

Maryland FirstNet: A Geospatial Analysis of First Responder Broadband Communication Needs

Mary Buffington
Eastern Shore Regional GIS Cooperative





- First high-speed, interoperable, nationwide wireless broadband network dedicated to public safety
- Network will fulfill a fundamental need of the public safety community and the last remaining recommendation of the 9/11 Commission
- Creating a nationwide network and providing wireless services to public safety agencies across the country
- Tasked with leveraging existing telecommunications infrastructure and assets – including exploring public/private partnerships that can help support and accelerate the creation of the network

Why FirstNet?

A network that can be counted on during emergencies

1. First responders deserve the best network
2. Reliability must be built in
3. Public safety needs true priority
4. Special events attract big crowds
5. Rural emergencies pose coverage challenges
6. Flying blind is dangerous
7. Sharing one network improves communication
8. Mass markets fuel innovation
9. Budgets are tight
10. Battling enemies requires a coordinated response



Why not commercial?

Commercial networks crash when too many users attempt to access the network



Commercial devices don't stand-up to first responder use



Damage to commercial networks infrastructure due to severe weather



Maryland FiRST vs. Maryland FirstNet

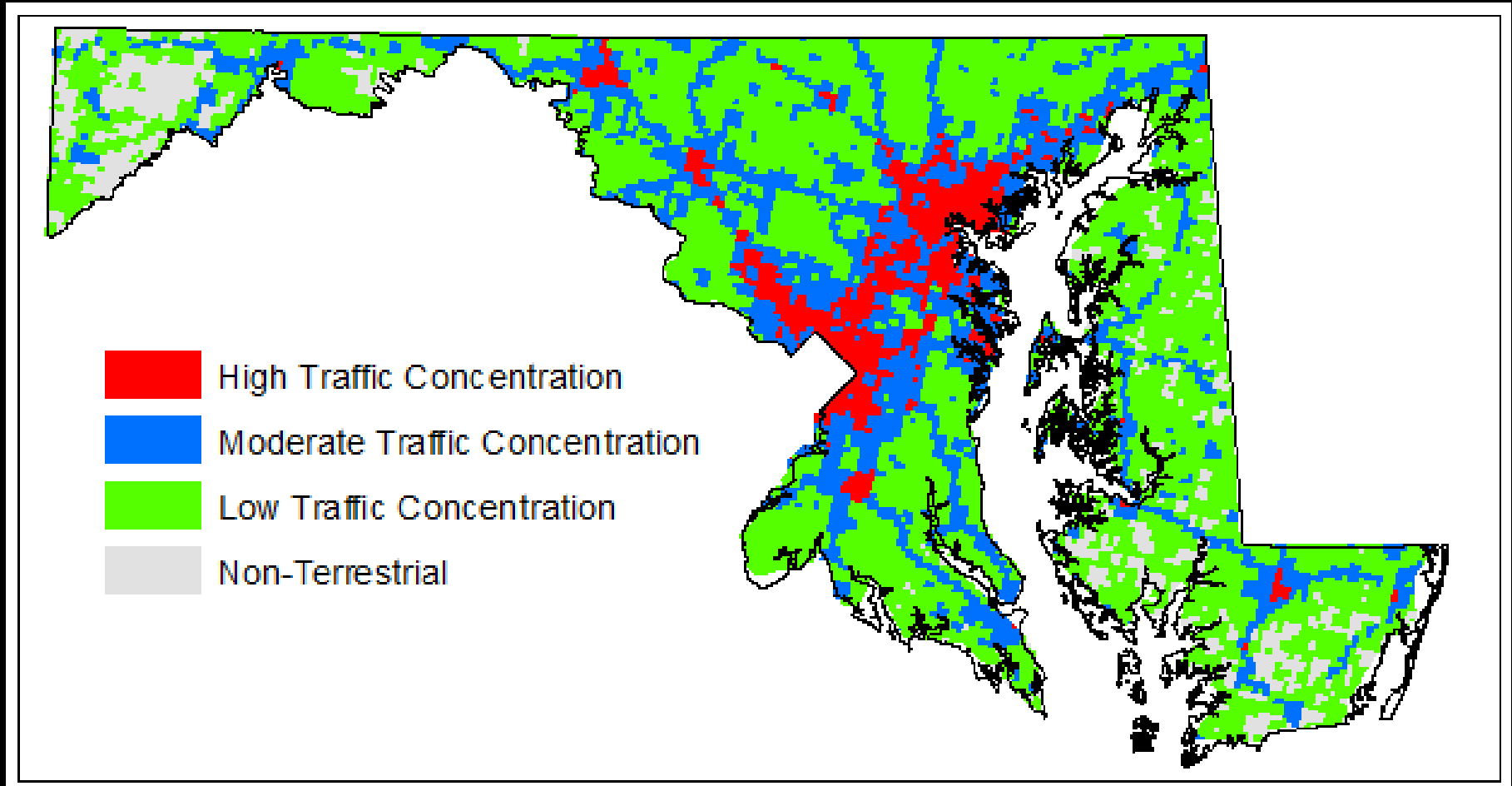
Maryland FiRST

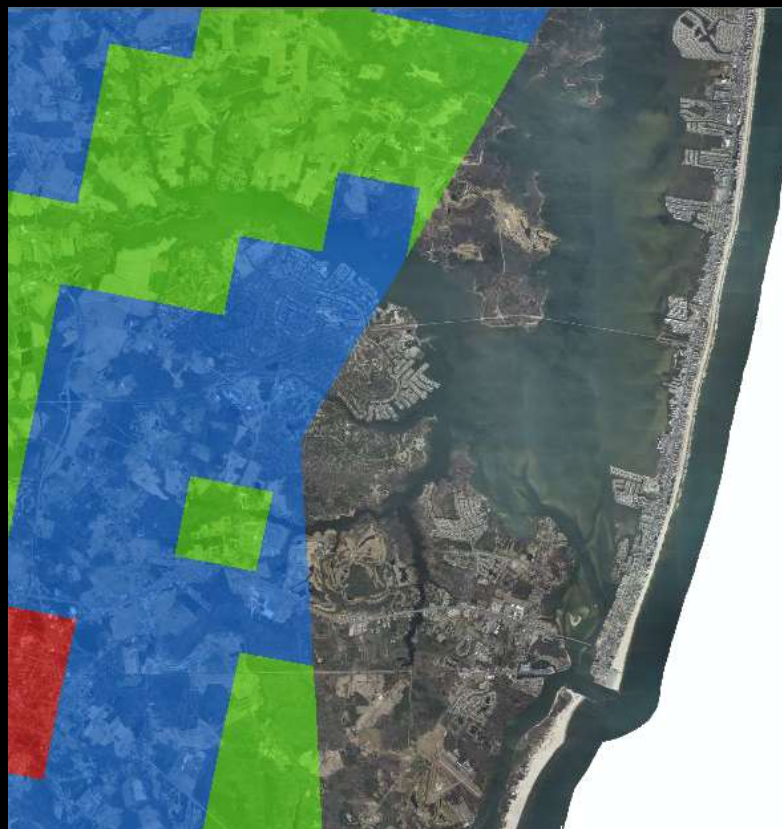
- 700 MHz Radio System in MD
- Allows first responders to share information by voice and data signals on demand, in real time, when needed, as authorized

