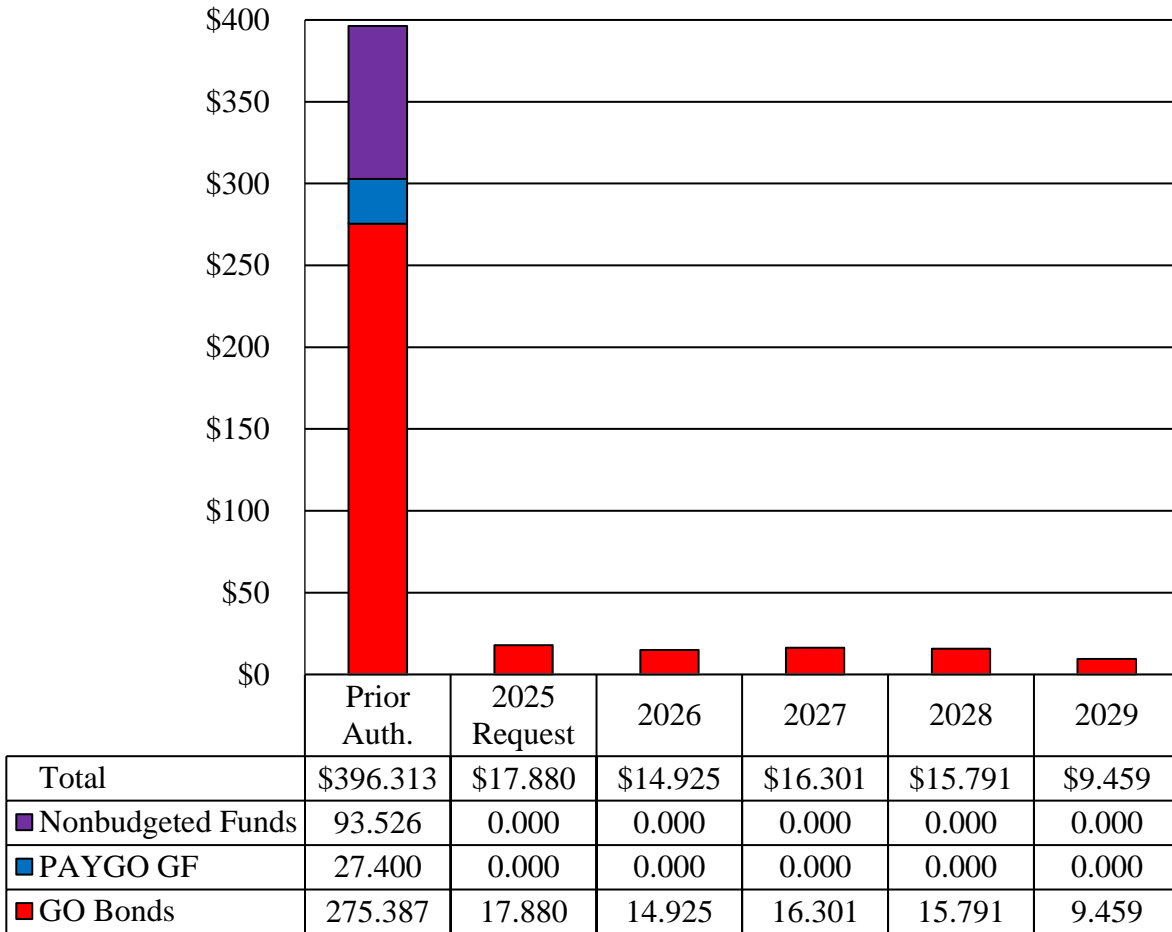


FB04
Department of Information Technology – Capital

Capital Budget Summary

State-owned *Capital Improvement Program*
Maryland First Responders Interoperable Radio System Team
(\$ in Millions)



