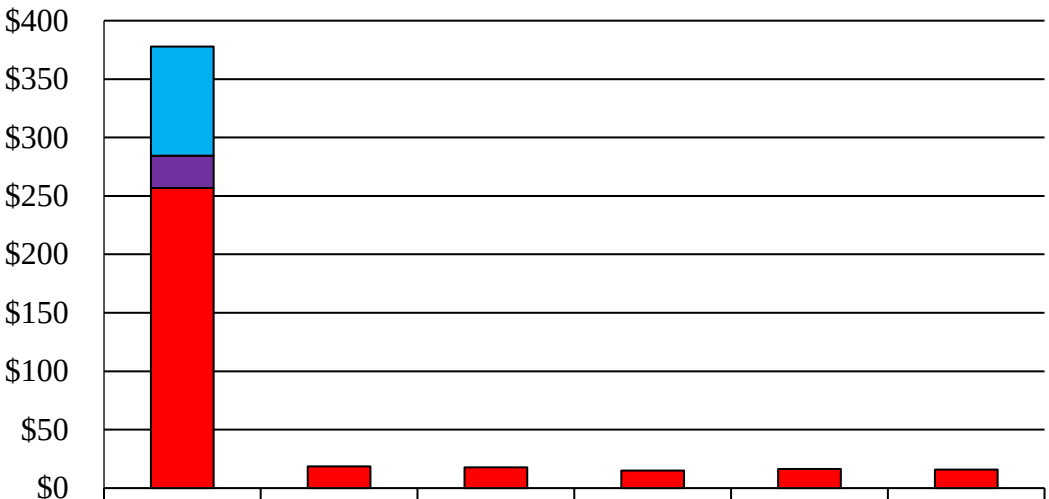
FB04
Department of Information Technology

Capital Budget Summary

State-owned *Capital Improvement Program*
Public Safety Communications System
($ in Millions)



	Prior Auth.	2024 Request	2025	2026	2027	2028
Total	$377.873	$18.440	$17.880	$14.925	$16.301	$15.791
Nonbudgeted Funds	93.526	0.000	0.000	0.000	0.000	0.000
PAYGO GF	27.400	0.000	0.000	0.000	0.000	0.000
GO Bonds	256.947	18.440	17.880	14.925	16.301	15.791

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

Key Observations

- ***Programmed Funding Levels Increase:*** The *Capital Improvement Program* (CIP) increases funding for this project by $9.4 million in fiscal 2024 and by $28.9 million from fiscal 2025 to 2027. These additional funds support expanding the scope by adding geo-redundant prime/control sites, in-building antenna amplifiers, and fiber to improve backhaul.

For further information contact: Patrick S. Frank Patrick.Frank@mlis.state.md.us

GO Bond Recommended Actions

1. Concur with the Governor's authorization.

Summary of Fiscal 2024 Funded State-owned Projects

Public Safety Communications System

The Department of Information Technology (DoIT) fiscal 2024 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 and interoperability users and Maryland jurisdictions, jurisdictions from neighboring states, and federal partners as interoperability users. From September to November 2022, the system supported approximately 29,000 primary users and 54,500 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;