Maryland FirstNet

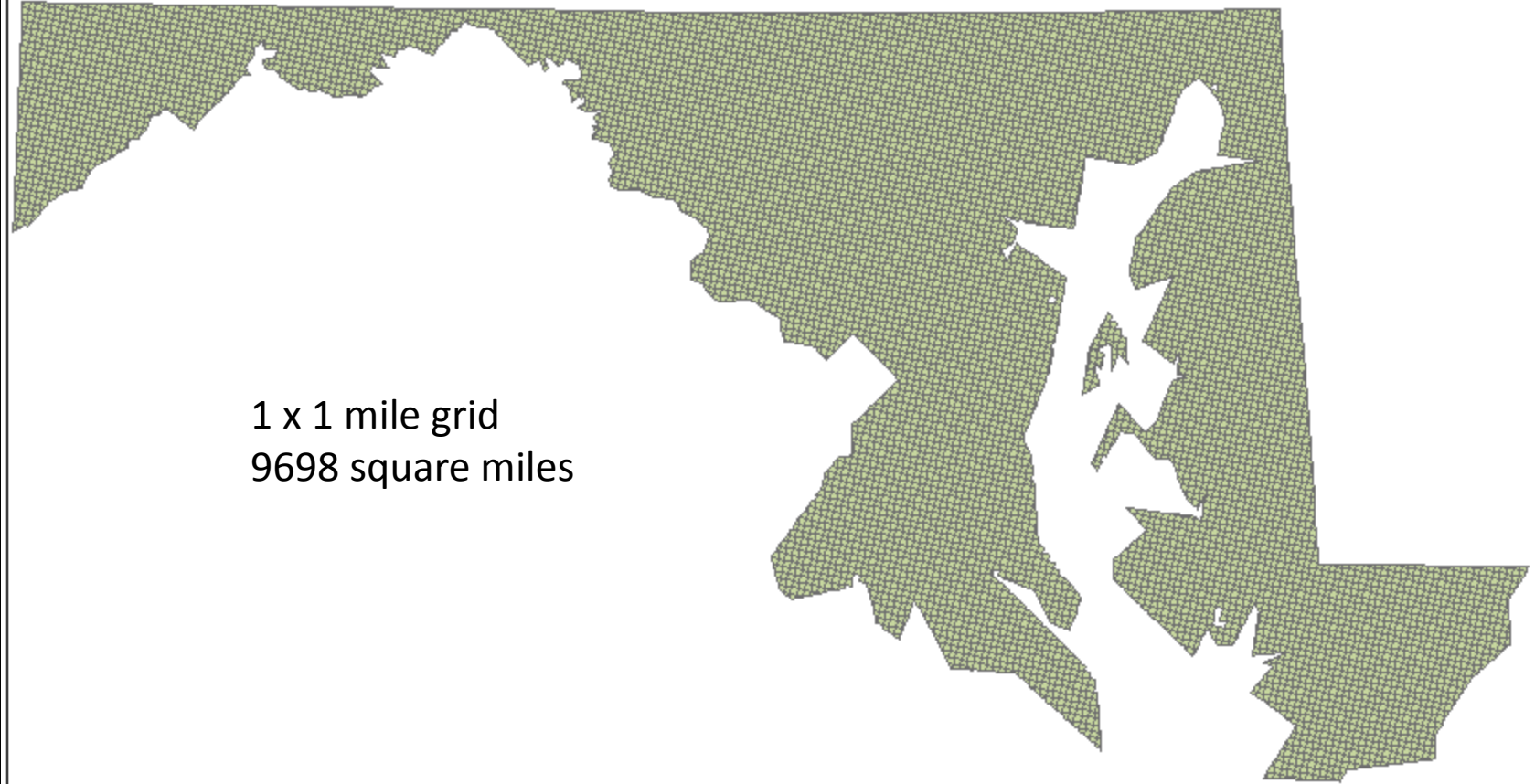
- 700 MHz spectrum for nationwide broadband communications
- Video, data access and sharing
- Mobile, tablet, laptop

Federal FirstNet Coverage

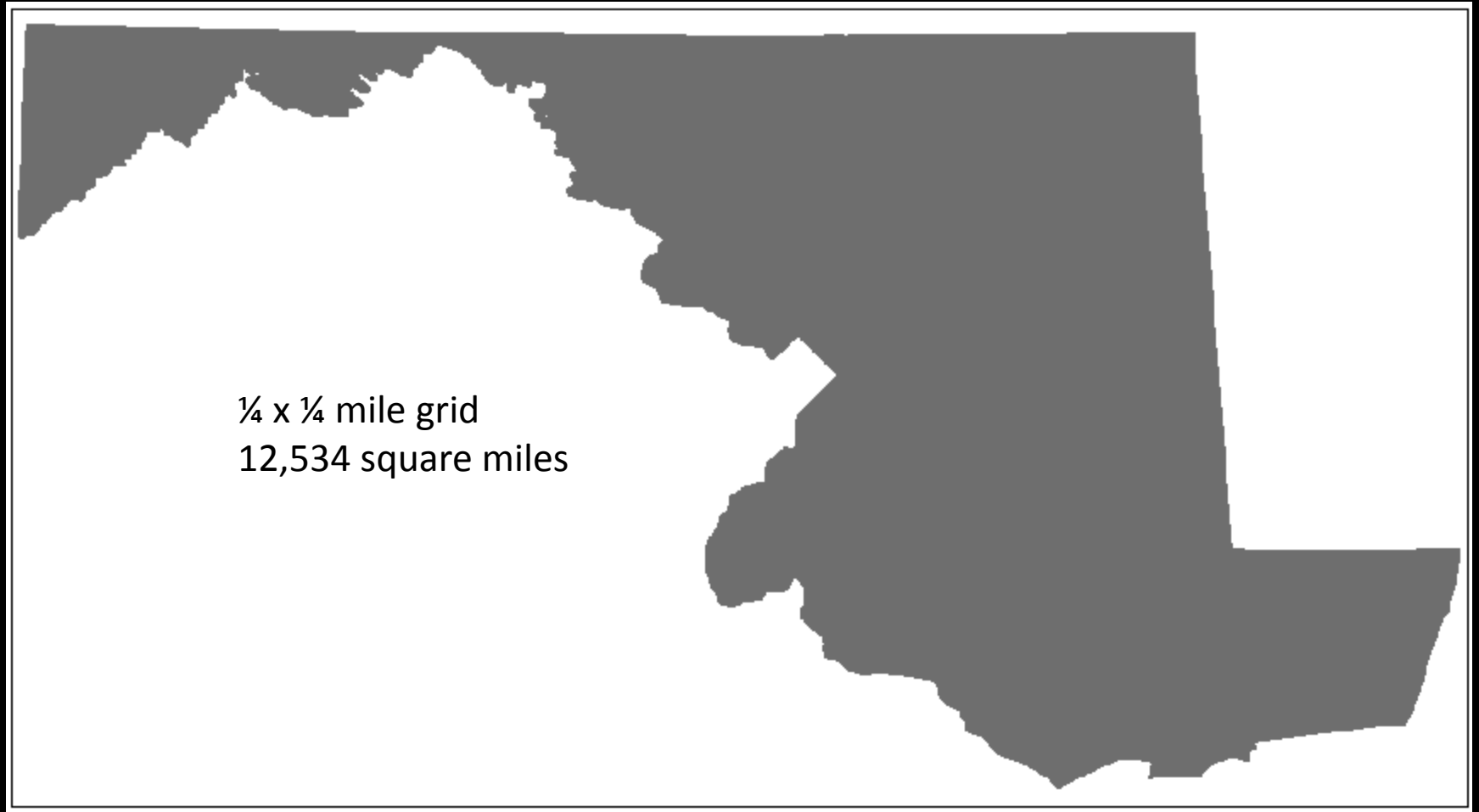




Federal Coverage Area



Maryland Coverage Area



Identify Needs for the Quarter Mile

- Calls for Service Data – Fire, Police, and EMS from 2014
 - Number of Calls
 - Duration
 - Priority level (chest pain vs. fender bender)
- Population
 - Public Safety Personnel presence
 - Nighttime/Residential
 - Daytime/Working
- Traffic
 - Annual Average Daily Traffic
 - Evacuation Routes
 - Alternate Modes of Transportation (light rail, bus, train)
- Facilities
 - Community Anchor Institutions
 - Other Facilities (water treatment plant, energy facility, etc.)
 - Public Places (sports/racing arena, casino, park, etc.)
- Other Coverage
 - No access to Commercial 4G Broadband
 - Presence of Broadband Deadzone
 - No access to Maryland FiRST Radio Network

Federal FirstNet 1 mile Coverage

- Public safety user population
- Public safety high risk areas/areas of interest
- US population
- Developed areas/buildings
- Transportation
 - Roads/highways
 - Commercially navigable waterways
 - Railroads
 - Transit links

