Mead & Hunt

ITE Mid-Colonial District 2025 Annual Meeting

Baltimore City Signal System Management

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MID-COLONIAL DISTRICT

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Outline

- Scenario Planning
- Case Study #1 Baltimore City
- Case Study #2 Anne Arundel County
- Case Study #3 Transit Signal Priority
- Case Study #4 City of Annapolis
- Future Forces

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Performance Measures

Increase in Overall Travel Time Reliability in South Baltimore

- Morning Rush Hour: **3%** increase in reliability
- Midday Rush Hour: **8%** increase in reliability
- Afternoon Rush Hour: **12%** increase in reliability

DOWNTOWN

- Added LPIs: **168 signals**
- Increased Avg. Crossing Time by **3 Seconds**
- Additional Cycles due to Shorter Cycle Lengths: **65%** increase in cycles per day

SOUTH BALTIMORE

- Added LPIs: **50 signals**
- Increased Crossing Time by **13%**
- Additional Cycles due to Shorter Cycle Lengths: **12%** increase in cycles

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Technology

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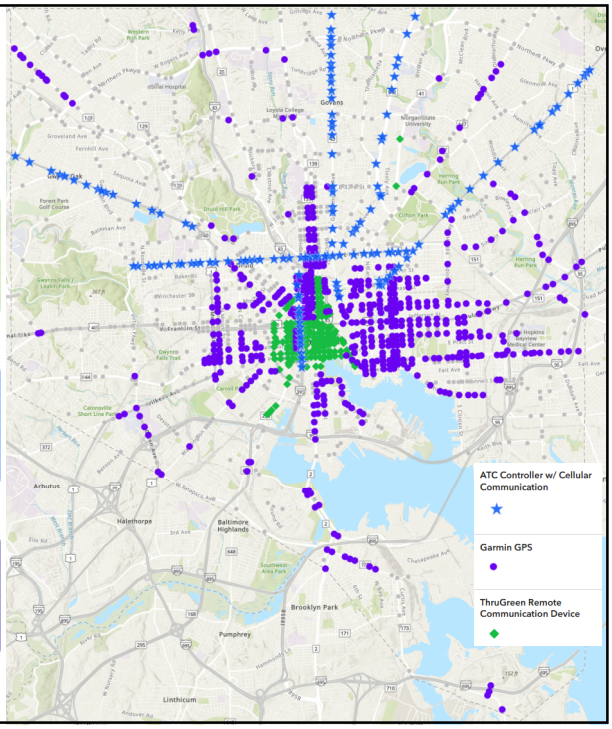
Software

- 150 ThruGreen ATMS
- 140 TSP Cubic ATMS
- 520 GPS for Clock Sync



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Cubic ATMS.NOW

- A platform to manage, not just to monitor the system

Maintain signal communication; maintain coordination operations; check alarms, timing adjustments,..