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

Key Observations

- ***MD First Responders Interoperable Radio System Team (MD FiRST) Infrastructure Regional Build Completed, Focus Shifts to Correct Deficiencies:*** The original infrastructure build of the 700-megahertz (MHz) radio communication system is complete and operational as of April 2023. MD FiRST has identified deficiencies in the existing emergency communications systems. Four new subprograms started in fiscal 2024 to fill the gaps by providing additional functionality to system users and improving system operability, resilience, and performance. The new planned features include additional radio sites, installation of in-building antenna systems, redundant control sites, and an expansion of fiber optic to replace microwave transmission. These features are discussed in detail later in the analysis.
- ***New Maintenance Contract Request for Proposals:*** The current project maintenance contract with Motorola is expiring in November 2025. The Department of Information Technology (DoIT) notes that the request for proposals (RFP) has been drafted and has started the process to engage a technical writer to finalize the RFP for issuance. The RFP is comprised of nine independent Functional Areas (FA) in which a bidder may choose to bid on a singular FA, multiple FAs, or all FAs. The RFP is planned for issuance in May 2024, and the awarded bidder(s) will begin work in November 2025.

GO Bond Recommended Actions

1. Approve \$17,880,000 in general obligation bonds to continue construction of the statewide Maryland First Responders Interoperable Radio System Team (FiRST). The authorization supports adding tower, in-building amplifiers, redundant control sites, and fiber optic network.

Summary of Fiscal 2025 Funded State-owned Projects

Maryland First Responders Interoperable Radio System Team

The DoIT fiscal 2025 capital budget includes one project, the MD FiRST project. This provides an interoperable statewide public safety radio communications system for public safety first responders throughout the State. The system uses the Public Safety 700 MHz spectrum licensed to the State by the Federal Communications Commission. MD FiRST was previously referred to as the Public Safety Communications System.

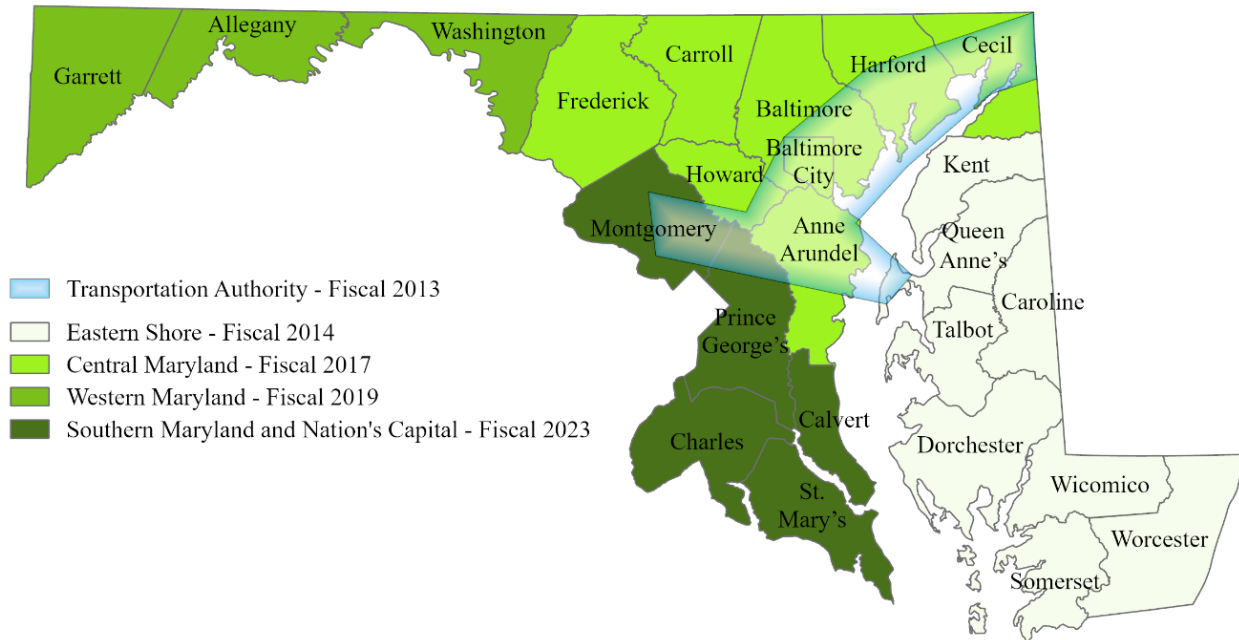
MD FiRST provides the primary operating radio system for all State agencies providing a communications platform for State agencies and seamless interoperability among users and first responders at all levels of government. Interoperable communication is the ability for first responders to transmit voice and data communications in real time, regardless of agency or jurisdictional boundary. The system also supports local jurisdictions as primary and interoperability users and Maryland jurisdictions, jurisdictions from neighboring states, and federal partners as interoperability users. The backbone of the project initiated in calendar 2010. Upon completion, the infrastructure consists of a communication backbone of approximately 170 radio sites that include communication towers, equipment shelters, radio equipment, and data communication equipment. According to DoIT, the system currently supports approximately 30,000 primary users and 85,000 interoperability users as of January 2024.

