

**Before the  
Federal Communications Commission  
Washington, D.C. 20554**

In the Matter of	)	
	)	
Implementation of Sections 309(j) and 337 of the Communications Act of 1934 as Amended	)	WT Docket No. 99-87
	)	
Promotion of Spectrum Efficient Technologies on Certain Part 90 Frequencies	)	RM-9332
	)	

To: The Commission

**REQUEST FOR WAIVER**

The Commonwealth of Pennsylvania, Department of Conservation and Natural Resources ("DCNR"), hereby submits a request for waiver of the narrow-banding rules. As set forth below, DCNR has shown due diligence, other parties would not be adversely affected, and the amount of additional time requested to complete re-banding is reasonable.

**Introduction**

A. Background on DCNR

Many years ago, the Pennsylvania General Assembly created an Executive Agency specifically dedicated to the administration and preservation of Pennsylvania's extensive public Park and Forest lands. The original Agency was designated as the Department of Forests and Waters. The Department of Conservation and Natural Resources (DCNR) is the successor to that first Agency and was established on July 1, 1995. Act 18 of 1995, June 28, P.L. 89, No.18 (Act 18).

DCNR maintains and operates one hundred twenty (120) State Parks, which encompass approximately 300,000 acres of land, as well as twenty (20) Forest Districts, which represent 2.2 million acres of State Forest land. For the State Park system alone, there are 36.8 million visitors annually. The Agency also issues and oversees several hundred Grant awards to local municipalities for conservation projects through Community Conservation Partnerships to benefit rivers, trails, greenways, local parks and recreation. DCNR also has statewide responsibility for gathering and providing vital information on Pennsylvania's State Ecological and Geologic Resources.

In order to responsibly administer this vast area of public property, the Legislature included in its early Legislation, and later in Act 18, provisions to establish an independent law enforcement presence on these public lands. A contingent of law enforcement officers was established within DCNR with a broad scope of Enforcement powers. This Authority is provided enforcement powers for both State Parks and State Forest Districts, and its officers possess the powers of regular police

The statutory authority of these Officers is equivalent to Pennsylvania State Police in the enforcement of the Pennsylvania Crimes Code, but basically limited in jurisdiction to the State Parks and State Forest Districts. However, even that restriction is circumscribed by the provisions of the Extra-Territorial Municipal Police Jurisdiction Act, which provides DCNR Officers with authority for enforcement in other municipal jurisdictions under certain circumstances, such as in pursuit of a suspect for a violation occurring on DCNR property or in cases where assistance is requested by a Municipal Police Agency. DCNR Officers are of course empowered to respond to any request for assistance by the Pennsylvania State Police. Although State Police have statewide jurisdiction, in most cases State Police defer law enforcement responsibility on State Park and State Forest Lands to DCNR State Park and State Forest Officers.

Further, both DCNR law enforcement officers and other State Park and State Forest personnel, where authorized by Statute, respond to requests for assistance in cases involving search and rescue or other public safety emergency situations involving public health and welfare. DCNR personnel, for instance, worked closely with FEMA and PEMA personnel in responding recently to the devastating effects of the flooding in Pennsylvania caused by Tropical Storm Lee in 2011. The Bureau of Forestry is also specifically provided statewide jurisdiction to respond to fire emergencies in any Pennsylvania community and does so, as well as responding to National Fire Emergencies in other States on a regular annual basis.

Given its wide ranging public safety and emergency response authority, DCNR must have the capability for immediate and reliable radio communications within the physical area of its statutory responsibilities. This challenge is made especially difficult for one reason: The terrain covered routinely by the Department is more extreme than the normal terrain routinely covered by State or most Municipal Police. As a result, the radio system DCNR must put in place in order to accomplish narrow-banding has required extensive planning and implementation effort. The most effective system has been found to be a hybrid one, which requires repeater facilities and towers that allow radio signals to travel over mountainous and uneven terrain in order to reach personnel in those geographically wilder areas where coverage would otherwise be infeasible.

These radio capabilities must also be able to work properly in all kinds of communications circumstances, whether it be between State Park or Forest Officers or other DCNR Agency personnel within the Park or Forest District itself; between State Park or State Forest Officers

and State Police; between State Park or State Forest Officers and Federal Agencies or their counterparts; and, between State Park or State Forest Officers and adjoining Municipal Police or other County or Township Emergency Personnel. See also Attachment A, MOU.B. Description of Current DCNR Radio System

DCNR currently employs a VHF wideband repeater system utilizing a large legacy wideband VHF radio system. DCNR operates its system on the following VHF wideband frequencies: 159.255; 159.345; 159.420; 159.360; 159.330; 159.285; 151.175; 151.400; 151.385; 151.295; 151.160; 151.460; 158.850; 153.860; and 151.445 MHz. The system consists of 1800 mobile radios, 2000 portable radios, 20 mountain-top 100 watt base radios, 200 localized mid-power base radios and 55 repeater sites across the Commonwealth. DCNR relies heavily on portables and repeaters for the majority of its radio communications. DCNR has approximately 200 security vehicles in service between Parks and Forest Districts which operate on these frequencies. Most of DCNR's wideband radio equipment is not capable of migration to VHF narrowband technology. See Attachment A, MOU.

### **DCNR Has Shown Due Diligence**

#### **A. Steps Taken to Plan, Initiate and Implement the New Radio System**

In the 1990's, the Commonwealth made the decision to build a statewide 800 MHz radio system for all state government agencies under the Governor's jurisdiction. Responsibility for radio communications at that time was under the control of the Governor's Office of Administration (OA), and DCNR coordinated its radio system operations with OA. The Commonwealth, acting through OA, awarded the contract for the Commonwealth's statewide system to Harris Corporation (then M/A Com) for an 800 MHz OpenSky platform. The 800 MHz platform was built as a mobile-based radio system. While portables were supported by the 800 MHz system, the coverage for portables was limited.

DCNR encumbered 18 million dollars in the year 2000 to migrate to the Commonwealth's 800 MHz system. DCNR's plan was to use the system for its mobile and fixed location communications. DCNR is a portable radio based agency and, as noted above, the mobile-based OpenSky system would not provide adequate portable radio coverage for its mission.

While DCNR progressed on transitioning its mobiles and fixed locations to 800 MHz, it continued to search for a viable option to provide reliable portable radio coverage. In 2008, DCNR worked with Harris Corporation (then Tyco) to develop and design a communications system to support its portable radio requirements. Harris Corporation developed and designed a VHF/800 MHz Hybrid Radio System as a solution to meet its portable radio requirements. See Attachment B, Simplified Schematic.

Harris Corporation presented the proposal for the Hybrid Radio System to DCNR in February of 2009. See Attachment C, Harris Proposal Letter. The proposal was reviewed and accepted by DCNR. The proposal recommended building a VHF Narrowband repeater system and interfacing the repeaters into the 800 MHz OpenSky system. The system consisted of 1900 mobile 800 MHz radios, 350 800 MHz base radios, 2000 VHF narrowband portable radios and 95 VHF narrowband repeaters. DCNR and OA executed a Memorandum of Understanding (MOU) that documented the proposed conversion project. See Attachment A..

DCNR placed an order for the new radio equipment over three years ago, i.e. in June 2009. Prototyping of the mobile radio and base radio installations was completed in 2010. The VHF narrowband repeater installation commenced in 2010.

In June of 2011, DCNR started the installation of its 800 MHz mobile and base radios. The installation of the VHF narrowband repeaters also continued through 2011. The 800 MHz mobile and base radio installations were completed in January of 2012.

Harris Corporation completed the installation of the VHF narrowband repeaters backbone in the spring of 2012. DCNR distributed its 2000 VHF narrowband portables and placed them in use during May and June of 2012. DCNR started using the new Hybrid Radio System in July of 2012. However, as explained below, problems surfaced.<sup>1</sup>

## **Present Status of Implementation Efforts**

### **A. Current Challenges to Implementation**

DCNR became aware quickly that several problems existed with the new Hybrid System. The problems involve the 800 MHz base radio that hinders its ability to receive and transmit on the new VHF narrowband repeater. There are also two issues directly related to the VHF narrowband repeaters and frequencies. DCNR is receiving radio traffic interference from co-channel users on its newly licensed narrowband VHF frequencies. Moreover, a large number of the VHF narrowband repeaters are not providing adequate portable radio coverage.

The technical issues with the 800 MHz base radios have been identified, and technical support is in the process of applying a correction to all fixed 800 MHz base radios. However, our contractor (Harris) has advised that the corrective action will take several months to complete.

DCNR and Harris Corporation are working to resolve the VHF issues associated with the Hybrid Radio System. DCNR has long strived to be completely operational on narrow-banded channels before the December 2012 deadline. However, the unforeseen technical interference and coverage issues being experienced prevent the Hybrid System from being fully operational,

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<sup>1</sup> DCNR operates on VHF frequencies separate from those of the State Police. Thus, the State Police Request for Waiver does not take the place of the need for this Request.

and will require continued reliance on the legacy wideband system pending correction of these issues.

**B. Projected Schedule for Completion**

DCNR will continue to work to resolve the issues with the Hybrid System. Nonetheless, because of the unique public safety concerns and geographical constraints involved in solving the reception difficulties, DCNR finds it necessary to request an extension for the use of the legacy VHF wideband system until these VHF narrowband issues are resolved. This process will require an extension until January, 2014, in order to narrow-band the existing DCNR VHF frequencies. The projected date of completion for the mobile and portable units is June, 2013, and for final infrastructure placement December, 2013.

The prior wide-band radio units were not capable of narrow band technology and therefore have been completely replaced. The replacement narrow-band units equipped for the new system are already in the field. See also Attachment A, MOU, Exhibit C, pages 19 through 21. Likewise, much of the infrastructure development is complete. The 95 repeater units are in place. See also Attachment A, MOU.

**B. Statement of Availability of Adequate Funding**

As noted previously, DCNR encumbered 18 million dollars in the year 2000 to migrate to the Commonwealth's 800 MHz system. Funding continues to be available from the original appropriation of 18 million dollars for the adjustments necessary to bring the system to completion. DCNR has also executed and funded three separate Purchase Orders for concurrent maintenance of the radio system once the original appropriation is exhausted. See Attachments D, E and F, DCNR Purchase Orders.

**Impact of Extension on Existing Use or Licensees**

DCNR has re-used all of its existing licensed VHF wideband frequencies in the Hybrid System. DCNR is currently in the process of converting its FCC wideband licenses to narrowband. There are no other known impacts in this regard. See also Exhibit C to Attachment A.

**Conclusion**

Accordingly, for the reasons set forth above, DCNR requests an extension to complete re-banding to January 1, 2014.

Respectfully submitted,

DEPARTMENT OF CONSERVATION AND  
NATURAL RESOURCES

  
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# Memorandum of Understanding

Between

Department of Conservation and Natural Resources

and

Governor's Office of Administration

**THIS MEMORANDUM OF UNDERSTANDING**, made and entered into this \_\_\_ of \_\_\_ 2009, by and between the Department of Conservation and Natural Resources (hereinafter "DCNR") and the Governor's Office of Administration (hereinafter "OA").

