	Duration	Start	Finish	Predecessors	Successors	% Complete
44	Harris	Remove existing tower	0 wks	Fri 8/19/16	Fri 8/19/16	51		0%
45	Harris	Offload and set Shelter	1 day	Thu 7/7/16	Thu 7/7/16	43	46	100%
46	Harris	Construct Ground System around Shelter and Tower	1 wk	Wed 5/25/16	Thu 6/16/16	45	47,49	100%
47	Harris	Install electrical System to Shelter	1 day	Fri 7/8/16	Fri 7/8/16	46	51,50	100%
48	Harris	Install combiner system	3 days	Mon 5/30/16	Wed 6/1/16			100%
49	Harris	Install generator	2 days	Thu 6/2/16	Fri 6/17/16	46		75%
50	Harris	Install DC Plant	1 day	Fri 6/3/16	Mon 6/20/16	47	205	100%
51	Harris	Compound - Gravel, Cleanup	3 wks	Fri 7/8/16	Fri 7/29/16	47	44	25%
52		**Rockdale**	**317 days**	**Mon 4/6/15**	**Fri 7/1/16**			**100%**
73		**Stoughton WT**	**316 days**	**Mon 4/6/15**	**Thu 6/30/16**			**100%**
95		**DeForest**	**317 days**	**Mon 4/6/15**	**Fri 7/1/16**			**100%**
113		**Deerfield**	**1 day?**	**Mon 4/6/15**	**Mon 4/6/15**			**100%**
115		**Brigham**	**192 days**	**Mon 9/28/15**	**Fri 7/1/16**			**100%**
134								
135		**Antenna Installation**	**238 days**	**Fri 7/31/15**	**Fri 7/8/16**		**222**	**99%**
136	Harris	WJJO (P25, AT)	4 days	Tue 7/5/16	Fri 7/8/16			100%
137	Harris	Rockdale (P25, AT, Paging)	10 days	Thu 5/12/16	Wed 5/25/16	67		100%
138	Harris	Stoughton WT (P25, AT, Paging, MA RX)	11.5 days	Thu 3/31/16	Fri 4/15/16	88	66	100%
139	Harris	DeForest (P25, AT, Paging)	15 days	Mon 5/23/16	Fri 6/10/16	109		100%
140	Harris	Brigham (MA, AT)	3 days	Thu 2/25/16	Mon 2/29/16	128	141	100%
141	Harris	Madison-UW Antenna Swap (P25, AT, MA)	3 days	Tue 3/1/16	Thu 3/3/16	140	151	100%
142	Harris	Roxbury Antenna Swap (AT TX, Paging)	2 days	Tue 2/9/16	Wed 2/10/16		143,152	100%
143	Harris	Eisner Antenna Swap (AT TX, MA RX, Paging)	2 days	Thu 2/11/16	Fri 2/12/16	142	144,150	100%
144	Harris	Sun Prairie Antenna Swap (AT TX, Paging)	50 days	Mon 3/21/16	Fri 5/27/16	143	145,154	100%
145	Harris	Verona Antenna Swap (AT TX, Paging, Pt x Pt)	2 days	Wed 2/17/16	Thu 2/18/16	144	153	100%
146	Harris	Deerfield (azimuth change)	1 day	Fri 7/31/15	Fri 7/31/15			0%
147								
148		**2nd AT Channel Installation**	**92 days**	**Thu 2/11/16**	**Fri 6/17/16**		**222**	**100%**
155								
156		**Microwave Installation**	**264 days**	**Mon 7/13/15**	**Tue 7/26/16**			**96%**
157	Harris	Perform Visual Survey of Paths (Alcatel)	10 days	Mon 7/13/15	Fri 7/24/15	9		100%
158	Harris	Procure Microwave Equipment	14 wks	Tue 12/1/15	Tue 3/15/16	118FS+2 wks	159	100%
159	Harris	Install MW antennas and equipment (Alcatel)	15 days	Thu 6/23/16	Wed 7/13/16	158	160	100%
160	Harris	Verify path reliability, levels and alarms (Alcatel)	7 days	Thu 7/14/16	Fri 7/22/16	159	161	40%
161	Dane	MW Sign-off	0 days	Tue 7/26/16	Tue 7/26/16	160	217	0%
162								
163		**Mutual Aid Relocation**	**0 days**	**Thu 3/24/16**	**Thu 3/24/16**			**100%**
165								
166		**System Installation (P25, Paging, AT)**	**327 days?**	**Mon 7/20/15**	**Fri 10/28/16**			**88%**
167	Harris	Order Equipment and Redesign Network	4 wks	Mon 7/20/15	Wed 11/4/15	10	168	100%
168	Harris	Assemble and Stage Equipment in Lynchburg	8 wks	Thu 11/5/15	Mon 1/11/16	167	169	100%
169	Harris	Deliver and Prepare Physically for Upgrade	5 days	Tue 1/12/16	Mon 1/18/16	168	178,173	100%
170		**SR10A Upgrade**	**109 days**	**Mon 12/28/15**	**Fri 5/27/16**			**97%**



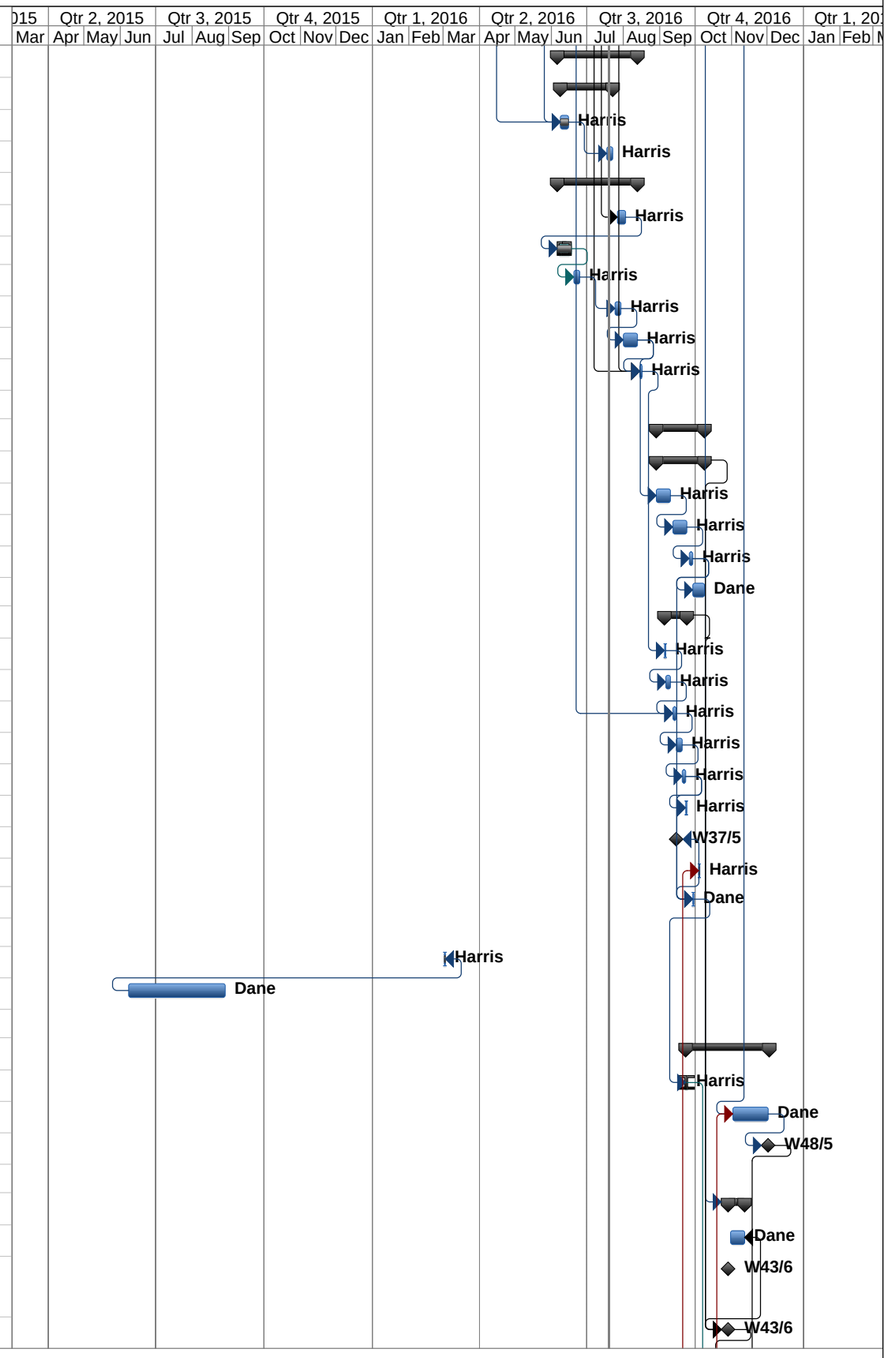
Attachment 7C Expanded System Project Schedule

ID	Resource Names	Task Name	Duration	Start	Finish	Predecessors	Successors	% Complete
171	Dane	Lock down UAS database - transfer to Harris for conversion	1 day	Mon 12/28/15	Mon 12/28/15	173FS-30 edays		100%
172	Harris	Upgrade IPCP and Sites	5 days	Mon 1/25/16	Fri 1/29/16			100%
173	Harris	Install Secondary Network Switching Center	5 days	Mon 1/25/16	Fri 1/29/16	169	174,171FS-30 edays	100%
174	Harris	Install Primary Network Switching Center	2 days	Mon 2/1/16	Tue 2/2/16	173	175FS+60 days	100%
175	Harris	Update and Integrate ISSI	7 days	Thu 5/19/16	Fri 5/27/16	174FS+60 days	176	90%
176	Harris	Cutover to SR10A	1 day	Fri 4/1/16	Fri 4/1/16	175	214	100%
177		**CCB (Primary Dispatch)**	**204 days**	**Tue 1/19/16**	**Fri 10/28/16**			**85%**
178	Harris	Upgrade consoles to Symphony (main dispatch)	25 days	Tue 1/19/16	Mon 2/22/16	169	179FS+30 days	100%
179	Harris	Integrate Duet audio interface (Symphony/Moto)	44 days	Tue 4/5/16	Fri 6/3/16	178FS+30 days	186,180	100%
180	Harris	Integrate/test Duet telephone interface	1 day	Mon 6/6/16	Mon 6/6/16	179	181	100%
181	Harris	Integrate/test Duet light bar interface	0 days	Wed 6/8/16	Wed 6/8/16	180	182	100%
182	Harris	Test new 24" touchscreen monitor	2 days	Wed 6/8/16	Thu 6/9/16	181	183	100%
183	Harris	Order 22 x 24" touchscreen monitors	30 days	Fri 6/10/16	Thu 7/21/16	182	184	100%
184	Harris	Install touchscreen monitors	8 days	Fri 7/22/16	Tue 8/2/16	183	185	0%
185	Harris	Coordinate Fitchburg Console Upgrades	5 days	Wed 8/3/16	Tue 8/9/16	184		0%
186	Harris	Confirm Console Configurations (Provide Admin Support)	5 days	Tue 4/12/16	Wed 6/8/16	179	233,214	75%
187	Harris and Dane	Dispatch Training (4 hour sessions at back-up Dispatch)	5 days	Mon 10/24/16	Fri 10/28/16	246SF-17 days		0%
188		**EDC (Backup Dispatch)**	**20 days**	**Mon 8/3/15**	**Fri 8/28/15**			**0%**
189	Dane	Site ready for equipment installation	0 days	Mon 8/3/15	Mon 8/3/15		190,191	0%
190	Harris	Install network connection (fiber to UW-Madison NSC)	5 days	Mon 8/3/15	Fri 8/7/15	189	193	0%
191	Harris	Install IRIM radios into existing cabinet	5 days	Mon 8/3/15	Fri 8/7/15	189	192,193	0%
192	Harris	Install M7300 backup radios into existing cabinet	5 days	Mon 8/10/15	Fri 8/14/15	191	194	0%
193	Harris	Install antennas	2 days	Mon 8/10/15	Tue 8/11/15	190,191	194	0%
194	Harris	Install Symphony consoles	5 days	Mon 8/17/15	Fri 8/21/15	192,193	195	0%
195	Harris	Test EDC radios and consoles	5 days	Mon 8/24/15	Fri 8/28/15	194		0%
196		**Stoughton WT**	**25 days?**	**Thu 3/31/16**	**Wed 5/4/16**			**99%**
197	Harris	Install Site Equipment	22 days	Thu 3/31/16	Fri 4/29/16	87	198	100%
198	Harris	Apply Power, set levels and parameters	2 days	Mon 5/2/16	Tue 5/3/16	197,93	199	85%
199	Harris	Activate paging transmitter / Deactivate Stoughton AT&T	1 day?	Wed 5/4/16	Wed 5/4/16	198		100%
200		**Rockdale**	**17 days**	**Mon 5/9/16**	**Tue 5/31/16**			**98%**
201	Harris	Install Site Equipment (and existing shelter equipment)	15 days	Mon 5/9/16	Fri 5/27/16	66	202	100%
202	Harris	Apply Power, set levels and parameters	2 days	Mon 5/30/16	Tue 5/31/16	201,71		85%
203		**WJJO**	**70.25 days**	**Wed 3/16/16**	**Wed 6/22/16**			**99%**
204	Harris	Install Site Equipment (shelter at GenComm)	33 days	Wed 3/16/16	Fri 4/29/16		205	100%
205	Harris	Apply Power, set levels and parameters	2 days	Mon 6/20/16	Wed 6/22/16	204,50		85%
206		**DeForest**	**58 days**	**Fri 4/1/16**	**Tue 6/21/16**			**99%**
207	Harris	Install Site Equipment	56 days	Fri 4/1/16	Fri 6/17/16	108	208	100%
208	Harris	Apply Power, set levels and parameters	2 days	Mon 6/20/16	Tue 6/21/16	207,111		85%
209		**Brigham**	**29 days**	**Thu 3/24/16**	**Tue 5/3/16**			**99%**
210		Install Site Equipment	27 days	Thu 3/24/16	Fri 4/29/16	130	211	100%
211		Apply Power, set levels and parameters	2 days	Mon 5/2/16	Tue 5/3/16	210,132		85%



Attachment 7C Expanded System Project Schedule

ID	Resource Names	Task Name	Duration	Start	Finish	Predecessors	Successors	% Complete
212		**Optimization**	**50 days**	**Mon 6/6/16**	**Fri 8/12/16**			**33%**
213		**Network Switches-Consoles & Interop**	**32.5 days**	**Wed 6/8/16**	**Fri 7/22/16**			**50%**
214	Harris	Verify Switch and console performance	5 days	Wed 6/8/16	Wed 6/15/16	176,186	215	100%
215	Harris	Verify Interop GW and IRIM	5 days	Mon 7/18/16	Fri 7/22/16	214		0%
216		**VHF P25 Simulcast**	**50 days**	**Mon 6/6/16**	**Fri 8/12/16**			**29%**
217	Harris	Connect MW and verify network	5 days	Wed 7/27/16	Tue 8/2/16	161	218	0%
218		Combiner retuning at existing P25 sites	10 days	Mon 6/6/16	Fri 6/17/16	217	219	100%
219	Harris	Set all levels & parameters	5 days	Mon 6/20/16	Fri 6/24/16	218	220	0%
220	Harris	Set simulcast timing	5 days	Mon 7/25/16	Fri 7/29/16	219	221	0%
221	Harris	Prepare for ATP test	10 days	Mon 8/1/16	Fri 8/12/16	220	222,226	0%
222	Harris	**Verify Analog Tactical and Paging Performance**	2 days	Mon 8/15/16	Tue 8/16/16	221,135,148	231	0%
223								
224		**Acceptance Testing**	**30 days**	**Mon 8/29/16**	**Sat 10/8/16**			**1%**
225		**Coverage Tests**	**30 days**	**Mon 8/29/16**	**Sat 10/8/16**		**252**	**0%**
226	Harris	Perform BER/RSSI testing of P25	2 wks	Mon 8/29/16	Fri 9/9/16	221	227	0%
227	Harris	Perform DAQ of P25, MA, EMS-B, and Paging	2 wks	Mon 9/12/16	Fri 9/23/16	226	228	0%
228	Harris	Submit CATP results to Dane County	3 days	Mon 9/26/16	Wed 9/28/16	227	239,229	0%
229	Dane	Approve CATP results	10 edays	Wed 9/28/16	Sat 10/8/16	228		0%
230		**Functional Acceptance Tests**	**15 days**	**Mon 9/5/16**	**Fri 9/23/16**		**252**	**0%**
231	Harris	Review MW performance for each site and entire loop	1 day	Mon 9/5/16	Mon 9/5/16	222	232	0%
232	Harris	Run Functional Test at a selected RF site.	4 days	Tue 9/6/16	Fri 9/9/16	231	233	0%
233	Harris	Run Functional Test at Dispatch Center.	3 days	Mon 9/12/16	Wed 9/14/16	232,186	234	0%
234	Harris	Run Functional test with user equipment and BeOn	3 days	Thu 9/15/16	Mon 9/19/16	233	235	0%
235	Harris	Run functional test of AT, Paging, ISSI	3 days	Tue 9/20/16	Thu 9/22/16	234	239,236	0%
236	Harris	Submit Functional Test Results to County	1 day	Fri 9/23/16	Fri 9/23/16	235		0%
237	Harris	Submit Final Drawing Set to County	0 days	Thu 9/15/16	Thu 9/15/16	239SF-2 wks		0%
238	Harris	Complete Transition Plan	1 day	Tue 10/4/16	Tue 10/4/16	253FS-8 wks		90%
239	Dane	Dane County Approves ATP test results and Drawing Set	1 day	Thu 9/29/16	Thu 9/29/16	228,235	245FS-5 days,237SF-	0%
240								
241	Harris	Provide New Radio Configuration Settings	1 day	Wed 3/2/16	Thu 3/3/16	242SF-30 days		100%
242	Dane	Radio Programming	60 days	Mon 6/8/15	Fri 8/28/15		241SF-30 days	0%
243								
244		**30-Day Burn-in**	**51 days**	**Fri 9/23/16**	**Fri 12/2/16**			**0%**
245	Harris	Pilot Users (Highway Dept) on P25	1 day	Fri 9/23/16	Fri 9/23/16	239FS-5 days	253	0%
246	Dane	Burn In Execution	30 edays	Tue 11/1/16	Thu 12/1/16	253	247,187SF-17 days	0%
247	Dane	Burn In Acceptance	0 days	Thu 12/1/16	Thu 12/1/16	246	257	0%
248								
249		**Cutover**	**10 days**	**Fri 10/28/16**	**Fri 11/11/16**	**20**		**0%**
250	Dane	Train Users for New System	10 days	Mon 10/31/16	Fri 11/11/1	252SF-20 days		0%
251	Dane	Turn off Main Fire Repeater at UW-Madison (158.745MHz)	0 days	Fri 10/28/16	Fri 10/28/16			0%
252	Dane	Notify and prepare departments	0 days	Fri 10/28/16	Fri 10/28/16	225,230	253,250SF-20 days	0%



Attachment 7C Expanded System Project Schedule

ID	Resource Names	Task Name	Duration	Start	Finish	Predecessors	Successors	% Complete
253	Dane	Cutover to new system.	1 day	Tue 11/1/16	Tue 11/1/16	252,245	256,238FS-8 wks,246	0%
254								
255		**Final Acceptance**	**23 days**	**Wed 11/2/16**	**Fri 12/2/16**			**0%**
256	Harris	Submit Final Documentation	1 day	Wed 11/2/16	Wed 11/2/16	253		0%
257	Dane	Final System Acceptance	1 day	Fri 12/2/16	Fri 12/2/16	247	258	0%
258		**Warranty Begins**	0 days	Fri 12/2/16	Fri 12/2/16	257		0%

Dane County Radio System

Amendment 7

Attachment 7D: Implementation Plan

Table of Contents

Project Team

Harris has assigned the following people to execute the system expansion:

Michael Lochner	Project Manager (lead)
Paul Crowe	Project Manager
Daniel McCoy	System Engineer (lead)
Brian Justin	RF Engineer
Craig Fitzsimmons	Site Manager
Bob Lockhart	Regional Service Manager
Frank Ober	Training Manager

Implementation Plan

The following implementation plan describes the actions and deliverables for the System as amended. The project schedule shall be Attachment C, Project Schedule, attached to Amendment 7 of the Contract.

Infrastructure System Design

Site Surveys – Completed

Customer Design Review (CDR) – Completed

Manufacturing - Completed

Site Development

Site Material Procurement

Harris will place orders on the subcontractors that will perform the site development and order the vendor materials required for the sites. Shipments have been coordinated with the vendors based on the project schedule to ensure availability of parts and materials which are needed on site.

Site Development List by Site

The following is a table of the sites that are part of the Harris design.

Systems installed at each site

Site #	Site Name	P25	Mutual Aid	Point to Point	EMS-B	Siren Control	Paging	Analog Tactical
1	CCB							
2	Stoughton Water Tank		RX					
3	Sun Prairie (AT)							
4	Roxbury							
5	Eisner		RX					
6	UW Broadcast		TXRX					
7	Verona							
8	Deerfield		TXRX					
9	Brigham		TXRX					
10	WMGN							
11	McKee							
12	DeForest							
13	Rockdale							
14	WJJO							

The following is a description of the site development needs for each site. It defines changes to existing facilities and new site development work.

DeForest	Description
	The DeForest Site will be a VHF trunked simulcast site plus paging, fireground and a fiber optic connection.
Tower	Use existing tower with 40ft extension, add lights (w/ control)
Shelter	Use interior room within State Patrol building
Generator	None (will use DOT building's backup power)
DC Power	Furnish and install a -48V DC power plant to supply the RF equipment.
Grounding	Attach to ground system in building
Construction Drawing	1-21-2016

WJJO	Description

	The WJJO Site will be a VHF trunked simulcast site plus fireground and new MW links. Harris will contract for the building of a new 465' tower at this location. In addition, Harris is responsible for all permitting in this effort.
Tower	New Tower (to be built by Mid-West Family Broadcasting)
Shelter	Furnish and install a new 12' X 26' Concrete Shelter
Generator	Furnish and install a new 45-KW natural gas Generator
DC Power	Furnish and install a -48V DC power plant to supply the RF Eqpt & MW equipment.
Grounding	Tie new shelter and tower ground rings to existing site grounding halo
MW hop to	Sun Prairie and Rockdale
Construciton Drawing	Site drawing 11-12-2015 and tower drawing 12-22-2015

Stoughton Water Tank	Description
	The Stoughton Site will be a VHF trunked simulcast site plus paging, fireground and new MW links.
Tower	Use existing water tank
Shelter	Furnish and install a new 12' X 36' Concrete Shelter
Generator	Furnish and install a new 45-KW natural gas Generator
DC Power	Furnish and install a -48V DC power plant to supply the RF Eqpt & MW equipment.
Compound	New compound
Grounding	New ground system
MW hop to	CCB and Rockdale
Construction Drawing	1-22-2016

Rockdale	Description
	The Rockdale Site will be a VHF trunked simulcast site plus paging, fireground and new MW links.
Tower	Use existing tower with remediation (includes spot painting where necessary, and moving tower light control into new shelter and connection to Network Sentry)
Shelter	Relocate existing 12' X 26' Concrete Shelter from the Stoughton AT&T site.
Generator	Relocate the existing 45-KW propane Generator from the Stoughton AT&T site. Add fuel level indicator and wire to NWS.
DC Power	Relocate the existing -48V DC power plant from the Stoughton AT&T site.
Compound	New compound
Grounding	New ground system
MW hop to	WJJO and Stoughton
Construction Drawing	11-03-2015

Brigham	Description
	The Brigham Site will be a VHF mutual aid and Analong Tactical site.
Tower	Existing tower (also includes moving tower light control into new shelter)
Shelter	Furnish and install a new 12' X 16' Concrete Shelter
Generator	Furnish and install a new 45-KW propane Generator
DC Power	Furnish and install a -48V DC 480A power plant to supply the RF Eqpt & MW equipment.
Compound	Existing compound to include new shelter, generator, and fuel tank
Grounding	Expand ground system to include new shelter

MW hop to	Leased line only (will require T1 to both existing and new shelter for a short time during the implementation)
Construction Drawing	9-23-2015

Fuel level sensors will also be added to the following sites:

- Eisner
- Roxbury
- Brigham
- Verona

Light control move will be completed at:

- Roxbury

Installation

Site installation work will begin in coordination with the completion of the site development and the equipment delivery schedule. A list of major tasks for each subsystem is below:

- Microwave system
  - Install the expanded microwave system to the following sites:
    - Rockdale
    - Stoughton Water Tank
    - WJJO
  - Change configuration (azimuths) of the microwave system at the following sites:
    - CCB
    - Sun Prairie
- Paging System
  - Install new simulcast paging transmitters and UHF backup at the following sites:
    - DeForest
    - Stoughton Water Tank
    - Rockdale (move from Stoughton AT&T)
  - Connect Paging systems to microwave network.
- Conventional Mutual Aid
  - Install new VHF conventional Mutual Aid channels at Brigham.
  - Relocate VHF conventional Mutual Aid channels from Roxbury to Eisner.
- VHF P25 Simulcast Trunking System
  - Install the 10 channel VHF P25 simulcast system at the following sites:
    - DeForest
    - Stoughton Water Tank

  - WJJO
  - Rockdale (relocated from Stoughton AT&T)

- P25 System Network Switches and System Management
  - Install Primary NSC at the CCB building
  - Install the Backup NSC at Madison-UW
- Analog Tactical
  - Install two new Analog Tactical channels at:
    - DeForest
    - Rockdale
    - WJJO
    - Brigham
    - Stoughton Water Tank
  - Install new second Analog Tactical channel at:
    - Deerfield
    - Eisner
    - UW Broadcast
    - Roxbury
    - Verona
    - Sun Prairie
- Dispatch Locations
  - Primary Dispatch at CCB building
    - Upgrade 21 consoles at CCB Primary Dispatch.
    - Remove Maestro training consoles from CCB
  - Backup Dispatch
    - Install 10 consoles at new Backup Dispatch Center (includes 6 Maestro->Symphony upgrades, plus 4 new Symphonys)

Order of Installation (tasks may be completed in parallel with each other)

- Stoughton WT, Stoughton AT&T, and Rockdale
  - Fabricate and install LMR and microwave mounting brackets on tower
  - Install transmission line entrance panel on water tower
  - Set Stoughton WT shelter
  - Install utilities, gas and electric
  - Install ice bridge and LMR antennas
  - Install LMR and other equipment in shelter
  - Transition to UHF paging backbone
  - Turn on Stoughton WT paging (re-time paging as necessary)
  - Turn off Stoughton AT&T paging
  - Turn off Stoughton AT&T IFERN-1 channel (assumes this channel will be down for extended amount of time)

- Install microwave
- Move AT&T shelter to Rockdale

- Rockdale (assumption is no icing conditions present, and remediation complete)
  - Set AT&T shelter at Rockdale site
  - Install utilities, propane and electric
  - Install generator
  - Install ice bridge and LMR antennas
  - Install microwave
  - Install LMR and other equipment in shelter
  - Turn off old shelter fire paging
  - Turn on new shelter fire paging (re-time paging as necessary)

- Deforest
  - State legacy MW dishes will be temporarily removed during tower extension. State will re-route MW traffic during removal.
  - Configure fiber connection between DeForest and CCB
  - Can turn paging on once DeForest paging is ready (re-time paging as necessary)

- Brigham
  - Set new Brigham shelter
  - Install ice bridge to new shelter
  - Install utilities, T1 connectivity, propane, and electric to new shelter
  - Install generator
  - Install LMR and other equipment in new shelter
  - Install LMR antennas to existing equipment in new shelter
  - Run 1/2” transmission line ‘jumper’ cables from legacy to existing shelter
  - While no testing or optimization is occurring, jumpers will attach new antennas and feed line to legacy LMR equipment
  - While testing and optimization is occurring, jumpers will be temporarilty removed to attach new feed line to new equipment
  - After transition to new equipment, jumpers between shelters will be permanently removed

- WJJO
  - Complete tower
  - Set new shelter
  - Install ice bridge and LMR antennas

- Install utilities and electric to new shelter
- Install generator
- Install LMR and other equipment in new shelter

System Optimization

Once each of the backbone system installations is complete, Harris will optimize each of the system as follows:

- Prepare all sites for Site inspections
- Verify microwave backhaul system is:
  - Operational
  - Passes BER test
  - Alarm system is operational
- Paging
  - Current paging system is carrying live traffic, so changes will be made on the live system.
  - Set paging simulcast delay parameters
  - Verify network connectivity
  - Verify simulcast paging system is ready for functional test
  - Set levels on back-up link system
  - Verify simulcast paging system is operational
- Conventional Mutual Aid
  - Set all levels on Mutual Aid repeaters
  - Verify voting and TX selection operation
  - Verify network multiplex connectivity back to Network Switches and dispatch.
- Analog Tactical
  - Set all levels on all repeaters
  - Verify voting and TX selection operation
  - Verify network multiplex connectivity back to Network Switches and dispatch
- Verify Console operationVHF P25 Simulcast trunk system
  - Verify network connectivity
  - Set levels, verify proper operation
  - Verify simulcast timing is set at simulcast control points
  - Verify simulcast system alarms are operating properly

    - Verify dispatch operations
- Prepare all sites for applicable Acceptance Testing
- Set and verify all levels and parameters at the Network Switching Centers
- Verify that the dispatch centers are operating and ready for testing
- Verify IP addresses are set as established in the IP-plan
- Record levels and parameters
- Enter and verify cross-connect information to drawings making red-line corrections to the final drawing package

Harris will convey any pre-planned system down-time for testing or transition to Dane County so they may coordinate with all applicable users.

Acceptance Testing

Acceptance tests to be performed as shown in the corresponding Acceptance Test Plans.

Transition Plan:

Dane County VHF Radio System

Transition Plan

Scope

This document describes the activities required to successfully transition the DaneCom users to the new systems. Amendment 6 of the contract introduces new sites and requires one site to be relocated to an existing legacy tower. This requires a planned conversion to minimize interruptions to operations.

Mutual Aid

As of 1 November 2016 (date per Project Schedule), these channels will be available to dispatchers:

- VCALL10
- VTAC12
- VLAW31

The transition for the following channels will be completed when the dispatcher begins using the Symphony Console:

- EMS-B
- Point to Point
- IFERN
- MARC1/2 (field users will transition to the narrowband MARC1/2 channel at this time)

*Assumption – Both systems will be connected in parallel as part of the implementation

Analog Tactical

As of 1 November 2016 (date per Project Schedule), both analog tactical channels will be available to dispatchers.

Dispatch

As of 1 November 2016 (date per Project Schedule), dispatchers will unplug their headset from the Motorola console and plug into the Symphony Console.

Paging

As of 1 November 2016 (date per Project Schedule), dispatchers will unplug their headset from the Motorola console and plug into the Symphony Console to begin using the paging system.

P25 Transition

P25 Public Safety user Cutover 1 November 2016 (date per Project Schedule)

20 days prior to P25 Cutover (during 30-day Burn-In), non-Public Safety (Highway and Public Works) will cutover.

Attachment 7E-1
Functional Test Procedures
For
Dane County
SR10A.1 Functional Testing

Table of Contents

ABOUT THIS DOCUMENT

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

Customer:	Dane County
Prepared By:	Daniel McCoy

DOCUMENT USAGE

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

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

SUBSCRIBER UNIT USAGE

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

1. Customer Approval

This Acceptance Test Procedure has been read and approved for use as the system acceptance test.

