STATEWIDE AGENCIES RADIO SYSTEM (STARS)

PROGRAM

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

October 2013

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TO: The Honorable Robert F. McDonnell, Governor of Virginia

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

The Honorable Lacey E. Putney
Chairman of the House Appropriations Committee

Pursuant to Item 416 (C.2.) of the 2013 Virginia Acts of Assembly, I am respectfully submitting herewith a *Report on the Statewide Agencies Radio System (STARS) Program.*

Respectfully,

W. S. Flaherty

Superintendent

WSF/RAE/tlt

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 responsibility for the engineering, installation, maintenance, and operation of the STARS system. 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, were operational.

STARS provides 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 capacity through the addition of radio frequencies. In all applicable design components, STARS has addressed safeguards to system security, including controlled system access and Advanced Encryption Standard (AES) 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 §2.2-2264 of the Code of Virginia, 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 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.

Revised Contract Appropriation Cost for STARS	**$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	**$2,972,813**
New site construction Phase 3	**$1,761,100**
New site construction Phase 4	**$4,229,688**
700 MHz Re-banding Phase 5	**$6,000,000**
Projected Funding Balance at Project Completion	**$ - 0 -**

STARS Management Structure

The STARS participants are composed of the following 21 state agencies:

Alcoholic Beverage Control
Capitol Police
Charitable Gaming
Chesapeake Bay Bridge and Tunnel Police
Conservation and Recreation
Corrections
Emergency Management
Environmental Quality
Fire Programs
Forestry
Game and Inland Fisheries
Health
Juvenile Justice

Military Affairs
Mines, Minerals, and Energy
Motor Vehicles
State Police
Transportation
Virginia Information Technologies Agency
Virginia Marine Resources Commission
Virginia Port Authority

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, Technology, and Transportation. The Secretary of Public Safety serves as the Chairperson. 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 current Chairman is Captain Joseph Pajic with the Virginia Department of Game and Inland Fisheries. 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.

Projected STARS Recurring 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 the engineering, installation, maintenance, and operations of the STARS system. The Department assumed the responsibility for equipping new vehicles, aircraft, and boats that belong to the 21 STARS agencies, removing equipment from decommissioned or crashed vehicles, and refurbishing and re-installing the reconditioned hardware into another vehicle. The original funding for the Communications Division plus additional funding for the maintenance of STARS provides for total funding of $26,177,087 each fiscal year.

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 lifecycle cost to keep the core network up to date is over $3.5 million annually. The hardware that provides land mobile radio services is no longer supported after Software Release 7.17 scheduled for implementation in 2019. The projected cost to replace this hardware averages $141,000 per site or $8.5 million to replace approximately 60 sites.

The dispatch centers in the network consist of 40 analog Gold Elite consoles and 38 MCC7500 digital consoles. The analog consoles are not supported after Release 7.14 and the digital consoles require an upgrade prior to Release 7.13. These two releases are scheduled for midyear 2015. The cost of the Gold Elite hardware replacement is $1.7 million with the hardware for the upgrade to the digital consoles projected at $385,000.

Another major cost on the horizon is the replacement of the Motorola fault monitoring hardware. This hardware is no longer supported after Release 7.13 scheduled for mid-year 2015 with a projected cost of $900,000.

The costs above do not consider manpower, installation supplies, per diem, travel costs and gasoline, but are representative of network changes that continue to evolve.

New Initiatives

COMLINC

Local, state, and federal radio systems operate in a number of specific frequency bands (VHF low-band, VHF high-band, UHF, 700 MHz, and 800 MHz). Radios operating in different frequency bands cannot communicate. The Commonwealth Link to Interoperable Communications (COMLINC) allows dispatchers at state, federal, county, and city communications centers to establish communications patches between their agency and another agency regardless of frequency band. For example, a Sheriff's Office 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 the STARS Network Operations Center (NOC). As of this report, there are now 126 agencies/jurisdictions on the COMLINC system including all State Police Divisions, most localities, colleges and universities, and state and federal agencies.

