Department of Information Technology – Capital

Capital Budget Summary

State-owned *Capital Improvement Program*
($ in Millions)

Projects	Prior Auth.	2021 Request	2022 Est.	2023 Est.	2024 Est.	2025 Est.
Public Safety Communications System	$348.847	$9.613	$5.300	$5.500	$9.000	$8.701
Total	**$348.847**	**$9.613**	**$5.300**	**$5.500**	**$9.000**	**$8.701**

Fund Source	Prior Auth.	2021 Request	2022 Est.	2023 Est.	2024 Est.	2025 Est.
GO Bonds	$228.950	$9.613	$5.300	$5.500	$9.000	$8.701
PAYGO GF	27.400	0.000	0.000	0.000	0.000	0.000
Other[1]	92.497	0.000	0.000	0.000	0.000	0.000
Total	**$348.847**	**$9.613**	**$5.300**	**$5.500**	**$9.000**	**$8.701**

GF: general funds
GO: general obligation
PAYGO: pay-as-you-go

[1] State Highway Administration projects included in prior years.

Key Observations

- T1 telecommunications technology used in phases 1 to 4, which are operational, will no longer be supported by the vendor after 2022. The system is being upgraded so that all equipment uses Ethernet networking technology. The capital budget bill authorizes $8.0 million in fiscal 2021, $2.7 million in fiscal 2022, and $2.7 million in fiscal 2023 for these upgrades. Phase 5 was designed and is being implemented with Ethernet-compatible technology.

Analysis of the FY 2021 Maryland Executive Budget, 2020

- As the system has become operational, deficiencies and gaps have been detected in radio coverage and system redundancy. The *Capital Improvement Program* (CIP) provides $24.7 million from fiscal 2021 to 2025 for site improvements to address this.

Summary of Recommended Bond Actions

1. Public Safety Communications System

    Approve $9,613,000 in general obligation bonds to continue construction of the statewide Public Safety Communications System.

2. SECTION 13 – the Department of Information Technology – Public Safety Communications System

    Approve $2,685,000 in general obligation bonds for fiscal 2022 to continue construction of the statewide Public Safety Communications System.

3. SECTION 14 – the Department of Information Technology – Public Safety Communications System

    Approve $2,650,000 in general obligation bonds for fiscal 2023 to continue construction of the statewide Public Safety Communications System.

Budget Overview

The Department of Information Technology (DoIT) fiscal 2021 capital budget includes one project, the Public Safety Communications System project. This provides an integrated statewide public safety wireless communication system and a primary radio communication system for public safety first responders throughout the State. The system uses the Public Safety 700 megahertz (MHz) spectrum licensed to the State by the Federal Communications Commission. The program is also referred to as Maryland First Responders Interoperable Radio System Team (FiRST).

The State has a contract with Motorola to build and renovate infrastructure for this project. Once completed, this radio system will be the primary operating radio system for all State agencies, providing a communications platform for State agencies and allowing for seamless interoperability among State users and first responders at all levels of government. Interoperable communications is the ability for first responders to transmit voice and data communications in real time, regardless of agency or jurisdictional boundary. The system also supports local jurisdictions as primary users and federal partners as interoperability users
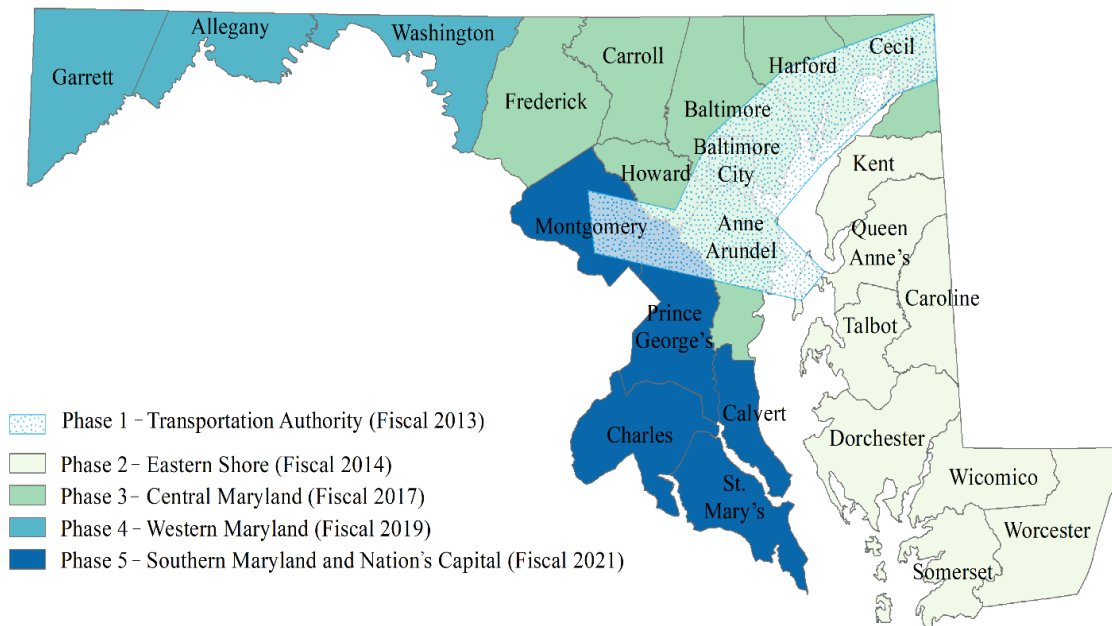
Exhibit 1 shows the construction schedule by phases. The phases are:

- phase 1 is the Maryland Transportation Authority and Baltimore City that became operational in fiscal 2013;

- phase 2 is the Eastern Shore that was deployed in fiscal 2013 and 2014;

- phase 3 is Central Maryland in which Baltimore, Carroll, Cecil, Frederick, and Harford counties became operational in fiscal 2016, while Anne Arundel and Howard counties became operational in fiscal 2017;

- phase 4 is Western Maryland in which Washington County became operational in December 2017, Allegany County in July 2018, and Garrett County in December 2018; and

- phase 5 is the nation's capital area and Southern Maryland, which is expected to be deployed December 2020 in Calvert, Charles, and St. Mary's counties and January 2021 in Montgomery and Prince George's counties.

Exhibit 1
Schedule for Implementing Maryland FiRST
Fiscal Years That Regions Become Operational

Phase 1 – Transportation Authority (Fiscal 2013)
Phase 2 – Eastern Shore (Fiscal 2014)
Phase 3 – Central Maryland (Fiscal 2017)
Phase 4 – Western Maryland (Fiscal 2019)
Phase 5 – Southern Maryland and Nation's Capital (Fiscal 2021)

FiRST: First Responders Interoperable Radio System Team

Source: Department of Information Technology

Out-year Authorizations for Coverage and Site Improvements

Once complete, the system's infrastructure will consist of a backbone of approximately 170 radio transmitter sites (that includes towers and shelters), radio equipment, fiber and microwave transport, and data communications equipment. The system is designed for on-street radio coverage, but in many areas also provides a level of in-building coverage. With phases 1-4 live and operational, DoIT is able to gather system radio coverage data across the majority of the State. The department has found some deficiencies in that coverage and the backend infrastructure that are addressed in the CIP.

In an effort to mitigate these deficiencies, DoIT recommends additional transmitter radio sites be added to the system in areas with demonstrable coverage gaps. DoIT is also looking at providing in-building coverage for schools and malls, particularly in the eight counties that use Maryland FiRST as their primary public safety communications system, to support a response to an active shooter situation. DoIT makes every attempt to utilize or build towers on State-owned properties to minimize the cost of purchasing or leasing real-estate. The costs to develop transmitter sites can vary substantially site by site, depending on the available assets and site geography. These variable costs include the costs to build the tower and shelter, remediate an existing tower, purchasing and installing equipment, and implementation of fiber and/or microwave backhaul.

Radio communications between users consists of both voice and data information. The 700 MHz system uses fiber and microwave backhaul to transmit voice and data between transmitter sites and often over large geographical distances. Due to limitations with fiber and microwave technologies, the 700 MHz system is designed to be robust with redundant links wherever possible to reduce the risk of a system interruption. DoIT has identified potential backhaul improvement opportunities that will further harden the system and provide additional redundancy. These can be realized through the use of new fiber installs, re-routing of existing connections and the addition of new microwave paths.

Convert Phases One to Four to Ethernet

The 700 MHz system vendor, Motorola, has announced that it will cease support of T-1 technology in 2022. While phase 5 of the system was designed using Ethernet technology, phases 1-4 were implemented using T-1 in an effort to leverage existing State assets. Though Motorola will continue to support T-1 technology on the Maryland FiRST system as currently configured, Maryland First will no longer be able to receive system upgrades after 2019. These system upgrades include updates software and hardware, security patches and bug fixes. As T-1 equipment ages, replacement equipment and support will not be available and the system will atrophy in place.

DoIT has initiated a plan with Motorola to convert phases 1-4 to Ethernet technology before the system reaches end of life support. Ethernet is the current radio industry standard for backhaul and provides capabilities that T-1 technology did not offer. Ethernet has the capability of carrying more data throughout the system as it has greater bandwidth than T-1. In addition, it provides greater resilience due to the nature of its routing capabilities.

2020 CIP Increases Proposed Authorizations

To address radio coverage gaps and the Ethernet conversion, the program was expanded in the 2019 CIP to include out-year funding phases 1 to 4 upgrades to Ethernet technology and system hardening. Funding increases in the 2020 CIP. **Exhibit 2** shows that $7.8 million has been added to the 2020 CIP for this project.