Maryland FirstNet ¼ mile Coverage

- Number of Calls for Service
- Duration of Calls for Service*
- Priority level*
- Number of Public Safety Personnel
- Nighttime/Residential Population
- Daytime/Working Population*
- Annual Average Daily Traffic
- Evacuation Routes
- Alternate Modes of Transportation (light rail, bus, train)
- Community Anchor Institutions*
- Other Facilities (water treatment plant, energy facility, etc.)
- Public Places (sports/racing arena, casino, park, etc.)
- No access to Commercial 4G Broadband
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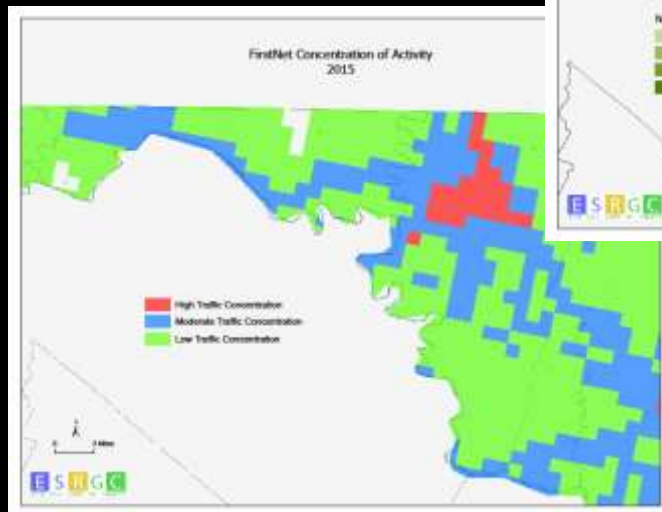
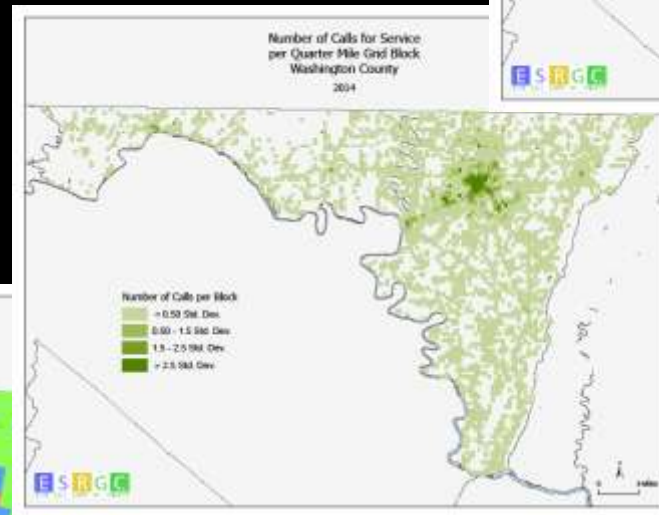
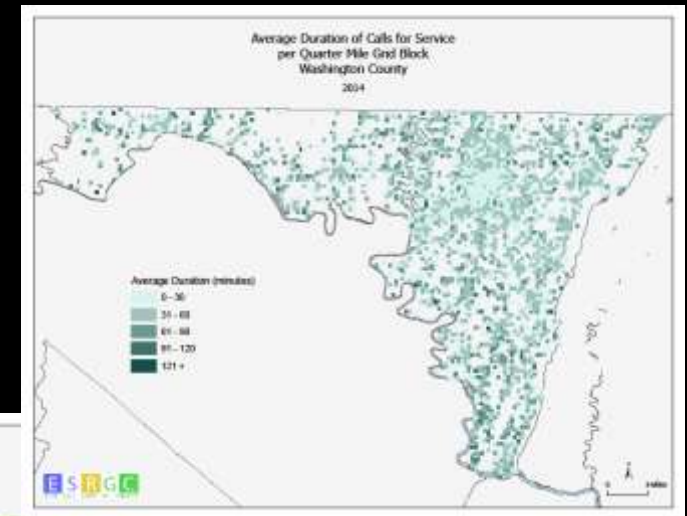
Calls for Service Data Collection

- 2014 Calls for Service Data from Dispatch Operations
 - Location (address or X/Y)
 - Dispatch time
 - Close time
 - Priority
- Number of Public Safety Personnel
 - Survey sent to public safety agencies
- Data sensitivity issues and Carrots
 - Requested as .txt or .csv via secure ftp
 - Raw data deleted from server after 60 days of delivery
 - Geocode addresses and aggregate to quarter mile grid

	Agency Name	Address	County	Operating Personnel
1	Allegany Cnty Emer Mgmt Agency	11400 Pittsburgh Plate Glass Rd SE Cumberland, MD 21502	Allegany	40
2	Allegany Amb Svc Inc	176 W Main St Frostburg, MD 21532	Allegany	15
3	Ellerslie Ambulance Service	PO Box 390 Ellerslie, MD 21529	Allegany	8
4	Frostburg Area Ambulance Service	PO Box 57 Frostburg, MD 21532	Allegany	70
5	George's Creek Amb Svc	19 Union St Lonaconing, MD 21539	Allegany	15
6	La Vale Vol Rescue Squad	977 National Hwy LaVale, MD 21502	Allegany	30
7	Tri-Towns Ambulance	59 Main St Westernport, MD 21562	Allegany	30
8	Baltimore Pike Volunteer Fire Dept.	15010 Baltimore Pike NE, Cumberland, MD 21502	Allegany	23
9	Barton Fire Rescue	19202 Legislative Rd. Barton, MD	Allegany	33
10	Bedford Road Volunteer Fire Dept.	13200 Bedford Rd NE, Cumberland, MD 21502	Allegany	18
11	Bowling Green Volunteer Fire Dept.	12420 McMullen Hwy SW, Cumberland, MD 21502	Allegany	33

Calls for Service Data Collection Results

- 22 counties participated
- 4 State agencies (MSP, MDTA, MAA, DNR)
- 14,862,296 total calls for service used
 - 2.5 calls per person in Maryland



Data Categories

Number of Calls for Service

Number of Calls for Service	COUNT_CAT
1 - 2	1
3 - 18	2
19 - 237	3
238 - 3,205	4
11,456 - 43,507	5

Average Call Duration

DURATION_min	DURATION_CAT
0 - 5	0
6 - 30	1
31 - 60	2
61 - 90	3
91 - 120	4
121 +	5

Public Safety Personnel

PERSONNEL	PERSONNEL_CAT
0.004956629 - 2.34328358	1
2.34328359 - 7.44927536	2
7.44927537 - 27.25	3

SHA AADT

Average Number of Daily Vehicles	AADT
36,120 - 249,910	1
26,983 - 35,972	.8
17,993 - 26,982	.6
9,003 - 17,992	.4
12 - 9,002	.2

Call Priority

	0 - 9	1 - 9	1 - 5	0 - 4	1 - 15	1 - 7	0 - 5	1 - 9; P	0 - 9; A - V	1, 1F, 2, 2F, 3, 4, E, EF
high = 3	0 - 2	1 - 3	1	0	1 - 5	1 - 2	0 - 1	1 - 3	0 - 2; A	E, EF, 1, 1F
medium = 2	3 - 5	4 - 6	2 - 3	1 - 2	6 - 10	3 - 4	2 - 3	4 - 6	3 - 5; B - D	2, 2F
low = 1	6 - 9	7 - 9	4 - 5	3 - 4	11 - 15	5 - 7	4 - 5	7 - 9; P	6 - 9; E - V	3 - 4, NULL

