

STATEWIDE AGENCIES RADIO SYSTEM

Annual Status Report

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



October 2021

**Colonel Gary T. Settle
Superintendent**

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October 1, 2021

TO: The Honorable Ralph Northam, Governor of Virginia

The Honorable Janet D. Howell
Chairwoman 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,

A handwritten signature in cursive script that reads "Gary T. Settle".

Superintendent

TAB/WJD

Enclosure

Executive Summary

Statewide Agencies Radio System 2021 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 Virginia 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 Wildlife Resources
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 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 2 co-chairs. The VSP Communications Officer shall serve as co-chair and the second co-chair shall be recommended by the UARC 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 1289, 2020 Virginia Acts of Assembly, Item 425, and the FY2021 and FY2022 allotted funding for Telecommunications and Statewide Agencies Radio System (STARS) (30204) is \$38,414,712.

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 2021 lifecycle cost to keep the core Motorola portion of the network current is \$1,564,372.24. 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 – 89 sites complete with 20 remaining.

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 with one less battery system to maintain.

- 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.

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 next upgrade will take place after the infrastructure projects as part of Phase 5 are completed.

- The mobile data terminal (MDT) fleet is currently undergoing continual upgrades to remove aging devices that do not support the latest software (Windows 10) and applications in use by the multiple agencies. The fleet is currently transitioning to a newer model Panasonic Toughbook (CF31 to CF55).

The original STARS contract provided mobile (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.

In addition to the increased bandwidth demands, the FBI and Department of Homeland Security have added new security requirements that require portable device 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 reoccurring cost and additional strain on tight budgets. 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 and encryption requires new software. Remote device management with Microsoft's System Center Configuration

Manager (SCCM) software along with VITA are underway, also incurring recurring costs.

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. Roll calls are underway between the State and localities to ensure better performance through repeated use of the system and familiarity for the users. The southwest region of the State are heavy users of the system, with nearly daily usage being observed. Four new COMLINC Technician positions have been funded and three have been hired, with the fourth currently in the hiring process.

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 appear on all VSP dispatch consoles to improve interoperability with localities.

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. 6 VCIN Helpdesk positions were transferred to the NOC to aid in the additional workload demands.

New STARS Site Construction

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. STARS Network Operations Center personnel gather locations and open informational trouble tickets that enabled the engineers to perform coverage testing to determine the best location for new sites. Subsequently, the Communications Division requested permission from the STARS Management Group to use the remaining funds from the original bond to install additional land mobile radio sites to fill in coverage gaps in the original network. To date 15 sites have been completed, with three additional sites in varying stages of development.

Work on identifying additional coverage gaps continue to ensure ever-improving coverage for all STARS users.

Upgrades to STARS Infrastructure Network

The 2019 Legislature approved phased bond funding over four years for the following:

Microwave Radios Replacement: The STARS statewide point-to-point microwave backhaul network replacement was awarded to AVIAT Networks whom will complete the installation and commissioning of the new radios before December of 2021. As of this writing 89 of 112 microwave paths are complete.

MPLS: Converting existing Time Division Multiplex (TDM) network architecture to newer technology, Multi-Protocol Label Switching (MPLS). With the discontinuation of support for T1 technologies within our infrastructure MPLS has

become the industry standard in data transport, therefore STARS infrastructure is utilizing NOKIA routers to accomplish the conversion and future transport throughout the network. Work continues in concert with the microwave radio replacement with routers being configured and turned up to pass test data one ring at a time between the Richmond primary control site and the secondary control site in Salem. The overall project is scheduled for completion in the fourth quarter of 2022.

Radio Authentication: Adds another layer of security to all subscriber radios in the STARS fleet. These features allowed only properly registered radios to access the network and prevent cloning of radios to spoof the system. The infrastructure equipment installation is in place and testing has been completed. This new system will be implemented as the new subscriber units are installed through the second quarter of 2024.

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 (FCC) license were modified and all have been granted by the Commission. The infrastructure is in place and initial testing has been completed. A petition for waiver was filed by VSP to the FCC to increase the talk-in power of the mobile radios. This will increase the output of the radios from 60 Watts to 100 Watts helping to improve coverage in known weak areas and the ability of the mobile radios to reach tower sites.

DSR: Dynamic System Resilience will provide real-time back up and switching between the Richmond and Salem zone controller cores in the event of a major failure. It will duplicate each core at each and will provide uninterrupted redundancy without human intervention for a switch to occur.

Subscriber Radio Replacement: Replacement of the entire STARS subscriber fleet (mobile, portable and DVRS or equivalent) due to current existing radio platform (Motorola XTS/XTL) has reached end of life, support, and does not have the capabilities of Radio Authentication and TDMA. The RFP closed on June 3, 2021 with 2 vendors responding, and evaluations of the proposed solutions being evaluated at the time of this writing.