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

2. Facility Test

2.1 Visual Inspection

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

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

Setup:

None

Execution:

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

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

2.2 Power Backup / UPS Verification

Purpose:	**To verify that the site can run on the UPS without interruptions.**
Expected Results:	**Radio communication should not be interrupted during the transition.**
Setup:	**Prior to the execution of this test, ensure any computers or other devices with volatile memory are backed up or are on power circuits not affected by this test.**
Notes:	**Harris will perform this test at all locations. Harris is not responsible for test failures due to inadequate backup power equipment that is under the county's responsibility to provide. Any such failures of county provided backup power equipment will not delay system acceptance. Record in the comments section the names of locations tested and who has provided the backup power equipment (Harris or the county).**

Execution:

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

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

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 using Internet Explorer and 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 by selecting System/Administrative/Admin Class.

3. Select "Add" to display the Administration User Detail screen.

4. Enter a name (e.g., TestAgency) description, and password. Select save to download.

5. Log out of the default account.

6. Log in as the new TestAgencyAdmin

   - Verify access with TestAgencyAdmin

7. Log out of the Test AgencyAdmin.

8. 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 Provision Agency with Talk Groups and Subscriber Units in the UAS

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

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

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

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

Radios						
Description	RSI	Protocol Mask	Status	Sub Type	Assigned End User	Algorithm Support
Radio1	9980001	P25	Enabled Unit	Harris P5400	010:998:0001	AES
Radio2	9980002	P25	Enabled Unit	Harris P5400	010:998:0002	AES
Radio3	9980003	P25	Enabled Unit	Harris XG-75 Portable	010:998:0003	AES
Radio4	9980004	P25	Enabled Unit	Harris XG-75 Portable	010:998:0004	AES

Console9101	9989101	P25	Enabled Unit	Symphony Console	010:998:9101	AES
Radio5	9980005	P25	Enabled Unit	Harris XG-75 Portable	010:998:0005	AES
Radio6	9980006	P25	Enabled Unit	Harris XG-75 Portable	010:998:0006	AES
Radio7	9980007	P25	Enabled Unit	Harris XG-75 Portable	010:998:0007	AES
Radio8	9980008	P25	Enabled Unit	Harris XG-75 Portable	010:998:0008	AES
Radio9	9980009	P25	Enabled Unit	Harris XG-75 Portable	010:998:0009	AES
Radio10	9980010	P25	Enabled Unit	Harris XG-75 Portable	010:998:0010	AES

Execution:

1. Browse to the UAS using Internet Explorer and the address of 'https://s0u1uas.vida.local:8443/nas'

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

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

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

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

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

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

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

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

Priority Id	Coverage	Valid Coverage
5	P25Sites_PSAPs	P25Sites_PSAPs

Results (Pass/Fail) _____

Tester: _____ Date: _____

Comments: _____

_____

_____

3.3 Create a Subscriber Unit Report from the UAS

Purpose: **Demonstrate the capability to create a report of Subscriber units in the UAS database.**

Expected Results: **This test will create a Subscriber unit report.**

Setup: **Agency level access to UAS or a UAS client.**

Execution:

1. Browse to the UAS using Internet Explorer and the address of 'https://s0u1uas.vida.local:8443/nas'
2. Log into the UAS as an Agency level administrator.
3. Select System/Report/Voice End User.
4. Type '0210' into the 'User Id' and select apply.
   - ☐ Verify that the UAS displays the user info for user '0210'

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

3.4 Dynamic Regroup from the UAS

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

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

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

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

Execution:

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

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

3. Select 'End User Group' select 'Add' to add 'End User Group Detail'. Name the group 'Regroup1' and enter the description of 'Regroup1 test'. Select the 998 agency from the 'Select a Scope' drop down. Add the two radios to the 'Selected' windows and select 'ok' to close the 'End User Group Detail'. Then select the 'Save' button to down load the new regroup.

4. Select the 'Define Regroup' select 'Add' name the regroup 'Regoup1' and make the description 'Regroup1 test'. Change the 'Profile Name' to 'Regroup1' and change the 'End User Group id to 'Regroup1'. Select ok and save to save the changes to the UAS.

5. Select Manage Regroup, check the box for 'Regoup1' and select the button for 'Regroup' and select save to start the regroup.

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

6. At Radio 1 and Radio 2, attempt to change talk groups away from TG64003 P25. Verify that both radios are forced to remain on TG64103 P25.
7. PTT Radio 1 on TG64003 P25. Verify that Radio 7 hears audio on TG64003 P25 and can respond.

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

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

3.5 Unit Deregistration

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

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

Setup: **Only the radio for this test should be on talk group TG64101 P25 all other radios should be on other talk groups.**

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

Execution:

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

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

   - Verify that Console 9101 can PTT on talk group on TG64001 but no channels are brought up at the sites, because there is no demand for it at the sites.

Results (Pass/Fail) _____

Tester: _____ Date: _____

Comments: _____

_____

_____

3.6 Unit Enable/Disable from the UAS

Purpose:	**Demonstrate the capability to disable a lost/stolen radio from the UAS.**
Expected Results:	**This test has the ability to disable & re-enable a designated radio.**
Setup:	**Obtain 2 radios switched to the same unencrypted group and note the IDs. Switch on the radios and ensure that they communicate. Verify all sites are connected to the NSC.**
Note:	**The test will automatically delete the encryption key from the radio (if applicable). To restore unit encrypted functionality, the radio must have the key re-installed.**

Execution:

1. Select TG64001 P25 on both radios

   ☐ Verify that the radios can communicate.

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

   ☐ Attempt to PTT the radio and verify that it will not communicate with the system.

   ☐ PTT radio 2 and verify that radio 1 cannot receive the call.

3. Enable the ID of radio 1.

   ☐ Verify that the Enable/Disable screen indicates that the Current State of the radio is Enabled.

   ☐ Confirm that the radios can communicate in unencrypted mode.

4. Switch off radio 1 and disable it from the Enable/Disable screen.

   ☐ Verify that the desired state is Disabled and the Current State is Enabled.

   ☐ Switch on the radio and verify that, on logging into the site, it becomes disabled.

   ☐ Verify that the State settings change to Disabled and that the radios cannot communicate.

5. Enable the radios

   - ☐ Verify that radios can communicate.

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

3.7 UAS Site Adjacency Configuration

Purpose: **Demonstrate the capability to configure site adjacnecies 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:	_____		
	_____		
	_____		

3.8 Radio Detach

Purpose: **Confirms the site will send a radio detach command when its configured registration timer expires.**

Expected Results: **The radio reregisters on the site in response to the radio detach command.**

Setup **Program site with a radio registration age timer (in UAS under system> Protocol timer > radio re registration timer) set to 5 minutes and two radios programmed for operation on the site.**

Execution:

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

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

3.9 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**	**Preferr Vocode**
010:998:9150	Rad9150	Radio9150	Pers1	998_10_supervisor	FALSE	FALSE	FALSE	P25 Fu Rate
OS Voice Auth	**Transc Allowed Flag**							
FALSE	TRUE							
Subscriber Unit								
Description	**RSI**	**Electronic Serial Number**	**Protocol Mask**	**Status**	**Sub Type**	**Assigned End User**		**Algorit Suppo**
Radio9150	99899150	109989150	P25	Enabled Unit	Harris P5400	010:998:9105		AES

Execution:

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

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

2. Program Radio 9801 with an ID 9989150.

3. Attempt to PTT Radio 9150.

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

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

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

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

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

6. Key radio 9150

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

7. Restart radio 9150 and PTT the radio

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

8. Delete 10998999150 from the UAS database

9. Key radio 9150 from UAS

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

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

3.10 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:	_____		
	_____		
	_____		

3.11 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:	_____		
	_____		
	_____		

3.12 Regional Network Manager 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: _____	
_____	
_____	

3.13 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.**

Execution:

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

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

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

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

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

5. Turn the device back ON.

   - ☐ Verify that the device alarm clears and displays green.

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

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

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

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

Tester:		Results:	Date:	

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

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

3.14 P25 Station Reconfiguration using the Device Manager

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

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

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

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

Execution:

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

2. Access the screen to configure channel parameters.

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

4. Verify the changes take place.

5. Revert site changes, download, and verify site is operating as intended.

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

4. CONTROL POINT MOVEMENT

4.1 DCP Forced Control Point Movement

Purpose: **This test will demonstrate the DCP system can move the control point in response to user command.**

Expected Results: **This test will verify that the Control Point can be moved from the active site to an alternate Control Point Site. After the control point is switched to the alternate Control Point the system should operate normally.**

Setup: **The DCP system is operating with an active control point and at least two sites are enabled to be the control point.**

Execution:

1. Log into the RNM
2. In Network view identify the site which is the active control point.
3. Right click on the control point site icon and select 'Change Control Point to Best Site Available" .
4. Verify system is still functioning (i.e. voice calls can be made – between radios and a radio and console and optionally data calls can be made (e.g. radios can be 'pinged') .
5. Verify that the RNM indicates a different site as control point and the previous control point is now a TX site. (note – a CP only site displays "zzzz" when it is not the active control point.)
6. On the RNM right click on the previous control point site and select "Change to be the Control Point".
7. Verify system is still functioning (i.e. calls can be made – between radios and a radio and console and optionally data calls can be made (e.g. radios can be 'pinged'). .
8. Verify that the RNM indicates the control point has moved to the site selected in step 6 and the previous control point is now a TX site. (note – a CP only site displays "zzzz" when it is not the active control point.)

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

4.2 DCPControl Point Movement in response to Faults at the Active Control Point

Purpose: **This test will demonstrate that the Control Point will move in response to failures at the active Control Point.**

Expected Results: **This test will verify that the DCP system will move the active Control Point to an alternate control point site when the active control oint experiences failures. After the Control Point move the old control point should drop to bypass and the rest of the system should operate normally as a Simulcast cluster.**

Setup: **The DCP system is operating with an active control point and is properly configured with at least two sites enabled to be the control point.**

Execution:

1. Verify system is functioning (i.e. calls can be made – between radios and a radio and console and optionally data calls can be made (e.g. radios can be 'pinged').

2. At the control point site disconnect the 1pps cable from GPS B.

3. Verify the system is still functioning (i.e. calls can be made – between radios and a radio and console and optionally data calls can be made (e.g. radios can be 'pinged') and control point has not moved. The traffic controllers at the control point display 'CC xx' and 'TC xx' when idle; at a satellite site the traffic controllers display "TR xx' where xx is the channel number. (>

4. At the control point site disconnect the 1pps cable from GPS A.

5. Verify that the control point moved to next ranked site and the old control point is now in bypass. The traffic controllers at the control point display 'CC xx' and 'TC xx' when idle; Any channels that are configured to be active at the old control point site when it is in bypass will have all their status LED red. In bypass all the traffic controllers display 'CC xx' and 'TC xx' when idle and the status LED will be red.

6. Verify the RNM indicates the new control point and shows the old control point site is now in bypass.

7. Verify the simulcast system is still functioning (i.e. calls can be made – between radios and a radio and console and optionally data calls can be made (e.g. radios can be 'pinged'). .

8. If the old control point has channels active in bypass verify radios switched to this bypass site acquire the control channel and can communicate. (note – this step could be skipped; the bypass tests in sections 20.x will do this) >

9. Restore the connections to the GPS receivers at the site in bypass (the old control point site).

10. Verify that the site exits bypass and joins the simulcast cluster.

☐

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

5. P25 TRUNKED CALLS AND SITE FEATURES

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

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

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

5.1 Transmit Grant Tone

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

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

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

Execution:

1. Press PTT button on radio with valid group selected.
2. Verify grant tone is heard at radio when working channel access is granted.

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

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

5.2 Out of Range Tone on PTT

Purpose: **The test demonstrates the radios out of range tone.**

Expected Results: **When the radio losses connectivity with the control channel the radio plays a tone to make the user aware that it has lost connectivity to the Control Channel.**

Setup: **One radio with a valid ID and a valid group on selected system. System scanning should be disabled in the radio personality as necessary for specific radio type being tested.**

Execution:

1. With valid group selected, and radio initially logged into and monitoring the Control Channel on the selected system, reduce the signal strength reaching the radio by some means (ex. unscrewing and removing the portable radio antenna, or moving further from the site).

   - ☐ Verify that the radio indicates loss of Control Channel on the display when the received signal strength is sufficiently reduced (i.e. out of range of system).
   - ☐ Press PTT button on radio, and verify that an out of range tone is heard at the radio.

.

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

5.3 Transmission Trunking

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

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

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

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

Execution:

1. PTT Radio 1 and talk.
   - ☐ The transmit (TX) indicators should turn on at Radio 1.
   - ☐ Verify the number of the channel assigned.
2. PTT Radio 2 and talk.
   - ☐ The transmit (TX) indicators should turn on at Radio 2.
   - ☐ Verify the next channel is assigned.
3. PTT Radio 3 and talk.
   - ☐ The transmit (TX) indicators should turn on at Radio 3.
   - ☐ Verify the next channel is assigned.

Results (Pass/Fail) _____

Tester: _____ Date: _____

Comments: _____

_____

_____

5.4 Message Trunking

Purpose: **This test will demonstrate that the system can work as a message trunking system.**

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

Setup: **No other radios should be on the system. Each call needs to happen within 3 seconds of each other for this test to work. If there are no talk groups setup in the UAS that are Message Trunked this will need to be fixed before this test can be run.**

Radio Description	Radio Lid	Talk Group Description	Talk Group ID
Radio 1	998001	TG64001 P25	64003
Radio 2	998002	TG64001 P25	64003
Radio 3	998003	TG64001 P25	64003

Execution:

1. PTT Radio 1 and talk.
   - ☐ The transmit (TX) indicators should turn on at Radio 1.
   - ☐ Verify the number of the channel assigned.
2. PTT Radio 2 and talk.
   - ☐ The transmit (TX) indicators should turn on at Radio 2.
   - ☐ Verify the same channel is assigned in step 1.
3. PTT Radio 3 and talk.
   - ☐ The transmit (TX) indicators should turn on at Radio 3.

- ☐ Verify the same channel is assigned in step 1 and 2.

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

5.5 Group Test Call

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

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

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

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

Execution:

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

Results (Pass/Fail) _____

Tester: _____ Date: _____

Comments: _____

_____

_____

5.6 Individual (Private) Call

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

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

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

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

Execution:

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

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

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

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

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

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

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

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

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

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

6. Repeat steps 1-8 for encrypted mode.

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

5.7 System All Call

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

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

Setup:

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

Execution:

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

   - Audio should be heard at Radios 2 and 3.

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

Results (Pass/Fail) _____

Tester: _____ Date: _____

Comments: _____

_____

_____

5.8 Transmit Denied (for Invalid radio ID)

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

Execution:

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

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

5.9 Single Site Call Queue Declaration Alert

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

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

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

Execution:

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

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

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

3. Unkey (release PTT button) radio 2.

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

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

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

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

6. Unkey all radios.

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

5.10 Recent User Priority

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

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

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

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

Execution:

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

5. Unkey Radio 4

   ☐ Verify that Radio 1 un-queues and transmits.

6. Unkey all radios.

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

5.11 Call Priority for Group IDs

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

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

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

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

Execution:

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

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

5.12 Emergency Call Priority for Group IDs

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

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

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

Execution:

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

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

5.13 Group Scan

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

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

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

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

Execution:

1. Place a call from Radio 2 on talk TG64001 P25.
   - ☐ Verify the call is received and audio is heard on Radio 1.
2. Place a call from Radio 2 on talk TG64002 P25.
   - ☐ Verify the call is not received by Radio 1.
3. Enable group scan on Radio 1.
4. Place another call from Radio 2 on talk TG64002 P25.
   - ☐ Verify that the call is now received and audio is heard on Radio 1.

Results (Pass/Fail) _____

Tester: _____ Date: _____

Comments: _____

_____

_____

5.14 Priority Scan

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

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

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

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

Execution:

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

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

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

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

3. Turn off scan on all radios.

Results (Pass/Fail) _____

Tester: _____ Date: _____

Comments: _____

_____

_____

5.15 Unit to Unit Call Alert Paging

Purpose:	**To demonstrate that a radio can send a page to a different radio on the system.**
Expected Results:	**This test will verify that radio 1 can send a page to radio 2**
Setup:	**Radio 1 with Call Alert programmed into a button ("PAGE") and Radio 2's ID programmed into its Individual Call list. Radio 1 and Radio 2 on the same site.**

Execution:

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

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

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

5.16 Transmit Busy Lockout

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

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

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

.

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

Execution:

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

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

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

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

Results (Pass/Fail) _____

Tester: _____ Date: _____

Comments: _____

_____

_____

5.17 Continuous Control Channel Update

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

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

Setup:

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

Execution:

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

Results (Pass/Fail) _____

Tester: _____ Date: _____

Comments: _____

_____

_____

5.18 Convert Too Callee

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

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

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

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

Execution:

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

Results (Pass/Fail) _____

Tester: _____ Date: _____

Comments: _____

_____

_____

5.19 Site Trunking (Failsoft) Indication

Purpose: **This test will demonstrate that radio will display a symbol when the site it is logged into is not connected to the system.**

Expected Results: **This test will verify that the radio will display an 'F' when the site it is logged into is not connected to the system.**

Setup:

Radio Description	Radio Lid	Talk Group Description	Talk Group ID	Site #
Radio 1	998001	TG641001 P25	64001	1
Radio 2	998002	TG641001 P25	64001	1
Radio 3	998003	TG641001 P25	64001	2

Execution:

1. PTT Radio 1
   - Verify that the Radio 1, Radio 2, and Radio 3 can communicate on the system.

2. Disconnect the network connection from the Network Switching Center to the Site Router, causing loss of communication from the site back to the Network Switching Center.
   - Verify that Radio 1 and Radio 2 indicate a Failsoft alarm ("F") on their displays this may take several minutes.

3. PTT Radio 1 on Talkgroup A. Verify audio is heard at Radio 2. Verify audio is not heard on Radio 3.

4. Re-connect the network from the Network Switching Center to the Site Router.
   - Verify the Failsoft alarm disappears on the radios and that communications with Radio 3 is restablished.

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

6. SYMPHONY DISPATCH FEATURE SET

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

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

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

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

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

Execution:

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
- ☐ 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
- ☐ Release the mouse button to end the call.

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

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

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

6.2.1 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 a 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 a incoming call on module TG64002

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

6.2.2 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 a 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:			

6.3 Emergency Call and Emergency Alarm

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

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

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

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

Execution:

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

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

6. Clear the emergency by selecting the ‘Clear X’ button

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

7. Transmit on the radio

8. Verify the emergency is cleared and normal group calls have resumed.

9. Select 64001TG group selected on the console, declare an emergency on the test group by pressing the ‘Emer Declare’.

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

10. Acknowledge by hitting ‘Ack’ in step 4

11. Clear the emergency with the console.

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

6.4 System Wide Call (All Call & Announcements)

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

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

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

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

Execution:

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

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

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

6. Release the Instant TX key.

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

6.5 Alert Tones

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

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

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

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

Execution:

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

- ☐ Verify the call on Radio 1 drops

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

6.6 Console Pre-Empt

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

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

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

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

Execution:

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

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

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

3. Un-key the first Radio.

   - ☐ Verify that the pre-empted caller LID and CALL indicators are removed and the pre-empted radio audio is no longer heard on the pre-empting console.

4. Un-key the console.

Results (Pass/Fail) _____

Tester: _____ Date: _____

Comments: _____

_____

_____

6.7 Simulselect

Purpose: **Confirms operation of the console Simulselect feature, which allows multiple talk groups to be selected for communication simultaneously.**

Expected Results: **The console can select multiple talk groups and communication is allowed.**

Setup **Console 1 programmed with talk groups TG64051 P25, TG64052 P25, TG64053 P25, and TG64054 P25.**

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

Execution:

1. Create simulselect group on the 4 test group modules
2. Place a call from the console on the simulselect group
   - ☐ Verify that the call is heard all four radios
3. Place a call from each radio
   - ☐ Verify that only the console hears the calls
   - ☐ Verify only the radios on similar talk groups here the call
4. Deactivate the simulselect group.

Results (Pass/Fail) _____

Tester: _____ Date: _____

Comments: _____

_____

_____

6.8 Patch

Purpose: **Confirms the console patch feature creates shared communication between multiple selected talk groups.**

Expected Results: **The patched talk groups can communicate.**

Setup **Console 1 programmed with talk groups TG64051 P25, TG64052 P25, TG64053 P25, and TG64054 P25.**

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

Execution:

1. Create patch on PATCH 1 with all four groups above.
2. Place a call from the newly created patch
   - ☐ Verify that the call is heard on all the radios
3. Place a call from each radio
   - ☐ Verify that the call is heard on the console and each radio.
4. Deactivate the patch.

Results (Pass/Fail) _____

Tester: _____ Date: _____

Comments: _____

_____

_____

6.9 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: _____	
_____	
_____	

6.10 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:			

7. BEON FEATURES

Purpose: **These will test the BeOn features.**

Expected Results: **This test will demonstrate that BeOn works as designed.**

Setup: **This test will show that the BeOn system allows a smartphone to communicate with the radio system.**

7.1 Transmit Grant Tone

Purpose: **This test will demonstrate the grant tone on BeOn.**

Expected Results: **When the smartphone PTTs on the BeOn app it will play a grant tone.**

Setup: **Grant tone (Ready to Talk tone) enabled in smartphone radio personality.**

Radio Description	Radio Lid	Talk Group Description	Talk Group ID
BeOn_202	998202	TG64151 P25	64151
BeOn_203	998203	TG64151 P25	64151
BeOn_204	998204	TG64151 P25	64151

Execution:

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

   ☐ Verify grant tone is heard at smartphone when working channel access is granted.

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

Results (Pass/Fail) _____

Tester: _____ Date: _____

Comments: _____

_____

_____

7.2 Group Call

Purpose: **The Group Test Call will show that the smartphone can communicate using a group call**

Expected Results: **Selected talk-group call audio is heard.**

Setup: **Set smart-phones 1, 2, & 3 to (Group A) per test group structure. Make sure Scan is turned OFF.**

Radio Description	Radio Lid	Talk Group Description	Talk Group ID
BeOn_202	998202	TG64151 P25	64151
BeOn_203	998203	TG64151 P25	64151
BeOn_204	998204	TG64151 P25	64151

Execution:

1. PTT on BeOn_202 and talk.
   - ☐ The transmit (TX) indicators should turn on at BeOn_202.
   - ☐ Audio should be heard in BeOn_203, and BeOn_204 .
   - ☐ The ID of BeOn_202 should be seen at BeOn_203, and BeOn_204.
2. Set BeOn_204 to TG64152 P25. PTT on BeOn_202 and talk.
   - ☐ The transmit (TX) indicators should turn on at BeOn_202.
   - ☐ Audio should be heard in BeOn_203 only.
   - ☐ The ID of BeOn_202 should be seen at BeOn_203 only.

Results (Pass/Fail) _____

Tester: _____ Date: _____

Comments: _____

_____

_____

7.3 Individual (Private) Call

Purpose: **Confirms individual calls can be initiated using BeOn enabled smartphones.**

Expected Results: **Individual calls are confirmed.**

Setup:

Radio Description	Radio Lid	Talk Group Description	Talk Group ID
BeOn_202	998202	TG64151 P25	64151
BeOn_203	998203	TG64151 P25	64151
BeOn_204	998204	TG64151 P25	64151

Execution:

1. Using the BeOn_202, select the pre-stored ID of BeOn_203 or enter the BeOn_203 ID directly from the keypad, and PTT smartphone 1.

   - ☐ Verify that BeOn_203 receives the call and displays the ID of smartphone 1.
   - ☐ Verify that BeOn_204 remains idle.

2. Release the PTT on BeOn_202 and immediately PTT on BeOn_203.

   - ☐ Verify that BeOn_202 receives the call and displays the ID of BeOn_203.
   - ☐ Verify BeOn_204 remains idle.

Results (Pass/Fail) _____

Tester: _____ Date: _____

Comments: _____

_____

_____

7.4 Group Scan

Purpose: **Confirms the scan function which allows a smartphone to hear audio on selected talk-groups other than the current talk-group.**

Expected Results: **Selected talk-group call audio is heard.**

Setup: **BeOn_202 set up with TG64151 P25 and TG64152 P25 in the scan list, TG64151 P25 selected, and group scan initially disabled.**

Radio Description	Radio Lid	Talk Group Description	Talk Group ID
BeOn_202	998202	TG64151 P25	64151
BeOn_203	998203	TG64151 P25	64151
BeOn_204	998204	TG64151 P25	64151

Execution:

1. Place a call from BeOn_203 on TG64151 P25.

   ☐ Verify the call is received and audio is heard on BeOn_202.

2. Place a call from BeOn_203 on TG64152 P25.

   ☐ Verify the call is not received by BeOn_202.

3. Enable group scan on BeOn_202.

4. Place another call from BeOn_203 on TG64152 P25.

   ☐ Verify that the call is now received and audio is heard on BeOn_202.

Results (Pass/Fail) _____

Tester: _____ Date: _____

Comments: _____

_____

_____

7.5 Emergency Group Call

Purpose: **Confirms an emergency can be declared, recognized and cleared by a smartphone.**

Expected Results: **The emergency is declared, recognized and cleared.**

Setup:

Radio Description	Radio Lid	Talk Group Description	Talk Group ID
BeOn_202	998202	TG64151 P25	64151
BeOn_203	998203	TG64152 P25	64152
BeOn_204	998204	TG64153 P25	64153

Execution:

1. Press the Emergency call button on BeOn_204 and then PTT BeOn_204.

   - ☐ Verify that BeOn_204 indicates the “TX EMER” declaration and that it reverts to the home group.

   - ☐ Verify that BeOn_202 and BeOn_203 indicate a “RX EMER” and hear audio on the emergency home group.

2. Clear the emergency with the Supervisor smartphone (BeOn_202).

   - ☐ Verify the emergency clears in the smartphones.

Results (Pass/Fail) _____

Tester: _____ Date: _____

Comments: _____

_____

_____

8. P25 SIMULCAST BYPASS OPERATION

Program the MASTR V modules (both Control Points and Transmit Sites) to the Final Configuration. Refer to the installation manual for the guide to setting TX Traffic Controllers / CP Traffic Controllers personality parameters.

Verify the BYPASS plan has been reviewed and approved by customer representative. This procedure makes assumptions on bypass sites before implementation and test of the System. After WMS/Panther signal strength data collection, final decision will be made on the actual bypass "ON" and "OFF" sites.

Prepare a minimum of two terminal radios programmed to operate on the active BYPASS site and the main simulcast system.

8.1 Site OFF - Final Configuration

Purpose: **Confirm sites configured to be in the "OFF" condition during BYPASS are in the expected BYPASS mode.**

Expected Results: **The "OFF" site traffic controllers have no control channel.**

Setup: **Sites intended to be "OFF" in event of BYPASS must have all channels set to disabled (unchecked in Device Manager, TC personality).**

Execution:

1. At one of the sites designated as an "off" site, create a condition to force BYPASS by disconnecting the router to MPLS connection. All other sites will have the HPAs disabled locally.

   - ☐ Verify transmit site is in BYPASS mode.
   - ☐ The Traffic Controller module display indicates "TC" instead of "TR". Note: TC= Working Traffic Channel, standalone mode, TR=Working Channel, simulcast mode, and Control Channel, simulcast mode is indicated by the transmit LED indicator.

2. Observe the repeater (station) Traffic Controller modules.

   - ☐ Verify there is no active control channel.
   - ☐ Verify no stations are keyed or producing RF power.

3. Restore the site to normal by returning the site to simulcast mode by reconnecting the router to MPLS connection.

   - Verify transmit site is in normal simulcast mode. The Traffic Controller modules will indicate “TR(n)” , where n is the channel number.

4. Repeat steps 1-3 for the remaining “OFF” bypass sites in the simulcast system under test.

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

8.2 Site ON (trunking) - Final Configuration

Purpose: **Confirm sites configured to be in the "ON" condition during BYPASS are in the expected BYPASS mode.**

Expected Results: **The "ON" site traffic controllers have a control channel and calls to terminal radios can be initiated.**

Setup:

Execution:

1. Create a condition to force BYPASS by disconnecting the router to MPLS connection.
   - ☐ Verify transmit site is in BYPASS mode. BYPS LED on Baseband module and the Traffic Controller module display indicates either "TC" or "CC" instead of "TR.
   - ☐ Observe the stations/repeater Traffic Controller modules. Verify there is an active control channel on one of the Traffic Controller modules. The remaining repeater/stations Traffic Controller modules will indicate "TC".
   - ☐ Verify the station appearing as control channel is keyed, producing RF power and modulated with control channel data.
   - ☐ Verify a terminal radio set to the system programmed for the site in BYPASS with the correct site ID recognizes the site's control channel data.

2. Key the terminal radio on a group call.
   - ☐ Verify a working channel assignment is made within the channel group allowed in the personality.
   - ☐ Verify the call is heard on a second terminal radio set to the active BYPASS system.

3. Restore the site to simulcast mode by reconnecting the router to MPLS connection.
   - ☐ Verify transmit site is in normal simulcast mode. Traffic Controller modules indicate "TR(n).

4. Repeat steps 1-3 for the remaining "ON" bypass sites in the simulcast system under test.

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

8.3 Control Point Trunking Reset Control

Purpose: **A properly set up Simulcast BYPASS system will disable CP Traffic Controller modules associated with active channels at a TX site operating in BYPASS. This keeps the remaining sites operating in Simulcast mode from being assigned to channels expected to be active at the site in BYPASS. Sites programmed to be OFF in BYPASS will not require any Traffic Controller modules to be held OFF.**

Expected Results: **This test will verify that the Control Point Traffic Controller modules will be held OFF corresponding to the active channels at a site as a result of the TX site being in BYPASS.**

Setup:

Execution:

1. Force a TX site that will become active into BYPASS by disconnecting the router to MPLS connection.
   - ☐ Verify TX site is in BYPASS mode.
   - ☐ Verify transmit site is in BYPASS mode. Traffic Controller module display indicates either "TC" or "CC" instead of "TR".
   - ☐ Verify the CP Traffic Controller modules on the channels intended to be OFF are held OFF.

2. Observe the RNM screen for the simulcast system.
   - ☐ Verify the channels intended to be OFF at the Control Point are reported as OFF (RED).

3. Restore the site to simulcast mode by reconnecting the router to MPLS connection.
   - ☐ Verify the TX site Traffic Controller modules revert to normal Simulcast.
   - ☐ Verify the CP Traffic Controller modules associated with the site in BYPASS are returned to normal.

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

8.4 Bypass – Site Minimum Channels

Purpose:	**Confirm a site enters bypass when active channels fall below site minimum channels setting.**
Expected Results:	**The site enters bypass mode.**
Setup:	**Sites are configured with cluster minimum channels set to 6 and site minimum channels to 7.** **Bypass Plan: TR Site 1 Ch 3,4,5; TR Site 2 Ch 6,7,8; TR site 3 Ch 9,10,11 TR Sites 4 and 5 dark**
Note	**Settings and bypass plan can be customer final settings; execution will have to adjust to accommodate those settings.**

Execution:

1. At TR site 1 disable channels 8 - 11 using the TX disable switch on the PA (only channels 1-7 are still functioning).
   - ☐ Verify system and site still functioning in simulcast; the disabled channels 8-11 are in alarm state at the control point site.
   - ☐ At TR site 1 the Traffic Controller modules displays still indicates “TR” not “TC” or “CC”. Note: TC= Working Traffic Channel, standalone mode, TR=Working Channel, simulcast mode, and Control Channel, simulcast mode is indicated by the transmit LED indicator.

2. At the same site disable channel 7 using the TX disable switch on the PA.
   - ☐ Verify system is still functioning in simulcast. Control Point ch 3,4 and 5 in alarm state.
   - ☐ Verify TR site 1 is in bypass. The Traffic Controller module display indicates “TC” instead of “TR”. All channels status indicates alarm. Note: TC= Working Traffic Channel, standalone mode, TR=Working Channel, simulcast mode, and Control Channel, simulcast mode is indicated by the transmit LED indicator always on.