## WITNESSETH

**WHEREAS**, the General Assembly in Pennsylvania Legislative Act 148 (1996) has authorized OA to develop, manage, and maintain a statewide wireless network, known as the Pennsylvania Statewide Radio Network (hereinafter "PA-STARNet"), to provide for the two-way wireless communication requirements of departments and agencies of the Commonwealth of Pennsylvania; and,

**WHEREAS**, Section 501 and 502 of the Administrative Code of 1929 (71 P. S. 181 and 182) require that commonwealth departments and agencies coordinate their work and activities with other commonwealth departments and agencies; and,

**WHEREAS**, the commonwealth has through Management Directive 245.15, *Statewide Public Safety Radio System*, dated March 7, 2006, established PA-STARNet as the single shared-use public safety radio system for all commonwealth agencies under the Governor's jurisdiction; and,

**WHEREAS**, Management Directive 245.17, *Commonwealth of Pennsylvania Public Safety Communications Council*, establishes that the Office of Public Safety Radio Services (OPRS) under OA is the single authority for public safety communications in the commonwealth and is responsible for administration of the technical, engineering, and operational aspects of public safety communications using PA-STARNet; and,

**WHEREAS**, DCNR was among the original departments and agencies identified for use of PA-STARNet, was appropriated funding for the purchase of PA-STARNet subscriber equipment, and desires to use PA-STARNet for wireless two-way communication in support of the department's operations; and,

**WHEREAS**, PA-STARNet is designed primarily for mobile radio communication focusing on roadways and areas of high traffic while many of DCNR's areas of operation are located in state parks and state forests that require portable radio communication in remote forested areas; and,

**WHEREAS**, radio signals in the Very High Frequency (VHF) band are better suited for portable radio operations in forested areas than the 800 megahertz (MHz) signals used by PA-STARNet's native OpenSky® technology; and,

**WHEREAS**, DCNR holds licenses to frequencies in the VHF band to be applied to Radio Frequency (RF) coverage of DCNR's areas of operation.

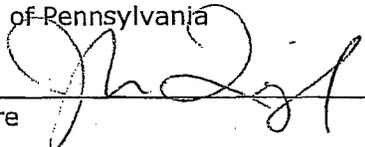
DCNR-OCC  
LOG # 09-1041

**NOW THEREFORE**, the parties to this Memorandum of Understanding (hereinafter "MOU") set forth the following as the terms and conditions of their understanding:

1. DCNR and OA will jointly design, construct, install, configure, and deploy radio communications infrastructure using the VHF band and interoperable with PA-STARNet (hereinafter "VHF network augmentation") according to the design in **Exhibit A**, *DCNR/OPRS VHF-800 MHz OpenSky® Project (February 2009)*.
2. All enhancements or additions to PA-STARNet as a result of VHF network augmentation shall become part of PA-STARNet, to be owned, maintained, managed, and operated by OPRS for the benefit of the departments, agencies, and other organizations using the network.
3. Upon incorporation of VHF network augmentation as part of PA-STARNet, responsibility for operating and maintaining VHF network augmentation shall remain with OPRS and shall not revert to DCNR.
4. The cost of equipment and services for design, procurement, construction, and installation of VHF network augmentation and initial DCNR fleet deployment shall be borne as follows:
  - 4.1. OA shall bear the cost of all base stations, antennas, structures, and associated services for VHF network augmentation, as specified in **Exhibit B**, *Tyco Electronics Letter of Proposal (May 13, 2009)* under the category *Infrastructure*, not to exceed four (4) million dollars, using funds appropriated by the General Assembly under Legislative Act 41 (2008) for completion of PA-STARNet.
  - 4.2. Pricing specified in **Exhibit B** shall prevail over any pricing specified in other attachments to this MOU.
  - 4.3. DCNR shall bear the cost of all subscriber equipment for use by DCNR, and of all associated services such as installation and configuration.
  - 4.4. DCNR shall bear the cost of any augmentation infrastructure and associated services not included in **Exhibit A** but required, in DCNR's assessment, to meet the department's RF coverage requirements for fleet operations.
5. DCNR shall be responsible for all of the following:
  - 5.1. Definition of DCNR's operational requirements for two-way wireless communication in support of the design, construction, and deployment of VHF network augmentation and the migration of DCNR radio use to PA-STARNet; and,
  - 5.2. Facilitation and coordination of permissions for the use of land and other property owned by DCNR for the construction, installation, deployment, and operation of VHF network augmentation; and,
  - 5.3. Assignment to OPRS of all frequency licenses held by DCNR in the VHF band as of the date of execution of this MOU as specified in **Exhibit C**, *VHF Channel Licenses*, using the Federal Communications Commission (FCC) Assignment of Authorization process, for use in configuration and deployment of VHF network augmentation or for other purposes in administering PA-STARNet for the benefit of those using the network. DCNR acknowledges that once transferred to OPRS, frequencies will be migrated to narrowband use.
6. OPRS shall be responsible for all of the following:
  - 6.1. Technical guidance and oversight in the design, procurement, construction, installation, configuration, and deployment of VHF network augmentation; and,
  - 6.2. Specification and procurement of equipment and services for the design, construction, installation, configuration, and deployment of VHF network augmentation; and,

- 6.3. Management, operation, and maintenance of VHF network augmentation as part of the overall PA-STARNet infrastructure. In the event that the level of appropriated funding becomes inadequate to maintain full service levels, OPRS shall make its best effort to continue operation and maintenance of VHF network augmentation consistently with available funding and with overall priorities for PA-STARNet.
7. The parties to this MOU acknowledge and understand the following:
- 7.1. The foregoing presents the terms and conditions of their understanding.
- 7.2. This MOU is not intended to and does not create any contractual rights or obligations with respect to the signatories, their departments or agencies, or any other parties.
- 7.3. This MOU can be modified or terminated only as an amendment thereto, submitted in writing to all signatory parties for review and concurrence at least sixty (60) days in advance of the desired effective date.
- 7.4. Any dispute arising hereunder shall be submitted to the Office of General Counsel for final resolution.

DEPARTMENT OF CONSERVATION AND NATURAL RESOURCES,  
Commonwealth of Pennsylvania

By:  6/3/09  
Signature Date

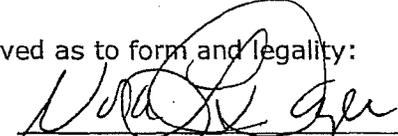
Title: Acting Secretary

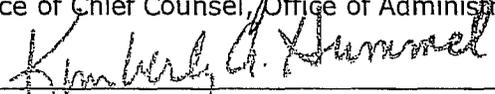
OFFICE OF ADMINISTRATION, Commonwealth of Pennsylvania

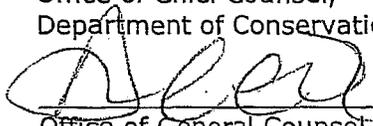
By: Nanni Wyatt 6.17.09  
Signature Date

Title: SECRETARY OF ADMINISTRATION

Approved as to form and legality:

By:  6-16-09  
Office of Chief Counsel, Office of Administration Date

By:  6/5/09  
Office of Chief Counsel, Date  
Department of Conservation and Natural Resources

By:  7.1.09  
Office of General Counsel Date

## Exhibit A—DCNR/OPRS VHF-800 MHz OpenSky® Project

Incorporated herein by reference:

*DCNR/OPRS VHF-800 MHz OpenSky® Project*

February 2009, including System Description section as revised May 2009

## Exhibit B—Tyco Electronics Letter of Proposal

*Tyco Electronics Cost Proposal Version 3*  
May 13, 2009

## Table of Contents – System Description

### *System Description*

<i>Project Approach</i> .....	3
Overview.....	3
<i>DCNR Site Type Descriptions</i> .....	4
Type 1 - OPRS Sites with Two Existing VHF Antennas.....	4
Type 2 - OPRS Sites with One Existing VHF Antenna.....	5
Type 3 - Not Used.....	6
Type 4 - OPRS Sites without Any Existing VHF Antenna Equipment.....	7
Type 5 - Not Used.....	8
Type 6 - DCNR High-Profile Sites.....	8
Type 7 - DCNR Park Offices.....	8
Type 8 - DCNR Pole Mounted Sites.....	9
UHF/VHF Cross-Band System at Ohioyle State Park.....	10
Aircraft Communications.....	10
System Spares.....	10
Combining, Filtering, and Duplexing.....	10
T-Pass.....	11
Combining and Multicoupling.....	11
Duplexing.....	11
<i>Coverage Analysis and Design</i> .....	12
Radio Propagation Model.....	12
Terrain and Environmental Databases.....	13
Coverage Maps.....	13
Frequency Planning.....	14
Frequency Consultant.....	15
Frequency Searches.....	16
Assist with FCC Licensing.....	16
Disclaimers.....	16
<i>DCNR System Integration</i> .....	17
High Profile.....	17

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Low Profile .....	18
<b>User Interfaces</b> .....	<b>19</b>
P7100 <sup>IP</sup> Portable.....	19
M5300 Mobile Radio .....	19
M7100 <sup>IP</sup> Mobile Radio .....	21
Mobile Vehicular Repeaters.....	21

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## System Description

### Project Approach

#### Overview

Tyco Electronics, (M/A-COM) Inc. is pleased to present this proposal to the Pennsylvania Department of Conservation and Natural Resources (DCNR) for a new VHF overlay, integrated with the OPRS PA-STARNet OpenSky network. By utilizing the existing resources provided by the Commonwealth of Pennsylvania's Office of Public Safety Radio Services (OPRS), DCNR will be able to refresh and improve their radio communications with this project and reduce total cost of ownership.

The collaborative DCNR, OPRS, and Tyco Electronics IP-based hybrid design gives the best-fit solution by leveraging two powerful technology platforms into a common network architecture, and utilizing each one in its most effective manner. The VHF overlay will provide portables with the best propagation coverage footprint, while the OpenSky trunking system will leverage the multitudes of OPRS base stations placed around the state and provide the mobile radios with voice and data capability. This solution provides coverage where needed while balanced with costs. Combined together in a seamless IP-based network, DCNR will have a robust, functional, and highly adaptive solution moving forward.

The DCNR solution is an analog conventional overlay integrated into the OPRS PA-STARNet OpenSky network mostly using the NetworkFirst Interoperability Gateways that OPRS has already installed and fills in areas with additional integrated sites. This scope also provides the necessary subscriber terminal equipment and builds out the necessary sites selected by a project team of DCNR, OPRS, and M/A-COM.

## DCNR Site Type Descriptions

The DCNR VHF overlay will use mostly existing OPRS high-profile tower sites. Most of these tower sites have existing VHF antennas at them already, and antennas will be added at a handful of sites. Additionally, key park offices and pole-mounted sites will be used to fill coverage gaps. Overall eighty-nine repeater sites will be established to support statewide portable radio communications on VHF.

Below are site type categories explaining, generally, the configuration and work effort at a particular site type. The system is defined by the site type quantities multiples used in the design connected into the OPRS state-wide system. DCNR communication is integrated and transported by the OPRS system to anywhere OPRS has connectivity.

M/A-COM has teamed with DCNR and OPRS to coordinate and optimize this design. This proposal is based on the efforts of that teamwork and the design is at a mature level.

### Type 1 - OPRS Sites with Two Existing VHF Antennas

Type One sites will be installed at OPRS tower locations that currently have two VHF antennas. One of the antennas offers 6 dB gain and is located at the top of the tower and the second antenna offers 3 dB gain and is located 20 feet below the base of the top antenna. These two antennas currently have 1/2 inch coax feed-lines and support a simplex channel each.

Under the new arrangement, the top antenna will be used as the receive antenna and the lower antenna will be used as the transmit antenna. Due to the interlacing of the current simplex channels with the DCNR channel and the spacing of the antennas, special filtering is needed that will serve the purpose of combining and multicoupling as well as providing the necessary isolation between the transmit and receive signals. This filtering is expandable to accommodate additional channels, but the filtering system in-whole will need to be considered.

These sites do not require any additional work on the tower and will have one VHF station and a VHF combiner/multi-coupler added to the existing complement of VHF equipment currently installed in the shelter. No tower work is anticipated on these sites as the current antennas and 1/2 inch coax feed-lines will be used. Grounding is assumed to be at TE specifications and backed-up 48VDC power already exists. The new DCNR MASTR III station will be supported by newly supplied DC-DC converters. As-built drawings will also be updated.

The existing NetworkFirst gateways will be used to interface the new DCNR channels to PA-STARNet system. An Ethernet switch will be added that will connect to the existing router. Please see the System Integration Section below.

Below is a table listing the 31 sites of this type. The color shown corresponds to the sites shown on the included coverage maps. (PHIL02 has added filtering to combine an additional OPRS channel already existing at the site.)