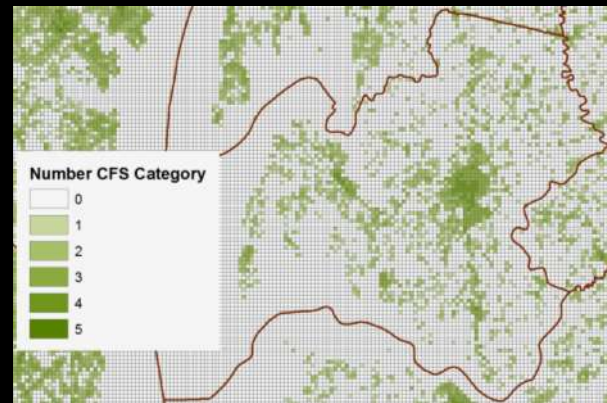
Weight Data

Maryland FirstNet Public Safety Weighting Matrix							
Category	Number	Need Factor	Values	Weighting	Highest Score	Data Source	Definition
Calls for Service (30%)	1	Calls for Service (50%)	1 - 5	3	15	County CAD data	Number of calls for service logged over a 1-year period: 5 classes
	2	Avg Call Duration (25%)	0 - 5	1.25	7.5	County CAD data	Average call for service duration: 6 classes
	3	Call Category Rank (25%)	1-3	2.5	7.5	County CAD data	Categorize calls for service by broadband need: 3 classes (high, medium, low)
Population (27%)	4	Public Safety Personnel (55.6%)	1-3	5	15	Maryland FirstNet Survey	Number of PS Personnel in a grid - based on jurisdictional response areas: 3 classes (high, medium, low)
	5	Daytime Population (22.2%)	.1 to 1	6	6	American Community Survey	Daytime/Work population in a grid: 10 classes
	6	Nighttime Population (22.2%)	.1 to 1	6	6	US Census (2010)	Nighttime/Residential population in a grid: 10 classes
Transportation (20%)	7	Average Daily Traffic (40%)	.2 to 1	8	8	SHA AADT	Average number of vehicles that travel through a grid on major roads: 5 classes
	8	Evacuation Route (30%)	0 or 1	6	6	SHA	Grid is intersected by designated evacuation route
	9	Transportation (30%)	0 or 1	6	6	MD iMap	Grid is intersected by transportation route (train, light rail, subway, or bus line)
Facilities (20%)	10	Community Anchor Institution (35%)	0 or 1	7	7	MD iMap	Presence of a CAI in a grid: 0 or 1
	11	Facilities (35%)	0 or 1	7	7	MD iMap	Grids are within a set distance of airport, energy plant, wastewater treatment plant, correctional facility: 0 or 1
	12	Public Places (30%)	0 or 1	6	6	MD iMap	Grids are within a set distance of sports/racing arena, state/county/national park, state fairground: 0 or 1
Other Coverage (3%)	13	No MD FIRST Coverage (50%)	0 or 1	1.5	1.5	Maryland FIRST	Grid does not have MD FIRST coverage: 0 or 1
	14	No access to Commercial BB (25%)	0 or 1	0.75	0.75	Maryland Broadband Mapping Initiative	Grid does not have access to commercial mobile broadband service: 0 or 1
	15	Presence of BB Deadzone (25%)	1 or 1	0.75	0.75	Maryland Broadband Mapping Initiative	Presence of a broadband deadzone
TOTAL Score				66.75	100	Total score per grid is weighted sum of all factor scores	

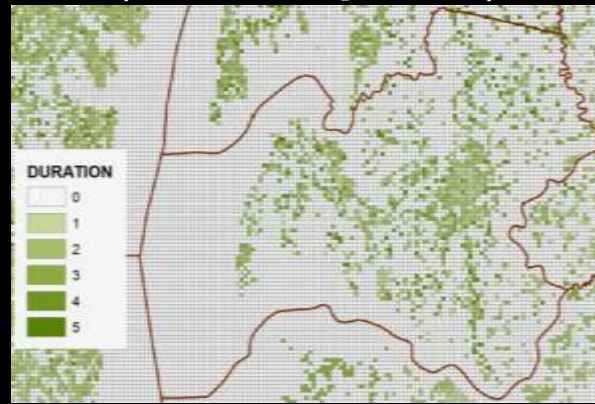
([COUNT_CAT] * 3)

([DURATION] * 1.25)

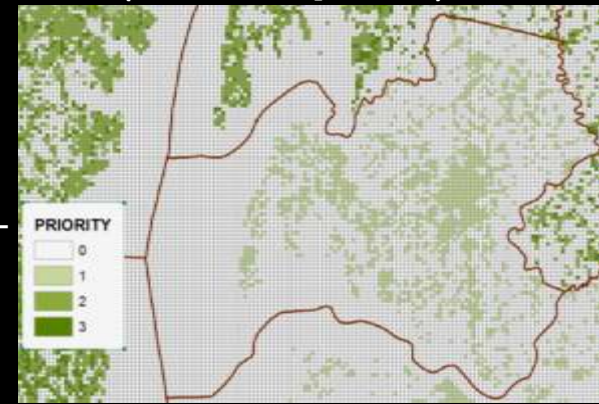
([PRIORITY] * 2.5)



+



+



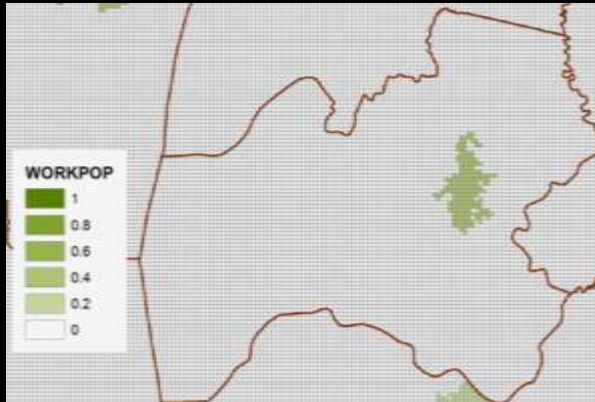
([PERSONNEL_CAT] * 5)

([WORKPOP] * 6)

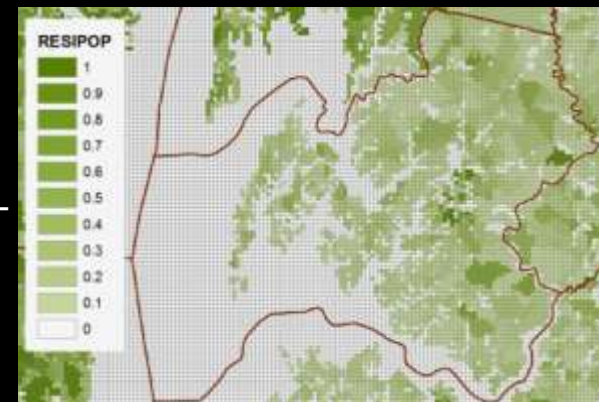
([RESIPOP] * 3)