Controller List

Setup | Preview | Print | Export | Reset Column Order

Alar	Statu	ID	Name	Not	Doc	Drop	Port	Flex Group	Type	IP Address	Free	Coord Stat	Pattern	TBC	Local Counter	Cycle	Seq	Prog Split 1	Prog Split 2	Prog Split 3	Prog Split 4	Last Date/Time
		1367	GAY & BIDDLE & BROADWAY			94	E-NET-5094	Belair	NTCIP 76.x ATC Ethernet	010.200.000.09	COORD	SYNC	6 PM	107	60	110	1	11	55	0	44	9/4/2020 3:27 P
		1405	BELAIR & PARKMONT			114	E-NET-5114	Belair	NTCIP 76.x ATC Ethernet	010.200.000.11	COORD	SYNC	6 PM	69	40	110	1	0	76	0	34	9/4/2020 3:27 P
		1505	LIBERTY HEIGHTS & MONDAW			120	E-NET-5120	Liberty Heights	NTCIP 76.x ATC Ethernet	010.200.000.12	COORD	SYNC	6 PM	59	53	120	1	0	88	0	32	9/4/2020 3:27 P
		1529	YORK & GLENWOOD			28	E-NET-5028	Greenmount/York	NTCIP 76.x ATC Ethernet	010.200.000.01	COORD	SYNC	6 PM	68	65	110	1	0	78	0	32	9/4/2020 3:27 P
		1602	NORTH & ACCESS			78	E-NET-5078	North	NTCIP 76.x ATC Ethernet	010.200.000.07	COORD	SYNC	6 PM	119	19	150	1	0	80	30	40	9/4/2020 3:27 P
		1659	LIBERTY HEIGHTS & AYRDALE			127	E-NET-5127	Liberty Heights	NTCIP 76.x ATC Ethernet	010.200.000.12	COORD	SYNC	6 PM	59	24	120	1	0	89	0	31	9/4/2020 3:27 P
		1663	BELAIR & BIRITE			113	E-NET-5113	Belair	NTCIP 76.x ATC Ethernet	010.200.000.11	COORD	SYNC	6 PM	70	44	110	1	0	83	0	27	9/4/2020 3:27 P
		1669	LIBERTY HEIGHTS & BERWYN &			129	E-NET-5129	Liberty Heights	NTCIP 76.x ATC Ethernet	010.200.000.12	COORD	LONG -8	6 PM	40	12	120	1	0	86	0	34	9/4/2020 3:27 P
		1703	NORTH & BOND			88	E-NET-5088	North	NTCIP 76.x ATC Ethernet	010.200.000.08	COORD	SYNC	6 PM	69	109	110	1	0	80	0	30	9/4/2020 3:27 P
		1727	YORK & NOTRE DAME			27	E-NET-5027	Greenmount/York	NTCIP 76.x ATC Ethernet	010.200.000.01	COORD	SYNC	6 PM	71	91	110	1	0	79	0	31	9/4/2020 3:27 P
		1732	NORTH & CHESTER			92	E-NET-5092	North	NTCIP 76.x ATC Ethernet	010.200.000.08	COORD	SYNC	6 PM	71	64	110	1	0	73	0	33	9/4/2020 3:27 P
		1744	LIBERTY HEIGHTS & MONDAW			121	E-NET-5121	Liberty Heights	NTCIP 76.x ATC Ethernet	010.200.000.12	COORD	SYNC	6 PM	61	55	120	1	20	65	0	35	9/4/2020 3:27 P
		1754	NORTH & THOMAS			63	E-NET-5063	North	NTCIP 76.x ATC Ethernet	010.200.000.05	COORD	SYNC	6 PM	72	63	110	1	0	75	0	35	9/4/2020 3:27 P
		1763	LIBERTY HEIGHTS & HOWARD P			134	E-NET-5134	Liberty Heights	NTCIP 76.x ATC Ethernet	010.200.000.13	COORD	SYNC	6 PM	62	102	120	1	0	100	0	20	9/4/2020 3:27 P
		1764	YORK & ORKNEY			33	E-NET-5033	Greenmount/York	NTCIP 76.x ATC Ethernet	010.200.000.02	COORD	SYNC	6 PM	62	45	120	1	0	80	0	40	9/4/2020 3:27 P
		1765	LOCH RAVEN & LOCHNER			41	E-NET-5041	Loch Raven	NTCIP 76.x ATC Ethernet	010.200.000.03	COORD	SYNC	6 PM	62	50	120	1	17	61	0	42	9/4/2020 3:27 P
		1793	ALAMEDA & 32ND			49	E-NET-5049	Loch Raven	NTCIP 76.x ATC Ethernet	010.200.000.04	COORD	SYNC	6 PM	63	7	120	1	0	82	0	38	9/4/2020 3:27 P
		1820	NORTH & PULASKI			67	E-NET-5067	North	NTCIP 76.x ATC Ethernet	010.200.000.05	COORD	SYNC	6 PM	73	67	110	1	0	74	0	36	9/4/2020 3:27 P
		2	Test-SAI			1	E-NET-5001		NTCIP 76.x ATC Ethernet	010.200.000.04				0	0			0	0	0	0	1/1/1970 12:00 A
		3	Test-Jacobs			1	E-NET-5001		NTCIP 76.x ATC Ethernet	010.200.000.14				0	0			0	0	0	0	1/1/1970 12:00 A
		1055	NORTH & POPLAR GROVE			60	E-NET-5060	North	NTCIP 76.x ATC Ethernet	010.200.000.05				0	0			0	0	0	0	1/1/1970 12:00 A
		1573	NORTH & DUKELAND			61	E-NET-5061	North	NTCIP 76.x ATC Ethernet	010.200.000.05				0	0			0	0	0	0	1/1/1970 12:00 A
		1225	BELAIR & OVERLEA			119	E-NET-5119	Belair	NTCIP 76.x ATC Ethernet	010.200.000.11	FREE	FREE	6 PM	74	94		1	0	80	0	30	9/4/2020 3:27 P
		745	YORK & OLD COLD SPRING			24	E-NET-5024	Greenmount/York	NTCIP 76.x ATC Ethernet	010.200.000.01	FREE	FREE	6 PM	74	39		1	0	75	0	35	9/4/2020 3:27 P