Type	Color	ID	Name
1	Red	BEAV02	Raccoon Creek
1	Red	BEDF02	Martin Hill
1	Red	BERK02	Hopewell
1	Red	BERK04	Port Clinton
1	Red	BLAI02	Martinsburg
1	Red	BRAD41	ROBWOOD III
1	Red	BUTL01	PGC: Hilliards
1	Red	CAMB02	Lower Yoder
1	Red	CENT04	Rush
1	Red	CLIN02	Tamarack
1	Red	COLU01	Catawissa
1	Red	CRAW01	Townville
1	Red	DAUP01	Ellendale
1	Red	ERIE92	Washington Stockpile
1	Red	FAYE01	PONDFIELD
1	Red	GREE08	WAYNESBURG PDOT
1	Red	JEFF02	Hays Lookout
1	Red	LAWR06	Grindstone
1	Red	LUZE01	WYOMING PTC
1	Red	LYCO02	Waterville
1	Red	MCKE01	Port Allegheny
1	Red	MERC92	New Vernon Stockpile
1	Red	MONR03	COOLBAUGH
1	Red	PHIL02	PSP Phila. HQ. Troop K.
1	Red	PIKE01	HIGH KNOB
1	Red	SNYD02	Richfield
1	Red	SOME06	NEGRO MOUNTAIN
1	Red	TIOG06	Pat Jr. Fire Tower
1	Red	WARR34	Kinzua Dam
1	Red	WAYN31	BEACH LAKE
1	Red	WAYN33	Mount Ararat

### Type 2 - OPRS Sites with One Existing VHF Antenna

Type Two sites will be installed at OPRS tower locations that currently have one VHF antenna, to which a second antenna will be added. The existing single antenna offers 3 dB gain and is located at the top of the tower. The antenna currently has a 1/2 inch coax feed-line and supports a single simplex channel.

Under the new arrangement, a new 6dB gain antenna will be installed and the existing 3dB gain antenna will be installed 20 feet below the base of the existing antenna. The top antenna

will be used as the receive antenna and the lower antenna will be used as the transmit antenna. New 7/8 inch coax feed-line will be installed for the new RX antenna and the existing 1/2 inch coax feed-line will be used for the TX antenna.

Due to the interlacing of the current simplex channels with the DCNR channel and the spacing of the antennas, special filtering is needed that will serve the purpose of combining and multicoupling as well as providing the necessary isolation between the transmit and receive signals. This filtering is expandable to accommodate additional channels, but the filtering system in-whole will need to be considered.

These sites require an additional VHF antenna on the tower and will have one VHF station and a VHF combiner/multi-coupler added to the existing complement of VHF equipment currently installed in the shelter. A tower loading study has already been performed by OPRS for these sites. Grounding is assumed to be at TE specifications and backed-up 48VDC power already exists. The new DCNR MASTR III station will be supported by newly supplied DC-DC converters. As-built drawings will also be updated.

The existing NetworkFirst gateways will be used to interface the new DCNR channels to PA-STARNet system. An Ethernet switch will be added that will connect to the existing router. Please see the System Integration Section below.

Below is a table listing the 16 sites of this type. The color shown corresponds to the sites shown on the included coverage maps. (YORK16 already has the RX antenna in place and a new TX antenna will be added.)

Type	Color	ID	Name
2	Orange	BUCK40	Nockamixon State Park
2	Orange	CAME05	Truman
2	Orange	CENT08	Little Flat
2	Orange	CLEA51	SCIBootcamp
2	Orange	CLIN41	Rainsares III
2	Orange	COLU02	Vandine
2	Orange	FORE07	Tylersburg
2	Orange	HUNT01	Loop Lookout
2	Orange	INDI01	CLYMER FIRE TOWER
2	Orange	JUNI05	Icksburg
2	Orange	MONT01	MONTOUR
2	Orange	POTT12	Denton Hill
2	Orange	SULL03	BEAR WALLOW
2	Orange	SUSQ06	GREAT BEND
2	Orange	YORK16	Conewago
2	Orange	YORK94	I-83 Rest

Type 3 - Not Used

## Type 4 - OPRS Sites without Any Existing VHF Antenna Equipment

Type Four sites will be installed at OPRS tower locations that have no VHF antennas or equipment.

Under the new design, a new single antenna will be used to transmit and receive. The DCNR VHF frequency will be the only frequency considered at these locations for the purposes of this proposal. Co-located VHF frequencies on commercial sites can be filtered on a case-by-case basis.

These sites require one duplexed VHF antenna on the tower and will have one VHF station. A tower loading study will need to be performed as tower work is anticipated on these sites as a new antenna and coax feed-line will be installed. Grounding is assumed to be at TE specifications and backed-up 48VDC already exists. The new DCNR MASTR III station will be supported by newly supplied DC-DC converters. As-built drawings will also be updated.

A new OPRS provided NetworkFirst gateway will be used to interface the new DCNR channel. An Ethernet switch will be added that will connect to the existing router. The existing router will receive an upgrade to support the new NetworkFirst gateway. Please see the System Integration Section below.

Below is a table listing the 19 sites of this type. The color shown corresponds to the sites shown on the included coverage maps. (ERIE40 will have four channels with a TX combiner and antenna and a RX multicoupler and antenna.)

Type	Color	ID	Name
4	Pink	ADAM40N	Piney Mountain
4	Pink	BEDF30N	Tiger Valley
4	Pink	BLAI30N	Wopsy II
4	Pink	BUCK31N	Doylestown
4	Pink	BUTL91N	Fairview Stockpile
4	Pink	CARB03N	Broad Mnt.
4	Pink	CLEA03N	Boone Mtn
4	Pink	ERIE40N	Presque MAINT
4	Pink	FAYE09N	THARP KNOB
4	Pink	FULT40N	Tuscorora Summit
4	Pink	LANC33N	Truce
4	Pink	LUZE06N	RED ROCK
4	Pink	LYCO01N	Shaffers Path
4	Pink	MCKE03N	Hedgehog
4	Pink	MONR09N	FOX GPU
4	Pink	MONY50N	Graterford Prision Bell A
4	Pink	PERR02N	Three Square Hollow
4	Pink	SOME02N	BALD KNOB
4	Pink	WEST30N	Chestnut Ridge

## Type 5 - Not Used

## Type 6 - DCNR High-Profile Sites

Type Six sites will be installed at DCNR tower locations that will need a VHF antenna and new RF equipment. These sites will become part of the existing OPRS microwave backbone.

These sites require one duplexed VHF antenna on the tower and will have one VHF station. A tower loading study will need to be performed as tower work is anticipated on these sites as a new antenna and coax feed-line will be installed. This installation type will have one site on an existing DCNR tower. It is anticipated that DCNR or OPRS will install an appropriate communications shelter at this sites to support the site design. Grounding to TE specifications will be installed and backed-up 48VDC power will be supplied. The new DCNR MASTR III station will be supported by newly supplied DC-DC converters. As-built drawings will also be created.

A new OPRS provided NetworkFirst gateway will be used to interface the new DCNR channels to the PA-STARNet system. An Ethernet switch and router will be added that will connect to the new (provided by OPRS) microwave site backhaul links. Please see the System Integration Section below.

Below is a table listing the 1 site of this type. The color shown corresponds to the sites shown on the included coverage maps.

Type	Color	ID	Name
6	Black	DC_SOLAR	SOLAR MTN. (Radio Tower)

## Type 7 - DCNR Park Offices

Type Seven sites will be installed at DCNR park office locations that will need tower-mounted VHF and 800 MHz antennas and equipment installed inside the park office.

These sites require one duplexed VHF antenna and one 800MHz antenna on the tower and will have one VHF station linked to a fixed M7300 radio installed in the existing park building next to the tower. These sites will be linked to the existing OPRS OpenSky network via the M7300 radio. (See the System Integration Section below.)

A tower loading study will need to be performed as tower work is anticipated on these sites as new antennas and coax feed-lines will be installed. Grounding to TE specifications will be installed and the equipment will be powered by a SkyCharger power system. As-built drawings will need to be created.

Below is a table listing the 15 sites of this type. The color shown corresponds to the sites shown on the included coverage maps. (Note that Pymatuning is added after the maps were released.)

Type	Color	ID	Name
7	Blue	DCPO Col Denning	DCPO Col Denning
7	Blue	DCPO Hyner Run	DCPO Hyner Run
7	Blue	DCPO Kettle Creek	DCPO Kettle Creek
7	Blue	DCPO Linn Run	DCPO Linn Run
7	Blue	DCPO Little Pine	DCPO Little Pine
7	Blue	DCPO Nesopeck	DCPO Nesopeck
7	Blue	DCPO Ole Bull	DCPO Ole Bull
7	Blue	DCPO Pine Grove	DCPO Pine Grove
7	Blue	DCPO Pr Gallitzen	DCPO Pr Gallitzen
7	Blue	DCPO Reeds Gap	DCPO Reeds Gap
7	Blue	DCPO Ryerson Sta	DCPO Ryerson Sta
7	Blue	DCPO Salt Spring	DCPO Salt Spring
7	Blue	DCPO Sizerville	DCPO Sizerville
7	Blue	DCPO Worlds End	DCPO Worlds End
7	Blue	Pymatuning	Pymatuning (in Ohio)

Please note that the Pymatuning site will use the existing VHF antenna system. The Pymatuning site structure will only have an 800 MHz OpenSky control station antenna and coax cable added as part of this scope. This site is not located at a DCNR Park Office and is assumed to have an adequate shelter and site facilities.

### Type 8 - DCNR Pole Mounted Sites

Type Eight sites will be installed at DCNR park locations that will need a new wooden pole, VHF and 800 MHz antennas, and equipment mounted outdoors in a pole-mounted cabinet.

These sites will have 90' wooden poles installed in the park with one duplexed VHF antenna on the pole and will have one VHF station linked to a fixed M7300 radio installed in an outdoor cabinet mounted on the pole. These sites will be linked to the existing OPRS OpenSky network via the M7300 radio. (See the System Integration Section below.)

Grounding to TE specifications will be installed and the equipment will be powered by a SkyCharger power system. As-built drawings will also need to be created.

Below is a table listing the 7 sites of this type. The color shown corresponds to the sites shown on the included coverage maps. (Some of these sites' antennas may be able to be mounted to existing structures.)

Type	Color	ID	Name
8	Olive	DCCAB White Clay	White Clay
8	Olive	DCCAB LG Lower	LG Lower
8	Olive	DCCAB LG Middle	LG Middle
8	Olive	DCCAB LG Upper	LG Upper
8	Olive	DCCAB Buchanans BP	Buchanans BP
8	Olive	DCCAB Poe Paddy	Poe Paddy
8	Olive	DCCAB Sinnemahoning ALT	Sinnemahoning ALT (Campground)

### UHF/VHF Cross-Band System at Ohiopyle State Park

A UHF to VHF cross-band system will be installed at Ohiopyle State Park. This system will have a single UHF M7100 radio interfaced with a single VHF M7100 radio. Each radio will have a single antenna.

It is anticipated that the UHF antenna will be mounted high on the tower and the VHF antenna will be mounted low on the tower to provide separation from the Type 2 site antenna being installed there. Additional padding may be required on the VHF radio, or the antenna may need to be mounted off of the tower.

The tower loading study will be performed as part of the Type 2 study and the system will have its own DC-DC converter.

### Aircraft Communications

3 site expansions have been optioned for statewide communications to support aircraft tracking and coordination in and out of active fire zones. These analog conventional expansions have been planned for selected Type 1 or Type 2 sites where the filter systems will be expanded and the project antenna system will be used.

Under this option, six (6) OpenSky control stations have been added for dispatch communications from various sites including airbases or command centers. The control stations will need to be integrated with the OPRS radio network.

### System Spares

A spares package has been included which essentially contains the proposed equipment compliment of seven site base stations, one T-Pass, multicoupler, and duplexer, and one antenna of each kind.

### Combining, Filtering, and Duplexing

There are three types of antenna combining used in the proposed site types:

### **T-Pass**

T-Pass is a TX/RX product that allows discrete frequencies to be combined (or multicoupled) by using an assembly of tuned cavities. The cavities act as filtered taps to connect the various base stations and repeaters and provide them the necessary isolation from each other as well as themselves on the receive side. This is especially effective when simplex channels fall between the transmit and receive frequencies of a repeater with tight antenna spacing - such as planned for at site Types 1 and 2. Generally, the use of T-Pass inserts additional loss and a low-noise, low-gain receive pre-amplifier as been planned for the high-profile sites.

