Request for Proposals

STATEWIDE PUBLIC SAFETY WIRELESS COMMUNICATIONS SYSTEM

PROJECT NO. 060B9800036

DEPARTMENT OF
INFORMATION TECHNOLOGY

Appendices 2, 4, 5, 6, 11, 13, 14, 15 and 16

July 9, 2008

APPENDICES DISTRIBITED WITH RFP

APPENDIX 2 – *State Regions and Coverage Area Definition*

APPENDIX 4 – *Mutual Aid Interoperability Systems*

APPENDIX 5 – *Existing State Network Monitoring Systems*

APPENDIX 6 – *Dispatch Point Location and Console Capacity*

APPENDIX 11 – *State Tower Loading Plan*

APPENDIX 13 – *Generator Startup Checklist*

APPENDIX 14 – *700 MHz Channel Plan*

APPENDIX 15 – *Punchdown Block Layout*

APPENDIX 16 – *System Acceptance Test Program*

APPENDIX 2
State Regions and Coverage Area Definitions

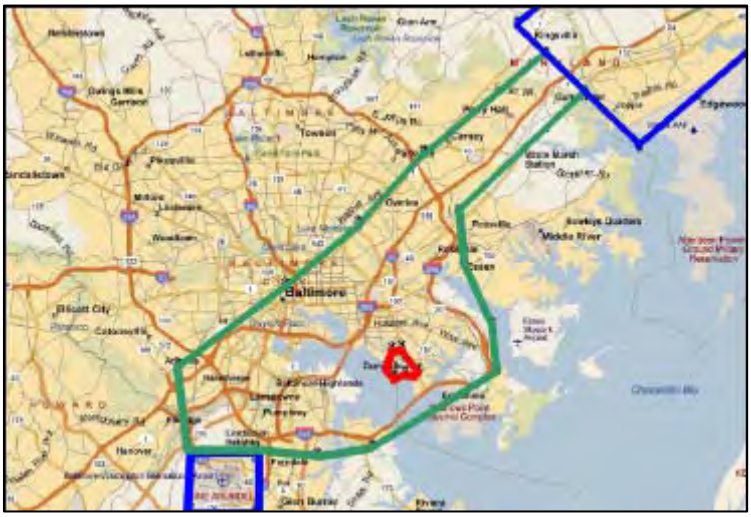
Region 1

- Anne Arundel County
- Baltimore County
- Baltimore City
- Carroll County
- Cecil County
- Fredrick County
- Harford County
- Howard County

Region 1A

- Baltimore County bound by the following coordinates:

LATITUDE	LONGITUDE
39.1916° N	76.5933° W
39.1966° N	76.5500° W
39.2433° N	76.4500° W
39.2716° N	76.4533° W
39.3100° N	76.4766° W
39.3400° N	76.4800° W
39.4133° N	76.3791° W
39.4366° N	76.4100° W
39.3766° N	76.5083° W
39.3333° N	76.5608° W
39.2958° N	76.6191° W
39.2466° N	76.7058° W



- I-95 between Baltimore County and Delaware State Lines bound by the following coordinates:

LATITUDE	LONGITUDE
39.4541° N	76.4333° W
39.3783° N	76.3350° W
39.5450° N	76.0783° W
39.5775° N	75.9550° W
39.6325° N	75.7658° W
39.6800° N	75.7791° W
39.6600° N	76.0208° W
39.6008° N	76.1825° W
39.5258° N	76.3133° W
39.4558° N	76.4333° W

- BWI Airport bound by the following coordinates:

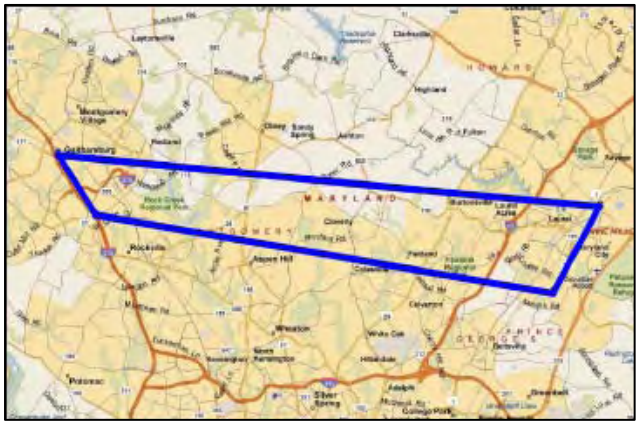
LATITUDE	LONGITUDE
39.1960° N	76.6979° W
39.1959° N	76.6427° W
39.1564° N	76.6424° W
39.1561° N	76.6984° W

- W.P. Lane (Chesapeake Bay) Bridge bound by the following coordinates:

LATITUDE	LONGITUDE
39° 1' 28" N	76° 24' 45" W
38° 59' 7" N	76° 19' 20" W
38° 58' 24" N	76° 19' 28" W
38° 59' 34" N	76° 23' 59" W
39° 0' 33" N	76° 24' 57" W
39° 1' 28" N	76° 24' 45" W
39° 0' 33" N	76° 24' 57" W
39° 1' 17" N	76° 27' 29" W
38° 59' 19" N	76° 30' 39" W
39° 0' 7" N	76° 31' 34" W
39° 2' 9" N	76° 27' 35" W
38° 59' 7" N	76° 19' 20" W
38° 58' 24" N	76° 19' 28" W
38° 57' 27" N	76° 12' 25" W
38° 58' 18" N	76° 12' 24" W

- Inter-County Connector bound by the following coordinates:

LATITUDE	LONGITUDE
39.1391°N	77.2104°W
39.1057°N	77.1833°W
39.0638°N	76.8584°W
39.1107°N	76.8254°W



- A one (1) mile radius around Route 50/301 between the William Lane Memorial Bridge and the Route 50/301 split.[1]
- A three (3) mile radius formed around the Nice Bridge and facilities.[2]

Region 2

- Caroline County
- Dorchester County
- Kent County
- Queen Anne's County
- Somerset County
- Talbot County
- Wicomico County
- Worcester County

Region 3

- Calvert County
- Charles County
- Montgomery County
- Prince George's County
- Saint Mary's County

[1] This area shall be transitioned to Region 2 as part of the Region 2 build out

[2] This area shall be transitioned to Region 3 as part of the Region 3 build out

Region 4

- Allegany County
- Garrett County
- Washington County

Urban Areas - Requiring 24 dB Building Loss

The areas shown below with a population greater than 1,000 people per square mile require the coverage design to include a total of 24 dB for building loss.

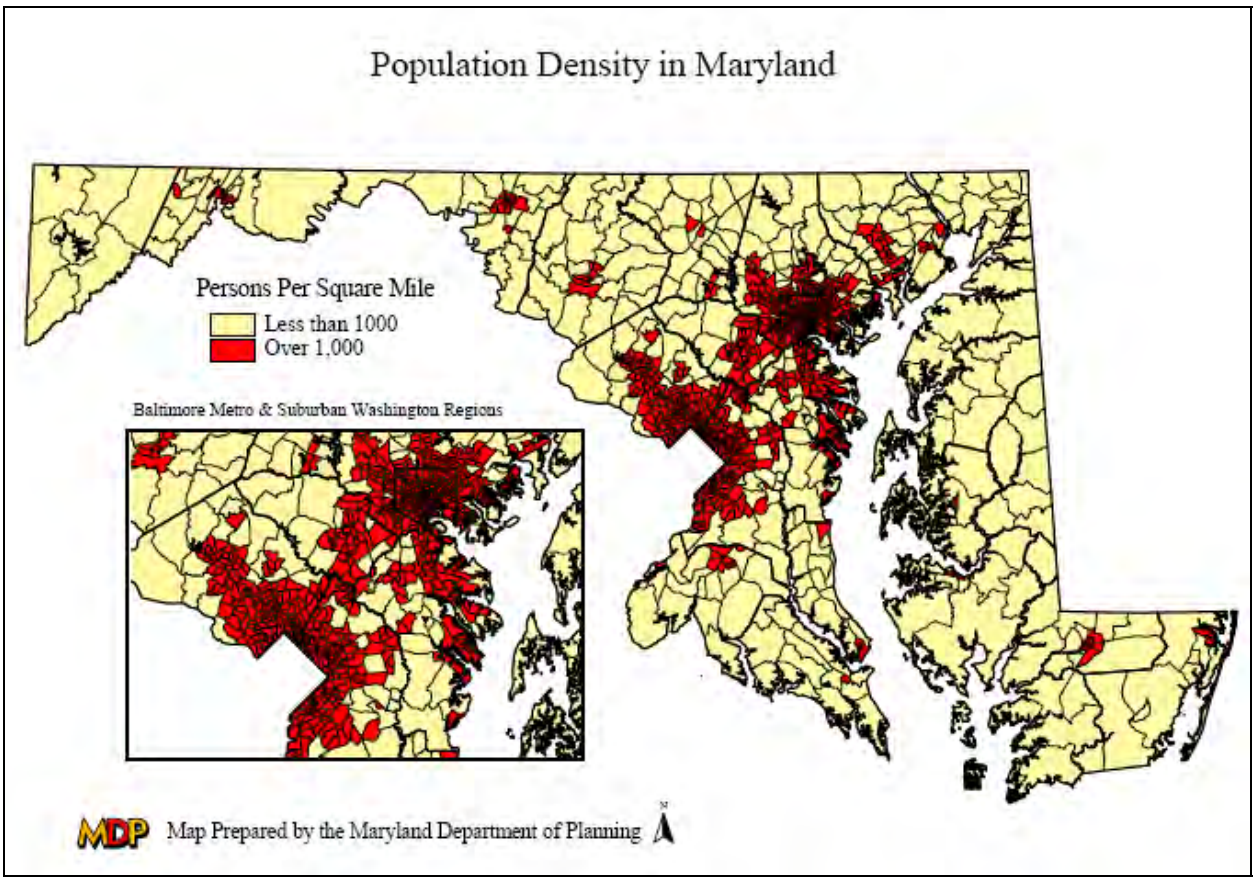


Figure 1: ***24 dB Building Loss in Areas of Population >1,000/sq. mile***

Maryland Incident Management Interoperable Communications System (MIMICS).

MIMICS is a Maryland State Police initiative designed to create connectivity between disparate radio systems for Incident Management between various Public Safety communication systems throughout the state of Maryland. The system consists of 18 cell sites with ACU1000 audio interconnect switches located in 18 counties. Each site can work independently or collectively using the statewide Public Safety Intranet. The sites contain 2 major radio groups. The first group of radios contain VHF and UHF base stations used to communicate on the nationwide VTac and UTac interop frequencies. The second group of radios allow interoperability with multiple local agencies within the tower cell region. The Wide Area Interoperability software allows usage and monitoring of all 18 sites from any MIMICS monitoring/control station located within the state. Additionally this software can connect radio systems in different cell sites together allowing patches, within cell and also cell to cell, to be created in any combination through out the state.

ACU – 1000 Site Locations

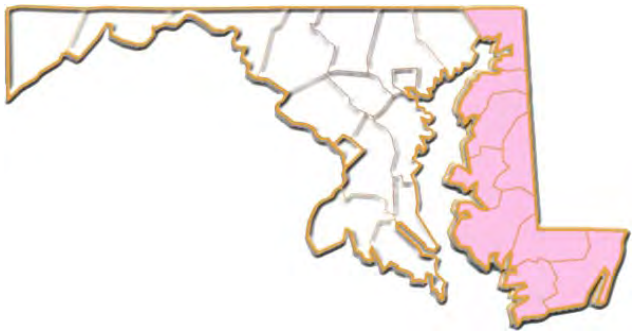
- Cecil County - North East State Police Barrack
- Queen Annes County - Centreville State Police Barrack/4H Tower Site
- Talbot County - Easton State Police Barrack
- Wicomico County - Salisbury State Police Barrack
- Somerset County - Princess Anne State Police Barrack
- Harford County - Madonna Tower Site
- Baltimore County - Cub Hill Tower Site
- Carroll County - Westminster State Police Barrack
- Howard County - Waterloo State Police Barrack
- Prince Georges County- College Park State Police Barrack
- Montgomery County - Rockville State Police Barrack
- Charles County - LaPlata State Police Barrack
- Calvert County - Prince Frederick State Police Barrack
- Frederick County - Frederick Law Enforcement Complex
- Allegany County - Cumberland State Police Barrack
- Garrett County - McHenry State Police Barrack
- Anne Arundel County - Parole Tower Site
- Worcester County - Berlin State Police Barrack

Maryland Eastern Shore Interoperability Network (MESIN).

MESIN will provide public safety communications connectivity to twelve designated mutual aid sites throughout the Eastern Shore, nine (9) County Dispatch Centers, Ocean City Dispatch, MEMA, and three State-Owned ACU-1000 sites. The project will utilize National Public Safety Planning Advisory Committee (NPSPAC) mutual aid frequencies combined with an IP based network consisting of gateways, routers, and a fully redundant switch. Mutual aid network users will automatically be connected to legacy system users whenever the dispatch center activates the designated talk groups and provides capabilities for cross-band inter-system operation. This approach will lead to enhanced interoperability and improved effectiveness for Maryland eastern shore public safety organizations.

The Maryland Eastern Shore Interoperability Network will provide public safety communications connectivity to 227 entities within the service area.

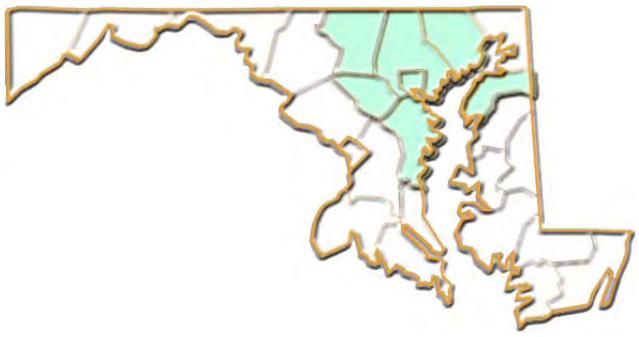
- 9 counties
- 57 municipalities
- 80 fire companies
- 61 ambulance companies
- 8 state agencies
- 7 federal agencies
- 3 utilities.



Central Maryland Area Regional Communications (CMARC) System.

The Central Maryland Area Regional Communications System will deploy infrastructure in the central Maryland area for region-wide use of the national calling and tactical 800 MHz channels (8TAC). These channels will provide another "layer" of communications interoperability for central Maryland emergency services providers.

All CMARC dispatch centers and field providers will have the ability to receive and transmit on the National Calling Channel (NCC) and all National Tactical Channels (NTACs). Communications on the NCC and any NTAC will be governed by protocols adopted by the CMARC Oversight Committee. MEMA will serve as the control point for the National mutual aid channels and will monitor the NCC at all times.



Project Team Members include representatives from all jurisdictions in the Baltimore Metro Statistical Area, as well as representatives from various county, state and federal agencies.

DPS Telecom — Product Summary

"Your Partners in Network Alarm Management"

NetGuardian 832A G4

The NEXT Evolution of the Popular 832A Line

With 8 serial ports, two separate Ethernet cards, SNMP v2c support, powerful alarm collection and versatile alarm reporting via SNMP Trap, email and pager, the NetGuardian 832A G4 can handle any alarm monitoring need.

NetGuardian 832A G4 Benefits

Now Featuring

- **Dual Ethernet for multiple network support**
- **8-RJ45 110K max baud serial port terminal server provides LAN Telnet access to remote equipment**
- **RoHS 5 compliant to meet overseas requirements**
- **Supports SNMP v2c Informs, v2c Traps and v1 Traps permits robust message delivery**
- **Firmware now upgradeable via LAN**
- **32 discrete alarms, 32 ping alarms, 8 analog alarms and 8 control relays**
- **Web interface: monitor without a master**
- **24/7 notification via email and alphanumeric pager ensures you will never miss a critical alarm**
- **Ability to expand to 176 discretes/32 control relays with NetGuardian Expansion Units**
- **Free lifetime firmware upgrades**
- **2-year hardware warranty**
- **30-DAY NO-RISK MONEY-BACK GUARANTEE**

Overview

The NetGuardian 832A G4 is a powerful, compact LAN-based alarm collector that provides network managers with remote visibility of their IP network elements. With 32 ping alarms, 32 discrete alarms, 8 analog inputs, and 8 controls, this versatile unit is the ideal network monitoring solution.

If an element fails to respond to successive pings, or if anything goes wrong with the environmental controls, the NetGuardian 832A notifies personnel using a variety of methods with a complete status message. Notification types include SNMP Traps, alphanumeric pager, numeric pager, text message, TCP text, T/MonXM, and E-mail. The unit also stores up to 100 events in its event log.

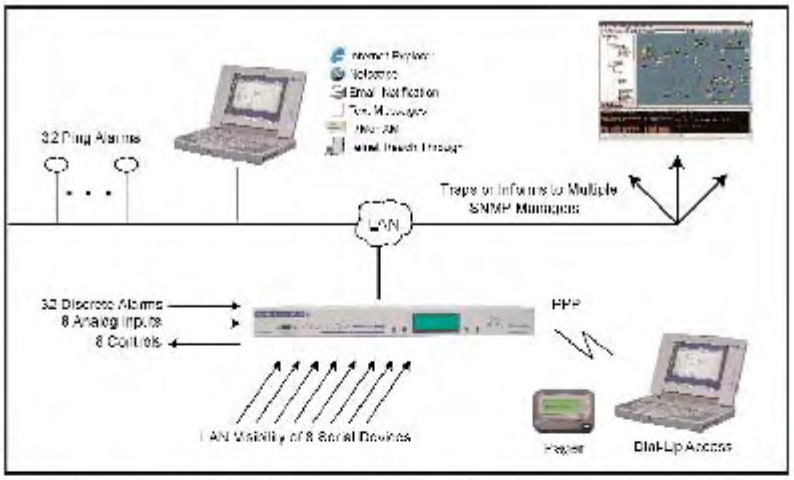
In addition to network and environmental alarms and controls, the NetGuardian also acts as a terminal server for 8 serial ports, thereby eliminating the need for dedicated circuits and the recurring monthly costs associated with such transports.

The NetGuardian 832A is easy to install, with connectors for all serial and LAN ports, alarm, analog, and control wiring. A hinged back panel with all wire wrap connections is also available for other installation options. The unit mounts quickly in either 19" or 23" equipment racks while occupying only one rack unit of space.

Provisioning of the NetGuardian 832A can be easily accomplished using any Web Browser or generic TTY terminal. This can be done on site, using the front panel craft port, or remotely via LAN (TELNET) or dial-up modem. The entire configuration is saved on the NetGuardian 832A where it remains secure through power outages in non-volatile RAM.

Additional options include a built in sensor power supply, dual power feeds, and integrated temperature and battery sensors.

The versatility, capacity, and reliability of the NetGuardian 832A are the reasons why it is the standard for network alarm monitoring needs.



The NetGuardian 832A monitors IP aware devices' network presence as well as interfaces discrete alarm points and controls at network sites.

Stand-alone monitoring via Web Interface

The NetGuardian offers a Web Browser interface for easy and convenient alarm management and unit configuration via Internet or Intranet. The user friendly interface allows complete access to all the functions of the unit and enables the user to quickly set up alarm point descriptions, view alarm status, issue controls, and configure paging information, as well as additional options.

View and configure the NetGuardian via a Web Browser over LAN.

TTY Interface

In addition to the Web Browser interface, the NetGuardian provides a menu-style TTY interface for basic configuration, which may be accessed via the craft port, dial-up port or Telnet session via LAN.

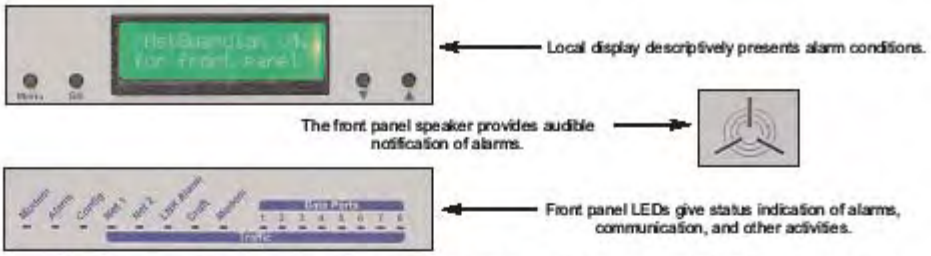
Alarm Reporting

The NetGuardian 832A reports discrete alarms, relay status, analog alarms, and network equipment failures over the LAN/WAN to an SNMP manager or to the DPS Telecom IAM-S Network Alarm Management System.

- ***SNMP Trap Reporting*** - The NetGuardian can report directly to an SNMP Manager and will respond to SNMP queries and commands. Multiple SNMP managers at multiple IP addresses are also supported by the NetGuardian. Communication may be achieved via PPP (dial-up) or LAN.
- ***T/Mon NOC Support*** - The NetGuardian 832A can also report to a T/Mon NOC Network Alarm Monitoring System via LAN and dedicated serial communications links. In case of primary path failure, the system will automatically fall back to the alternate path dial-up, ensuring alarm data won't be lost when it's needed most. The modems can also be used as the primary communication method for "Off Net" sites.

Reach-Through Ports

The NetGuardian's reach-through ports permit multiple Telnet sessions and a dial-up session to connect through to serial ports connected to the administration ports of your network equipment. This gives your staff the ability to assess and repair your network faster without having to be physically present at the network site. It is also cost effective because there is no need to purchase a dedicated terminal server.



The NetGuardian front panel provides audible notification, an LCD menu, and LED status indicators for simple, detailed, and fast diagnosis.

24/7 pager and email alerts

Out of the box, the NetGuardian 832A supports 24/7 pager and email reporting. Send alarms directly to maintenance technicians in the field, even when no one's in the office.

Dual NIC security model

For enhanced security, the NetGuardian 832A G4 has two separate NICs. This allows you to connect the NetGuardian-16S to two separate networks, and allows users on separate networks to access the same unit.

SNMP v2c Informs for robust message delivery

The NetGuardian 832A supports SNMP v2c Informs, as well as SNMP v2c and v1Traps. SNMP v2c Inform messages provide confirmed delivery of alarms. When an SNMP manager receives an Inform message, it sends a confirmation response to the SNMP agent. If the agent doesn't receive the confirmation response, it resends the Inform.

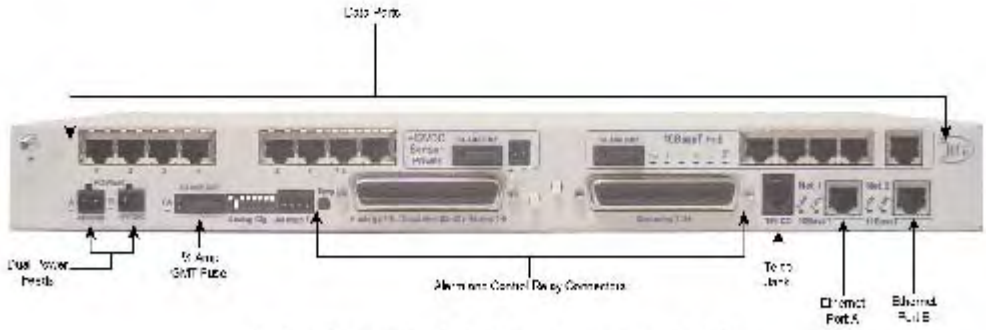
NG Edit 4

NG Edit4 allows you to create configuration files without being connected to the NetGuardian. Download the files to the NetGuardian via LAN or upload current files for backup.

Optional Features

The following features are available for the NetGuardian:

- ***NEBS Level 3 Certification*** - NEBS certification ensures that the NetGuardian has undergone rigorous tests including electrical, magnetic, safety, and mechanical.
- ***Built-in sensor power supply*** - Eliminates the need for an additional power supply for your sensors –12 or –24V).
- ***Dual power feeds*** - Provides an alternate power input in the event one power source fails.
- ***Integrated temperature and battery sensors*** - Eliminates the cost and setup time of installing external sensors.



NetGuardian rear view featuring easy-to-use connectorization.

Accessories

NetGuardian Expansions

Up to three NetGuardian 48 discrete point expansion cards can be added to monitor sites with higher point capacity requirements.

Unit	Capacity
Base NG	32
1 DX	80
2 DX	128
3 DX	176

Hinged Back Panel

The hinged wire wrap back panel offers alternate connectivity options.

GLD Support

The optional GLD (General LCD Display) can be connected to the NetGuardian providing remote audible notification and LCD viewing and interaction. Up to three GLDs can be daisy-chained to the NetGuardian.

Building Access System

The Building Access System gives network alarm managers the ability to control and regulate door entry access.

Specifications

Dimensions:	1.75" H x 17" W x 12" D (4.5 cm x 43.2 cm x 30.5 cm)
Weight:	4 lbs. 3 oz. (1.9 kg)
Mounting:	19" or 23" rack
Power Input:	–48VDC (–40 to –56VDC) (Optional) –24 VDC (–18 to –36 VDC), (Optional) Wide Range –24/–48 VDC (–18 to –72 VDC)
Current draw:	200mA
Interfaces:	8 RJ45 Yost RS-232 ports 2 RJ45 Ethernet 10baseT port 1 RJ11 Telco jack 2 50-pin amphenol connectors (discretes, controls, and analogs)
Protocols:	SNMPv1, SNMPv2c, or DCP (depending on firmware ordering options), TAP (Alpha) paging, and Numeric paging
Modem:	33.6K internal
Discrete Alarm Inputs:	32
Control Outputs:	8 FormC
Max. Voltage:	60 VDC/120 VAC
Max. Current:	1 Amp, AC/DC
PPP:	Permanent, Backup, or On-demand
Ping Alarms:	32
Analog Alarms:	8
Input Range:	–94 to +94 VDC or 4 to 20 mA
Operating Temperature:	32° to 140°F (0°- 60°C)
Operating Humidity:	0% to 95% non-condensing
Fuse:	3/4 Amp GMT for power inputs 1/4 Amp GMT for external sensor power outputs and integrated Ethernet hub

Ordering Options

NetGuardian 832A	32 discrete alarms, 32 ping alarms, 8 analog alarms, 8 control relays, 8 serial ports
NetGuardian-C	16 discrete alarms, 16 ping alarms, 2 analog alarms, 2 control relays, 4 serial ports
NetGuardian-CS	16 discrete alarms, 16 ping alarms, 2 analog alarms, 2 control relays, 8 serial ports
NetGuardian-CA	16 discrete alarms, 16 ping alarms, 4 analog alarms, 2 control relays, 8 serial ports
NetGuardian Migration Pkg	Feature code that permits easy field upgrades from a "C" to a full version

Available in: –48VDC, –24VDC, +24VDC, and wide range versions

Call 1-800-622-3314 for Pricing

All DPS Telecom products are backed by our 30-Day, No-Risk Guarantee:
"If you buy our equipment and are not satisfied for any reason during the first 30 days, simply return it for a full refund."