Initial Project Buildout Plan Complete

This project was divided into five phases with counties grouped geographically within a given phase, as seen in **Exhibit 1**. All phases of the project have been completed and are operational.

- 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, which became operational in April 2023.

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

Ethernet Conversion Update

The 700 MHz system vendor no longer supports the T-1 technology. While phase 5 of the system was designed using Ethernet technology, phases 1 through 4 were implemented using T-1 technology to leverage existing State assets and contain project costs. An upgrade to Ethernet is required because 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.

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.

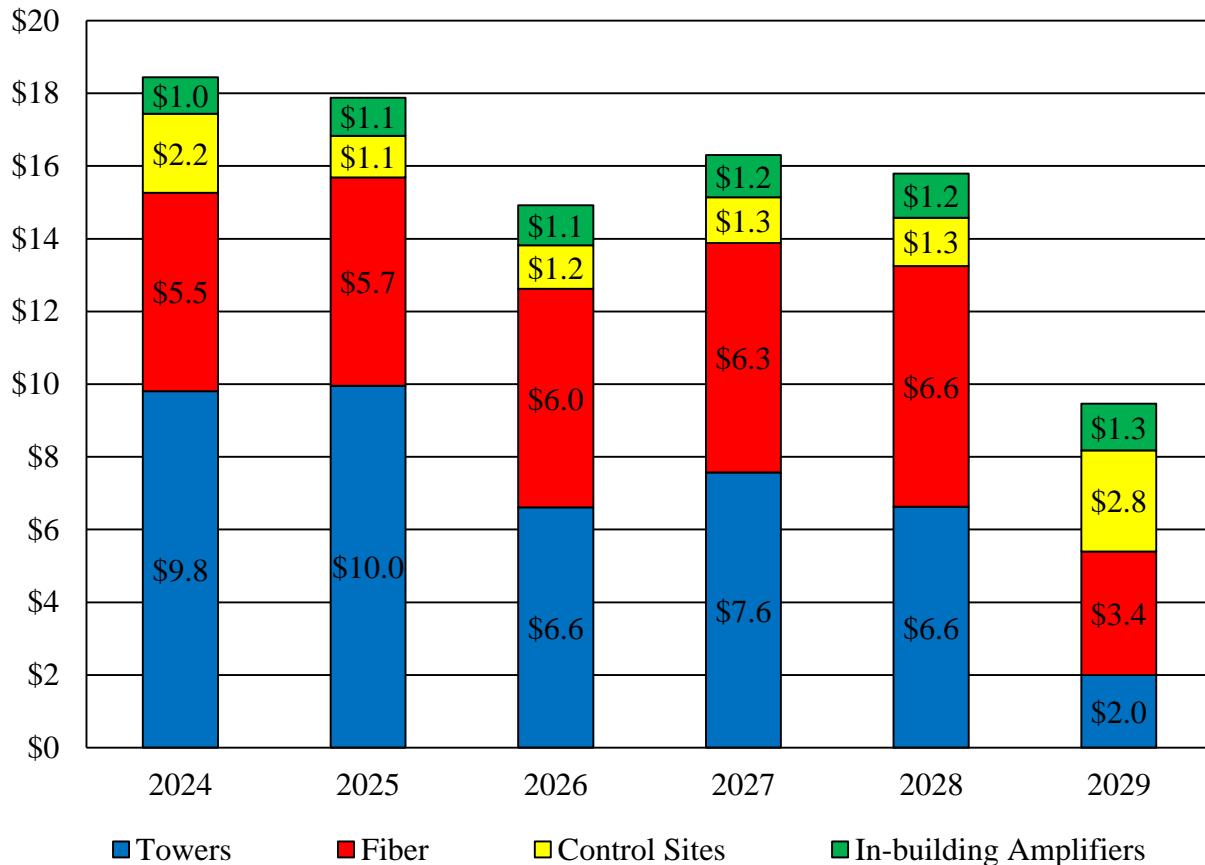
DoIT initiated a plan with Motorola to convert phases 1 to 4 to Ethernet technology before the system reaches end of life support. T-1 to Ethernet design was completed in April 2023. The equipment inspections were completed in November 2023, and the site installation and implementation work are underway. The funds needed to complete T-1 Ethernet conversion have already been authorized in prior capital budget bills. The project is on track to be completed in September 2025.