The T-Pass assemblies are expandable; however, the whole assembly's filtering network must be taken into account when modifying it (such as with PHIL02.) Finally, the T-Pass has been proposed on a typical frequency scenario in which the final design will be based on the final frequency plan. These designs, based on that final frequency set per site may change the proposed design, filtering cavity quantity and cost which can be accommodated through change orders, if required.

### **Combining and Multicoupling**

Combining and multicoupling allows for frequency sets to be managed into two antennas. This is a standard arrangement, is specified from TX-RX, and is being included for ERIE40 where four channels are proposed. (Optional pre-selection can be added if desired.)

### **Duplexing**

Duplexers allow for a repeater's separate transmit and receive signals to be combined into one antenna. The use of a duplexer is especially suited for sites that only have tower space for one antenna as the duplexer device provides the receive pre-selection and electrical isolation of the receiver from the transmitter. Generally, the use of a duplexer inserts additional loss and a low-noise, low-gain receive pre-amplifier as been planned for the high-profile sites. A dB Spectra (was once dB Products) duplexer has been specified due to its small size and low insertion loss.

## Coverage Analysis and Design

Coverage for DCNR was analyzed using M/A-COM's Radio Analysis and Propagation Tool Repository (RAPTR) design software. RAPTR is an advanced coverage design and engineering software package employing a suite of design modules, allowing a system to be handled from the initial site selection process, to the detailed coverage design, to microwave backbone design, to frequency planning, to coverage acceptance. The RAPTR propagation model has been finely tuned to predict coverage in all of the conditions that are present in a land-mobile radio system.

RAPTR was developed and is maintained by M/A-COM's RF Integrity group. The RF Integrity group also maintains the databases that are used by RAPTR and develops new design modules and features that are required to meet special customer requirements. RF Integrity continually evaluates the performance of the propagation model used within RAPTR, refines it as necessary and validates its performance. The propagation model used by RAPTR is described below along with some of its advanced features.

### Radio Propagation Model

RAPTR propagation modeling is compatible with Telecommunications Industry Association (TIA) Telecommunications Systems Bulletin TSB88-B "Wireless Communications Systems - Performance in Noise and Interference Limited Situations - Recommended Methods for Technology-Independent Modeling, Simulation, and Verification." The propagation model used by RAPTR is based on the Okumura-Hata-Davidson (OHD) model as described in TSB88-B. Factors relating to environment and terrain are added to derive the total path loss value. RAPTR employs the Epstein-Peterson diffraction model in conjunction with the OHD model in a proprietary method to greatly enhance the path loss calculation. The diffraction calculations are coupled with the environment database to further increase the calculation of path loss.

RAPTR uses a Tile Method for analyzing the propagation, a much more accurate method than the older radial method. Radial methods begin to lose resolution as the distance from the site increases; the distance increases between evaluation locations from radial to radial. The Tile method uniformly predicts the coverage for a system by dividing the project area (i.e., the DCNR park and forest boundaries) into small areas called tiles. The size of the tiles used by RAPTR is three arc-seconds, approximately 300 feet per side. RAPTR models the propagation from a site to each tile in the project area. With the Tile method, the interaction of signals from different sites can be more accurately determined. This increases the accuracy of evaluating coverage for simulcast systems, voting system, multi-site networks, interference, and handoff.

The methods used by RAPTR to calculate the path loss are the result of evaluating over 189,000 different propagation paths as part of an extensive data collection effort performed by M/A-COM over the past several years. These paths encompassed a variety of terrain and environment features, ranging from over water paths, to flat terrain in Florida, to

mountainous areas such as western Virginia, New Hampshire, and California. It also included varying environmental conditions, ranging from highly urbanized areas to rural open and forested areas. As a result, the propagation model has been finely tuned to perform in all of the conditions that are present in a land-mobile radio system. The model is accurate from flat terrain to highly rugged mountainous terrain, and from urban to rural areas.

## Terrain and Environmental Databases

The accuracy of any coverage prediction is to a large degree dependent upon the terrain data available for the project. RAPTR makes use of two primary terrain databases. First is the 30 arc-second database available for the entire world. However, due to its coarse resolution, it is only used where more detailed data is not available. Second is the three arc-second database derived from the United States Geological Survey (USGS) Digital Elevation Model (DEM) data that provides much greater resolution and accuracy, both spatially and in elevation. This database can be supplemented with the more recent USGS 30-meter data, providing higher degrees of resolution and accuracy. The 30-meter data is incorporated into the main RAPTR terrain database using methods described in TSB88-B. Thirty-meter data available from the USGS was used for analyzing coverage design and predictions for DCNR. The terrain data can be displayed within RAPTR to give system designers the ability to locate sites on the basis of elevation. The terrain can be displayed in either an aerial view or as a colored contour map.

RAPTR employs a number of sophisticated analysis techniques when evaluating coverage. Instead of considering what the environment type is at the location, or tile, being evaluated, it will take into account the environment surrounding the location. This increases the accuracy of coverage predictions by detecting transitions in the environment - for instance, when transitioning from agricultural to forest, or urban to suburban. In addition, a designer can select from a category of environment. For example, the designer can select for the Forest environment class from categories of Pine, Hardwood, Mixed, etc. Also, RAPTR can perform an analysis of the environment and classify it based on density. This increases the accuracy of coverage predictions by being able to account for dense forests and sparse forests. All these factors combine to allow RAPTR to incorporate a very detailed model of the environment into coverage designs.

## Coverage Maps

The table below lists the coverage maps for DCNR. Included are RAPTR maps showing five watt VHF portable and fifty watt VHF mobile coverage talk back and talk out. The coverage design modeling has been set for portable operation at the head which takes a head-loss factor into account (i.e., one's head is between the repeater's and radio's antenna.) The green color displayed indicates a DAQ3.0 equivalency level (-104dBm) for analog coverage with a 95% confidence factor. A blue color is shown indicating a -112dBm level where the radios start to break squelch and offer a degree of understandability (per OPRS.) Coverage of less than a 95% confidence factor or below -112dBm is shown in areas that are white.

Please note that the Pymatuning site rearrangement is not included in the previously released coverage maps.

Below is a table listing the provided coverage maps. The first four figures are run in M/A-COM's RAPTR propagation tool and Fig. 5 is the current Commonwealth Digital 800 MHz coverage for OpenSky mobiles which was run in EDX.

Enclosed is a master site spreadsheet listing and summarizing the site types. Please note that RAPTR assumes a radiation height from the center of the antennas, so antennas located at the top of a tower will appear to be slightly higher than the tower (by half of the antenna's length.)

Some sites are modeled with a 12-channel multiplexer simply to add 4.2dB of gain to overcome the coax line losses and the T-Pass or duplexer losses. This gain device may be replaced by a small low-noise amplifier that will serve the same purpose.

DCNR Coverage Maps	
Figure	Description
01 MTO STATE ALL PLUS NEEDED OFFICES	Phase 1 Mobile Talkout (Includes All Site Types Radiating)
02 MTB STATE ALL PLUS NEEDED OFFICES	Phase 1 Mobile Talkback (Includes All Site Types Radiating)
03 PTO STATE ALL PLUS NEEDED OFFICES	Phase 1 Portable Talkout (Includes All Site Types Radiating)
04 MTB STATE ALL PLUS NEEDED OFFICES	Phase 1 Portable Talkback (Includes All Site Types Radiating)
05 MTO OPRS OPENSKY	OpenSky OPRS Mobile Balanced

### Frequency Planning

At the time of this proposal submittal, the frequency plan has not been finalized. M/A-COM assumes that the final frequency plan will be supportable by each site and has collaborated with DCNR to provide this proposal with reasonable station ERP settings for the coverage analysis. M/A-COM desires that the channels have adequate separation between transmit and receive frequencies, non-overlapping transmit/receive frequencies, and adequate transmit and receive between-channel separation, i.e. 500 kHz or more, to support use of cavity combiners and has modeled around this parameter. M/A-COM has proposed the services of a frequency consultant that will assist M/A-COM and DCNR with finalizing the frequency plan, but has based the proposal on the following standard disclaimers:

- It is assumed that the final frequencies will not generate intermod products or mix with other frequencies at the transmitter locations to create detrimental intermod products that will impact the performance of the proposed system. No interference issues, at these locations, have been indicated to M/A-COM up to this point; however

a frequency analysis will be performed after contract award and FCC approval. If the frequencies are not compatible and cause intermod interference, M/A-COM will provide an additional quote for frequency resolution.

- Resolving interference nuisances from a third party source is outside the scope of this proposal. M/A-COM products will adhere to the transmission requirements of the acquired license. If third party interference becomes a problem, M/A-COM will provide a quote for interference resolutions services.
- M/A-COM will take all precautions to supply base station equipment and antenna systems in proper working order. We will verify proper operation before putting the equipment into service by verifying proper alignment and ensuring that the equipment meets published specifications. We will repair or replace any M/A-COM provided equipment that is found not to be in proper working condition or that does not meet the published electrical specifications. As such, our equipment should not create spurious noise or transmissions that would interfere with other RF systems.
- The final frequency plan drives the RF sub-system design. Costs may vary from that which is proposed due to unique frequency combining and multicoupling. Such cost variations can be handled with change orders.
- M/A-COM will perform an Intermod Study to analyze the potential for intermodulation products created by all frequencies provided to DCNR. M/A-COM will also include in the study (if provided) the frequencies of other systems that are co-located at DCNR transmission sites. However, M/A-COM can not be responsible for intermodulation products created by the mixing of transmission signals between the frequencies provided to DCNR and other RF systems in the area. This would include not only intermod products that interfere with the M/A-COM system but also intermod products that interfere with other RF systems. Neither can M/A-COM be responsible for interference to equipment, installed in the vicinity of our equipment that is inadequately designed or inadequately installed, making it susceptible to interference from equipment that is operating properly. M/A-COM will make a best faith effort to identify any such equipment, and recommend engineering solutions that might be applied to that equipment.
- Please see the enclosed Project Management and Implementation Plan for other disclaimers, assumptions and roles.

### Frequency Consultant

M/A-COM will be providing the services of a professional FCC licensing consultant, ACD Telecom, to perform the frequency search and licensing efforts during the detail design phase of the project implementation. ACD Telecom will perform two actions: 1.) Perform frequency searches and formulate a preliminary frequency plan, and 2.) Assist with FCC licensing effort and finalize the frequency plan. Specifically, ACD Telecom will, under M/A-COM's contract:

### **Frequency Searches**

- Perform Frequency Searches in the VHF High Band (150 MHz to 170 MHz) eligible for public safety users as stated per FCC Rule 90.17.
- Perform single frequency search for the candidate channels both for Co and Adjacent channel users.
- Perform coverage and interference contours for the proposed and exiting licensees of the candidate channels in the VHF High Band, as needed.
- Analyze the existing State's owned licenses for possible re-use.
- Correspondence with the applicant and M/A-COM.
- Submit a frequency plan report in an Excel format where it will show what frequencies have been recommended for which sites under the Frequency Search Phase.
- Be prepared to have one face to face customer meeting for two ACD staff.

### **Assist with FCC Licensing**

- Complete FCC Form 601.
- Correspondence with the other frequency coordinators to answer any questions they might have.
- Correspondence with FCC staff to answer any questions they might have.
- Correspondence with the applicant and M/A-COM.
- Formulate a slow growth plan, if required.
- Perform Safe Harbor analysis and calculations for compliance with FCC requirements.
- Submit a final frequency plan report in an Excel format where it will show what frequencies have been licensed by FCC for which sites as part of the FCC Licensing Phase.
- Be prepared to have one face to face customer meeting for two ACD staff.