3. At the same site restore all channels back to service (enable the PA using the TX disable switch on the PA).
   - ☐ Verify transmit site 1 is in normal simulcast mode. The Traffic Controller modules will indicate “TR(n)” , where n is the channel number.
   - ☐ Verify all channels are in service at the control point.

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

9. High Availability Failover Tests

9.1 Primary VNIC Failover

Purpose To verify VNIC will automatically failover.

Expected Results Secondary VNIC becomes active automatically when primary VNIC goes down.

Setup

Locate the primary NSS1 server. From the root user login screen, initaite a VNIC failover by issuing the HArestart command on the primary VNIC.

Execution

1. Note that Primary VNIC (NSS1) goes down.
2. Verify that Secondary VNIC (NSS2) becomes Primary.
3. Verify call functionality by making group and individual radio calls.
4. Verify that NSS1 VNIC comes back into operation as the standby VNIC.

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

9.2 Secondary VNIC Failover

Purpose To verify VNIC will automatically failover.

Expected Results Primary VNIC becomes active automatically when Secondary VNIC goes down.

Setup

Locate the primary NSS2 server. From the root user login screen, initaite a VNIC failover by issuing the HArestart command on the Secondary VNIC.

Execution

1. Note that Primary VNIC (NSS2) goes down.
2. Verify that Secondary VNIC (NSS1) becomes Primary.
3. Verify call functionality by making group and individual radio calls.
4. Verify that NSS21 VNIC comes back into operation as the standby VNIC.

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

10. Wide Area Router Failure

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

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

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

1. Use Radio 1 to initiate a call

- Verify that the call is heard on the Radio 2. Keep the call active during fail-over.

2. Use Radio 3 to initiate a call

   - Verify that the call is heard on Radio 4. Keep the call active during fail-over.

3. Log in to s0u1nss and s0u2nss, and change your user to the root user by typing ‘su –‘ and entering the password.

4. Type ‘HArunning’ into both NSSs, one will report that it is the ‘Stand By’ and one will report that it is the ‘Primary’ log the information in the chart below.

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

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

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

   - The call from radio 1 to 2 will continue and the console will lose connectivity to the VNIC.

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

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

11. Conventional System Test

11.1 Functional Test

Setup

This test verifies that the conventional equipment can communicate to radios. The test requires two Mobile (or portable) radios programmed with the test frequencies.

Execution

1. Select two physical locations that provide full capture of the site.
2. From the first test radio, select and pick channel 1, PTT the radio and speak into the radio.
3. Verify that the second test radio receives the audio from the first radio.
4. PTT the second radio and verify the audio is received at the first radio.
5. Repeat steps 1-4 for remaining channels.

Results

Record the results on the following data sheet.

Conventional Functional Test

Test Evaluator:	Test Observer:
Organization:	Organization:
Receiver Location:	Test Radio 1:
Transmitter Location:	Test Radio 2:

Originating Radio	Channel	Pass/Fail	Remarks
1	1		
2	1		
1	2		
2	2		
1	3		
2	3		
1	4		
2	4		
1	5		
2	5		
1	6		
2	6		
1	7		
2	7		
1	8		
2	8		
1	9		

2	9		
1	10		
2	10		

Results (Pass/Fail) _____

Tester: _____ Date: _____

Comments: _____

_____

_____

12.iRIM Testing

Setup

This setup applies to the test contained in this section. Two radios are required, programmed as follows:

(Utilize test or customer database groups A,B,C & D as specified)

Radio 1: P25 Radio with iRIM groups assigned in the personality.

Radio 2: Conventional Group assigned to each iRIM. iRIM 1-12

12.1 iRIM Call (Portable to Portable)

Setup

Set radio 1 to (iRIM Talk Group, iRIM 1) per test group structure
Set radio 2 to (iRIM Talk Group, iRIM 1) per test group structure

Group Call

Execution

1. PTT radio 1 and talk. The transmit (TX) indicator should turn on at radio 1
2. Audio should be heard in radio 2
3. Verify that the iRIM mobile indicates that it is passing radio traffic
4. Verify that the Zetron iRIM interface shows that a call is being recevied and sent to the correct radio (Mobile Radio 1)
5. Verify that the Interop gateway channel 1 illuminates and shows that a call is being processed
6. PTT radio 2 and talk. The transmit (TX) indicator should turn on at radio 2
7. Audio should be heard in radio 1
8. Verify that the iRIM mobile indicates that it is passing radio traffic
9. Verify that the Zetron iRIM interface shows that a call is being recevied and sent to the correct radio (Mobile Radio 1)
10. Verify that the Interop gateway channel 1 illuminates and shows that a call is being processed

11. Repeat this test for the remaining 11 radios

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

iRIM Call (Portable to Console)

Setup

Set radio 1 to (iRIM Talk Group, iRIM 1) per test group structure
Set Symphony Console to (iRIM Talk Group, iRIM 1 module) per test group structure.

Execution

1. PTT radio 1 and talk. The transmit (TX) indicator should turn on at radio 1
2. Audio should be heard in the console
3. Verify that the iRIM mobile indicates that it is passing radio traffic
4. Verify that the Zetron iRIM interface shows that a call is being recevied and sent to the correct radio (Mobile Radio 1)
5. Verify that the Interop gateway channel 1 illuminates and shows that a call is being processed
6. PTT the Symphony Console and talk.
7. Audio should be heard in radio 1
8. Verify that the iRIM mobile indicates that it is passing radio traffic
9. Verify that the Zetron iRIM interface shows that a call is being recevied and sent to the correct radio (Mobile Radio 1)
10. Verify that the Interop gateway channel 1 illuminates and shows that a call is being processed
11. Repeat this test for the remaining 11 radios

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

13 – Console TESTING

DaneCom - Symphony Console
Visual and Functional Acceptance Test Process and Sign-off

Radio Console Position: _____

Date: _____

Functional Acceptance Testing **Pass/Fail:**

Talkgroup that is used for testing: _____

Symphony Touch Screen control: _____

Symphony Mouse control _____

TX and RX a call on the MCC 7500 – Left/Right Headset jack/footswitch: _

TX and RX a call on the Symphony – Left/Right HSJ/footswitch: _____

Select Speaker 1 audio (Symphony): _____

Unselect Speaker 2 audio(Symphony): _____

Light Bar: TX/RX/Phone (Symphony): _____

Back-up Radio: TX/RX (Symphony): _____

Call Director /Telephone Integration: _____

Audio Recall (Symphony): _____

Select Speaker 1 audio (Moto): _____

Unselect Speaker 2 audio (Moto): _____

Call Director /Telephone Integration: _____

_____

_____ _____

DaneCom Signature: Harris Signature

Punch list or Comments:

_____

DaneCom Console Functional Acceptance Test Process

Symphony Touch Screen Control

Purpose

To show that the Symphony console will respond to the touch of a dispatcher's finger.

Expected Results

The Symphony console will respond to the touch of a dispatcher's finger.

Execution

With the mouse focus on the Symphony portion of the console, using your finger and the touchscreen your can control the mouse.

Verify that you will be able to create an instant transmit from a long held finger pressure. Verify that you can move through the menus with your finger selecting the function buttons.

Receiving Calls

Purpose

To demonstrate Symphony and MCC 7500 ability to receive calls.

Expected Results

The Symphony and MCC 7500 can receive calls, through select and unselected speakers and through headsets

Execution

- **Plug in a headset into the left headset jack**

Symphony:
Select a talk group.
Have a field unit radio transmit on that talk group, verifying that it can be heard in the headset.

MCC 7500:
Select a talk group.
Have a field unit radio transmit on that talk group, verifying that it can be heard in the headset.

- **Unplug the headset from the integrated jack**

Symphony:
Select a talk group. – Selected Speaker

Have a field unit radio transmit on that talk group, verifying that it can be heard in the Select Speaker.

Unselect the talk group – Un-Selected Speaker
Have a field unit radio transmit on that talk group, verifying that it can be heard in the Un-Select Speaker.

MCC 7500:
Select a talk group. – Selected Speaker
Have a field unit radio transmit on that talk group, verifying that it can be heard in the Select Speaker.

Unselect the talk group – Un-Selected Speaker
Have a field unit radio transmit on that talk group, verifying that it can be heard in the Un-Select Speaker.

- **Plug in a headset into the right headset**

Symphony:
Select a talk group.
Have a field unit radio transmit on that talk group, verifying that it can be heard in the headset.

MCC 7500:
Select a talk group.
Have a field unit radio transmit on that talk group, verifying that it can be heard in the headset.

Transmitting Calls

Purpose

To demonstrate Symphony and MCC consoles ability to transmit calls.

Expected Results

The Symphony and MCC 7500 can transmit calls while connected to either headset jack. The Symphony utilizes the right footswitch, Select Transmit or Instant Transmit. The MCC 7500 utilizes the left footswitch, Select Transmit or Instant Transmit

Execution

- **Plug in a headset into the left headset jack**

Symphony:
Select a talk group.
Transmit on the talk group through:
Footswitch
Select Transmit
Instant Transmit

MCC 7500:
Transmit on the talk group through:
Footswitch

Select Transmit
Instant Transmit

- **Plug in a headset into the right headset jack**

Symphony:
Select a talk group.
Transmit on the talk group through:
Footswitch
Select Transmit
Instant Transmit

MCC 7500:
Transmit on the talk group through:
Footswitch
Select Transmit
Instant Transmit

Light Bar Interaction

Purpose

To demonstrate use of the light bar.

Expected Results

The Symphony console is configured to close a contact on a light bar indicating when the console is in:

- Transmit State
- Receive State on Selected Talk Group
- Telephone call.

Execution

- **Select a Talk Group on the Symphony Console and perform the following actions:**

Transmit on a talk group on the console – the yellow light is flashing
Receive a call on the Selected talk group- the yellow light is flashing
Off-hook telephone indicator and the green light is illuminated

"Easy Button" – Back up Radio

Purpose

To demonstrate the Easy Button for the Backup Radio.

Expected Results

In the event that the Symphony console goes down, there is an RF based radio integrated into the console position.
The dispatcher will be able to transmit and receive over the backup radio. Both headset jacks will work identically.

Execution

- **Turn on the back up radio integrated into the console furniture:**

Select the talkgroup on the radio that you want to communicate on.
Press the “easy button” connected to the radio – the light will turn RED.
Transmit using the Symphony footswitch.
The receive audio will be received in the dispatcher’s headset.
The transmit audio will be sent over the radio via the headset.

Call Director/Telephone Interface

Purpose

To demonstrate Call Director/Telephone Interface without the Multiviewer.

Expected Results

The Symphony console will be integrated into the telephone system to operate dispatching radio console calls, in addition to be able to receive and place telephone calls.

Execution

- **Insert a headset into the left headset jack and place a telephone call.**

The selected talk group on the console will be re-directed to the Select Speaker.
If the dispatcher transmits on the selected talk group, the dispatcher’s audio does not go out the phone line, and only the dispatcher’s audio goes over the selected channel.

- **Insert a headset into the right headset jack and receive a telephone call.**

The selected talk group on the console will be re-directed to the Selected Speaker.
If the dispatcher transmits on the selected talk group, the dispatcher’s audio does not go out the phone line, and only the dispatcher’s audio goes over the selected channel.
check to see that the caller’s audio stays in the headset

Testing the Audio Recall:

The Symphony consoles record the Selected Audio, as well as available Un-Selected Audio from the radio channels/talkgroups. This audio can be retrieved and replayed by the operator.

Execution

Click on the “Select History” box and the Instant Audio Recall box will open up. Select the record to be replayed, and press the “Play” button.
The playback audio will come through the headset.
Click on the “Un-Select History” box and the Instant Audio Recall box will open up. Select the record to be replayed, and press the “Play” button.
The playback audio will come through the headset.

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

Attachment 7E-2

Coverage Acceptance Test Procedures for P25 Trunked System for County of Dane, WI

TABLE OF CONTENTS

REVISION HISTORY

Rev #	Date	Author	Description of Changes
1	2/22/2015	P. Crowe	Modified from previous version: added tests for 16 dB boundaries.
2	2/28/2015	P. Crowe	Defined 16 dB boundaries
3	3/2/2015	P. Crowe	Corrected Document number and title
4	7/16/2015	P. Crowe	Updated based on CDR 2 feedback.
5	8/25/2015	P. Crowe	Added description of separate 6 dB and 16 dB attenuation used for DAQ tests.
6	8/27/2015	P. Crowe	Added description of separate 6 dB and 16 dB attenuation used for BER tests.
7	1/18/2016	P. Crowe	Separated 6 and 16 dB DAQ test results.
8	5/12/2016	M. Lochner	Filename, header, footer update, content update

ABOUT THIS DOCUMENT

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

Customer: County of Dane, WI
Prepared By: Harris

DOCUMENT USAGE

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

- Transmit Frequency and Deviation
- Output and Reflected Power
- Receiver Sensitivity
- Receiver Multicoupler Gain (if applicable)
- Receiver Preamplifier Gain (if applicable)
- Time Domain Reflectometry of Transmission Line
- Combiner Loss (if applicable)
- Audio line out
- Audio line in

System parameters and measurements will be provided to County of Dane, WI as part of the final documentation package.

NOTES

This is the ATP that applies to the P25 VHF Simulcast system.

Definition of "Geographic Area of Concern"

- Dane County proper
- In Columbia County - Town of Leeds: S 1/2 21-23, 24-29, 31-36
- In Columbia County - Town of Hampden: 29-33
- In Jefferson County - Town of Lake Mills: 19, W 1/2 20, SW 1/4 28, NW 1/4 29, S 1/2 39, 30-33
- In Jefferson County - Town of Oakland: 1-10, 15-22, 27-34
- In Rock County - Town of Union: 4-7, N 1/2 8
- In Green County - Town of Brooklyn: 1-18, 20-24, N 1/2 25-27
- In Green County - Town of Exeter: 1-29, 33-36

The 16 dB Boundaries are defined as three rectangles:

- DeForest / Windsor area
  - 43dN 17' 19" 89dW 19' 18"
  - 43dN 11' 35" 89dW 17' 02"
  - 43dN 10' 35" 89dW 21' 16"
  - 43dN 16' 25" 89dW 23' 40"
- Deerfield Area
  - 43dN 04' 53" 89dW 01' 43"
  - 42dN 58' 12" 88dW 58' 44"
  - 42dN 56' 59" 89dW 03' 34"
  - 43dN 03' 37" 89dW 06' 47"
- Stoughton Area
  - 42dN 57' 07" 89dW 10' 14"
  - 42dN 53' 33" 89dW 10' 15"
  - 42dN 53' 34" 89dW 15' 31"
  - 42dN 57' 08" 89dW 15' 30"

Coverage testing to be performed during full foliage conditions from May 1st to September 30th unless mutually agreed by Provider and County.

1. PORTABLE ON-STREET VOICE QUALITY TEST

This Acceptance Test Procedure (ATP) is used by Harris for RF coverage verification based on the evaluation of Digital voice quality.

This ATP is in conformance with the Telecommunications Industry Association (TIA) Telecommunications Systems Bulletin TSB-88-C, titled "Wireless Communications Systems - Performance in Noise and Interference-Limited Situations - Recommended Methods for Technology-Independent Modeling, Simulation, and Verification". TSB-88-C has defined Channel Performance Criterion (CPC) as the specified minimum design performance level in a faded channel, and provides a set of Delivered Audio Quality (DAQ) CPCs that define subjective voice quality performance applicable to both analog voice and digital voice systems. These DAQ definitions are provided in Table 1.

Table 1 - Delivered Audio Quality Scale Definitions

Delivered Audio Quality	Subjective Performance Description
DAQ 5.0	Speech easily understood.
DAQ 4.5	Speech easily understood. Infrequent Noise/Distortion.
DAQ 4.0	Speech easily understood. Occasional Noise/Distortion.
DAQ 3.4	Speech understandable with repetition only rarely required. Some Noise/Distortion.
DAQ 3.0	Speech understandable with slight effort. Occasional repetition required due to Noise/Distortion.
DAQ 2.0	Understandable with considerable effort. Frequent repetition due to Noise/Distortion.
DAQ 1.0	Unusable, speech present but unreadable.

TSB-88-C also defines a service area as a boundary of the geographic area of concern for a user, and states that Validated CPC Service Area Reliability shall be determined by the percentage of test locations in the bounded service area that meet or exceed the specified CPC.

RF coverage using this ATP is verified by evaluating the voice quality of Digital voice test calls to/from a portable radio at specific test locations throughout Dane County's defined bounded service area. At each test location, a test call is placed from the portable user to the dispatcher (an inbound call), as well as from the dispatcher to the portable user (an outbound call). The inbound and outbound test call at each location is graded using the DAQ definitions in Table 1. Scores that equal or exceed Dane County's specified CPC of DAQ 3.4 are considered acceptable (PASS), and those lower than DAQ 3.4 are not acceptable (FAIL).

1.1 Test Equipment and Preparation

Harris XG-25 or XG-75 radios will be used for the voice quality test.The portable radios will be worn on the belt and equipped with a shoulder-mounted speaker/microphone. For portable indoor coverage verification, the variable attenuator will be set to 6 dB loss or 16 dB loss for the building category being evaluated.

County talkgroup 13806 will be used for testing.

Prior to performing the tests, each County site must be audited to verify that the radio system is operating properly. The audits will verify the antenna configuration, the power into the antenna, the antenna installation, and the frequency of the test transmitter. Harris shall provide all test equipment necessary to perform the County site audits.

County site audit results will be provided to the County before testing begins.

1.2 Test Planning

TSB-88-C recommends coverage verification at a statistically significant number of random test locations, uniformly distributed throughout the service area. To accomplish this, the service area is divided by a grid pattern as an aid to test planning.

Harris will use a 1-mile by 1-mile grid pattern to obtain an even or uniform distribution of test locations throughout the Geographic Area of Concern. Harris will use a 0.25-mile by 0.25-mile grid pattern to obtain an even or uniform distribution of test locations throughout the 16 dB coverage areas. The grid pattern is overlaid onto street maps and a drive test route determined that will pass through all accessible grids (i.e. have roads) that have their center point within Dane County's defined service area boundary.

The following grid patterns will be used, and will be shifted to best align grid centers to roads. The grid will be provided to the County at least five days before testing begins.

System	Service Boundary	Grid Size	Number of Grids
VHF P25 Simulcast	Geographic Area of Concern	1 mile by 1 mile	1350
VHF P25 Simulcast	16 dB Bounded Areas	0.25 mile by 0.25 mile	1280

All accessible grids will be tested. The voice quality test is conducted at a randomly selected location within each grid, typically as close to the center of the grid as possible. To the extent possible, test locations in adjacent grids should not be clustered closer to one another than 100λ[1]. All test calls will be made with the portable operator at street level outside any vehicle or other enclosure such as buildings, tunnels, underpasses, underground garages, or other man made obstructive areas where radio coverage is not planned or expected. Separate tests will be performed within the 16 dB bounded areas using 6 dB attenuation for testing the GAOC and 16 dB attenuation for testing the 16 dB bounded area.

Any grids that Dane County decides not to test will have coverage scored as a PASS in the reliability calculations.

Inaccessible grids (i.e. have no roads) will be discarded from the reliability calculations with the % acceptance criteria adjusted by treating the inaccessible grids as exclusion zones. All test members will be briefed on the test methods prior to starting each test, including how to distinguish the DAQ level.

[1] Approximately 650-ft at VHF.

1.3 Grading of Test Locations

The Digital voice quality test requires two representatives from each entity (Harris and Dane County). One representative from Harris and one from Dane County will be the Field team, which will travel the drive route, perform the inbound calls, and grade the outbound calls. The second group of representatives will be the Base team, which will remain at the dispatch location, grade the inbound calls, and perform the outbound calls.

To reduce the time required for this coverage test, a single Base team can support multiple Field teams, and multiple Field and Base teams may be used.

At each agreed upon test location, with the Field team representatives outside of the vehicle, the portable to dispatch (inbound) and the dispatch to portable (outbound) test calls are performed. Per TSB-88-C, if the message is not understood on the first attempt the portable user is allowed to move 3-feet in any direction and the test can be repeated one time.

The Digital voice test calls consist of a short message representative of typical public safety call duration and include the identification of the location being tested. The suggested inbound test message is "TEAM XXX TESTING GRID NUMBER XXX, on XXX, near XXX," followed by a Harvard sentence. To ensure that the message is understood, the dispatcher then repeats the inbound test message. The dispatcher will then make a similar outbound test call. The suggested outbound test message is "CONFIRMING GRID XXX", followed by a Harvard sentence. The field team will then repeat the dispatcher's test message.

Each of the four representatives grades the test call using the Table 1 DAQ definitions and records the test score for each test location using the template in Table 3. PASS or FAIL determination is made separately for the inbound and outbound calls at each location. For each call direction, a test location is deemed to PASS if it meets or exceeds Dane County's requirement for DAQ 3.4 voice quality from both graders. If both graders agree that the voice quality does not meet the defined DAQ 3.4 criteria, then that test location fails for the direction being graded. If a score differs between testers at a location that results in a failing score from only one tester, that location will need to be tested again to determine the cause of the discrepancy. If the discrepancy cannot be rectified, then that grid will be set aside for discussion and evaluation.

1.4 Test Analysis and Acceptance

The data logged by the four representatives on the grading template is then analyzed to determine whether the individual test grid meets the DAQ 3.4 definition.

An individual test grid is determined to PASS if both the inbound and outbound calls in that grid have been scored as a PASS.

The Digital voice quality test is deemed to meet the coverage requirements if, for each bounded service area in Table 2, the percentage of test grids that receive a PASS score equals or exceeds Dane County's minimum % Validated CPC Service Area Reliability acceptance criteria that is shown.

Table 2 - Coverage Service Area and Acceptance Criteria

Portable Service Area Definition	Description	% Validated CPC Service Area Reliability Acceptance Criteria
Geographic Area of Concern (6dB)	Digital	95%
16 dB Bounded Areas	Digital	95%

1.5 Results Presentation

A test report is provided that includes:

- the number of test grids
- the location tested within each grid, with each coordinate in its own column
- an Excel copy of the Table 3 inbound or outbound grading template used by each grader
- the PASS/FAIL score for each test grid/location for each call direction
- the % PASS calculation for the service area
- a statement of overall test acceptance or failure of coverage.
- a record of whether a test message was considered passed only after the field team moved three feet as allowed by TSB-88
- details regarding the dates and times of the tests and breifings, names and organizations of the testers

Results (Pass/Fail) _____

Tester: _____ Date: _____

Comments: _____

_____

_____

Table 3: Voice Quality Test Grading Template

Coverage Test Data for: County of Dane, WI Date: ________

Requirement: DAQ 3.4

Check the link used: ☐ Analog Voice ☐ Digital Voice ☐ Base to Portable (outbound) ☐ Portable or Mobile to Base (inbound)

Harris Evaluator:	Dane County Evaluator:
Organization:	Organization:
Transmitter Location:	Test Radio:
Receiver Location:	Test Frequency:

Grid / Location Number	Harris Grade	Dane County Grade	Remarks	PASS / FAIL Score	3 Ft Move Req

(One row for each test location)

2. BIT ERROR RATE (BER) TEST

This Acceptance Test Procedure (ATP) is used by Harris for RF coverage verification based on Bit Error Rate (BER) measurements. This procedure provides an accurate, statistically valid, repeatable, objective, and cost-effective method to verify all County of Dane, WI coverage requirements are met.

This ATP is in conformance with the Telecommunications Industry Association (TIA) Telecommunications Systems Bulletin TSB-88-C titled "Wireless Communications Systems - Performance in Noise and Interference-Limited Situations - Recommended Methods for Technology-Independent Modeling, Simulation, and Verification". TSB-88-C has defined Channel Performance Criterion (CPC) as the specified minimum design performance level in a faded channel, and provides a set of Delivered Audio Quality (DAQ) CPCs that define subjective voice quality performance applicable to both analog voice and digital voice systems.

TSB-88-C also defines a service area as a boundary of the geographic area of concern for a user, and states that Validated CPC Service Area Reliability shall be determined by the percentage of test locations in the bounded service area that meet or exceed the specified CPC. Harris has proposed a Bounded Area design for County of Dane, WI as defined in TSB-88-C wherein coverage predictions are made out to the boundary of the defined service area and coverage is verified throughout the service area out to the boundary through the performance of a Validated CPC Service Area Reliability test.

RF coverage using this ATP is verified by measuring talk-out (base to mobile) BER throughout Dane County's defined bounded service area, and calculating the percentage of measurements that are equal or better than a BER of 2% required to support Dane County's specified CPC of DAQ 3.4.

2.1 Setup

Harris' TYPHON wireless testing system is utilized to measure BER. TYPHON consists of mobile radios, a GPS receiver to provide accurate position information for each measured data point, a computer with an internal clock that coordinates and records the test data, roof mounted antennas, and variable attenuators for use when portable coverage is being tested.

The TYPHON equipment will be mounted inside the test vehicle (standard passenger vehicle for single BER measurements, or SUV/van for multiple BER measurements) with an external antenna(s) mounted on the outside and centrally located on the vehicle's roof, with no other equipment installed on the roof. For portable outdoor coverage verification, the variable attenuator will be set to a 14 dB level to account for portable body losses and difference of height of test antenna on vehicle from body height of 3 feet. For portable indoor coverage verification, the variable attenuator will be set to a level to account for the 14 dB portable body losses and difference of height of test antenna on vehicle from body height of 3 feet plus the 6 dB loss of the building category being evaluated for GAOC, or plus 16 dB loss of the building category being evaluated for the 16 dB bounded areas.

Prior to taking BER measurements, each site must be audited to verify that the radio system is operating properly. The audits will verify the antenna configuration, the power into the antenna, the antenna installation, and the frequency of the test transmitter. Harris shall provide all test equipment necessary to perform the audits.

2.2 Drive Route Planning

TSB-88-C recommends coverage verification measurements at a statistically significant number of random test locations, uniformly distributed throughout the service area. To accomplish this, the service area is divided by a grid pattern as an aid to the development of a drive test route with an approximately equal distance traveled in each grid.

Harris will use a 1-mile by 1-mile grid pattern to obtain an even or uniform distribution of test locations throughout the Geographic Area of Concern. Harris will use a 0.25-mile by 0.25-mile grid pattern to obtain an even or uniform distribution of test locations throughout the 16 dB coverage areas. The grid pattern is overlaid onto street maps and a drive test route determined that will pass through all accessible grids (i.e. have roads) that have their center point within Dane County's defined service area boundary.

The drive route should pass through each grid at least once but not more than twice, as far as is practically possible. The defined drive route should not pass through tunnels, underpasses, underground garages, or other man made obstructive areas where radio coverage is not planned or expected. If a drive route passes through any of these areas, the TYPHON unit is disabled to prevent the collection of data in these areas.

The following grid patterns will be used, and will be shifted to best align grid centers to roads. The grid will be provided to the County at least five days before testing begins.

System	Service Boundary	Grid Size	Number of Grids
VHF P25 Simulcast	Geographic Area of Concern	1 mile by 1 mile	1350
VHF P25 Simulcast	16 dB Bounded Areas	0.25 mile by 0.25 mile	1280

BER measurements will be made in all accessible grids within Dane County's defined service area boundary. Test measurements along the drive route that are outside of Dane County's service area boundary will not be counted. Any areas or accessible grids within the service area boundary that Dane County decides not to test will have coverage scored as a PASS in the reliability calculations.

Inaccessible grids (i.e. have no roads) will be discarded from the reliability calculations with the % acceptance criteria adjusted by treating the inaccessible grids as exclusion zones.

2.3 Data Measurements

Each radio system base station site transmits the data sequences on a working channel, and measurements of this signal are collected with the TYPHON equipment mounted inside the test vehicle as it is driven along the defined test drive route. The software in the TYPHON laptop computer will automatically measure and record the data

sequences that will be used to determine the BER for each measurement point along the drive route.

2.4 Data Analysis and Acceptance

All BER measurement data records collected from the drive test within the defined service area boundary are post-processed and used in the final analysis.

Measurements that have a BER equal to or better than 2% are recorded as PASS; the remainder are recorded as FAIL.

The installed radio system coverage is deemed to meet the coverage requirements if, for each bounded service area in Table 5, the ratio of the number of PASS points to the total number of points in the service area equals or exceeds the minimum % Validated CPC Service Area Reliability acceptance criteria that is shown.

Table 5 - Coverage Service Area, Signal Level, and Acceptance Criteria

Service Area Definition	Maximum % BER	% Validated CPC Service Area Reliability Acceptance Criteria
Geographic Area of Concern	2%	95%
16 dB Bounded Areas	2%	95%

2.5 Results Presentation

The data records are plotted on a map showing the test grids, the areas tested and the test results. Different pen colors are used to show ranges of measured BER. A test report is also provided that summarizes the test results.

Results (Pass/Fail) _____

Tester: _____ Date: _____

Comments: _____

_____

_____

3. SUCCESSFUL TEST CRITERIA

3.1 Test Criteria

This Test Procedure shall be considered successful if 95% of all tested grids pass the BER Test and if 95% of all tested grids pass the Portable On-Street Voice Quality Test.

Attachment 7E3

Coverage Acceptance Test Procedures For Mutual Aid and EMS-B for County of Dane, Wisconsin

TABLE OF CONTENTS

REVISION HISTORY

Rev #	Date	Author	Description of Changes
1	3/2/2015	P. Crowe	New release for amended coverage
2	6/8/2015	D. McCoy	Updated based on CDR 1 feedback.
3	7/16/2015	P. Crowe	Updated based on CDR 2 feedback.
4	7/30/2015	P. Crowe	Added statement to shift grids centers to roads. Added guidance to testers to note inbound and outbound separately.
5	5/12/2016	M. Lochner	Title, header, footer changes

ABOUT THIS DOCUMENT

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

Customer: County of Dane, WI
Prepared By: Harris Corporation

DOCUMENT USAGE

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

- Transmit Frequency and Deviation
- Output and Reflected Power
- Receiver Sensitivity
- Receiver Multicoupler Gain (if applicable)
- Receiver Preamplifier Gain (if applicable)
- Time Domain Reflectometry of Transmission Line
- Combiner Loss (if applicable)
- Audio line out
- Audio line in

System parameters and measurements will be provided to County of Dane, WI as part of the final documentation package.

NOTES

This is the ATP that applies to the VHF mutual aid and Analog Tactical systems.

Definition of "Geographic Area of Concern"

- Dane County proper
- In Columbia County - Town of Leeds: S 1/2 21-23, 24-29, 31-36
- In Columbia County - Town of Hampden: 29-33
- In Jefferson County - Town of Lake Mills: 19, W 1/2 20, SW 1/4 28, NW 1/4 29, S 1/2 39, 30-33
- In Jefferson County - Town of Oakland: 1-10, 15-22, 27-34
- In Rock County - Town of Union: 4-7, N 1/2 8
- In Green County - Town of Brooklyn: 1-18, 20-24, N 1/2 25-27
- In Green County - Town of Exeter: 1-29, 33-36

Coverage testing to be performed during full foliage conditions from May 1st to September 30th unless mutually agreed by Provider and County.

1. PORTABLE ON-STREET VOICE QUALITY TEST

This Acceptance Test Procedure (ATP) is used by Harris for RF coverage verification based on the evaluation of Analog voice quality. This test is prepared for the following channels – VCALL 10, VTAC 12, WISMARC1 & 2, VLAW 31, and IFERN 1.

