STATEWIDE AGENCIES RADIO SYSTEM

Annual Status Report

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

October 2020

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October 1, 2020

TO: The Honorable Ralph Northam, Governor of Virginia

The Honorable Thomas K. Norment, Jr.
Co-Chair of the Senate Finance Committee

The Honorable Emmet W. Hanger, Jr.
Co-Chair of the Senate Finance Committee

The Honorable Luke E. Torian
Chairman of the House Appropriations Committee

Pursuant to House Bill 5002 Item 419.C.1 of the 2020 Virginia Acts of Assembly, I am respectfully submitting herewith a report *on the Status of the Statewide Agencies Radio System (STARS) Program.*

Respectfully,

Gary T. Settle

Superintendent

TAB/LKH/tlg

Enclosure

Executive Summary

Statewide Agencies Radio System 2020 Status Report

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 system. The STARS Network including the backbone microwave network, the land mobile radio network, the five (5) Tidewater tunnels and two (2) Western tunnels, and all vehicle-based hardware and software for all twenty-one State Agencies were operational.

STARS provides a multi-channel trunked digital voice and data wireless communications capability specifically designed to meet APCO Project 25 public safety requirements. The core microwave network consists of Synchronous Optical Network (SONET) ring-protected transmission paths providing the highest quality of service, security, and reliability possible through controlled system access and Advanced Encryption Standard (AES) encryption for law enforcement users when needed. This network supports the 22 participating agencies throughout the Commonwealth and facilitates interoperability with other state, local, and federal agencies.

Initial Bond Funding

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 the constructing, improving, furnishing, maintaining, acquiring and renovating buildings, facilities, improvements, and land for the STARS project. Chapter 245 approved by the General Assembly session 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.

The revised Contract appropriation cost for STARS is	**$361,200,000**
Less $50,000 allocated to Department of Forestry	**$361,150,000**
Phase 1 Cost	**$346,186,399**
Bond Funds remaining at completion of Phase I	**$14,963,601**
New site construction Phase 2	**$3,218,788**
New site construction Phase 3	**$1,619,871**
New site construction Phase 4	**$4,046,542**
Hampton Tower Site, GTR8000 Site Repeater Upgrade, -48VDC Power Upgrade, MDT's, and Telscan Upgrade Phase 5	**$6,000,000**
New site construction Phase 6	**$78,400**
Projected Funding Balance at Project Completion	**$ - 0 -**

STARS Program Management Structure

The STARS participants are composed of the following 22 agencies. 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 PD

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 Transportation. The Secretary of Public Safety serves as the Chairman. The STARS Management Group provides direction and overall governance for the development, implementation, and ongoing operation of STARS. In addition, they review all procurements and contracts, coordinate 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 UARC shall have two co-chairs. The VSP Communications Officer shall serve as co-chair and the second co-chair shall be recommended by the URAC membership. 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, 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 assist the STARS Management Team with the development of a comprehensive management plan and procedures for the operation of STARS.

STARS Annual 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 with access to repair parts, test equipment, and vehicles on a 24/7 basis. On July 1, 2011, the Department assumed the responsibility for equipping new vehicles, aircraft, and boats that belong to the 22 STARS agencies, removing equipment from decommissioned or crashed vehicles, and the refurbishment and re-installation of the reconditioned hardware into another vehicle. Per Chapter 854, 2019 Virginia Acts of Assembly, Item 419, and the FY2020 allotted funding for Telecommunications and Statewide Agencies Radio System (STARS) (30204) is $31,109,016.00.

Current Enhancement Projects

Maintaining technology today is a labor intensive and costly proposition. Hardware and software is typically obsolete by the time it is purchased and installed and STARS is no exception. The FY 2020 lifecycle cost to keep the core Motorola portion of the network current is $1,518,808.00. This does not include the hardware and software upgrades, repair parts, and labor necessary to keep the transport network at top operational efficiency.

Current enhancement projects include:

- Replacement of all -48VDC power supplies and the retirement of the uninterruptable power supplies

Motorola upgrade release 7.18 was completed third quarter of 2019 and all land mobile radio fixed site repeater hardware and software have been replaced in order to be supported by the manufacturer Motorola Solutions.