Visit our website at www.dpstele.com
4955 East Yale Avenue, Fresno, California 93727 • 800-622-3314 • Fax 559-454-1688

APPENDIX 6
Dispatch Point Location and Console Capacity

	AGENCY	CONSOLE LOCATION (PHYSICAL ADDRESS)	MANUFACTURER	MODEL NAME	MODEL NUMBER	YEAR PURCHASED	OPERATOR POSITIONS (Enter Quantity)	RADIO CHANNELS (Enter Quantity)	AUXILIARY FUNCTIONS (Enter Quantity)	LOGGING RECORDER (Y OR N)	LOGGING RECORDER CHANNELS (Enter Quantity)	COMMENTS
1	MIEMSS	653 West Pratt Street, Baltimore MD 21201	Motorola	Centracom II	68000 Series	2001	10	40	376	Y	64 Analog	Conventional Button Console with Special Modifications
2	MIEMSS	Shock Trauma Center, Baltimore MD 21201	Motorola	Centracom II	68000 Series	2001	3	40	376	N		Conventional Button Console with Special Modifications
3	MIEMSS	Allegany 911, Cumberland	Motorola	Centracom II	6800 Series	2006	3	6	120	N		Conventional Button Console with Special Modifications
4	MIEMSS	Talbot 911, Easton	Motorola	Centracom II	6800 Series	2000	2	6	60	N		Conventional Button Console with Special Modifications
5	MIEMSS	Worcester 911, Snow Hill	Motorola	Centracom II	6800 Series	1995	1	10	60	N		Conventional Button Console with Special Modifications
6	MIEMSS	Wicomico 911, Salisbury	Motorola	Centracom II	6800 Series	1995	1	10	60	N		Conventional Button Console with Special Modifications
7	SHA	Hanover	Orbacom	T5?	?	?	15	?	?	?	?	Networked with MEMA, College Park Chart, and Golden Ring Chart. All modules have hot standby units.
8	MdTA FMT E.V.Bldg	2301 S.Clinton st.Baltimore, MD 21224	Orbacom	TDM-150	TDM-150	198..	1	4	N/A	Y	3	Modified in 2002
9	MdTA Port Admin.	603 Harbor Field Rd. Baltimore, MD 21222	Zetron	4010	4010	2002	1	3	N/A	Y	1	
10	MdTA LMB	881 Oceanic Dr. Annapolis, MD 21401	Zetron	4010	4010	2006	1	4	N/A	Y	1	
11	MdTA JFK Admin.	1 Turnpike Dr. Perryville, MD 21903	Ultra-Com	Ultra-Com 96		1996	2	see comments	see comments	Y	see comments	More info. available at MSP
12	MSP	Westminster Barrack	Mod-u-Com	Ultrcom 96		1981	2	5 Multi-Channel Base Stations	Door Switches	Yes	12	2 way patch @ EOC with Low Band and 800 MHz system
13	MSP	Forrestville Barrack	Zetron	4010		2000	2	6 Multi-Channel Base Stations	Door Switches	Yes	12	Remote unit located at Duty Officer location connected to secondary base station
14	MSP	Leonardtown Barrack	Zetron	4010		2000	2	6 Multi-Channel Base Stations	Door Switches	Yes	12	Remote unit located at Duty Officer location connected to secondary base station. Of the 6 base stations, 1 unit is County programmed 800 MHz base station. 2way patch @ EOC with Low Band and 800 MHz system
15	MSP	Waterloo Barrack	Zetron	4010		1999	2	7 Multi-Channel Base Stations	Door Switches	Yes	12	Remote unit located at Duty Officer location connected to secondary base station. Of the 7 base stations, 1 unit is County programmed 800 MHz base station. 2 way patch @EOC with Low Band and 800 MHz system
16	MSP	Glen Burnie Barrack	Zetron	4010		2002	2	7 Multi-Channel Base Stations	Door Switches	Yes	12	Remote unit located at Duty Officer location connected to secondary base station. Of the 7 base stations, 1 unit is County programmed 800 MHz base station.
17	MSP	College Park Barrack	Zetron	4010		2001	2	5 Multi-Channel Base Stations	Door Switches	Yes	12	Remote unit located at Duty Officer location connected to secondary base station
18	MSP	Pikesville Headquarters	Motorola	Centracom		?	1	4 Multi-Channel Base Stations	Door Switches	Yes	8	
19	MSP	North East Barrack	Orbacom	TDM-150		2004	3	7 Multi-Channel Base Stations	Door Switches & telephone answering	Yes	12	Of the 7 base stations, 2 are Cecil County VHF Trucked programmed base stations. 2 way patch @ EOC with Low Band and VHF Trunking system.
20	MSP	Easton Barrack	Orbacom	TDM-150		2005	3	10 Multi-Channel Base Stations	Door Switches & telephone answering	Yes	12	Of the 10 base stations, 2 are Tri-County 800 MHz programmed base stations. 1 way patch @MSP with Low Band and 800 MHz system.
21	MSP	Frederick Law Mall	Motorola	Share with County Golden Ellite Console system		2000		6 Multi-Channel Base Stations		Yes	10	2 way patch @ EOC with Low Band and 800 MHz system
22	MSP	Golden Ring Barrack	Orbacom			1986	2	7 Multi-Channel Base Stations	Door Switches	Yes	12	Remote unit located at Duty Officer location connected to secondary base station
23	MSP	Cumberland Barrack	Orbacom			1986	2	8 Multi-Channel Base Stations	Door Switches	Yes	10	Remote unit located at Duty Officer location connected to secondary base station. Of the 8 base stations, 1 unit is County programmed 800 MHz base station.
24	MSP	Bel Air Barrack	Orbacom			1986	2	7 Multi-Channel Base Stations	Door Switches	Yes	12	Remote unit located at Duty Officer location connected to secondary base station. Of the 7 base stations, 1 unit is County programmed 800 MHz base station. 2 way patch @ EOC with Low Band and 800 MHz system.

APPENDIX 6
Dispatch Point Location and Console Capacity

	AGENCY	CONSOLE LOCATION (PHYSICAL ADDRESS)	MANUFACTURER	MODEL NAME	MODEL NUMBER	YEAR PURCHASED	OPERATOR POSITIONS (Enter Quantity)	RADIO CHANNELS (Enter Quantity)	AUXILIARY FUNCTIONS (Enter Quantity)	LOGGING RECORDER (Y OR N)	LOGGING RECORDER CHANNELS (Enter Quantity)	COMMENTS
25	MSP	Annapolis Barrack	Orbacom			1986	2	7 Multi-Channel Base Stations	Door Switches	Yes	10	Remote unit located at Duty Officer location connected to secondary base station. Of the 7 base stations, 1 unit is County programmed 800 MHz base station.
26	MSP	Prince Frederick Barrack	Orbacom			1986	2	6 Multi-Channel Base Stations	Door Switches	Yes	10	Remote unit located at Duty Officer location connected to secondary base station. Of the 6 base stations, 1 unit is County programmed 800 MHz base station. 1 way patch @ MSP with Low Band and 800 MHz
27	MSP	Hagerstown Barrack	Orbacom			1987	2	5 Multi-Channel Base Stations	Door Switches	Yes	10	Remote unit located at Duty Officer location connected to secondary base station
28	MSP	Berlin Barrack	Orbacom			1987	2	6 Multi-Channel Base Stations	Door Switches	Yes	12	Remote unit located at Duty Officer location connected to secondary base station. Of the 6 base stations, 1 unit is County programmed 800 MHz base station. 1 way patch @ MSP with Low Band and 800 MHz
29	MSP	Salisbury Barrack	Orbacom			1987	2	6 Multi-Channel Base Stations	Door Switches	Yes	10	Remote unit located at Duty Officer location connected to secondary base station. Of the 6 base stations, 1 unit is County programmed 800 MHz base station. 2 way patch @ MSP with Low Band and 800 MHz
30	MSP	La Plata Barrack	Zetron	4010		2000	2	7 Multi-Channel Base Stations	Door Switches	Yes	10	Remote unit located at Duty Officer location connected to secondary base station. Of the 7 base stations, 1 unit is County programmed 800 MHz base station. 1 way patch @ MSP with Low Band and 800 MHz
31	MSP	Centreville Barrack	Orbacom			1987	2	10 Multi-Channel Base Stations	Door Switches	Yes	12	Remote unit located at Duty Officer location connected to secondary base station. Of the 10 base stations, 1 unit is County programmed 800 MHz base station. 1 way patch @ MSP with Low Band and 800 MHz
32	MSP	Rockville Barrack	Orbacom			1987	2	5 Multi-Channel Base Stations	Door Switches	Yes	10	Remote unit located at Duty Officer location connected to secondary base station. Of the 5 base stations, 1 unit is County programmed 800 MHz base station. 2 way patch @ EOC with Low Band and 800 MHz
33	MSP	McHenry Barrack	Orbacom	TDM-150		1995	2	7 Multi-Channel Base Stations	Door Switches & telephone answering	Yes	10	Remote unit located at Duty Officer location connected to secondary base station
34	MSP	JFK Barrack	Mod-u-Com	Utracom 96		1996	2	5 Multi-Channel Base Stations	Door Switches	Yes	10	Remote unit located at Duty Officer location connected to secondary base station. 1 way patch between Low Band and JFK Highway Maint. VHF High Band
35	MSP	Princess Anne Barrack	Zetron	4010		2001	1	5 Multi-Channel Base Stations	Door Switches	Yes	10	Remote unit located at Duty Officer location connected to secondary base station. Of the 5 base stations, 1 unit is County programmed 800 MHz base station. 2 way patch @ EOC with Low Band and 800 MHz
36	DNR	TAWES Dispatch; 580 Taylor Avenue, Basement	ModUComm	Ultra Com NT		2002	7	84	Door Switches, PBX	Yes	48	
37	DNR	NRP Gwynnbrook S/N 110075	ZETRON	4010		2007	2	10	N/A	No	0	
38	DNR	NRP Hillsboro S/N 110078	ZETRON	4010		2007	2	10	N/A	No	0	
39	DNR	NRP Waldorf S/N 110076	ZETRON	4010		2007	2	10	N/A	No	0	
40	DNR	NRP Johnson	ZETRON	4010		2007	2	10	N/A	No	0	
41	DNR	NRP Waldorf	VEGA	1610			1	6	N/A	N	0	
42	DNR	NRP Gwynnbrook	VEGA	1616			1	8	N/A	N	0	
43	DNR	NRP TOWN HILL	VEGA	2002			1	2	N/A	N	0	

APPENDIX 6
Dispatch Point Location and Console Capacity

LINE	AGENCY	CONTROL STATION / DESKTOP REMOTE CONTROLLER LOCATION (PHYSICAL ADDRESS)	QTY.	MANUFACTURER	MODEL NAME	MODEL NUMBER	YEAR PURCHASED	Wireline or RF (Enter W or R)	Control Line QTY	RADIO CHANNELS (Enter Quantity)	AUXILIARY FUNCTIONS (Enter Quantity)	LOGGING RECORDER (Y OR N)	LOGGING RECORDER CHANNELS (Enter Quantity)	COMMENTS
1	SHA	Statewide	65					R				N		800 MHz SYSTEM INTERFACE
2	SHA	Statewide	600					W	2	16		N		Local Facility Use
3	SHA	Statewide	100					W	10	16		N		Local Facility Use
4	MdTA FMT Maint.	4000 Leland Ave. Baltimore, MD 21224	1	MA/Com	Orion	DSDX03	1998	R	1	4	N/A	Y	4	Recorder is at FMT
5	MdTA W.Garage	N/A	1	Kenwood		TK-790/890	2005	R	1	4	N/A	Y	4	Recorder is at FMT
6	MdTA E.Garage	3990 Leland Ave.Baltimore, MD 21224	1	Kenwood		TK-790/890	2005	R	1	4	N/A	Y	4	Recorder is at FMT
7	MdTA BHT Admin.	1200 Frankfurst Ave. Baltimore, MD 21226	1	Motorola	Astro Spectra	L04RKH9PW9AN	2004	R	1	4	N/A	Y	4	Recorder is at FMT
8	MdTA FSK Police	301 Authority Dr.Baltimore, MD 21222	1	Motorola/ Kenwood	Astro Spectra	L04RKH9PW9AN,TK790/890	2004/2006	R	1	4	N/A	Y	4	Recorder is at FMT
9	MdTA FSK Maint.	304 Authority Dr.Baltimore, MD 21222	1	GE		NBA203	1998	R	1	4	N/A	Y	4	Recorder is at FMT
10	MdTA HMB	6000 Pulaski hwy. Baltimore , MD 21903	1	Motorola/ Kenwood	Astro Spectra	L04KKH9PW9AN, TK790/890	2005/2006	R	1	4	N/A	Y	4	
11	MdTA NMB	9665 Orland Park Rd., Newburg, MD 20664	1	Motorola/ Kenwood	Astro Spectra	L04RKH9PW9AN, TK790/890	2002/2005	R	1	4	N/A	Y	4	
12	MdTA Port Admin.Police	603 Harbor Field Rd., Baltimore, MD 21222	1	Kenwood		TK-630/730	2000	R	1	4	N/A	Y	4	
13	MdTA LMB Admin.	850 Revell Highway, Annapolis, MD 21903	1	CPI		DR20	2005	W	1	2	N/A	Y	4	
14	MdTA JFK Maint.1	2819 BelCamp Rd., Belair, MD 21015	1	CPI		DR20	2001	W	1	2	N/A	Y	2	Recorder is at HMB
15	MdTA JFK Maint.2	568 Bouchelle Rd.Alkton, MD 21921	1	CPI		DR20	2001	W	1	2	N/A	Y	2	Recorder is at HMB
16	MdTA JFK Admin.	1 Turnpike Dr. Perryville MD 21903	1	Motorola,MA/Com	Astro Spectra, Orion	L20URS9PW18N, DSDX04	2007	R	1	6	N/A	Y	unknown	More info.available at Cecil & Harford County
17	MSP - Aviation	Martins Airport	1	Mobile Radio Units				R	1	6	N/A	N	N/A	
18	MSP - Aviation	Andrews Air Force Base	1	Mobile Radio Units				R	1	6	N/A	N	N/A	
19	MSP - Aviation	Frederick Airport	1	Mobile Radio Units				R	1	6	N/A	N	N/A	
20	MSP - Aviation	Salisbury Airport	1	Mobile Radio Units				R	1	6	N/A	N	N/A	
21	MSP - Aviation	Cumberland	1	Mobile Radio Units				R	1	6	N/A	N	N/A	
22	MSP - Aviation	Centreville	1	Mobile Radio Units				R	1	6	N/A	N	N/A	
23	MSP - Aviation	St. Mary's Airport	1	Mobile Radio Units				R	1	6	N/A	N	N/A	
24	MSP - Aviation	Norwood	1	Mobile Radio Units				R	1	6	N/A	N	N/A	
25	MSP - CVED	CVED Headquarters - Linthicum	1	Mobile Radio Units				R	1	32	N/A	N	N/A	
26	MSP - CVED	Finzel Scalehouse	1	Mobile Radio Units				R	1	32	N/A	N	N/A	
27	MSP - CVED	New Market Scalehouse	1	Mobile Radio Units				R	1	32	N/A	N	N/A	
28	MSP - CVED	Hyattsvilolle Scalehouse	1	Mobile Radio Units				R	1	32	N/A	N	N/A	
29	MSP - CVED	Park & Ride Scalehouse	1	Mobile Radio Units				R	1	32	N/A	N	N/A	
30	MSP - CVED	Upper Marlboro Scalehouse	1	Mobile Radio Units				R	1	32	N/A	N	N/A	
31	MSP - CVED	Parkton Scalehouse	1	Mobile Radio Units				R	1	32	N/A	N	N/A	
32	MSP - CVED	Conowingo Scalehouse	1	Mobile Radio Units				R	1	32	N/A	N	N/A	
33	MSP - CVED	Cecilton Scalehouse	1	Mobile Radio Units				R	1	32	N/A	N	N/A	
34	MSP - CVED	Delmar Scalehouse	1	Mobile Radio Units					1					
35	MSP	Governor's Mansion	1	Mobile Radio Units				R	1	4	Encrypted	N	N/A	
36	MSP	Legislature Services Building	1	SSC Remote				W	1	1	N/A	N	N/A	
37	MSP	DMV - Glen Burnie	1	General Electric				W	1	4		N	N/A	Shared base station with Glen Burnie Barracks
38	DNR	Assateague S.P. Camp Office	1	Vertex	VX-4000V			R			N/A	N	N/A	Local Control Point
39	DNR	Assateague S.P. Main Office	1	Vertex	VX-4000V			R						
40	DNR	Assateague S.P. Maint. Office	1	GE	Phoenix			R						
41	DNR	Big Savage Tawes Forestry Control	1	Kenwood	TKR-750			W	1					

LINE	AGENCY	CONTROL STATION / DESKTOP REMOTE CONTROLLER LOCATION (PHYSICAL ADDRESS)	QTY.	MANUFACTURER	MODEL NAME	MODEL NUMBER	YEAR PURCHASED	Wireline or RF (Enter W or R)	Control Line QTY	RADIO CHANNELS (Enter Quantity)	AUXILIARY FUNCTIONS (Enter Quantity)	LOGGING RECORDER (Y OR N)	LOGGING RECORDER CHANNELS (Enter Quantity)	COMMENTS
42	DNR	Billmeyer WMA	1	GE	Phoenix			R						
43	DNR	Black Hills Forestry	1	Vertex	VX-4000V			R						
44	DNR	Cederville	1	Vertex	VX-5500V			R						
45	DNR	Centerville Forestry Office	1	Vertex	VX-5500V			R						
46	DNR	Choptank Fishing Pier	1	GE	Phoenix SX			R						
47	DNR	Cunningham Falls SP Manor area	1	GE	Phoenix			R						
48	DNR	Elk Neck Forestry	1	BK	GMH5992X			R						
49	DNR	Fair Hill	1	Vertex	VX-5500V			R						
50	DNR	Fair Hill NRMA	1	BK	EMH5990A			R						
51	DNR	Gambrill SP	1	Vertex	VX-3000			R						
52	DNR	Hickory 911 Tower	1	Kenwood	TKR-750			W						
53	DNR	Indian Springs WMA	1	Vertex	VX-4000V			R						
54	DNR	Janes Island - Main Office	1	Vertex	VX-4000V			R						
55	DNR	Janes Island Camp Store	1	BK	King			R						
56	DNR	Johnson	1	Kenwood	TKR-750			W						
57	DNR	Madonna Forestry Ranger Station	1	BK	GMH5992X			R						
58	DNR	Martinak Forestry office	1	GE	Phoenix SX			R						
59	DNR	Millington WMA	1	GE	Phoenix			R						
60	DNR	Millington WMA	1	GE	Phoenix mobile			R						
61	DNR	Nassawango Tower	1	GE	Master II			W						
62	DNR	Nassawango Tower	1	GE	Master II			W						
63	DNR	Nassawango Tower	1	GE	Master II			W						
64	DNR	New Germany SP / Savage River SF	1	Kenwood	TKR-750			W						
65	DNR	Patapsco Park Avalon area	1	Vertex	VX-4000V			R						
66	DNR	Patapsco Park McKeldin area	1	Tait	T800			W						
67	DNR	Patapsco Park HQ. Hollifield	1	GE	D176TBU66A			W						
68	DNR	Patapsco Park Pickall area	1	Vertex	VX-4000V			R						
69	DNR	Pokomoke S.P.	1	Kenwood	TKR-750			W						
70	DNR	Powellville Forestry Office	1	Tait				R						
71	DNR	Rocks tower N. Parks	1	Kenwood	TKR-750			W						
72	DNR	Rocky Gap Camper contact	1	Vertex	VX-3000			R						
73	DNR	Rocky Gap campstore	1	GE	Phoenix			R						
74	DNR	Rocky Gap maintenance	1	GE	Phoenix			R						
75	DNR	Rocky Gap ROG	1	Kenwood	TKR-780			R						
76	DNR	Rocky Gap S.P. Main office	1	Kenwood	TKR-750			W						
77	DNR	Sandy Point S.P	1	Kenwood	TKR-750			W						
78	DNR	Seneca Creek Park	1	Kenwood	TKR-750			W						
79	DNR	Smallwood	1	Kenwood	TKR-750			W						
80	DNR	Smallwood S.P. Park office	1	Motorola	Maxtrac			R						
81	DNR	Swallow Falls S.P.	1	Vertex	VX-4000V			R						
82	DNR	Thayerville	1	Tait	High Sierra			W						

LINE	AGENCY	CONTROL STATION / DESKTOP REMOTE CONTROLLER LOCATION (PHYSICAL ADDRESS)	QTY.	MANUFACTURER	MODEL NAME	MODEL NUMBER	YEAR PURCHASED	Wireline or RF (Enter W or R)	Control Line QTY	RADIO CHANNELS (Enter Quantity)	AUXILIARY FUNCTIONS (Enter Quantity)	LOGGING RECORDER (Y OR N)	LOGGING RECORDER CHANNELS (Enter Quantity)	COMMENTS
83	DNR	Thayerville Deep Creek Lake S.P.	1	Kenwood	TKR-750			W						
84	DNR	Town Hill NRP office	1	Vertex	VX-4000V			R						
85	DNR	Town Hill NRP Tawes control	1	Kenwood	TKR-750			W						
86	DNR	Town Hill NRP Town Hill control	1	Kenwood	TKR-750			W						
87	DNR	Tuckahoe SP Office	1	Vertex	VX-5500V			R						
88	DNR	Tuckahoe State Park - Shop	1	Tait				W						
89	DNR	Vienna Tower	1	Kenwood	TKR-750			W						
90	DNR	Waldorf	1	Kenwood	TKR-750			W						
91	DNR	Waldorf	1	Motorola	MTR2000			W						
92	DNR	Washington Monument	1	Vertex	VX-5500V			R						
93	DNR	WMPT Owings Mills	1	Kenwood	TKR-750			W						
94	DNR	Various Parks and Forestry offices		AEE	RT-31			W	1	>1				Telephone Style Desk Top Single line control
95	DNR	Various Parks and Forestry offices		SSC	831AY			W	1	>1				Desk Top Multi-channel Single line control
96	DNR	Various Parks and Forestry offices		SSC	834AY			W	1	>1				Desk Top Multi-channel Single line control
97	DNR	Various Parks and Forestry offices		GE	MASTR Controller			W	1	>1				Desk Top Multi-channel Single line control
98	DNR	Various Parks and Forestry offices		Vega	C-2000HS			W	1	>1				Desk Top Multi-channel Single line control

120’ TOWER

	Top	120	BMR-12	0°	800 MHZ	1 5/8"
	Top	120	BMR-12	120°	800 MHZ	1 5/8"
	Top	120	BMR-12	240°	800 MHZ	1 5/8"
	Top Less 20’	100	BMR-12	0°	800 MHZ	1 5/8"
	Top Less 20’	100	BMR-12	120°	800 MHZ	1 5/8"
	Top Less 20’	100	BMR-12	240°	800 MHZ	1 5/8"
	Top Less 30’	90	8' HP Solid Dish	0°	6.000 GHz	EW63
	Top Less 30’	90	8' HP Solid Dish	120°	6.000 GHz	EW63
	Top Less 30’	90	8' HP Solid Dish	240°	6.000 GHz	EW63
	Top Less 40’	80	BMR-12	60°	800 MHZ	1 5/8"
	Top Less 40’	80	BMR-12	180°	800 MHZ	1 5/8"
	Top Less 40’	80	BMR-12	300°	800 MHZ	1 5/8"
	Top Less 60’	60	DB 224	0°	138-174 MHZ	7/8"
	Top Less 60’	60	DB 224	120°	138-174 MHZ	7/8"
	Top Less 60’	60	DB 224	240°	138-174 MHZ	7/8"

180' TOWER

	Top	180	BMR-12	0°	800 MHZ	1 5/8"
	Top	180	BMR-12	120°	800 MHZ	1 5/8"
	Top	180	BMR-12	240°	800 MHZ	1 5/8"
	Top Less 20'	160	BMR-12	0°	800 MHZ	1 5/8"
	Top Less 20'	160	BMR-12	120°	800 MHZ	1 5/8"
	Top Less 20'	160	BMR-12	240°	800 MHZ	1 5/8"
	Top Less 40'	140	BMR-12	0°	800 MHZ	1 5/8"
	Top Less 40'	140	BMR-12	120°	800 MHZ	1 5/8"
	Top Less 40'	140	BMR-12	240°	800 MHZ	1 5/8"
	Top Less 80'	120	DB 224	0°	138-174 MHZ	7/8"
	Top Less 80'	120	DB 224	120°	138-174 MHZ	7/8"
	Top Less 80'	120	DB 224	240°	138-174 MHZ	7/8"
	Top Less 80'	100	8' HP Solid Dish	0°	6.000 GHz	EW63
	Top Less 80'	100	8' HP Solid Dish	120°	6.000 GHz	EW63
	Top Less 80'	100	8' HP Solid Dish	240°	6.000 GHz	EW63
	Top Less 100'	80	DAPA 59210 Panel Antenna Array	360°	1710-1990 MHZ	24 X 1 5/8"
	Top Less 120'	60	DB858HV90E-SX Panel Antenna	360°	806-896 MHZ	6 X 1 5/8"

330' TOWER

	Top	330	BMR-12	0°	800 MHZ	1 5/8"
	Top	330	BMR-12	120°	800 MHZ	1 5/8"
	Top	330	BMR-12	240°	800 MHZ	1 5/8"
	Top Less 20'	310	BMR-12	0°	800 MHZ	1 5/8"
	Top Less 20'	310	BMR-12	120°	800 MHZ	1 5/8"
	Top Less 20'	310	BMR-12	240°	800 MHZ	1 5/8"
	Top Less 40'	290	BMR-12	0°	800 MHZ	1 5/8"
	Top Less 40'	290	BMR-12	120°	800 MHZ	1 5/8"
	Top Less 40'	290	BMR-12	240°	800 MHZ	1 5/8"
	Top Less 60'	270	DB 420-D	0°	450 MHZ Dual fed antenna	2 X 7/8"
	Top Less 60'	270	DB 420-D	120°	450 MHZ Dual fed antenna	2 X 7/8"
	Top Less 60'	270	DB 420-D	240°	450 MHZ Dual fed antenna	2 X 7/8"
	Top Less 80'	250	DB 224	0°	138-174 MHZ	7/8"
	Top Less 80'	250	DB 224	120°	138-174 MHZ	7/8"
	Top Less 80'	250	DB 224	240°	138-174 MHZ	7/8"
	Top Less 100'	230	DAPA 59210 Panel Antenna	360°	1710-1990 MHZ	24 X 1 5/8"