+

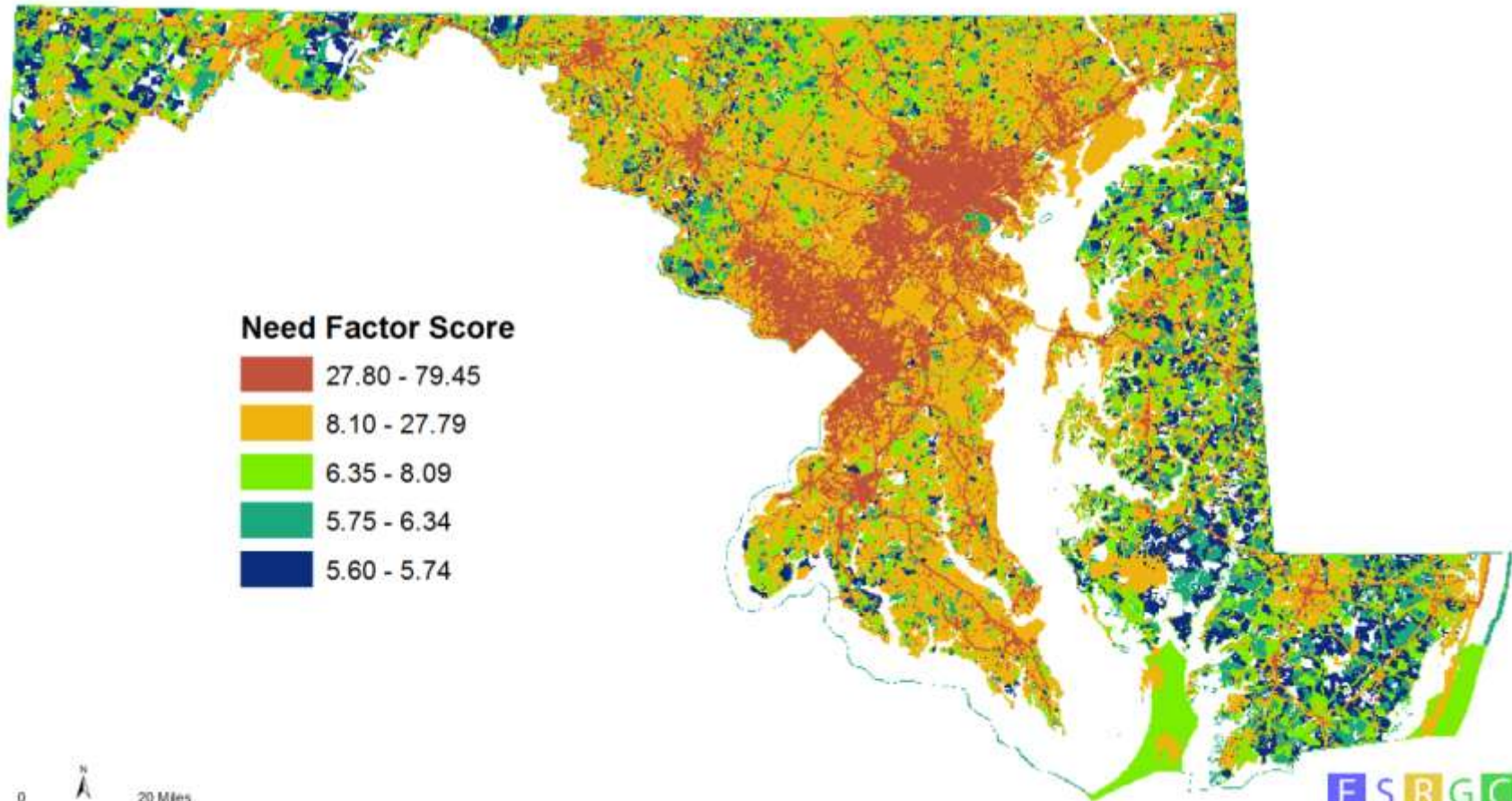


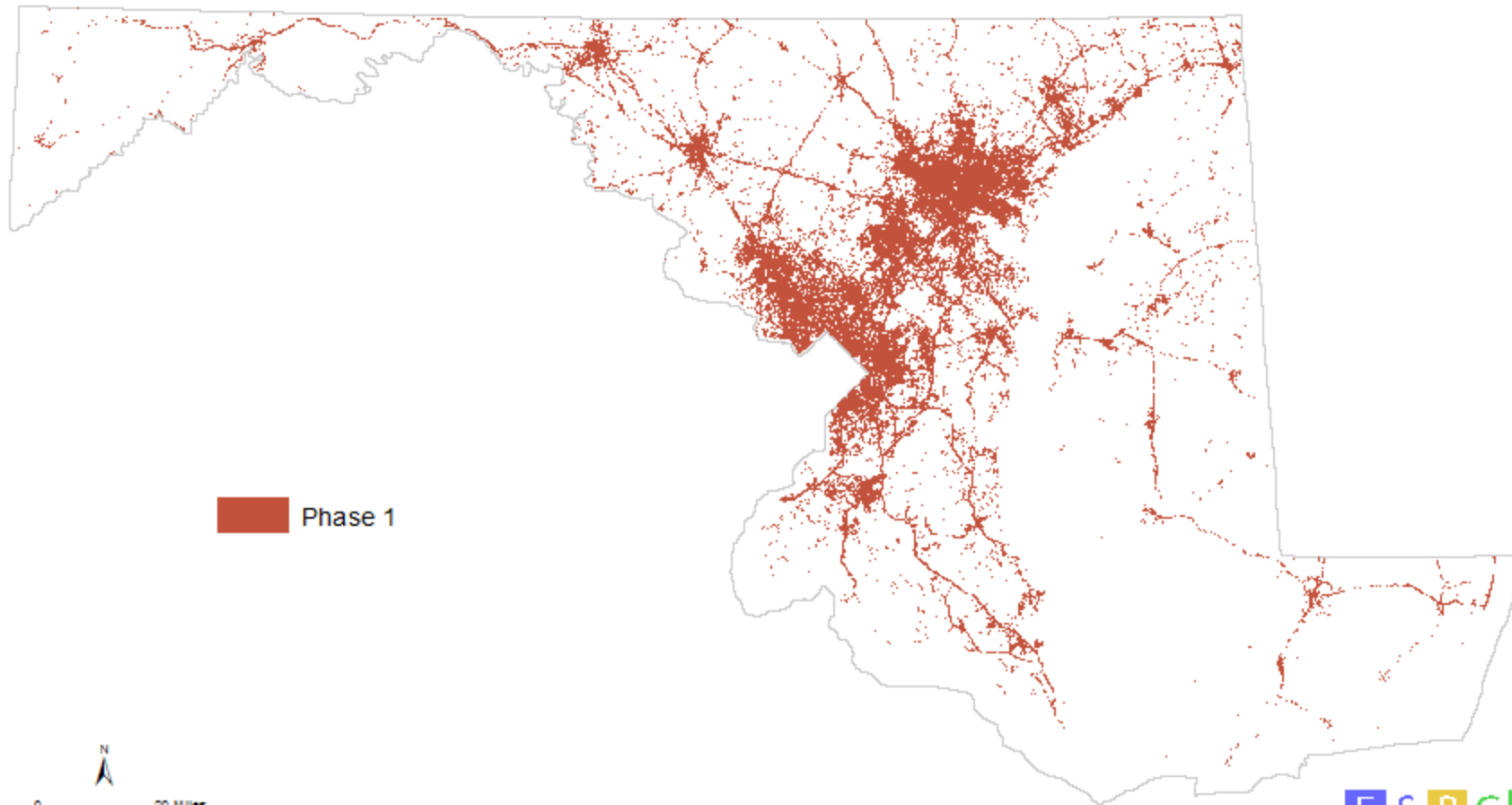
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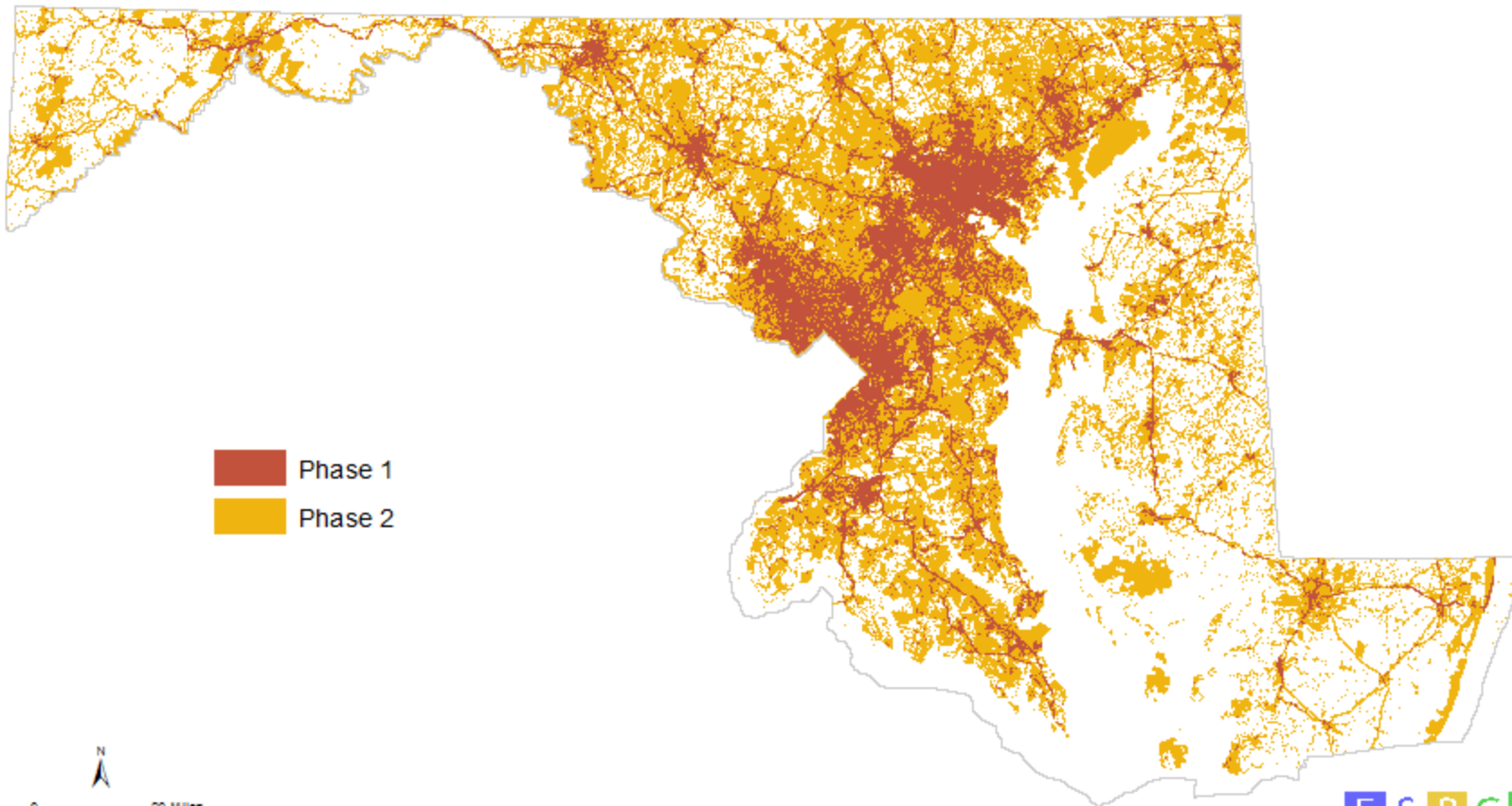