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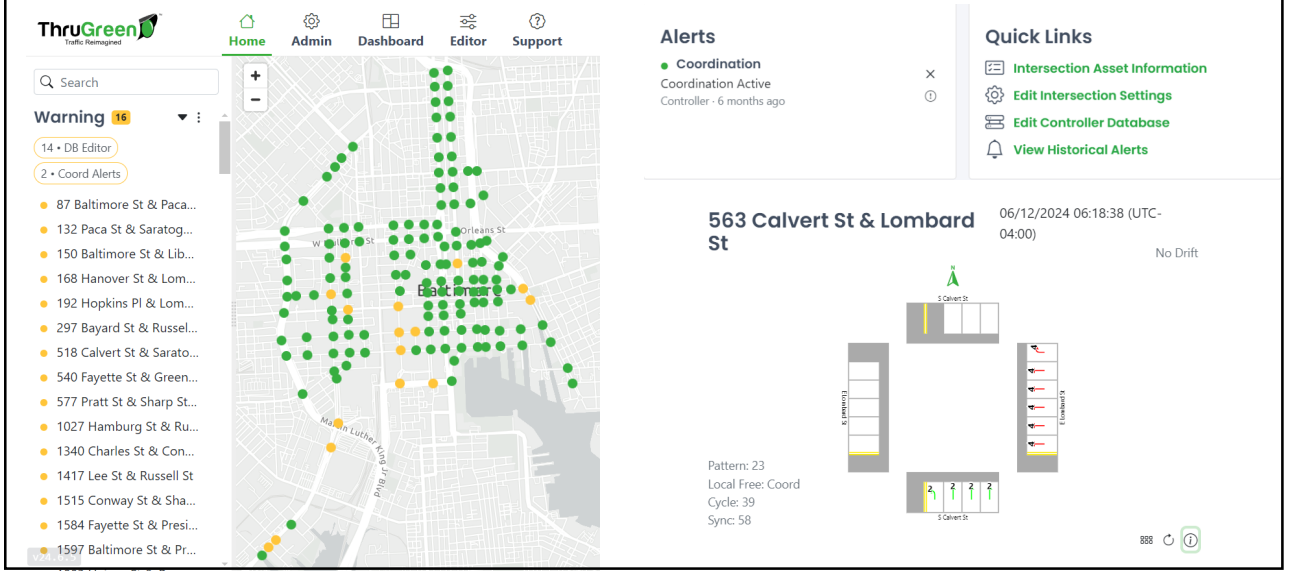
ThruGreen ATMS



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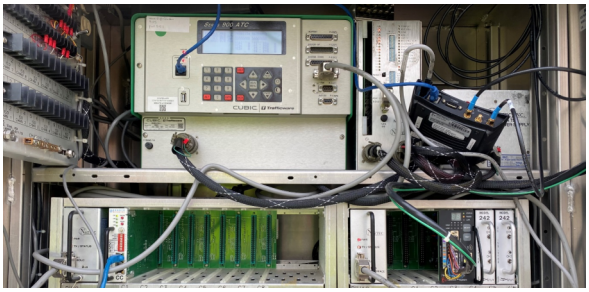
Controllers