The COMLINC Project implemented by the Cities of Lynchburg and Roanoke provide interoperability for 34 localities in Divisions 3 and 6 and at State Police Division 3 and 6 Headquarters. The COMLINC participants are the counties of Albemarle, Amherst, Appomattox, Augusta, Bedford, Botetourt, Buckingham, Campbell, Charlotte, Craig, Cumberland, Fluvanna, Franklin, Greene, Halifax, Henry, Mecklenburg, Montgomery, Nelson, Patrick, Prince Edward, and Roanoke; as well as the cities of Bedford, Charlottesville, Lynchburg, Roanoke, Salem, Staunton and Waynesboro. Also included are the towns of Farmville, South Boston, Staunton, Vinton and Liberty University.

The Virginia State Police Communications Division is responsible for engineering, installation, maintenance, and technical support for the entire statewide COMLINC network. As with the STARS Network, this network is also becoming dated. The cost of upgrading all existing COMLINC sites to the latest release of software (Version 3.38) from the current 3.14/3.18 is well over $1,000,000 or $9,500 per site.

There is a trial study underway in the Charlottesville area to allow smart phone users to monitor system audio. The necessary hardware and software to add this capability is expected to be costly. The trial will provide a cost versus benefit analysis for this capability.

Statewide Interdepartmental Radio System (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. The STARS mobile radios are programmed to transmit and receive on the VHF interoperability channels while the STARS 700/800 MHz portable radios have the 700 MHz and 800 MHz interoperability channels programmed. SIRS installation and testing has been completed in VSP Divisions 1, 5, and 7. Installation continues in the other Divisions.

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. 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 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 Federal Bureau of Investigation and the Department of Homeland Security have added new security requirements that require portable computer hard drives to be encrypted to thwart theft, encryption for all transmitted data that traverse unsecured networks such as the Internet, and multi-factor authentication to ensure that persons logging into the network are 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 are needed. 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 Toughbook laptops. VSP Divisions 1 and 2 and selected other workgroups have been replaced.

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 open informational trouble tickets that enabled the engineers to perform coverage testing to determine the best location for a new site. In some cases, it was possible to re-orient directional LMR antennas to cover these areas without degrading coverage in other areas. In a number of cases, the only possible solution was to design and implement new LMR sites. This required the acquisition of land, tower construction, purchase of a new communications shelter, and equipment. In some cases, existing microwave repeater locations could be used and LMR installed.

The first site to be converted from microwave-only to LMR was in Waverly. This site operated so well that additional channels had to be added to handle the traffic. The following new sites are in varying degrees of implementation:

- Waverly
- Dumfries Scales
- Rawley Springs
- Potts Mountain
- Bath County Hydro
- Elliott Knob
- Massanutten
- Westin Hotel
- Gordonsville
- Big Walker Mountain
- Interstate-77 Rest Stop
- Wise County
- Division 1 Dispatch
- VSP Driver Training Complex
- Amelia VDOT

The Dumfries Scales site located on Interstate 95 in Northern Virginia is operational and experiencing similar busy traffic patterns to Waverly. Construction of the Rawley Springs site in Rockingham County is nearly complete and ready for equipment installation. Final inspections for the Driver Training Complex are expected in mid-September with equipment installation to follow.

One of the significant hurdles in site construction is the lockdown of operating frequencies. Three of the sites listed above (Division 1 Dispatch, Massanutten, and Elliott Knob) received frequency lockdown in early September. Since the amount of work in these microwave-only sites is significantly less than constructing a tower and building a shelter, these sites should be ready by early fall awaiting receipt of long lead-time items such as antennas and combiner/multi-coupler orders (eight week lead-time).

Most of these sites will be constructed with the bond funds saved during the STARS Project. Several sites are being funded out of the Communications Division's General Fund.