Department of Information Technology – Capital

Capital Budget Summary

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

Projects	Prior Auth.	2023 Request	2024 Est.	2025 Est.	2026 Est.	2027 Est.	Beyond CIP
Public Safety Communications System	$364.789	$13.084	$9.000	$8.701	$5.500	$6.000	TBD
Total	**$364.789**	**$13.084**	**$9.000**	**$8.701**	**$5.500**	**$6.000**	**TBD**

Fund Source	Prior Auth.	2023 Request	2024 Est.	2025 Est.	2026 Est.	2027 Est.	Beyond CIP
GO Bonds	$243.863	$13.084	$9.000	$8.701	$5.500	$6.000	TBD
PAYGO GF	27.400	0.000	0.000	0.000	0.000	0.000	TBD
Nonbudgeted Funds[1]	93.526	0.000	0.000	0.000	0.000	0.000	TBD
Total	**$364.789**	**$13.084**	**$9.000**	**$8.701**	**$5.500**	**$6.000**	**TBD**

CIP: *Capital Improvement Program*
GF: general funds
GO: general obligation
PAYGO: pay-as-you-go

[1] State Highway Administration funds included in prior years shown as nonbudgeted funds.

GO Bond Recommended Actions

1. Approve $13,084,000 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.

Summary of Fiscal 2023 Funded State-owned Projects

Public Safety Communications System

The Department of Information Technology (DoIT) fiscal 2023 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 design, 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 seamless interoperability among 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.

Project Plan

This project was divided into five phases, as seen in **Exhibit 1**. The status of each phase is as follows:

- phase 1 is the Maryland Transportation Authority area of operation 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. The radio infrastructure has been built out and coverage testing has successfully completed. However, after conducting pre-deployment systems testing, DoIT advises that there are problems with the Ethernet backhaul. The backhaul network did not perform at a public safety grade level, so DoIT advises that the phase 5 area will not go live until the contractor has corrected the issues.

Exhibit 1
Schedule for Implementing Maryland FiRST
Fiscal Years That Regions Become Fully Operational
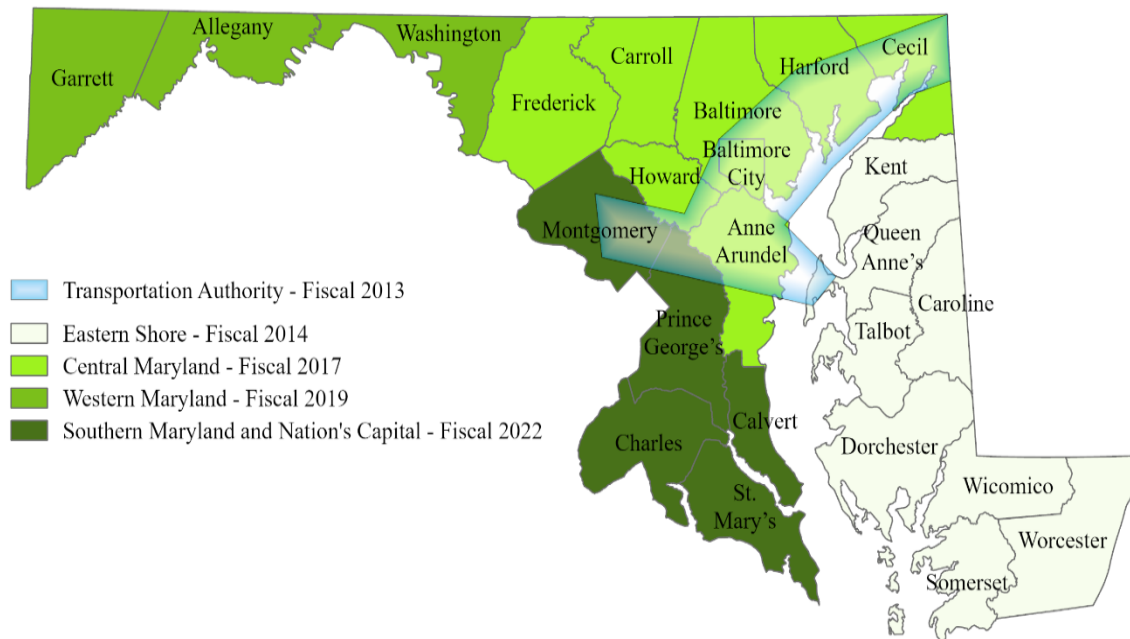
FiRST: First Responders Interoperable Radio System Team

Source: Department of Information Technology

Site Improvements Are Planned – Additional Towers and Backhaul

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. DoIT has gathered system radio coverage data across most of the State. The department has found some deficiencies in that coverage and the backend infrastructure that are addressed in the *Capital Improvement Program* (CIP).