- Naztec 980 TS2
- Cubic ATC – LRT Corridor



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Data Management

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Data Management

Signal ID: 1170
39.321979°N 76.615658°W
14.9 mi

Name
ST. PAUL & 28TH

Zone
GATEWAY NORTH

Pre-Implementation Signal Data Collection

Verify ID
Yes

Cabinet_Type
A (Pole Mounted; 8 Load Switches)

Cabinet Location (quadrant)
SW or W

ThruGreen Device
No

Coord Status
Coord

Clock Daylight Savings Enabled
Yes

Clock GMT: -5
No, clock parameters fixed

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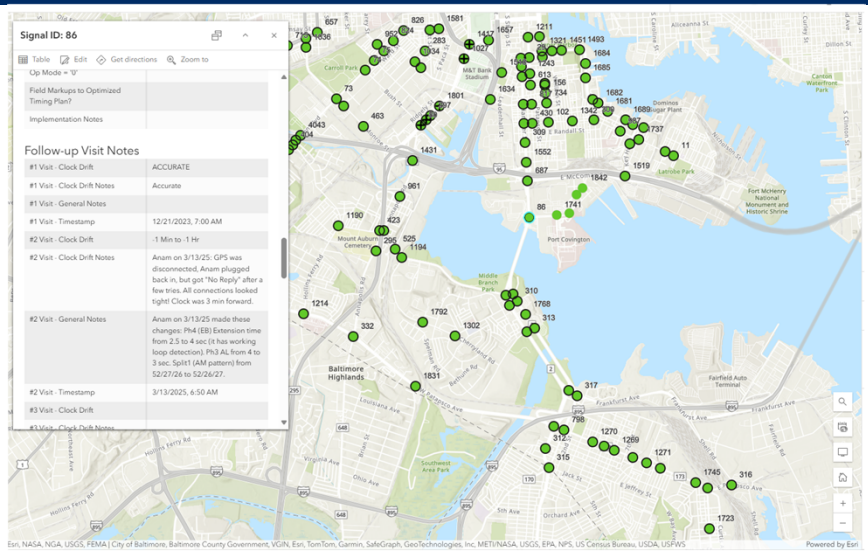
Data Management



Signal ID: 1170
39.321979°N 76.615658°W
14.9 mi

Clock Drift
+1 Min to +1 Hr

Clock Drift Notes
-3Min -40Sec

Clock Fixed
Yes

GPS Status
No GPS

GPS Fixed?
NA (No GPS or GPS Works)

Cluster Signal
No

Turns on Red Allowed?
No Turn on Red (see NTOR Notes)

NTOR Notes
EB 28th St, SB St. Paul St NTOR

Bike Facilities
Yes (On-Street Bike Lane)

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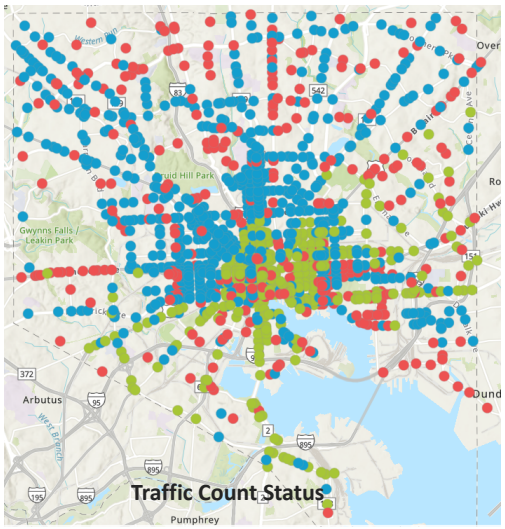
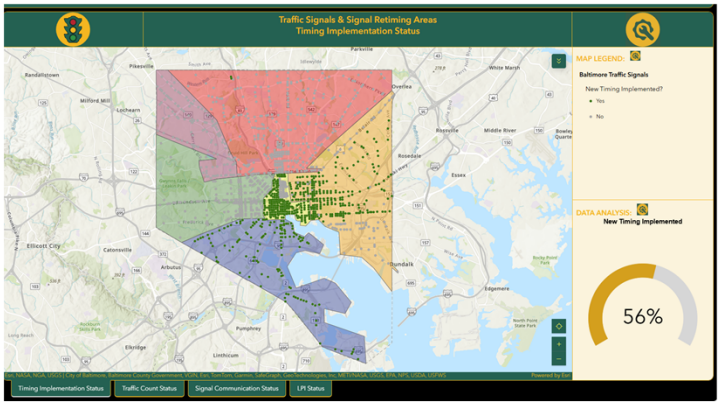
Data Management