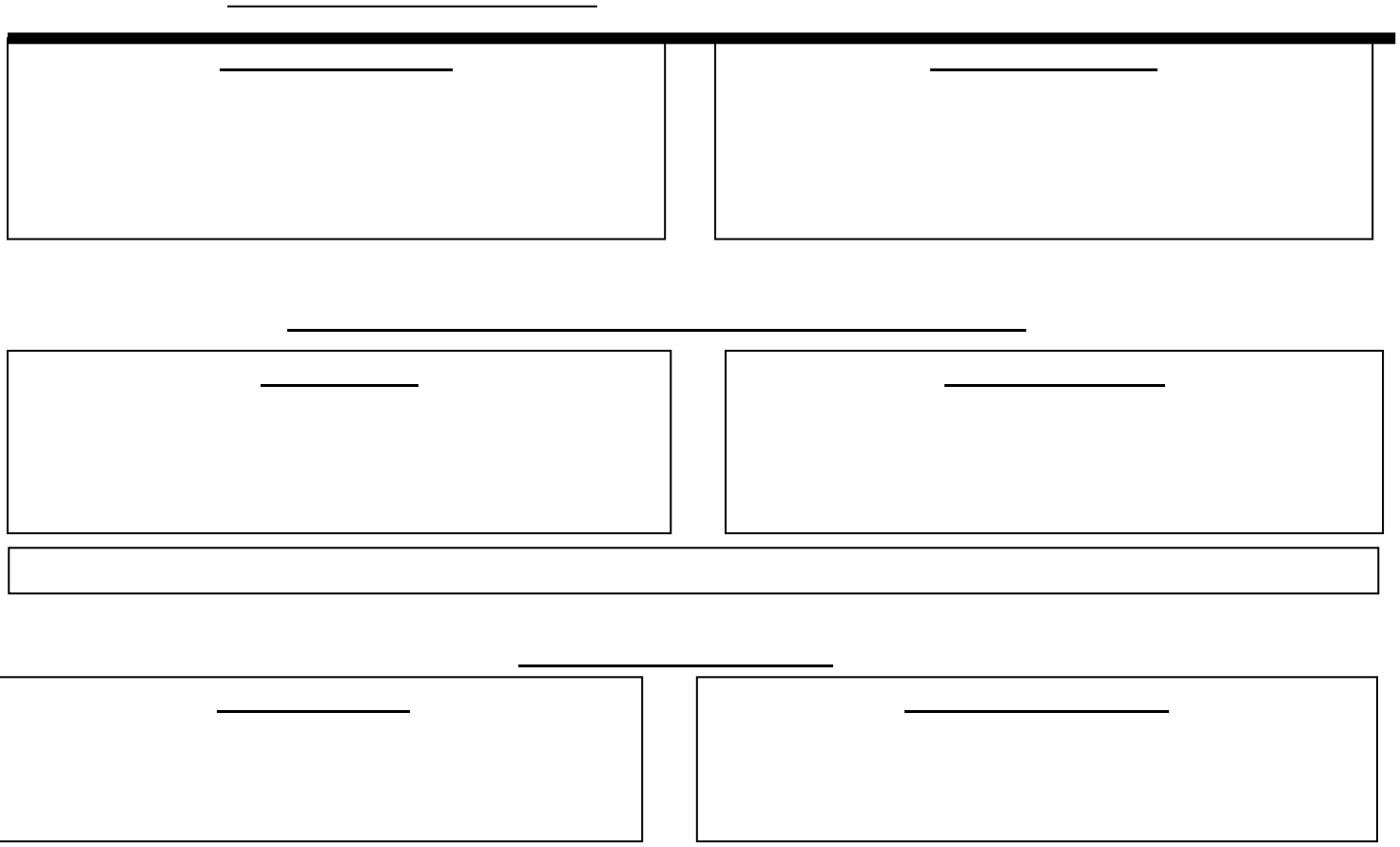
Antenna ID	MOUNTING LOCATION Below Tower Top	MOUNTING LOCATION **AGL (ft)**	ANTENNA MODEL	ANTENNA AZIMUTH (True N Ref)	FREQUENCY	TRANSMISSION LINE SIZE
17	Top Less 120’	210	DB858HV90E-SX Panel Antenna Array	360°	806-896 MHZ	6 X1 $^{5}/_{8}$"
	Top Less 140’	190	8' HP Solid Dish	0°	6.000 GHz	EW63
	Top Less 140’	190	8' HP Solid Dish	120°	6.000 GHz	EW63
	Top Less 140’	190	8' HP Solid Dish	240°	6.000 GHz	EW63
	Top Less 160’	170	DAPA 59210 Panel Antenna Array	360°	1710-1990 MHZ	12 X1 $^{5}/_{8}$"
	Top Less 180’	150	DB858HV90E-SX Panel Antenna Array	360°	806-896 MHZ	6 X1 $^{5}/_{8}$"
	Top Less 200’	130	8' HP Solid Dish	0°	6.000 GHz	EW63
	Top Less 200’	130	8' HP Solid Dish	120°	6.000 GHz	EW63
	Top Less 200’	130	8' HP Solid Dish	240°	6.000 GHz	EW63
	Top Less 220’	110	(6) DB858HV90E-SX Panel Antenna Array	360°	806-896 MHZ	6 X 1 $^{5}/_{8}$"
	Top Less 240’	90	(6) DAPA 59210 Panel Antenna Array	360°	1710-1990 MHZ	24 X 1 $^{5}/_{8}$"

450' TOWER

	Top	450	BMR-12	0°	800 MHZ	1 5/8"
	Top	450	BMR-12	120°	800 MHZ	1 5/8"
	Top	450	BMR-12	240°	800 MHZ	1 5/8"
	Top Less 20'	430	BMR-12	0°	800 MHZ	1 5/8"
	Top Less 20'	430	BMR-12	120°	800 MHZ	1 5/8"
	Top Less 20'	430	BMR-12	240°	800 MHZ	1 5/8"
	Top Less 40'	410	BMR-12	0°	800 MHZ	1 5/8"
	Top Less 40'	410	BMR-12	120°	800 MHZ	1 5/8"
	Top Less 40'	410	BMR-12	240°	800 MHZ	1 5/8"
	Top Less 60'	390	DB 420-D	0°	450 MHZ Dual fed antenna	2 X 7/8"
	Top Less 60'	390	DB 420-D	120°	450 MHZ Dual fed antenna	2 X 7/8"
	Top Less 60'	390	DB 420-D	240°	450 MHZ Dual fed antenna	2 X 7/8"
	Top Less 80'	370	DB 224	0°	138-174 MHZ	7/8"
	Top Less 80'	370	DB 224	120°	138-174 MHZ	7/8"
	Top Less 80'	370	DB 224	240°	138-174 MHZ	7/8"
	Top Less 100'	350	DAPA 59210 Panel Antenna	360°	1710-1990 MHZ	24 X 1 5/8"

Antenna ID	MOUNTING LOCATION Below Tower Top	MOUNTING LOCATION **AGL (ft)**	ANTENNA MODEL	ANTENNA AZIMUTH (True N Ref)	FREQUENCY	TRANSMISSION LINE SIZE
17	Top Less 120’	330	DB858HV90E-SX Panel Antenna Array	360°	806-896 MHZ	6 X1 $^{5}/_{8}$"
	Top Less 140’	310	8' HP Solid Dish	0°	6.000 GHz	EW63
	Top Less 140’	310	8' HP Solid Dish	120°	6.000 GHz	EW63
	Top Less 140’	310	8' HP Solid Dish	240°	6.000 GHz	EW63
	Top Less 160’	290	DAPA 59210 Panel Antenna Array	360°	1710-1990 MHZ	12 X1 $^{5}/_{8}$"
	Top Less 180’	270	DB858HV90E-SX Panel Antenna Array	360°	806-896 MHZ	6 X1 $^{5}/_{8}$"
	Top Less 200’	250	8' HP Solid Dish	0°	6.000 GHz	EW63
	Top Less 200’	250	8' HP Solid Dish	120°	6.000 GHz	EW63
	Top Less 200’	250	8' HP Solid Dish	240°	6.000 GHz	EW63
	Top Less 220’	230	(6) DB858HV90E-SX Panel Antenna Array	360°	806-896 MHZ	6 X 1 $^{5}/_{8}$"
	Top Less 240’	210	(6) DAPA 59210 Panel Antenna Array	360°	1710-1990 MHZ	24 X 1 $^{5}/_{8}$"
	Top Less 320’	130	8' HP Solid	0°	6.000 GHz	EW63

Antenna ID	MOUNTING LOCATION Below Tower Top	MOUNTING LOCATION **AGL (ft)**	ANTENNA MODEL	ANTENNA AZIMUTH (True N Ref)	FREQUENCY	TRANSMISSION LINE SIZE
			Dish			
	Top Less 320’	130	8' HP Solid Dish	120°	6.000 GHz	EW63
	Top Less 320’	130	8' HP Solid Dish	240°	6.000 GHz	EW63
	Top Less 340’	110	(6) DB858HV90E-SX Panel Antenna Array	360°	806-896 MHZ	6 X 1 5/8"
	Top Less 360’	90	(6) DAPA 59210 Panel Antenna Array	360°	1710-1990 MHZ	24 X 1 5/8"



PRE-START CHECKS

Inspect for the following:

- ☐ Freight damage (components tight, straight, etc.)
- ☐ Proper belt alignment and tensions
- ☐ Governor rod movement and clearance
- ☐ Fluid levels (oil, anti-freeze, battery, governor, etc.)
- ☐ Correct fuel and exhaust plumbing
- ☐ Adequate air flow
- ☐ Correct AC wire sizes and connections
- ☐ Correct DC wire sizes and connections (route separate from AC)
- ☐ Proper size battery(ies)

Close the AC circuit breaker to block heater and battery charger.

- ☐ Block heater is operational
- ☐ Battery charger is operational
- ☐ Battery charge voltage_____

PREPARATION FOR STARTUP

- ☐ In the transfer switch, set safety disconnect switch to "Manual"
- ☐ Connect AC frequency meter and ammeter
- ☐ Connect battery(is)
- ☐ Bleed the fuel system
- ☐ Is the electrical system on Dummy load?

RUNNING CHECKS

Start the engine. Bring up to speed slowly by holding the Carburetor/governor linkage. Complete the following checks:

RUNNING CHECKS (CONTINUED)

- ☐ Check DC alternator output. AMPS _____ VOLTS_____
- ☐ Adjust frequency (Hertz) to correct no-load setting (see manufacturer's recommendations)
- ☐ If necessary, adjust DC control/latch-crank circuit board
- ☐ Check no-load voltage. Adjust voltage regulator if necessary
- ☐ Test automatic shutdowns (low oil pressure, low coolant level, High coolant temperature, overspeed set to _____Hz. (Other_____)
- ☐ Engine coolant temperature (hot run) = _____
- ☐ Oil pressure (hot run) =_____
- ☐ Check for fluid leaks
- ☐ If required, adjust carburetor/governor to handle full load
- ☐ Transfer customer loads to alternator. Load amps = _____
- ☐ No-load voltage = _____ Full load voltage = _____
- ☐ No load frequency _____ Full load frequency_____
- ☐ Function test: Manufacturer-supplied accessories (i.e. remote Annunciator, pre-alarms, day tanks, etc.)
- ☐ INSTRUCT END USER ON FUNCTIONS OF UNIT. Set times to Customer's request and run a simulated power outage.

OPTIONAL TRANSFER SWITCH DATA

The following data is not required by Manufacturer, but may be included for State use if desired

EXERCISE DAY_____ EXERCISE TIME OF DAY_____

APPLICATION

☐ Standyby Power ☐ Primer Power

TIMER & SENSOR SETTINGS

Voltage Dropout Sensor _____ Line Interrupt Delay Timer _____
Eng. Minimum Run Time _____ Engine Warm-up Timer_____
Standby Voltage Sensor _____ Standby Freq. Sensor_____
Time Delay Neutral Time _____ Voltage Pickup Sensor_____
Return to Utility Timer _____ Engine Cool-down Timer_____

LIQUID - COOLED STAND-BY POWER SYSTEM
CUSTOMER INSPECTION and Acceptance

This acceptance testing is made this _____ day of _____ 20_____ between (Service Dealer) _____ and the State of Maryland.

In consideration of the agreements herein contained:
The customer agrees to: Remit the amount of $_N/A____ for a period of _N/A____ years.
The Service Dealer agrees for a period of _____ year(s) from initial startup (or effective date _____) of the standby power system to inspect, test and adjust the unit at approximately 6-month intervals.

Data Plate Information

Alternator

Model No. _____
Serial No. _____
Volts _____
Amps _____
Power Factor _____

Transfer Switch

Model No. _____
Serial No. _____ Initial Start Up Date _____

Pass	Fail	PRE-START CHECKS
____	____	Engine Fluid Levels
____	____	Fuel Line Filter
____	____	All Coolant Hoses
____	____	Engine Coolant Heater
____	____	LPG Sludge Drain
____	____	All Pulley Belts
____	____	Battery Trickle Charger/Battery Cables
____	____	Battery Warmer
____	____	Battery Water Level
____	____	Battery Specific Gravity
____	____	Spark Plug Wires
____	____	Spark Plugs
____	____	Engine Cylinder Compression
____	____	Electrical Connections
____	____	Annunciator Panel
____	____	Change Oil/Filters

Pass	Fail	ENGINE RUNNING
____	____	Ignition Points/Distributor Cap Rotor
____	____	Choke/Diesel Preheat
____	____	Ignition Point Dwell/Timing
____	____	Diesel Injection System
____	____	Carburetor
____	____	Engine Governor/Actuator
____	____	D.C. Engine Alternator
____	____	All Gauges
____	____	Warning Lights/Shutdowns
____	____	Output Voltage/Flicker
____	____	All Electrical Connections
____	____	All Electrical Controls
____	____	Automatic Telephone Dialer
____	____	Alarm Annunciator
____	____	Transfer Switch Operation
____	____	Fuel Regulation Diagram
____	____	Oil Pressure
____	____	Water Temperature
____	____	Fluid Leaks

Comments or Additional Work Requested: _____

_____

_____

_____

Vendor

Company Name _____ Phone _____

Address _____

Authorized Signature _____ Date _____

State of Maryland
Statewide Interoperability Project

700 MHz Channel Plan

Presented by

RCC Consultants, Inc.

Initial Revision - Feb. 20, 2007
Revision 1 - May 8, 2007
Final Revision – May 21, 2007
Updated – November 1, 2007

Table of Contents

1. Executive Summary

RCC Consultants has reviewed the specific information available on the current spectrum allocation agreements and discussions within Maryland and the surrounding states. We have examined in detail several potential design methods for their impact on Maryland's planned system, and propose that Maryland pursue the method that provides the greatest flexibility and capacity for its use. This recommendation is based upon evaluating and accommodating the site specific RF coverage design effort with the project design goal.

Conclusions:

1. Maryland faces severe spectrum pressure and must be proactive to preserve as much of the potentially available 700 MHz spectrum as possible for its use.
2. The current proposed channel allocations potentially leave Maryland without sufficient spectrum to build the desired system.
3. The "New York Plan" coupled with the low power allocations for Virginia are detrimental to Maryland, and should be replaced by a performance-based re-use pattern and design.
4. Coordination agreements with the surrounding five states and the District of Columbia are required as soon as possible, and must be concluded prior to completing the final system design.
5. Non-uniform coordination agreements with surrounding licensees will result in depletion of spectrum availability.
6. Performance-based reuse plan can be developed to realize Maryland's design goals which can also provide acceptable technical coordination for the surrounding coordinating licensees.

A detailed channel allocation method and matrix is provided, providing the basis for site-specific engineering following the completion of spectrum coordination agreements.

2. Introduction

This document provides a channel plan for the State of Maryland Interoperability Network. The term "channel plan" has several meanings, each of which must converge and result in the allocation of specific RF frequencies (channels) to specific sites from the starting point of the FCC's general 700 MHz Band Plan.

2.1. Concurrent Elements to Develop a Channel Plan

There are four concurrent tracks that guide and bound the convergence and realization of a site specific channel plan; Regulatory, Coordination, Physical and Functional.

Regulatory – The FCC 700 MHz Band Plan allocates blocks of spectrum for various licensees with specific rules and technical requirements related to the use of spectrum, as well as the termination of broadcasting in the band pursuant to the Digital Television Transition and Public Safety Act. This Act is based upon Senate Bill 1932 - Deficit Reduction Act of 2005 and Title III Digital Television Transition and Public Safety Act, Section 3002 (b)(c). In this Bill, the FCC auctions spectrum to compensate for the Federal deficit.

Coordination – Blocks of spectrum from the FCC plan are shared by state and local governments and require coordination with bordering licensees sharing the same spectrum. In the case of 700 MHz spectrum, the States coordinate the State License spectrum and public safety Regional Planning Committees coordinate the General Use spectrum allocations.

Physical – The physical allocation of channels will depend upon agreements resulting from the Coordination track and from the selection of actual sites in the network to be built. This track will require some iterative approaches that can be divided into three steps:

1. Develop a physical reuse pattern concept to be used in the final Coordination agreements with neighboring states for State License spectrum, and with local governments and the Planning Committees for General Use spectrum. RCC suggests this step must be further divided into two parallel tracks:
   i. A pre-allocated Distance Based Model, and
   ii. A Performance Based Model
2. With coordination secured, apply the reuse pattern allocations and geometry to actual site locations.
3. Modify site designs and allocations to conform to the State's project design goals and coordination agreements including system coverage and interference performance.

Functional – All channels can be allocated to the respective physical plan which, by virtue of geometry, may bind network capacity or ability to relocate channels to some degree in particular geographic areas. Alternatively, it may be useful to develop special application channels such as those for vehicular repeaters, cell-on-wheels, wide area use, etc. These channels would be set aside for the intended application. RCC suggests if Maryland is the only entity with these requirements, then the Special Use channels are applied based upon coordination agreements with other states and the physical site geometry plan. If the special application channels are also useful and desired by neighboring states, it would be possible to have these channels become part of the State-to-State Coordination plan(s).

2.2. General and Applied Channel Plan

In theory, the Channel Plan is developed in a sequential fashion beginning with the Regulatory allocation. Next, coordination agreements with adjacent states are reached; then the site-specific physical plan is developed; and finally, the functional allocations are applied. In reality, there will be multiple iterations as the Channel Plan is applied to site specific design. For example, once the network design has identified all sites, some sites might require special approval in the Coordination step.

The Regulatory and Coordination plans generally are conceptual to provide the first round of rules or guidelines for a particular licensee to begin its design. As such, these provide a "General Channel Plan". The General Channel Plan can provide a pre-allocation of channels by geography or jurisdictions with the understanding that jurisdictional boundaries and the physics of radio frequency (RF) propagation typically are not adaptable for a global fit. That is, design changes are made based upon actual physical site selection and physical parameters, and in cases where the coordination requirements between neighboring States call for further site specific review.

An "Applied Channel Plan" would incorporate the Physical and Functional elements defined above. The guidelines of the General Channel Plan guide the physical site architecture in order to develop a specific and detailed channel allocation to the sites in the design; for example, specifying antenna type and orientation, mounting height and effective transmitter power. Because adaptation of a channel plan to a site specific allocation is dependant upon the General Channel Plan and upon actual site locations, the RF propagation and sites selection must be completed with minimal risk that site deployments change with respect to the engineered design site locations.

Once RF design has provided an expected level of coverage reliability throughout the wide area of the service territory, the site specific channel allocation process from the Applied Channel Plan which had used the architecture and approaches defined in the General Channel Plan as bounds to match the design requirements for site location, channel application and capacity.

3. General Channel Plan Elements

The General Channel Plan Elements consists of the FCC 700 MHz Band Plan and the Licensee Coordination elements.

3.1. FCC Allocation – National Public Safety 700 MHz Band Plan

Chart 1 represents the FCC 700 MHz Band Plan related to the public safety allocations. See Appendix for larger version.

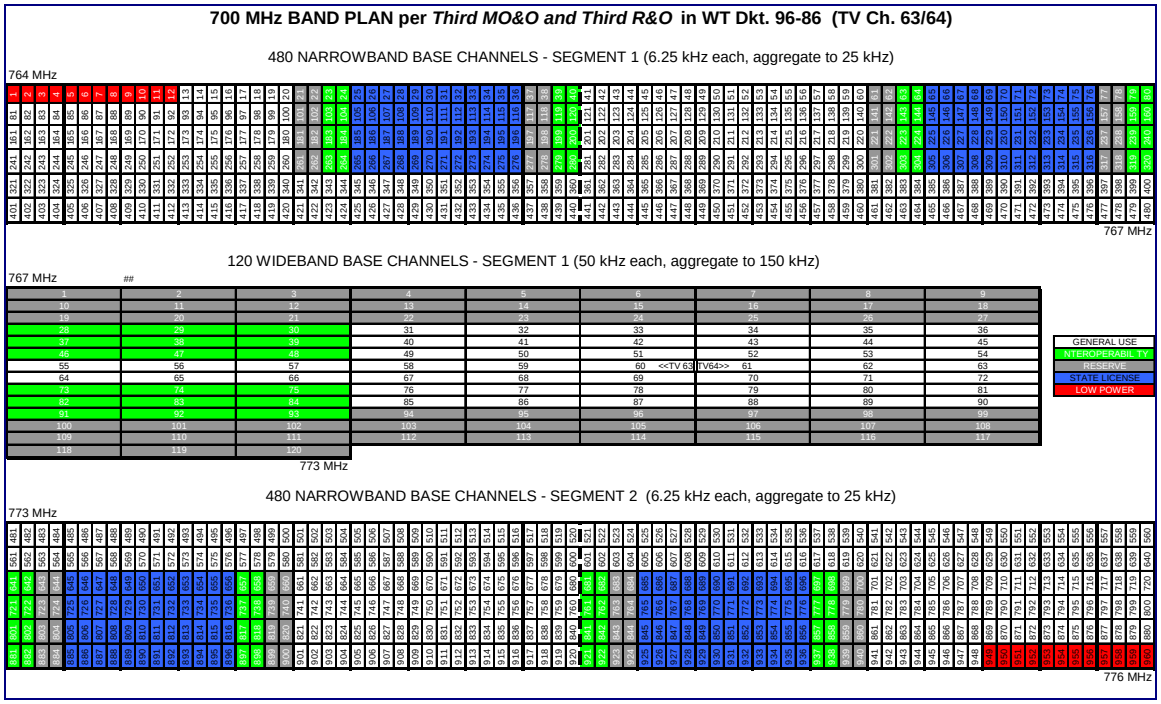


Chart 1) FCC Band 700 MHz Band and Channelization Plan

The FCC divided spectrum from TV broadcast channels into several public safety licensee categories: General Use, Interoperability, Reserve, State License, and Low-Power.

The State License allocations are composed of 2.4 MHz of spectrum to form mobile relay pairs. Within this 2.4 MHz, 1.2 MHz is used for base transmit and 1.2 MHz is used for mobile transmit. This results in a total quantity of 192 channel pairs set on 6.25 kHz channel centers. This is the basic building block for all public safety allocation at 700 MHz, with 6.25 kHz channels combined to produce wider bandwidth channels. This provides the FCC required channels efficiency of one voice path or 4800 bps data rate per 6.25 kHz segment.

As part of the proposed reconfiguration of the public safety 700 MHz band, the Commission has concluded that the broadband operation will be relocated to TV Channels 63/68 and that narrowband operation will be in TV Channels 64/69. RCC anticipates that the FCC channel numbers will remain as previously indicated, however channel pairs below FCC channel number 480 will change frequency as they are moved into a common TV channel based upon recent and preliminary FCC information.

The FCC has modified the 700 MHz channel plan as of April 25, 2007. RCC has provided a representation of our understanding of the pending FCC channel plan in Appendix B.

RCC believes the FCC channels numbers will be the same with the reconfigured band plan. Chart 2 below illustrates the channel pairs allotted to the states in 6.25 kHz blocks.

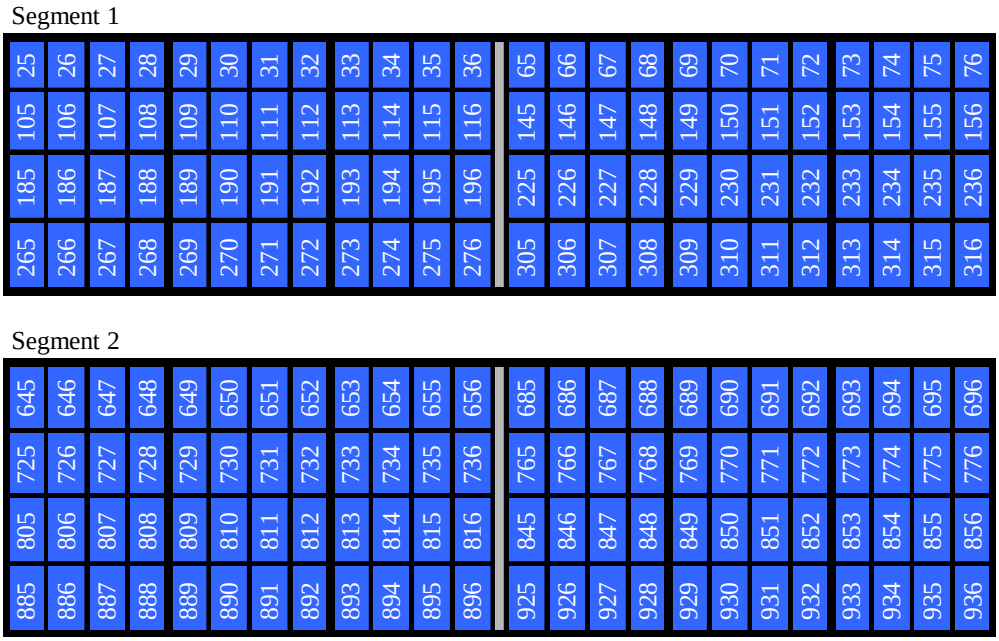


Chart 2) State License spectrum allocation
(6.25 kHz using FCC channel numbers)

The chart above illustrates the actual channel numbering system from the FCC. There are two segments of the State License allocation. Each segment contains 96 channel pairs using a 6.25 kHz bandwidth. This provides an aggregate total of 192 Channel pairs operating within a 6.25 kHz bandwidth.

The FCC has permitted aggregation of channels into larger bandwidth configurations until 2014 without consideration for maintaining an efficiency equivalency. After 2015, all systems must be converted to utilize the 6.25 kHz channel efficiency standard. Presently, technology does not provide for the use of Frequency Division Multiple

Access (FDMA) solution to achieve a 6.25 kHz channel equivalency. FDMA only operates within the 12.5 or 25 kHz channel spacing.

The channels spaced at 12.5 kHz are compliant for Project 25 Phase I FDMA equipment today, but does not meet the long term (after 2015) efficiency standard set by the FCC. Once Project 25 Phase I is installed, in order to achieve the 6.25 kHz channel efficiency, a migration to P25 phase II Time Division Multiple Access (TDMA) solution would need to be implemented. TDMA operates within 12.5 or 25 kHz bandwidths to enable a duel or quad talk groups capability on a single RF channel. Both of these evolving technologies will exhibit a data rate of 9600 bps at 12.5 kHz and 19,200 bps at 25 kHz meeting the FCC efficiency standard.

Either Project 25 Phase II or Time Division Multiplex technologies (TDMA) show a promise to attain the FCC's required throughput.

Chart 3 shows the channel pairs allotted to the states at 12.5 kHz blocks.

Chart 3) State License channel "quantities" (12.5 kHz bandwidth).
Note: FCC channel numbering system is not followed.

The chart above illustrates the quantity of channels available using a 12.5 kHz bandwidth allocation by concatenating two 6.25 kHz channels. This chart does not conform to the FCC channel number system. There are two segments of the State License spectrum allocation. Each segment contains 48 channel pairs using a 12.5 kHz bandwidth. This provides an aggregate total of 96 Channel pairs operating using a 12.5 kHz bandwidth.

Concatenating four 6.25 kHz channels results in 24 channel pairs for each of the two segments using a 25 kHz bandwidth. This provides an aggregate total of 48 channel pairs operating within a 25 kHz bandwidth.

3.2. State, Local and Regional Coordination

The geographic size, shape, and population distribution of the State of Maryland make coordination and licensing efforts particularly complicated. Simply put, there is very little of Maryland's geography that can avoid coordination with other entities, whether other states, the District of Columbia, or other Regions (for the General Use channels). As Maryland is ahead of most (if not all) other entities in planning for a 700 MHz network, and as most of the other entities do anticipate eventual use of the 700 MHz spectrum, the coordination effort for Maryland will be both particularly difficult and important. Since the FCC's test or standard to determine coordination is evidence of concurrence, it is reasonable to assume that no one state or eligible entity is willing to give up its "fair share" of the available spectrum. This presumption implies that the amount and distribution of the available State License channels will likely be divided evenly between the coordinating states in a given area.

