

**STATEWIDE AGENCIES RADIO SYSTEM (STARS)  
PROGRAM**

**A Report to the Governor, House Appropriations Committee,  
And Senate Finance Committee**



**October 2015**

**Colonel W. Steven Flaherty  
Superintendent**

Colonel W. S. (Steve) Flaherty  
Superintendent

(804) 674-2000



Lt. Colonel Robert B. Northern  
Deputy Superintendent

**COMMONWEALTH OF VIRGINIA**  
**DEPARTMENT OF STATE POLICE**  
P. O. Box 27472, Richmond, VA 23261-7472

October 1, 2015

TO: The Honorable Terry McAuliffe, Governor of Virginia

The Honorable Walter A. Stosch  
Co-Chairman of the Senate Finance Committee

The Honorable Charles J. Colgan  
Co-Chairman of the Senate Finance Committee

The Honorable S. Chris Jones  
Chairman of the House Appropriations Committee

Pursuant to the Appropriation Act, Item 413 C.2. (Regular Session, 2015), I am respectfully submitting herewith a report on the *Statewide Agencies Radio System (STARS) Program*.

Respectfully,

A handwritten signature in black ink that reads "W. S. Flaherty".

Superintendent

WSF/RAE/tlt

Enclosure

## **Implementation Report**

### **Statewide Agencies Radio System (STARS) Contract**

Colonel W. Steven Flaherty, State Police Superintendent and Mr. Mark Moon, Vice President and General Manager of Motorola signed a \$329 million contract between Motorola and the Commonwealth of Virginia for the design, construction, and implementation of the Statewide Agencies Radio System (STARS) on July 13, 2004. A ceremonial contract signing was held on July 16, 2004, in conjunction with a press conference.

Effective July 1, 2011, the Virginia State Police Communications Division assumed the engineering, installation, maintenance, and operations of the STARS Network. The STARS Network (including the backbone microwave network, the land mobile radio network, the five Tidewater tunnels and two western tunnels, and vehicles for all 21 state agencies) was operational.

STARS provides a multi-channel, trunked, digital, voice and data wireless communications specifically designed to meet APCO Project 25 public safety requirements. The core network was built on the legacy Virginia State Police microwave radio network through upgrades to Synchronous Optical Network (SONET) ring-protected transmission paths. This network supports the 21 participating state agencies throughout the Commonwealth and facilitates interoperability with other state, local, and federal agencies.

The design of STARS was the culmination of a partnership with the Commonwealth, the project's engineering consultant, AECOM Design (formerly Hayes, Seay, Mattern & Mattern, Inc. (HSMM) / CTA Communications), and Motorola. The design considered: 1) meeting the needs of participants, 2) utilizing existing resources where possible, and 3) minimizing risk. The network consists of today's latest technologies. STARS allows the Commonwealth to retain a high level of service and security and the flexibility to add additional capacity through additional radio frequencies. In all applicable design components, STARS has addressed safeguards to system security, including controlled system access, and Advanced Encryption Standard (AES) encryption for law enforcement users. The system infrastructure will serve the Commonwealth for many years to come.

## Total Cost of System Implementation

### Special Funds

Pursuant to the Code of Virginia §2.2-2264, the General Assembly authorized the Virginia Public Building Authority to issue revenue bonds not to exceed \$159,300,000 for constructing, improving, furnishing, maintaining, acquiring and renovating buildings, facilities, improvements, and land for the STARS project. Chapter 245 approved by the General Assembly Session on March 30, 2006, authorized additional funding via Bonds issued by the Virginia Public Building Authority in the amount not to exceed \$201,900,000 to complete STARS.

<b>The revised Contract appropriation cost for STARS is</b>	<b>\$361,200,000</b>
<b>Less \$50,000 allocated to Department of Forestry</b>	<b>\$361,150,000</b>
<b>Phase 1 Cost</b>	<b>\$346,186,399</b>
<b>Bond Funds remaining at completion of Phase I</b>	<b>\$14,963,601</b>
<b>New site construction Phase 2</b>	<b>\$3,218,871</b>
<b>New site construction Phase 3</b>	<b>\$1,677,579</b>
<b>New site construction Phase 4</b>	<b>\$3,453,806</b>
<b>700 MHz Re-banding Phase 5</b>	<b>\$6,000,000</b>
<b>New site construction Phase 6</b>	<b>\$613,345</b>
<b>Projected Funding Balance at Project Completion</b>	<b>\$ - 0 -</b>

### STARS Management Structure

The STARS participants are composed of the following 21 state agencies and one locality. Representatives from each agency make up the User Agencies Requirements Committee (UARC):

Chesapeake Bay Bridge and Tunnel Police  
Department of Agriculture and Consumer Services  
Department of Alcoholic Beverage Control  
Division of Capitol Police  
Department of Conservation and Recreation  
Department of Corrections  
Department of Emergency Management  
Department of Environmental Quality