Traffic Count Status



Client Dashboard

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Signal Timing

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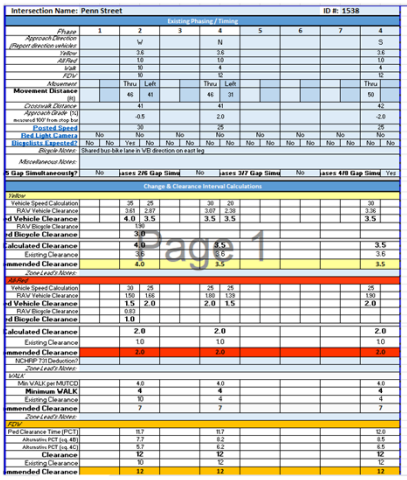
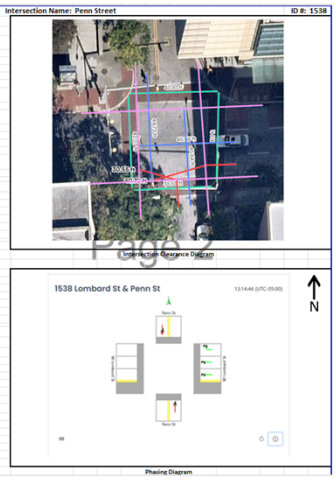
Change & Clearance Intervals





Nearmap Design → **Clearance Calculations** → Speed → Red Light Camera → Bike Facility → Images & Extras

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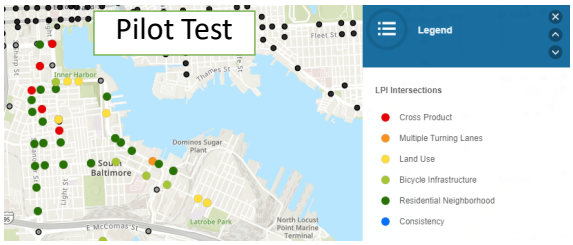
Leading Pedestrian Intervals



FRAMEWORK (NOT WARRANTS)

Implement if… (any)

1. >5k Cross Product
2. Multiple Turn Lane (sight distance)
3. Ped Generator

Other Considerations

1. Split @ Mins
2. Bike Signals/Lanes
3. Crash History
4. Lane Use
5. Vehicle LOS
6. Consistency0

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Cycle Length

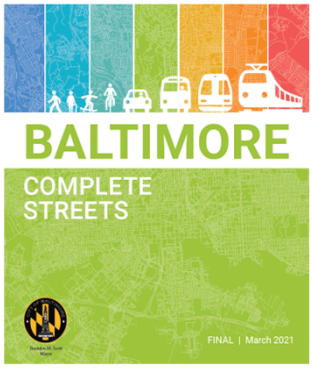

Table 8. Desirable Signal Timing Based on Street Type

Street Type	Timing Method	Peak Hours Cycle Length (sec.) (3)	Non-Peak Hours Cycle Length (sec.) (3)
Downtown Commercial	(1)	60-120	60
Downtown Mixed-Use	(1)	60	40-60
Urban Village Main	(1)	60	40-60
Urban Village Neighborhood	(1)	60	40-60
Urban Village Shared Street	(1)	60	40-60
Urban Center Connector	(1), (2)	90-120	60-90
Neighborhood Corridor	(1)	60	40-60
Industrial Access	(1), (2)	90-120	60-90
Parkway	(1), (2)	90-120	60
Boulevard	(1)	60-90	60