3.2.1. State-to-State Cooperation

Maryland must, if at all possible, attempt to develop a single coordination plan that applies to all its neighboring states. The potential for development of individual and potentially incompatible coordination plans might result in further division of the available channels and overall a smaller pool of channels for Maryland. (See Section 3.2.3 and charts 4, 5, and 6 below).

In allocation of the State License spectrum, the FCC did not reserve any allocations for a specific state; instead it determined that all states, territories, and the District of Columbia are eligible to license all channels on a geographic basis. Thus, a site license is not required for a state to operate on the State License channels. The only limiting factor is that a state may not permit a service contour of 40 dBu F(50, 50) to extend beyond the state border without a site and channel specific agreements with the adjacent states. Because interference and reduced reliability generally is observed with an 18 dB Carrier-to-Interference ratio (C/I), the interference signal from such an operation is 22 dBu F(50, 10). Therefore, meeting the FCC criteria of service area will result in interference well into the adjacent state.

Should both states attempt to utilize the same channel with the service contour not leaving the state, the interference area will render both operations unable to utilize the channel except with large site separation. As the two service areas abut at the state border, the C/I between the two 40 dBu contours will be 0 dB. The 22 dB interference contour from each abutting site will extend well into the adjoining state, rendering that geographic area between the service contour and interference contour is well below the minimum 18 dB C/I. Agreements to divide channels along the borders, or define a performance usage other than the service contour defined by the FCC are absolutely necessary to forestall these problems.

It is to the benefit of larger states or regions consisting of large contiguous “blocks” of land area to argue for low-reuse-pattern coordination plans, as these plans by their nature preserve their borders while still allowing free reign on reuse within the interior of their “block”. However, denser reuse pattern coordination has a disproportionate impact on system complexity and cost to states with large land areas due to the increase in required sites caused by lower site profiles which are defined by lower antenna heights.

States or regions with small contiguous blocks of land area, such as Maryland, Delaware and the District of Columbia, do not benefit from low-reuse-pattern-coordination because most sites are subject to coordination with the bordering states and regions. In this case, low profile sites, and thus denser reuse-pattern-coordination, allow system design to have both high coverage saturation and RF channel capacity. Either use of high profile sites, tall antenna height, or acceptance of low reuse-pattern-coordination, reduces the ability reuse channels and therefore results in either low RF coverage or low capacity for the system design for states or regions of small land areas.

3.2.2. State and Regional Planning Committee

Despite the fact that the State of Maryland and the Region 20 Planning Committee manage and use different channel pools, all potential licensees at 700 MHz face the same geographic issue: Maryland and Region 20 are too small to autonomously allocate any significant number of channels. Maryland is far ahead of most other entities in planning for use of the 700 MHz channel allocation, and is in a strong position to offer a channel plan methodology as an example for the Regional Planning Committees to follow. The State as well as the Regional Committee would substantially increase the usable spectrum that could be provided to both Maryland and local governments by following a common spectrum coordination methodology of State Licensed and General Pool channel allocations.

3.2.3. Impact of Coordination Area on Channel Availability

The following maps illustrate the impact of coordination agreements on Maryland's ability to allocate and use channels in the State License. For the purpose of these illustrations, the interference contours have been estimated at 30 air miles. Of course, this distance may vary due to geography, and will be impacted by the C/I criteria selected as noted above.

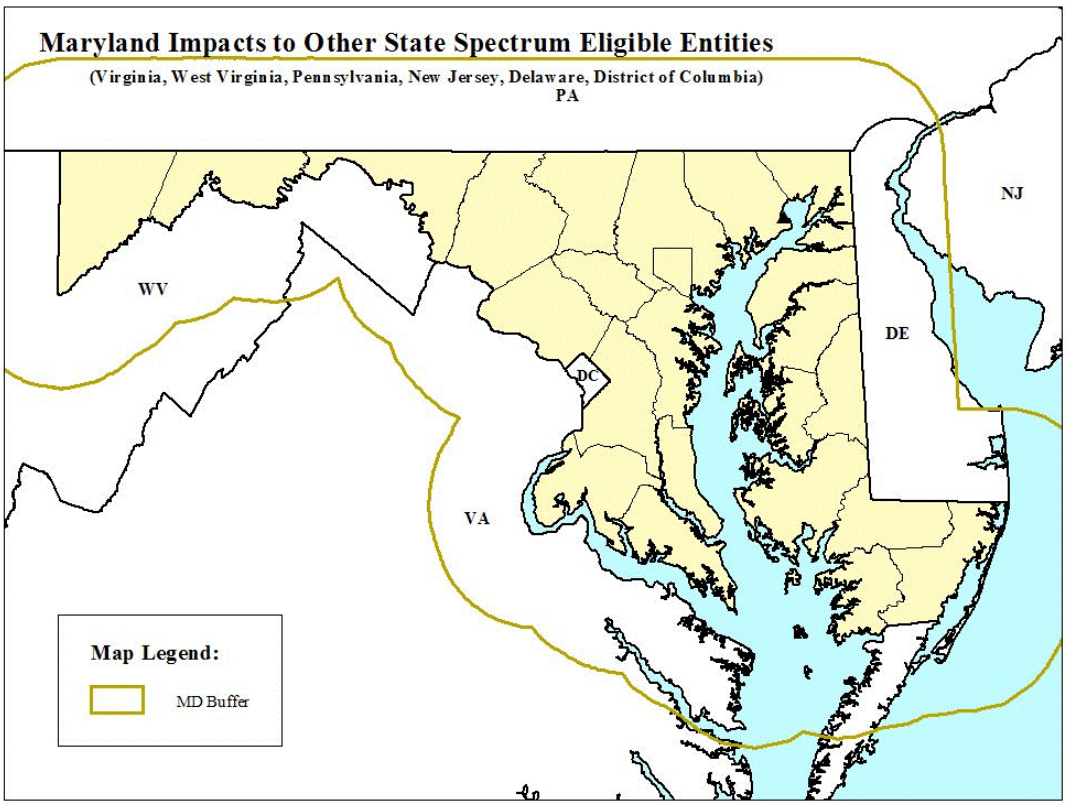


Chart 4) Coordination Area External to Maryland

Chart 5 illustrates coordination contours created by projecting interference potentially created by adjacent states' licensed channels transmitting into Maryland. Again, a significant portion of both the land area and the population of Maryland are impacted by the requirement to share and coordinate use of these channels. In these areas, it is likely that, at best, only half of the channels in the pool will be available to Maryland. The area highlighted orange, along the bay, is the only area not requiring State-to-State coordination.

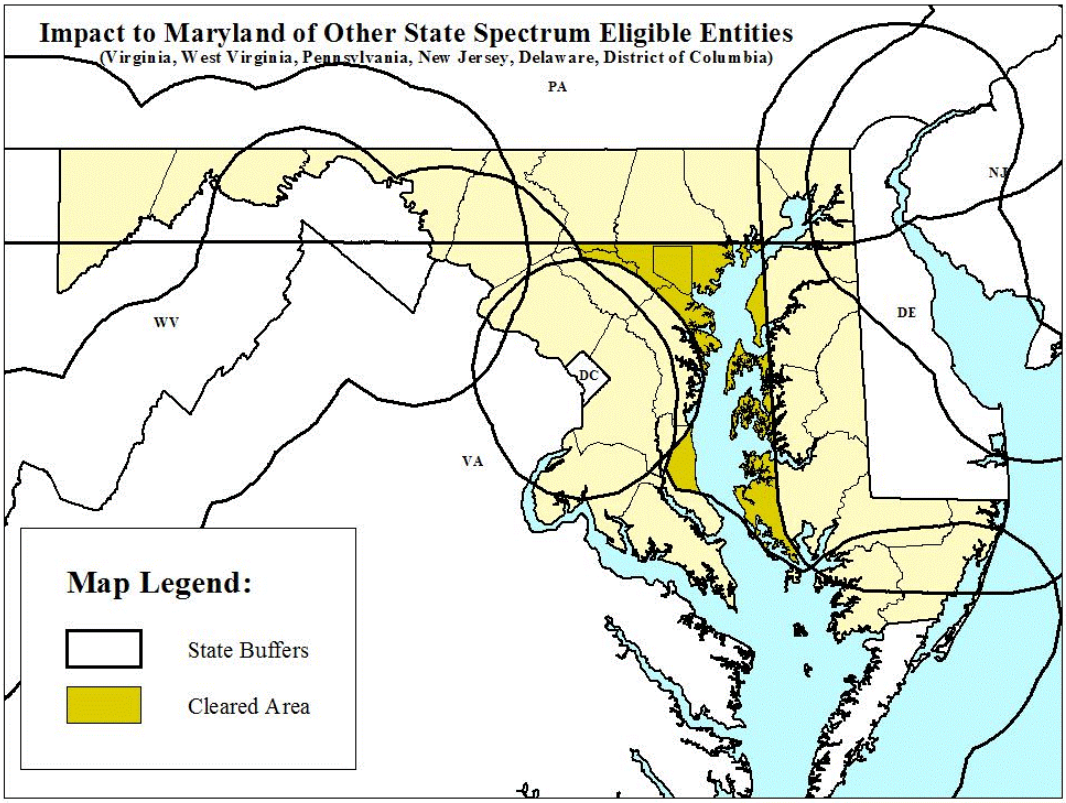


Chart 5) Coordination Area Within Maryland

Chart 6 shows the areas where coordination contours from three or more states overlap. In the blue highlighted areas, three or four states are contending for use of the same State License pool, with a proportionately lower number of channels likely to be available for Maryland's use. Only in the orange highlighted "Cleared" area in the center of Maryland is coordination not required.

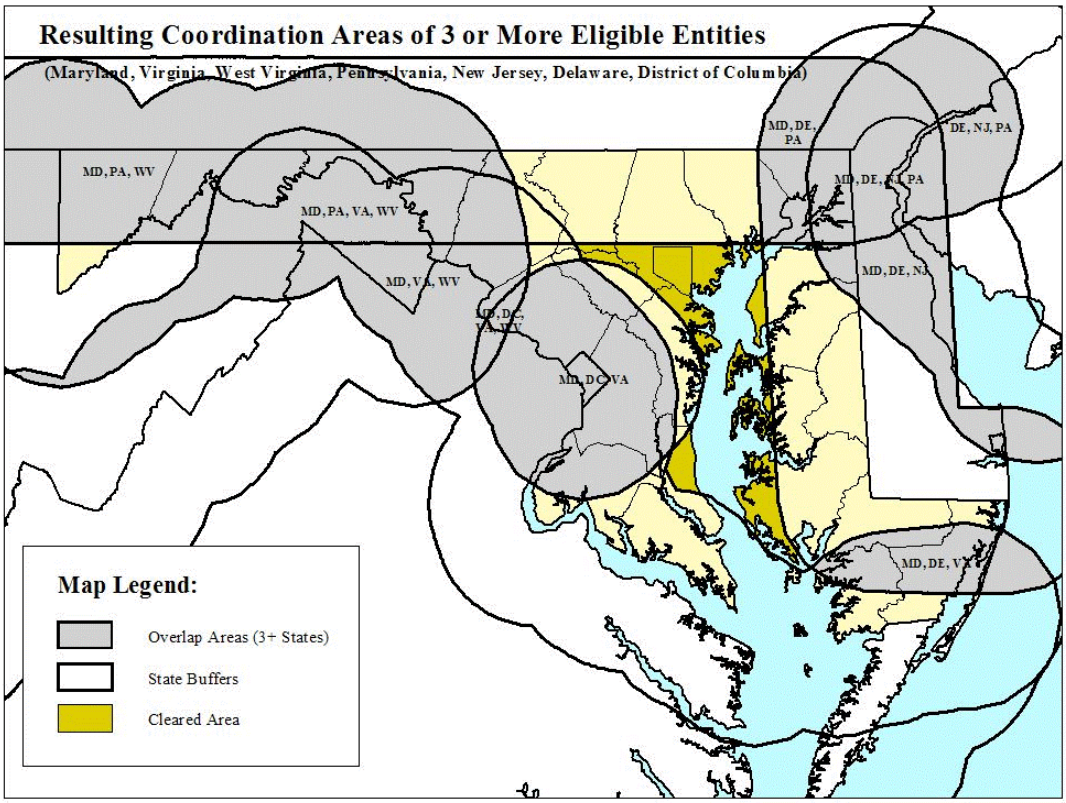


Chart 6) Zone Overlap of Three or More States' Contours

3.3. Special Considerations Impacting the General Channel Plan

There are other considerations that impact the 700 MHz spectrum allocation. These either must be incorporated into the applied channel plans or addressed by other methods to minimize their impact upon the ability to deploy the network.

3.3.1. The FCC Ninth NPRM

The FCC's Ninth Notice of Proposed Rule Making (9th NPRM) for 700 MHz spectrum, has been issued and proposes to redefine important aspects of the 700 MHz spectrum. On April 25, 2007, the FCC proposed as a matter of Further Rulemaking major modifications to the 700 MHz spectrum which will affect the specific frequencies for the narrowband channels and will remove the wideband channels in favor of broadband channelization of a single nationwide carrier for data applications. This modification will impact how inter-Region and perhaps inter-operations technology and capabilities would be deployed. As currently proposed, this would impact availability of spectrum for Maryland because of the loss of data channels proposed by the FCC. The Commission further concluded that this broadband network should be managed by one entity or manager. The proposal by the Commission is a tentative conclusion that is supported in a Further Notice of Proposed Rulemaking under PS Docket 06-229 adopted by the Commission on April 25, 2007.

There are potential adverse impacts to public safety land mobile radio communications created by the 9th NPRM. In it, the FCC has proposed to shift the public safety allocations and eliminate the possibility to license wideband channels (50 kHz wide that can be combined up to 150 kHz) that were originally proposed to accommodate wide band data up to 384 kbps. In their place, the FCC proposes to combine all of the wideband channels into one broadband allocation (10 MHz) with a single nationwide licensee authorized to sell service to public safety and other commercial operations. The single national licensee also would be authorized to utilize the existing narrowband voice channels, potentially including those channels assigned to state governments, on a secondary basis provided that no interference is rendered.

In order to attain the required bandwidth, the 700 MHz Public Safety and State License channels will be reconfigured into different portions of the band compared with the current FCC 700 MHz Band Plan. The State License channels might still be grouped into four segments of 300 kHz. The new Band Plan would space the channel groups closer together, because there no longer will be the wideband channels located between each of the two groups. RCC advises that, as currently proposed, there would be no net loss of State License channels. However these channels will be compacted and less spacing will be allowed between channels pairs.

A recent press release from U.S. Senator John McCain from Arizona indicates that he proposes to offer legislation to add a broadband segment to the public safely allocation that will be independent of the reconfiguration of the existing public safety 700 MHz Band. Adoption of this plan by Congress, the 9th NPRM may be rendered moot.

3.3.2. RWBN Spectrum

The National Capital Region (NCR) is attempting to develop a Regional Wireless Broadband Network (RWBN). This network is based upon the use of the wideband channel allocations allocated to NCR jurisdictions as included in the draft Region 20 Plan for 700 MHz.[1] The NCR has received a Waiver from the FCC to use some of the General Use wideband channels in a particular configuration.

Under the draft Region 20 Plan for 700 MHz, all wideband channels are allocated to geographical areas, not to specific units of government. This facet was adopted to permit the State of Maryland to apply for wideband channels in any county or the City of Baltimore. If the 9th NPRM is adopted as drafted, Maryland will not be eligible to apply for the data channel assignments as included in the draft Region 20 Plan for 700 MHz. Furthermore, this can mean that Maryland may have lesser ability to use General Use wideband channels in any configuration other than the configuration required by the RWBN.

[1] The Region 20 document will remain a draft until concurrence has been received from all adjacent regions.

3.3.3. TV Broadcast Channel Impacts

Chart 7 illustrates TV channel 63, 64, 68 and 69 currently in use in the 700 MHz Band.

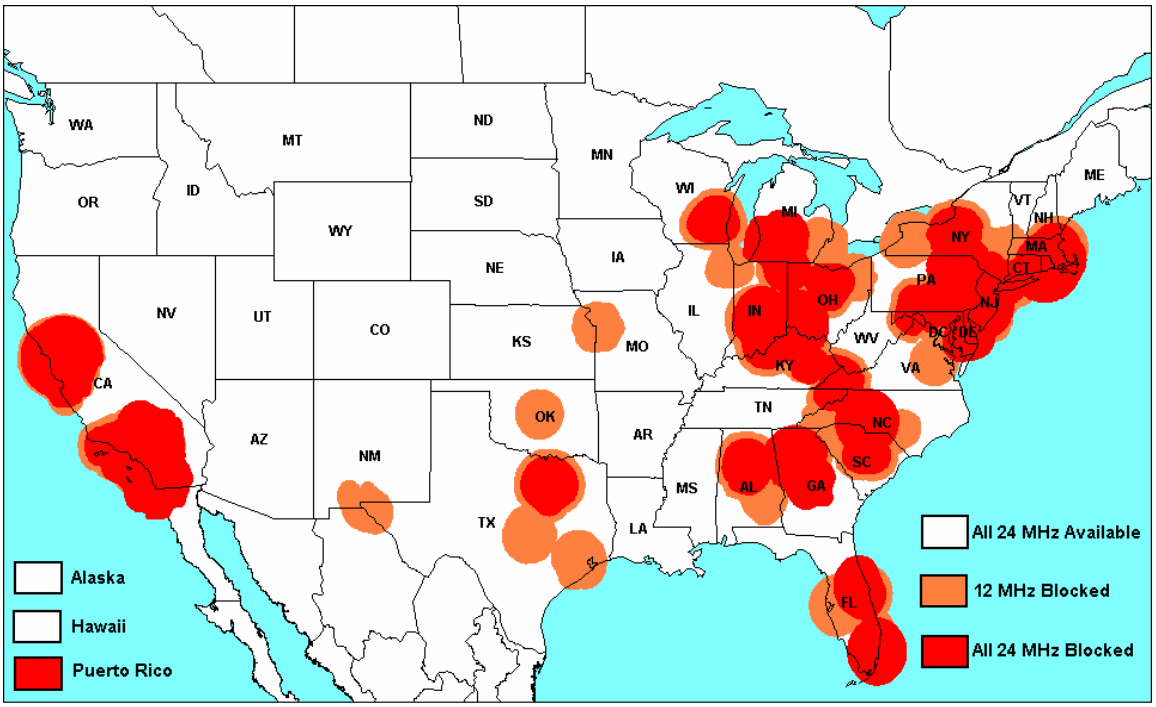


Chart 7) TV Channels affecting use of 700 MHz spectrum

The FCC requires TV Broadcasters to relocate and clear the channels by February 2009. This includes high power, low power (secondary) and translator locations.

As can be seen, Maryland and much of the mid-Atlantic region is directly impacted by the relocation of TV Broadcasters. Early use of spectrum is possible in some areas of Maryland and requires proper coordination with the broadcasters per existing FCC regulations.

Chart 8 defines the current TV Allocations for high, low and translator locations that are currently in operation within or in close proximity to Maryland. This list also includes TV channels that are adjacent to the spectrum defined for public safety 700 MHz use.

State	Call Sign	Analog Channel	Digital Channel	Location	Service[2] Radius	Problem After Feb-2009
DC	WZDC-LP	64	N/A	Washington	N/A	No
DE	WDPB	64	44	Seaford	36	No
MD	WFPT	62	28	Frederick	47	No
MD	WWTD-LP	63	N/A	Annapolis	N/A	No
MD	W28BY	63	N/A	Baltimore	N/A	No
MD	W63DC	63	N/A	Ocean City	N/A	No
MD	W65EF	65	N/A	Ocean City	N/A	No
MD	WMPB	67	29	Baltimore	58	No
MD	W67EA	67	N/A	Salisbury	N/A	No
MD	WJAL	68	16	Hagerstown	58	No
MD	WQAW-LP	69	N/A	Salisbury	N/A	No
MD	WQAW-LP	69	N/A	Salisbury	N/A	No
MD	WQAW-LP	69	N/A	Salisbury	N/A	No
MD	WQAW-LP	69	N/A	Salisbury	N/A	No
MD	NEW	69	N/A	Ocean City	N/A	No
MD	WQAW-LP	69	N/A	Salisbury	N/A	No
NJ	WWSI	62	49	Atlantic City	54	No
NJ	WUVP	65	66 (29)	Vineland	73	Yes [3]
PA	WPVI	6	64 (6)	Philadelphia	99	Yes [4]
PA	WCAU	10	67 (34)	Philadelphia	91	Yes [5]
PA	WFMZ	69	46	Allentown	56	No
VA	WUPV	65	47	Ashland	60	No
VA	WPXW	66	36	Manassas	65	No
VA	WLFG	68	49	Grundy	68	No
VA	960920IL	69	N/A	Fredericksburg	N/A	No

Chart 8) Current TV Allocations

Depending upon desired sites to be deployed, operation and use of 700 MHz channels prior to February 2009, requires coordination with TV Broadcasters. After February 2009, two stations in Philadelphia potentially impact channel use in northeastern Maryland on a temporary basis. This means network design might be forced to accommodate this impact if required. This accommodation is likely to necessitate more sites using lower antenna heights and/or lower power compared with the desired network topology. Consequently, the network might not have access to the required spectrum in this area of Maryland until the Philadelphia channels 64 and 67 are cleared. Vineland, NJ is a similar yet less serious concern.

[2] Service radius is converted from FCC service area data. Some licenses such as low power or translators do not define this data.
[3] Uses channel 66 to transition to DTV Channel 29.
[4] FCC tentative re-allocation will transition this station to DTV Channel 6 when that channel becomes available, which is anticipated within 6-12 months of February 2009.
[5] Uses channel 67 to transition to DTV Channel 34.

4. Applied Channel Plan Elements

It is important that Maryland try to develop uniform coordination among the adjacent states eligible to license the spectrum as noted in the sections above. Each separate agreement potentially inserts a different set of bounds upon the Applied Channel Plan for sites and channel allocations within the coordination area. Areas where more than one separate agreement applies will be subject to the more stringent coordination requirements. Coordination processes between applicable eligible entities provide the parameters, bounds and freedoms to develop the Applied Channel Plans for network and site deployment.

The Applied Channel Plan's elements consist of the Physical and Functional Channel allocation processes. The Physical elements result from performance based design resulting in a standardized minimum site separation of typical site configurations. The Functional elements are derived from applied channel groupings.

RCC was provided with two initial bounds of the Applied Channel Plan for the State License spectrum. One defined an arrangement where Virginia and Maryland have allocated a set of 25 kHz channel allocations for Virginia to use as low power channels. This represents 25% of the total State License spectrum allocation. This allocation is based upon the second bound, where the concept of wide-area channel allocations and coordination are achieved based upon distance and re-use pattern termed the New York Overlay.

RCC understands the reasoning behind these two initial bounds, and advises they place restrictions upon the network and suggests that based upon the overall geography of Maryland and the bordering entities, a performance based methodology can be developed that meets both the spirit and intention of the New York Overlay with it's resulting allocations for Virginia's low power usage applications. Furthermore, this Performance Based Channel Plan must provide a valid method and process for network design and coordination among all entities sharing the spectrum.

4.1. Background for Modeling and Planning Channel Allocations to Sites

The allocations of frequencies that will lead to a reuse pattern that is spectral efficient and minimizes channel interference is modeled using a hexagon-shaped "cell" to allocate RF channel(s) to site(s) within the each cell hexagon. Chart 9 illustrates a single cell hexagon which contains as an example, a single radio network site that in turn contains a specific set of RF channels.

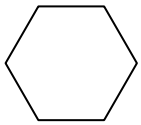


Chart 9) A single cell "hexagon" of channels and site(s)

Since all frequencies would not be allocated to a single cell hexagon, a number of cells are defined as a group or "cluster" of cells. Chart 10 illustrates a 12-cell "Cluster" Configuration (A, B, C, D, E, F, G, H, I, J, L, K).

Chart 10) A "Cluster" consisting of 12 cells (hexagons)

Each cell above has a different set of channels that are unique. Cell A has different channels than all the rest, likewise, Cell B, Cell C, etc. This specific cluster of cells takes the shape of a rectangular-based polygon.

The "cluster" of cells, or polygon, is then patterned to repeat across the desired service territory for the system design.

Chart 11 illustrates several clusters that are covering a larger service territory. Due to the cluster pattern, all cells, and thus re-used channels, are separated by either 106 or 75 miles. The difference is due to the rectangular polygon that is now patterned four times. The closest "cells" reusing a channel are illustrated above as the 75-mile separation.

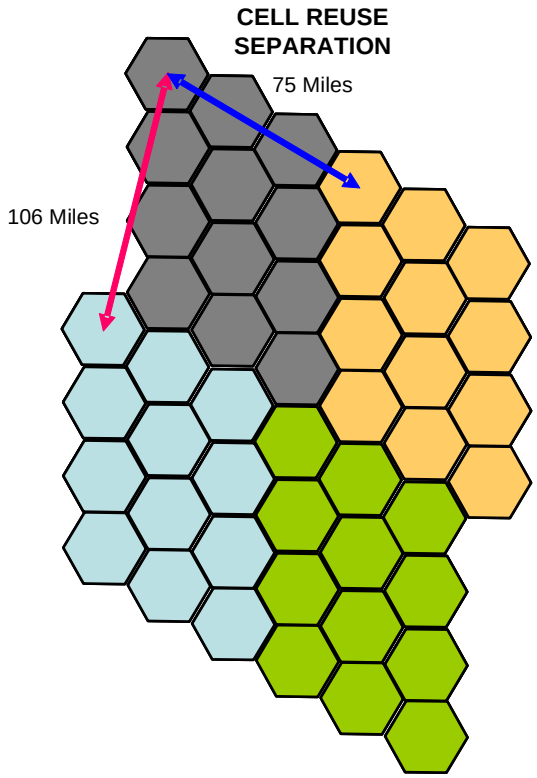


Chart 11) Repeated cell clusters across the service territory

The size of the cell (hexagon), cluster polygon geometry, and the resulting frequency reuse site separation impacts:

4.1-a) availability of spectrum,
4.1-b) coverage signal levels of a cell site,
4.1-c) interference from the surrounding cell sites,
4.1-d) overall cost of the system, and
4.1-e) at a given cost, the performance of the signal of any one channel/site or group of channels/sites in a particular area.

A larger cell size (hexagon) or cluster polygon results in farther site separation re-use patterns between cells using the same channels and therefore:

- Decreases the number of frequencies available by limiting reuse in other areas. (reference 4.1-a),
- Requires high profile sites or multiple low profile sites to cover a particular cell. (reference 4.1-b),
- Requires greater distance between cells and sites using the same channel. (reference 4.1-c),
- In general, high profile sites cost more than low profile sites. Therefore, the total cost of a system design using a lower quantity of high profile sites is likely to be less than the cost of a system design using a higher quantity of low profile sites. (reference 4.1-d), however,
- In a given area, or at an equal system cost, a high profile site design cannot meet stringent coverage performance such as in-building coverage throughout the area with respect to items 4.1-a, -b and -c above compared to a low profile design. (reference 4.1-e).

A smaller cell size (hexagon) or cluster polygon results in closer site separation re-use patterns between cells using the same channels and therefore:

- Increases the number of frequencies available by increasing reuse in other areas. (reference 4.1-a),
- Reduces high profile site use and reduces need for multiple low profile sites to cover a particular cell.
  (reference 4.1-b),
- Accommodates less distance between cells and sites using the same channels. (reference 4.1-c),
- In general, low profile sites cost less than high profile sites. Therefore, the total cost of a system design using a higher quantity of low profile sites is likely to be more than the cost of a system design using a lower quantity of high profile sites. (reference 4.1-d), however,
- In a given area, or at an equal system cost, a low profile site design is able to meet stringent coverage performance such as in-building coverage throughout the area with respect to items 4.1-a, -b and -c above compared to a high profile design. (reference 4.1-e).