This ATP is in conformance with the Telecommunications Industry Association (TIA) Telecommunications Systems Bulletin TSB-88-C, titled "Wireless Communications Systems - Performance in Noise and Interference-Limited Situations - Recommended Methods for Technology-Independent Modeling, Simulation, and Verification". TSB-88-C has defined Channel Performance Criterion (CPC) as the specified minimum design performance level in a faded channel, and provides a set of Delivered Audio Quality (DAQ) CPCs that define subjective voice quality performance applicable to both analog voice and digital voice systems. These DAQ definitions are provided in Table 1.

Table 1 - Delivered Audio Quality Scale Definitions

Delivered Audio Quality	Subjective Performance Description
DAQ 5.0	Speech easily understood.
DAQ 4.5	Speech easily understood. Infrequent Noise/Distortion.
DAQ 4.0	Speech easily understood. Occasional Noise/Distortion.
DAQ 3.4	Speech understandable with repetition only rarely required. Some Noise/Distortion.
DAQ 3.0	Speech understandable with slight effort. Occasional repetition required due to Noise/Distortion.
DAQ 2.0	Understandable with considerable effort. Frequent repetition due to Noise/Distortion.
DAQ 1.0	Unusable, speech present but unreadable.

TSB-88-C also defines a service area as a boundary of the geographic area of concern for a user, and states that Validated CPC Service Area Reliability shall be determined by the percentage of test locations in the bounded service area that meet or exceed the specified CPC.

RF coverage using this ATP is verified by evaluating the voice quality of Analog voice test calls to/from a portable radio at specific test locations throughout Dane County's defined bounded service area. At each test location, a test call is placed from the portable user to the dispatcher (an inbound call), as well as from the dispatcher to the portable user (an outbound call). The inbound and outbound test call at each location is graded using the DAQ definitions in Table 1. Scores that equal or exceed Dane County's specified CPC of DAQ 3.4 are considered acceptable (PASS), and those lower than DAQ 3.4 are not acceptable (FAIL).

1.1 Test Equipment and Preparation

Harris XG-25 or XG-75 radios will be used for the voice quality test. The portable radio will be held at the head level. XG-75M, M7300, or XG100M mobile radios will be used for EMS-B tests at 50W mobile power, using a permanent or magmount, 0dB, ¼ wave antenna at 5' above ground.

Prior to performing the tests, each site must be audited to verify that the radio system is operating properly. The audits will verify the antenna configuration, the power into the

antenna, the antenna installation, and the frequency of the test transmitter. Harris shall provide all test equipment necessary to perform the site audits.

1.2 Test Planning

TSB-88-C recommends coverage verification at a statistically significant number of random test locations, uniformly distributed throughout the service area. To accomplish this, the service area is divided by a grid pattern as an aid to test planning.

A 1-mile by 1-mile grid pattern will be used, and will be shifted to best align grid centers to roads. The service area is as follows for the two sets of channels tested in this ATP.

Channels	Service Area	Grid Size	Number of Grids
VCALL 10, VTAC 12, WISMARC 1&2, VLAW31, IFERN 1	Geographic Area of Concern	1-mile by 1-mile	1350
EMS B	Geographic Area of Concern	1-mile by 1-mile	1350

All accessible grids will be tested. The voice quality test is conducted at a randomly selected location within each grid, typically as close to the center of the grid as possible. To the extent possible, test locations in adjacent grids should not be clustered closer to one another than 100λ[1]. All test calls will be made with the portable operator at street level outside any vehicle or other enclosure such as buildings, tunnels, underpasses, underground garages, or other man made obstructive areas where radio coverage is not planned or expected. All mobile calls will be made with the vehicle stationary and occupants within vehicle.

Inaccessible grids (i.e. have no roads) will be discarded from the reliability calculations with the % acceptance criteria adjusted by treating the inaccessible grids as exclusion zones. All test members will be briefed on the test methods prior to starting each test, including how to distinguish the DAQ level.

1.3 Grading of Test Locations

The Analog voice quality test requires two representatives from each entity (Harris and Dane County). One representative from Harris and one from Dane County will be the Field team, which will travel the drive route, perform the inbound calls, and grade the outbound calls. The second group of representatives will be the Base team, which will remain at the dispatch location, grade the inbound calls, and perform the outbound calls.

To reduce the time required for this coverage test, a single Base team can support multiple Field teams, and multiple Field and Base teams may be used.

At each agreed upon test location, with the Field team representatives outside of the vehicle, the portable to dispatch (inbound) and the dispatch to portable (outbound) test calls are performed. Per TSB-88-C, if the message is not understood on the first attempt the portable user is allowed to move 3-feet in any direction and the test can be repeated one time.

[1] Approximately 650-ft at VHF.

The Analog voice test calls consist of a short message representative of typical public safety call duration and include the identification of the location being tested. The suggested inbound test message is "TEAM XXX TESTING GRID NUMBER XXX, on XXX, near XXX," followed by a Harvard sentence. To ensure that the message is understood, the dispatcher then repeats the inbound test message. The dispatcher will then make a similar outbound test call. The suggested outbound test message is "CONFIRMING GRID XXX", followed by a Harvard sentence. The field team will then repeat the dispatcher's test message.

Each of the four representatives grades the test call using the Table 1 DAQ definitions and records the test score for each test location using the template in Table 2. PASS or FAIL determination is made separately for the inbound and outbound calls at each location. For each call direction, a test location is deemed to PASS if it meets or exceeds Dane County's requirement for DAQ 3.4 voice quality from both graders. If both graders agree that the voice quality does not meet the defined DAQ 3.4 criteria, then that test location fails for the direction being graded. If a score differs between testers at a location that results in a failing score from only one tester, that location will need to be tested again to determine the cause of the discrepancy. If the discrepancy cannot be rectified, then that grid will be set aside for discussion and evaluation.

1.4 Test Analysis and Acceptance

The data logged by the four representatives on the grading template is then analyzed to determine whether the individual test grid meets the DAQ 3.4 definition.

An individual test grid is determined to PASS if both the inbound and outbound calls in that grid have been scored as a PASS.

The Analog voice quality test is deemed to meet the coverage requirements if, for each bounded service area in Table 2, the percentage of test grids that receive a PASS score equals or exceeds Dane County's minimum % Validated CPC Service Area Reliability acceptance criteria that is shown.

Table 2 - Coverage Service Area and Acceptance Criteria, Mutual Aid

Portable Outdoor Service Area Definition	Description	% Validated CPC Service Area Reliability Acceptance Criteria
Geographic Area of Concern	Analog	92%

Table 3 - Coverage Service Area and Acceptance Criteria, EMS-B

Mobile Outdoor Service Area Definition	Description	% Validated CPC Service Area Reliability Acceptance Criteria
Geographic Area of Concern	Analog	95%

1.5 Results Presentation (Mutual Aid)

A test report is provided that includes:

- the number of test grids
- the location tested within each grid (GPS or written description)
- a copy of the Table 4 inbound or outbound grading template used by each grader
- the PASS/FAIL score for each test grid/location
- the % PASS calculation for the service area
- a statement of overall test acceptance or failure of coverage
- map with pass/fail (green/red)
- any differences between plan vs execution

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

1.6 Results Presentation (EMS-B)

A test report is provided that includes:

- the number of test grids
- the location tested within each grid (GPS or written description)
- a copy of the Table 4 inbound or outbound grading template used by each grader
- the PASS/FAIL score for each test grid/location
- the % PASS calculation for the service area
- a statement of overall test acceptance or failure of coverage
- map with pass/fail (green/red)
- any differences between plan vs execution

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

Table 4: Voice Quality Test Grading Template

Coverage Test Data for: County of Dane, WI Date: ________

Requirement: DAQ 3.4

Check the link used: ☐ Analog Voice ☐ Base to Portable (outbound)
☐ Digital Voice ☐ Portable or Mobile to Base (inbound)

Harris Evaluator:	Dane County Evaluator:
Organization:	Organization:
Transmitter Location:	Test Radio:
Receiver Location:	Test Frequency:

Grid / Location Number	Harris Grade Inbound / Outbound	Dane County Grade Inbound / Outbound	Remarks	PASS / FAIL Score	3 Ft Move Req

(One row for each test location)

2. SUCCESSFUL TEST CRITERIA

2.1 Test Criteria

The Mutual Aid Test Procedure shall be considered successful if 92% of all tested grids pass the Portable On-Street Voice Quality Test.

The EMS-B Test Procedure shall be considered successful if 95% of all tested grids pass the Mobile Voice Quality Test.

Paging System

Attachment 7E-6

Coverage and Functional Acceptance Test Procedures

For

Paging System

Dane County, Wisconsin

TABLE OF CONTENTS

REVISION HISTORY

Rev #	Date	Author	Description of Changes
1	3/2/2015	P. Crowe	New release for amended coverage
2	6/8/2015	D. McCoy	Updated based on CDR 1 feedback.
3	7/16/15	P. Crowe	Updated based on CDR 2 feedback.
4	8/30/16	M. Lochner	Updated header/footer and title page

OVERVIEW

The purpose of this acceptance test plan is to verify paging coverage and functionality of the paging equipment provided by Harris/General Communications. The Dane County Paging System has been configured using Harris Symphony console stack paging.

The paging system will support tone paging. The pages will be initiated from the County's Symphony consoles.

1. 1.0 CUSTOMER APPROVAL

This Acceptance Test Procedure has been read and approved for use as the system acceptance test.

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

2. VISUAL INSPECTION

2.1 Visual Inspection of New Sites

Setup

Prior to the actual acceptance test, a physical inspection of the paging equipment must be performed. All equipment locations must be inspected. Any discrepancy, which affects operator safety must be corrected before the remaining tests are performed.

Execution

1. Verify the area is clean and that all cabinets and racks are both clear of debris and clean.

2. Verify all equipment cabinets are spaced per the drawings, secured and grounded.

3. Verify all cables are dressed, secured and correctly marked.

4. Verify all nameplates and labels are in place.

5. Verify all protective foam, tape, and packing material has been removed.

6. Verify all punchblocks are labeled.

Results (Pass/Fail) _____

Tester: _____

Date: _____

Comments: _____

_____

_____

3. GROUNDING INSPECTION

3.1 Grounding Validation of New Sites

Setup

For detailed information on grounding validation, refer to HARRIS manual AE/LZT 123 4618/1 Rev. D (or current revision) Site Grounding and Lightning Protection Guidelines.

Execution

1. Verify all grounds measure less than 5 ohms to earth.
2. Verify all electrical outlets are grounded with one ground per circuit.
3. Verify all electrical bonding preserves integrity to equipment ground (Isolated ground).

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

4. RADIO PAGING FROM SYMPHONY CONSOLE

4.1 General Description

4.2 Test Procedure

2TONE PAGE
From the console, select a single button pager and push the send key. Verify that the message is transmitted to the pager correctly.

STACK PAGE
From the console, select multiple single button pagers and push the send key. Verify that the message is transmitted to the selected pagers correctly. This will confirm that STACK paging works, and a single pager can be a member of several groups.

GROUP PAGE:
From the console, select a group paging button and push the send key. Verify that the message is transmitted to the group of pager correctly. This will confirm that GROUP paging works, and a single pager can be a member of several groups.

RESULTS

2TONE PAGE:	[ ] PASS	[ ] FAIL
STACK PAGE:	[ ] PASS	[ ] FAIL
GROUP PAGE:	[ ] PASS	[ ] FAIL

Results (Pass/Fail) _____

Tester: _____

Date: _____

Comments: _____

_____

_____

5. RADIO PAGING FROM ZETRON MODEL 640 PAGING TERMINAL

5.1 General Description

5.2 Test Procedure

2TONE PAGE
From a PSTN phone dial the paging terminal. Wait for the prompt and enter a 3 digit pager cap code. Wait for prompt and speak your message and hang up. Verify that the message is transmitted to the pager correctly.

RESULTS

2TONE PAGE: [ ] PASS [ ] FAIL

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

6. PAGING BASE STATIONS

6.1 Description

Confirm that each Base Station is configured for the system designed ERP at each site and that the deviation is +/- 2.0 KHz for tones, +/- 2.5 KHz for voice and that each station can be operated by the front panels.

Using a Watt meter, measure the power out and power reflected of the transmitter, and record that reading.

Using a Communications Service Monitor, record the deviation, and Frequency Error from the 155.8425 MHz operating frequency.

Sun Prairie
FREQUENCY: _____ Error from 155.8425 MHz
TONE MODULATION: _____ +/- KHz (narrowband)
VOICE MODULATION: _____ +/- KHz (narrowband)
FORWARD POWER: _____ Watts
REFLECTED POWER: _____ Watts

Base Station working: [ ] PASS [ ] FAIL

Roxbury Township
FREQUENCY: _____ Error from 155.8425 MHz
TONE MODULATION: _____ +/- KHz (narrowband)
VOICE MODULATION: _____ +/- KHz (narrowband)
FORWARD POWER: _____ Watts
REFLECTED POWER: _____ Watts

Base Station working: [ ] PASS [ ] FAIL

Eisner Tower - Mazomanie
FREQUENCY: _____ Error from 155.8425 MHz
TONE MODULATION: _____ +/- KHz (narrowband)
VOICE MODULATION: _____ +/- KHz (narrowband)
FORWARD POWER: _____ Watts
REFLECTED POWER: _____ Watts

Base Station working: [ ] PASS [ ] FAIL

Stougthon WT
FREQUENCY: _____ Error from 155.8425 MHz
TONE MODULATION: _____ +/- KHz (narrowband)
VOICE MODULATION: _____ +/- KHz (narrowband)
FORWARD POWER: _____ Watts
REFLECTED POWER: _____ Watts

Base Station working: [ ] PASS [ ] FAIL

Verona Tower
FREQUENCY: _____ Error from 155.8425 MHz
TONE MODULATION: _____ +/- KHz (narrowband)
VOICE MODULATION: _____ +/- KHz (narrowband)
FORWARD POWER: _____ Watts
REFLECTED POWER: _____ Watts

Base Station working: [ ] PASS [ ] FAIL

UW Tower
FREQUENCY: _____ Error from 155.8425 MHz
TONE MODULATION: _____ +/- KHz (narrowband)
VOICE MODULATION: _____ +/- KHz (narrowband)
FORWARD POWER: _____ Watts
REFLECTED POWER: _____ Watts

Base Station working: [ ] PASS [ ] FAIL

Deerfield Tower
FREQUENCY: _____ Error from 155.8425 MHz
TONE MODULATION: _____ +/- KHz (narrowband)
VOICE MODULATION: _____ +/- KHz (narrowband)
FORWARD POWER: _____ Watts
REFLECTED POWER: _____ Watts

Base Station working: [ ] PASS [ ] FAIL

DeForest Tower
FREQUENCY: _____ Error from 155.8425 MHz
TONE MODULATION: _____ +/- KHz (narrowband)
VOICE MODULATION: _____ +/- KHz (narrowband)
FORWARD POWER: _____ Watts
REFLECTED POWER: _____ Watts

Base Station working: [ ] PASS [ ] FAIL

Rockdale Tower
FREQUENCY: _____ Error from 155.8425 MHz
TONE MODULATION: _____ +/- KHz (narrowband)
VOICE MODULATION: _____ +/- KHz (narrowband)
FORWARD POWER: _____ Watts
REFLECTED POWER: _____ Watts

Base Station working: [ ] PASS [ ] FAIL

Results (Pass/Fail) _____

Tester: _____

Date: _____

Comments: _____

_____

_____

7. RF COVERAGE - NON-AUTOMATED COVERAGE TESTING

This Acceptance Test Procedure (ATP) is used by Harris for verification of both indoor and outdoor paging coverage based on the evaluation of voice quality using a pager attenuated 12 dB to simulate coverage within a building and a standard pager for coverage outdoors. The test is not used to verify coverage inside any randomly selected building nor in any specific or mandatory building. Paging coverage testing shall be performed at the same time as coverage testing of the P25, Mutual Aid, or EMS-B voice radio system. For voice quality tests, at least 95 percent of the test locations shall provide a voice quality rating of DAQ 3.4 or better.

Harris will use a 1-mile by 1-mile grid pattern to obtain an even or uniform distribution of test locations throughout the Geographic Area of Concern. The grid pattern is overlaid onto street maps and a drive test route determined that will pass through all accessible grids (i.e. have roads) that have their center point within Dane County's defined service area boundary.

The following grid patterns will be used, and will be shifted to best align grid centers to roads.

System	Service Boundary	Grid Size	Number of Grids
VHF Paging	Geographic Area of Concern	1 mile by 1 mile	1350

This ATP is in conformance with the Telecommunications Industry Association (TIA) Telecommunications Systems Bulletin TSB-88-C, titled "Wireless Communications Systems - Performance in Noise and Interference-Limited Situations - Recommended Methods for Technology-Independent Modeling, Simulation, and Verification". TSB-88-C has defined Channel Performance Criterion (CPC) as the specified minimum design performance level in a faded channel, and provides a set of Delivered Audio Quality (DAQ) CPCs that define subjective voice quality performance applicable to both analog voice and digital voice systems. These DAQ definitions are provided in Table 1.

Table 1 - Delivered Audio Quality Scale Definitions

Delivered Audio Quality	Subjective Performance Description
DAQ 5.0	Speech easily understood.
DAQ 4.5	Speech easily understood. Infrequent Noise/Distortion.
DAQ 4.0	Speech easily understood. Occasional Noise/Distortion.
DAQ 3.4	Speech understandable with repetition only rarely required. Some Noise/Distortion.

Delivered Audio Quality	Subjective Performance Description
DAQ 3.0	Speech understandable with slight effort. Occasional repetition required due to Noise/Distortion.
DAQ 2.0	Understandable with considerable effort. Frequent repetition due to Noise/Distortion.
DAQ 1.0	Unusable, speech present but unreadable.

7.1 Setup

The Symphony console will be configured to send test pages. The test personnel will be made up of Dane County representitives as well as Harris representitves. Paging coverage testing will be performed at the same time as coverage testing of the P25, Mutual Aid, or EMS-B voice radio system if practical. A standard test result form will be used to document test information for each test location including:

Date
Time
Personnel
Location
Pager serial numbers
Pass or fail status

7.2 Data Analysis and Acceptance

A test location is considered a PASS if if the voice page is received with with a voice quality rating of DAQ 3.4 or better. A page received received with a voice quality less than DAQ 3.4 is scored as a FAIL. The non-automated test is considered accepted if 95% of the test location are scored as a PASS.

Results (Pass/Fail) _____

Tester: _____ Date: _____

Comments: _____

_____

_____

Attachment 7E-7
System Reliability Test
For
Dane County, Wisconsin

Overview

The 30-Day Reliability Test is a standalone performance test designed to demonstrate successful operation of the system over an extended period of time. In order to proceed with the 30-Day Operational Test, the following conditions must be satisfied: (i) installation and optimization of the System must be successfully completed; (ii) all functional and coverage tests must be successfully completed; (iii) the County and the provider agree to begin the reliability test; and (iv) preventive maintenance and all other infrastructure related installation must be completed or put on hold until after the test period.

The Reliability Test Period shall be defined as the time period initially starting on the first day of the period and running until the System successfully operates for thirty (30) days without a "Major System Failure" (as hereinafter defined). During the Reliability Testing Period, detailed records of Hardware and Software failures shall be kept. The failures shall be classified as a "Major System Failure", an "Intermediate System Failure", or a "Minor Failure" (all as defined below). Detailed records shall also be kept of the failure corrections made by the provider to the System.

Criteria

The Reliability Test Period shall be successfully completed upon the completion of a thirty (30) calendar day period without the occurrence of a "Major System Failure". Only the failures identified below shall be considered during the Reliability Testing Period. Failures and the resulting actions shall be defined as follows:

Actions by Failure Type

(i) Major System Failure - A "Major System Failure" shall be defined for this Agreement, as occurring when the System experiences one of the failures of Harris supplied Hardware or Software described below which compromises the System's ability to operate as a simulcast trunked radio system. In the event of a "Major System Failure", during the Reliability Test, the 30 day Reliability Test Period shall be stopped, Harris shall make the necessary repairs, and a brand new thirty (30) day Reliability Test Period shall be commenced.

See definition of major failure below

(ii) Intermediate System Failure - An "Intermediate System Failure" shall be defined as occurring when the System experiences one of the failures of Harris supplied Hardware or Software described below. In the event of an "Intermediate System Failure", the thirty (30) day Reliability Test Period shall be paused, Harris shall make the necessary repairs, and the 30 day Reliability Test Period shall be started at the point that it was discontinued and shall continue until a 30 day period occurs without a Major System Failure. For example, if an "Intermediate System Failure" occurs on Day 23 of the Reliability Test Period, warranty repairs shall be made and the Reliability Test Period shall re-commence and continue on Day

23. The Reliability Test Period shall then be deemed successfully completed when Day 30 is completed without the occurrence of a Major System Failure.

See definition of intermediate failure below

(iii) Minor Failures - "Minor Failures" shall be defined as occurring when a failure of Harris supplied Hardware or Software occurs that is considered minor in nature and has no material effect on the overall operation of the System or major System components. In the event of a "Minor Failure", Harris shall commence and complete warranty repairs in a timely manner. The thirty (30) day Reliability Test Period shall not be stopped or suspended in any way in the event of a "Minor Failure".

(iv) No Failure – The following occurrences will not constitute a failure:

- "Known" non-coverage areas (as identified during Coverage Testing)
- Commercial power failures
- Scheduled preventive maintenance downtime
- Failures due to environmental conditions or acts of God, for which Harris has no control
- Failures due to City/County staff/operator errors

If a "No Failure" event occurs, the thirty (30) day Reliability Test Period shall be stopped, Harris shall make the necessary repairs and the thirty (30) day Reliability Test Period shall be re-started at the point that it was discontinued and shall continue until a thirty (30) day period occurs without a Major System Failure. For example, if a "No failure" event occurs on Day 23 of the Reliability Test Period, warranty repairs shall be made and the Reliability Test Period shall re-commence and continue on Day 23. The Reliability Test shall then be deemed successfully completed when Day 30 is completed without the occurrence of a Major System Failure.

Definition of Major and Intermediate Failures:

Major Failure Definition – a Major Failure is defined by the following:

- P25 simulcast subsystem reverting to bypass for longer than 300 seconds.
- Dispatch Console equipment or dispatch network failure resulting in the loss of a complete Dispatch Center or a combined loss of 2 or more Dispatch Consoles.
- Network Switching Center or Simulcast IP Control Point Site failure resulting in a complete loss of functionality for the site's equipment.
- Any component or module failure resulting in the loss of 2 or more of trunked talkpath resources system-wide or within a single simulcast subsystem.
- Failure of the paging equipment that prevents delivery of a page within 60 seconds.
- Failure of the mutual aid equipment that prevents mutual aid communications for >120 seconds.

Intermediate Failure Definition

- System Control Equipment Failures: "System Control Equipment" shall be defined as: Simulcast control point equipment, voting equipment, and simulcast remote transmit equipment. A failure of an item of System Control Equipment that does not result in a loss of channels constituting a Major System Failure will be defined as an "Intermediate System Failure". If the same problem of this type occurs twice then that elevates to a major failure.
- Site Control Equipment Failure: "Site Control Equipment" shall be defined as: a site controller or antenna system. A failure of an item of Site Control Equipment that does not result in a loss of the simulcast trunking function or cause a reversion to bypass mode will be defined as an "Intermediate System Failure."
- Console Failure: "Console Failure" shall be a failure caused by either: (a) a loss of normal operational use of an item of Console Equipment supplied by Harris; or (b) a simultaneous loss of normal operational use of multiple items of Operator Interface Equipment supplied by Harris. "Console Equipment" shall be defined as the central processing unit (CPU), monitor, multiviewer system, and link to the console. "Operator Interface Equipment" shall be defined as the keyboard, mouse/pointer. Failure of a single console is an intermediate failure.
- Failure in any of the link paths that does not result in a loss of dispatch capability, including RF dispatch, or other major failure will be defined as an "Intermediate System Failure."
- Failure of any single base station (trunking, mutual aid, paging, etc) will be an intermediate failure.

All of the above faults will be considered Major Failures or Intermediate failures provided they are a failure of Harris provided equipment, and not County provided equipment or networks. Console faults must be caused by a malfunction of the console operator position which is not the result of operator error, abuse, physical damage, spilled liquids, headset problems, mouse/pointer problems, or keyboard failures. Degradation to communications quality that are not attributable to the work performed or the materials provided by Harris will not constitute a Major or Intermediate Failure.

ALLOWED USE:

During the 30-Day Operational Test, the County shall utilize the system for its intended purpose on a limited basis, as described below, and may test all operational modes and equipment configurations to ensure that all features operate properly and that all system anomalies have been identified.

The following usage by County shall be allowed as part of this test and shall not be interpreted by PROVIDER as Acceptance or beneficial use of the System:

- Use, including use for its intended purpose, by a limited set of terminals (mobile and portable radios and pagers) not to exceed a total number of 220 active units or a mutually agreed number, not including those terminals used to connect the dispatch consoles, gateways, or other infrastructure components to the System. These test radios should not be used for public safety events where lives or property are at risk.
- Use of terminals for the purposes of training.
- Additionally, for any portion of this Operational Reliability Test Period, the County may patch (or otherwise interconnect) channels of the System to channels of systems currently in use by the County for purposes of loading the new system with traffic from the existing system. This interconnection will not allow transmissions from the new system to the existing system but only copying of existing system traffic onto the new system.

Procedures

If the County perceives a fault, the County is responsible for notifying Harris within 12 hours of the fault. County and Harris personnel will then determine the nature of the fault (its failure level), and if the fault is caused solely by Harris equipment. Upon this determination, Harris will repair the fault.

As defined earlier in this document, in the event of a Major Failure as defined above, the existing 30-day Operational Test will terminate. Harris will repair any verified operational fault. If the repair cannot be made immediately, the County will be notified of the time needed for the repair. Upon completion of repairs, Harris shall notify the County. The County, in conjunction with Harris, shall test the repairs to ensure that the system is operating according to specification. After verifying correct operation, a new 30-day Operational Test will begin the following calendar day.

All system failures will be reported. All failures, major, intermediate, and minor, will be recorded in a log detailing the failure. Information provided will include the amount of time that the subsystem or component operated in a failed condition, as well as corrective measures taken to resolve the failure. Within 48 hours after the restoration of any failure condition, Harris will meet with the County to explain the failure, corrective actions, and steps taken to prevent similar failures in the future. A Failure Modes and Errors Analysis (FMEA) will be generated each week. This report will track all major and minor failures, as well as the corrective action that was taken to resolve the issue. These written reports will include, as a minimum:

- Model and Serial Number of the equipment affected (Asset number if applicable)
- Original Complaint
- Revised Complaint and/or Trouble Found
- Repairs Made and Parts Used
- Technician Name or Control Number
- Any recommended improvements to the system/subsystem.

A final written report shall be submitted to the County within thirty days after the successful completion of the Reliability Test.

Attachment 7E-8
Functional Test Procedures
For
ISSI
Dane County, Wisconsin

1.0 Customer Approval

This Acceptance Test Procedure has been read and approved for use as the system acceptance test.

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

2.0 System Test Acceptance

This Acceptance Test Procedure has been successfully completed.

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

3.0 P25 ISSI GATEWAY

Setup: **This setup applies to the tests contained in this section.**

1) System (Dane) is connected to System (WISCOM) using the P25 ISSI wireline interface.

2) Four radios are required, programmed as follows:

Radio 1 and 2: System (Dane)

Talk Group 96, 97, 98 or 99

Radio 3 and 4: System (WISCOM)

Talk Group 96, 97, 98 or 99

NOTE: Radios 2 and 4 are used to verify receive audio on originating system/call

3.1 System Registration & Interoperability Calling

Setup:

Logs Radios 1 and 2 into System (Dane)

Log Radios 3 and 4 into System (WISCOM)

Set radios to ISSI Interop Talkgroup 96, 97, 98 or 99:

Execution:

1. PTT Radio 1 on System **(Dane)** and verify it communicates with Radio 2 on System **(Dane)** and Radio 3 on System **(WISCOM)**. Verify that audio is received on Radios 2 and 3. Verify that the Caller ID of Radio 1 is displayed on Radios 2 and 3.
2. PTT Radio 3 and verify it communicates with Radio 1 on System **(Dane)** and Radio 4 on System **(WISCOM)**. Verify that audio is received on Radios 1 and 4. Verify that the Caller ID of Radio 3 is displayed on Radios 1 and 4.
3. Log Radio 1 into System **(WISCOM)**.
4. Log Radio 3 into System **(Dane)**.
5. Set both radios to ISSI interop Talk group 96, 97, 98 or 99.
6. PTT Radio 1 and verify it communicates with Radio 3 on System **(Dane)** and Radio 4 on System **(WISCOM)**. Verify that audio is received on Radios 3 and 4. Verify that the Caller ID of Radio 1 is displayed on Radios 3 and 4.
7. PTT Radio 3 and verify it communicates with Radio 1 on System **(WISCOM)** and Radio 2 on System **(Dane)**. Verify that audio is received on Radios 1 and 2. Verify that the Caller ID of Radio 3 is displayed on Radios 1 and 2.
8. Repeat the previous steps for encrypted voice.

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

3.2 Declaring an Emergency Call

Setup:

Log Radio 1 into System (Dane)

Log Radio 3 into System (WISCOM)

Set radios to ISSI Interop Talkgroup 96, 97, 98 or 99:

Execution:

1. Declare an Emergency on Radio 1 on System **(Dane)** and verify Radio 3 on System **(WISCOM)** receives the emergency. Verify that audio is 3. Verify that the Caller ID of Radio 1 is displayed 3.
2. PTT Radio 3 and verify it communicates with Radio 1 on System **(Dane)**. Verify that audio is received on Radio 1. Verify that the Caller ID of Radio 3 is displayed on Radio 1.
3. Clear the emergency.
4. Repeat the previous steps with Radio 3 on System (WISCOM) creating the Emergency.

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

3.3 Unit Deregistration

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

Setup: **Log Radio 1 into System (Dane)**

Log Radio 3 into System (WISCOM)

Set radios to ISSI Interop Talkgroup 96, 97, 98 or 99

Console with ISSI Talkgroup module programmed

Execution:

1. PTT Console ISSI Talkgroup and verify it communicates on the system to Radio 3. Return call from Radio 3 to Console on ISSI Talkgroup.

2. Turn off radio 3 and wait for expiration of the radio timeout period.

   - Verify that Console can PTT on ISSI TalkGroup but no channels are brought up at the sites, because there is no demand for it at the sites.

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

3.4 ISSI Fault Monitoring

Purpose: **Demonstrate the capability to monitor the loss of the ISSI at 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. 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. Power down the ISSI virtual machine.

   - Verify that the RNM indicates an alarm for the affected device.

5. Turn the device back ON.

   - Verify that the device alarm clears and displays green.

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

3.5 Real Time Monitoring

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

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 3 on an ISSI TalkGroup.