### **Disclaimers**

As the frequency searches and FCC licensing can be a moving target with uncertain results, ACD Telecom needs to proceed with the following reasonable disclaimers:

- These fees do not include an attorney's fee, if necessary.
- These fees do not include frequency coordinators' fees.
- While we will do our best to find suitable channels for the requested sites, we CANNOT guarantee 100% successful result.
- The total estimated time to complete the FCC Licensing Phase is contingent upon the frequency coordinator and FCC's speed of service.

## DCNR System Integration

In the proposed solution, VHF portables will be cross-banded to 800 MHz OpenSky mobiles. OpenSky talkgroups will be given access throughout the Commonwealth and will utilize the already established seven-region highly-survivable OPRS network. IP-based networking will be utilized to provide connectivity to the new VHF site equipment.

### High Profile

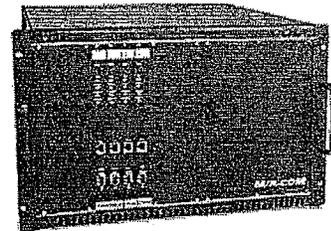
A majority of the DCNR VHF High-Profile design sites, Site Types 1-4, are to be located at existing OPRS sites which already support the 800MHz OpenSky PA-STARNet statewide system. These site locations are supported by an extensive WAN microwave backbone that allows transport across the entire state. To these site quantities in the proposed design, the Site Type 6 sites will be added with microwave backhaul and will become a networked part of the OPRS system. To support the system integration and the audio signal flow, either the existing NetworkFirst Interface will be used or a new NetworkFirst Interface will be placed there.

At the high-profile site, a subscriber's voice audio signal flowing through the repeater (such as transmitting VHF portable) will not only be repeated at that site, but will also be split off and shared with a NetworkFirst Gateway DVU card. This DVU card will react to the CTCSS tone encoded in the audio (discriminator audio) and will steer that audio to an OpenSky voice group directly on the OPRS network. A Zetron 38 Repeater Panel will manage the CTCSS assignments and audio flow.

The OpenSky voice group mentioned above can be one associated to that particular repeater assigned to a Park, a Park Complex, Forest or Forest Headquarters, or Tactical Forest Firefighting command center arrangement. The OpenSky talkgroup will be associated with new OpenSky mobiles placed in park vehicles. These mobiles will utilize the 800 MHz mobile coverage footprint across the state. (Please see the included Coverage Map, Fig. 5.)

Upon receipt of different CTCSS tones, that same DVU card can steer that audio to an OpenSky voice group such as local law enforcement, or a county's 911 talkgroup, or even administrative complex-level talkgroups or state-wide-level talkgroups. The CTCSS tones can be knob selectable on the subscriber's portable.

Audio originating from the OpenSky talkgroup (such as transmitting 800 MHz OpenSky mobile) is sent outbound from the DVU card to the repeater with the properly programmed CTCSS tone to the subscriber units, such as on a return call. The CTCSS tone is talkgroup-unique and is dynamically based on the particular OpenSky talkgroup.



NetworkFirst Interface Gateway

## Low Profile

Several sites, Types 7 and 8, will be low-profile which will interface the new repeater to a M7300 mobile radio acting as a control station in the OpenSky system. Such as above, an OpenSky talkgroup will correspond with that particular repeater and park facility, but the connectivity to that park and repeater will be through the OpenSky air interface rather than directly through the network as with Site Types 1-6. An IDA Easy-Link Plus will manage the audio and PTT connections.

Understandably, the low-profile sites will have a lower level of complexity: meaning that it will only have access to a single talkgroup (the one that the M7300 will be programmed to) and the OpenSky system's grant and queuing tones will not be heard by the VHF subscriber due to the cross-band interface. However, the benefit that is brought forward by this design is the functionality of a "gap-filling" repeater in a low-lying park area having wireless access to the state-wide OpenSky system and having minimal environmental impact. (Most of the locations will be at existing park offices that have existing towers; the remainder will be in wooden pole-mounted cabinets similar to OPRS Cell Sites.)

## User Interfaces

### P7100<sup>IP</sup> Portable

The P7100<sup>IP</sup> is one of M/A-COM's higher tier radios. The P7100<sup>IP</sup> was chosen for DCNR's needs and has been proposed to support key functionality.

Below is a table listing the terminal material types and quantities and included features and accessories.

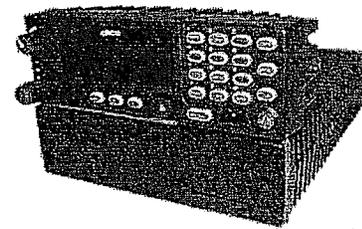
Description	Quantity
Portable, P7150, 136-174MHz, System	2195
Battery, NiMH, Extra Hi Capacity, DR	2195
Antenna, 150-174MHz, Wideband Helical<IS>	2195
Belt Clip, Metal<IS>	2195
Microphone, Lapel<IS>	300
Battery, NiMH, Extra Hi Capacity, DR	2195
Battery, Clam Shell, AA Alkaline	2195
Charger, VC3000, P7100/7200/5100	2195
Power Adapter Kit, VC3000 Charger	2195
Case, Leather, with Belt Loop & Swivel<IS>	1500
CHARGER, TESTER/COND BATTERY	110
Adapter, NiMH Battery Conditioner	660
Programming	2195



P7150 Portable Radio -  
Scan Model

### M5300 Mobile Radio

The M5300 mobile radio is part of the OpenSky suite of products delivering high capacity, end-to-end digital communication primarily for use in vehicles and is designed to meet the critical needs of business, industrial, utility and public service needs. Each mobile is capable of group scan, priority group scan, radio enable/disable, conventional talk-around, emergency call, and dynamic reconfiguration. The radio also has integrated GPS capability.



M5300 Mobile Radio, System  
Model (Optionally Separated)

Below is a table listing the terminal material types and quantities and included features and accessories.

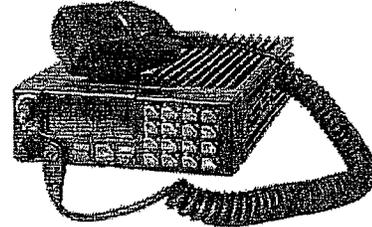
Description	Quantity
<b>Remote-Mount Mobile</b>	
Mobile, M5300 OpenSky, Half Duplex	1407
Feature, Max(1024+) System/Groups	1407

GPS Option	1407
Control Unit,CH721,System,Remote Mount	1407
Accessories,M5300 Remote Mount	1407
Microphone, DTMF, Right Angle,M5300	1407
Antenna, 800MHz,3dB Gain, Roof Mount	1407
Antenna, GPS, Magnet Mount	1407
Installation and Programming	1407
<b>Front-Mount Mobile</b>	
Mobile,M5300 OpenSky, Half Duplex	300
Feature, Max(1024+) System/Groups	300
GPS Option	300
Control Unit,CH721,System,Front Mount	300
Accessories,M5300 Front Mount	300
Microphone, DTMF, Right Angle,M5300	300
Antenna,700/800MHz,3dB,Elevated Feed, RM	300
Antenna, GPS, Magnet Mount	350
Antenna, 800MHz,3dB Gain, Mag Mount	50
Installation and Programming	300
<b>Field Office Front-Mount Control Station</b>	
Mobile,M5300 OpenSky, Half Duplex	246
Feature, Max(1024+) System/Groups	246
Control Unit,CH721,System,Front Mount	246
Accessories,M5300 Front Mount	246
Microphone,Desktop,M5300,CH-721 CU	246
Power Supply, AC/DC	246
Installation and Programming	246
Installation of previously purchased OpenSky Control Stations with required accessories	86

## M7100<sup>IP</sup> Mobile Radio

The M7100<sup>IP</sup> is one of M/A-COM's higher tier radios that is a complement to the P7100 portable. These units are available both front (dash) mount and rear (trunk) mount configuration.

This mobile will be used in special applications such as installed in woodland fire-fighting trucks and other special vehicles. Below is a table listing the terminal material types and quantities and included features and accessories.



**M7100 Mobile Radio - System Model**

Description	Quantity
<b>Remote-Mount Mobile</b>	
Mobile, M7100-IP, 136-174MHz, 110W	300
Control Unit, System, Remote Mount	300
Microphone, Noise Canceling	300
Kit, Accessory, Remote Mount, 60W TX & More	300
Antenna, 136-941MHz, 1/4WL, TNC, Std Roof Mt	300
Installation and Programming	300
Removal of current VHF Radio	300

## Mobile Vehicular Repeaters

In conjunction with the M7300, Pyramid Vehicular Repeaters have been proposed to support local VHF portable connectivity to the 800 MHz OpenSky system. This functionality provides a bubble of VHF coverage around a vehicle that will allow subscriber terminals to cross-connect to an OpenSky talkgroup on the PA-STARNet system. This coverage is especially beneficial to law enforcement operating within a reasonable range from the vehicle. In essence, this solution is a miniature mobile low-power version of a Site Type 7 or 8. Below is a table listing the terminal material types and quantities and included features and accessories.

Description	Quantity
<b>Mobile Repeater</b>	
Antenna, 136-941MHz, 1/4WL, TNC, Std Roof Mt	200
MOBILE, VEH REPEATER, SX, 150-174MHZ, 12.5K	200
Support, Mobile Connector, Short Package	200
BRACKET, CABLE SUPPORT	200
Installation and Programming	200

## Exhibit C—VHF Channel Licenses

Call Sign	Grant Date	Expired Date
KA41607	9/3/2003	11/21/2013
KAN603	7/4/2001	9/26/2011
KDX446	9/19/2001	12/10/2011
KDX447	5/8/2002	8/4/2012
KDX450	2/21/2003	5/13/2013
KDX451	9/26/2001	12/24/2011
KDX452	7/2/2002	9/15/2012
KDX453	7/4/2001	9/26/2011
KDX454	9/19/2001	12/10/2011
KDX455	11/10/2001	2/6/2012
KDY285	1/3/2003	3/30/2013
KFI584	10/3/2001	12/30/2011
KFN709	7/31/2002	10/27/2012
KFN710	5/8/2003	7/21/2013
KFN711	5/8/2003	7/29/2013
KFN714	10/3/2001	12/30/2011
KFO902	7/9/2003	9/29/2013
KFR556	9/25/2002	12/22/2012
KFR557	10/3/2001	12/29/2011
KFR558	10/3/2001	12/29/2011
KFR559	11/22/2003	2/15/2014
KFR560	10/3/2001	12/30/2011
KFT242	5/31/2002	8/19/2012
KFX265	9/19/2001	12/10/2011
KFX266	9/19/2001	12/8/2011
KFZ744	10/3/2001	12/29/2011
KFZ745	10/3/2001	12/29/2011
KFZ746	6/1/2005	8/28/2015
KFZ747	1/3/2003	4/1/2013
KG9163	1/3/2003	4/1/2013
KGG613	5/31/2002	8/20/2012
KGG660	8/7/2003	10/31/2013
KGM49	9/19/2001	12/8/2011
KGV623	9/19/2001	12/10/2011
KGV650	11/22/2001	2/18/2012
KGW251	10/19/2002	1/15/2013
KIK702	12/20/2001	3/16/2012
KIZ625	6/5/2003	8/30/2013
KJ3981	11/14/2006	2/10/2017
KJI662	12/20/2001	3/16/2012
KJI700	1/29/2002	4/16/2012
KJI753	1/29/2002	4/16/2012
KJM46	6/1/2005	8/28/2015
KJV34	9/26/2001	12/24/2011
KJV35	7/2/2002	9/15/2012
KKC636	3/19/2002	6/16/2012
KKV736	5/31/2002	8/19/2012