The cell hexagon size, minimum site separation of the channel reuse, and service territory reuse pattern needs to be carefully selected to fit the needs of Maryland's unique requirements. In the following pages, these variables will be analyzed to determine Maryland's optimal solution for coverage, interference, and spectrum availability.

4.2. New York Concept Allocation Overlay

The proposed New York Overlay Channel Plan (the "NY Overlay") is predicated on a distance based allocation concept illustrated in Chart 12:

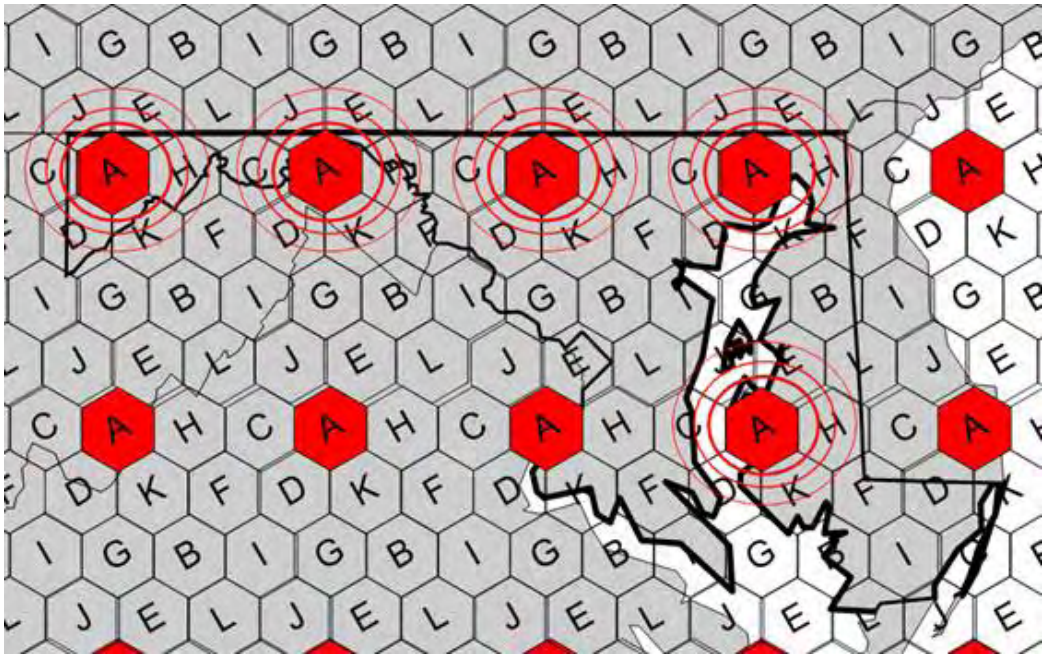


Chart 12) New York Overlay Allocation Concept
Reuse pattern based upon 60-Mile Site Separation

Each hexagon represents a cell and each cell has a set of channels allocated. This is applicable at the outset of any spectrum or regional channel planning process prior to deployment of any coordinating entities. RCC assumes the low power allocation between Maryland and Virginia follows this NY Overlay approach.

The NY Overlay allocates cells, and thus channels, to Maryland in a reuse pattern as follows:

- one time (the J cell),
- two times (the B, E, G, and I, cells),
- three times (F and L cells),
- four times (C and K cells),
- five times (A and D cells), and
- six times (H cell).

The NY Overlay applies 25 kHz channels into 12 cells. Based upon the FCC allocation for State License spectrum, this equates to each cell being configured with four 25 kHz channels each. [48 channel pairs @ 25 kHz / 12 cells = 4 channels per cell]

Chart 13 illustrates the total cells and 25 kHz channels allocated for Maryland based upon the NY Overlay:

Cell ID	25 KHz Channels per Cell	Number of Cells Assigned in Maryland	Total Channels Assigned in Maryland
A	4	5	20
B	4	2	8
C	4	4	16
D	4	5	20
E	4	2	8
F	4	3	12
G	4	2	8
H	4	6	24
I	4	2	8
J	4	1	4
K	4	4	16
L	4	3	12
25 kHz ch. :	**48**	**39**	**156**

Chart 13) New York Overlay – 25 kHz channel allocations in Maryland with 60-Mile Site Separation

For 25 kHz spaced channels, there will be 156 channels available in the reuse allocation pattern allocated to cells within Maryland.

Chart 14 illustrates the NY Overlay using 12.5 kHz channel allocations. This equates to each cell being configure for 8 channels per cell. [96 channel pairs @ 12.5 kHz / 12 cells = 8 channels per cell]

Cell ID	12.5 KHz Channels per Cell	Number of Cells Assigned in Maryland	Total Channels Assigned in Maryland
A	8	5	40
B	8	2	16
C	8	4	32
D	8	5	40
E	8	2	16
F	8	3	24
G	8	2	16
H	8	6	48
I	8	2	16
J	8	1	8
K	8	4	32
L	8	3	24
12.5 kHz ch. :	**96**	**39**	**312**

Chart 14) New York Overlay – 12.5 kHz channel allocations in Maryland with 60-Mile Site Separation

For 12.5 kHz spaced channels, there will be 312 channels available in the reuse allocation pattern allocated to cells within Maryland.

All else equal, reducing the channel bandwidth 50% does yield twice as many channels available. Maryland has tentatively agreed with Virginia to allow certain 25 kHz allocations for their low power applications. RCC suggests this concept is valid; however, if Virginia is not deploying 25 kHz bandwidth devices, there will be more efficient allocation of the same amount of channels for Virginia although they will be grouped in such a way that neither Virginia nor Maryland have adjacent channel allocations within a cell.

The NY Overlay approach sizes the cells and thus the channel reuse allocation for very stringent protection by cell separation distances. The relatively large cell reuse separation reduces the ability to reuse spectrum within the state boundaries. Channel sets allocated three or fewer times within Maryland may then impact the system ability to meet the capacity needs for the State Agencies in high traffic areas or the available spectrum allocation may be independently hampered by separate coordination agreements.

As the Channel Plan realization transitions from the FCC Band Plan through the coordination steps, Maryland has six bordering c-channel licensees that will require coordination: Pennsylvania, Virginia, Delaware, West Virginia, the District of Columbia, and New Jersey. Thus, a major concern arises from the possibility that Maryland could end up with multiple coordination agreements; each based upon its respective bordering states' spectrum needs.

Each separate agreement then impacts any potential channel reuse in Maryland. The FCC requires states to coordinate their State License frequencies and relinquishes any further responsibility in that aspect. Given there are six bordering entities to Maryland, there are only a few square miles that are not affected by State-to-State coordination requirements (See Chart 6). Subject to any agreements, most of the Maryland land area is at risk of spectrum division by a magnitude of two to four. This would result in less spectrum availability for each entity.

Alternatively, the channels could be divided based upon population contained within the bordering counties of the States. The CAPRAD allocations which can be used by the Regional Planning Committees to allocate the General Use spectrum are based upon population and have received general acceptance within the Public Safety community.

Chart 15 illustrates the population density defined by County for Maryland and surrounding jurisdictions.

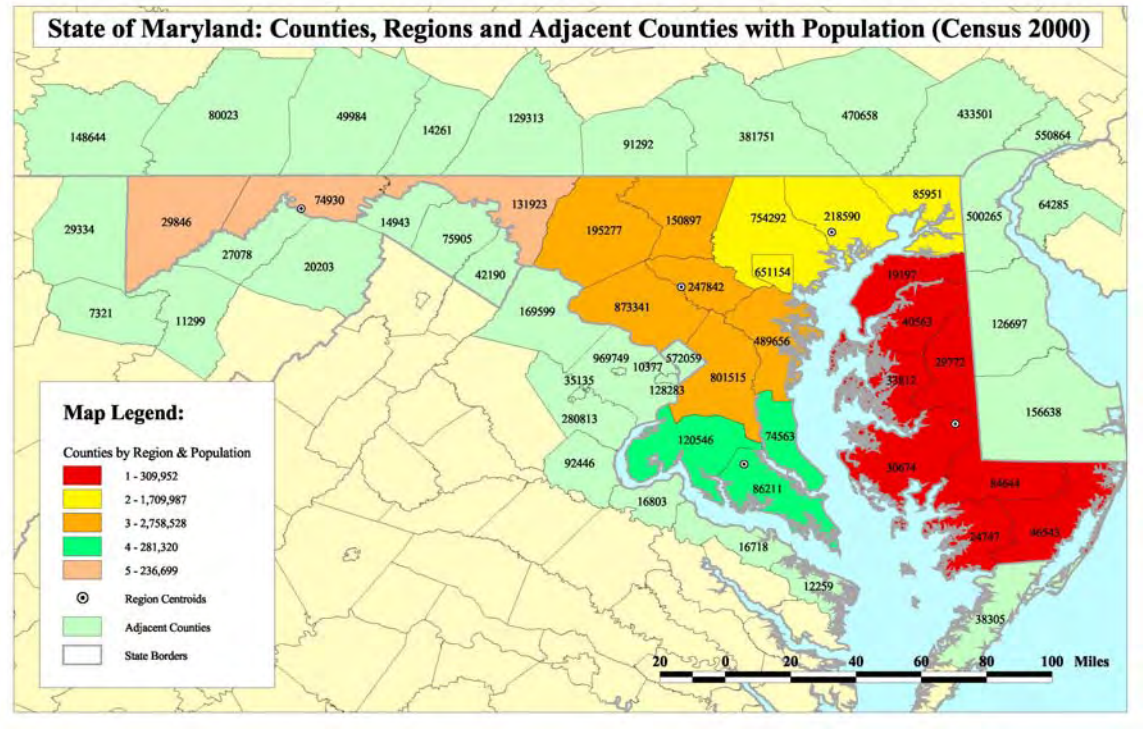


Chart 15) Population based Channel Allocation concept (e.g. CAPRAD)

A possible solution would be to petition CAPRAD to perform a population based distribution of the State License channels along each state border and then tie the allocations into a nationwide coordinated system. This would prevent the possibility that multiple agreements with different states would result in incompatible allocations. However, any Regional or State Channel Plan has the possibility of reaching an impasse when it meshes with another divergent approach. This dichotomy can result in some states failing to reach agreement on the use of the channels.

RCC suggests that the NY Overlay allocation concept is well better suited for areas of greater land area than Maryland such as Pennsylvania and Virginia. The large cell sizes and large separation between cells provides level of interference protection that conversely cannot allow adequate reuse in a small geographic area because the larger states, Pennsylvania and Virginia, using this pattern will remove any possibility for Maryland to reuse channels in a higher reuse density.

With State-to-State coordination is not yet in place in final form, Maryland is in a unique position of leading in this geographic area regarding funding and deploying a statewide network. Maryland also is in a unique position to develop a performance based channel plan that provides the flexibility Maryland needs for a tighter reuse pattern compared to the NY Overlay approach. This plan can be engineered to RF performance of typical sites to be constructed in Maryland and therefore align coordination process for the other states that border Maryland. The RF performance must be modeled appropriately to provide desired coverage of a cell and to assess the impact of any site that reuses the channel. This would result in a performance based channel reuse plan where the performance is predicated upon assumptions that any State or eligible licensee, desires the maximum allocation of channels with flexibility to construct them given well defined performance and impact evaluation standards. RCC also suggests that besides a performance based approach, special application channels can be allocated that are common to all States.

In summary, RCC believes that Maryland is in the unique position to assume the leadership role to construct a valid performance based reuse plan and to transition all adjoining States from the conceptual plans currently in place such as the NY Overlay and CAPRAD to plans that can realize successful implementation based upon defined engineering performance parameters.

4.3. Physical Channel Allocation

A very important aspect of the Applied Channel Plan for Maryland is to be able to reuse channels in a network design. Maryland is geographically irregularly shaped and too small to follow most "distance based" (NY Overlay) pre-allocation reuse methodologies (CAPRAD).

Instead, RCC will provide a performance based methodology based upon a minimum site separation utilizing realistic site configurations. That methodology will provide a usable process for the State of Maryland's system design and surrounding State licensees as well.

It would also be possible to provide this same methodology to the General Use channels such that all states and regions could coordinate all spectrum with the same parameters and gain high density of spectrum availability in the mid-Atlantic area.

4.3.1. Minimum Reuse Site Spacing

An important design limit to define is the minimum spacing between sites that use the same channel. The following performance comparison scenario will define the "minimum" site separation that can be achieved based upon typical site design parameters and accommodation of any modulation schemes or other parameters that could differ between various networks.

Chart 16 identifies sites from the database (tower site icons) to compare sites using the same channel separated by 20 and 25 miles. The site in Talbot County is represented by the large dark colored signal footprint. The other two sites, one located due north in Queen Anne's County, and the other is located northeast in Caroline County, are being considered to use the same RF channel as the Talbot site.

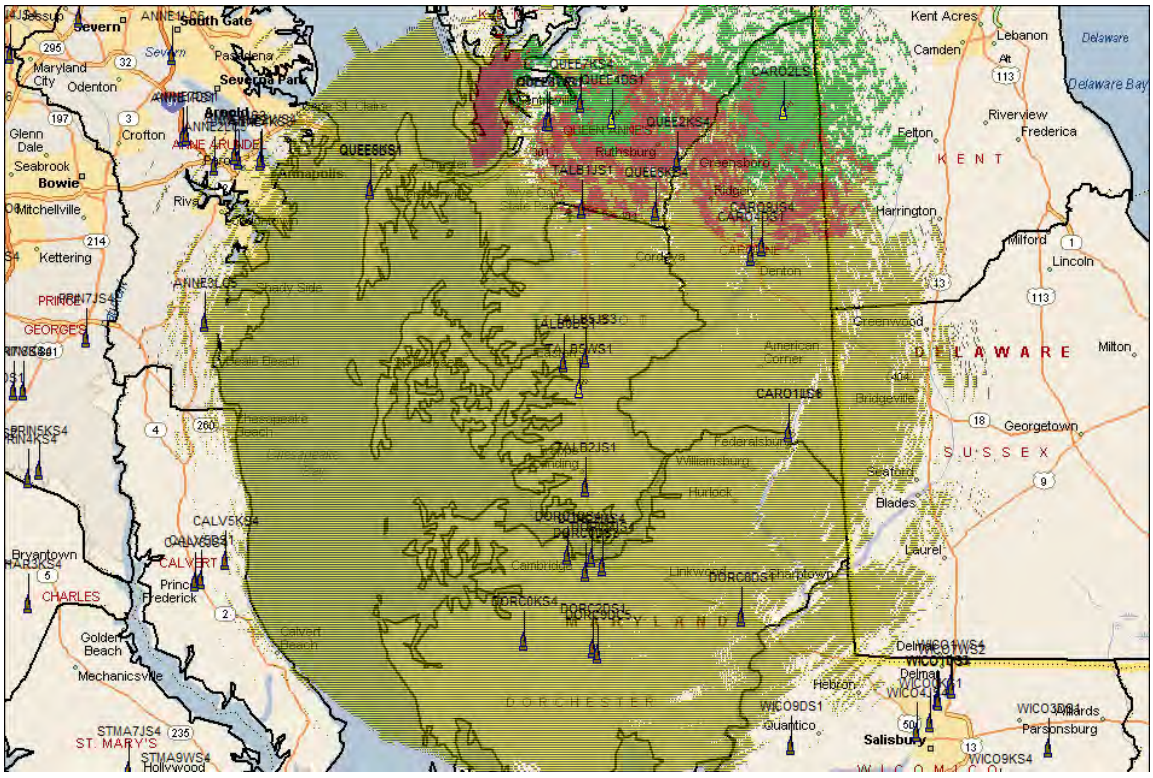


Chart 16) Desired to undesired signal – Carrier-to-Interference at 20 and 25 miles

Desired coverage (green color) is predicted at Maryland's target coverage level of 97% reliability. Undesired coverage (dark color) is predicted at 50% reliability consistent with coverage to interference evaluations. The resulting interference is illustrated in the red color.

The Caroline site is separated by 25 miles while the Queen Anne's site is 20-mile separation from the Talbot site. There is notable interference impacting the desired coverage of the Caroline site. Ideally, a site in Denton, MD, as identified by the icons, could be constructed on a different channel to mitigate the interference. This separation would be the last resort if there are no more channels available or budgetary constraints limit additional sites.

Therefore, the minimum performance-based site separation using typical site design parameters cannot tolerate much less than 25 mile site separation. It is possible to design site configurations to meet such a close re-use pattern. However, that impacts the overall cost of the system.

RCC therefore suggests that due to the effect of high ground elevation causing extended signal range, as well as the Bay providing minimal signal attenuation. Therefore, a minimum of 36-mile site separation is desired for the design of the system.

Chart 17 compares the 25-mile separated site performance to a 36-mile separation. RCC locations provided in the Maryland site database for this illustration:

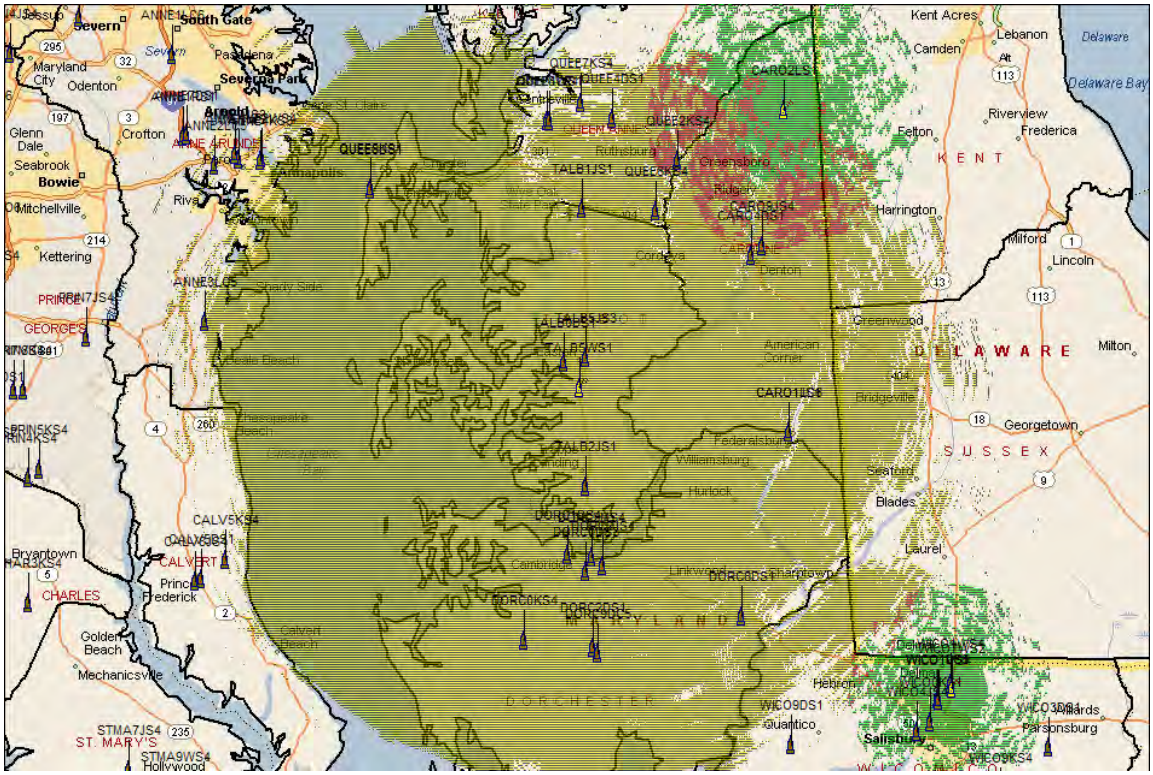


Chart 17) Desired to undesired signal – Carrier-to-Interference at 25 and 35 miles

At the 36-mile spacing, the site in Wicomico County provides minimal interference with the Talbot site.

Comparatively, the current reuse spacing of the NY Overlay separates channel reuse by 60 miles. This would result in a wider distance spacing which reduces the ability to reuse spectrum and potentially impact capacity or flexibility of where sites can be constructed. RCC suggests there is a valid reason to use 60-mile spacing, primarily when high profile site configurations are used to provide mobile-based or low site count based system design. However, when portable based and building penetration reliability is the design goal, then high profile site configurations and large reuse separations are best replaced by low profile site configurations which allow closer reuse allocations.

With a 36-mile separation balancing typical site configurations with coverage requirements, the next step is to develop a sample reuse pattern to test the sample area.

4.3.2. 7-Site Reuse C/I Performance Test Pattern

A conceptual set of seven sites is defined for the purpose of justifying minimum site spacing for the reuse pattern. In addition, some general prediction parameters are modified compared to desired design in order to capture the impact of desired coverage versus interference areas if channels are reused at nearby sites.

These seven sites are designed to provide desired coverage for the "target" cell land area and a slight amount of coverage beyond the cell. Site specific parameters such as antenna height and power levels are adjusted for each cell to provide the desired performance.

Each site is then evaluated separately with respect to desired RF coverage versus undesired RF coverage and the resulting interference of the overlap area. In this case, a specific channel within target cell is selected and is evaluated for desired coverage performance versus any impact of the channel reuse allocations of all other cells operating on the same channel.

Chart 18 illustrates the desired coverage and resulting interference from sites operating with the same channel.

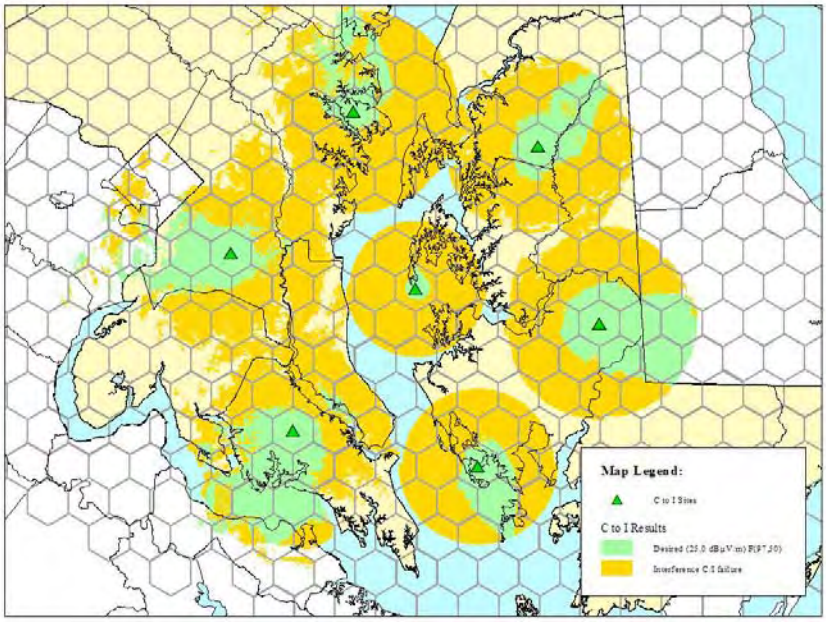


Chart 18) 7-site Carrier-to-Interference test pattern

In this example, cells site designs are acceptable for the design because both (i) and (ii) apply:

(i) the interference does not encroach unacceptably upon the desired cell coverage and

(ii) one or both of the following apply:

(a) Operational sites with other channel allocations provide coverage in the interference areas (e.g. sites are operating in cells between the "A" cells), or,

(b) Either the desired or undesired "A" sites provide coverage to the interference areas using other channels allocated to the "A" channel set. If only (b) applies, then channel assignment prioritization or talkgroup-to-channel steering may be required to minimize impact to users.

Cell site designs would not be acceptable if either (iii) or (iv) apply:

(iii) the interference encroaches too much upon the desired cell coverage or

(iv) neither of the following apply:

(a) Operational sites with other channel allocations provide coverage in the interference areas (e.g. sites are operating in cells between the "A" cells), nor,

(b) Either the desired or undesired "A" sites provide coverage to the interference areas using other channels allocated to the "A" channel set. If only (b) applies, then channel assignment prioritization or talkgroup-to-channel steering may be required to minimize impact to users.

Undesired signal will always exist from other sites using the same channels within the interference zone. However, the "target" cell land area does not have destructive interference. That is, the undesired signal within the cell is (theoretically) below the system's design interference threshold. In those cases where the undesired signal is stronger than predicted, further design assessment is taken to reduce the interference or mitigate its impact:

- Adjacent sites are examined to see if another site provides service to the impacted area(s) ("best server" analysis);
- Other channels are examined for potential use in the impacted area(s) ("short spaced" channel allocations); and,
- Special use sites may be considered in difficult circumstances.

Typical cell site design parameters vary effective radiated power from 25 to 60 watts, and use 4-degree down-tilt antennas at 200 feet elevation to reduce signal strength on the horizon. These represent very practical site design parameters and are consistent with achieving statewide coverage services. Increasing power or antenna heights at a site will provide greater coverage from that site, but at the expense of interference area expansion near sites using the same channels.

Other technical design parameters must be considered to balance technological as well as budgetary cost considerations. As antenna height is raised on a tower structure, power is necessarily reduced. In simple terms, range (i.e. distance from the site) increases with increased antenna height. However, as distance from the site increases, signal strength falls exponentially, thus reliability is not achieved in proportion with the added range due to the increased antenna height. In other words, destructive interference at remote areas is increased without providing statistically (at any one given location) and geographically (percentage of land area within a block) increased service reliability. Finally, an increased antenna heights or power levels will adversely affect reuse of the channel. Even with these considerations, actual sites used in the design will be configured to use a range of antenna heights and power levels to balance service performance, reliability, and overall site count, thereby positively impacting the project budget.

4.3.3. Statewide Reuse C/I Performance Test Pattern

The Chart 19 illustration applies the reuse pattern to a set of sites across the state:

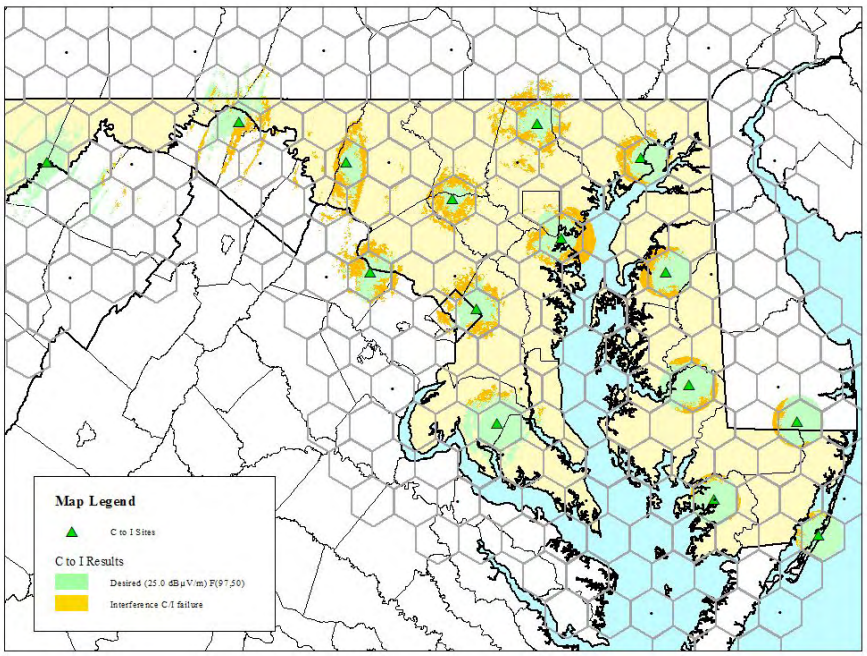


Chart 19) Statewide Carrier-to-Interference test pattern

The map above illustrates all of the sites reusing the channel with a 36-mile site separation. Note, the western portion of Maryland illustrates a gap in the reuse pattern due to the irregular state boundary.