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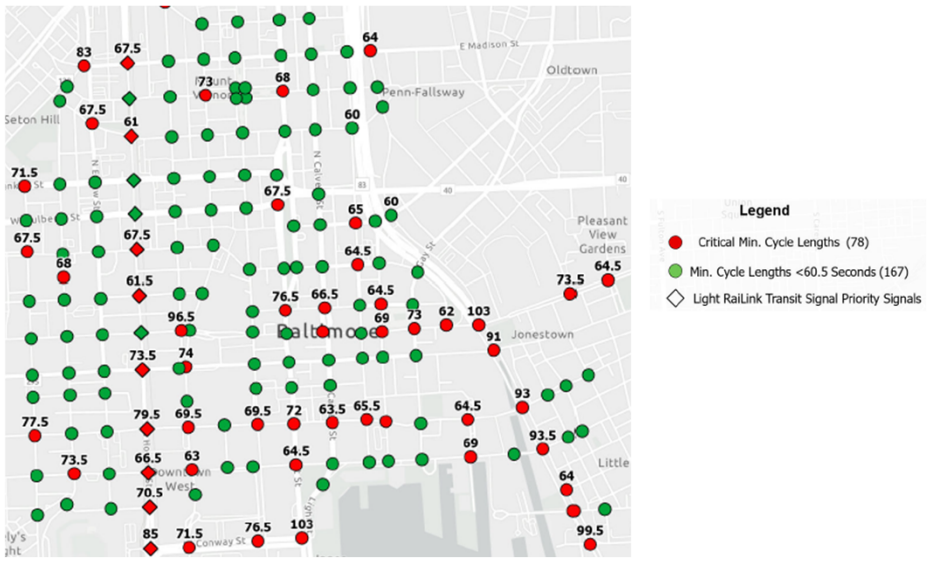
Cycle Length

Minimum Cycle Lengths



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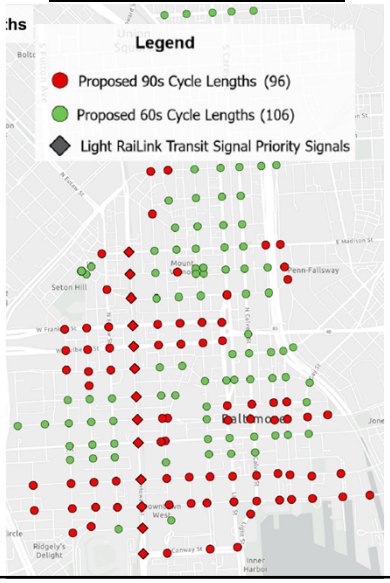
Cycle Length

Off-Peak Cycle Lengths



AM Peak Period Cycle Lengths

	Existing		Recommended	
Cycle Length	No. of Intx.	% of Intx.	No. of Intx.	% of Intx.
60	2	1%	28	14%
75	1	1%		
80	38	18%		
86	2	1%		
90	2	1%	107	53%
93	1	1%		
100	47	23%		
110	52	25%		
116	1	1%		
120	48	23%	61	30%
150	7	4%	6	3%
160	1	1%		
	202		202	

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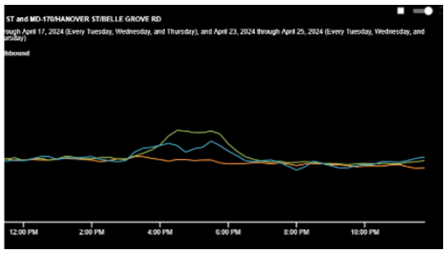
Special Events

- FSK Bridge Collapse
- 4th of July Detour Plan due to Inner Harbor Fireworks
- CIAA Men's & Women's Basketball Tournament
- Egress Patterns for Raven's Home Games



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Transit Signal Priority

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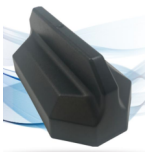
MTA TSP Implementation & Operation

- TSP is a system made of other systems and components
  - AVL System
  - TSP Technology Type
- All parts should work independently and in coordination with other parts
- Running a TSP program requires inter-agency coordination
  - Transit Agency
  - Traffic Agency(s)