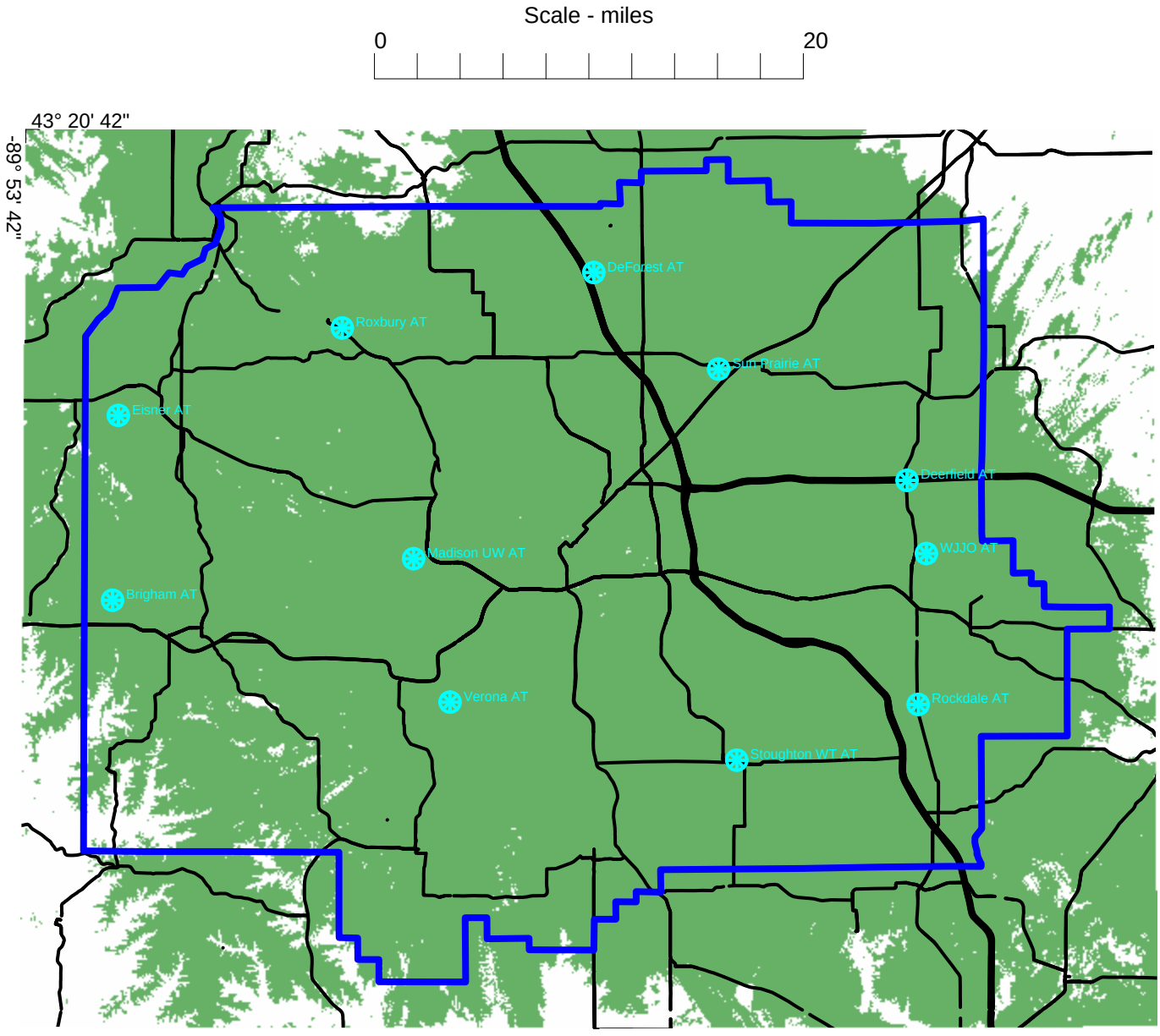
7. Verify that the event viewer displays the talkgroup ID and calling party ID.

8. Verify the state changes from Free to Talk.

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

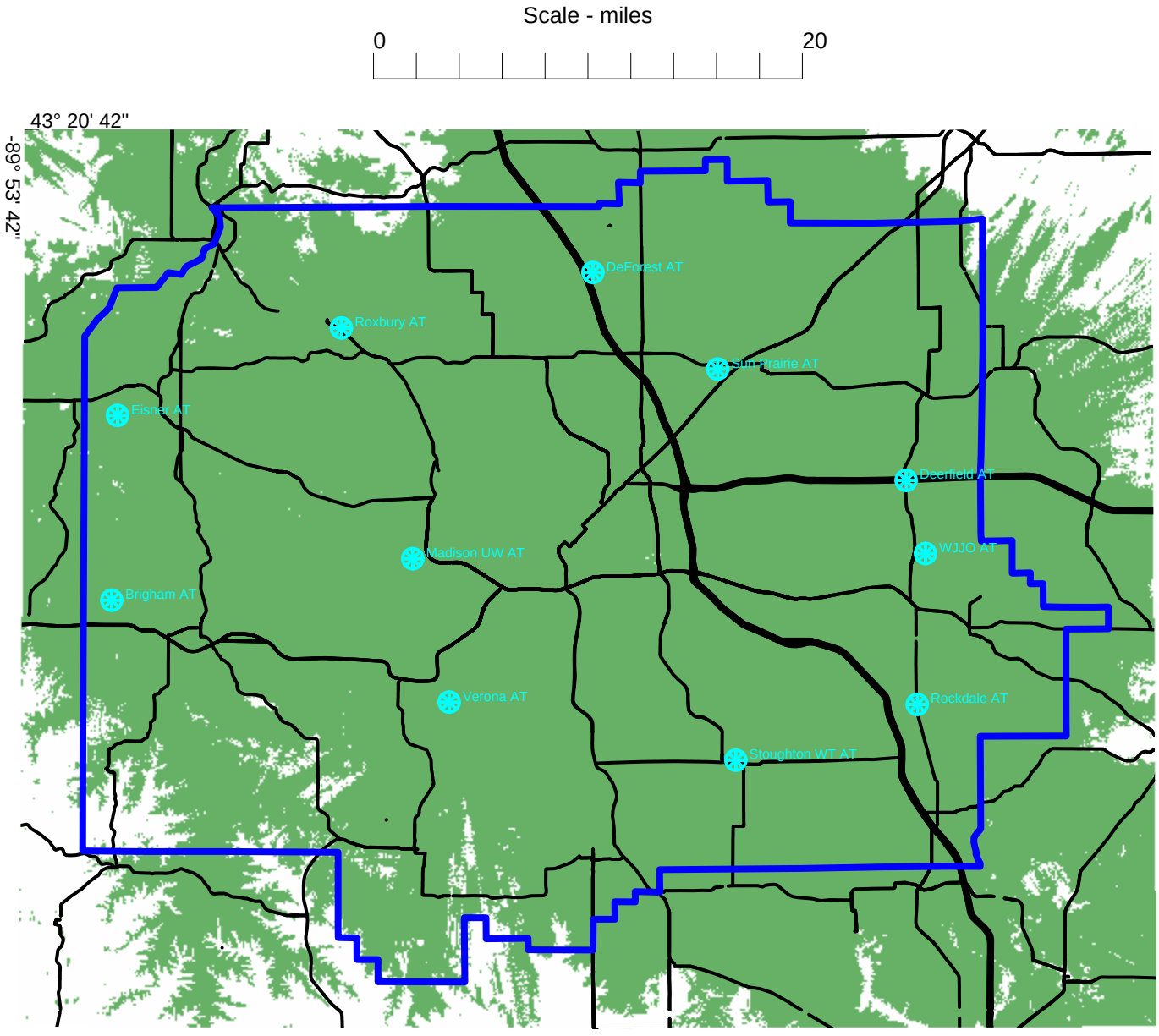
RF Integrity

RAPTR Version 26.4.342
Tuesday, June 30, 2015 10:17:55
Project: Dane - Analog Tactical
MBP: 10280
Figure: Analog Tactical - 6dB PTB
Engineer: DLM
Map type - 1:479,947
Note: Map depicts coverage across the defined service area. Statistical variability does not allow for guarantee of coverage in specific locations, but does represent graphically area % coverage.



RF Integrity

RAPTR Version 26.4.342
Thursday, June 25, 2015 10:25:08
Project: Dane - Analog Tactical
MBP: 10280
Figure: Analog Tactical - 6dB PTO
Engineer: DLM
Map type - 1:479,947
Note: Map depicts coverage across the defined service area. Statistical variability does not allow for guarantee of coverage in specific locations, but does represent graphically area % coverage.



Attachment 7G-1: Responsibility Matrix

The table below identifies the responsibilities of both Harris and Dane County for the expanded system design. The following matrix will clarify roles and responsibilities for both the County and Provider as defined in the purchase agreement.

Table A - Responsibility Matrix

	General Project Tasks	Harris	Dane County	Comments
1	Provide adequate staffing to support the project and its schedule.		X	
2	Provide adequate staffing to support the project and its schedule.	X		
3	Provide that all existing County equipment (towers, shelters, generators) and facilities to be used in the design will be in good working condition for use on this project.		X	For Amendment 7: WJJO tower is to be replaced (Harris' task) Rockdale tower to have remediation DeForest tower to have remediation
4	Existing County towers to have adequate cable ladders for securing cables.	X		New cable ladders to be installed on Rockdale and Brigham towers
5	Deleted			
6	For any tower that fails the tower analysis study will be identified and reported to the County. Harris will: a. Obtain quote to strengthen the tower if possible. b. Provide a quote for a new replacement tower. c. Help the County look for a new site.	X		
7	Present mounting design, installation and site development plan, County to approve.	X		Completed per Amendment 6.
8	Obtain permission for the Harris team to have access to the County Sites and any other sites that are part of the final design.		X	

	General Project Tasks	Harris	Dane County	Comments
9	Obtain permission for any site improvements and work as proposed and approved in the Customer Design Review.		X	
10	Develop site plans for each site where improvements are to be made. Drawings will be created that will be used as part of the Customer Design Review, and the drawings will also be used to prepare the necessary construction permit applications.	X		Harris to support permitting process by attending meetings, and/or public hearings, as requested. Completed per Amendment 6.
11	Submit permitting documents.	X		Harris will provide construction permits
12	Recommend VHF frequency plan.	X		Harris will complete and provide an intermodulation analysis as part of the recommendation. Completed per Amendment 6.
13	Approve VHF frequency plan as described in Attachment A-1, System Description, and direct Harris to prepare frequency licensing forms.		X	
14	Prepare frequency licensing forms.	X		Harris will support frequency coordination meetings in Wisconsin as required. Completed per Amendment 6.
15	Review and sign forms and submit FCC, NTIA, and/or Regional Coordinator, with appropriate fees.		X	Task completed
16	**Interference: by Harris products.** Research any interference caused by its products and either repair or replace at its discretion to resolve the issue.	X		

	General Project Tasks	Harris	Dane County	Comments
17	**Interference caused by others.** 3rd party interference will be the County's and the interferer's responsibility to resolve, per Clause 17 of the Purchase Agreement.		X	
17-A	**Interference caused by others.** Prior to final acceptance, Harris will provide a reasonable amount of technical and engineering support, at Harris expense, to help determine the source of any potential interference and the best technical solution. Harris will recommend filters or materials to be purchased by the County at its option.	X		

	CDR	Harris	Dane County	Comments
18	Site Surveys	X		Harris team to visit those sites where additional information is required to complete the final design and documents for the CDR, including grounding evaluation. Completed per Amendment 6.
19	Site Surveys		X	As requested, Dane County to accompany Harris on the site surveys and arrange for any required expert or knowledgeable individuals to participate. County to provide additional details or items that may have changed from earlier surveys. Completed per Amendment 6.
20	Microwave Path Survey	X		Alcatel will conduct path sightings to verify all paths are un-obstructed. Results to be presented at CDR unless a path problem should arise, then immediate discussions will take place. Completed per Amendment 6.

	CDR	Harris	Dane County	Comments
21	CDR Present design to Dane County for its review and approval. Including, but not limited to: • P25 Simulcast Expansion • Mutual Aid Relocation • Paging Expansion • Analog Tactical Expansion • Microwave Expansion	X		Harris to present the information and drawings as described in the Project Implementation plan Attachment D-1. Completed per Amendment 6.
22	Develop a revised project schedule that will be the basis for the project rolling forward	X		Project schedule will be updated as required and uploaded to the project's SharePoint website.
23	Participate in all review meetings, providing valuable feedback and information for the proposed work.		X	
24	Review all material presented.		X	
25	Approve the Customer Design Review		X	Signifies Design Approval and the go ahead to order material, submit for permits and to start site development.

	Microwave System	Harris	Dane County	Comments
26	Provide expanded County microwave links per Amendment 6 Customer Design Review	X		Alcatel to prepare microwave frequency coordination and submittal.

Site Project Tasks				
	General Site Development Issues	Harris	Dane County	Comments
27	Provide authorization for Harris to use the existing towers and install the new antenna loads, and provide shelter space or compound space per the final design.		X	
28	Arrange for electric power (within 50 feet of new shelter) and pay for monthly electric usage		X	New Power connections for sites getting new shelters will be 240V AC 200A

Site Project Tasks				
29	Provide sites that are free of contaminated or hazardous material.		X	If any contaminated or hazardous material is found, Harris will stop work, and notify the County. County will resolve or ask Harris for a quote.
30	Provide adequate access to each site, such that large vehicles (cranes, concrete trucks & tractor trailers) can deliver material and services as needed		X	County to resolve any access issues or approve required change order as required.
31	Provide sites that have soil conditions that are suitable for the site development work planned. Harris has not provided for any drilling, blasting or removal of excessive rock, large material or excess water.		X	If such conditions are found, Harris will seek appropriate change order from the County for the un-foreseen issue. County to resolve or approve required change order as required
32	Site Grounding Install new "Ground Systems" at all new sites getting new shelters.	X		Harris will use its "Site Grounding and Lightning Protection" procedures for all grounding work.
33	Provide adequate ground systems on all existing County towers.		X	Existing tower ground will be connected to new shelter ground in at least two locations at sites getting new shelters. Harris will make connection, but expects suitable tower ground to be present for the connection.
34	Provide a site ground that measures 5-ohms at each site getting a new shelter. The soil at each site must be conducive for the construction of a site ground system that will measure out to be 5 ohms or less. If the soil conditions are not conducive to obtaining the desired ground system, Harris will provide a report and a plan for the most cost effective ground system for that site.	X		County to review report and accept recommended ground system design, or approve purchase of special grounding material to maximize the ground system at the site.
35	Site Acquisition and Lease Site Cost		X	County to pay all lease cost for non-County sites
	Stoughton Water Tower	**Harris**	**Dane County**	**Comments**
36	Install LMR & MW systems as per design	X		
37	Site Development. Develop site improvements as described in the Implementation Plan.	X		

Site Project Tasks				
38	Obtain lease with tower owner and shelter location		X	Sign lease for site allowing Harris to begin work at the site.
	DeForest	**Harris**	**Dane County**	**Comments**
39	Install LMR & MW systems as per design	X		
40	Site Development Develop site improvements as described in the Implementation Plan.	X		Site development tasks include tower remediation and 40ft extension added to tower.
	Rockdale	**Harris**	**Dane County**	**Comments**
41	Install LMR & MW systems as per design	X		Shelter, Generator, and associated equipment will be relocated from Stoughton AT&T
42	Site Development Develop site improvements as described in the Implementation Plan.	X		Site development tasks include tower remediation and replacement of qty 3 guy anchors.
	WJJO	**Harris**	**Dane County**	**Comments**
43	Install LMR & MW systems as per design	X		
44	Site Development Develop site improvements as described in the Implementation Plan.	X		Site development tasks include building new tower on site.
45	Obtain lease with tower owner and shelter location		X	Sign lease for site allowing Harris to begin work at the site.
	Brigham	**Harris**	**Dane County**	**Comments**
48	Install mutual aid and Analog Tactical system per design shown in CDR.	X		Harris is responsible for the antenna replacement plan without reinforcing or modifying the tower.
49	Site Development Develop site improvements as described in the Implementation Plan.	X		
	Network Control & Dispatch	**Harris**	**Dane County**	**Comments**
50	**City/County Building (CCB)** Upgrade primary switch to SR10A.1 as described in the CDR.	X		
51	**City/County Building (CCB)**	X		

Site Project Tasks				
	Upgrade 21 Maestro Consoles to Symphony Consoles			
52	**UW Madison** Upgrade secondary switch to SR10A.1 as described in the CDR.	X		
53	**Backup Dispatch Center** Install 14 Symphony Consoles	X		6 Symphony consoles will be Maestro replacements. 8 Symphony consoles have been purchased by Dane County via Amendment 6 option.
	Testing Project Tasks	**Harris**	**Dane County**	**Comments**
54	Conduct Site inspections as defined in ATP document	X		Harris to develop punch-list of all issues, resolve/develop plan, and provide status report.
55	Provide people to participate in site inspections.		X	
56	Conduct Functional ATPs as described in the System Description, Attachment A-1 and defined in the Acceptance Test Plans, included in the Attachment E-1 addenda.	X		
57	Provide people to participate in Functional testing		X	ATP defines test set up and procedures.
58	Sign-off completion of Functional ATP for the systems tested.		X	
59	Provide the drivers, vehicles and equipment for taking automated test measurements.	X		
60	Conduct coverage ATP of the P25 system, Paging, and Mutual Aid systems, as described in the System Description, Attachment A-1 and defined in the Acceptance Test Plans, included in the Attachment E-1 addenda.	X		
61	Prepare coverage ATP reports.	X		
62	Review and sign-off coverage ATP Reports.		X	
	Cutover Project Tasks	**Harris**	**Dane County**	**Comments**

Site Project Tasks				
63	Develop transition plan.	X		
64	Develop user operational cutover plan.		X	Dane County to coordinate with Harris for timing.
	Document Project Tasks	**Harris**	**Dane County**	**Comments**
65	Provide system "As-Built" documentation.	X		PDF format
66	Provide site equipment floor plan drawings.	X		PDF format
67	Provide site equipment rack drawings.	X		PDF format
68	Provide tower antenna layout drawings.	X		PDF format
69	Provide equipment technical manuals.	X		PDF format
70	Provide Customer Design Review Documentation.	X		PDF format
71	Provide system block drawings.	X		PDF format

Attachment 7I-1 – Site Deliverable Equipment List by Site, Summary Level

The following is a summary list of the equipment to be installed at each site/location.

City County Building	New Virtual Network Switching Server 21 Symphony Consoles
UW Madison Tower	New Virtual Network Switching Server
Backup Dispatch	Relocated Equipment: 6 Symphony Consoles 6 Backup Mobile Radios New Equipment: 4 Symphony Consoles 8 Backup Mobile Radios (XL-200P)
DeForest State Patrol	• Ten (10) MASTR V Series Base Stations – P25 System • One (1) MASTR III Base Station – Paging System • Two (2) MASTR III Based Stations – Analog Tactical System • One (1) Network Sentry • One (1) Cisco Switch • One (1) Cisco Router • One (1) GPS MUX • RF Combiners, RX Multicouplers • Associated Cabling, Racks, and Hardware • (2) TX Antennas – P25 • (1) TX Antenna – Paging • (1) TX Antenna – Analog Tactical • (1) RX Antenna – P25 • (1) RX Antenna – Analog Tactical
Rockdale Tower	Relocated Equipment: • Ten (10) MASTR V Series Base Stations – P25 System • One (1) MASTR III Base Station – Paging System • Two (2) MASTR III Based Stations – Analog Tactical System • Six (6) MASTR III Base Stations – Mutual Aid System • One (1) Network Sentry • One (1) Cisco Switch • One (1) Cisco Router • One (1) GPS MUX

	• RF Combiners, RX Multicouplers • Associated Cabling, Racks, and Hardware <u>New Equipment:</u> • (2) TX Antennas – P25 • (1) TX Antenna – Paging • (1) TX Antenna – Analog Tactical • (1) RX Antenna – P25 • (1) RX Antenna – Analog Tactical and Mutual Aid
Stoughton Water Tank	• Ten (10) MASTR V Series Base Stations – P25 System • One (1) MASTR III Base Station – Paging System • Two (2) MASTR III Based Stations – Analog Tactical System • One (1) Network Sentry • One (1) Cisco Switch • One (1) Cisco Router • One (1) GPS MUX • RF Combiners, RX Multicouplers • Associated Cabling, Racks, and Hardware • (2) TX Antennas – P25 • (1) TX Antenna – Paging • (1) TX Antenna – Analog Tactical • (1) RX Antenna – P25 • (1) RX Antenna – Analog Tactical
WJJO	• Ten (10) MASTR V Series Base Stations – P25 System • Two (2) MASTR III Based Stations – Analog Tactical System • One (1) Network Sentry • One (1) Cisco Switch • One (1) Cisco Router • One (1) GPS MUX • RF Combiners, RX Multicouplers • Associated Cabling, Racks, and Hardware • (2) TX Antennas – P25 • (1) TX Antenna – Analog Tactical • (1) RX Antenna – P25 • (1) RX Antenna – Analog Tactical
Brigham	• Six (6) MASTR III Base Stations – Mutual Aid System • Two (2) MASTR III Based Stations – Analog Tactical System

	• One (1) Network Sentry • One (1) Cisco Switch • One (1) Cisco Router • One (1) MUX pair (to link CCB) • RF Combiners, RX Multicouplers • Associated Cabling, Racks, and Hardware • (1) TX Antenna – Mutual Aid • (1) TX Antenna – Analog Tactical • (1) RX Antenna – Mutual Aid • (1) RX Antenna – Analog Tactical
Microwave Equipment Detailed list will be provided as part of as-built records.	<u>New microwave radios, dish antennas, and associated cabling and hardware for the following paths:</u> • Rockdale – WJJO • WJJO – Sun Prairie <u>Rerouted microwave radios, dish antennas, and associated cabling and hardware for the following paths:</u> • CCB – Stoughton WT • Stoughton WT – Rockdale

New Equipment List, Detailed Level

The following is a detailed list of the new equipment to be provided according to this Amendment.

Part Number	Description	Quantity	Area
NSC and Dispatch			
NS-PNSD	SERVER,PREMIER NSC,VMWARE	1	NSC and Dispatch
NS-SN5K	SERVICE,SYBASE LICENSE	2	NSC and Dispatch
NM-SU3K	STORAGE ARRAY NETWORK, NETAPP SAN	1	NSC and Dispatch
MANM-NSG9C	License,Quad Mode Vocoder	1	NSC and Dispatch
NM-NG2A	LICENSE,SQL ENTERPRISE EDITION	1	NSC and Dispatch
NM-VM2B	SOFTWARE,PREMIER CORE,VM	1	NSC and Dispatch
VS-CR51	ROUTER,3925,AC,DATA	1	NSC and Dispatch
VSEPOVM	Software, Epolicy Orch VM	1	NSC and Dispatch
SS-SN9P	SERVICE,SUMS	1	NSC and Dispatch
NS-PNSD	SERVER,PREMIER NSC,VMWARE	1	NSC and Dispatch
NS-SN5K	SERVICE,SYBASE LICENSE	2	NSC and Dispatch
NM-SU3L	STORAGE ARRAY NETWORK NETAPP SAN-HA	1	NSC and Dispatch
MANM-NSG9C	License,Quad Mode Vocoder	1	NSC and Dispatch
NM-NG2A	LICENSE,SQL ENTERPRISE EDITION	1	NSC and Dispatch
NM-VM2B	SOFTWARE,PREMIER CORE,VM	1	NSC and Dispatch
NM-VM2C	SOFTWARE,RSMPRO,VM	1	NSC and Dispatch
VSVS02	VIDA Security, NSC	1	NSC and Dispatch
VS-CR51	ROUTER,3925,AC,DATA	1	NSC and Dispatch
NS-PKGBN	PACKAGE,BEON,FOUNDATION,+10 USERS	1	NSC and Dispatch
BM-FW2K	LICENSE,BEON PC CLIENT,MS WINDOWS	5	NSC and Dispatch
BM-FW2E	App,BeON Android or IOS Client	440	NSC and Dispatch
UD-ZN4Z	CONSOLE,SYMPHONY,BUNDLE,PREMIER	35	NSC and Dispatch
Cisco	UWM Backup Firewall	1	NSC and Dispatch
Analog Tactical			
Sinclair	Combiner Addition	7	Analog Tactical
EA101135V106	Module,Site Voter,Svm-2,Analog Voter	7	Analog Tactical
SXHMCX	Station,Conv MASTR III,150.8-174MHz,110W	1	Analog Tactical
SXHMCX	Station,Conv MASTR III,150.8-174MHz,110W	1	Analog Tactical
SXHMCX	Station,Conv MASTR III,150.8-174MHz,110W	1	Analog Tactical
SXHMCX	Station,Conv MASTR III,150.8-174MHz,110W	1	Analog Tactical
SXHMCX	Station,Conv MASTR III,150.8-174MHz,110W	1	Analog Tactical
SXHMCX	Station,Conv MASTR III,150.8-174MHz,110W	1	Analog Tactical
SXHMCX	Station,Conv MASTR III,150.8-174MHz,110W	1	Analog Tactical
Sinclair	Combiner Addition	1	AT DeForest
KRD103106/264	Multiplexer,CP,12Ch,w/o IEA,+24DPS	1	AT DeForest
EA101135V106	Module,Site Voter,Svm-2,Analog Voter	1	AT DeForest
Sinclair	Antenna,150-160MHz,Omni	1	AT DeForest

Sinclair	Antenna,Broadband,6 DBd	1	AT DeForest
SXHMCX	Station,Conv MASTR III,150.8-174MHz,110W	1	AT DeForest
SXHMCX	Station,Conv MASTR III,150.8-174MHz,110W	1	AT DeForest
Sinclair (MISC-MTRL-PO-REF)	Combiner Addition	1	AT Stoughton
KRD103106/264	Multiplexer,CP,12Ch,w/o IEA,+24DPS	1	AT Stoughton
EA101135V106	Module,Site Voter,Svm-2,Analog Voter	1	AT Stoughton
Sinclair	Antenna,150-160MHz,Omni	1	AT Stoughton
Sinclair	Antenna,Broadband,6 DBd	1	AT Stoughton
SXHMCX	Station,Conv MASTR III,150.8-174MHz,110W	1	AT Stoughton
SXHMCX	Station,Conv MASTR III,150.8-174MHz,110W	1	AT Stoughton
Sinclair	Combiner Addition	1	AT WJJO
KRD103106/264	Multiplexer,CP,12Ch,w/o IEA,+24DPS	1	AT WJJO
EA101135V106	Module,Site Voter,Svm-2,Analog Voter	1	AT WJJO
Sinclair	Antenna,150-160MHz,Omni	1	AT WJJO
Sinclair	Antenna,Broadband,6 DBd	1	AT WJJO
SXHMCX	Station,Conv MASTR III,150.8-174MHz,110W	1	AT WJJO
SXHMCX	Station,Conv MASTR III,150.8-174MHz,110W	1	AT WJJO
Sinclair	Combiner Addition	1	AT Brigham
KRD103106/264	Multiplexer,CP,12Ch,w/o IEA,+24DPS	1	AT Brigham
EA101135V106	Module,Site Voter,Svm-2,Analog Voter	1	AT Brigham
Sinclair	Antenna,150-160MHz,Omni	1	AT Brigham
Sinclair	Antenna,Broadband,6 DBd	1	AT Brigham
SXHMCX	Station,Conv MASTR III,150.8-174MHz,110W	1	AT Brigham
SXHMCX	Station,Conv MASTR III,150.8-174MHz,110W	1	AT Brigham

Mutual Aid

SXHMCX	Station,Conv MASTR III,150.8-174MHz,110W	1	Brigham MA
SXHMCX	Station,Conv MASTR III,150.8-174MHz,110W	1	Brigham MA
SXHMCX	Station,Conv MASTR III,150.8-174MHz,110W	1	Brigham MA
SXHMCX	Station,Conv MASTR III,150.8-174MHz,110W	1	Brigham MA
SXHMCX	Station,Conv MASTR III,150.8-174MHz,110W	1	Brigham MA
SXHMCX	Station,Conv MASTR III,150.8-174MHz,110W	1	Brigham MA
KRD103106/264	Multiplexer,CP,12Ch,w/o IEA,+24DPS	2	Brigham MA
EA101135V106	Module,Site Voter,Svm-2,Analog Voter	6	Brigham MA
Sinclair	Antenna,150-160MHz,Omni	1	Brigham MA
Sinclair	Antenna,Broadband,6 DBd	1	Brigham MA
SA-MD7A-DC	Network Sentry,IP Simulcast, DC	1	Brigham MA
VSCR05	Alcatel 7705 SAR Router	1	Brigham MA
VSCR07	Router,Cisco,2911,AC,Sec,w/EtherSwitch	1	Brigham MA
DC Plant	Brigham DC Plant	1	Brigham MA
Generator	Brigham Generator	1	Brigham MA
Shelter	Brigham Shelter	1	Brigham MA

P25 Sites

SC-VTXP25-DC	MASTR V IP Simulcast,Tx Site,Comm Equip	1	DeForest
VSCR14	Router,2921,DC,Security,w/Ether Switch	1	DeForest

VS-CU5C	SWITCH,CISCO ME 3400E,DC,24-PORT	1	DeForest
VS-CU6G	MODULE,CISCO EHWIC-4ESG 4-PORT GIG INT	1	DeForest
SC-MD7A-DC	Network Sentry,IP Simulcast	1	DeForest
SA-KRE1011217/02	ANTENNA,1574-1606 MHZ,WITH MOUNT	2	DeForest
PT-018602-001	Filter,Surge Protector,800-2500MHz	2	DeForest
MASV-HTXMV	Station,MASTR V,P25T,150-174 MHz	1	DeForest
MASV-NSG9K	Feature,Software,P25 Phase 2	1	DeForest
SV-AW5M	Power Amplifier,Linear,150-174MHz	1	DeForest
SV-RB3K	Busbar,HPA/PS,MASTR V	1	DeForest
SV-PS2P-DC	Power Supply,-48V,DC,MASTR V	1	DeForest
SV-RB3B	Power Supply Shelf,1st Position	1	DeForest
SV-RB3G	Shelf,14-Slot,Open Rack	1	DeForest
SV-PM1C	Processor,Baseband Module,MASTR V	1	DeForest
MASV-NCN7T	Frame,Preselector,MASTR V VHF	1	DeForest
SV-NZN8S-DC	Fan Tray,MASTR V, DC	1	DeForest
MASV-NRF5D	Preselector,150-160MHz,MASTR V	1	DeForest
MASV-HTXMV	Station,MASTR V,P25T,150-174 MHz	1	DeForest
MASV-NSG9K	Feature,Software,P25 Phase 2	1	DeForest
SV-AW5M	Power Amplifier,Linear,150-174MHz	1	DeForest
SV-RB3K	Busbar,HPA/PS,MASTR V	1	DeForest
SV-PS2P-DC	Power Supply,-48V,DC,MASTR V	1	DeForest
SV-RB3A	Power Supply Shelf,2nd Position	1	DeForest
MASV-NRF5D	Preselector,150-160MHz,MASTR V	1	DeForest
MASV-HTXMV	Station,MASTR V,P25T,150-174 MHz	1	DeForest
MASV-NSG9K	Feature,Software,P25 Phase 2	1	DeForest
SV-AW5M	Power Amplifier,Linear,150-174MHz	1	DeForest
SV-RB3K	Busbar,HPA/PS,MASTR V	1	DeForest
SV-PS2P-DC	Power Supply,-48V,DC,MASTR V	1	DeForest
SV-RB3C	Power Supply Shelf	1	DeForest
SV-PM1C	Processor,Baseband Module,MASTR V	1	DeForest
MASV-NRF5D	Preselector,150-160MHz,MASTR V	1	DeForest
MASV-HTXMV	Station,MASTR V,P25T,150-174 MHz	1	DeForest
MASV-NSG9K	Feature,Software,P25 Phase 2	1	DeForest
SV-AW5M	Power Amplifier,Linear,150-174MHz	1	DeForest
SV-RB3K	Busbar,HPA/PS,MASTR V	1	DeForest
SV-PS2P-DC	Power Supply,-48V,DC,MASTR V	1	DeForest
SV-RB3C	Power Supply Shelf	1	DeForest
MASV-NRF5D	Preselector,150-160MHz,MASTR V	1	DeForest
MASV-HTXMV	Station,MASTR V,P25T,150-174 MHz	1	DeForest
MASV-NSG9K	Feature,Software,P25 Phase 2	1	DeForest
SV-AW5M	Power Amplifier,Linear,150-174MHz	1	DeForest
SV-RB3K	Busbar,HPA/PS,MASTR V	1	DeForest
SV-PS2P-DC	Power Supply,-48V,DC,MASTR V	1	DeForest
SV-RB3C	Power Supply Shelf	1	DeForest
SV-RB3G	Shelf,14-Slot,Open Rack	1	DeForest
SV-PM1C	Processor,Baseband Module,MASTR V	1	DeForest
MASV-NCN7T	Frame,Preselector,MASTR V VHF	1	DeForest