Department of Fire Programs  
Department of Forestry  
Department of Game and Inland Fisheries  
Department of Health  
Department of Juvenile Justice  
Department Military Affairs  
Department of Mines, Minerals, and Energy  
Department of Motor Vehicles  
Department of State Police  
Department of Transportation  
Virginia Information Technologies Agency  
Virginia Marine Resources Commission  
Virginia Port Authority  
Buchanan County Sheriff's Department and Grundy Police Department

**The STARS Management Group** is a Board established by Executive Order 28 (2002) and composed of the Secretaries of Agriculture and Forestry, Commerce and Trade, Finance, Health and Human Resources, Natural Resources, Public Safety and Homeland Security, Technology, and Transportation. The Secretary of Public Safety and Homeland Security serves as the Chairman. The STARS Management Group provides direction and overall governance for the development, implementation, and ongoing operation of STARS. In addition, the group reviews all procurements and contracts, coordinates radio frequency licenses granted by the federal government to agencies of the Commonwealth, and promote interagency cooperation and coordination in the use of communications resources.

**The User Agencies Requirements Committee (UARC)** consists of two representatives (primary and alternate) from each member agency and institution. The Chairman of the UARC is selected by the STARS Management Group. The current Chairman is Mr. James R. Squares, Jr. with the Virginia Department of Motor Vehicles. The UARC meets as necessary, but at least quarterly. The specific duties of UARC are to advise on the needs of member agencies for the planning, design, establishment, and operation of STARS; to provide advice on proposals for other federal, state, or local agencies to join STARS and on any proposals for third party use of any STARS infrastructure or component; and to assist the STARS Management Team with the development of a comprehensive management plan and procedures for the operation of STARS.

### **Projected STARS Reoccurring Operating Costs**

The STARS Network is a public safety grade wireless communications system that must be maintained in an operational status 24 hours per day, seven days per week. To accomplish this, a well-trained staff of engineers and technicians must be available and have access to parts, test equipment, and vehicles on a 24/7 basis. Based on a study by the STARS Management Group, commercial services were cost prohibitive, would not maintain the required level of knowledge of the network, and were not available on a

24/7 basis. The Department of State Police has historically been a self-maintained communications network provider with Department employed engineers and technicians. There is no other practical or cost effective way to maintain the STARS network infrastructure and the subscriber vehicles within the network.

The implementation of STARS replaced the legacy Virginia State Police radio system. Effective July 1, 2011, the Virginia State Police Communications Division assumed responsibility for the engineering, installation, maintenance, and operations of the STARS Network. The Department assumed responsibility for equipping new vehicles, aircraft, and boats that belong to the 21 STARS agencies, removing equipment from decommissioned or crashed vehicles, and the refurbishment and re-installing the reconditioned hardware into other vehicles. Per Chapter 665, 2015 Virginia Acts of Assembly, Item 43, the FY16 allotted funding for Telecommunications and Statewide Agencies Radio System (STARS) (30204) is \$25,840,605.

Maintaining technology today is a labor intensive and costly proposition. Hardware and software are typically obsolete by the time they are purchased and installed and STARS is no exception. The FY 2016 lifecycle cost to keep the core Motorola portion of the network current is \$2,219,189. This does not include the hardware and software upgrades necessary to keep the transport network at top operational efficiency. By July 2019, all land mobile radio hardware must be replaced. The projected cost to replace this hardware averages \$141,000 per site or \$8.5 million. In addition, much of the support hardware including microwave radios, power subsystems, and multi-plexing equipment is at or approaching end-of-life. All new sites under construction are being equipped with the latest hardware.

The dispatch centers in the original network consisted of 40 analog Gold Elite consoles and 38 MCC7500 digital consoles. The analog consoles are not supported after Release 7.16, which is scheduled for implementation in July 2017. The digital consoles will be upgraded as part of the Release 7.11 to 7.14 upgrade scheduled for October 2015. Of the original 40 analog consoles, 21 have been upgraded, with 19 remaining to be replaced. The cost to replace the remaining 19 analog consoles is approximately \$833,881.

There are a number of other major subsystems that require replacement in the near future. These include:

<b><u>Subsystem</u></b>	<b><u>Projected Cost</u></b>
LMR Repeater	\$8,100,000
UPS and -48VDC power plants	\$2,200,000
Mobile and Portable Radios	Over \$50 Million

The costs above do not consider the manpower, installation supplies, per diem and other travel costs, and gasoline. It is a representative, but not an all inclusive listing of the expenses required to keep the network operational.

## **COMLINC**

Local, state, and federal radio systems operate in a number of specific frequency bands (VHF low-band, VHF high-band, UHF, 700, and 800 MHz). Radios operating in different frequency bands cannot communicate directly. The Commonwealth Link to Interoperable Communications (COMLINC) allows dispatchers at the state, federal, county, and city communications centers to establish communications patches between themselves and another agency, regardless of frequency band. For example, a sheriff's department can patch to the fire department, regardless of the frequencies used by each agency. Patches can also be made to phone networks and used to establish dispatcher conferences. By using COMLINC, each dispatcher initiates the patch themselves at their console in coordination with the participating agency. COMLINC also provides instant recall of recorded audio.