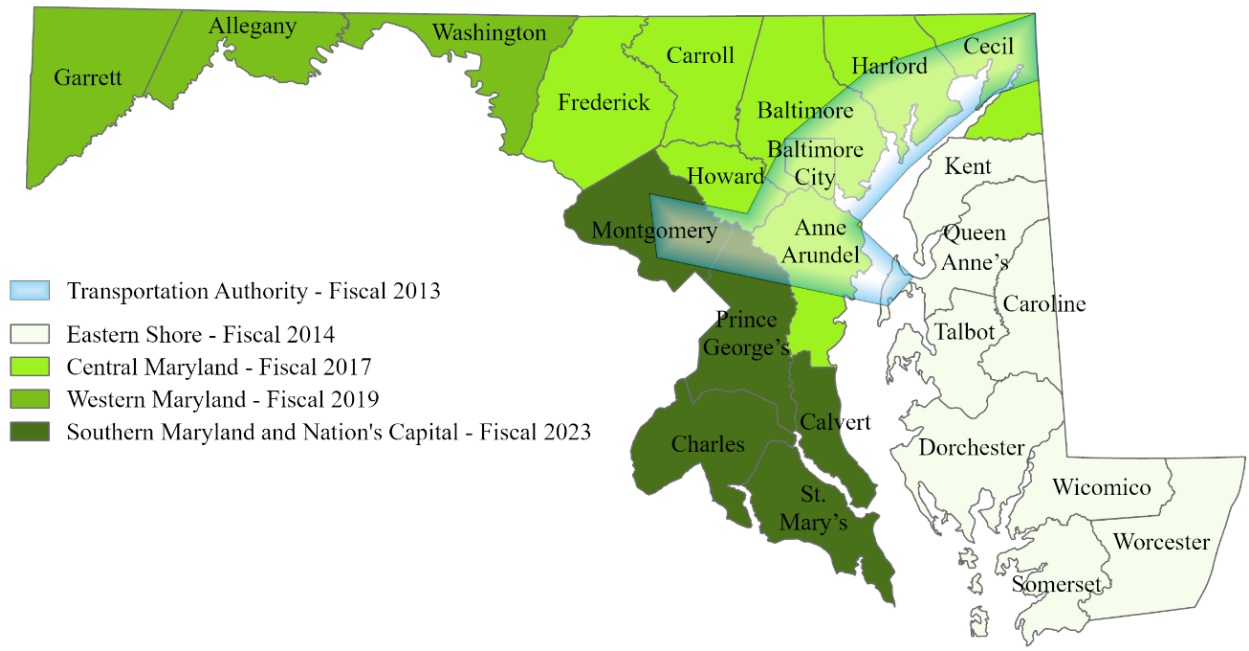
- phase 4 is Western Maryland in which Washington County became operational in December 2017, Allegany County in July 2018, and Garrett County in December 2018; and

- phase 5 is the nation's capital area and Southern Maryland. The radio infrastructure was built out and coverage testing was successfully completed in calendar 2021. However, after conducting predeployment systems testing, DoIT advised that there were problems with the Ethernet backhaul so that the backhaul network did not perform at a public safety grade level. The initial Ethernet solution for Phase 5 implemented by Motorola required a redesign, which has been completed. The equipment was ordered but deliveries were delayed due to supply chain issues. DoIT advises that this phase is scheduled to go live 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, Motorola, has announced that it will cease support of 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.

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. These funds have been authorized in prior capital budget bills. Design is expected to be completed in fiscal 2023 with implementation in fiscal 2024.

Planned Radio Sites to Improve Coverage

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 CIP.

To mitigate these deficiencies, DoIT recommends additional transmitter radio sites be added 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. **Exhibit 2** shows planned radio sites. Beyond fiscal 2026, additional sites and areas have been identified. However, until phase 5 is live and DoIT gets actual data, it is unclear what the precise coverage is in Southern Maryland or the counties by the nation's capital.

Exhibit 2
Planned Radio Sites
Fiscal 2024-2026

Fiscal Year	County	Site Name or Identifier	Site Status
2024	Allegany	Cumberland	Greenfield
2024	Montgomery	Elmer School	Existing
2024	Queen Anne's	Queenstown	Greenfield
2024	Howard	Patapsco State Park	Greenfield
2025	Montgomery	Fire Station 30	Existing
2025	Allegany	Barton	Greenfield
2025	Garrett	New Germany State Park (West)	Greenfield
2025	Talbot	St. Michael's	To be determined
2026	Montgomery	Bretton Woods	Existing
2026	Garrett	Accident	Existing
2026	Montgomery	Burtonsville	Existing

Note: A greenfield site is a site where there is no tower and a new tower must be built.