MASV-NRF5D	Preselector,150-160MHz,MASTR V	1	DeForest
MASV-HTXMV	Station,MASTR V,P25T,150-174 MHz	1	DeForest
MASV-NSG9K	Feature,Software,P25 Phase 2	1	DeForest
SV-AW5M	Power Amplifier,Linear,150-174MHz	1	DeForest
SV-RB3K	Busbar,HPA/PS,MASTR V	1	DeForest
SV-PS2P-DC	Power Supply,-48V,DC,MASTR V	1	DeForest
SV-SP2U	Programming,IP Simulcast	1	DeForest
SV-RB3C	Power Supply Shelf	1	DeForest
MASV-NRF5D	Preselector,150-160MHz,MASTR V	1	DeForest
MASV-HTXMV	Station,MASTR V,P25T,150-174 MHz	1	DeForest
MASV-NSG9K	Feature,Software,P25 Phase 2	1	DeForest
SV-AW5M	Power Amplifier,Linear,150-174MHz	1	DeForest
SV-RB3K	Busbar,HPA/PS,MASTR V	1	DeForest
SV-PS2P-DC	Power Supply,-48V,DC,MASTR V	1	DeForest
SV-RB3C	Power Supply Shelf	1	DeForest
SV-PM1C	Processor,Baseband Module,MASTR V	1	DeForest
MASV-NRF5D	Preselector,150-160MHz,MASTR V	1	DeForest
MASV-HTXMV	Station,MASTR V,P25T,150-174 MHz	1	DeForest
MASV-NSG9K	Feature,Software,P25 Phase 2	1	DeForest
SV-AW5M	Power Amplifier,Linear,150-174MHz	1	DeForest
SV-RB3K	Busbar,HPA/PS,MASTR V	1	DeForest
SV-PS2P-DC	Power Supply,-48V,DC,MASTR V	1	DeForest
SV-RB3C	Power Supply Shelf	1	DeForest
MASV-NRF5D	Preselector,150-160MHz,MASTR V	1	DeForest
MASV-NMR1H	Rack,Open,86 in(Xtra Dp) with support	1	DeForest
SV-ZN9L	Panel,Splitter, Expansion Cabinet	1	DeForest
MASV-HTXMV	Station,MASTR V,P25T,150-174 MHz	1	DeForest
MASV-NSG9K	Feature,Software,P25 Phase 2	1	DeForest
SV-AW5M	Power Amplifier,Linear,150-174MHz	1	DeForest
SV-RB3K	Busbar,HPA/PS,MASTR V	1	DeForest
SV-PS2P-DC	Power Supply,-48V,DC,MASTR V	1	DeForest
SV-RB3B	Power Supply Shelf,1st Position	1	DeForest
SV-RB3G	Shelf,14-Slot,Open Rack	1	DeForest
SV-PM1C	Processor,Baseband Module,MASTR V	1	DeForest
MASV-NCN7T	Frame,Preselector,MASTR V VHF	1	DeForest
SV-NZN8S-DC	Fan Tray,MASTR V, DC	1	DeForest
SV-ZN9K	PANEL,XCONNECT,MASTR V	1	DeForest
MASV-NRF5D	Preselector,150-160MHz,MASTR V	1	DeForest
MASV-HTXMV	Station,MASTR V,P25T,150-174 MHz	1	DeForest
MASV-NSG9K	Feature,Software,P25 Phase 2	1	DeForest
SV-AW5M	Power Amplifier,Linear,150-174MHz	1	DeForest
SV-RB3K	Busbar,HPA/PS,MASTR V	1	DeForest
SV-PS2P-DC	Power Supply,-48V,DC,MASTR V	1	DeForest
SV-RB3A	Power Supply Shelf,2nd Position	1	DeForest
MASV-NRF5D	Preselector,150-160MHz,MASTR V	1	DeForest
SXMR1G	Rack,Open,86 in,Extra Deep	1	DeForest
Sinclair	Antenna,150-174MHz	1	DeForest

Sinclair	Antenna,150-174MHz	1	DeForest
Sinclair	Antenna,150-174MHz	1	DeForest
Sinclair	Antenna,150-174MHz	1	DeForest
Sinclair	Combiner/Multicoupler, 10 CH	1	DeForest
Sinclair	Antenna,150-174MHz	1	Rockdale
Sinclair	Antenna,150-174MHz	1	Rockdale
Sinclair	Antenna,150-174MHz	1	Rockdale
Sinclair	Antenna,150-174MHz	1	Rockdale
Sinclair	Combiner/Multicoupler, 10 CH	1	Rockdale
SC-VTXP25-DC	MASTR V IP Simulcast,Tx Site,Comm Equip	1	Stoughton
VSCR14	Router,2921,DC,Security,w/Ether Switch	1	Stoughton
VS-CU5C	SWITCH,CISCO ME 3400E,DC,24-PORT	1	Stoughton
VS-CU6G	MODULE,CISCO EHWIC-4ESG 4-PORT GIG INT	1	Stoughton
SC-MD7A-DC	Network Sentry,IP Simulcast	1	Stoughton
SA-KRE1011217/02	ANTENNA,1574-1606 MHZ,WITH MOUNT	2	Stoughton
PT-018602-001	Filter,Surge Protector,800-2500MHz	2	Stoughton
MASV-HTXMV	Station,MASTR V,P25T,150-174 MHz	1	Stoughton
MASV-NSG9K	Feature,Software,P25 Phase 2	1	Stoughton
SV-AW5M	Power Amplifier,Linear,150-174MHz	1	Stoughton
SV-RB3K	Busbar,HPA/PS,MASTR V	1	Stoughton
SV-PS2P-DC	Power Supply,-48V,DC,MASTR V	1	Stoughton
SV-RB3B	Power Supply Shelf,1st Position	1	Stoughton
SV-RB3G	Shelf,14-Slot,Open Rack	1	Stoughton
SV-PM1C	Processor,Baseband Module,MASTR V	1	Stoughton
MASV-NCN7T	Frame,Preselector,MASTR V VHF	1	Stoughton
SV-NZN8S-DC	Fan Tray,MASTR V, DC	1	Stoughton
MASV-NRF5D	Preselector,150-160MHz,MASTR V	1	Stoughton
MASV-HTXMV	Station,MASTR V,P25T,150-174 MHz	1	Stoughton
MASV-NSG9K	Feature,Software,P25 Phase 2	1	Stoughton
SV-AW5M	Power Amplifier,Linear,150-174MHz	1	Stoughton
SV-RB3K	Busbar,HPA/PS,MASTR V	1	Stoughton
SV-PS2P-DC	Power Supply,-48V,DC,MASTR V	1	Stoughton
SV-RB3A	Power Supply Shelf,2nd Position	1	Stoughton
MASV-NRF5D	Preselector,150-160MHz,MASTR V	1	Stoughton
MASV-HTXMV	Station,MASTR V,P25T,150-174 MHz	1	Stoughton
MASV-NSG9K	Feature,Software,P25 Phase 2	1	Stoughton
SV-AW5M	Power Amplifier,Linear,150-174MHz	1	Stoughton
SV-RB3K	Busbar,HPA/PS,MASTR V	1	Stoughton
SV-PS2P-DC	Power Supply,-48V,DC,MASTR V	1	Stoughton
SV-RB3C	Power Supply Shelf	1	Stoughton
SV-PM1C	Processor,Baseband Module,MASTR V	1	Stoughton
MASV-NRF5D	Preselector,150-160MHz,MASTR V	1	Stoughton
MASV-HTXMV	Station,MASTR V,P25T,150-174 MHz	1	Stoughton
MASV-NSG9K	Feature,Software,P25 Phase 2	1	Stoughton
SV-AW5M	Power Amplifier,Linear,150-174MHz	1	Stoughton
SV-RB3K	Busbar,HPA/PS,MASTR V	1	Stoughton
SV-PS2P-DC	Power Supply,-48V,DC,MASTR V	1	Stoughton

SV-RB3C	Power Supply Shelf	1	Stoughton
MASV-NRF5D	Preselector,150-160MHz,MASTR V	1	Stoughton
MASV-HTXMV	Station,MASTR V,P25T,150-174 MHz	1	Stoughton
MASV-NSG9K	Feature,Software,P25 Phase 2	1	Stoughton
SV-AW5M	Power Amplifier,Linear,150-174MHz	1	Stoughton
SV-RB3K	Busbar,HPA/PS,MASTR V	1	Stoughton
SV-PS2P-DC	Power Supply,-48V,DC,MASTR V	1	Stoughton
SV-RB3C	Power Supply Shelf	1	Stoughton
SV-RB3G	Shelf,14-Slot,Open Rack	1	Stoughton
SV-PM1C	Processor,Baseband Module,MASTR V	1	Stoughton
MASV-NCN7T	Frame,Preselector,MASTR V VHF	1	Stoughton
MASV-NRF5D	Preselector,150-160MHz,MASTR V	1	Stoughton
MASV-HTXMV	Station,MASTR V,P25T,150-174 MHz	1	Stoughton
MASV-NSG9K	Feature,Software,P25 Phase 2	1	Stoughton
SV-AW5M	Power Amplifier,Linear,150-174MHz	1	Stoughton
SV-RB3K	Busbar,HPA/PS,MASTR V	1	Stoughton
SV-PS2P-DC	Power Supply,-48V,DC,MASTR V	1	Stoughton
SV-SP2U	Programming,IP Simulcast	1	Stoughton
SV-RB3C	Power Supply Shelf	1	Stoughton
MASV-NRF5D	Preselector,150-160MHz,MASTR V	1	Stoughton
MASV-HTXMV	Station,MASTR V,P25T,150-174 MHz	1	Stoughton
MASV-NSG9K	Feature,Software,P25 Phase 2	1	Stoughton
SV-AW5M	Power Amplifier,Linear,150-174MHz	1	Stoughton
SV-RB3K	Busbar,HPA/PS,MASTR V	1	Stoughton
SV-PS2P-DC	Power Supply,-48V,DC,MASTR V	1	Stoughton
SV-RB3C	Power Supply Shelf	1	Stoughton
SV-PM1C	Processor,Baseband Module,MASTR V	1	Stoughton
MASV-NRF5D	Preselector,150-160MHz,MASTR V	1	Stoughton
MASV-HTXMV	Station,MASTR V,P25T,150-174 MHz	1	Stoughton
MASV-NSG9K	Feature,Software,P25 Phase 2	1	Stoughton
SV-AW5M	Power Amplifier,Linear,150-174MHz	1	Stoughton
SV-RB3K	Busbar,HPA/PS,MASTR V	1	Stoughton
SV-PS2P-DC	Power Supply,-48V,DC,MASTR V	1	Stoughton
SV-RB3C	Power Supply Shelf	1	Stoughton
MASV-NRF5D	Preselector,150-160MHz,MASTR V	1	Stoughton
MASV-NMR1H	Rack,Open,86 in(Xtra Dp) with support	1	Stoughton
SV-ZN9L	Panel,Splitter, Expansion Cabinet	1	Stoughton
MASV-HTXMV	Station,MASTR V,P25T,150-174 MHz	1	Stoughton
MASV-NSG9K	Feature,Software,P25 Phase 2	1	Stoughton
SV-AW5M	Power Amplifier,Linear,150-174MHz	1	Stoughton
SV-RB3K	Busbar,HPA/PS,MASTR V	1	Stoughton
SV-PS2P-DC	Power Supply,-48V,DC,MASTR V	1	Stoughton
SV-RB3B	Power Supply Shelf,1st Position	1	Stoughton
SV-RB3G	Shelf,14-Slot,Open Rack	1	Stoughton
SV-PM1C	Processor,Baseband Module,MASTR V	1	Stoughton
MASV-NCN7T	Frame,Preselector,MASTR V VHF	1	Stoughton
SV-NZN8S-DC	Fan Tray,MASTR V, DC	1	Stoughton

SV-ZN9K	PANEL,XCONNECT,MASTR V	1	Stoughton
MASV-NRF5D	Preselector,150-160MHz,MASTR V	1	Stoughton
MASV-HTXMV	Station,MASTR V,P25T,150-174 MHz	1	Stoughton
MASV-NSG9K	Feature,Software,P25 Phase 2	1	Stoughton
SV-AW5M	Power Amplifier,Linear,150-174MHz	1	Stoughton
SV-RB3K	Busbar,HPA/PS,MASTR V	1	Stoughton
SV-PS2P-DC	Power Supply,-48V,DC,MASTR V	1	Stoughton
SV-RB3A	Power Supply Shelf,2nd Position	1	Stoughton
MASV-NRF5D	Preselector,150-160MHz,MASTR V	1	Stoughton
SXMR1G	Rack,Open,86 in,Extra Deep	1	Stoughton
Sinclair	Antenna,150-174MHz	1	Stoughton
Sinclair	Antenna,150-174MHz	1	Stoughton
Sinclair	Antenna,150-174MHz	1	Stoughton
Sinclair	Antenna,150-174MHz	1	Stoughton
Sinclair	Combiner/Multicoupler, 10 CH	1	Stoughton
SC-VTXP25-DC	MASTR V IP Simulcast,Tx Site,Comm Equip	1	WJJO
VSCR14	Router,2921,DC,Security,w/Ether Switch	1	WJJO
VS-CU5C	SWITCH,CISCO ME 3400E,DC,24-PORT	1	WJJO
VS-CU6G	MODULE,CISCO EHWIC-4ESG 4-PORT GIG INT	1	WJJO
SC-MD7A-DC	Network Sentry,IP Simulcast	1	WJJO
SA-KRE1011217/02	ANTENNA,1574-1606 MHZ,WITH MOUNT	2	WJJO
PT-018602-001	Filter,Surge Protector,800-2500MHz	2	WJJO
MASV-HTXMV	Station,MASTR V,P25T,150-174 MHz	1	WJJO
MASV-NSG9K	Feature,Software,P25 Phase 2	1	WJJO
SV-AW5M	Power Amplifier,Linear,150-174MHz	1	WJJO
SV-RB3K	Busbar,HPA/PS,MASTR V	1	WJJO
SV-PS2P-DC	Power Supply,-48V,DC,MASTR V	1	WJJO
SV-RB3B	Power Supply Shelf,1st Position	1	WJJO
SV-RB3G	Shelf,14-Slot,Open Rack	1	WJJO
SV-PM1C	Processor,Baseband Module,MASTR V	1	WJJO
MASV-NCN7T	Frame,Preselector,MASTR V VHF	1	WJJO
SV-NZN8S-DC	Fan Tray,MASTR V, DC	1	WJJO
MASV-NRF5D	Preselector,150-160MHz,MASTR V	1	WJJO
MASV-HTXMV	Station,MASTR V,P25T,150-174 MHz	1	WJJO
MASV-NSG9K	Feature,Software,P25 Phase 2	1	WJJO
SV-AW5M	Power Amplifier,Linear,150-174MHz	1	WJJO
SV-RB3K	Busbar,HPA/PS,MASTR V	1	WJJO
SV-PS2P-DC	Power Supply,-48V,DC,MASTR V	1	WJJO
SV-RB3A	Power Supply Shelf,2nd Position	1	WJJO
MASV-NRF5D	Preselector,150-160MHz,MASTR V	1	WJJO
MASV-HTXMV	Station,MASTR V,P25T,150-174 MHz	1	WJJO
MASV-NSG9K	Feature,Software,P25 Phase 2	1	WJJO
SV-AW5M	Power Amplifier,Linear,150-174MHz	1	WJJO
SV-RB3K	Busbar,HPA/PS,MASTR V	1	WJJO
SV-PS2P-DC	Power Supply,-48V,DC,MASTR V	1	WJJO
SV-RB3C	Power Supply Shelf	1	WJJO
SV-PM1C	Processor,Baseband Module,MASTR V	1	WJJO

MASV-NRF5D	Preselector,150-160MHz,MASTR V	1	WJJO
MASV-HTXMV	Station,MASTR V,P25T,150-174 MHz	1	WJJO
MASV-NSG9K	Feature,Software,P25 Phase 2	1	WJJO
SV-AW5M	Power Amplifier,Linear,150-174MHz	1	WJJO
SV-RB3K	Busbar,HPA/PS,MASTR V	1	WJJO
SV-PS2P-DC	Power Supply,-48V,DC,MASTR V	1	WJJO
SV-RB3C	Power Supply Shelf	1	WJJO
MASV-NRF5D	Preselector,150-160MHz,MASTR V	1	WJJO
MASV-HTXMV	Station,MASTR V,P25T,150-174 MHz	1	WJJO
MASV-NSG9K	Feature,Software,P25 Phase 2	1	WJJO
SV-AW5M	Power Amplifier,Linear,150-174MHz	1	WJJO
SV-RB3K	Busbar,HPA/PS,MASTR V	1	WJJO
SV-PS2P-DC	Power Supply,-48V,DC,MASTR V	1	WJJO
SV-RB3C	Power Supply Shelf	1	WJJO
SV-RB3G	Shelf,14-Slot,Open Rack	1	WJJO
SV-PM1C	Processor,Baseband Module,MASTR V	1	WJJO
MASV-NCN7T	Frame,Preselector,MASTR V VHF	1	WJJO
MASV-NRF5D	Preselector,150-160MHz,MASTR V	1	WJJO
MASV-HTXMV	Station,MASTR V,P25T,150-174 MHz	1	WJJO
MASV-NSG9K	Feature,Software,P25 Phase 2	1	WJJO
SV-AW5M	Power Amplifier,Linear,150-174MHz	1	WJJO
SV-RB3K	Busbar,HPA/PS,MASTR V	1	WJJO
SV-PS2P-DC	Power Supply,-48V,DC,MASTR V	1	WJJO
SV-SP2U	Programming,IP Simulcast	1	WJJO
SV-RB3C	Power Supply Shelf	1	WJJO
MASV-NRF5D	Preselector,150-160MHz,MASTR V	1	WJJO
MASV-HTXMV	Station,MASTR V,P25T,150-174 MHz	1	WJJO
MASV-NSG9K	Feature,Software,P25 Phase 2	1	WJJO
SV-AW5M	Power Amplifier,Linear,150-174MHz	1	WJJO
SV-RB3K	Busbar,HPA/PS,MASTR V	1	WJJO
SV-PS2P-DC	Power Supply,-48V,DC,MASTR V	1	WJJO
SV-RB3C	Power Supply Shelf	1	WJJO
SV-PM1C	Processor,Baseband Module,MASTR V	1	WJJO
MASV-NRF5D	Preselector,150-160MHz,MASTR V	1	WJJO
MASV-HTXMV	Station,MASTR V,P25T,150-174 MHz	1	WJJO
MASV-NSG9K	Feature,Software,P25 Phase 2	1	WJJO
SV-AW5M	Power Amplifier,Linear,150-174MHz	1	WJJO
SV-RB3K	Busbar,HPA/PS,MASTR V	1	WJJO
SV-PS2P-DC	Power Supply,-48V,DC,MASTR V	1	WJJO
SV-RB3C	Power Supply Shelf	1	WJJO
MASV-NRF5D	Preselector,150-160MHz,MASTR V	1	WJJO
MASV-NMR1H	Rack,Open,86 in(Xtra Dp) with support	1	WJJO
SV-ZN9L	Panel,Splitter, Expansion Cabinet	1	WJJO
MASV-HTXMV	Station,MASTR V,P25T,150-174 MHz	1	WJJO
MASV-NSG9K	Feature,Software,P25 Phase 2	1	WJJO
SV-AW5M	Power Amplifier,Linear,150-174MHz	1	WJJO
SV-RB3K	Busbar,HPA/PS,MASTR V	1	WJJO

SV-PS2P-DC	Power Supply,-48V,DC,MASTR V	1	WJJO
SV-RB3B	Power Supply Shelf,1st Position	1	WJJO
SV-RB3G	Shelf,14-Slot,Open Rack	1	WJJO
SV-PM1C	Processor,Baseband Module,MASTR V	1	WJJO
MASV-NCN7T	Frame,Preselector,MASTR V VHF	1	WJJO
SV-NZN8S-DC	Fan Tray,MASTR V, DC	1	WJJO
SV-ZN9K	PANEL,XCONNECT,MASTR V	1	WJJO
MASV-NRF5D	Preselector,150-160MHz,MASTR V	1	WJJO
MASV-HTXMV	Station,MASTR V,P25T,150-174 MHz	1	WJJO
MASV-NSG9K	Feature,Software,P25 Phase 2	1	WJJO
SV-AW5M	Power Amplifier,Linear,150-174MHz	1	WJJO
SV-RB3K	Busbar,HPA/PS,MASTR V	1	WJJO
SV-PS2P-DC	Power Supply,-48V,DC,MASTR V	1	WJJO
SV-RB3A	Power Supply Shelf,2nd Position	1	WJJO
MASV-NRF5D	Preselector,150-160MHz,MASTR V	1	WJJO
SXMR1G	Rack,Open,86 in,Extra Deep	1	WJJO
Sinclair	Antenna,150-174MHz	1	WJJO
Sinclair	Antenna,150-174MHz	1	WJJO
Sinclair	Antenna,150-174MHz	1	WJJO
Sinclair	Antenna,150-174MHz	1	WJJO
Sinclair	Combiner/Multicoupler, 10 CH	1	WJJO

Paging

Sinclair	Combiner	1	Paging DeForest
KRD103106/264	Multiplexer,CP,12Ch,w/o IEA,+24DPS	1	Paging DeForest
Sinclair	Antenna,150-160MHz	1	Paging DeForest
SXHMCX	Station,Conv MASTR III,150.8-174MHz,110W	1	Paging DeForest
Sinclair	Combiner	1	Paging Stoughton
KRD103106/264	Multiplexer,CP,12Ch,w/o IEA,+24DPS	1	Paging Stoughton
Sinclair	Antenna,150-160MHz	1	Paging Stoughton
SXHMCX	Station,Conv MASTR III,150.8-174MHz,110W	1	Paging Stoughton

Consoles

UD-SW1B	SW,SYMPHONY PC APP & WIN 8 IMAGE	1	Backup Dispatch
UD-ZN4Z	CONSOLE,SYMPHONY,BUNDLE,PREMIER	4	Backup Dispatch
UD-AB1A	SPEAKER, NANO, SYMPHONY	8	Backup Dispatch
UD-CU6U	MONITOR, 23" CLASS,HIGH DEF	4	Backup Dispatch
UD-AB1K	CABLE,DISPLAYPORT TO DVI-D,10FT	4	Backup Dispatch
UD-AB1F	MOUSE, OPTICAL, USB, SCROLL WHEEL	4	Backup Dispatch
UD-AB1G	KEYBOARD, 104 KEY, USB, HUB	4	Backup Dispatch
UD-AB1E	DUAL FOOTSWITCH, USB, SYMPHONY	4	Backup Dispatch
UD-AB1M	DESK MIC, DB9	4	Backup Dispatch
UD-AB1B	JACK BOX, 6 WIRE	8	Backup Dispatch
CM-022218-3006WJ	Adapter,6 Wire Jackbox to Headset	8	Backup Dispatch

Attachment I-2 – Site Equipment Returned to Harris, Summary Level

The following is a summary list of the equipment being returned to Harris from each site/location.

City County Building	27 Dell Vista PCs29 Enhanced Cable Enclosures
	
	Dane does not want:
	• 27 Dell PC keyboards
	• 27 Dell PC mice
	• 1 Lexmark printer
	• 14 Sequoia
	
	Unsure
	• 3 Sun SPARC Enterprise T5120 servers (checking to see if County IM wants them)
	• Transfer to DaneCom spares inventory if having specific value:
	  ○ Cisco 3925
	  ○ Cisco switch

UW Madison	Unsure
	• 2 Sun SPARC Enterprise T5120 servers (checking to see if County IM wants them)
	• Transfer to DaneCom spares inventory if having specific value:
	  ○ Cisco 3900 series
	  ○ Cisco switch
	  ○ Cisco 5510

Attachment 7I-3 – Site Equipment Taken out of Service

The following is a summary list of the equipment to be installed at each site/location.

City County Building	• NSS rack with power bars and leftover blank panels • 4 Dell R610/T610 servers • Any 19" NEC TechGlobal touch-screen monitors
	• NSS rack with power bars and leftover blank panels • 1 Dell R610 server

Additional Equipment / Software / Services		
Four (4) Symphony Consoles	$240,000	
ISSI Gateway for City of Madison	$102,500	*Includes 12 talkpaths (If additional talkpaths required, Harris shall provide up to 20 at no additional charge)*
4 Additional Talk-paths for WISCOM ISSI	$7,500	*Includes 20 for WISCOM (16 were purchased under the original contract)*
372 Additional console Flex-paths (12 additional per console)	$69,750	*Includes 12 additional Flexpaths for 31 consoles*
19 Touchscreen Monitors in Lieu of Standard Monitors	$41,304	*Includes 19 monitors*
Fuel Level Sensors on Generator Fuel Tanks at 5 Sites	$28,100	
Move IRIM to EDC	$29,600	
Re-route T1 from CCB to Roxbury & Eisner	$6,000	
Move Lighting Control on Roxbury	$3,000	
Subtotal of Additional Equipment and Services	**$527,754**	
Maintenance Credit		
Annual Maintenance Credit	($45,374)	
Total Six (6) Year Maintenance Credit*	**($272,246)**	

Item	**Price**	**Value****
Additional Equipment / Software / Services	$0	*$527,754*
Maintenance Credit	($272,246)	*$272,246*
Coverage of Maintenance Exclusions***	$0	*$700,000*
Total Amendment 7 Price	**($272,246)**	*$1,500,000*

To be fully applied to the Annual Fee for Maintenance Year 3 (2019)

****Value of Additional Equipment / Software / Services provided by Harris at no cost to the County***

*****Includees repair or replacement and preventative maintenance of all equipment (except batteries and necessary tower climbs)***

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EXHIBIT 7C

SOFTWARE LICENSE AGREEMENT

This License Agreement ("Agreement") is made on _____, 2016, (the "Effective Date") between Harris Corporation, a Delaware Corporation, through its Communication Systems Segment, ("LICENSOR") with offices at 221 Jefferson Ridge Parkway, Lynchburg, VA 24501 and County of Dane, Wisconsin ("LICENSEE"). LICENSOR is the owner of certain wireless communications software programs and LICENSEE desires to obtain a license from LICENSOR to use such wireless communications programs.

1.0 Definitions.

1.1 "Designated Systems": Means the Harris system(s), products, and Designated Terminals purchased by Buyer and identified in the Primary Agreement for which the Licensed Programs and documentation are intended to be used.

1.2 "Designated Terminals": Means the LICENSOR's Terminals purchased by LICENSEE.

1.3 "Licensed Programs": The term Licensed Programs shall mean the wireless communications computer programs in software or firmware supplied under this Agreement by LICENSOR in binary object code format to the LICENSEE (stand alone or in conjunction with the purchase of a LICENSOR wireless communications system.) Licensed Programs shall also include all other material related to the Licensed Programs supplied by LICENSOR to LICENSEE hereunder, and which may be in machine readable or printed form, including but not limited to user documentation and/or manuals.

1.4 "Open Source Software": Means software with either freely obtainable source code, license for modification, or permission for free distribution.

1.5 "Open Source Software License": The terms or conditions under which the Open Source Software is licensed.

1.6 "Primary Agreement": The agreement to which this exhibit is attached.

1.7 "Third Party Software Products": Shall mean programs that are not developed by LICENSOR which are licensed/purchased by LICENSOR for inclusion in its products.

2.0 License Grant for Licensed Programs.

2.1 Subject to the terms of this License Agreement and the performance by Licensee of its obligations hereunder, LICENSOR hereby grants to Licensee, and Licensee hereby accepts from LICENSOR, (a) a personal, non-transferable, non-exclusive, perpetual, limited license to use the Licensed Programs in object code format only and (b) install and execute such Licensed Programs on Licensee's equipment and (c) which are to be used for internal business purposes only. All licensed programs under this License Agreement shall only be used in conjunction with the Designated System. This license does not transfer any right, title, or interest in the Licensed Programs. The license granted authorizes Licensee to use the Licensed Programs in object code format and does not grant any rights to source code.

2.2 LICENSEE will not reproduce, modify, or make derivative works of the Licensed Programs, except that LICENSEE may make one archival, and one inactive backup, copy of the Licensed Programs. In addition, LICENSEE, its agents, consultants and/or its subcontractors will not attempt to reverse engineer, decompile, or reverse-compile any software contained in the Licensed Programs and any attempt to do so shall be a material breach of this License Agreement. With respect to the Licensed Programs, LICENSEE will not alter, deface, discard, or erase any media, documentation, or LICENSOR or Third Party Licensor's trademarks or proprietary rights notices.

2.3 Third Party Software Products may be subject to additional license terms, which, if applicable, are set out in Product Specific License Terms delivered with each product. Additional Third Party license terms and conditions may be found at http://pspc.harris.com/LicenseAgreements/default.aspx. To the extent applicable, LICENSEE shall comply with any additional Third Party Software Product license terms.

2.4 If the Software licensed under this License Agreement contains or is derived from Open Source Software, the terms and conditions governing the use of such Open Source Software are in the Open Source Software Licenses of the copyright owner and not this License Agreement and, to the extent applicable, LICENSEE will comply with the Open Source Software terms License terms. If there is a conflict between the terms and conditions of this License Agreement and the terms and conditions of the Open Source Software Licenses governing Licensee's use of the Open Source Software, the terms and conditions of the license grant of the applicable Open Source Software Licenses will take precedence over the license grants in this License Agreement. If requested by Licensee, Harris will use commercially reasonable efforts to: (i) determine whether any Open Source Software is provided under this License Agreement; (ii) identify the Open Source Software and provide Licensee a copy of the applicable Open Source Software License (or specify where that license may be found).

3.0 Protection and Security of Licensed Programs.

LICENSEE acknowledges and agrees that the Licensed Programs and any materials and/or documentation related thereto, and any portion thereof, supplied by LICENSOR hereunder are proprietary and confidential to LICENSOR or applicable third party licensors and are a valuable commercial asset of LICENSOR or their third party owners. LICENSEE also acknowledges and agrees that LICENSOR and/or the third party licensors have and shall retain all proprietary rights in their respective portions of the Licensed Programs and any materials and/or documentation related thereto. LICENSEE (i) shall respect such proprietary rights, (ii) shall protect LICENSOR and any third party licensor's proprietary rights at least to the extent that it protects its own proprietary information, or such (iii) shall not use the Licensed Programs nor any materials or documentation related thereto except for the purposes for which they are being made available as set forth in this Agreement and (iv) shall not reproduce, print, disclose, or otherwise make said Licensed Programs or materials and/or documentation related thereto available to any third party, in whole or in part, in whatever form, except as permitted in the terms of this Agreement.

4.0 Warranty

Seller warrants, for the greater of a period of one year or, if a longer warranty period for the product containing the Licensed Program is set forth in a Primary Agreement, the longer warranty period shall apply commencing with the date of Licensee's acceptance of their Designated System, that any Licensed Program furnished to Licensee under this License Agreement shall be capable of successfully operating on the Designated System in accordance with the logic defined in the operator's manuals when the system is supplied with correct input data. If, on the basis of evidence submitted to LICENSOR within the term of this warranty, it is shown that any Licensed Program does not meet this warranty, LICENSOR will, at its option, either correct the defect or error in the Licensed Program, free of charge, or make available to Licensee a substitute program. The foregoing warranty is exclusive and in lieu of all other warranties whether written, oral, implied or statutory. **NO IMPLIED OR STATUTORY WARRANTY OF**

MERCHANTABILITY OR FITNESS FOR A PARTICULAR PURPOSE, NONINFRINGEMENT, SHALL APPLY, ALL OF WHICH ARE EXPRESSLY DISCLAIMED BY LICENSOR.