Analysis of the FY 2023 Maryland Executive Budget, 2022

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 counties that use Maryland FiRST as their primary public safety communications system, to support a response to an active shooter situation.

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, rerouting of existing connections, and the addition of new microwave paths.

DoIT prepared a master plan that identified areas with poor coverage that could benefit from improvements. **Exhibit 2** shows planned radio sites. DoIT attempts to use 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 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, purchase and install equipment, and implementation of fiber and/or microwave backhaul. When preparing its master plan, the department prioritized locations based on the factors to maximize available funding. These key factors, in order of highest to lowest, are:

- locations where a State tower, equipment shelter, and backhaul communication equipment already exist;

- locations where a county or commercial tower exists; however, backhaul and/or equipment shelters may not be present;

- greenfield sites where there is no tower, equipment shelter, and existing backhaul; however, a partner may provide funding for a new tower; and

- greenfield sites where there is no tower, equipment shelter, and existing backhaul communication equipment and no outside funding is available.

Exhibit 2
Planned Radio Sites
Fiscal 2023-2027

Fiscal Year	County	Site Name or Identifier
2023	Carroll	Harvey Gummel
2023	Washington	Greenbriar State Park
2024	Garrett	New Germany State Park (East)
2024	Montgomery	Elmer School
2024	Montgomery	Fire Station 30
2024	Howard	Patapsco State Park
2024	Anne Arundel	Harwood
2025	Queen Anne's	Queenstown US 50/301
2025	Allegany	Barton
2025	Garrett	New Germany State Park (West)
2026	Montgomery	Silver Spring
2026	Allegany	Bretton Wood
2026	Garrett	Accident
2027	Charles or St. Mary's	Border Area
2027	Prince George's	Ourisman
2027	Allegany	Flintstone
N/A	Dorchester or Somerset	Bishop's Head

Source: Department of Information Technology

Convert Phases 1 to 4 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 through 4 were implemented using T-1 technology in an effort to leverage existing State assets and contain project costs. Though Motorola continues to support T-1 technology on the Maryland FiRST system as currently configured, beginning in 2022, Maryland FiRST will no longer be able to receive system upgrades. These upgrades include updates to software and hardware, security patches, and bug fixes. As T-1 equipment ages and replacement equipment and support are not available, the system would atrophy in place if not upgraded.

DoIT has initiated a plan with Motorola to convert phases 1 to 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.

Additional Costs Attributable to Conversion to Ethernet

Exhibit 3 shows that the entire increase to the CIP is due to higher costs for the Ethernet conversion.

Exhibit 3
**Public Safety Communications System Capital Costs**
Fiscal 2023-2026
($ in Millions)

	2023	2024	2025	2026	Total
2021 CIP Towers and Backhaul	$2.850	$9.000	$8.701	$5.500	$26.051
2021 CIP Ethernet Conversion	2.650	0.000	0.000	0.000	2.650
2021 CIP Subtotal	*$5.500*	*$9.000*	*$8.701*	*$5.500*	*$28.701*
2022 CIP Towers and Backhaul	$2.850	$9.000	$8.701	$5.500	$26.051
2022 CIP Ethernet Conversion	10.234	0.000	0.000	0.000	10.234
2022 CIP Subtotal	*$13.084*	*$9.000*	*$8.701*	*$5.500*	*$36.285*
Difference	**$7.584**	**$0.000**	**$0.000**	**$0.000**	**$7.584**

CIP: *Capital Improvement Program*

Source: Department of Information Technology

DoIT advises that the cost of the Ethernet conversion is now more than previously estimated. **Exhibit 4** shows that an additional $7.6 million is needed to complete the Ethernet conversion, bringing the total cost to $29 million. During testing of the phase 5 Ethernet backhaul, the network did not perform at a public safety grade level. One concern is that as Motorola worked through the issues, new problems materialized. DoIT advises that these problems will have an impact on the phases 1 to 4 Ethernet conversion and that the cost of the conversion will be higher than previously estimated. DoIT has expressed concerns about the network design. Motorola is developing options to address deficiencies, but at this point, it is unclear what the solutions will be.