This "Statewide" performance-based carrier-to-interference approach is beginning to illustrate the increase in reuse pattern compared to the NY Overlay concept. This is important in order to be able to apply channels to sites that are being designed to provide high reliability for portable street and even portable in-building coverage.

4.3.4. Region-wide Site C/I Performance Test Pattern

Chart 20 transitions the carrier-to-interference into resultant RF coverage performance prediction of all reuse sites in Maryland and surrounding States. This serves as an important point of comparison for reuse patterning in the performance based plan as this allows carrier-to-interference design to be transposed back into RF coverage performance.

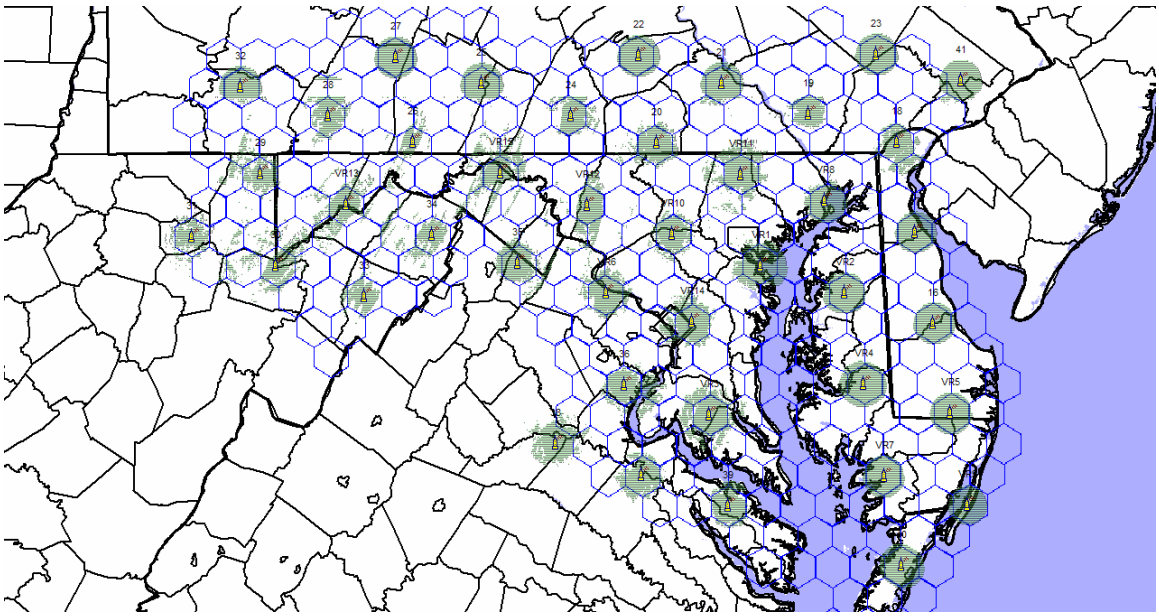


Chart 20) Statewide Carrier-to-Interference test pattern

Predicted RF coverage performance is also illustrated for other States based upon Maryland RFP specifications, but can be modified to their desired design goals which can differ than Maryland's. The site parameters are not optimized for the other States as this is just illustrative. However, in general site designs would be in line with Maryland site configurations.

Because Maryland has the more stringent coverage and reuse requirements, network designs deployed using less than 95% reliability or mobile-based designs will achieve their desired design goals without compromise from Maryland's design or this optimized reuse pattern.

4.3.5. Cell Reuse Grid Geometry

Based upon the performance analysis, RCC will follow a 36-mile channel reuse separation. This separation will then be applied to the channel groupings.

The NY Overlay identifies a 12-cell grouping as illustrated in Chart 21:

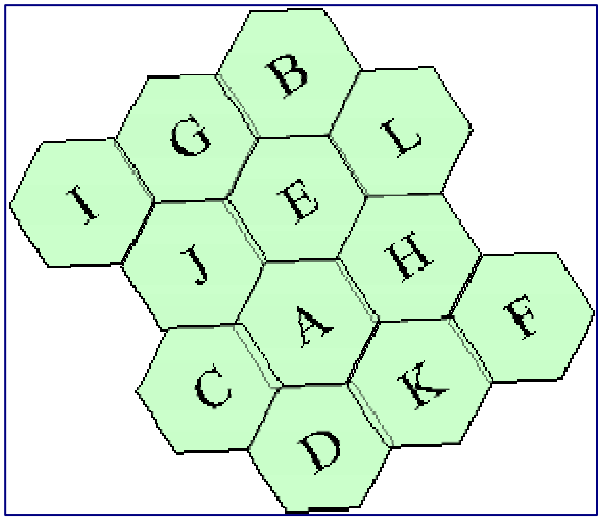


Chart 21) NY Overlay 12-cell grid geometry

The reuse distances in the NY Overlay are not equal as there is one extra row of cells in the overall 3 by 4 pattern above. RCC has not performed a detailed distance analysis; however, documentation on the NY Overlay illustrates reuse separation between cells of the same channel group from 60 to 90 miles depending upon the cell group evaluated.

Large reuse distances require large cells. In applying a reuse pattern to actual site locations, it is generally accepted that some amount of site shifting is required. When cell sizes are too large, it is difficult to configure a particular site at the borders of a cell to meet interference protection criteria. There is a limited amount of leeway that a typical site configuration can tolerate and RCC recommends approximately 5 to 7 miles might be a practical limit to meet design and coordination process goals.

For 36-mile reuse, the 12-cells would necessarily become much smaller, which might overcompensate the balance of coverage, interference and capacity. Alternatively, utilizing a number of cells other than 12, and resizing those cells would restore the cell sizes and can even increase capacity per cell. Grouping these cells into clusters can also provide channels that are applicable into multiple cells of the same cluster.

Therefore RCC suggests a grid of 7 cells. These 7-cells are defined as a "Cluster". Three clusters of 7-cells each can provide a regular repeating pattern of 21 cells where there is a constant distance between all Clusters and cell centers as illustrated in Chart 22:

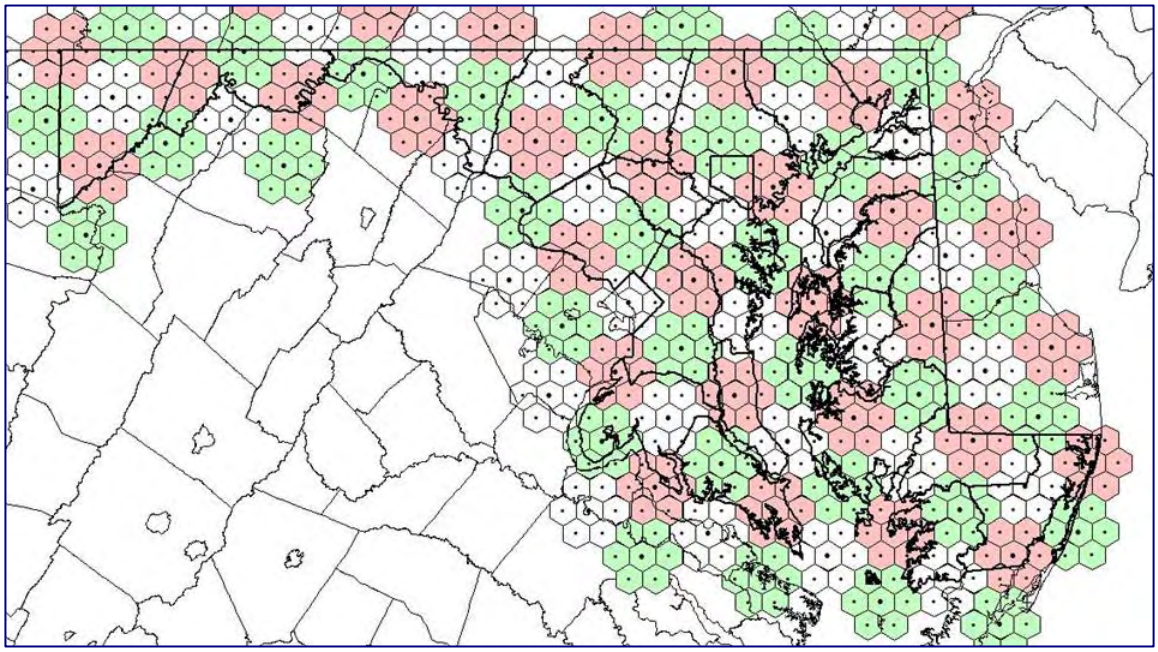


Chart 22) 21-cell grid geometry

From three 7-cell clusters there are 21 total cells to apply unique channels. This would accommodate two 25 kHz channels per cell leaving six 25 kHz channels left over. These six would be applied in specific clusters, 2 channels for each cluster set, as capacity or other dynamic or functional allocation

At 12.5 kHz channels, four channels would be available as unique channels per cell. The twelve remaining channels would be applied in specific clusters, four channels for each cluster set.

With the site separation and cell channel complement identified, the channel allocation groups will be mapped to the Physical Channel Plan for each cell and thus applied to site(s) within or very near the cell.

4.4. Functional Channel Allocation – Channel Matrix

4.4.1. NY Overlay Matrix Concept and Virginia Allocations

Currently there is a conceptual channel allocation matrix developed from the Regulatory and Coordination aspects. This current allocation concept is initially intended to allow Maryland and Virginia to begin the planning processes. This approach is based upon distance separation allocation. A Distance Based allocation is appropriate in early planning and coordination efforts.

Chart 23 illustrates the NY Overlay allocation matrix:

Current 12-cell channel allocation (NY Overlay)

Polygon Cell Designation	TV Channel 63/68	TV Channel 63/68	TV Channel 64/69	TV Channel 64/69
A	25-28	65-68	645-648	685-688
B	29-32	69-72	649-652	689-692
C	33-36	73-76	653-656	693-696
D	185-188	225-228	805-808	845-848
E	189-192	229-232	809-812	849-852
F	193-196	233-236	813-816	853-856
G	105-108	145-148	725-728	765-768
H	109-112	149-152	729-732	769-772
I	113-116	153-156	733-736	773-776
J	265-268	305-308	885-888	925-928
K	269-272	309-312	889-892	929-932
L	273-276	313-316	893-896	933-936

Chart 23) NY Overlay channel allocation with Virginia low power assignments

RCC was informed that the "red" allocations above initially were allotted to the Commonwealth of Virginia as low-power channels to accommodate cross-band vehicular repeaters. RCC advises that there are pre-defined low-power channels already allocated by the FCC within the 700 MHz Band Plan and would suggest both Maryland and Virginia might benefit in using those defined channels of low power operations as both States consider the requirement to coordinate and share the State License spectrum allocation.

RCC also advises that per the current FCC rules, there is at least one TV broadcast station that represents potential depletion of channel availability to the Maryland network. Due to the geographic size of Maryland, coordination agreements with other States could render these same channels unavailable throughout all or much of the rest of Maryland.

RCC suggests that if Virginia is deploying 12.5 kHz for its low power channels and has simply reserved the adjacent channels for network site allocations, then Virginia and Maryland would be better off separating these aggregated 25 kHz channels to accommodate the Performance Based allocation proposed by RCC. This Performance Based allocation will provide protection for network and low power allocations without the inefficiencies of large distance separated allocation approaches and geo-political or population based allocation such as CAPRAD.

4.4.2. Mapping Functional and Physical Requirements

The current Channel Plan concept is based upon simple distance separation and allocates all State License channels to a set of 12 cells at four 25 kHz channels per cell. This aligns with the FCC allocation and permits a four channel site to be deployed practically anywhere the coordination plans can allow. The current plan does not develop the physical aspects of site separation beyond the basic geometry of a 12-cell reuse pattern wherein each cell is uniformly sized.

RCC advises that the current concept potentially limits the reuse capability of the Maryland project, primarily because of the distance separation based allocations, but also because of the possibility that the State-to-State coordination agreements may not be uniform and any special allocation channels will deplete Maryland system capacity on an ad-hoc basis.

The documentation provided to RCC by the Project Office contains information defining the cell size and radii geometry for the NY Overlay channel reuse parameters. The NY Overlay concept plan is based upon a 12-cell reuse pattern wherein each cell is sufficiently large to accommodate high profile and high powered sites.

The NY Overlay documents provided contain more than one geometric cell sizing and reuse spacing of the NY Overlay plan. In one approach, the cell size and 12-cell reuse pattern yield a channel reuse separation of between 60 and 80 miles because of asymmetric reuse patterns. A second 12-cell approach yields a channel reuse separation of between 75 and 106 miles because of asymmetric reuse patterns. Unless specifically stated or illustrated, RCC uses the closer spaced site separation, 60-miles, to compare the NY Overlay 12-cell approach throughout this document.

This resulting reuse spacing of the NY Overlay is reasonable for very large land areas such as New York, Pennsylvania, and Virginia, because these States can modify reuse patterns far from their respective coordination borders as required. This concept can

become restrictive to spectrum availability and thus network capacity in smaller land area states such as Maryland, Delaware, New Jersey, and the District of Columbia.

Furthermore, it typically is understood in coordination agreements that a channel, or channels, might be relocated to an adjacent cell, subject to site specific RF design parameters that meet the standard reuse pattern or coordination agreement requirements.

Consider these four general configurations that apply to a coordination arrangement and site specific designs:

4.4.2-a) Large Cell sizes - Radius of the cell "hexagon" is large (compared to 4.4.2-b);
4.4.2-b) Small Cell sizes - Radius of the cell "hexagon" is small (compared to 4.4.2-a);
4.4.2-c) High profile site - Antenna height and ground elevation is tall (compared to 4.4.2-d) or transmitters are high powered; and,
4.4.2-d) Low Profile site - Antenna height or ground elevation is short (compared to 4.4.2-c) or transmitters are low powered.

Either large cell sizes (4.4.2-a) or high profile specific site design (4.4.2-c) tend to limit the ability to re-position a channel to an adjacent cell or to a specific high profile site except where State-to-State coordination is not required.

Either small cell sizes (4.4.2-b) or low profile specific site design (4.4.2-d) accommodate re-positioning a channel to an adjacent cell or to a specific low profile site both where State-to-State coordination is not required and potentially within the geographic area where coordination is required.

State-to-State coordination would not be required except for sites and channels within the coordination area. While specific site parameters, ground elevation, antenna height, and power vary greatly, and channels applied to the site need to be re-positioned, the following rules apply and must be met absent any other arrangement between licensees that use the same channels:

4.4.2-e) No coordination is required by the FCC for co-channel re-use by different licensees for sites that are spaced greater than 70-miles. In other words, regardless of cell sizing, re-use patterns, or site specific designs, co-channel licensees can construct sites using channels and site specific designs without coordination as long as the sites are spaced greater than 70 miles. There is no geographic point within the State of Maryland that can construct any site meeting this FCC regulatory parameter. Therefore, all sites within Maryland must:

e1) be coordinated with the other licensee on a site by site basis, or

e2) follow the FCC 40 dBu coordination requirements, or

e3) follow a coordination agreement that differs from the FCC 40 dBu requirement to allow site specific designs to meet that agreement.

4.4.2-f) At 700 MHz, the FCC places one additional requirement for co-channel licensees that desire to construct sites that are less than 70-miles [item (4.4.2-e1, -e2 and -e3) above]. Absent an over-riding coordination agreement between the licensees, the signal of the particular constructed frequency shall be at a strength no greater than 40 dBu at the border of each licensee's "service territory". This applies whether the service territories physically border each other or not.

This means that absent any other arrangement between co-channel licensees, Maryland's site specific design of constructed channels must be at a signal level of 40 dBu at the state border. Likewise, absent any other arrangement, Pennsylvania, New Jersey, Delaware, Virginia, West Virginia and the District of Columbia would also have to construct their site specific designs to meet the same 40 dBu requirement at their state borders.

In the case of Maryland, five eligible licensees physically border the state boundaries and the sixth, New Jersey, is within the FCC's 70-mile coordination distance. The 40 dBu signal levels, allow sites to be spaced closer than 70-miles with great site specific design variations for service territories that do not physically border each other (i.e. Maryland and New Jersey). However, for service territories that do border each other (i.e. Maryland and the five other eligible entities), the 40 dBu signal levels require very stringent designs of sites and channel reuse, particularly those channels at sites that are near the adjacent borders. This stringent 40 dBu requirement results in very low profile site designs and low antenna heights or low power levels for sites near the border of the state.

Similar to the NPSPAC 821 MHz spectrum allocation process. a 40 dBu signal level protects co-channel licensees to a point where site separation for most typical site specific designs are perhaps 30-miles to meet the 40 dBu signal at the border of the service territory. Site specific designs might vary this "buffer" distance, but generally all sites within the 30-miles of the border must be designed to limit the signal level at the state border to meet the FCC's 40 dBu coordination requirement. The FCC 40 dBu requirement places a burden on the State of Maryland because almost the entire state land area falls within this 30-mile buffer zone.

4.4.2-g) Given the possible large or small cell sizes and high or low site profile combinations of items described in items (4.4.2-a) through (4.4.2-d) above, then item 4.4.2-e1, -e2 and –e3 and item 4.4.2-f above, interact and therefore must be integrated and balanced in the system and site design effort. The site specific design effort must accommodate variations in site specific design profiles and site locations to meet the need to construct sites where service is required for Maryland and the five bordering eligible licensees as well as New Jersey.

4.4.2-h) The above item 4.4.2-e1) FCC 70-mile separation and item 4.4.2-e2) FCC 40 dBu border signals cannot be used to achieve the State of Maryland's network design for coverage or capacity and accommodate the six other eligible entities entitlements. Since only Maryland's site design can be the starting point here, Maryland would be best served to lead an effort to develop an alternative State-to-State coordination arrangement indicated by item (4.4.2-e3) above.

4.4.2-i) Absent a State-to-State channel coordination arrangement with all six entities, the following guidelines must be applied to affect a statewide network meeting the coverage requirements of Maryland's Statewide Interoperability Project:

i1) High profile site designs are limited to the extreme interior of the state.

i2) Low profile site design is required throughout the remainder of the state.

i3) Short spaced channel reuse is required throughout the State of Maryland, which means large cell hexagon sizes or large distances between re-used channels is not a desirable option.

i4) Performance-Based Carrier-to-Interference design can address the design to accommodate the lack of agreement beyond the FCC 40 dBu requirement.

i5) Sites within 30 miles of the border are all subject to coordination and therefore limited in site design profile and it is assumed that all sites for the other eligible entities within 30 miles of the border are subject to coordination and also limited in site profile. All "high profile" sites in Maryland and the other entities that are within 50 miles of the respective borders are also subject to coordination. The 50-mile buffer will encompass 100 % of sites within Maryland.

Therefore Maryland cannot depend upon the FCC 70-mile site separations non-coordination requirement for most sites in the state (greater than 70 miles), nor can Maryland construct any site that is not subject to either the FCC 40 dBu at the state border or alternative coordination agreements of large cell sizes or high site profile designs.

Maryland can develop a system design based upon small cell sizes and lower profile sites which can be developed into an acceptable coordination effort with surrounding states, provide the increased RF performance compared to large cell coordination methodologies, and even be combined with the Regional Planning Committees' spectrum pools to better address shared use of those channels between the states and local governments.

In the case of Maryland, Chart 24 illustrates there is little land area, and thus seven cells, that are not within 30 miles of a bordering state (clear or light yellow and light blue colored) and the land area of those seven cells consist primarily of the Chesapeake Bay.

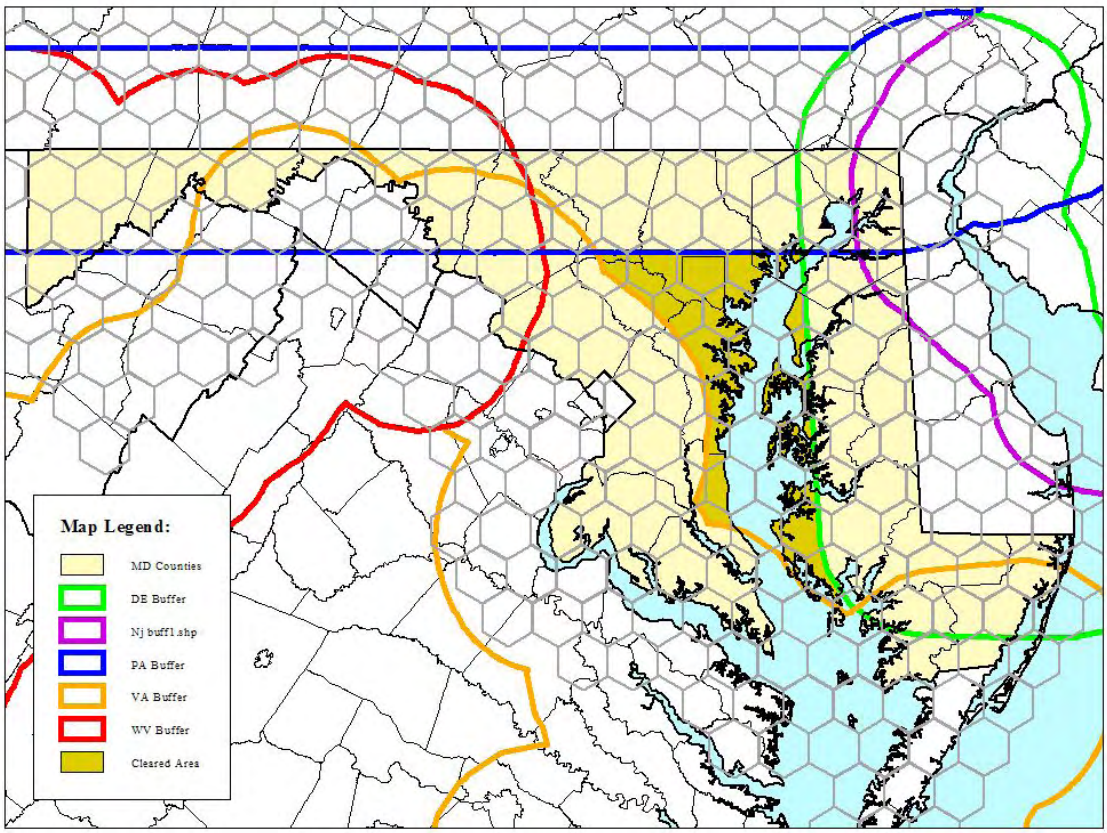


Chart 24) Coordination and Non-Coordination area within Maryland

The 12-cell pattern with large Distance Based reuse separation limits the flexibility or capacity based upon the coordination areas illustrated above, and becomes quite cumbersome if the coordination areas above must follow different processes, technical attributes, or channel allocation schemes.

The 12-cell pattern is able to map all State License spectrum allocations equally to each cell (e.g. four 25 kHz allocations per cell). This allows equal channel quantities (four) to be mapped to each of the 12-cells. RCC advises this can be adequate for most areas in Maryland, however high density usage areas do require more channels and there are no provisions for special applications channels such as wide area, vehicular repeater, Cell-on-Wheels (COW), dynamic reuse, and low altitude fixed and rotary wing aircraft channels. Any of these special application requirements would deplete capacity from one or more cells because they are applied in a particular geographic area.

Furthermore, if these special application channels are allocated individually by each state, then the allocation of cell channels to special applications are not necessarily uniformly available. One state may have reason to use different special application channels on its border while a different state may be assigning the channels to the standard allocation pattern for its network, thus precluding them from use by the neighboring state along a border.

Without uniform special use channel coordination, if Maryland requires special application channels, they would require ad-hoc allocation on a cell-by-cell basis. As an example, COW channels might have to be modified based upon the location of the temporary operations along the borders of the state and, because of the 12-cell reuse size, over most of the land area within the center of the state.

4.4.3. Three "7-cell" clusters (N=21) channel allocation tables

Chart 25 illustrates the RCC recommended Pattern of three 7-cell clusters resulting in a 21-aggregated cell grid geometry termed N=21:

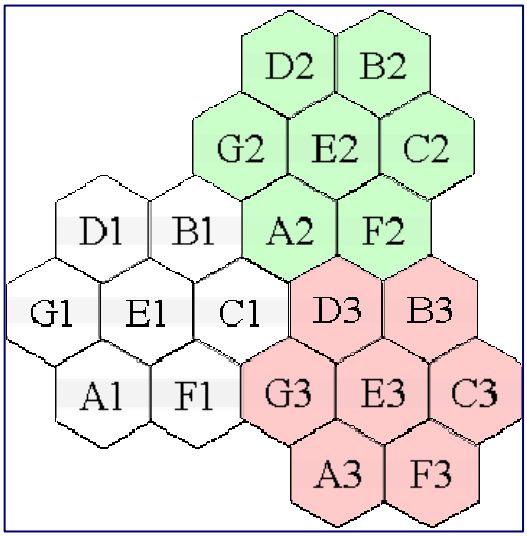


Chart 25) 21-cell grid geometry

Chart 26 illustrates the N=21 pattern allocated to Maryland:

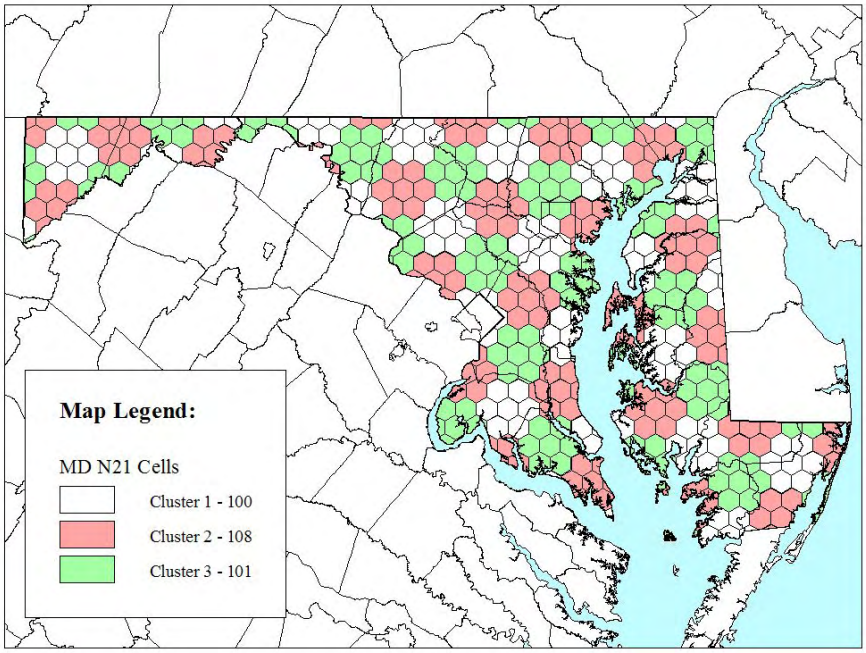


Chart 26) Cells allocated to Maryland

There are seven cells in a cluster. Three clusters make the N=21 pattern. Clusters are positioned to provide the 36-mile site separation.