MD FiRST Focus Shifts to Filling Gaps

The infrastructure build of the 700 MHz radio communication system is complete and operational as of April 2023. MD FiRST has identified three deficiencies in the existing emergency communications systems: (1) the lack of interoperability between State, local, and federal agencies; (2) poor coverage in certain geographic areas; and (3) the expense of maintaining multiple, incompatible radio systems. The identification of gaps has now shifted the program's focus to construct improvements to meet current and future requirements of the State. Four new subprograms started in fiscal 2024 to provide additional functionality to system users and improve system operability, resilience, and performance. The new planned features include additional radio sites, installation of in-building antenna systems, redundant control sites, and an expansion of fiber optic to replace microwave transmission.

Ethernet conversion is an ongoing subprogram and is fully funded. **Exhibit 2** shows new planned features to fill the gaps in the existing emergency communication system and their estimated costs for coverage and site improvements from fiscal 2024 to 2029. The estimated costs total \$92.8 million through the end of fiscal 2029. This is consistent with the estimate presented last year. Fiscal 2029 costs for redundant control sites are approximately \$1.5 million higher than in previous years because those costs include two additional prime sites as compared to one additional prime site.

Exhibit 2
MD FiRST Capital Costs
Fiscal 2024-2029
(\$ in Millions)



MD FiRST: First Responders Interoperable Radio System Team

Source: 2024 *Capital Improvement Program*

Planned Radio Sites to Improve Coverage

The system’s infrastructure consists of a communication 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 also provides a level of in-building coverage in many areas. 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).

To mitigate these deficiencies, DoIT is adding additional transmitter radio sites to the system in areas with demonstrable coverage gaps. DoIT prepared a master plan that identified areas with poor coverage that could benefit from improvements. This objective was allocated \$9.8 million in fiscal 2024 and would receive an additional \$10 million in fiscal 2025 and a total of \$32.8 million from fiscal 2025 through 2029. **Exhibit 3** shows planned radio sites for fiscal 2024 with funding already approved and the planned radio sites for fiscal 2025 through 2029 that will require funding.

**Exhibit 3
Planned Radio Sites
Fiscal 2024-2029**

<u>Fiscal Year</u>	<u>County</u>	<u>Site Name or Identifier</u>	<u>Site Status</u>
2024	Garrett	Oakland	Existing
2024	Allegany	Cumberland	Greenfield
2024	Howard/Baltimore	Patapsco SP	Greenfield
2024	Queen Anne’s	Queenstown	Greenfield
2025	Montgomery	Fire Station 30	Existing
2025	Allegany	Barton Valley	Greenfield
2025	Garrett	New Germany SP-E	Greenfield
2025	Talbot	St Michaels	To Be Determined
2026	Montgomery	Bretton Woods	Existing
2026	Montgomery	Burtonsville	Existing
2026	Garrett	Accident	Existing
2027*	Prince George’s	Ourismann	Existing
2027*	Carroll	Harvey Gummel	Existing
2027*	Garrett	New Germany SP-W	Greenfield
2028*	Allegany	Flinstone	Existing
2028*	Charles	Charles	To Be Determined
		(To Be Determined)	
2028*	St Mary’s	St Mary’s	To Be Determined
		(To Be Determined)	
2028*	Dorchester	Dorchester	To Be Determined
2029*	Montgomery	Elmer School Road	To Be Determined

*Sites are subject to change pending further site investigation activities.

Note: Funding for fiscal 2024 sites is already approved. A greenfield site is a site where a new tower must be built.

Source: *Maryland Public Communication System Capital Master Plan*, June 2023

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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.