Call Sign	Grant Date	Expired Date
KLE800	11/16/2004	2/5/2015
KLE834	10/3/2001	12/30/2011
KLK479	10/3/2001	12/30/2011
KLK480	9/19/2001	12/10/2011
KLK595	9/19/2001	12/10/2011
KLK596	11/22/2001	2/18/2012
KLK597	11/22/2001	2/18/2012
KLP811	11/22/2001	2/18/2012
KLS512	10/19/2002	1/15/2013
KLU444	10/3/2001	12/29/2011
KLV986	10/3/2001	12/29/2011
KLY261	9/19/2001	12/10/2011
KLY262	10/3/2001	12/30/2011
KLY874	1/3/2002	3/20/2012
KM9907	11/10/2001	2/5/2012
KMA402	5/31/2002	8/19/2012
KMA508	5/31/2002	8/19/2012
KMA509	5/31/2002	8/19/2012
KMN75	10/19/2002	1/15/2013
KNBC406	1/16/2003	4/15/2013
KNBC422	1/31/2001	4/17/2011
KNBF375	2/23/2001	5/6/2011
KNBG279	6/20/2001	9/3/2011
KNBG383	6/20/2001	9/3/2011
KNBJ667	7/4/2001	9/29/2011
KNBL323	6/26/2001	9/19/2011
KNBL324	6/20/2001	9/3/2011
KNCW622	1/31/2001	4/29/2011
KNDV312	7/2/2002	9/15/2012
KNHL280	6/17/2003	9/6/2013
KNHL281	6/17/2003	9/6/2013
KNHL282	6/17/2003	9/6/2013
KNHL283	6/17/2003	9/6/2013
KNHL284	6/17/2003	9/6/2013
KNHL962	6/17/2003	9/12/2013
KNHM323	8/7/2003	10/31/2013
KNHN511	6/21/2003	9/16/2013
KNHN512	6/27/2003	9/19/2013
KNHU535	8/19/2003	11/7/2013
KNHU536	8/19/2003	11/7/2013
KNHU537	8/19/2003	11/7/2013
KNHU538	8/19/2003	11/7/2013
KNHU539	8/19/2003	11/7/2013
KNHU540	8/19/2003	11/7/2013
KNIH359	10/28/2003	1/19/2014
KNIJ244	10/28/2003	1/17/2014
KNIJ876	11/22/2003	2/14/2014

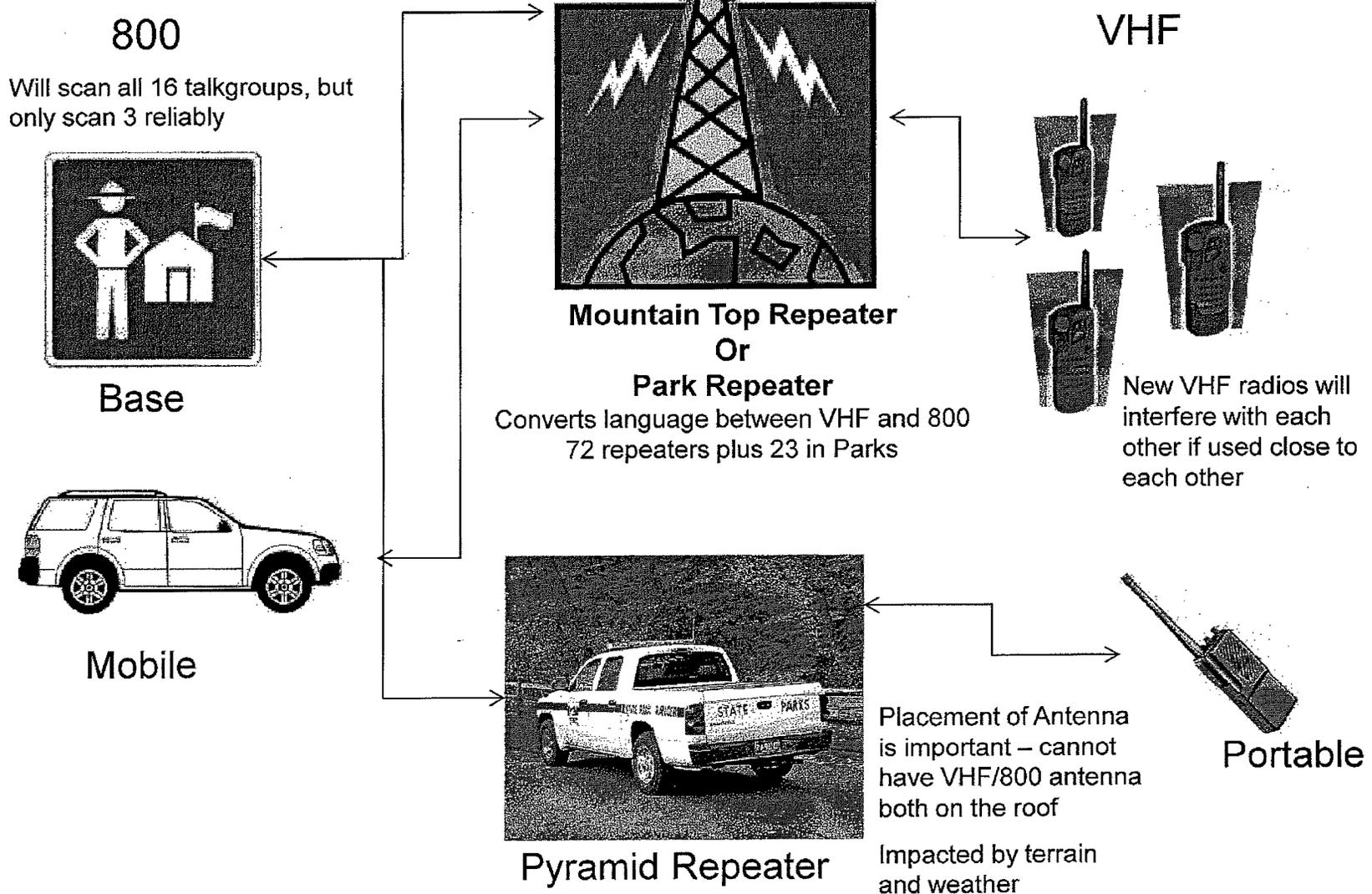
Call Sign	Grant Date	Expired Date
KNIK335	10/28/2003	1/19/2014
KNJJ265	3/9/2004	5/25/2014
KNJJ266	3/9/2004	5/25/2014
KNJQ705	4/20/2004	7/5/2014
KNJY467	4/20/2004	7/5/2014
KNJY685	6/3/2004	8/18/2014
KPG28	9/19/2001	12/11/2011
KPG31	10/3/2001	12/30/2011
KQL752	2/18/2004	5/15/2014
KQN935	9/19/2001	12/11/2011
KQN936	2/10/2004	4/27/2014
KQO246	10/3/2001	12/29/2011
KQO247	10/3/2001	12/29/2011
KQO251	9/19/2001	12/8/2011
KQO252	9/26/2001	12/24/2011
KQO253	10/3/2001	12/29/2011
KQO255	10/3/2001	12/29/2011
KQO292	9/19/2001	12/8/2011
KQO293	9/19/2001	12/11/2011
KQO294	9/19/2001	12/8/2011
KQU276	9/19/2001	12/11/2011
KRB473	11/22/2001	2/18/2012
KRJ667	10/3/2001	12/29/2011
KRJ668	10/3/2001	12/29/2011
KRJ669	11/15/2001	2/12/2012
KSM915	3/25/2005	6/6/2015
KSO985	3/25/2005	6/6/2015
KSO987	3/25/2005	6/6/2015
KSQ440	3/25/2005	6/6/2015
KSQ442	10/16/2001	10/16/2011
KSQ513	3/25/2005	6/6/2015
KSZ840	11/29/2000	1/15/2011
KTE471	12/20/2001	3/16/2012
KTE472	12/20/2001	3/16/2012
KTE473	12/20/2001	3/16/2012
KTG482	8/19/2003	11/7/2013
KTI716	3/25/2005	6/7/2015
KTI717	3/25/2005	6/7/2015
KTI791	9/25/2001	12/22/2011
KTI792	12/15/2001	12/22/2011
KTR757	10/3/2001	12/30/2011
KTU254	11/22/2001	2/18/2012
KTU255	11/22/2001	2/18/2012
KTU258	11/22/2001	2/18/2012
KTU260	3/9/2004	5/25/2014
KUJ546	11/22/2001	2/18/2012
KUJ547	2/18/2004	5/16/2014
KUJ548	6/20/2001	9/6/2011
KUP220	9/19/2001	12/11/2011
KVI621	8/16/2002	11/5/2012
KVI622	9/25/2002	12/22/2012
KVN570	2/7/2003	4/27/2013

Call Sign	Grant Date	Expired Date
KVN641	5/8/2003	7/26/2013
KVN642	7/31/2002	10/27/2012
KVN776	9/25/2002	12/22/2012
KVP529	8/16/2002	11/5/2012
KVP530	10/9/2003	1/3/2014
KVP565	9/25/2002	12/22/2012
KVP819	8/16/2002	11/12/2012
KVP820	8/16/2002	11/5/2012
KVP821	8/16/2002	11/5/2012
KVP822	8/16/2002	11/5/2012
KVT590	8/5/2005	10/30/2015
KVV650	10/19/2002	1/15/2013
KVV845	5/8/2003	7/28/2013
KVV850	2/7/2003	4/27/2013
KWI698	8/7/2003	10/31/2013
KWI699	8/7/2003	10/31/2013
KWM578	8/7/2003	10/31/2013
KWM579	9/19/2003	12/8/2013
KWM580	9/19/2003	12/8/2013
KWM908	10/19/2002	1/15/2013
KWO459	2/10/2004	4/27/2014
KWV591	2/10/2004	4/27/2014
KXA325	11/29/2000	1/15/2011
KXQ873	5/31/2002	8/19/2012
KYI970	2/2/2005	4/30/2015
KYY964	3/25/2005	6/6/2015
KZF968	8/5/2005	10/30/2015
KZF969	8/5/2005	10/25/2015
KZF970	2/21/2003	5/12/2013
KZR72	6/1/2005	8/28/2015
WAF956	9/19/2003	12/8/2013
WAF957	9/19/2003	12/8/2013
WAP827	2/10/2004	4/27/2014
WAU798	7/20/2004	10/16/2014
WBC396	2/2/2005	4/30/2015
WBE429	2/2/2005	4/30/2015
WBL254	8/5/2005	10/30/2015
WBL255	6/1/2005	8/28/2015
WBL619	8/5/2005	10/25/2015
WBP220	8/5/2005	10/25/2015
WBT652	10/12/2001	1/8/2012
WBZ303	9/26/2001	12/24/2011
WCC964	11/2/2004	1/17/2015
WCG598	10/19/2002	1/15/2013
WCO5593	8/11/2004	11/2/2014
WCW527	5/31/2002	8/19/2012
WCW532	5/31/2002	8/19/2012
WCW615	5/31/2002	8/19/2012
WCW616	5/31/2002	8/19/2012
WCW651	5/31/2002	8/19/2012
WDN388	2/25/2003	5/24/2013
WFK768	6/3/2004	8/31/2014

Call Sign	Grant Date	Expired Date
WFK769	6/3/2004	8/31/2014
WFX498	7/20/2004	10/12/2014
WGC650	6/21/2005	9/6/2015
WGJ850	6/20/2001	9/3/2011
WGK495	7/20/2004	10/12/2014
WGK496	7/20/2004	10/12/2014
WGK497	7/20/2004	10/12/2014
WGK498	7/20/2004	10/12/2014
WGL326	2/2/2005	4/30/2015
WGQ256	1/10/2001	4/3/2011
WGT313	1/10/2003	4/8/2013
WIK54	11/29/2000	1/15/2011
WIQ72	9/25/2001	12/22/2011
WJD45	9/19/2001	12/11/2011
WJU66	9/19/2001	12/11/2011
WNAC856	6/3/2004	8/7/2014
WNAX886	9/17/2004	12/11/2014
WNBE737	11/2/2004	1/17/2015
WNBJ426	11/2/2004	1/17/2015
WNCB645	12/8/2004	3/6/2015
WNCG493	12/21/2004	3/19/2015
WNCR674	7/19/2001	10/8/2011
WNGP938	5/30/2001	8/25/2011
WNHA827	7/19/2001	10/16/2011
WNHB745	7/4/2001	9/25/2011
WNHB746	7/4/2001	9/25/2011
WNHS497	9/19/2001	12/12/2011
WNMN398	7/16/2003	10/7/2013
WNPB608	7/16/2003	10/8/2013
WNSS749	4/27/2005	7/9/2015
WNYD246	10/12/2001	1/3/2012
WNYD247	10/12/2001	1/3/2012
WNYD958	10/16/2002	12/24/2012
WNYK884	11/10/2001	2/7/2012
WNZU756	7/2/2002	7/2/2012
WOW22	9/19/2001	12/10/2011
WPEF344	11/22/2003	2/15/2014
WPHK348	3/25/2005	6/7/2015
WPHK349	3/25/2005	6/7/2015
WPHK547	3/25/2005	6/7/2015
WPHK548	3/25/2005	6/7/2015
WPKC947	10/31/2001	1/23/2012
WPKC950	10/31/2001	1/23/2012
WPQ96	7/31/2002	10/27/2012
WPTF841	9/24/2001	9/24/2011
WPUK820	3/25/2002	3/25/2012
WPYD205	7/22/2003	7/22/2013
WPYF320	7/30/2003	7/30/2013
WPYP210	9/18/2003	9/18/2013
WQD458	2/2/2005	5/2/2015
WQD459	2/2/2005	4/30/2015
WQD460	2/2/2005	4/30/2015