Licensed Programs which have been developed or are owned by a third party licensor and which are sublicensed by LICENSOR to LICENSEE hereunder shall be warranted to LICENSEE only to the extent that the licensor of such sublicensed programs warrants such sublicensed programs to LICENSOR.

In the event that the Licensed Programs do not conform to the representation above, LICENSEE's sole remedy and LICENSOR's sole and exclusive liability shall be to replace such Licensed Programs with the then current released version of such Licensed Programs.

5.0 Limitation of Liability.

5.1 **THE LIMITATION OF LIABILITY PROVISION IN THE PRIMARY AGREEMENT SHALL GOVERN THIS LICENSE AGREEMENT AND SECTION 5.2 SHALL NOT APPLY. IF THERE IS NO LIMITATION OF LIABILITY PROVISION IN THE PRIMARY AGREEMENT, SECTION 5.2 SHALL APPLY.**

5.2 **IN NO EVENT WILL LICENSOR AND/OR ANY THIRD PARTY LICENSOR(S) BE LIABLE FOR ANY SPECIAL, INDIRECT, INCIDENTAL, CONSEQUENTIAL, PUNITIVE OR EXEMPLARY DAMAGES, INCLUDING BUT NOT LIMITED TO ANY DAMAGES RESULTING FROM LOSS OF USE, LOSS OF DATA, LOSS OF PROFITS OR LOSS OF BUSINESS, WHETHER BASED ON CONTRACT, TORT, STRICT LIABILITY OR ANY OTHER THEORY OR FORM OF ACTION, EVEN IF LICENSOR AND/OR ITS THIRD PARTY LICENSOR(S) HAS BEEN ADVISED OF THE POSSIBILITY OF SUCH DAMAGES. LICENSOR'S AND THIRD PARTY LICENSORS', LIABILITY IN CONTRACT, TORT OR OTHERWISE ARISING OUT OF OR IN CONNECTION WITH THIS LICENSE AGREEMENT OR THE USE OF THE LICENSED PROGRAMS SHALL NOT EXCEED THE TOTAL COMPENSATION PAID TO LICENSOR BY LICENSEE FOR THE PRODUCTS CONTAINING THE LICENSED PROGRAMS.**

6.0 Term and Termination.

6.1 LICENSOR reserves the right, in addition to any other remedies it may retain in this License Agreement or may be entitled to in law or equity (including immediate injunctive relief and repossession of all non-embedded Licensed Programs and documentation), to terminate this License Agreement at any time prior to the expiration of any Term in the event LICENSEE breaches any material term or condition or fails to perform or observe any obligations or covenants of this License Agreement and such failure and/or breach is not remedied within thirty (30) days of written notice from LICENSOR.

6.2 Within thirty (30) days after termination or expiration of this License Agreement, LICENSEE will return to LICENSOR all confidential material including but not limited to all copies, partial copies, and/or modified copies (if any) of Licensed Programs and any equipment owned by LICENSOR in LICENSEE's possession.

7.0 Assignment/Transfer.

This License Agreement, the licenses granted hereunder and the Licensed Programs provided to LICENSEE under this License Agreement may not be assigned, sub-licensed, or otherwise transferred by LICENSEE to any third party without LICENSOR's prior written consent, except that this license may be assigned if the Products containing the Licensed Programs are transferred but the new owner or user of the Products may only use the Licensed Programs in

accordance with terms of this License Agreement. Subject to the foregoing, any assignee hereunder shall be subject to all of the terms, conditions and provisions of this License Agreement. Any attempt by LICENSEE to assign, sub-license, or transfer the Licensed Programs, or any of the rights or duties contained in this Agreement, without LICENSOR's prior written consent shall be void.

8.0 Severability.

If any term or provision of the License Agreement is determined by a court or government agency of competent jurisdiction to be invalid under any applicable statute or rule of law, such provision(s) are, to that extent, deemed omitted, but this License Agreement and the remainder of its provision shall otherwise remain in full force and effect.

9.0 Waiver.

No waiver will be implied from conduct or failure to enforce rights. No waiver will be effective unless in writing signed on behalf of the party against whom the waiver is asserted.

10.0 Compliance with Laws.

Licensee acknowledges that the Licensed Programs are subject to the laws and regulations of the United States and Licensee will comply with all applicable laws and regulations, including export laws and regulations of the United States. Licensee will not, without the prior authorization of Harris and the appropriate governmental authority of the United States, in any form export or re-export, sell or resell, ship or reship, or divert, through direct or indirect means, any item or technical data or direct or indirect products sold or otherwise furnished to any person within any territory for which the United States Government or any of its agencies at the time of the action, requires an export license or other governmental approval. Violation of this provision is a material breach of this Agreement.

11.0 Governing Law.

This License Agreement will be governed by the laws of the Unites States to extent that they apply and otherwise to the laws of the State of New York. The terms of the U.N. Convention on Contracts for the International Sale of Goods do not apply. The parties expressly agree that the Uniform Computer Information Transactions Act ("UCITA") applicable in any jurisdiction shall not apply to this Agreement.

12.0 U.S. Government.

If Licensee is the U.S. Government, the Licensed Programs and documentation qualify as "commercial items," as that term is defined at Federal Acquisition Regulation ("FAR") (48 C.F.R.) 2.101, consisting of "commercial computer software" and "commercial computer software documentation" as such terms are used in FAR 12.212. Consistent with FAR 12.212, and notwithstanding any other FAR or other contractual clause to the contrary in any agreement into which the Agreement may be incorporated, Customer may provide to Government end user or, if the Agreement is direct, Government end user will acquire, the software and documentation with only those rights set forth in the Agreement. Use of either the software or documentation or both constitutes agreement by the Government that the software and documentation are "commercial computer software" and "commercial computer software documentation," and constitutes acceptance of the rights and restrictions herein.

13.0 Agreement.

This License Agreement may be part of a Primary Agreement between LICENSOR and LICENSEE for the purchased products by LICENSEE from LICENSOR. The Primary Agreement and this License Agreement contain the full understanding of the parties with respect to the subject matter hereof and which supersede all prior understandings and writings relating thereto and which shall become binding on the Effective Date of this License Agreement. No waiver, consent, modification, amendment, or change to the terms of this License Agreement shall be binding unless agreed to in a writing signed by LICENSEE and LICENSOR. If there is any conflict between the terms of the Primary Agreement and this License Agreement as to the Licensed Programs, the terms of this License Agreement will prevail.

14.0 Notices.

Notices shall be provided as set forth in the Primary Agreement. In the event there is no notice provision in the Primary Agreement, notices and other communications between the parties shall be transmitted in writing by certified mail or nationally recognized overnight courier service.

15.0 Survival.

Sections 2.2, 3, 5, 6, 8, 9, 11, and 13 of this License Agreement shall survive termination of this License Agreement.

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EXHIBIT 7D

SOFTWARE FX AGREEMENT

THIS SOFTWARE FX AGREEMENT ("Agreement") is hereby entered into between Harris Corporation, a Delaware Corporation, through its Communication Systems Segment ("Harris" or "Seller") and County of Dane, Wisconsin ("Subscriber") on the following terms and conditions:

1. SCOPE OF AGREEMENT

During the term of this Agreement, as set forth in Section 11, Harris agrees to provide Subscriber with the following:

A. Harris Software Update benefits including software updates, documentation updates and other services, as set forth in Section 3 of this Agreement, for the software developed and provided by Harris and contained within the Subscriber's Designated Harris System(s) as described in **Exhibit A** to this Agreement; and

B. Harris Security Update Management Service including patch management services for the updating of security related patches, as set forth in Section 4 of this Agreement, to the Subscriber's Designated Harris System(s) as described in **Exhibit A** to this Agreement.

2. DEFINITIONS

As used in this Agreement, the following terms shall have the meanings set forth below.

A. "Contract" means the Agreement for the purchase of the Designated System(s).

B. "Current Software Release Levels" means the most recent Software release announced by Harris as being commercially available. "Commercially available" does not include interim releases provided as emergency fixes or software released for beta test or noncommercial or similar purposes.

C. "Designated System(s)" means the Harris system(s) purchased by Subscriber and identified in Exhibit A to this Agreement. The Designated System does not include Third Party Software Products. Excluded Products or other systems to which the Designated System may be linked.

D. "Enterprise Configuration" means a radio system level configuration that is capable of supporting Large county, multi-county, regional or state wide installations.

E. "Excluded Products" means third Party Products contained in the customer's system that were not sold by Harris to Subscriber.

F. "Harris Licensed Programs" means all Harris Software programs and associated documentation nonexclusively licensed to Subscriber by Harris for use solely with Subscriber's Designated System.

G. "Harris Software Updates" means any commercially available corrections, modifications or enhancements to the Licensed Programs generally released and/or provided by Harris.

H. "Harris Network Solutions Provider" (NSP) means an entity authorized by Harris to sell certain Harris products and systems as an authorized NSP in accordance with the provisions of a NSP Agreement between Harris and such person or entity.

I. "IAVA" Information Assurance Vulnerability Alert. An IAVA is an announcement of a computer application software or operating system vulnerability notification in the form of alerts, bulletins, and technical advisories identified by DoD-CERT, a division of the United States Cyber Command.

J. "Optional Feature" means those Harris Software features, not currently contained in the Subscriber's Designated System, available for Current Software Release Levels that are available to Subscriber at an additional cost.

K. "Product Vulnerability Alerts" (PVAs) means security vulnerabilities reported against a product supplied by the Seller. Notifications of these PVAs are obtained from multiple sources; governmental, vendor, independent and open source databases.

L. "PVA Evaluation" means the Seller's process for evaluation of a potential Product Vulnerability Alert affecting products provided by the Seller.

M. "RCE" means Harris's Regional Centers of Excellence. RCEs are Harris master distributors of all Harris land mobile radio products and services.

N. "STIG" means Security Technical Implementation Guide. A STIG is a methodology for standardized secure installation and maintenance of computer software and hardware

O. "Security Updates" means software updates that mitigate, address and/or resolve product security vulnerabilities in system components offered by the Seller. These updates may include Vendor Patches and/or Vendor Work-Arounds.

P. "Security Update Distribution" means the Seller providing Security Updates to which the Subscriber is entitled under the terms of this Agreement, affecting components of the Subscriber's Designated System as defined in Exhibit A.

Q. "Software Updates" means all Harris provided software updates to either Harris designated SW system components or SUMS Software updates.

R. "SUMS" means Harris's Security Update Management Service. Harris's automated patch management system that provides periodic, security-related software updates.

S. "SUMS Software Updates" means periodic, security-related software, including but not limited to, operating system updates, antivirus signatures, and other security related Windows-based 3rd party updates (Adobe, Java, Flash).

T. "Tech-Link" is the technical information section of Harris's web site. Access is restricted to authorized subscribers via user ID and password login.

U. "Third Party Software Products" means software owned by a party other than Harris Corporation.

V. "Vendor Patches" means software updates provided by third-party software vendors that mitigate, address and/or resolve PVA(s).

W. "Vendor Work-Arounds" means configuration and/or procedural changes provided by third-party software vendors that mitigate, address and/or resolve PVA(s).

3. HARRIS SOFTWARE UPDATES

A. Harris Software Releases Included. With respect to each Licensed Program, and subject to the conditions of this Agreement, Harris will provide the Software Updates described below during the term of this Agreement. All Updates shall be shipped to Subscriber's Software FX contact designated in Exhibit A of this Agreement via protective packaging containing a quantity of programmed Software media (e.g., Proms, Tapes, Compact Discs or DVDs) necessary for Subscriber to fully implement the Software Updates within its Designated System. In addition, each shipment of Software Updates shall contain at least one set of Software release notes detailing the contents of the Software Update and providing installation instructions.

i. Software Updates Upon Enrollment. As determined by the system audit described in Section 6.A.i. of this Agreement, Harris shall provide to Subscriber the Software Updates needed, if any, to bring the Licensed Programs within Subscriber's Designated System up to Harris's Current Software Release Levels. Such Updates will be provided at no additional cost to Subscriber provided Subscriber has enrolled in the Software FX program within the enrollment deadline specified in Section 9.A of this Agreement. **[To be tailored dependant upon customer's HW FX enrollment] – [and provided Subscriber has installed, at Subscriber's expense, the compatible hardware necessary to accommodate the Software Updates.]**

ii. Subsequent Software Updates. During the term of this Agreement and subject to Subscriber's performance of its obligations, Harris shall provide to Subscriber Software Updates, released by Harris subsequent to Subscriber's enrollment in Software FX, for the Licensed Programs contained within Subscriber's Designated System. Such subsequent Software Updates may include:

a. Enhancements and/or corrections to existing features for all Designated System backbone components and/or radios;

b. New features or improvements to existing features implemented via the system components already contained within Subscriber's Designated System.

B. System Level Release Documentation: Prior to the general release of a major system release by Harris for Harris Licensed Programs, Harris shall make available a system level release document announcing the impending release, and detailing its contents and impact, if any, on any other Harris hardware or Software components. Subscriber acknowledges that older hardware may not have sufficient capacity for the operation of the Software Updates. NOTHING IN THIS AGREEMENT OR OTHERWISE REQUIRES HARRIS EITHER TO DESIGN UPDATES THAT REMAIN COMPATIBLE WITH DESIGNATED SYSTEM HARDWARE OR TO PROVIDE ADDITIONAL HARDWARE UNDER THIS AGREEMENT, AND SUBSCRIBER WAIVES ANY SUCH DUTY OR OBLIGATION BY HARRIS.

4. HARRIS SECURITY UPDATE MANAGEMENT SERVICE

A. Security Update Distributions Inclusions. Subject to the conditions of this Agreement, Seller will provide periodic Security Updates described below during the term of this Agreement. All Security Updates shall be provided to Subscriber's contact designated in Exhibit A. Security Updates shall contain software necessary for the Subscriber to fully implement the Security Update within the Designated System and at least one set of Software release notes detailing the contents of the Security Updates and providing installation instructions.

i. Security Updates Upon Enrollment. As determined by the system audit described in Section 6.A.i. of this Agreement, Seller shall provide to Subscriber the Security Updates needed, if any, to bring the Licensed Programs within Subscriber's Designated System up to Seller's current security software release levels. Such updates will be provided at no additional cost to Subscriber provided Subscriber has enrolled in the Software FX program within the enrollment deadlines specified in this Agreement. **[To be tailored dependant upon customer's HW FX enrollment] – [and provided Subscriber has installed, at Subscriber's expense, any compatible hardware necessary to accommodate the Security Updates.]**

ii. Subsequent Security Updates. During the term of this Agreement and subject to Subscriber's performance of its obligations, Seller shall provide to Subscriber Security Updates that may include:

a. Vendor Patches and/or Vendor Work-Arounds, enhancements, corrections and/or changes, made by third-party software vendors to software included in Seller provided products subject to the Subscriber's right to receive the third-party software. The Subscriber may be required to have currently executed services/support Agreement(s) with third-party vendor(s) separate from this Agreement.

B. SUMS Product Features Summary.

a. The Seller will use reasonable efforts to monitor pertinent governmental, vendor, independent and open source databases for PVAs, IAVAs, STIGs and for any subsequent resolutions that affect products provided by the Seller that are part of the Subscriber's Designated System.

b. The Seller will make every reasonable effort to verify that the PVA, IAVA, and STIG resolutions, Vendor Patches and/or Vendor Work-Arounds, do not adversely affect the Seller's stated performance of the Subscriber's Designated System.

c. The Seller will provide Security Update Distributions to the Subscriber at periodic intervals targeting bi-monthly releases. The interval shall be determined solely by the Seller. More frequent Security Update Distributions may be required to address urgent product security vulnerabilities. Security Update Distributions on other than a bi-monthly basis do not constitute a contractual default by the Seller.

d. The Seller will provide Security Update Distributions in a means suitable for use on the target devices of the Subscriber's Designated System. Optional On-Site Support Services may be contracted by the Subscriber, outside of this Agreement, through the Seller or the Seller's RCE or Network Solutions Provider or designated local service provider as set forth in Section 6.A.iv.

e. Prior to the general release by Seller of any Security Updates, Seller shall make available a SUMS Product release document announcing the impending release, and detailing its contents and impact, if any, on any other Seller hardware or Software components. Subscriber acknowledges that older hardware may not have sufficient capacity for the operation of the Software Updates. NOTHING

IN THIS AGREEMENT OR OTHERWISE REQUIRES SELLER EITHER TO DESIGN UPDATES THAT REMAIN COMPATIBLE WITH DESIGNATED SYSTEM HARDWARE OR TO PROVIDE ADDITIONAL HARDWARE UNDER THIS AGREEMENT, AND SUBSCRIBER WAIVES ANY SUCH DUTY OR OBLIGATION BY SELLER.

f. The Seller will provide with each Security Update Distribution a Security Release Notes document. This document will detail the PVA resolutions and/or mitigation addressed by this release, installation and installation recovery procedures and software and hardware compatibility information where applicable.

g. Automated Security Update Distribution Services. The Seller will provide a means of automating the distribution of Security Updates to the target devices within the Subscriber's Designated System. Subscriber shall be responsible for providing the necessary hardware and licenses to run the automated distribution of Security Updates. This hardware shall be part of Subscriber's Designated Harris System or purchased at Subscriber's expense from Seller prior to the initialization of this Software FX Agreement. As set forth in Section 9.C. of this Agreement, it shall be the Subscriber's responsibility to complete the security update process on the target devices (e.g. rebooting the target devices) following the Patch Application instructions in the Release Notes accompanying each Security Update Distribution. Optional On-Site Support Services may be contracted by the Subscriber, outside of this Agreement, through the Seller or the Seller's RCE or Network Solutions Provider or designated local service provider as set forth in Section 6.A.iv.

h. Assessment Reporting. For those PVAs monitored by the Seller as stated in Section 4.B.a., the Seller will provide responses assessing the affects of the monitored PVAs on the LMR system and stating Seller's recommendations for required actions. Access to the PVA assessments will be granted through Tech-Link, a restricted web site maintained by the Seller. The Seller does not guarantee assessment response time, but will make reasonable efforts to provide timely assessment responses.

5. SOFTWARE RELEASES NOT INCLUDED

A. Software Releases Not Included. The following Software releases are not included within the terms of this Agreement:

i. New Products. Any Software products released by Harris for which an earlier generation or release level is not already contained within Subscriber's Designated System. If Subscriber wishes to implement such Software products within its Designated System, it will need to license such products at the fees then in effect and purchase any necessary compatible hardware for operation of such Software.

ii. Third Party Software. To the extent that such Third Party Software Products are available and compatible with the Designated System, Harris reserves the right to charge an additional fee for upgrades to software programs that are licensed by a third party for use with the Harris system yet are not the property of Harris. The Subscriber may be required to have currently executed services/support Agreement(s) with third-party vendor(s) separate from this Agreement. Subscriber must provide evidence of a current services/support Agreement at the seller's request.

6. SOFTWARE SERVICES INCLUDED

A. Services Included. Subject to the terms and conditions of this Agreement and Subscriber's compliance therewith, Harris will provide to Subscriber the services described below.

i. System Configuration Baseline and Documentation Update. As part of the initial enrollment process for Software FX, Harris may deem it necessary to conduct a system audit of Subscriber's Designated System(s) to be covered under this Agreement. If said audit is required, Harris, or its RCE or Harris Network Solutions Provider will conduct the audit. This audit will be used to verify Subscriber's first-year Software FX Fee and to determine the Software release levels for Licensed Programs contained within Subscriber's System at the time of enrollment, together with any hardware updates necessary to accommodate Software Updates.

ii. Installation Phone Support. Subscriber's Software FX subscription shall include telephone support by Harris's Technical Assistance Center (TAC) personnel with respect to the installation of Software Updates. Such support will be available during Harris' normal business hours (8:00 a.m. to 5:00 p.m. Eastern Standard Time Monday through Friday, excluding holidays) and for a period of ninety (90) days from the date the Software Update is released to Subscriber. After-hours emergency support will be available through Harris optional System Maintenance services at prices then in effect, provided that Subscriber is in compliance with the terms of this Agreement.

iii. Upgrade Planning. If Subscriber is in compliance with the terms of this Agreement and its Designated System is classified as an Enterprise Configuration, Harris, or its RCE or Network Solutions Provider, shall provide an annual consultation service to review Harris' planned Software releases and evaluate the operational and financial impact such releases may have on Subscriber's Designated System. If Subscriber is in compliance with the terms of this Agreement and its Designated System is classified below an Enterprise Configuration, upgrade planning is not included within the terms of this Agreement but can be obtained from Harris at the rates then in effect for such service.

iv. On-Site Services. Initial Installation Services are optionally available, outside of this Agreement, through the Seller, the Seller's RCE or Network Solutions Provider, or a designated local service provider provided that Subscriber is in compliance with the terms of this Agreement.

v. Tech-Link. Tech-Link is the restricted access, technical information section of Seller's web site. Seller will provide FX subscribers access, via user ID and password authorization, to FX and SUMS release documentation and downloadable distribution media. Seller will also provide additional authorization to allow subscribers to view PVA, IAVA, and STIG assessment recommendations described in Section 4.B.a.

7. SOFTWARE SERVICES NOT INCLUDED

Services Not Included. The following services/products are not included within the terms of this Agreement:

i. Hardware Upgrades. In the occasional event that a Software Update released requires a corresponding hardware change, Subscriber will need to purchase separately the compatible hardware required. Harris will endeavor to notify Subscriber in advance via the system level release documentation or, if applicable, via Software FX's upgrade planning service of any hardware changes needed in order to implement a Software Update. No such notice will be given for Third Party Software Updates or Excluded Products, and no hardware upgrade may be available.

ii. Software Update Installation. Installation of Software Updates for terminal products, Software Updates for infrastructure, and Security Updates by Seller are not included, but such installations may be obtained from Seller, or its RCE or Network Solutions Provider, at the rates then in effect for such service, provided that Subscriber is in compliance with the terms of this Agreement.

iii. Optional Support Services. Other Software support services Subscriber may require, including, but not limited to, training, customized software programming or troubleshooting through Seller's Technical Assistance Center are outside the scope of this Agreement but may be obtainable through other programs offered by Seller.

8. SOFTWARE DISTRIBUTION AND INSTALLATION

All Software Updates shall be provided to Subscriber's contact designated in Exhibit A. In addition, each shipment of Software Updates shall contain at least one set of Software release notes detailing the contents of the Software Update and providing installation instructions

In the event any Software media contained within Subscriber's Designated System incurs damage, whether from acts of Nature or human error, Harris shall provide replacements for such Software to Subscriber at no additional charge, subject to the terms and conditions of this Agreement.

9. CONDITIONS FOR SERVICE

A. Enrollment Deadline. Subscriber agrees to enroll in Software FX no later than sixty (60) days after the earlier of: (i) the first expiration date of the warranty provided by Harris for any component of Subscriber's Designated System, or (ii) the first expiration date of the warranty provided by Harris for any of the Software within Subscriber's Designated System. If either such warranty already has expired when Subscriber is first offered the Software FX Program, Subscriber will be given a 60-day grace period in which to enroll in Software FX. A Subscriber meeting the enrollment deadline will receive, at no additional charge as described in Sections 3.A.i. and 4.A.i of this Agreement; the Software Updates needed to bring its Designated System up to Harris's Current Software Release Levels to the extent the Designated System hardware is compatible with such Software Updates.

B. Subscriber Contact. Seller requests that Subscriber identify its Subscriber Contact in Exhibit A. Subscriber shall designate a person with sufficient technical expertise to be able to interact knowledgeably with Seller's technical support personnel. To the maximum extent practicable, Subscriber's communications with Seller (with regard to the Software Updates provided under this Agreement) should be through the Subscriber Contact.

C. Installation. Subscriber agrees to properly install the Software Updates provided by Seller in order of receipt from Seller. Subscriber understands that Software support provided by Seller is limited to Seller's Current and current minus 1 Software Release Levels of Licensed Programs for the Designated System.

D. Media Labeling. Subscriber agrees that if it makes copies of any Software Update supplied by Harris, for backup purposes, Subscriber will reproduce any copyright notice and/or proprietary notice appearing on and/or in such Update and will label all copies with all information, including part numbers and revision levels, provided on the set of media provided by Harris. Nothing herein grants Subscriber any right to sublicense any Software or to distribute copies to any other person, and such sublicensing and distribution is expressly prohibited.

E. No Modification of Software. Subscriber agrees not to modify, enhance or otherwise alter any Software unless specifically authorized in the user documentation provided by Harris with such Software Update or unless the prior written consent of Harris is obtained. Under no circumstance shall Subscriber create or permit the creation of any derivative work from any Software or the reverse engineering or replication of any Software.

F. Harris's obligations under this Agreement are conditional upon Subscriber's compliance with the terms of this Agreement and any Contract then in effect between Harris and Subscriber.

G. Harris may request from third party vendors on Subscriber's behalf any applicable vendor patches related to the System. Subject to the requirements of the Contract, Subscriber grants authority to Harris all approval rights relating to the selection of Vendor Patches.

10. FEES, TERMS OF PAYMENT & TAXES

A. SOFTWARE FX Fee. Subscriber agrees to pay Harris or its RCE an annual Software FX Fee, in the amount set forth in Exhibit A to this Agreement, plus taxes pursuant to Subsection E below, for Software FX services provided during the term as defined in Exhibit A. Subsequent years' Software FX Fees, beyond Subscriber's first-year fee specified in Exhibit A, may or may not remain at the same rates. Any significant changes made to Subscriber's Designated System(s) configuration will be reflected in the following year's Software FX Fee. If Harris's rates for Software FX should increase, Subscriber will be notified in writing of any such increases at least one hundred twenty (120) days prior to the end of Subscriber's yearly Software FX period then in effect.

B. Other Charges. Subscriber understands that if it chooses to delay its enrollment in Software FX beyond the deadline described in Section 9.A. of this Agreement, Subscriber will need to license, at the applicable fees then in effect, the initial Software Updates needed to bring its System up to Harris's Current Software Release Levels, as well as any hardware which may be required to accommodate such Updates.

C. Due Date. Subscriber's first-year Software FX Fee will be invoiced upon receipt of this Agreement signed by Subscriber. Payment will be due thirty (30) days from the date of the invoice. Subscriber's subsequent years' Software FX Fees will be automatically invoiced sixty (60) days prior to the commencement of the subsequent year's term. Payment of all amounts due is a condition precedent to Harris providing any future Software Updates or other services.

D. Taxes. In addition to all fees specified herein, Subscriber shall pay the gross amount of any present or future sales, use, excise, value-added, or other similar tax applicable to the price, sale or delivery of any products or services furnished hereunder or to their use by Subscriber, unless Subscriber shall otherwise furnish Harris with a tax-exemption certificate acceptable to the applicable taxing authorities.

E. Discontinuance. Subscriber understands that if Subscriber discontinues and then subsequently resumes participation in the Software FX Program, Subscriber will be required to pay a re-entry fee for any benefits provided to Subscriber upon re-entry to the Software FX Program plus the Software FX Fee for the term then commencing.

11. TERM & TERMINATION

A. Software FX services will be provided by Harris to Subscriber for an initial one-year term, as defined in Exhibit A to this Agreement, and thereafter on a year-to-year basis as provided herein, subject to prior

payment in full of all outstanding fees and charges at the time of renewal and compliance with the provisions of this Agreement.

B. Provided Subscriber is then in full compliance with all of its obligations, Subscriber's Software FX enrollment shall be automatically renewed on a succeeding yearly basis thereafter unless either party notifies the other in writing, at least ninety (90) days prior to the end of the yearly period then in effect, that this Agreement will not be renewed.

C. Harris shall have the right to suspend or terminate this Agreement upon thirty (30) days' prior written notice if Subscriber fails to pay any fees or charges due hereunder or if Subscriber commits any other breach of this Agreement or commits any breach of any applicable Software license Agreement for any Licensed Program being supported under this Agreement, any contract between Subscriber and Harris or any other obligation of Subscriber to Harris or any of its affiliates.

D. Harris shall have the right to discontinue providing Software FX services (including Updates) for any Licensed Program supported under this Agreement. Software Updates may be discontinued at any time at Harris's discretion. Other services shall not be discontinued without at least ninety (90) days' prior written notice by Harris to Subscriber. Notwithstanding any other provision of this Agreement, as Subscriber's sole and exclusive remedy Harris will provide a pro-rata refund of Subscriber's annual Software FX Fee if Harris elects to discontinue providing Software FX services for any Licensed Program supported under this Agreement.

E. Except as provided in Section 11.D. above, under no circumstances (including any termination of this Agreement) shall any fees paid pursuant to this Agreement be refundable once paid by Subscriber.

12. LIMITATION OF LIABILITY

EXCEPT FOR PERSONAL INJURY OR DEATH, HARRIS' TOTAL LIABILITY ARISING FROM THIS AGREEMENT WILL BE LIMITED TO THE AGGREGATE AMOUNT OF SOFTWARE FX FEES PAID TO HARRIS UNDER THIS AGREEMENT.

13. GOVERNING LAW AND DISPUTE RESOLUTION

This Agreement shall be governed by and construed in accordance with the laws of the Commonwealth of Virginia, excluding its rules pertaining to conflict of laws. Subscriber consents to the personal jurisdiction of the state and federal courts in the Commonwealth of Virginia. By entering into this Agreement, Harris and Subscriber hereby expressly waive any rights either party may have to a trial by jury of any civil litigation related to , or arising out of this Agreement.

14. NOTICES

All notices required or permitted hereunder shall be in writing and shall be deemed validly given upon being hand delivered, or upon receipt if sent by facsimile, e-mail or if mailed by certified mail, return receipt requested, to Subscriber at the address set forth in Exhibit A or to Harris Corporation at 221 Jefferson Ridge Parkway, Lynchburg, VA. 24501, Attention: Software Services Group, or to such other address as either party may designate to the other in writing.

HARRIS®

TECHNOLOGY TO CONNECT,
INFORM AND PROTECT™

15. ENTIRE AGREEMENT, EXECUTION AND MODIFICATION

A. This Agreement contains the entire and only Agreement between the parties concerning the subject matter hereof, and all prior representations and understandings in connection with the subject matter hereof are superseded and merged herein, and any representation or understanding not incorporated herein shall not be binding upon either party.

B. This Agreement shall not become effective until signed on behalf of Harris by one of its officers or by an executive duly authorized by Harris's Vice President. No change, modification, ratification, rescission, or waiver of this Agreement or any of the provisions hereof shall be binding upon Harris unless made in writing and signed on its behalf in like manner.

C. HARRIS DOES NOT ASSUME ANY OBLIGATIONS OR LIABILITIES IN CONNECTION WITH THE SOFTWARE OR SERVICES OTHER THAN THOSE EXPRESSLY STATED IN THIS AGREEMENT, AND DOES NOT AUTHORIZE ANY PERSON (INCLUDING HARRIS'S RCES OR SUBCONTRACTORS OR SUPPLIERS) TO ASSUME FOR HARRIS ANY OTHER OBLIGATIONS OR LIABILITIES.

IN WITNESS WHEREOF, and intending to be legally bound, the parties hereto have caused this Agreement to be executed by their duly authorized officers or representatives.