Exhibit 2
Public Safety Communications System Capital Costs
Added to the Capital Improvement Program
Fiscal 2021-2024
($ in Millions)

	2021	2022	2023	2024	Total
2019 CIP					
Towers and Backhaul[1]	$0.600	$5.000	$5.000	$3.000	$13.600
Ethernet Conversion	8.000	0.000	0.000	0.000	8.000
Subtotal	*$8.600*	*$5.000*	*$5.000*	*$3.000*	*$21.600*
2020 CIP					
Towers and Backhaul[1]	$1.613	$2.615	$2.850	$9.000	$16.078
Ethernet Conversion	8.000	2.685	2.650	0.000	13.335
Subtotal	*$9.613*	*$5,300*	*$5.500*	*$9.000*	*$29.413*
Difference	**$1.013**	**$0.300**	**$0.500**	**$6.000**	**$7.813**

CIP: *Capital Improvement Program*

[1] The 2019 CIP anticipated $600,000 in nonbudgeted funds. These funds are not available, so the 2020 CIP adds $600,000 in general obligation bond authorizations.

Source: 2020 *Capital Improvement Program*; Department of Information Technology

DoIT advises that the anticipated cost of upgrading to Ethernet technology is more than what was previously budgeted in the 2019 CIP. The Administration has also increased funding to add towers and improve backhaul. **Exhibit 3** shows that $5.3 million of the additional authorizations support Ethernet upgrades and $2.5 million for towers and backhaul. The 2020 CIP also adds $600,000 in general obligation bond authorizations. Nonbudgeted funds anticipated in the 2019 CIP are not available.

Exhibit 3
General Obligation Bond Authorization Changes from
2019 *Capital Improvement Program* to 2020 *Capital Improvement Program*
Fiscal 2021-2024
($ in Millions)

	2021	2022	2023	2024	Total
Additional Towers and Backhaul Hardening[1]	$1.013	-$2.385	-$2.150	$6.000	$2.478
Ethernet Conversion	0.000	2.685	2.650	0.000	5.335
Total	**$1.013**	**$0.300**	**$0.500**	**$6.000**	**$7.813**

[1] The 2019 CIP anticipated $600,000 in nonbudgeted funds. These funds are not available, so the 2020 CIP adds $600,000 in general obligation bond authorizations.

Sources: Department of Information Technology; Department of Budget and Management

Operating Budget Impact Statement

Executive's Operating Budget Impact Statement – State-owned Projects
Fiscal 2021-2025
($ in Millions)

		2021	2022	2023	2024	2025
Project Name						
	Estimated Operating Cost	$13.358	$14.807	$15,674	$16.231	$16.674
	Estimated Life Cycle Radio Equipment Replacement	0.000	1.000	1.000	2.000	4.000
Total Operating Impact						
	Estimated Operating Cost	**$13.358**	**$15.807**	**$16.674**	**$18.231**	**$20.674**
	Estimated Staffing	**8.00**	**8.00**	**8.00**	**8.00**	**8.00**

The fiscal 2021 allowance includes $13.6 million in operating costs for the Maryland FiRST radio program. The budget also includes 4 regular positions to operate the program. Costs shown in the table are incremental increases in addition to fiscal 2021 budgeted expenses. Cost increases are primarily attributable to inflation, expiring warranties,[1] and anticipated equipment replacement.[2] No additional staffing is anticipated.

Preauthorizations

Exhibit 4 shows that $5.3 million is provided in fiscal 2022 and 2023. Preauthorizations allow the project to move forward and the Board of Public Works to approve construction if the entire authorization is not provided in the budget year. In this case, the funds support additional costs associated with upgrading the T1 connectivity currently in place at many phase 1 to 4 sites with newer Ethernet technology.

Exhibit 4
Preauthorizations
Fiscal 2022-2025
($ in Millions)

Project	2022	2023	2024	2025	Reason
Public Safety Communications System	$2.650	$2.685	$0	$0	Funds are needed to complete Ethernet conversion that will be under contract before the funds are authorized in fiscal 2022 and 2023.

Source: Department of Budget and Management, 2020 *Capital Improvement Program*

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[1] There is a two-year warranty on the equipment. After two years, the State purchases service contracts, resulting in cost increases two years after the beginning of operations in an area.

[2] The notional lifecycle replacement schedule for digital subscriber unit radios is 7 to 8 years. However, due to the high cost of each unit, it is recommended that a 10- to 15-year replacement cycle be followed. The estimate begins to replace equipment in fiscal 2022.

GO Bond Recommended Actions

1. Approve $9,613,000 in general obligation bonds to continue construction of the statewide Public Safety Communications System. The authorization supports upgrading to Ethernet technology, adding towers, and improving backhaul.

2. Approve $2,685,000 in general obligation bonds for fiscal 2022 to continue construction of the statewide Public Safety Communications System. These funds continue the conversion to Ethernet technology.

3. Approve $2,650,000 in general obligation bonds for fiscal 2023 to continue construction of the statewide Public Safety Communications System. These funds continue the conversion to Ethernet technology.