Call Sign	Grant Date	Expired Date
WQD462	2/24/2005	5/7/2015
WQEG274	1/18/2006	1/18/2016
WQF222	7/16/2003	10/7/2013
WRW792	2/2/2005	4/30/2015
WSW734	3/20/2003	6/8/2013
WSW735	3/15/2002	5/27/2012
WXK747	2/7/2003	4/27/2013
WXP442	2/7/2003	4/27/2013
WZX396	2/10/2004	4/27/2014
WZX397	2/10/2004	4/27/2014

# Hybrid 800 VHF System





M/A-COM, Inc.  
M.S. 161-065  
P.O. Box 3608  
Harrisburg, PA 17105-3608

717-565-1226 tel  
717-565-1210 fax  
www.macom-wireless.com  
www.tycoelectronics.com

February 9, 2009

Pamela J. Pasi, Director  
Pennsylvania Department of Conservation and Natural Resources  
Division of Office Services  
PO Box 8769  
Harrisburg, PA 17105

Dear Director Pasi,

Tyco Electronics and its' M/A-COM business are pleased to present this proposal for a new VHF radio system overlay, integrated with the Office of Public Safety Radio Services PA STARNet. By utilizing the existing resources provided by the OPRS, DCNR will be able to refresh and improve their radio communications with this project and reduce total cost of ownership.

The solution design and function presented is a collaborative effort between DCNR, OPRS and Tyco Electronics. This solution provides coverage where needed while balanced with costs. The IP-based hybrid solution gives the best-fit solution by leveraging two powerful technologies into a common network architecture and utilizing each one in its best possible manner. The VHF overlay will provide portable radios with the best propagation coverage while the OpenSky Trunking system will leverage the multitudes of OPRS sites around the state for mobile voice and data. Combined together in a seamless IP-based network, DCNR will have a robust, functional and highly adaptive solution moving forward.

We look forward to working with DCNR and OPRS on this exciting project.

Sincerely,

A handwritten signature in black ink, appearing to read 'R. A. Kohr'.

Roger A. Kohr,  
Area Sales Manager, Pennsylvania

cc: Deputy Secretary Charles Brennan, Office of Public Safety Radio Services



**FULLY EXECUTED - CHANGE 1**  
 Purchase Order No: 4300291576  
 Original PO Effective Date: 07/01/2011  
 PO Change Date: 06/29/2012  
 PO Issue Date: 06/29/2012

Your SAP Vendor #: 154839

**Please Deliver To:**  
 Bureau of Administrative Services  
 400 Market Street 7Th Floor RCSOB  
 Harrisburg PA 17105-8769 US

**Supplier Name/Address:**  
 TRANSCORE HOLDINGS INC  
 DBA TRANSCORE LP  
 7917 Derry Street Suite 120  
 Harrisburg PA 17111 US

**Please Bill To:**  
 Commonwealth of Pennsylvania - PO Invoice  
 PO Box 69180  
 Harrisburg, Pennsylvania 17106

Supplier Phone Number: 717-561-9789  
 Supplier Fax Number: 717-561-9008

**Purchasing Agent**

Name: Maggie Boyer  
 Phone: 717-783-2566  
 Fax: 717-783-9186

**Purchase Order Description:**  
 38 Boyer 6/28/11 Central Radio Maint.

This Purchase Order is issued pursuant to the referenced Contract and constitutes the Suppliers authority to deliver the item(s) referenced below at the prices stated below to the location(s) identified above in accordance with the Contract terms and conditions.

Suppliers must provide four mandatory elements on PO invoices: PO Number, Invoice Date, Invoice Number, and Invoice Gross Amount. Failure to comply will result in the return of the invoice. Additional optional information such as supplier name, address, remit to information and PO Line Item information will improve invoice processing.

Item	Material/Service Desc	Qty	UOM	Delivery Date	Net Price	Price Unit	Total
1	Monthly Maintenance Portable Radios	228.000	Each	07/02/2011	13.02	1	2,968.56
	>>> Rel. ord. against contract	4400004179	Item	1			
	Item Text Monthly Maintenance Portable Radios						
2	Monthly Maintenance Mobile Radios	36.000	Each	07/02/2011	9.30	1	334.80
	>>> Rel. ord. against contract	4400004179	Item	1			
	Item Text Monthly Maintenance Mobile Radios (includes both VHF and 800 models)						

<b>Information:</b>	<b>Total Amount:</b> SEE LAST PAGE FOR TOTAL OF ALL ITEMS
	Currency: USD

Supplier's Signature _____	Title _____
Printed Name _____	Date _____



FULLY EXECUTED - CHANGE 1  
Purchase Order No: 4300291576  
Original PO Effective Date: 07/01/2011  
PO Change Date: 06/29/2012  
PO Issue Date: 06/29/2012

Supplier Name:  
TRANSCORE HOLDINGS INC  
DBA TRANSCORE LP

Item	Material/Service Desc	Qty	UOM	Delivery Date	Net Price	Price Unit	Total
3	Monthly Maintenance Base/Site Repeater	24.000	Each	07/02/2011	46.50	1	1,116.00
	>>> Rel. ord. against contract	4400004179	Item	1			
	Item Text Monthly Maintenance Base/Site Repeater						
4	Parts and Materials	1,438.430	Each	07/02/2011	1.00	1	1,438.43
	>>> Rel. ord. against contract	4400004179	Item	1			
	Item Text Estimated Parts and Materials						
5	Estimated Labor	40.000	Hour	07/02/2011	93.51	1	3,740.40
	>>> Rel. ord. against contract	4400004179	Item	1			
	Item Text Various Estimated Hourly Rates to Include the Following:  Regular Services - \$93.51/hr Travel Time - \$93.51/hr Cable Installation Services - \$93.51/hr (Re)Programming - \$93.51/hr Other - \$93.51/hr						
6	Miscellaneous Labor	5,241.800	Each	07/02/2011	1.00	1	5,241.80
	>>> Rel. ord. against contract	4400004179	Item	1			
	Item Text Estimated Miscellaneous Labor						
7	FY'12 Monthly Maintenance Portables SLA6 300.000		Each	07/01/2012	13.96	1	4,188.00
	>>> Rel. ord. against contract	4400004179	Item	1			
	*** New Item ***						

## Information:

Total Amount:  
SEE LAST PAGE FOR TOTAL OF  
ALL ITEMS

Currency: USD



**FULLY EXECUTED - CHANGE 1**  
**Purchase Order No: 4300291576**  
**Original PO Effective Date: 07/01/2011**  
**PO Change Date: 06/29/2012**  
**PO Issue Date: 06/29/2012**

**Supplier Name:**  
**TRANSCORE HOLDINGS INC**  
**DBA TRANSCORE LP**

Item	Material/Service Desc	Qty	UOM	Delivery Date	Net Price	Price Unit	Total
8	FY'12 Monthly Maintenance Mobiles SLA6	72.000	Each	07/01/2012	9.97	1	717.84
	>>> Rel. ord. against contract	4400004179	Item	1			
	*** New Item ***						
9	FY'12 Monthly Maintenance base/repeater	24.000	Each	07/01/2012	49.86	1	1,196.64
	>>> Rel. ord. against contract	4400004179	Item	1			
	*** New Item ***						
10	FY'12 Parts and Material	2,000.000	Each	07/01/2012	1.00	1	2,000.00
	>>> Rel. ord. against contract	4400004179	Item	1			
	*** New Item ***						
11	FY'12 Miscellaneous Labor	3,000.000	Each	07/01/2012	1.00	1	3,000.00
	>>> Rel. ord. against contract	4400004179	Item	1			
	*** New Item ***						

**General Requirements for all Items:**

**Header Text**

Purchase order will cover the DCNR Central Office radio maintenance services.

Quantities are estimated and may change depending upon the needs of the Bureau.

Contract Term: July 1, 2011 through June 30, 2012

DCNR Contact: Jim Kleeman  
 Contact phone: 717-787-2552

6/27/12 - Added new lines for FY'12 maintenance services. New term is July 1, 2012 through June 30, 2013. (MB)

**Terms of Payment**

Contractor will be paid on a reimbursement basis for actual services performed.

**Information:**

**Total Amount:**

25,942.47

**Currency: USD**



**FULLY EXECUTED - CHANGE 1**  
Purchase Order No: 4300291576  
Original PO Effective Date: 07/01/2011  
PO Change Date: 06/29/2012  
PO Issue Date: 06/29/2012

Supplier Name:  
TRANSCORE HOLDINGS INC  
DBA TRANSCORE LP

No further information for this PO.

Information:

Total Amount: 25,942.47

Currency: USD

	<p style="text-align: right;">Page 1 of 4</p> <p><b>FULLY EXECUTED - CHANGE 3</b>                  Purchase Order No: 4300291915                  Original PO Effective Date: 07/01/2011                  PO Change Date: 06/29/2012                  PO Issue Date: 06/29/2012</p>																																																								
<p>Your SAP Vendor #: 154839</p>	<p><b>Please Deliver To:</b>                  Bureau of State Parks                  400 Market Street 8Th Floor RCSOB                  Harrisburg PA 17105-8551 US</p>																																																								
<p><b>Supplier Name/Address:</b>                  TRANSCORE HOLDINGS INC                  DBA TRANSCORE LP                  7917 Derry Street Suite 120                  Harrisburg PA 17111 US</p> <p>Supplier Phone Number: 717-561-9789                  Supplier Fax Number: 717-561-9008</p>	<p><b>Please Bill To:</b>                  Commonwealth of Pennsylvania - PO Invoice                  PO Box 69180                  Harrisburg, Pennsylvania 17106</p>																																																								
<p><b>Purchasing Agent</b>                  Name: Maggie Boyer                  Phone: 717-783-2566                  Fax: 717-783-9186</p>	<p><b>Purchase Order Description:</b>                  38 Boyer 6/29/11 State Parks Radio Maint</p>																																																								
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<table border="1" style="width:100%; border-collapse: collapse;"> <thead> <tr> <th style="text-align: left;">Item</th> <th style="text-align: left;">Material/Service Desc</th> <th style="text-align: right;">Qty</th> <th style="text-align: left;">UOM</th> <th style="text-align: left;">Delivery Date</th> <th style="text-align: right;">Net Price</th> <th style="text-align: right;">Price Unit</th> <th style="text-align: right;">Total</th> </tr> </thead> <tbody> <tr> <td>1</td> <td>Monthly Maintenance Portables</td> <td style="text-align: right;">3,600.000</td> <td>Each</td> <td>07/02/2011</td> <td style="text-align: right;">13.02</td> <td style="text-align: right;">1</td> <td style="text-align: right;">46,872.00</td> </tr> <tr> <td></td> <td>&gt;&gt;&gt; Rel. ord. against contract</td> <td></td> <td>4400004179</td> <td>Item</td> <td></td> <td style="text-align: right;">1</td> <td></td> </tr> <tr> <td></td> <td colspan="7">Item Text Monthly Maintenance Portable Radios</td> </tr> <tr> <td>2</td> <td>Monthly Maintenance Mobiles</td> <td style="text-align: right;">6,120.000</td> <td>Each</td> <td>07/02/2011</td> <td style="text-align: right;">9.30</td> <td style="text-align: right;">1</td> <td style="text-align: right;">56,916.00</td> </tr> <tr> <td></td> <td>&gt;&gt;&gt; Rel. ord. against contract</td> <td></td> <td>4400004179</td> <td>Item</td> <td></td> <td style="text-align: right;">1</td> <td></td> </tr> <tr> <td></td> <td colspan="7">Item Text Monthly Maintenance Mobile Radios (includes both VHF and 800 models)</td> </tr> </tbody> </table>		Item	Material/Service Desc	Qty	UOM	Delivery Date	Net Price	Price Unit	Total	1	Monthly Maintenance Portables	3,600.000	Each	07/02/2011	13.02	1	46,872.00		>>> Rel. ord. against contract		4400004179	Item		1			Item Text Monthly Maintenance Portable Radios							2	Monthly Maintenance Mobiles	6,120.000	Each	07/02/2011	9.30	1	56,916.00		>>> Rel. ord. against contract		4400004179	Item		1			Item Text Monthly Maintenance Mobile Radios (includes both VHF and 800 models)						
Item	Material/Service Desc	Qty	UOM	Delivery Date	Net Price	Price Unit	Total																																																		
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	Item Text Monthly Maintenance Mobile Radios (includes both VHF and 800 models)																																																								
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<p>Supplier's Signature _____</p> <p>Printed Name _____</p>		<p>Title _____</p> <p>Date _____</p>																																																							