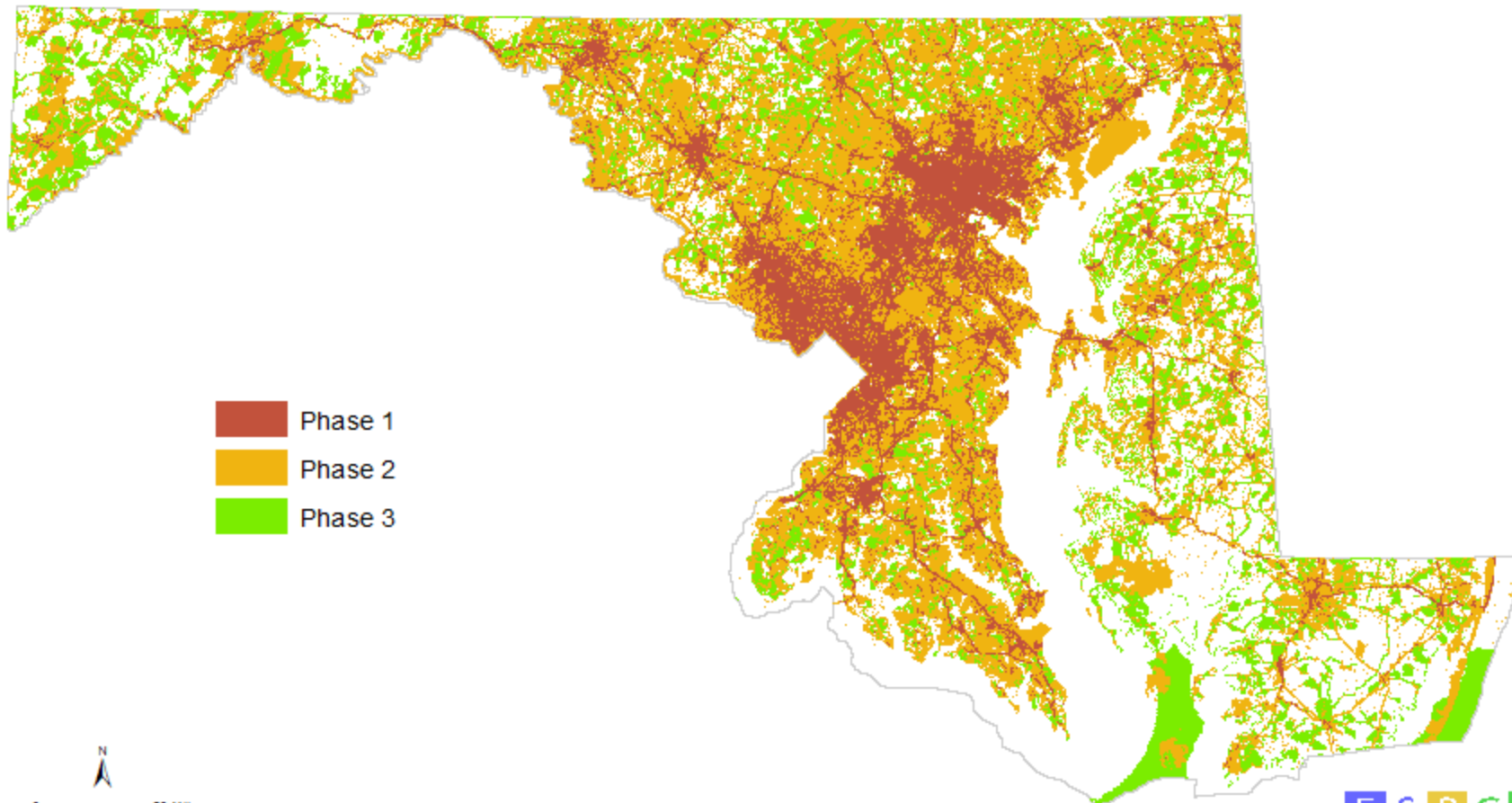
Each Quarter Mile Mapping Unit =

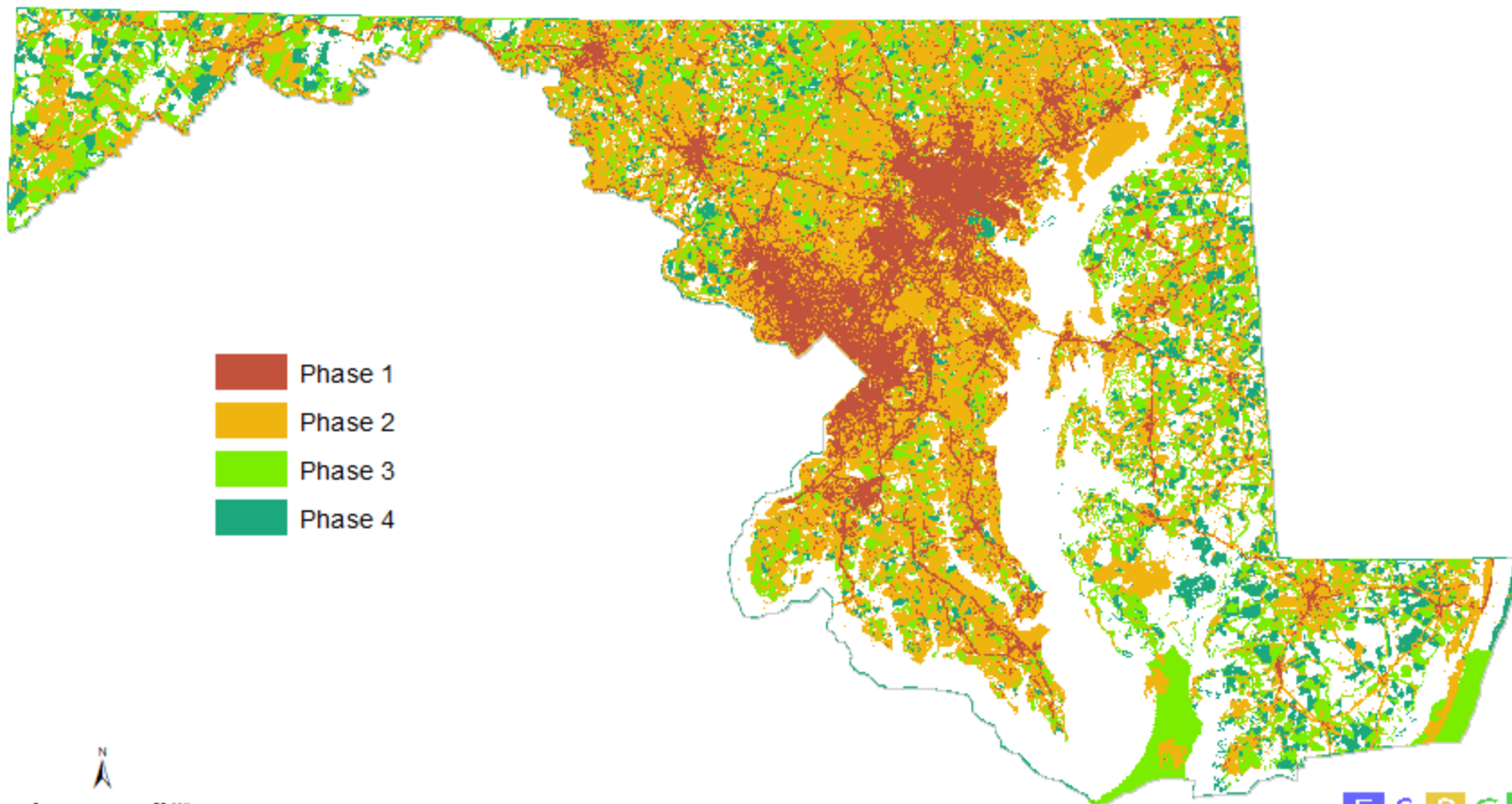
([COUNT_CAT] * 3) + ([DURATION] * 1.25) + ([PRIORITY] * 2.5) + ([PERSONNEL_CAT] * 5) + ([WORKPOP] * 6) +
 ([RESIPOP] * 6) + ([AADT] * 8) + ([EVACROUTE] * 6) + ([TRANSPORT] * 6) + ([CAI] * 7) + ([FACILITY] * 7) +
 ([PUBLIC] * 6) + ([MDFIRST] * 1.5) + ([COV4G] * .75) + ([DEADZONE] * .75)