Fiber Optic Expansion

MD FiRST uses fiber and microwave backhaul to transmit voice and data between transmitter sites and often over large geographical distances. The backhaul network was constructed using existing State microwave and fiber assets wherever possible. While microwave is a reliable means of data transportation, there are opportunities to expand the use of fiber optics to supplement or replace the reliance upon microwave. This mitigates performance issues during weather conditions like storms and extreme heat. DoIT is using revenues from resource sharing agreements to improve the existing backhaul network. The capital program supports large-scale improvements costing more than \$1 million. Dark fiber included in these runs could also benefit and support rural broadband initiatives.

The expansion of the fiber optic infrastructure was allocated \$5.5 million in fiscal 2024 and would receive an additional \$5.7 million in fiscal 2025 and a total of \$28.1 million from fiscal 2025 through 2029. The fiscal 2025 budget includes four fiber projects including Sudlersville to Massey to Galena (estimated at \$1.98 million), Carole Highlands (By-Pass) (estimated at \$610,000), Kent 911 to Still Pond (estimated at \$2.64 million), and fiber connecting the Mt. Savage Tower Site (estimated at \$500,000). There are a total of 12 projects planned from fiscal 2026 to 2029.

Georedundant Prime/Control Sites

Maryland FiRST radio towers are grouped into 22 geographical areas, usually within a county, to form a connected cell. Each cell has a prime site that controls and manages information while connecting that cell to the rest of the network. Adding a second and geographically located prime/control site within each cell provides redundancy in the event the primary controlling site is disabled due to planned or unplanned events. This reduces the risk of a large-scale radio coverage outage.

This objective was allocated \$2.2 million in fiscal 2024. The CIP programs an additional \$4.9 million for fiscal 2025 to 2028 to add one georedundant prime each year and \$2.8 million to add two georedundant primes in fiscal 2029. The order for adding them is prioritized by (1) the number of users affected should the simulcast cell go down and other considerations such as location of the seat-of-government; (2) the amount of coverage (or lack thereof) a simulcast cell area has from the surrounding cells and independent radio towers not tied to a cell (for example, counties that are located in the corners of the State have little to no beneficial coverage from surrounding sites); and (3) counties that are primary users since they do not have another radio system. Based on these priorities, DoIT proposes the following schedule from fiscal 2025 to 2029:

- \$1.15 million for the Anne Arundel County simulcast cell;
- \$1.2 million for the Cecil County simulcast cell;
- \$1.26 million for the Garrett County simulcast cell;
- \$1.33 million for the Allegar (partial Allegany County and partial Garrett County) simulcast cell; and
- \$1.39 million each for simulcast cells in Worcester/Somerset County and Montgomery County.

In-building Antennas

The system was designed for on-street coverage. As the system has been implemented, MD FiRST has identified areas with in-build coverage gaps. The use of adjunct technology, such as bi-directional amplifiers (BDA), may be used to supplement radio coverage in buildings and within smaller and discrete geographic areas to improve on-street and inbuilding coverage. Adding BDAs can be cost-effective solutions that reduce coverage gaps and enhance radio coverage in schools, State parks, tunnels, and critical infrastructure like hospitals and government buildings. This project element was allocated \$1.0 million in fiscal 2024 and would receive an additional \$1.1 million in fiscal 2025 and a total of \$5.8 million from fiscal 2025 through 2029.

Appendix 1
Executive’s Operating Budget Impact Statement – State-owned Projects
Fiscal 2025-2029
(\$ in Millions)

	2025	2026	2027	2028	2029
Maryland First Responders Interoperable Radio System Team					
Estimated Operating Cost	\$17.581	\$19.150	\$20.699	\$21.169	\$21.643
Estimated Staffing	9.0	9.0	9.0	9.0	9.0

The fiscal 2025 allowance includes \$17.6 million in operating costs for the MD FiRST radio program. The budget also includes 7 regular positions and 2 contractual full-time equivalents converted into regular positions in the fiscal 2025 allowance to operate the program. Cost increases are primarily attributable to expiring warranties and contractual increases. Costs for contracts total \$16 million, which is 91.1% of the operating budget. DoIT notes that staffing requirements may be reassessed upon completion of the conversion from T-1 to Ethernet.

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 subscriber radio equipment will be borne by the agencies and will be appropriated in the agencies’ budgets.