Source: *Draft Maryland Public Communication System Capital Master Plan*, July 2022

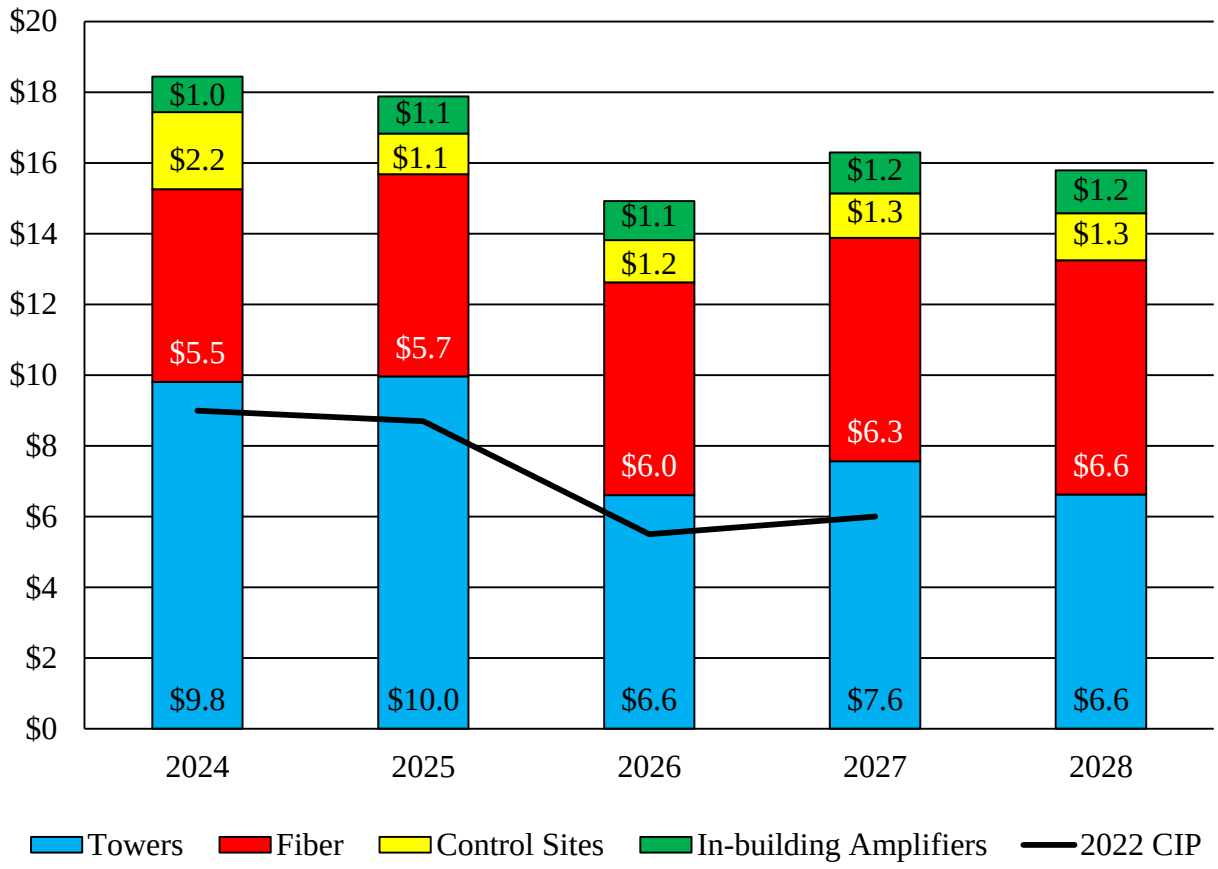
DoIT attempts to use or build towers on State-owned properties to minimize the cost of purchasing or leasing real estate. The costs to develop transmitter sites can vary substantially by site, depending on the available assets and site geography. These variable costs include the costs to build the tower 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.