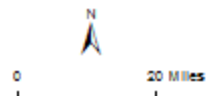
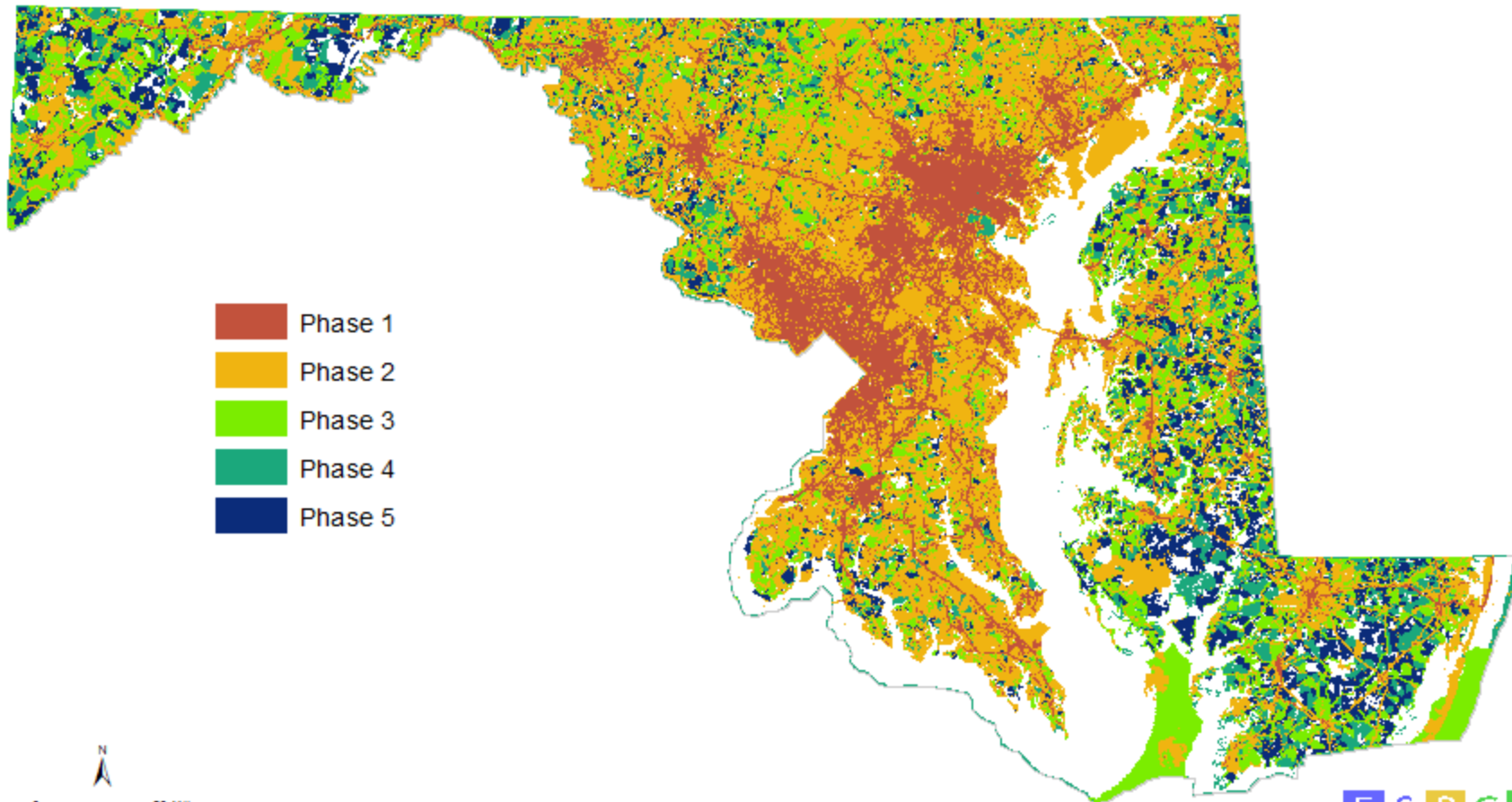


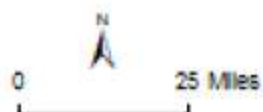
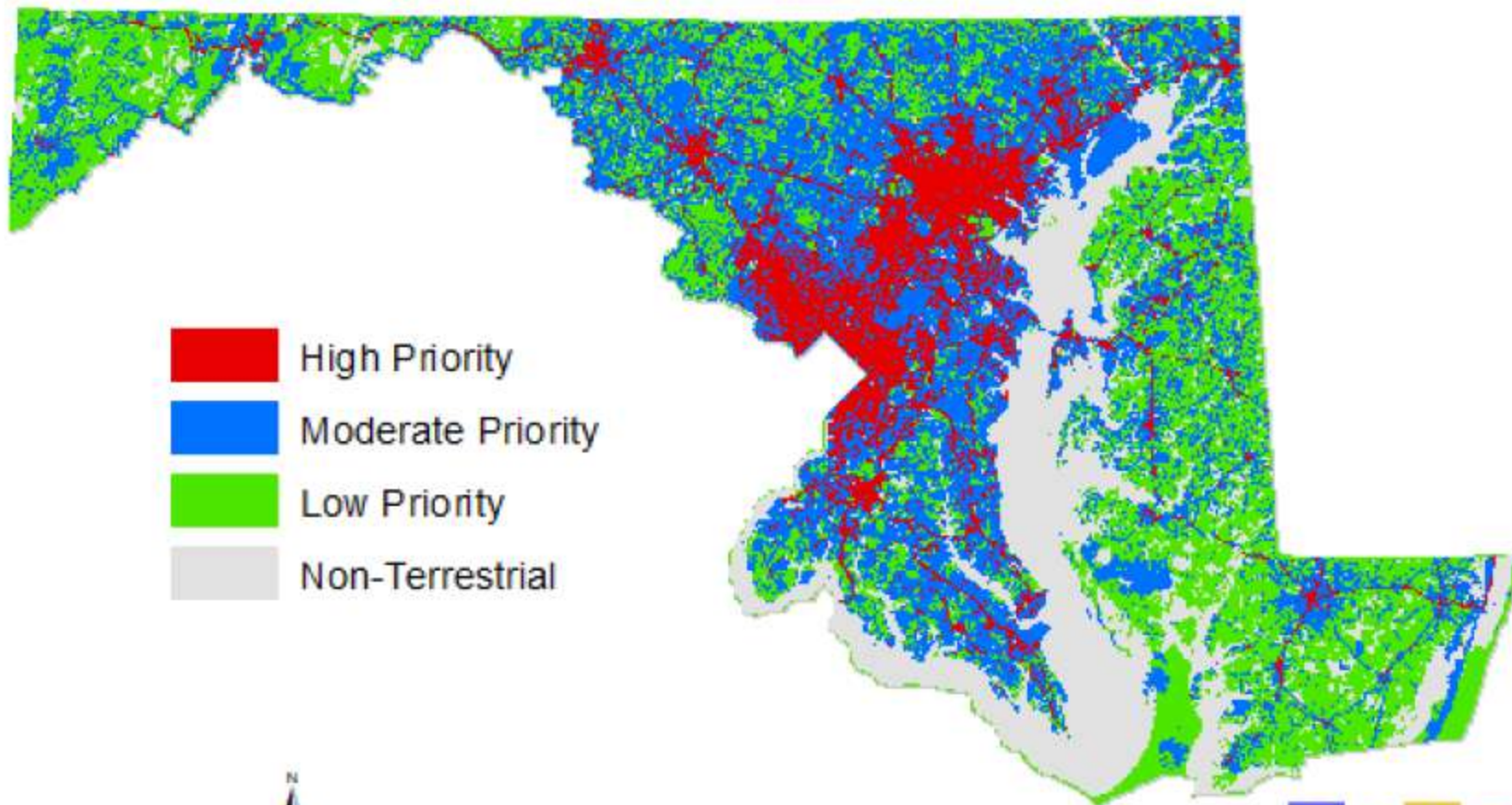