FULLY EXECUTED - CHANGE 3  
Purchase Order No: 4300291915  
Original PO Effective Date: 07/01/2011  
PO Change Date: 06/29/2012  
PO Issue Date: 06/29/2012

Supplier Name:  
TRANSCORE HOLDINGS INC  
DBA TRANSCORE LP

Item	Material/Service Desc	Qty	UOM	Delivery Date	Net Price	Price Unit	Total
3	Estimated Parts and Labor		Each	07/02/2011	1.00	1	8,974.40
		8,974.400					
	>>> Rel. ord. against contract	4400004179	Item	1			
	Item Text						
	Estimated Parts and Materials						
4	Labor Services		Hour	07/02/2011	93.51	1	39,882.02
		426.500					
	>>> Rel. ord. against contract	4400004179	Item	1			
	Item Text						
	Various Estimated Hourly Rates to Include the Following:						
	Regular Services - \$93.51/hr						
	Travel Time - \$93.51/hr						
	Cable Installation Services - \$93.51/hr						
	(Re)Programming - \$93.51/hr						
	Other - \$93.51/hr						
5	Labor Services	50.000	Hour	07/02/2011	124.68	1	6,234.00
	>>> Rel. ord. against contract	4400004179	Item	1			
	Item Text						
	Various Estimated Hourly Rates to Include the Following:						
	Tower Repair/Service - \$124.68/hr						
6	Miscellaneous Labor		Each	07/02/2011	1.00	1	29,120.87
		29,120.870					
	>>> Rel. ord. against contract	4400004179	Item	1			
	Item Text						
	Estimated Miscellaneous Labor						
7	FY'12 Portables Monthly Maintenance		Each	07/01/2012	13.96	1	7,705.92
		552.000					
	>>> Rel. ord. against contract	4400004179	Item	1			

## Information:

Total Amount:  
SEE LAST PAGE FOR TOTAL OF  
ALL ITEMS

Currency: USD



FULLY EXECUTED - CHANGE 3  
Purchase Order No: 4300291915  
Original PO Effective Date: 07/01/2011  
PO Change Date: 06/29/2012  
PO Issue Date: 06/29/2012

Supplier Name:  
TRANSCORE HOLDINGS INC  
DBA TRANSCORE LP

Item	Material/Service Desc	Qty	UOM	Delivery Date	Net Price	Price Unit	Total
*** New Item ***							
8	FY'12 Mobiles Monthly Maintenance	2,844.000	Each	07/01/2012	9.97	1	28,354.68
	>>> Rel. ord. against contract	4400004179	Item	1			
*** New Item ***							
9	FY'12 Estimated Parts and Labor	8,974.400	Each	07/01/2012	1.00	1	8,974.40
	>>> Rel. ord. against contract	4400004179	Item	1			
*** New Item ***							
10	FY'12 Labor Services Regular / Other	360.000	Each	07/01/2012	96.50	1	34,740.00
	>>> Rel. ord. against contract	4400004179	Item	1			
*** New Item ***							
11	FY'12 Labor Services Tower	250.000	Each	07/01/2012	128.67	1	32,167.50
	>>> Rel. ord. against contract	4400004179	Item	1			
*** New Item ***							
12	FY'12 Miscellaneous Labor	61,717.670	Each	07/01/2012	1.00	1	61,717.67
	>>> Rel. ord. against contract	4400004179	Item	1			
*** New Item ***							
13	FY'12 Monthly Maint Control Stations SLAG	480.000	Each	07/01/2012	28.95	1	13,896.00
	>>> Rel. ord. against contract	4400004179	Item	1			
*** New Item ***							

Information:

Total Amount:  
SEE LAST PAGE FOR TOTAL OF  
ALL ITEMS

Currency: USD



**FULLY EXECUTED - CHANGE 3**  
Purchase Order No: 4300291915  
Original PO Effective Date: 07/01/2011  
PO Change Date: 06/29/2012  
PO Issue Date: 06/29/2012

**Supplier Name:**  
TRANSCORE HOLDINGS INC  
DBA TRANSCORE LP

**General Requirements for all Items:**

**Header Text**

Purchase order will cover the DCNR Central Office radio maintenance services.

Quantities are estimated and may change depending upon the needs of the Bureau.

Contract Term: July 1, 2011 through June 30, 2012

DCNR Contact: Jennifer Park  
Contact phone: 717-705-3958

6/27/12 - Added new lines for FY'12 maintenance services. New term is July 1, 2012 through June 30, 2013. (MB)

5/23/12 - Increased line 4 and decreased line 5 per program's request (MB).

3/7/12 - Reduced quantities on line #5 and Increased quantities on line #6 per program's request as quantities are estimated (MB).

**Terms of Payment**

Contractor will be paid on a reimbursement basis for actual services performed.

No further information for this PO.

**Information:**

**Total Amount:**

375,555.46

**Currency:** USD



**FULLY EXECUTED - CHANGE 4**  
 Purchase Order No: 4300291499  
 Original PO Effective Date: 07/01/2011  
 PO Change Date: 06/29/2012  
 PO Issue Date: 06/29/2012

Your SAP Vendor #: 154839

**Please Deliver To:**  
 Bureau of Forestry  
 400 Market Street 6Th Floor RCSOB  
 Harrisburg PA 17105-8552 US

**Supplier Name/Address:**  
 TRANSCORE HOLDINGS INC  
 DBA TRANSCORE LP  
 7917 Derry Street Suite 120  
 Harrisburg PA 17111 US

**Please Bill To:**  
 Commonwealth of Pennsylvania - PO Invoice  
 PO Box 69180  
 Harrisburg, Pennsylvania 17106

Supplier Phone Number: 717-561-9789  
 Supplier Fax Number: 717-561-9008

**Purchasing Agent**  
 Name: Maggie Boyer  
 Phone: 717-783-2566  
 Fax: 717-783-9186

**Purchase Order Description:**  
 38 Boyer 6/28/11 Forestry Radio Maint.

This Purchase Order is issued pursuant to the referenced Contract and constitutes the Suppliers authority to deliver the item(s) referenced below at the prices stated below to the location(s) identified above in accordance with the Contract terms and conditions.

Suppliers must provide four mandatory elements on PO Invoices: PO Number, Invoice Date, Invoice Number, and Invoice Gross Amount. Failure to comply will result in the return of the invoice. Additional optional information such as supplier name, address, remit to information and PO Line Item information will improve invoice processing.

Item	Material/Service Desc	Qty	UOM	Delivery Date	Net Price	Price Unit	Total
1	Monthly Maintenance Portables	5,608.000	Each	07/02/2011	13.02	1	73,016.16
	>>> Rel. ord. against contract	4400004179	Item	1			
	Item Text Monthly maintenance for Forestry portable radios.						
2	Monthly Maintenance for Mobiles	7,501.000	Each	07/02/2011	9.30	1	69,759.30
	>>> Rel. ord. against contract	4400004179	Item	1			
	Item Text Monthly maintenance for Forestry mobile radios (includes both VHF and 800 system radios)						

<b>Information:</b>	<b>Total Amount:</b> SEE LAST PAGE FOR TOTAL OF ALL ITEMS
	Currency: USD

Supplier's Signature _____	Title _____
Printed Name _____	Date _____



**FULLY EXECUTED - CHANGE 4**  
Purchase Order No: 4300291499  
Original PO Effective Date: 07/01/2011  
PO Change Date: 06/29/2012  
PO Issue Date: 06/29/2012

**Supplier Name:**  
TRANSCORE HOLDINGS INC  
DBA TRANSCORE LP

Item	Material/Service Desc	Qty	UOM	Delivery Date	Net Price	Price Unit	Total
Item Text Various Estimated Hourly Rates to Include the Following Services:  Tower Repair/Service - \$124.68/hr							
6	Miscellaneous Labor		Each	07/02/2011	1.00	1	30,456.18
		30,456.180					
	>>> Rel. ord. against contract	4400004179	Item	1			
Item Text Miscellaneous Labor							
Field Changed: QUANTITY							
	Old Value:	25406.640					
	New Value:	30456.180					
Field Changed: VALUE							
	Old Value:	25406.64					
	New Value:	30456.18					
7	Monthly Maintenance Base/Site Repeater	24.000	Each	07/02/2011	46.50	1	1,116.00
	>>> Rel. ord. against contract	4400004179	Item	1			
Item Text Monthly Maintenance Base/Site Repeater							
8	Miscellaneous Labor		Each	07/02/2011	1.00	1	14,995.32
		14,995.320					
	>>> Rel. ord. against contract	4400004179	Item	1			
Item Text Miscellaneous Labor							
9	FY'12 Monthly Maintenance Portables	240.000	Each	07/01/2012	13.96	1	3,350.40
	>>> Rel. ord. against contract	4400004179	Item	1			
*** New Item ***							

**Information:**

**Total Amount:**  
SEE LAST PAGE FOR TOTAL OF  
ALL ITEMS

Currency: USD



**FULLY EXECUTED - CHANGE 4**  
Purchase Order No: 4300291499  
Original PO Effective Date: 07/01/2011  
PO Change Date: 06/29/2012  
PO Issue Date: 06/29/2012

**Supplier Name:**  
TRANSCORE HOLDINGS INC  
DBA TRANSCORE LP

**Header Text**

Purchase order will cover the DCNR Bureau of Forestry's radio maintenance services.

Quantities are estimated and may change depending upon the needs of the Bureau.

Contract Term: July 1, 2011 through June 30, 2012

DCNR Bureau of Forestry Contact: Ann Price  
Contact phone: 717-787-2926

6/27/12 - Added new lines for the FY'12 maintenance services. New term is July 1, 2012 through June 30, 2013. (MB)

6/7/12 - Reduced quantity on line 4 and moved money to line 6 and also added to line 2 to pay remaining FY'11 invoices (MB).

5/10/12 - Moved quantities from line 2 to line 1 per program's request for invoice payment (MB).

5/2/12 - Removed quantities from lines 1 and 2 in order to put funds on new line 8 per the program's request (MB).

4/3/12 - Moved quantities from line #5 to line #6 to adjust and pay invoices per program's request (MB).

**Terms of Payment**

Contractor will be paid on a reimbursement basis for actual services performed.

**No further information for this PO.**

**Information:****Total Amount:**

548,150.89

Currency: USD