COMLINC was initially implemented in 16 localities in central Virginia, and at State Police Divisions 1 and 5 along with STARS Network Operations Center (NOC). As of this report, there are now 172 agencies/jurisdictions on the COMLINC network, including all State Police Divisions, most localities, colleges and universities, and state and federal agencies. The initial systems were procured via competitive bid.

As the network has grown, the Virginia State Police Communications Division accepted responsibility for engineering, installation, maintenance, and technical support for the entire statewide COMLINC network. As with the STARS Network, COMLINC has become outdated since most servers and workstations are still operating on the Microsoft Windows XP operating system. The cost of upgrading all existing COMLINC sites to the latest release of software (Version 3.43) with the Windows 7 computer operating system is estimated at well over \$2 million. This upgrade will extend interoperability to smart phones, allowing radio communications and video and audio streaming.

## **SIRS**

In 1977, the Statewide Interdepartmental Radio System (SIRS) Advisory Board was created to improve coordination between state and local law enforcement agencies. At that time, no direct radio link existed between these agencies. The Advisory Board accepts applications for the use of the selected low-band VHF radio frequency of 39.54 MHz for statewide access for SIRS participating agencies. The FCC had set aside a Very High Frequency (VHF) of 155.475 MHz (wideband) and 155.4825 MHz (narrowband) as VHF interoperability channels to be used by law enforcement statewide. The SIRS Advisory Board manages the low band and VHF interoperability frequencies.

Currently, all STARS law enforcement vehicles are equipped with an independent low band (39.54 MHz) SIRS radio. This radio, being independent of the STARS radio, is always available to send and receive radio transmissions. STARS mobile radios are programmed to transmit and receive on VHF high-band frequencies. SIRS radios have

been installed in 18 STARS sites throughout the Commonwealth and will appear on all Virginia State Police dispatch consoles to improve interoperability with localities and the Virginia State Police.

### **Mobile Data Enhancement**

The original STARS contract provided mobile data terminals (MDT) for all law enforcement via laptops installed in the vehicles and the Integrated Voice and Data (IV&D) feature in the network. This capability provided for Virginia Criminal Information Network (VCIN) checks and Division of Motor Vehicle (DMV) license checks through the radio network. The variety and complexity of information technology changes daily, as does the bandwidth requirements. The IV&D feature in the STARS network was designed to accommodate short message traffic and cannot accommodate enhancements such as DMV photographs. To accommodate these new bandwidth requirements commercial wireless data cards were added to the laptops.

In addition to the increased bandwidth demands, the FBI and Department of Homeland Security have added new security requirements that require 1) portable computer hard drives to be encrypted to protect sensitive data if stolen, 2) encryption for all transmitted data that traverse unsecured networks such as the Internet, and 3) multi-factor authentication to confirm the identity of the person logging into the network.

All of these requirements add a strain on an already tight budget. Hard drive encryption requires new software. The encryption of transmitted data requires virtual private network (VPN) hardware and software. Depending on the implemented solution for multi-factor authentication, hardware and/or software will be required. All of these capabilities require new administrative procedures.

The original STARS Motorola laptops are out of warranty and are being replaced with the latest Panasonic Tough Book laptops. The projected cost to replace the Motorola laptops was projected to be at least \$16 million at a rate of \$3.2 million per year. Budget constraints have slowed the replacements at the same time that the failure rates and lack of spare parts for the Motorola laptops has increased.

### **New STARS Site Construction**

After the STARS Network was turned over to the Communications Division, users in a number of areas within the Commonwealth began to report radio problems that were identified as areas of very weak or poor coverage. Radio transmissions were garbled or robotic sounding in digital terms or radios were not able to send and receive. STARS Network Operations Center personnel began to gather the locations and opened informational that enabled the engineers to perform coverage testing to determine the best location for new sites.

During the initial network construction, the VSP Communications Division took over engineering and installation of several subsystems of the STARS network resulting in a



cost savings to the Commonwealth. Subsequently, the Communications Division requested permission from the STARS Management Group to use these funds to install additional land mobile radio sites to fill in coverage gaps in the original network. To date, 11 sites have been completed, with 7 more in various stages of construction.

The additional new sites and their degree of completion are as follows:

- Waverly Complete
- Dumfries Scales Complete
- Rawley Springs Complete
- Potts Mountain Complete
- Bath County Hydro Under Construction
- Elliott Knob Complete
- Massanutten Complete
- Virginia Beach Complete
- Gordonsville Complete
- Big Walker Mountain Under Construction
- Lambsburg Complete
- Buck Mountain Pending landowner permission to construct
  
- Division 1 Dispatch Complete
- VSP Driver Training Facility Complete
- Amelia VDOT Pending locality approval to construct
- Purgatory Pending approval to co-locate with cellular carrier
  
- Blue Mountain Pending approval to co-locate with locality
- West Point Construction Pending

Work continues on identifying additional coverage gaps.