HARRIS:

HARRIS CORPORATION
COMMUNICATION SYSTEMS SEGMENT

By: _____

Name: Christopher L. Chaffee

Title: Sr. Mgr., Contracts

Date: 09/13/2016

SUBSCRIBER:

COUNTY OF DANE, WISCONSIN

By: _____

Name:

Title:

Date:

Harris Corporation
Communication System Segment
221 Jefferson Ridge Parkway
Lynchburg, VA. 24501

EXHIBIT A Designated System

1. Term of Software FX Agreement.
The services, as described in the Software FX Agreement to which this Exhibit A is attached, will begin following system acceptance and continue for six (6) years thereafter and shall be automatically renewed for one-year periods thereafter pursuant to Section 11.8 of the Agreement.

2. Designated System Fees.
The Designated System(s) for which the Software FX Agreement will apply is (are):

Year following final acceptance	System Name	System Classification	FX Fee
Year 1	Dane County	P25	$95,833
Year 2	Dane County	P25	$95,833
Year 3	Dane County	P25	$95,833
Year 4	Dane County	P25	$95,833
Year 5	Dane County	P25	$95,833
Year 6	Dane County	P25	No Charge

Subscriber's subsequent years' Software FX Fees will be determined in accordance with Section 10.A. of the Agreement.

3. All Notices and Software Updates under this Software FX Agreement are to be provided by Harris to Subscriber under this Agreement are to be sent to:

Contact's Name:
Company Name:
Title:
Address:
(Do not use P.O. Boxes)

Telephone:
FAX No.

EXHIBIT 7F

SYSTEM MAINTENANCE AGREEMENT

THIS SYSTEM MAINTENANCE AGREEMENT (hereinafter "Agreement") is entered into this _ day of _, 2016, by and between Harris Corporation, a Delaware Corporation, through its RF Communications Division., located at 221 Jefferson Ridge Parkway, Lynchburg, Virginia 24501, USA, ("Seller"), and Dane County, Wisconsin located at 210 Martin Luther King Jr Blvd, Madison, WI 53703-3345 (hereinafter "Customer").

1. SCOPE OF AGREEMENT

During the term of this Agreement (hereinafter "Term"), Seller agrees to provide Customer with repair and maintenance services and parts, as set forth in Section 2 of this Agreement, to maintain the Customer's radio system equipment provided by Seller to Customer and listed in Addendum II to this Agreement.

2. CONDITIONS OF SERVICE

Seller shall supply all supervision, labor, service facilities, repair parts, test equipment, and supplies necessary to meet the service requirements stated in this Agreement.

2.1 Service Facilities

Seller shall have a full service maintenance facility available and staffed with factory trained service technicians. The location and staffing level shall be sufficient to meet the service requirements stated in this Agreement. The maintenance facility will be:
General Communications
2880 Commerce Park
Fitchburg, WI 53719

2.2 Right to Subcontract

Seller may subcontract service work to authorized service centers that meet the minimum requirements of a service center set forth in the Seller Authorized Service Center Agreement. Should any subcontractor fail to perform or their work otherwise proves unsatisfactory, Seller will arrange for continuing maintenance of the equipment by qualified technicians for the duration of this Agreement.

2.3 Fixed Equipment Maintenance

Fixed equipment is defined as those site repeater stations and associated equipment, multi-site coordinator, console electronics equipment, and other fixed equipment, all as listed in Addendum II, Equipment List, attached hereto and incorporated herein by reference. All work on fixed equipment shall be performed at the location of the equipment whenever possible. Emergency service shall be provided twenty-four hours per day, seven days per week. Technical personnel must respond to the emergency service request and begin troubleshooting efforts within one (1) hours of the request

and be at the location of the failed equipment within two (2) hours of the request if the problem cannot be corrected remotely. This service is included in the monthly maintenance rate. No fixed equipment shall be out of service in excess of 24 hours after notification of equipment failure when the failure results in the inability of mobile units to communicate with each other or with a dispatch center.

2.4 Mobile Equipment Maintenance

Mobile equipment is defined as those vehicular mounted radios, personal portable radios, vehicular repeaters, portable radio chargers, radio control stations and other mobile equipment, all as listed in Addendum II, Equipment List.

Mobile equipment shall be serviced at the customer building where the vehicle is normally assigned, at the vehicle's work location, or at a Seller's authorized service facility during normal working hours as mutually agreed upon by Seller and the Customer. All mobile service requests must be responded to within two working days from the receipt of the repair request. If the mobile radio cannot be repaired within two hours from the beginning of a service action, the radio unit shall be replaced, if requested, with a customer-provided spare unit. Emergency service shall be available twenty-four hours per day, seven days per week. Emergency service on mobile equipment, if requested, will be performed at the rate for demand service set forth in Addendum I, Maintenance Rates, attached hereto and incorporated herein by reference.

2.5 Spare Parts and Radios

a. Seller will maintain an adequate stock of spare parts, system-critical modules and mobile and portable radios as a back-up to Customer's spares inventory. The initial purchase of Customer's spares inventory will be at Customer expense.

b. Seller will support provisioning of its equipment for a period of five (5) years after final production of mobile and portable radios and seven (7) years after final production of fixed equipment. Third party equipment will be supported in accordance with the individual manufacturer's provisioning policy. Seller will utilize commercially reasonable efforts to assure third party spare parts and equipment availability to support its maintenance obligations under this Agreement. Seller shall not be liable to Customer for third party spare part and equipment obsolescence or unavailability under this Agreement beyond commercially reasonable efforts.

2.6 Working Hours

Working hours are defined as 8:00 a.m. to 5:00 p.m local time, Monday through Friday, excluding US Federal Public Holidays. Work performed outside of working hours is defined as emergency service and will be performed at demand service rates.

2.7 Demand Services

"Demand Services" shall mean service requests that are not included in this Maintenance Agreement as described in Section 2.8, Maintenance Responsibilities, of this Agreement. The installation, removal, or reinstallation of equipment not associated with repair / maintenance efforts as defined in this Agreement shall be considered Demand Service and be performed by Seller, following reasonable notice, and at the rates listed in Addendum I to this Agreement. Service work made necessary because of abuse or neglect not under the control of Seller will be performed at the hourly rate for demand service, plus the purchase of parts. Special work, not otherwise covered, will be performed at Seller prevailing rates.

2.8 Maintenance Responsibilities

Seller agrees to provide the following services and perform the tasks described as part of this Maintenance Agreement in accordance with the limitations and definitions of Sections 2.7 and 6.4 of this Agreement.

a. Seller shall check, on a daily basis, the radio system's alarm status and report any alarm conditions to the customer. Investigation and troubleshooting of alarms shall begin in order of severity and impact to the overall system's ability to maintain effective communications. Seller will inspect/test the communication equipment and make such repairs, adjustments and replacements of components as may be necessary to maintain and/or restore the system to normal operating conditions.

b. Seller shall repair, maintain and service all equipment listed in Addendum II, Equipment List, attached hereto.

c. Seller shall perform preventative maintenance inspections and tests as recommended by the OEM and required by applicable FCC regulations; as a minimum, these inspections and tests will be performed annually for equipment listed in Addendum II.

2.9 Service Records

The following service records shall be maintained and made available to the Customer upon request:

Monthly emergency service activity including failure type, corrective action taken and time required to restore service.

The results of preventive maintenance tests and inspections shall be provided, upon request by the Customer within 30 days of completion.

Service records for work performed as described in Section 2.9 shall be retained for the duration of this Agreement and any subsequent renewal periods.

2.10 Software Upgrades

Seller will provide labor to install and test software upgrades, whether for corrective or enhancement purposes, provided that Customer subscribes to a Seller software services agreement that provides the upgraded software.

2.11 Database Reprogramming

Mobile radio or system database corrections will be provided by Seller at no cost to Customer, during the term of this agreement, if the correction is necessary because of an error or omission on Seller's part. Database changes made at Customer's request will be performed at the hourly rates listed in Addendum I to this Agreement.

2.12 General

All services provided under this Agreement are only applicable to the land mobile radio products and systems sold and provided by Seller to Customer and listed in Addendum II to this Agreement. Prior to contract signing, Seller reserves the right to request a complete serial number listing of all equipment to be covered under this agreement.

2.13 Special Conditions

Any and all special service conditions are listed in Addendum III to this Agreement, the provisions of which are incorporated herein by reference.

3. CUSTOMER FINANCIAL OBLIGATIONS

3.1 Customer shall pay the annual maintenance fee as set forth in Addendum I to this Agreement in advance, on or before the effective date of this Agreement as set forth in Section 5.1 hereof . Fees for demand services, as set forth in Addendum I to this Agreement, are payable within thirty (30) days of receipt of Seller's invoice.

3.2 Seller may at any time hereafter revise the rates set forth in Addendum I by giving Customer written notice thereof not later than ninety (90) day prior to the expiration of a yearly period, provided that the revised rates are mutually agreed upon in writing and said revised rates shall be effective for the next yearly period, unless either party exercises its option to terminate the Agreement.

3.3 Any other payments under this Agreement are due within thirty (30) days of receipt of Seller's invoice.

3.4 All late payments under this Agreement shall bear interest at a rate of one and one-half percent (1.5%) per month.

4. WARRANTY

4.1 Seller warrants that all services performed under this Agreement will be done in an efficient and workmanlike manner. Under no circumstances will Seller's liability to Customer exceed the amounts paid by Customer under this Agreement for the

applicable service that causes the Customer's claim. IN NO EVENT SHALL SELLER BE LIABLE TO THE CUSTOMER FOR ANY SPECIAL, CONSEQUENTIAL, INCIDENTAL, INDIRECT OR EXEMPLARY DAMAGES INCLUDING, BUT NOT LIMITED TO, LOSS OF PROFIT OR REVENUES, LOSS OF USE OF THE EQUIPMENT OR ANY ASSOCIATED EQUIPMENT, COST OF CAPITAL, COST OF SUBSTITUTE GOODS, FACILITIES, SERVICES OR REPLACEMENT POWER, DOWNTIME COSTS OR CLAIMS OF CUSTOMER'S CLIENTS, IF ANY, FOR SUCH DAMAGES.

4.2 THE WARRANTY SET FORTH IN SECTION 4.1 ABOVE IS SELLER'S SOLE WARRANTY UNDER THIS AGREEMENT AND IS IN LIEU OF ANY AND ALL OTHER WARRANTIES WHETHER WRITTEN OR ORAL, EXPRESSED OR IMPLIED, STATUTORY OR OTHERWISE INCLUDING, BUT NOT LIMITED TO ANY WARRANTY OF MERCHANTABILITY OR FITNESS FOR A PARTICULAR PURPOSE.

4.3 Patents, Trademarks, Information

a. Nothing in this Agreement shall be construed as;

(i) A warranty or representation by Seller that any advice provided under this Agreement is or will be free from infringement of patents of third parties; or

(ii) Conferring a right to Customer to use in advertising, publicity or otherwise any trademark or trade name of Seller; or

(iii) Granting to Customer by implication, estoppel, or otherwise any licenses or rights under patents of Seller.

b. SELLER MAKES NO REPRESENTATIONS, EXTENDS NO WARRANTIES OF ANY KIND, EITHER EXPRESSED OR IMPLIED, AND ASSUMES NO RESPONSIBILITIES WHATSOEVER WITH RESPECT TO THE ADEQUACY, ACCURACY OR UTILITY OF ANY INFORMATION OBTAINED BY CUSTOMER UNDER THIS AGREEMENT. Seller assumes no responsibilities whatsoever with respect to the use by Customer or any third party of any information obtained by Customer or third party under this Agreement with respect to any use, sale or other disposition by Customer or its clients or other transferees of any products incorporating or made by use of the information obtained under this Agreement.

4.4 General

a. Radio systems are subject to degradation of service from natural phenomena such as so-called "skip" interference and other causes beyond the reasonable control of Seller such as motor ignition and other electrical noise as well as interference from other users assigned by the FCC to the same or adjacent frequencies. Seller cannot be responsible for interference or disruption of

service caused by operation of other radio systems or by natural phenomena or by motor ignition or other interference over which there is no reasonable control. Such foregoing interference and noise can be minimized by the addition of corrective devices (at Customer's expense) adapted for particular locations and installations. Seller will investigate interference complaints (at the rates specified in Addendum I to this Agreement) and make recommendations as to the use of such devices; however, total freedom from noise and interference cannot be guaranteed.

b. Seller does not assume responsibility for signal strength unless the deficiency is the result of substandard equipment maintenance.

c. If, due to the action of regulatory authorities, changes to the equipment become necessary, such changes will be performed by Seller upon request at the expense of Customer.

5. TERM AND TERMINATION

5.1 The services under this Agreement will be provided by Seller to Customer for an initial six year period and thereafter on an annual basis as provided herein with rates to be modified as set forth in Section 3.2.

The effective date of this Agreement is effective on the First Day after Final System Acceptance by COUNTY. .

5.2 The services shall be automatically extended at the end of the initial year for an additional year and on a succeeding yearly basis thereafter unless either party notifies the other, in writing, at least sixty (60) days prior to the end of the yearly period then in effect that the services shall not be extended.

5.3 In the event that Customer fails to make any overdue payments due to Seller under this Agreement within fifteen (15) days after receipt of written notice from Seller, Seller may at its option immediately thereafter terminate this Agreement.

5.4 In the event of any other default under this Agreement, either Customer or Seller shall give the other party written notice describing the default and a thirty (30) day period to correct the default. This Agreement may then be immediately canceled if the default is not corrected prior to the end of the thirty (30) day period.

6. LIMITATION OF LIABILITY

6.1 The total liability of seller, including its subcontractors or suppliers, on any and all claims, whether in contract, warranty, tort (including negligence or patent infringement) or otherwise, arising out of, connected with, or resulting from the performance or non-performance of any agreement resulting herefrom or from the manufacture, sale, delivery, resale, repair, replacement or use of any equipment or the furnishing of any service, shall not exceed the price allocable to the equipment or service which gives rise to the claim. Except as to title any such liability shall terminate

upon the expiration of the applicable warranty period specified in the article entitled "warranty".

6.2 IN NO EVENT, WHETHER AS A RESULT OF BREACH OF CONTRACT, WARRANTY, TORT (INCLUDING NEGLIGENCE OR PATENT INFRINGEMENT) OR OTHERWISE, SHALL SELLER, OR ITS SUBCONTRACTORS OR SUPPLIERS, BE LIABLE FOR ANY SPECIAL, CONSEQUENTIAL, INCIDENTAL, INDIRECT OR EXEMPLARY DAMAGES, INCLUDING, BUT NOT LIMITED TO, LOSS OF PROFIT OR REVENUES, LOSS OF USE OF THE EQUIPMENT OR ANY ASSOCIATED EQUIPMENT, COST OF CAPITAL, COST OF SUBSTITUTE GOODS, FACILITIES, SERVICES OR REPLACEMENT POWER, DOWNTIME COSTS OR CLAIMS OF BUYERS CUSTOMERS FOR SUCH DAMAGES. IF BUYER TRANSFERS TITLE TO, OR LEASES THE EQUIPMENT SOLD HEREUNDER TO, OR OTHERWISE PERMITS OR SUFFERS USE BY, ANY THIRD PARTY, BUYER SHALL OBTAIN FROM SUCH THIRD PARTY A PROVISION AFFORDING SELLER AND ITS SUBCONTRACTORS AND SUPPLIERS THE PROTECTION OF THE PRECEDING SENTENCE.

6.3 Any action for any claim of any kind for any loss or damages arising out of, connected with. or resulting from the performance, non-performance or breach of the Contract, or from the manufacture, sale, delivery, installation, technical direction or installation, resale, repair, replacement, licensing or use of any Hardware, Software or the furnishing of any Services, shall be commenced within one (1) year after the cause of action occurred or it shall be deemed waived or barred.

6.4 Seller shall not be liable for costs incurred for repair and/or replacement of equipment that fails or becomes inoperative due to negligence on the part of the user, liquid intrusion, lightning damage, user installations, user removals and/or acts of God, acts of terrorism or work performed by third parties not authorized by Seller to perform work on Seller equipment.

Seller shall not be liable for costs incurred for correcting, replacing or repairing equipment damaged and/or data corruption induced and/or caused by 3rd party personnel or other equipment / systems not provided by Seller.

6.5 The provisions of this Section, LIMITATION OF LIABILITY, shall apply notwithstanding any other provisions of this Contract and any other agreement.

6.6 The provisions if this Section, LIMITATION OF LIABILITY, shall survive the expiration or termination of this Contract.

7. GENERAL PROVISIONS

7.1 All notices under this Agreement shall be in writing and shall be deemed to have been duly given upon being delivered personally or upon receipt if mailed by certified mail, return receipt requested. Notices shall be sent to the representatives named below or any subsequent representative for which notice was provided pursuant to this section.

Seller:	**Customer:**
Harris Corporation	Dane County, Wisconsin
221 Jefferson Ridge Parkway	210 Martin Luther King Jr Blvd
Lynchburg, Virginia 24501	Room 109
	Madison, WI 53703-3345

7.2 This Agreement shall be interpreted and the legal relations between the parties determined in accordance with the laws of the Commonwealth of Virginia. The invalidity, in whole or in part, of any provision of this Agreement shall not affect the validity of enforceability of any other provisions thereof.

7.3 Seller shall not be responsible for delays or failures in performance under this Agreement that are due to causes beyond its reasonable control including, but not limited to, acts of God, war, acts of terrorism, fires, severe weather, floods, strikes, blackouts, – embargoes or work performed on Seller equipment by third parties not authorized by Seller to perform such work. In the event such delays or failures interrupt Seller's services to Customer, Seller shall promptly notify Customer of the circumstances and the anticipated delay.

7.4 This Agreement represents the entire understanding of the parties with respect to the subject matter hereof and this Agreement supersedes and replaces all prior Agreements and understandings, either oral or written, regarding the subject hereof.

7.5 This Agreement cannot be amended, modified or any provisions waived orally. All amendments and modifications must be in writing and signed by both parties. All waivers must be provided in writing by the party waiving their rights under this Agreement.

7.6 This Agreement may not be assigned without the prior written consent of the other party, which consent shall not be unreasonably withheld. However, Seller may: (i) assign all of its rights, obligations and liabilities under this Agreement to any subsidiary; or (ii) assign its rights to monies due or payable under this Agreement; Seller shall provide Customer with written notice of any such assignment. Seller's assignment of monies due or payable under the Agreement will not relieve Seller of any obligations or responsibilities to Customer hereunder.

[*End text this page*]

IN WITNESS WHEREOF, intending to be legally bound, Seller and Customer have executed this Agreement as of the dates set forth below.

HARRIS CORPORATION
RF COMMUNICATIONS DIVISION

By: _____

Name: Christopher W. Chaffee

Title: Senior Manager, Contracts

Date: 09/13/2016

COUNTY OF DANE, WISCONSIN

By: _____

Name: _____

Title: _____

Date: _____

ADDENDUM I

SYSTEM MAINTENANCE RATES

A. MAINTENANCE RATES

Year	Annual Fee
Maintenance Year 1 (2017)	$ 418,888.83
Maintenance Year 2 (2018)	$ 418,888.83
Maintenance Year 3 (2019)	$ 146,642.83
Maintenance Year 4 (2020)	$ 418,888.83
Maintenance Year 5 (2021)	$ 418,888.83
Maintenance Year 6 (2022)	$ 418,888.83
Grand Total (6 Years)	**$ 2,241,087.00**

B. DEMAND SERVICE RATES

Hourly Rate (normal business hours):	$113
Hourly Rate (overtime and holidays):	$169.50
Mobile/Portable Radio Reprogramming:	$60

C. DATABASE CORRECTION RATES

Hourly Rate:	$113

ADDENDUM II

EQUIPMENT LIST

A. **FIXED EQUIPMENT:** Equipment List is included in Exhibit A, Attachment I. Upon Customer Design Review Completion, Exhibit A, Attachment I will be updated to this Exhibit updated through System Acceptance.

B. **USER EQUIPMENT:** Equipment List is included in Exhibit A, Attachment I. Upon Customer Design Review Completion, Exhibit A, Attachment I will be updated to this Exhibit updated through System Acceptance.

ADDENDUM III

SPECIAL CONDITIONS

1.0 Maintenance Special Inclusions and Exclusions

The items identified below are covered by Seller during the Extended Warranty period (Year 1) if they have been provided and installed by Seller. Following the end of the Extended Warranty period, these items are specifically excluded from coverage by this Maintenance Agreement.

- Batteries of any type or equipment location. Batteries are considered a consumable item and are not covered by this agreement.
- Tower climbs

2.0 Specialized Site Access

On-site response times are based on the assumption that the site is accessible by normal transportation methods and vehicles. On-site response time requirements exclude site locations that require extensive drive time due to traffic conditions or site locations where specialized vehicles (snowcat, helicopter, etc) are required. In addition, Customer is responsible to ensure that all necessary clearances, escorts, or other special requirements have been met in advance to allow technicians prompt access to any equipment requiring service that may be located in a secured or limited access area of the Customer's facilities.

3.0 EQUIPMENT LISTS

All services provided under this Agreement are only applicable to the land mobile radio products and systems sold and provided by Seller to Customer and referenced in Addendum II to this Agreement. Prior to signing this Agreement, Seller shall provide a complete listing of all equipment to be covered under this agreement.

Customer may add or delete equipment items to the list of maintained equipment by notifying the Seller in writing. As additional items are purchased from Seller they will be added to this Agreement on an annual basis. Any changes to this Agreement will be through an Amendment document completed by Seller and provided to Customer for review, approval and signature. The Amendment document will provide revised equipment lists, revised pricing structure changes and any necessary changes to fully incorporate the additional items into the Agreement.

ADDENDUM IV

SCOPE OF WORK

Warranty & Maintenance Support Plan

Overview

The COUNTY is acquiring PROVIDER's Service Assurance Maintenance Plan which is designed to meet the requirements for defined services during the warranty period and flexible enough to meet the maintenance services requested by Dane County, WI. Additionally, Harris' Service Assurance program provides a full range of support services from basic break fix to full network and system operation and management, which can be utilized by Dane County as part of its post warranty plan. Please refer to Table B for applicable features. This full maintenance plan provides Dane County a comprehensive list of services needed to support their communications system. **This** exhibit describes Harris' warranty and maintenance plan. Harris' standard Systems Maintenance Agreement is included at the end of this exhibit.

Harris' Service Assurance program includes the following services for Dane County:

- **Warranty –** Following System Acceptance, Harris will provide a one-year Warranty on the commissioned infrastructure. Any Harris terminals purchased by this Agreement will include a two-year Warranty. During the infrastructure warranty period, technicians from General Communications will respond to service requests during normal business hours and emergency service call outs on a 24 x 7, 365 basis. Dane County will be provided a single point of contact to request warranty and maintenance services.
- **Emergency Response –** Requests for service in the event of a failure or other anomaly will be handled expeditiously by service personnel from General Communications, located in Madison, Wisconsin. Harris will provide a 1 hour or less guaranteed phone response and 2-hour on site response to emergency requests, made by the County, as defined in Table A below. Emergency response will be provided to Dane County on a 24 by 7 by 365 basis. Harris also provides our Technical Assistance Center (TAC), which provides telephone and web-based support to Dane County and other support personnel. Emergency response will be provided by our local service partner, General Communications (GC), Harris Company owned service centers, as well as our local Corporate Headquarters in Lynchburg, Virginia.

Enhanced Warranty

Warranty Period

Following System Acceptance, Harris will provide Dane County a one-year Warranty on the implemented system. The warranty period will begin after the Final System Acceptance date and run concurrent for 12 consecutive months. Warranty includes all necessary parts, labor, transportation, shipping to the customer, and other items normally required and/or consumed in maintaining the implemented network in order to meet original factory specifications, at no cost to Dane County. Harris will also provide Dane County a two-year Warranty on Harris subscriber equipment purchased by this Agreement. The warranty period will begin either after Final System Acceptance, or immediately after

purchase of the radio if purchased after System Acceptance, and run concurrent for 24 consecutive months.

Preventive Maintenance – Preventive Maintenance for the proposed system equipment is included in the enhanced Warranty period. Harris will provide a preventive maintenance program to Dane County that would be part of deliverables after System Acceptance and included in the annual Maintenance Contract. Preventive Maintenance includes operational tests and alignments of the implemented Dane County equipment to ensure the system elements meet or exceed original manufacturer's specifications and system design.

Escalation Procedures

Harris' Service Assurance approach will ensure we will meet or exceed the 1-hour phone response, 2-hour on-site response time by utilizing our local technicians when responding to a priority call in the following manner:

The escalation procedure commences as soon as Dane County calls the Harris help desk number or local authorized Harris technician(s). Local authorized Harris technicians will be on-call 24 hours a day to respond quickly to all service requests. If Dane County opts to call the Harris help desk, then all pertinent information will be redirected to the local technician(s).

The standard escalation procedure terminates as soon as a technician(s) is on the scene and begins the problem investigation and validation process. If the problem can be worked remotely (e.g., remote resetting / reconfiguring a device), then the clock will stop as soon as the technician(s) begins the problem investigation, validation and resolution process.

In the unlikely event of a catastrophic failure, backup restoration is available in a timely manner from our Lynchburg, Virginia Facility. The following step-by-step process is employed by Harris should Dane County feel that escalation is warranted:

- Step 1 – Dane County personnel initiate a service request directly to Harris, through the local telephone numbers provided under the customized service assurance plan during warranty or post-warranty maintenance.
- Step 2 – Harris will respond to the service request, per Dane County's requirement. If the service request is during non-standard business hours, the primary on-call technician will be paged. If after 15 minutes the primary on-call technician does not respond, the secondary or backup technician will be paged.
- Step 3 – Within the appropriate timeframe of reporting the system problem, a Harris technician will be on-site to commence repair activities.
- Step 4 – In the unlikely event that the service problem is not resolved within the appropriate restoration window, Dane County personnel should follow the customized escalation procedures developed through the support of the Harris Service Manager or provided at the time of system acceptance.
- Step 5 – If desired, within 24 hours of a service request failure, Dane County personnel may contact Harris's General Manager, located in Lynchburg, Virginia.

In the unlikely event of a catastrophic system failure, such as those caused by flood, severe lightning damage, etc., Harris can provide emergency replacement equipment to rapidly restore system operation. Emergency spare parts, switching equipment, consoles, and entire sites are available through our headquarters and manufacturing facility in Lynchburg, Virginia as well as our Authorized Service Center, General Communications located in Madison, WI.

Table A – Recommended Response and Restoration Times.

Failure Level	Type of Equipment	Response Time	Restoration Time
Level 1 (Catastrophic)	Complete Failure of Dispatching Capability (Consoles and/or Switches Inoperative)	1. Within 1 hour to respond to initial call 2. Within 2 hours to respond on site.	4 Hours or Less for any Level 1 Issue
	50% of Site Channels Inoperative	Same of above.	4 Hours or Less for any Level 1 Issue
	Critical Site Alarms (Entry, Fire, Loss of AC Power, Generator Failure)	Same as above	Same as above
Level 2 (Major Outage)	Intermittent or Partial Failure of Dispatching Capability (Consoles and/or Switches)	1. Same as Level 1 Catastrophic	8 Hours or Less for any Level 2 Issue
	25% of Site Channels or Subsystem Inoperative	Same as above	Same as above
	Major Site Alarms (Channel Failures, Low Power Failure)	Same as above	Same as above
Level 3 (System Impaired)	Less than 25% of Site Channels or Subsystem Inoperative	1. Within 2 hours to respond to the initial call. 2. 4 hours on-site	24 Hours or Less for any Level 3 Issue
	Individual Dispatch Console Failure	Same as above	Same as above
	Dispatch Control Stations	Same as above	Same as above
	Optimization Issues	Same as above	Same as above
Level 4 (Work Performed Later)	Hardware/Software Upgrades	Upon Mutual Agreement by Dane County and Harris. This is Considered Scheduled/Planned Work.	N/A
	Intermittent Problems Being Reviewed/Monitored	Same as above	Same as above
	Preventative Maintenance	Same as above	Same as above

Spare Parts

Dane County has purchased spare equipment for critical system components. The spare equipment will ensure that repairs are performed as expeditiously as possible in accordance with Harris' Critical Response Plan. As parts are used to repair equipment, all changes in inventory status will be recorded such as, removal and reinstallation, units in for repair and subsequently returned to spares inventory, units lost, stolen or beyond repair and scrapped.

Depot Maintenance

Harris' Depot Repair and Return Facility, located in Lynchburg, Virginia is staffed with certified Master Technicians and support personnel, and has historically provided the highest quality repairs, and turnaround times, for our Public Safety, and commercial customers for over four decades. Our facilities are ISO 9001: 2000, and Factory Mutual Certified. State-of-the-art test equipment and certified Master Technicians verify all repairs meet or exceed prescribed specifications. Our Repair and Return Facility utilizes a stockroom of common repair parts in order to reduce repair time. Over 95% of terminal and infrastructure equipment is repaired on site. Depot repairs of Harris equipment are returned to the customer within ten business days.

Technical Assistance Center

The Harris Technical Assistance Center (TAC) will provide telephone support during normal business hours 8:00 a.m. to 5:00 p.m customer local time. Monday through Friday. TAC is accessible through our Toll-Free 800 Hot-line. When additional support is required, the Harris R&D, Operations and Field teams work directly with TAC to assist in problem resolution. Local Technicians from General Communications are also on-call 24 hours a day.

Preventive Maintenance

Harris' proactive approach to the maintenance of Dane County's system will be preventive in nature. Preventive Maintenance for the proposed system equipment is included as part of the enhanced Warranty period and available for any optional extended Maintenance Contract. Preventive Maintenance includes operational tests and alignments of Dane County's equipment to ensure the system elements meet or exceed original manufacturer's specifications and system design. At a minimum, all replacement parts will be original parts or equal in quality and ratings to the original parts utilized during system deployment.

Software FX Program

Harris' Software FX program provides periodic updates for Harris licensed software. Software updates are packaged to match the system configuration and include enhancements, new features and the ability to enable licensed features that may be optionally available in a given software release. All backup diskettes, tapes or CD-ROMs and revised software manuals are provided at the time of any software revisions, and are available in manual form or on-line through our technical assistance web page. Harris will make every effort to separate corrective revisions from enhancements; however, if new releases are necessary to provide corrections, then the entire release (including enhancements) shall be provided to Dane County at no additional cost.

Installation of FX software updates is included as part of the warranty period and any annual Maintenance Contract purchased by Dane County. Refer to Section 2.10 of the System Maintenance Agreement. To avoid any inconvenience to Dane County, Harris will perform software upgrades during evenings or weekends at no additional expense and will keep Dane County informed in advance of updates to be uploaded onto the system. For maximum ongoing post-warranty service assurance, all software releases for all program-controlled devices will be brought to the same release level prior to the conclusion of the warranty period. Harris recommends ongoing, post-warranty software updates to Dane County in order to keep the system operating at peak performance.

System/NOC Monitoring

Harris has the capability to monitor the County's communications system through our Network Operations Center (NOC) at our Orlando, FL facility, which was designed, built and installed by Harris and is currently staffed by trained and fully qualified Harris personnel.
Our NOC facility will provide a full complement of management and support services for the County. Harris will provide the following basic services for the Dane County operation.

- 24 x 7 x 365 real time system alarm monitoring
- Diagnostic and troubleshooting of alarm conditions commensurate with the County's system capabilities and configuration
- Customer and / or on-call technician notification of alarm conditions
- Tracking of alarm remediation actions until the alarm condition is corrected and cleared
- Monthly reports summarizing alarms reported, corrective action taken, technician dispatch history and time to repair

Harris will work with assigned representatives from the County's organization to develop operational protocols and procedures to assure effective and efficient communications between both organizations and establish appropriate and mutually agreeable escalation procedures.

Harris will provide the necessary hardware, installation materials and installation labor to allow for secure VPN connectivity to its Orlando, Florida NOC facility. The County would be responsible for the necessary Internet access fees to support this connectivity (minimum speed is 768kb and can be cable or DSL).