Most transmission equipment is powered with -48VDC power plants. These units power the equipment using batteries with the batteries constantly recharged from either commercial power or generator backup power. Other site equipment is powered from commercial power through an uninterruptible power supply (UPS) also equipped with battery backup. The GTR8000 site repeaters can be powered with either source but are being DC powered allowing the retirement of the very expensive end-of-life UPS systems. The remaining AC powered hardware will be supplied power through redundant inverters. The projected cost of the -48VDC power plants and inverters is $2.4M. The elimination of the UPS's results in a multi-million dollar savings.

The core of the STARS voice and data network operates on Motorola hardware and software. The VSP Communications Division has negotiated a Software Upgrade Agreement II (SUA II) lifecycle contract with Motorola that upgrades the network once every two years. The SUA II annual contractual agreement provides software, hardware, and labor required to implement one system infrastructure upgrade in a two-year period. VSP chose a schedule that keeps STARS one upgrade below the latest to allow other users to identify system bugs and have them corrected before our upgrade. The SUA II agreement does not cover all hardware and software.

The original STARS contract provided mobile data terminals (MDT) for all law enforcement vehicles 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 has changed dramatically as has the data transmission bandwidth requirements since the inception of STARS. 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. The original STARS Motorola laptops were out of warranty and have been replaced with the latest Panasonic Tough book laptops. The MDT fleet is currently undergoing upgrades and replacements to Windows 10. The fleet will begin transition to a newer model Panasonic Toughbook (CF31 to CF55) in late 2020.

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

All of these latter 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.

Interoperability Between STARS and Outside Agencies

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 other agencies 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 VSP Division 1, and at State Police Divisions 1 and 5 along with STARS Network Operations Center (NOC). Through grants the network has grown to 135 fixed sites and 20 mobile command posts or tactical units providing interoperability between all State Police Divisions, most localities, colleges and universities, and other state and federal agencies.

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. The upgrade project for COMLINC has begun and all of the VSP sites have been completed. All upgraded systems will be using Windows 10 and will receive new hardware replace aging equipment. Each new upgrade will undergo a calibration to ensure optimized audio performance with the radio equipment connected to it. Plans are underway to establish more roll calls to ensure better performance of the system and the users. Four new COMLINC Technician positions have been funded and two have been hired recently and are undergoing their training at this time.

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 VSP dispatch consoles to improve interoperability with localities and the VSP.

Network Operations Center/Virginia Criminal Information Helpdesk

The Virginia State Police employs sixteen Network Operation Center Operators and 1 Network Operations Center Supervisor that: monitor the STARS Land Mobile Radio and point-to-point microwave radio systems statewide, emergency power, environmental systems, make routine infrastructure inputs and changes that allow only authorized users access to the LMR network. They have added the additional responsibilities and duties of the Virginia Criminal Information Network Help (VCIN) Desk support staff. This adds the duties of changing passwords, providing client access support on a 24/365 basis. Six VCIN Helpdesk positions were transferred to the NOC to aid in the additional workload demands.

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 trouble tickets 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 15 sites have been completed.

Work continues on identifying additional coverage gaps.

Upgrades to STARS Microwave Infrastructure System

The 2019 Legislature approved funding for:

Replacement of the VSP managed statewide point-to-point microwave backhaul network. AVIAT Networks received the award and have started the preliminary work. Actual microwave radio replacement began on July 8, 2020 and is expected to take 18 months to complete.

MPLS - Converting existing Time Division Multiplex (TDM) network architecture to newer technology called MultiProtocol Label Switching (MPLS). Motorola Solutions was selected due to their extensive experience integrating MPLS with existing Motorola STARS infrastructure using NOKIA routers. Preliminary work has already begun with actual router replacements to begin after some microwave radio replacements have been completed and deemed stable.

Radio Authentication adds another layer of security to all subscriber radios in the entire STARS fleet. Motorola Solutions was selected due to the existing STARS ASTRO 25 radio system in place. The infrastructure is in place and initial testing has been completed.

TDMA – Convert entire STARS Land Mobile Radio fleet to Time Division Multiple Access (TDMA) technology from current Frequency Division Multiple Access (FDMA). This will almost double radio traffic capacity because TDMA provides two radio voice conversations for each existing voice channel. Every STARS Federal Communications Commission license had to be modified and all have been granted by the Commission. The infrastructure is in place and initial testing has been completed. Actual in field subscriber testing began late June, 2020.

Subscriber Radio Replacement - Replacement of the entire STARS subscriber fleet due to current existing radio platform (Motorola XTS/XTL) has reached end of life and does not have the capabilities of Radio Authentication and TDMA. The RFP was published for bids on June 10, 2020. Bid responses were received and evaluation began in August 2020.