CIP Increases Funding for Maryland FiRST

Exhibit 3 shows that funding for this project is increased in the 2023 CIP by $38 million from fiscal 2024 through 2027. The project's scope has been expanded to include fiber, geo-redundant prime/control sites, and in-building antenna amplifiers. The 2023 CIP programs the funds for these improvements. DoIT had identified and requested these enhancements in prior years, so the Department of Legislative Services was aware of this request.

Exhibit 3
Comparing 2022 and 2023 CIP Spending
Fiscal 2024-2028
($ in Millions)



CIP: *Capital Improvement Program*

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

Fiber Optic Expansion

Maryland 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 NetworkMaryland and other networks, including rural broadband.

The CIP added $30.1 million from fiscal 2024 to 2028 to expand fiber optic infrastructure. Examples of projects to be funded include a new fiber path from Bucktown to Vienna (estimated at $1.9 million) and from Federalsburg to Salisbury (estimated at $4.5 million), which addresses a known network chokepoint and system vulnerability on the Eastern Shore.

Geo-redundant 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 manage 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.

The CIP now includes $7.1 million from fiscal 2024 to 2028 to add one geo-redundant prime each year. The long-term plan is to complete simulcast cells in about 12 of the 22 areas. 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:

- $2.18 million for the Baltimore simulcast cell (both city and county), which has twice the number of channels as other cells and is thus more expensive;
- $1.15 million for the Anne Arundel simulcast cell;
- $1.2 million for the Garrett simulcast cell;
- $1.26 million for the Cecil simulcast cell; and

- $1.33 million for the Allegar (partial Allegany County and partial Garrett County) simulcast cell.

In-building Antennas

The system was designed for on-street coverage. As the system has been implemented, Maryland 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. The CIP now includes $5.5 million from fiscal 2024 to 2028 to add BDAs.

System Maintenance to Avoid Preventable Early Replacement Costs

The State has spent almost $400 million to build a Statewide radio system supported by the latest technology. This has been a substantial investment in hardware and software. This section discusses efforts to avoid preventable early replacement costs.

Keeping Radio Technology Current

So that the radio technology does not become obsolete and reduce the need to conduct an expensive overhaul to update the technology in the next 15 or 20 years, the State has a maintenance contract with Motorola, the system's vendor. This includes a System Upgrade Assurance program that conducts system upgrades every two years.

Maintaining Radio Tower Sites

Sites that include towers and shelters with an HVAC system and a liquified petroleum gas system, need to be maintained. The system uses tower sites owned by the State, federal, and local agencies, as well as private companies. Each owner is responsible for maintaining their sites. For State sites, the owning agencies have their own protocols for maintaining sites and are responsible for maintaining them.

DoIT has responsibility for maintaining eight shelters and two towers. The department has contracts to perform inspections and preventive maintenance. Shelters get annual structural inspections to examine (1) roofs for cracks, tears, and punctures; (2) external walls for cracks, joint separation and caulk failure; (3) interior walls and ceiling for moisture or cracks; (4) floor for moisture, cracks, and warping; (5) visual check or internal wiring and ground connections; and (6) visual check of the foundation for cracks. Generators get a quarterly inspection that includes the charging system, automatic transfer switch, and engine coolant system; and annual preventive maintenance, which includes an oil change. HVAC systems get semiannual maintenance that includes cleaning filters and checking refrigerant levels.

Towers get an annual inspection. The inspection crew climbs the tower to check for rust, loose bolts, and mounting and secureness of equipment like antennas or microwave dishes. There is also a visual inspection of the foundation for cracks and electrical ground connections.

Appendix 1
Executive's Operating Budget Impact Statement – State-owned Projects
Fiscal 2024-2028
($ in Millions)

		2024	2025	2026	2027	2028
Public Safety Communications System						
	Estimated Operating Cost	$15.780	$17.289	$19.102	$20.657	$21.122
	Estimated Staffing	7.0	7.0	7.0	7.0	7.0

The fiscal 2024 allowance includes $15.8 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 $14.5 million, which is 92% of the operating budget. As the system is built out, more staff may be needed. Staffing may be reassessed after phase 5 is operational.

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.