To develop an estimated reuse allocation for Maryland, the total cells per cluster are allocated by comparing square miles of the cells and the land area. The number of cells per cluster is divided by seven to approximate the reuse of a particular channel as illustrated in Chart 27:

Cell ID	25 kHz Channels per Cell	Number of Cells Assigned in Maryland	Total Channels Assigned in Maryland
A1	2	14	28
A2	2	14	28
A3	2	15	30
B1	2	14	28
B2	2	14	28
B3	2	15	30
C1	2	14	28
C2	2	14	28
C3	2	15	30
D1	2	14	28
D2	2	14	28
D3	2	15	30
E1	2	14	28
E2	2	14	28
E3	2	15	30
F1	2	14	28
F2	2	14	28
F3	2	15	30
G1	2	14	28
G2	2	14	28
G3	2	15	30
X1-capacity	2	14	28
X2-capacity	2	14	28
X3-capacity	2	15	30
25 kHz ch. :	**48**	**344**	**688**

Cell ID	12.5 kHz Channels per Cell	Number of Cells Assigned in Maryland	Total Channels Assigned in Maryland
A1	4	14	56
A2	4	14	56
A3	4	15	60
B1	4	14	56
B2	4	14	56
B3	4	15	60
C1	4	14	56
C2	4	14	56
C3	4	15	60
D1	4	14	56
D2	4	14	56
D3	4	15	60
E1	4	14	56
E2	4	14	56
E3	4	15	60
F1	4	14	56
F2	4	14	56
F3	4	15	60
G1	4	14	56
G2	4	14	56
G3	4	15	60
X1-capacity	4	14	56
X2-capacity	4	14	56
X3-capacity	4	15	60
12.5 kHz ch. :	**96**	**344**	**1376**

Chart 27) 25 and 12.5 kHz channel allocations in Maryland for the 21-cell pattern

Chart 23 illustrates 48 and 96 channels, at 25 and 12.5 kHz respectively, with their approximate reuse allocation and resulting channels assigned in Maryland. While the numbers appear large, the allocations will be site specific and thus not all allocations will apply to the network design.

The N=21 count applies a fixed number of channels to the relatively small sized cells (A1 through G3). There are channels not allocated which can be used for capacity increase if required, defined as X1 to X3-capacity. These channels can be allocated to any cell within the cluster x1 (white), x2 (green) or x3 (red).

If not required for capacity, these channels can be returned to a regional coordination between the States and Local governments to develop “Special Use” as defined in the next section.

4.4.4. Special Use Channel Allocations

If Special Use channel allocations can make sense, then prior to mapping the channels to cells, any Special Use channel allocations could be identified as a function that addresses a common need across the six other coordinating entities (Pennsylvania, Virginia, Delaware, West Virginia, the District of Columbia, and New Jersey).

The most common functionality that RCC envisions in system design, coordination, or modifications to existing authorizations are as follows:

- Channels dedicated for interoperations (example: the NPSAPC mutual aid channels or the RINS allocation within the Region-20 NPSPAC Plan),
- Wide Area Channels (example: simulcast channels),
- Low Power Channels (example: channels used for vehicular repeaters or talk-around),
- Low Flying Aircraft Channels (example: water drop air-to-ground channels or medical transport operations across state boundaries), and
- Cell on Wheels (example mobile and deployable temporary sites for short term planned events as well as long term unplanned events).

RCC suggests there can be other desirable functions based upon common needs and upon specific technology platforms. RCC also can derive common uses that could be independent of technology such as dynamic channel allocation.

If Special Use allocations are desired because they address common needs, it does reduce State License spectrum from the "X-clusters" allocations and does not reduce any spectrum allocated to the channels allocated to the sites for the entire state. The NY Overlay would address this requirement by reducing capacity of specific cells, and thus sites, anywhere this function would be required.

It should be noted that some of the functional allocations identified might be relocated to other parts of the 700 MHz Band Plan, and some, in fact, may actually be more properly located elsewhere as well, such as the case with Interoperation channels and Low Power channels that do have reserved channels in the FCC Band Plan.

Chart 28 illustrates the case where three channels are relocated from site capacity to Special Use function.

Cell ID	25 kHz Channels per Cell	Number of Cells Assigned in Maryland	Total Channels Assigned in Maryland
A1	2	14	28
A2	2	14	28
A3	2	15	30
B1	2	14	28
B2	2	14	28
B3	2	15	30
C1	2	14	28
C2	2	14	28
C3	2	15	30
D1	2	14	28
D2	2	14	28
D3	2	15	30
E1	2	14	28
E2	2	14	28
E3	2	15	30
F1	2	14	28
F2	2	14	28
F3	2	15	30
G1	2	14	28
G2	2	14	28
G3	2	15	30
X1-capacity	1	14	14
X2-capacity	1	14	14
X3-capacity	1	15	15
SU1-special use	1	14	14
SU2-special use	1	14	14
SU3-special use	1	15	15
25 kHz ch. :	**48**	**387**	**688**

Cell ID	12.5 kHz Channels per Cell	Number of Cells Assigned in Maryland	Total Channels Assigned in Maryland
A1	4	14	56
A2	4	14	56
A3	4	15	60
B1	4	14	56
B2	4	14	56
B3	4	15	60
C1	4	14	56
C2	4	14	56
C3	4	15	60
D1	4	14	56
D2	4	14	56
D3	4	15	60
E1	4	14	56
E2	4	14	56
E3	4	15	60
F1	4	14	56
F2	4	14	56
F3	4	15	60
G1	4	14	56
G2	4	14	56
G3	4	15	60
X1-capacity	2	14	28
X2-capacity	2	14	28
X3-capacity	2	15	30
SU1-special use	2	14	28
SU2-special use	2	14	28
SU3-special use	2	15	30
12.5 kHz ch. :	**96**	**387**	**1376**

Chart 28) 25 and 12.5 kHz channel allocations in Maryland for the 21-cell pattern

A benefit of the N=21 pattern is that adjacent channel allocations can be separated. It is preferred to not have adjacent channels operational at the same site. This is particularly important as bandwidths are narrowed from 25 kHz to 12.5 kHz or the potential bandwidth of 6.25 kHz. RCC suggests the current understanding with Virginia and Pennsylvania could be reorganized to both remove adjacent channel allocation from their current application of low-power 12.5 kHz channels being adjacent to the network channels.

4.4.5. State Licensed Channel Allocation Matrix

Chart 29 defines the 25 kHz State Licensed Channel Allocation Matrix with no Special Use allocations:

Cell ID	25 kHz Channels per Cell	FCC Assigned Channel Number	FCC Assigned Channel Number
A1	2	25-28	105-108
A2	2	29-32	109-112
A3	2	33-36	113-116
B1	2	185-188	265-268
B2	2	189-192	269-272
B3	2	193-196	273-276
C1	2	65-68	145-148
C2	2	69-72	149-152
C3	2	73-76	153-156
D1	2	225-228	305-308
D2	2	229-232	309-312
D3	2	233-236	313-316
E1	2	645-648	725-728
E2	2	649-652	729-732
E3	2	653-656	733-736
F1	2	805-808	885-888
F2	2	809-812	889-892
F3	2	813-816	893-896
G1	2	685-688	765-768
G2	2	689-692	769-772
G3	2	693-696	773-776
X1-capacity	2	845-848	925-928
X2-capacity	2	849-852	929-932
X3-capacity	2	853-856	933-936
25 kHz ch. :	**48**		

Chart 29) N=21 (Three 7-cell cluster) Channel Allocation Matrix at 25 kHz

Chart 30 defines the 12.5 kHz State Licensed Channel Allocation Matrix with no Special Use allocations:

Cell ID	12.5 kHz Channels per Cell	FCC Assigned Channel Number	FCC Assigned Channel Number	FCC Assigned Channel Number	FCC Assigned Channel Number
A1	4	25-26	27-28	105-106	107-108
A2	4	29-30	31-32	109-110	111-112
A3	4	33-34	35-36	113-114	115-116
B1	4	185-186	187-188	265-266	267-268
B2	4	189-190	191-192	269-270	271-272
B3	4	193-194	195-196	273-274	275-276
C1	4	65-66	67-68	145-146	147-148
C2	4	69-70	71-72	149-150	151-152
C3	4	73-74	75-76	153-154	155-156
D1	4	225-226	227-228	305-306	307-308
D2	4	229-230	231-232	309-310	311-312
D3	4	233-234	235-236	313-314	315-316
E1	4	645-646	647-648	725-726	727-728
E2	4	649-650	651-652	729-730	731-732
E3	4	653-654	655-656	733-734	735-736
F1	4	805-806	807-808	885-886	887-888
F2	4	809-810	811-812	889-890	891-892
F3	4	813-814	815-816	893-894	895-896
G1	4	685-686	687-688	765-766	767-768
G2	4	689-690	691-692	769-770	771-772
G3	4	693-694	695-696	773-774	775-776
X1-capacity	4	845-846	847-848	925-926	927-928
X2-capacity	4	849-850	851-852	929-930	931-932
X3-capacity	4	853-854	855-856	933-934	935-936
12.5 kHz ch. :	**96**				

Chart 30) N=21 (Three 7-cell cluster) Channel Allocation Matrix at 12.5 kHz

5. Supporting Tools and Channel Plan Performance Results

5.1. Cell Grid, Terrain and Land-use Databases

Chart 31 illustrates the 30-meter terrain database and the cell grid overlay. RCC's propagation tool models both RF coverage and carrier-to-interference performance using 30-meter terrain database and 100-meter Land use/Land clutter databases.

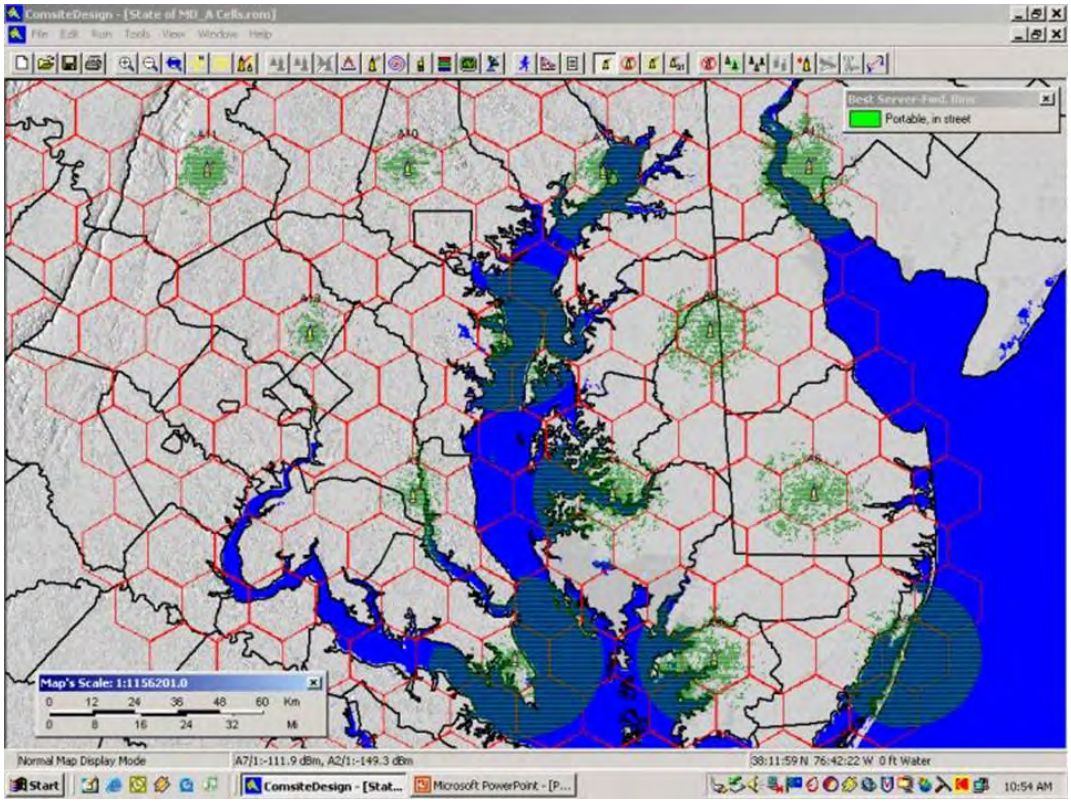


Chart 31) Cell Grid overlay on terrain and RF coverage performance

5.2. RF coverage and Carrier-to-Interference Performance

Chart 32 illustrates the Statewide RF coverage:

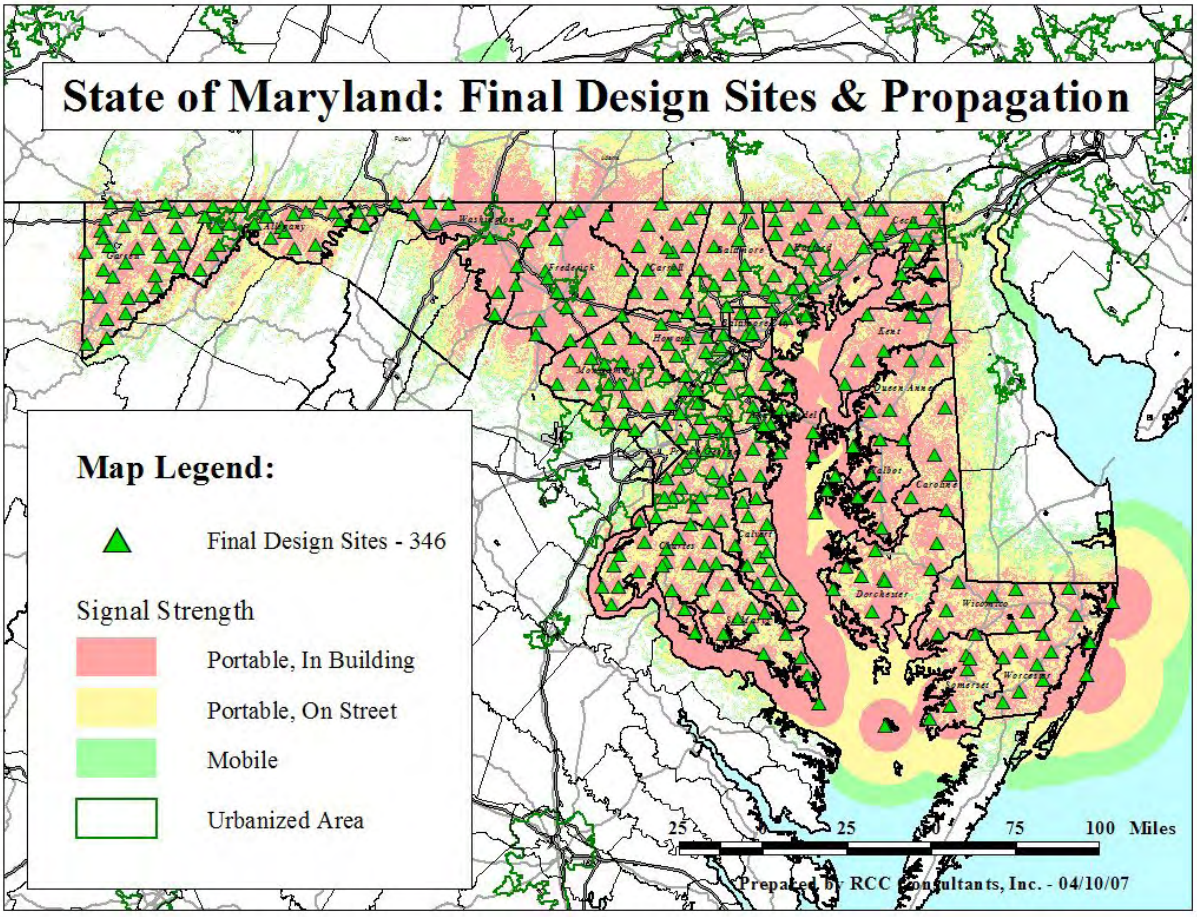


Chart 32) Statewide RF Coverage

Chart 33 illustrates selected RF sites and the resulting predicted RF coverage performance by County.

County	Land Area	Number of sites	% Mobile Coverage	% Portable Street Coverage	% Portable Building Coverage
Allegany	422.2	20	95	90	64
Anne Arundel	425.3	18	99	96	66
Baltimore - City	79.9	6	99	96	69
Baltimore	606.8	22	98	93	65
Calvert	217.4	12	99	94	68
Caroline	322.8	5	100	98	67
Carroll	452.9	15	99	96	78
Cecil	356.6	17	99	97	77
Charles	464.3	21	99	96	65
Dorchester	585.3	9	100	97	60
Frederick	667.8	18	99	98	84
Garrett	668.6	34	92	86	60
Harford	448.9	16	99	96	75
Howard	253.2	10	98	94	68
Kent	281.1	7	100	98	77
Montgomery	507.6	20	98	95	72
Prince George's	492.1	28	99	96	71
Queen Anne's	377.6	8	100	97	64
Somerset	332.7	7	100	96	53
St. Mary's	358.8	12	99	96	67
Talbot	268.3	8	100	99	72
Washington	466.1	13	99	97	86
Wicomico	387.9	7	100	99	65
Worcester	459.6	13	100	98	62
Statewide	9903.8	346	99%	95%	69%

Chart 33) Statewide RF coverage performance as percentages by County

The requirement for a Delivered Audio Quality (DAQ) of 3.4 requires the Bit Error Rate (BER) and Carrier-to-Noise plus Interference (C/(I+N)) to be in the range established by Telecommunications Industries Association (TIA) standard TSB-88-B. This establishes a value dependent on the modulation type and system bandwidth as shown in Chart 34:

Modulation Type, (channel spacing) For DAQ 3.4	Bit Error Rate (BER)	C / (I+N)
Analog FM ± 5 kHz (25 kHz)	N/A	20 dB
Analog FM ± 4 kHz (25 kHz)	N/A	22 dB
C4FM (IMBE) (12.5 kHz)	2.0%	17.7 dB
CQPSK (IMBE) (12.5 kHz)	2.0%	17.7 dB
CQPSK (IMBE) (6.25 kHz)	2.0%	17.7 dB
CVSD "XL" CAE (25 kHz)	3.0%	16.5 dB
CVSD "XL" CAE (NPSPAC)	3.0%	18.5 dB
C4FM (VSELP)* (12.5 kHz)	1.4%	19.0 dB
DIMRS (25 kHz) iDEN	1.5%	23 dB
EDACS® Wideband Digital (25 kHz)	2.0%	15.7 dB
EDACS® NPSPAC8 Digital	2.0%	16.7 dB
EDACS® Narrowband Digital	2.0%	17.7 dB
F4FM (IMBE) TDMA-2	2.0%	16.9 dB
F4GFSK (AMBE) OpenSky (25 kHz/2 Slot)	2.5%	16.4 dB
TETRA	2.0%	16 dB
Tetrapol	1.4%	15 dB
Source : TIA TSB-88-B Annex A Table A-1 Projected CPC Requirements for DAQ		

Chart 34) TIA TSB-88 Bit Error Rate and Carrier-to-Interference Parameters

For the purpose of establishing a baseline the C/I+N value of 22 dB was utilized for a generalization of 25 kHz channel spacing and a C/I+N value of 18 dB was utilized for a generalization of 12.5 kHz channel spacing.

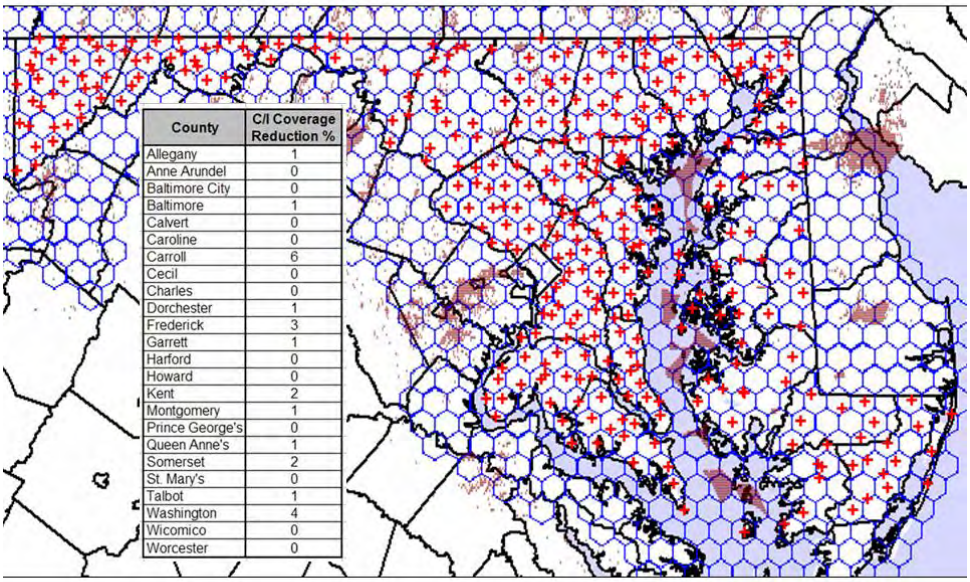
The channels are applied to all sites in the design. Based upon the N=21 grid, site specific designs, and site separation of actual locations, the resulting maps below illustrate the coverage-to-interference performance of all sites in the design.

The red areas represent areas where desired signal and undesired signal levels are less than the required C/I+N ratio for sites operating the same channels at other locations.

Interference is expected to occur where site separation is large or no sites exist such as beyond the state boundaries or within the Chesapeake Bay. Interference into the adjacent States is not of concern as RF coverage is marginal. For the Bay area, either adding sites or not assigning all channels at all sites will impact the interference areas.

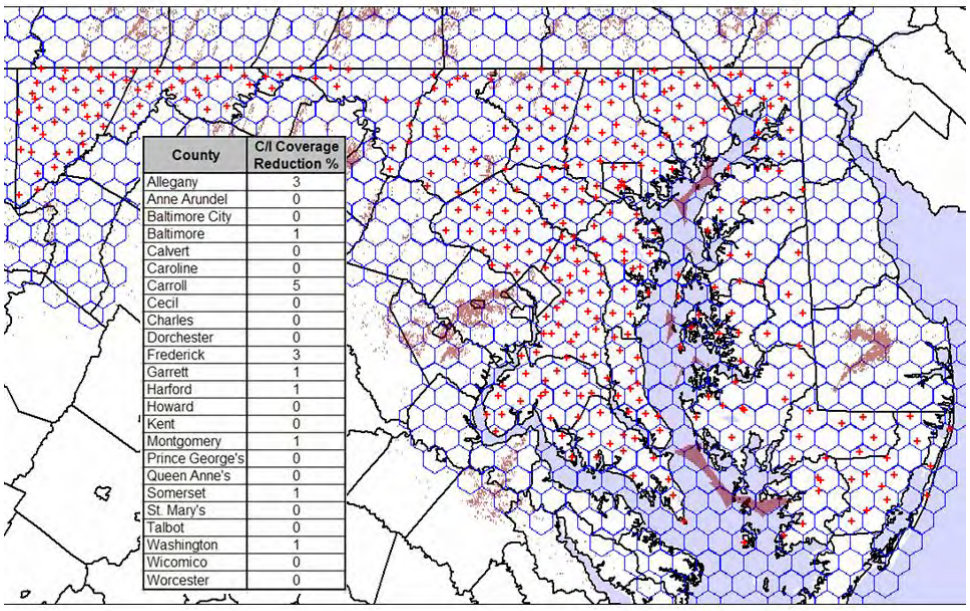
Chart 35 illustrates the Statewide RF coverage-to-interference performance achieved from the designed sites and channel plan for both 25 kHz and 12.5 kHz bandwidths.

25 kHz System Performance 22dB C/I+N - DAQ 3.4



County	C/I Coverage Reduction %
Allegany	1
Anne Arundel	0
Baltimore City	0
Baltimore	1
Calvert	0
Caroline	0
Carroll	6
Cecil	0
Charles	0
Dorchester	1
Frederick	3
Garrett	1
Harford	0
Howard	0
Kent	2
Montgomery	1
Prince George's	0
Queen Anne's	1
Somerset	2
St. Mary's	0
Talbot	1
Washington	4
Wicomico	0
Worcester	0

12.5 kHz System Performance 18dB C/I+N - DAQ 3.4



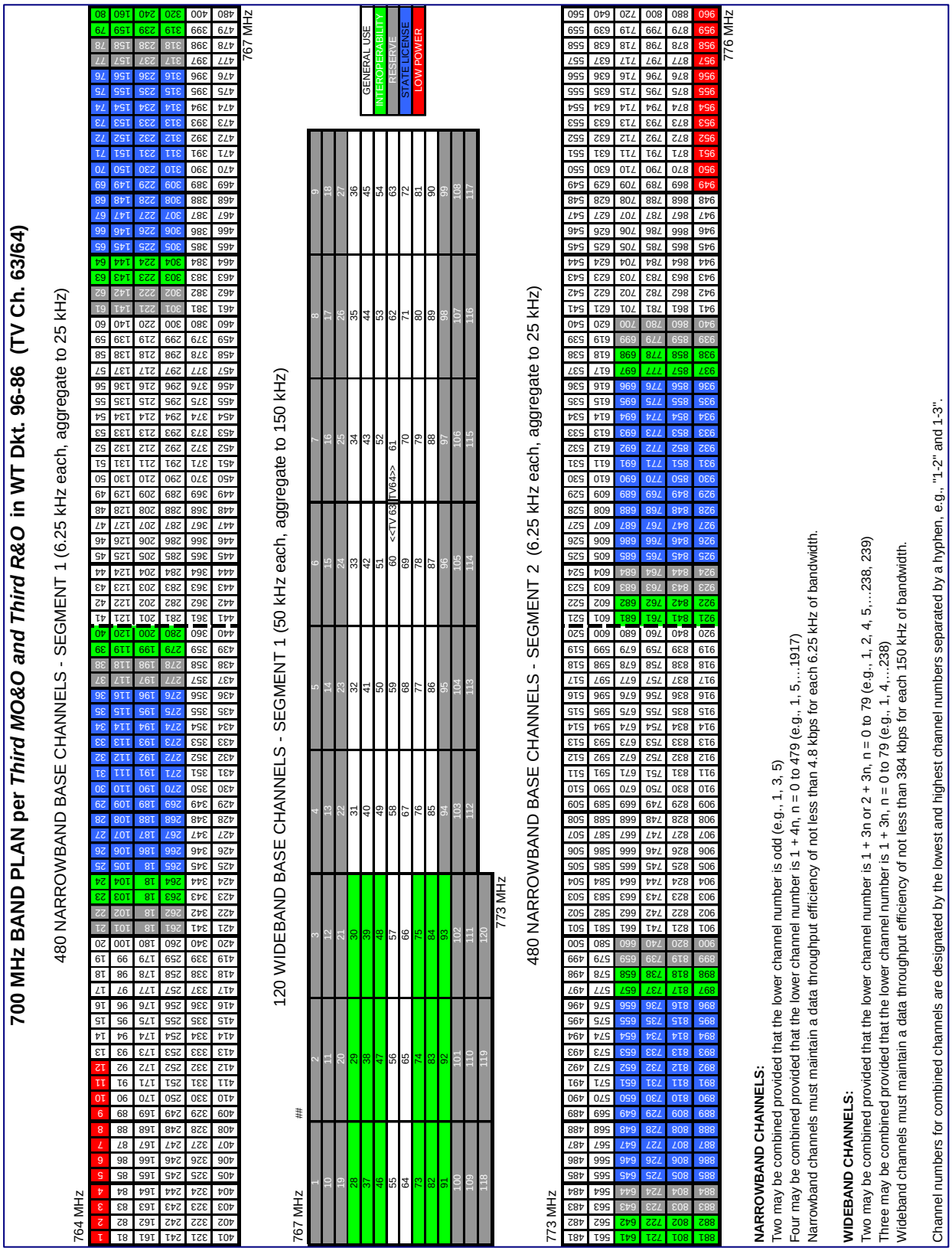
County	C/I Coverage Reduction %
Allegany	3
Anne Arundel	0
Baltimore City	0
Baltimore	1
Calvert	0
Caroline	0
Carroll	5
Cecil	0
Charles	0
Dorchester	0
Frederick	3
Garrett	1
Harford	1
Howard	0
Kent	0
Montgomery	1
Prince George's	0
Queen Anne's	0
Somerset	1
St. Mary's	0
Talbot	0
Washington	1
Wicomico	0
Worcester	0

Chart 35) Statewide Carrier-to-Interference coverage reduction Using 25 and 12.5 kHz bandwidths

Given the approximate fifty percent of search rings (X-sites) in the design, the iterative process required would not result in useful details for final design and more likely would impact sites that can move forward in the State-to-State coordination and site development phase. Site separation parameters identified in the Stage-5 Network Design interim deliverable, the State Licensed Channel Allocation Matrix, the Channel by site table (above), and the Carrier-to-Interference performance evaluation all work together to guide site specific design configuration as real sites are converted from search rings (X-sites), and maintain appropriate coordination parameters for other State License spectrum licensees.