Exhibit 4
T-1 to Ethernet Cost Increases
Fiscal 2020-2023
($ in Millions)
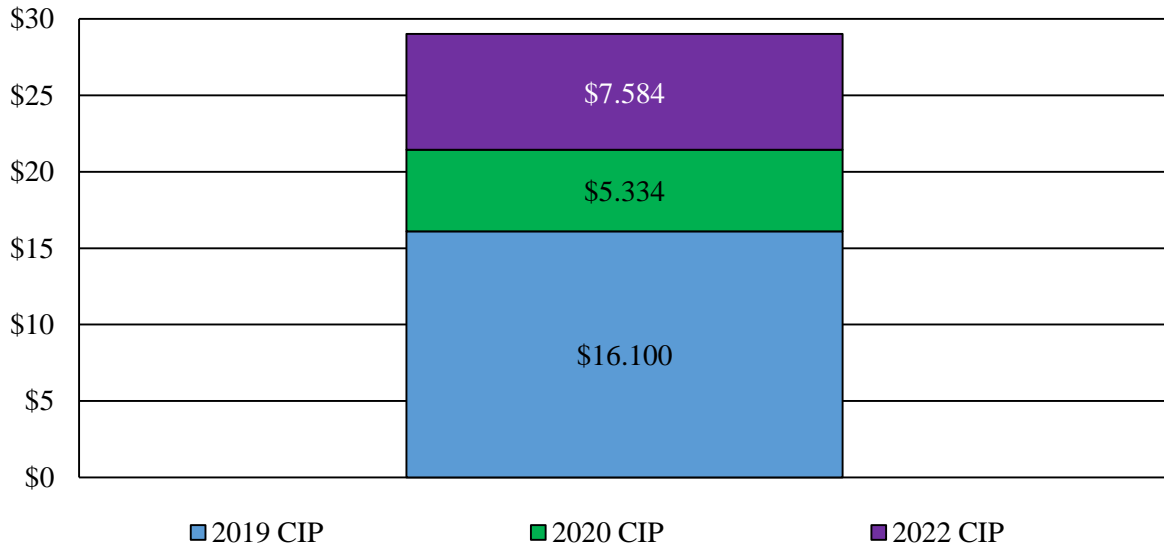
CIP: *Capital Improvement Program*

Source: Department of Information Technology

To provide effective executive direction for Maryland FiRST, the Statewide Interoperability Radio Control Board was created by Chapter 117 of 2014. The board is chaired by the Secretary of Information Technology and includes five *ex officio* members from State agencies and five members appointed by the Governor from local government. The board holds quarterly meetings to discuss efficiency measures such as call volume, number and duration of busy calls, and maintenance issues. The data suggest that the system is working highly efficiently. The system processes two million to three million calls monthly, and it is uncommon for the total time of busy calls in a month to exceed three seconds. Although three seconds could be vital in some emergencies, less than three seconds of busy time in a month does not seem to be excessive. The data presented at the board meetings suggest that T-1 technology, which supports all phases that are currently operating, is highly effective.

The State is in a unique situation as substantial funding is available to improve capital assets. It is unfortunate for this program that additional funds are needed to supplement the Ethernet conversion instead of addressing needs like purchasing bi-directional amplifiers to improve service in buildings. DoIT is encouraged to keep Ethernet costs down so that this authorization can also be used to support improving Maryland FiRST. **DoIT should be prepared to brief the committees on how it will keep costs down and manage the Ethernet conversion contract.**

Operating Budget Impact Statement

Executive's Operating Budget Impact Statement – State-owned Projects
Fiscal 2023-2027
($ in Millions)

	2023	2024	2025	2026	2027
Public Safety Communications System					
Estimated Operating Cost	$14.863	$16.518	$18.738	$20.051	$20.599
Estimated Staffing	7.0	7.0	7.0	7.0	7.0

The fiscal 2023 allowance includes $14.9 million in operating costs for the Maryland FiRST radio program. The budget also includes 7 regular positions to operate the program. Cost increases are primarily attributable to expiring warranties. Costs for contracts total $13.7 million, which is 92% of the operating budget. No additional staffing is anticipated.

State agencies using the system are charged the radio program's operating expenses, but non-State organizations are not charged. The State is encouraging non-State agencies to use the system and is concerned that charging them would discourage use. Hence, operations are funded through reimbursable funds from State agencies. These charges are based on the number of subscriber radios that each agency has registered on the system with agencies that have more radios registered being charged more. Additional costs related to replacing equipment will be borne by the agencies and will be appropriated in the agencies' budgets.