

STATEWIDE AGENCIES RADIO SYSTEM

Annual Status Report

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



October 2022

**Colonel Gary T. Settle
Superintendent**

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October 1, 2022

TO: The Honorable Glenn Youngkin, Governor of Virginia

The Honorable Janet D. Howell
Chairwoman of the Senate Finance Committee

The Honorable Barry D. Knight
Chairman of the House Appropriations Committee

Pursuant to House Bill 5002 Item 429.C.2 of the 2022 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 2022 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 Multiprotocol Label Switching (MPLS) 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 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.

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 after 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, MDTs, 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, 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 STARS Management Group selects the Chairman of the UARC. The UARC shall have two co-chairs. The VSP Communications Officer shall serve as co-chair, and the UARC membership shall recommend the second co-chair. 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 a week. To accomplish this mission, 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, 2022 Virginia Acts of Assembly, Item 429, and the FY2023 and FY2024 allotted funding for Telecommunications and Statewide Agencies Radio System (STARS) (30204) is \$40,585,306

Current Enhancement Projects

Maintaining technology today is a labor-intensive and costly proposition. Hardware and software are typically obsolete when purchased and installed, and STARS is no exception. The FY 2022 lifecycle cost to keep the core Motorola portion of the network current is \$1,611,303.40. 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 uninterruptible power supplies – 109 sites have been converted and are operational.

Most transmission equipment is powered with -48VDC power plants. These units power the equipment using batteries constantly recharged from commercial 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 DC powered to allow for the retirement of the 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 results in multi-million dollar savings with one less battery system to maintain.

- Motorola upgrade release 2021.1 was completed in July 2022, and all land mobile radio fixed site repeater hardware and software have been replaced 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 every two years. The SUA II annual contractual agreement provides software, hardware, and labor required to implement one system infrastructure upgrade in two years. The SUA II agreement does not cover all hardware and software. 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 mobile data terminal (MDT) fleet is undergoing continual upgrades to remove aging devices that do not support the latest software (Windows 10) and applications in use by 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 is provided for Virginia Criminal Information Network (VCIN) checks and Division of Motor Vehicle (DMV) license checks through the radio network. The IV&D feature in the STARS network was designed to accommodate short message traffic and cannot accommodate enhancements such as DMV photographs. The variety and complexity of information technology have changed dramatically, as have the data transmission bandwidth requirements since the inception of STARS. Commercial wireless data cards were added to the laptops to accommodate these new bandwidth requirements.

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. Multi-factor authentication ensures that the person logging into the network is whom they purport to be.

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. These capabilities require new administrative procedures, and encryption requires new software. Remote device management with Microsoft's System Center Configuration Manager (SCCM) software and VITA are underway, also requiring recurring costs.

Interoperability Between STARS and Outside Agencies

Local, state, and federal radio systems operate in many 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 the frequency band. For example, a Sheriff's Department can patch 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. 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 the Richmond area, State Police Divisions 1 and 5 Headquarters, and STARS Network Operations Center (NOC). Through grants, the network has grown to over 140 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. Four new COMLINC Technician positions have been funded, and all have been hired. The upgrade project for COMLINC has 76 sites live, and all of the VSP dispatch center sites have been completed. All upgraded systems will be using Windows 10 and will receive new hardware to replace aging equipment. Each new upgrade will be calibrated to ensure optimized audio performance with the radio equipment. Monthly roll calls are underway between the State and localities to ensure better performance through repeated system use and user familiarity. The southwest region of the State is a heavy user of the system, with nearly daily usage being observed.

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 SIRS advisory board manages the low band and VHF interoperability frequencies. The Advisory Board accepts applications for using 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.

All STARS law enforcement vehicles are currently equipped with a low independent band (39.54 MHz) SIRS radio. This radio, 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 who: monitor the STARS Land Mobile (LMR) Radio and point-to-point microwave radio systems statewide, emergency power, and environmental systems, and make routine infrastructure inputs and changes that allow only authorized users to 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 and providing client access support 24 hours a day, 365 days a year. 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 the engineering and installation of several subsystems of the STARS network resulting in cost savings for the Commonwealth. STARS Network Operations Center personnel gathered locations and opened informational trouble tickets that enabled the engineers to test coverage 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 continues to ensure continued coverage improvement for all STARS users.

Upgrades to STARS Infrastructure Network

The 2019 Legislature approved phased bond funding over four years for the following improvements, which will position STARS as the first VHF statewide radio system to be P25 Phase 2 in the nation, including:

Microwave Radios Replacement: The STARS statewide point-to-point microwave backhaul network replacement was awarded to AVIAT Networks, who has completed installing and commissioning the new radios with 112 microwave paths.

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

utilizes NOKIA routers to accomplish the conversion and future transport throughout the network. Testing and acceptance were completed on August 17, 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 prevented cloning of radios to spoof the system. This new system will be implemented as the new subscriber units are installed through the second quarter of 2024. The infrastructure equipment installation is in place, and testing has been completed.

TDMA: Convert the STARS Land Mobile Radio fleet to Time Division Multiple Access (TDMA) technology from the 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 was modified and granted by the Commission. The infrastructure is in place, and initial testing has been completed. A petition for a waiver was filed and granted 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 backup and switching between the Richmond and Salem zone controller cores in the event of a major failure. It will duplicate each core and provide uninterrupted redundancy without human intervention for a switch to occur. DSR is currently live and operational.

Subscriber Radio Replacement: Replacement of the entire STARS subscriber fleet (mobile, portable, and DVRS or equivalent) because the existing radio platform (Motorola XTS/XTL) has reached the end of life as well as support, and does not have the capabilities of Radio Authentication and TDMA. The RFP closed on June 3, 2021, with two vendors responding. A contract was awarded to Motorola Solutions, Inc. on December 30, 2021, in the amount of \$71,353,074. With this award, STARS will be the first statewide radio system in the nation to combine Public Safety Land Mobile Radio (LMR) with cellular Long Term Evolution (LTE), thereby increasing the system's capabilities and adding features as operational needs change.