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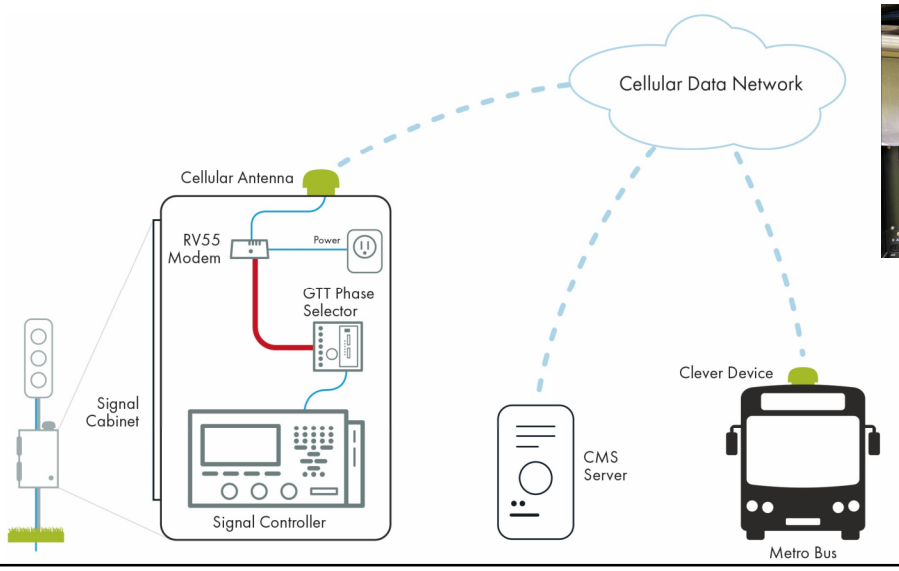
WMATA TSP System



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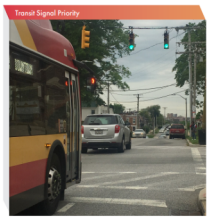
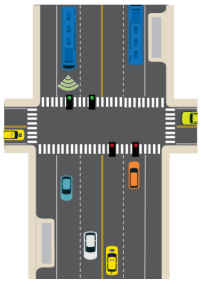
Partnership with MTA on Cloud-based TSP Testing





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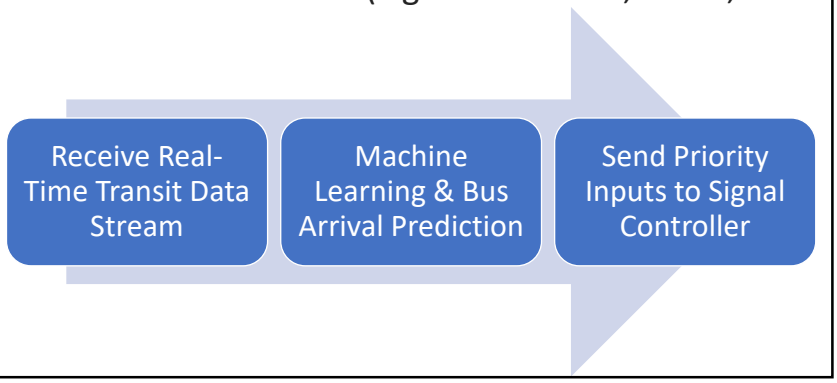
Cloud-Based Priority/Preemption Systems

- Another layer of complexity that makes it harder for the government agency to efficiently operate, troubleshoot, evaluate, and constantly improve the system.
- Requires a lot of collaboration between vendors (Signal Controller, ATMS, AVL, Priority)
- IT & Cybersecurity



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Connected Vehicle Testbed

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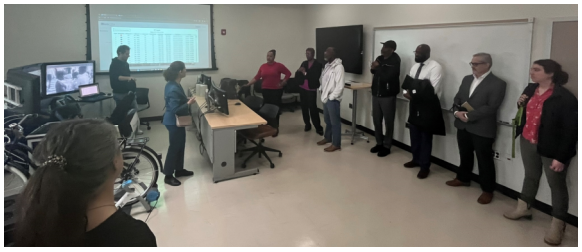
Partnership with Morgan State University

- LiDAR technology to detect and identify conflicts
  - Use big data to improve pedestrian and vehicle safety
  - Evaluate vehicle-to-vehicle and vehicle-to-ped conflict risks at intersections
- RSU to communicate with CVs
- Advanced signal controllers to send SPaT data
- Smart Intersections & Shuttle Tour - Feb 2024



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