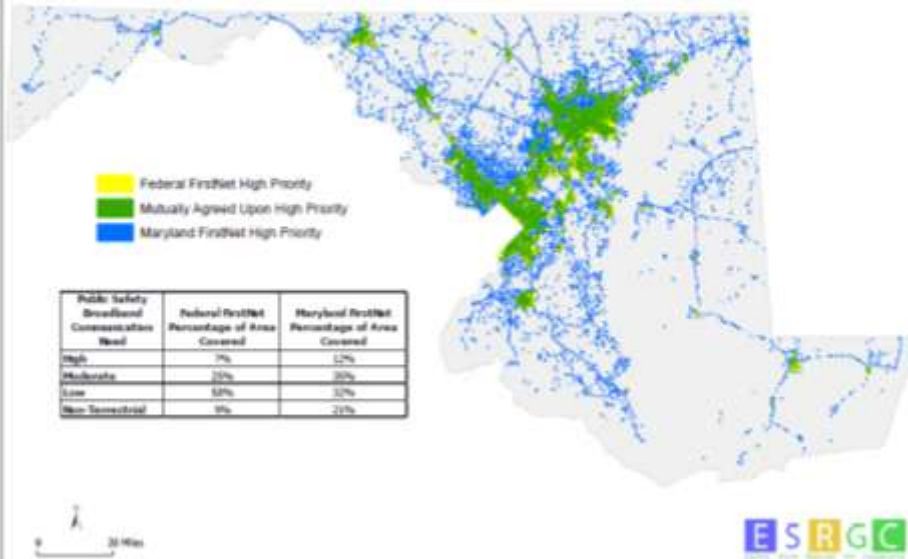




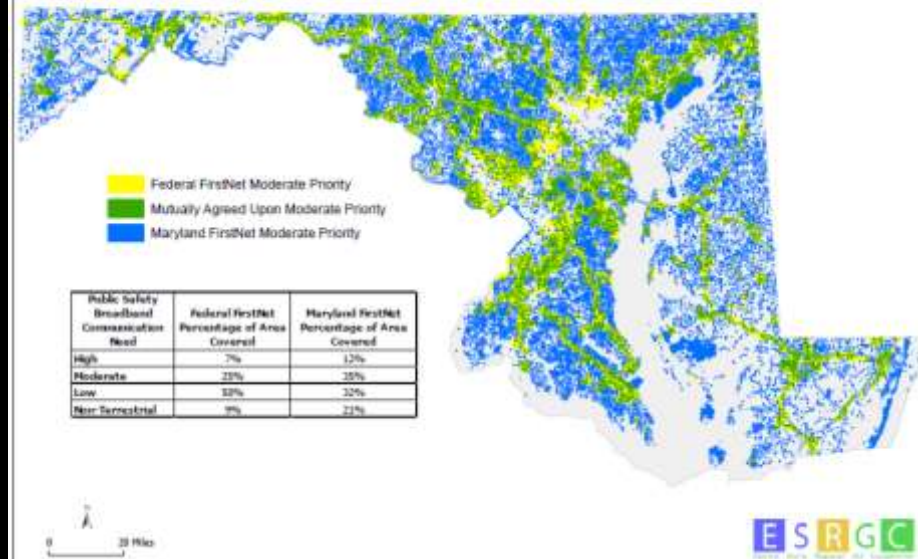




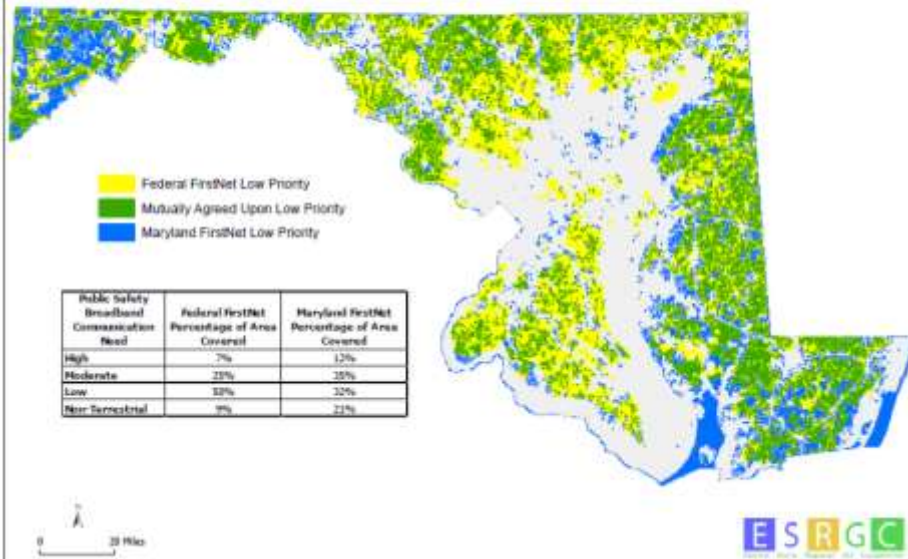
Public Safety Broadband Communications High Priority Areas
Maryland FirstNet and Federal FirstNet
2015



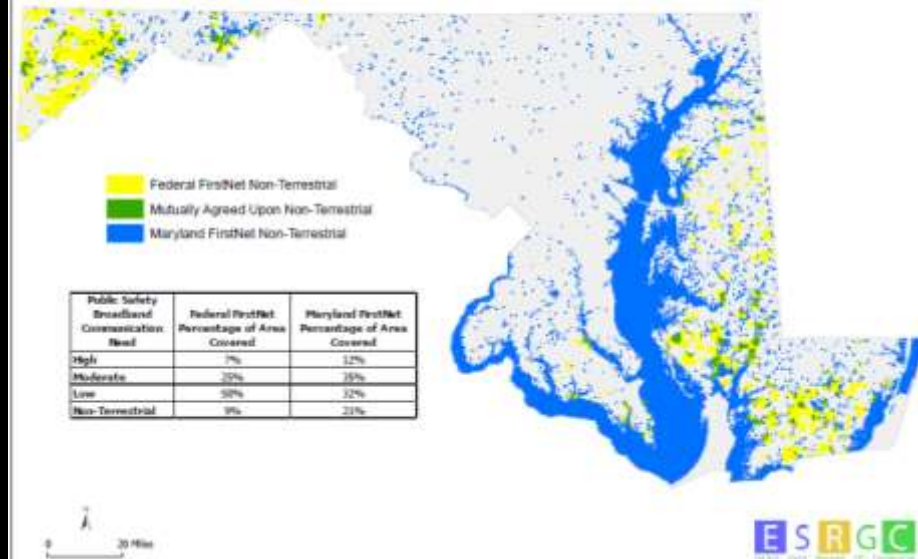
Public Safety Broadband Communications Moderate Priority Areas
Maryland FirstNet and Federal FirstNet
2015



Public Safety Broadband Communications Low Priority Areas
Maryland FirstNet and Federal FirstNet
2015



Public Safety Broadband Communications Non-Terrestrial Priority Areas
Maryland FirstNet and Federal FirstNet
2015



Project Review

- Obstacles
 - Delivery of calls for service data request
 - Range of calls for service data received
 - Each county/agency responsible for exporting CAD data
 - Short data processing time
 - Guidance from Federal FirstNet
- Maryland
 - Only 24 counties to contact and collect data
 - Regional Interoperability Sessions
 - Supported by MSP and DOIT
 - Data sources
 - Maryland iMap & Statewide Address Locator
 - Maryland Broadband Mapping Initiative
- Future Plans
 - Meet with counties/regions to review results
 - Add missing county data
 - Review feedback from FirstNet

Questions?

Mary Buffington

Senior GIS Analyst

Eastern Shore Regional GIS Cooperative

mebuffington@salisbury.edu