It would be possible to remove the constraint and develop a State Licensed Channel Allocation Matrix that only accommodates 12.5 kHz channel spacing. This will not completely clear the interference in the Bay area due to the site separations because the distances are too great between sites. Furthermore, this is not an appropriate step in an effort to develop a high capacity channel plan with Pennsylvania and Virginia, as both entities may be considering a 25 kHz plan, albeit for different reasons. Pennsylvania might deploy OpenSky. Virginia has received initial allocations that are in 25 kHz blocks. Either entity can benefit from converting to 12.5 kHz allocations, but Maryland must be able to accommodate both allocations until State-to-State coordination agreements are finalized. Finally, removing the constraint to accommodate both 12.5 kHz and 25 kHz allocation also has the effect of removing some available technologies from the State's eventual procurement process.

Appendix A – FCC 700 MHz Band Plan Matrix

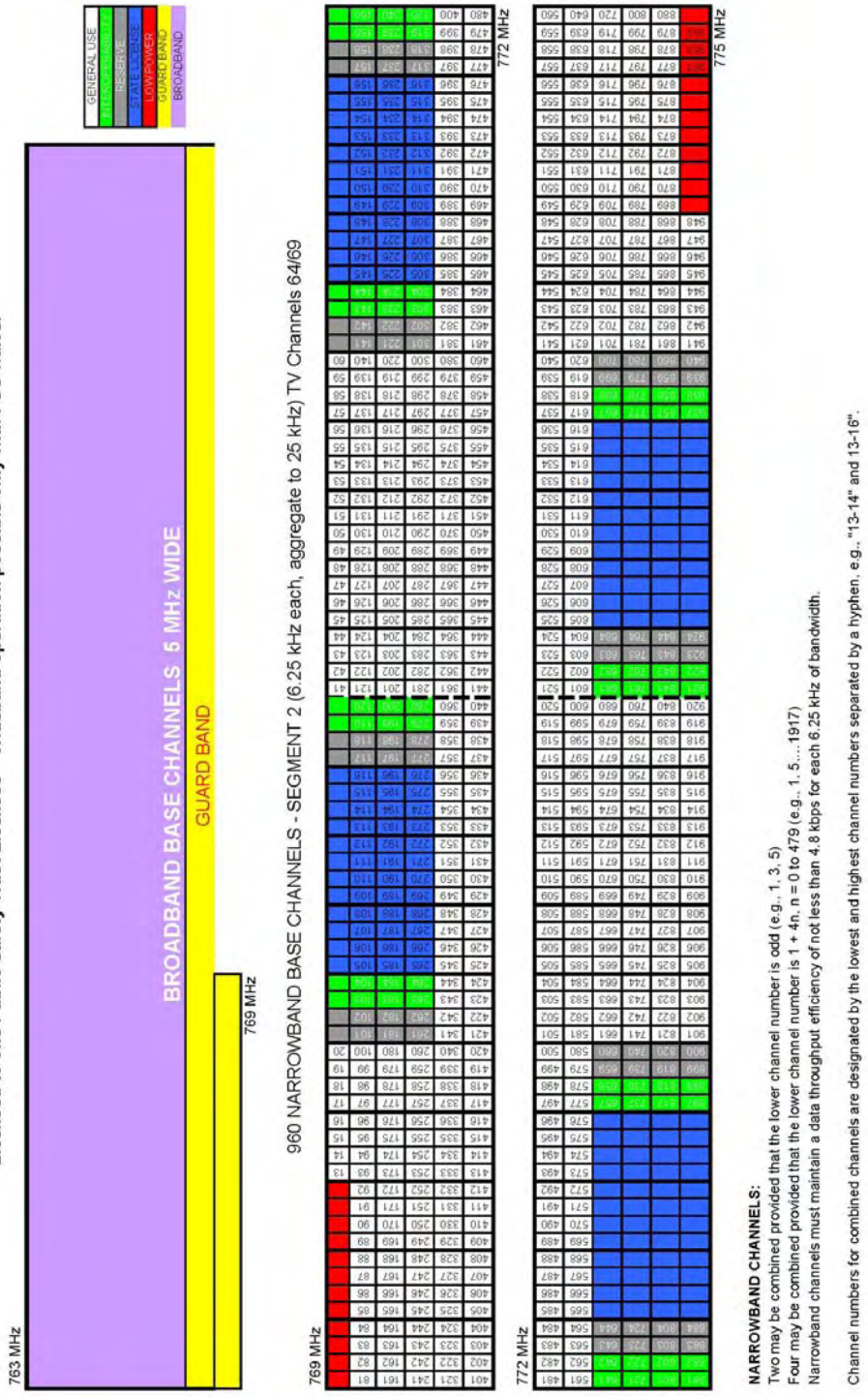


NARROWBAND CHANNELS:
Two may be combined provided that the lower channel number is odd (e.g., 1, 3, 5)
Four may be combined provided that the lower channel number is 1 + 4n, n = 0 to 479 (e.g., 1, 5,...1917)
Narrowband channels must maintain a data throughput efficiency of not less than 4.8 kbps for each 6.25 kHz of bandwidth.

WIDEBAND CHANNELS:
Two may be combined provided that the lower channel number is 1 + 3n or 2 + 3n, n = 0 to 79 (e.g., 1, 2, 4, 5,...238, 239)
Three may be combined provided that the lower channel number is 1 + 3n, n = 0 to 79 (e.g., 1, 4,...238)
Wideband channels must maintain a data throughput efficiency of not less than 384 kbps for each 150 kHz of bandwidth.

Channel numbers for combined channels are designated by the lowest and highest channel numbers separated by a hyphen, e.g., "1-2" and 1-3".

Appendix B – Revised FCC 700 MHz Band Plan Matrix


Revised 700 MHz BAND PLAN per the Ninth R&O in WT Dkt. 96-86
BROADBAND BASE CHANNEL - SEGMENT 1 TV Channels 63/68 Mobile channels + 30 MHz
Licensed to one Public Safety Trust Licensee Wideband operation possible only with FCC waiver
763 MHz
769 MHz
BROADBAND BASE CHANNELS 5 MHz WIDE
GUARD BAND
GENERAL USE
PUBLIC SAFETY
RESERVE
STATE & LOCAL
GUARD BAND
BROADBAND
960 NARROWBAND BASE CHANNELS - SEGMENT 2 (6.25 kHz each, aggregate to 25 kHz) TV Channels 64/69
769 MHz
772 MHz
772 MHz
775 MHz
NARROWBAND CHANNELS:
Two may be combined provided that the lower channel number is odd (e.g., 1, 3, 5)
Four may be combined provided that the lower channel number is 1 + 4n, n = 0 to 479 (e.g., 1, 5....1917)
Narrowband channels must maintain a data throughput efficiency of not less than 4.8 kbps for each 6.25 kHz of bandwidth.
Channel numbers for combined channels are designated by the lowest and highest channel numbers separated by a hyphen. e.g., "13-14" and 13-16".

Appendix C – Site Channel Allocations for 25 kHz and 12.5 kHz bandwidths

Legend for the State Spectrum RF Channel Plan (25 kHz and 12.5 kHz)

Site Label – RCC defined Site label with County based letters, certain Maryland site code and designation information.

Site Type	Description
MD	State of MD Site Database sites
MD-R	State of MD Site Database sites approved for raising of structure height
ULS	Sites from FCC Licensing Database with valid Antenna Structure Registrations (ASR)
LG	Sites provided by Local Governments such as Prince George's County that were not in State of MD Site Database
X	Search rings (X-sites) aligned to specific Channel Plan Cell hexagons. These locations represent search rings which continued site location efforts are required.

County – County encompassing the site coordinates.

Cell – the State Licensed Channel Allocation Matrix Cell that the site is associated in the geographic database.

Cluster ID –Cluster ID of the site in the geographic database.

Split Cell – Indicates when more than one site is located within a specific geographic database cell.

Number of Channels – Number of channels allotted to a specific site

State Channel #1 through #4 –State Licensed Channel ID numbers of the frequencies assigned to the site. The FCC has assigned the channel ID numbering scheme. All assignments are made to the site based upon the State Licensed Channel Allocation Matrix. Sites with less than four channels do not have additional spectrum available due to the specific cell, or adjacent cells having more than one site. Roving cluster channels are allocated from State Licensed Channel Allocation Matrix.

RF Channel Assignments per site (25 kHz bandwidth)

25 kHz Site Label	Type	County	Cell	Cluster ID	Split Cell	# of Chan.	State Channel #1	State Channel #2
ALLE117X	X	Allegany	B1	23	No	2	185-188	265-268
ALLE118X	X	Allegany	B2	24	Yes-2	1	189-192	none
ALLE120X	X	Allegany	B2	14	No	2	189-192	269-272
ALLE162X	X	Allegany	A1	16	No	2	25-28	105-108
ALLE164X	X	Allegany	G2	24	No	2	689-692	769-772
ALLE166X	X	Allegany	C2	14	Yes-2	1	149-152	none
ALLE167X	X	Allegany	F2	14	Yes-2	1	889-892	none
ALLE1DS4	MD	Allegany	B2	24	Yes-2	1	269-272	none
ALLE2DS3	MD	Allegany	A3	15	No	2	33-36	113-116
ALLE4DS3	MD	Allegany	F2	14	Yes-2	2	809-812	none
ALLE54X	X	Allegany	E2	24	No	1	649-652	729-732
ALLE55X	X	Allegany	C3	15	No	2	73-76	153-156
ALLE56X	X	Allegany	F3	15	Yes-2	1	893-896	none
ALLE57X	X	Allegany	G3	15	No	2	693-696	773-776
ALLE5DS3	MD	Allegany	F3	15	Yes-2	1	813-816	none
ALLE63X	X	Allegany	B3	22	No	1	193-196	273-276
ALLEULS1	ULS	Allegany	E3	15	Yes-2	2	653-656	none
ALLEULS2	ULS	Allegany	E3	15	Yes-2	1	733-736	none
ALLEULS3	ULS	Allegany	D2	24	No	1	229-232	309-312
ALLEULS4	ULS	Allegany	C2	14	Yes-2	2	69-72	none
ANNE146X	X	Anne Arundel	G3	74	Yes-2	2	773-776	none
ANNE19X	X	Anne Arundel	B3	74	No	2	193-196	273-276
ANNE1JS4	MD	Anne Arundel	E1	67	No	1	645-648	725-728
ANNE1LC6	MD	Anne Arundel	F1	67	No	1	805-808	885-888
ANNE1RS1	MD	Anne Arundel	G3	74	Yes-2	2	693-696	none
ANNE1WS1	MD	Anne Arundel	A3	74	Yes-2	1	33-36	none
ANNE29X	X	Anne Arundel	B1	81	No	2	185-188	265-268
ANNE2LC5	MD	Anne Arundel	A3	74	Yes-2	2	113-116	none
ANNE30X	X	Anne Arundel	D1	81	No	2	225-228	305-308
ANNE3LC5	MD	Anne Arundel	E1	81	No	2	645-648	725-728
ANNE4LC5	MD	Anne Arundel	A1	67	No	2	25-28	105-108
ANNE5LC5	MD	Anne Arundel	A2	68	No	1	29-32	109-112
ANNE85X	X	Anne Arundel	D3	74	No	2	233-236	313-316
ANNE89X	X	Anne Arundel	A1	81	Yes-2	2	25-28	none
ANNE90X	X	Anne Arundel	G1	81	No	1	685-688	765-768
ANNEULS1	ULS	Anne Arundel	E3	74	No	1	653-656	733-736
ANNEULS2	ULS	Anne Arundel	B2	73	Yes-2	1	269-272	none
ANNEULS3	ULS	Anne Arundel	B2	73	Yes-2	1	189-192	none
BALC0DS1	MD	Baltimore City	B1	67	Yes-3	1	265-268	none
BALC1DO6	MD	Baltimore City	F3	60	Yes-2	1	893-896	none
BALC3DS1	MD	Baltimore City	B1	67	Yes-3	2	185-188	none

25 kHz Site Label	Type	County	Cell	Cluster ID	Split Cell	# of Chan.	State Channel #1	State Channel #2
BALC5JS1	MD	Baltimore City	B1	67	Yes-3	1	925-928	none
BALC7JS1	MD	Baltimore City	G2	68	No	1	689-692	769-772
BALC87X	X	Baltimore City	F3	60	Yes-2	1	813-816	none
BALT0DS1	MD	Baltimore	D1	67	Yes-3	1	225-228	none
BALT0WS4	MD	Baltimore	D2	68	Yes-2	1	229-232	none
BALT141X	X	Baltimore	C2	59	Yes-2	2	149-152	none
BALT145X	X	Baltimore	D2	68	Yes-2	2	309-312	none
BALT149X	X	Baltimore	E2	52	No	2	649-652	729-732
BALT151X	X	Baltimore	D3	60	No	2	233-236	313-316
BALT1DS3	MD	Baltimore	F1	51	No	2	805-808	885-888
BALT1JS1	MD-R	Baltimore	A2	52	No	1	29-32	109-112
BALT22X	X	Baltimore	G2	52	No	2	689-692	769-772
BALT23X	X	Baltimore	C3	60	Yes-2	1	73-76	none
BALT25X	X	Baltimore	A1	61	No	1	25-28	105-108
BALT2JS1	MD	Baltimore	E1	61	Yes-2	2	645-648	none
BALT2KS4	MD	Baltimore	C3	60	Yes-2	1	153-156	none
BALT2LP1	MD	Baltimore	E3	60	No	2	653-656	733-736
BALT4KS3	MD	Baltimore	D1	67	Yes-3	2	845-848	none
BALT5WS3	MD	Baltimore	A3	60	No	2	33-36	113-116
BALT7KS1	MD	Baltimore	G3	60	No	2	693-696	773-776
BALT84X	X	Baltimore	B2	68	No	2	189-192	269-272
BALT86X	X	Baltimore	C1	51	No	2	65-68	145-148
BALTULS1	ULS	Baltimore	G1	61	No	2	685-688	765-768
BALTULS2	ULS	Baltimore	B3	60	No	2	193-196	273-276
BALTULS3	ULS	Baltimore	D2	52	No	2	229-232	309-312
CALV10X	X	Calvert	B2	88	No	2	189-192	269-272
CALV11X	X	Calvert	D2	88	No	2	229-232	309-312
CALV134X	X	Calvert	A2	88	No	1	29-32	109-112
CALV135X	X	Calvert	B3	94	No	1	193-196	273-276
CALV160X	X	Calvert	G1	95	Yes-2	1	685-688	none
CALV5DS1	MD	Calvert	F2	88	Yes-3	1	889-892	none
CALV5KS4	MD-R	Calvert	F2	88	Yes-3	2	849-852	none
CALV77X	X	Calvert	F2	88	Yes-3	1	809-812	none
CALV9X	X	Calvert	E2	88	No	1	649-652	729-732
CALVULS1	ULS	Calvert	G1	95	Yes-2	2	765-768	none
CALVULS2	ULS	Calvert	A1	81	Yes-2	2	105-108	none
CALVULS3	ULS	Calvert	A1	95	No	2	25-28	105-108
CARO103X	X	Caroline	C1	90	No	2	65-68	145-148
CARO106X	X	Caroline	E2	91	No	2	649-652	729-732
CARO1JS1	MD	Caroline	B3	97	No	2	193-196	273-276
CARO2LS1	MD	Caroline	G1	84	No	2	685-688	765-768
CARO4DS1	MD	Caroline	D2	91	No	2	229-232	309-312
CARR147X	X	Carroll	A1	51	No	2	25-28	105-108
CARR17X	X	Carroll	B2	59	No	2	189-192	269-272
CARR1LC5	MD	Carroll	F3	42	No	2	813-816	893-896

25 kHz Site Label	Type	County	Cell	Cluster ID	Split Cell	# of Chan.	State Channel #1	State Channel #2
CARR1PAX	X	Carroll	C2	41	No	2	69-72	149-152
CARR20X	X	Carroll	E1	51	No	2	645-648	725-728
CARR21X	X	Carroll	D1	51	No	2	225-228	305-308
CARR35X	X	Carroll	F2	41	No	2	809-812	889-892
CARR36X	X	Carroll	C3	50	No	1	73-76	153-156
CARR38X	X	Carroll	B3	50	No	2	193-196	273-276
CARR4WS1	MD	Carroll	G1	51	Yes-2	1	765-768	none
CARR6DS3	MD	Carroll	B1	51	No	2	185-188	265-268
CARR7KS4	MD-R	Carroll	C2	59	Yes-2	2	69-72	none
CARR81X	X	Carroll	D2	59	No	1	229-232	309-312
CARR97X	X	Carroll	F3	50	No	1	813-816	893-896
CARRULS1	ULS	Carroll	G1	51	Yes-2	1	685-688	none
CECI0KS1	MD	Cecil	A3	70	Yes-2	2	33-36	none
CECI108X	X	Cecil	G3	70	Yes-2	2	773-776	none
CECI153X	X	Cecil	B1	63	No	2	185-188	265-268
CECI159X	X	Cecil	E3	70	No	1	653-656	733-736
CECI173X	X	Cecil	C3	53	No	2	73-76	153-156
CECI1JS1	MD	Cecil	E2	62	Yes-2	1	729-732	none
CECI1KS1	MD	Cecil	D3	70	No	1	233-236	313-316
CECI1PAX	X	Cecil	A1	54	Yes-2	2	25-28	none
CECI2KS4	MD-R	Cecil	D1	63	Yes-2	1	225-228	none
CECI2LS1	MD	Cecil	E1	63	No	1	645-648	725-728
CECI2WS1	MD	Cecil	G3	70	Yes-2	1	693-696	none
CECI7JS3	MD-R	Cecil	A3	70	Yes-2	2	113-116	none
CECI91X	X	Cecil	D1	63	Yes-2	1	305-308	none
CECI93X	X	Cecil	G1	63	No	1	685-688	765-768
CECI9DO6	MD	Cecil	A1	54	Yes-2	1	105-108	none
CECIULS1	ULS	Cecil	B2	62	Yes-2	2	269-272	none
CECIULS2	ULS	Cecil	B2	69	Yes-2	2	189-192	none
CHAR0WS2	MD	Charles	A3	80	No	2	33-36	113-116
CHAR130X	X	Charles	E2	79	No	1	649-652	729-732
CHAR131X	X	Charles	A3	86	No	1	33-36	113-116
CHAR132X	X	Charles	C1	87	Yes-2	1	65-68	none
CHAR133X	X	Charles	D1	87	Yes-2	2	225-228	none
CHAR1WS3	MD	Charles	D1	87	Yes-2	2	305-308	none
CHAR2KS4	MD	Charles	A2	79	No	1	29-32	109-112
CHAR3DS1	MD	Charles	G3	86	No	2	693-696	773-776
CHAR3KS4	MD	Charles	C1	87	Yes-2	2	145-148	none
CHAR46X	X	Charles	C2	93	No	2	69-72	149-152
CHAR47X	X	Charles	B2	93	No	1	189-192	269-272
CHAR4X	X	Charles	F2	79	No	2	809-812	889-892
CHAR5DS1	MD	Charles	G1	87	Yes-2	2	765-768	none
CHAR5X	X	Charles	E3	86	No	2	653-656	733-736
CHAR6X	X	Charles	D3	86	No	2	233-236	313-316
CHAR74X	X	Charles	B3	86	No	2	193-196	273-276

25 kHz Site Label	Type	County	Cell	Cluster ID	Split Cell	# of Chan.	State Channel #1	State Channel #2
CHAR75X	X	Charles	B1	87	No	2	185-188	265-268
CHAR76X	X	Charles	A1	87	No	2	25-28	105-108
CHAR7X	X	Charles	E1	87	No	1	645-648	725-728
CHAR8X	X	Charles	F1	87	No	2	805-808	885-888
CHARULS1	ULS	Charles	G1	87	Yes-2	2	685-688	none
DORC0KS4	MD	Dorchester	A2	96	No	1	29-32	109-112
DORC1DS4	MD	Dorchester	B2	96	No	2	189-192	269-272
DORC2DS1	MD	Dorchester	F2	96	Yes-2	2	809-812	none
DORC42X	X	Dorchester	E3	97	No	2	653-656	733-736
DORC43X	X	Dorchester	C1	95	No	2	65-68	145-148
DORC44X	X	Dorchester	G2	96	No	2	689-692	769-772
DORC45X	X	Dorchester	B3	102	No	1	193-196	273-276
DORC8DS1	MD	Dorchester	A3	97	No	1	33-36	113-116
DORC9DC5	MD	Dorchester	F2	96	Yes-2	2	889-892	none
FRED0KS3	MD	Frederick	B1	48	Yes-2	2	853-856	none
FRED101X	X	Frederick	C3	39	No	2	73-76	153-156
FRED138X	X	Frederick	D1	58	No	2	225-228	305-308
FRED154X	X	Frederick	G1	40	No	2	685-688	765-768
FRED155X	X	Frederick	C2	49	No	1	69-72	149-152
FRED156X	X	Frederick	E2	49	No	2	649-652	729-732
FRED157X	X	Frederick	G1	58	Yes-2	2	685-688	none
FRED158X	X	Frederick	D3	57	No	2	233-236	313-316
FRED1JS1	MD	Frederick	G2	41	No	2	689-692	769-772
FRED1PAX	X	Frederick	B1	40	No	1	185-188	265-268
FRED2JS4	MD	Frederick	F2	49	No	2	809-812	889-892
FRED33X	X	Frederick	E1	40	Yes-2	2	645-648	none
FRED34X	X	Frederick	A1	40	No	1	25-28	105-108
FRED37X	X	Frederick	E3	50	No	1	653-656	733-736
FRED3DS3	MD	Frederick	D2	49	Yes-2	1	309-312	none
FRED5JS3	MD	Frederick	D2	49	Yes-2	2	229-232	none
FRED95X	X	Frederick	E1	40	Yes-2	1	725-728	none
FREDULS1	ULS	Frederick	A2	49	No	2	29-32	109-112
GARR0WS2	MD	Garrett	G1	13	Yes-2	2	765-768	none
GARR119X	X	Garrett	F1	13	No	2	805-808	885-888
GARR121X	X	Garrett	A2	14	No	2	29-32	109-112
GARR122X	X	Garrett	C2	6	No	2	69-72	149-152
GARR123X	X	Garrett	C3	12	No	2	73-76	153-156
GARR124X	X	Garrett	G2	21	No	2	689-692	769-772
GARR165X	X	Garrett	D1	13	No	2	225-228	305-308
GARR168X	X	Garrett	D3	22	No	2	233-236	313-316
GARR169X	X	Garrett	F3	7	No	1	813-816	893-896
GARR170X	X	Garrett	B3	12	No	1	193-196	273-276
GARR171X	X	Garrett	B2	21	Yes-2	2	269-272	none
GARR172X	X	Garrett	A2	21	No	2	29-32	109-112
GARR2RS1	MD	Garrett	B2	21	Yes-2	1	189-192	none

25 kHz Site Label	Type	County	Cell	Cluster ID	Split Cell	# of Chan.	State Channel #1	State Channel #2
GARR3DS1	MD	Garrett	G2	14	Yes-2	1	689-692	none
GARR4DS1	MD	Garrett	D2	21	No	2	229-232	309-312
GARR58X	X	Garrett	C1	13	Yes-3	1	65-68	none
GARR59X	X	Garrett	E1	13	No	2	645-648	725-728
GARR60X	X	Garrett	B1	13	No	2	185-188	265-268
GARR61X	X	Garrett	D2	14	No	2	229-232	309-312
GARR62X	X	Garrett	G2	14	Yes-2	1	769-772	none
GARR64X	X	Garrett	C1	13	Yes-3	1	845-848	none
GARR65X	X	Garrett	G3	22	No	2	693-696	773-776
GARR66X	X	Garrett	A3	7	Yes-2	1	113-116	none
GARR67X	X	Garrett	F2	6	Yes-2	1	889-892	none
GARR68X	X	Garrett	F3	12	No	2	813-816	893-896
GARR69X	X	Garrett	C1	20	No	2	65-68	145-148
GARR70X	X	Garrett	E2	21	No	2	649-652	729-732
GARR7KS3	MD	Garrett	G1	13	Yes-2	1	685-688	none
GARR9JS3	MD	Garrett	E2	14	No	2	649-652	729-732
GARR9JS4	MD	Garrett	A1	13	Yes-2	1	105-108	none
GARR9KS1	MD	Garrett	A1	13	Yes-2	1	25-28	none
GARR9KS4	MD	Garrett	C1	13	Yes-3	1	145-148	none
GARRULS1	ULS	Garrett	F2	6	Yes-2	1	809-812	none
GARRULS2	ULS	Garrett	A3	7	Yes-2	1	33-36	none
HARF0DS3	MD	Harford	E2	62	Yes-2	1	649-652	none
HARF125X	X	Harford	F3	53	No	2	813-816	893-896
HARF148X	X	Harford	C2	52	Yes-2	1	149-152	none
HARF150X	X	Harford	B2	52	No	2	189-192	269-272
HARF152X	X	Harford	C1	61	Yes-2	1	145-148	none
HARF174X	X	Harford	A3	53	Yes-2	1	113-116	none
HARF1LC5	MD	Harford	B1	61	No	2	185-188	265-268
HARF1PAX	X	Harford	G3	53	No	2	693-696	773-776
HARF24X	X	Harford	D1	61	No	2	225-228	305-308
HARF2KS1	MD	Harford	C2	52	Yes-2	1	69-72	none
HARF2LC5	MD	Harford	F1	61	No	2	805-808	885-888
HARF3LC5	MD	Harford	E3	53	No	2	653-656	733-736
HARF4DS1	MD	Harford	C1	61	Yes-2	1	65-68	none
HARF4KS4	MD	Harford	A3	53	Yes-2	1	33-36	none
HARF7LC5	MD	Harford	E1	61	Yes-2	1	725-728	none
HARF8WS1	MD	Harford	D2	62	No	2	229-232	309-312
HOWA142X	X	Howard	E2	59	No	2	649-652	729-732
HOWA143X	X	Howard	F2	59	No	2	809-812	889-892
HOWA16X	X	Howard	C1	58	No	2	65-68	145-148
HOWA1JS1	MD	Howard	A2	59	Yes-2	1	109-112	none
HOWA2LC5	MD	Howard	G1	67	No	2	685-688	765-768
HOWA3LC6	MD	Howard	C3	66	Yes-3	1	853-856	none
HOWA5LC5	MD	Howard	A2	59	Yes-2	1	29-32	none
HOWA6DS1	MD	Howard	D1	67	Yes-3	1	305-308	none

25 kHz Site Label	Type	County	Cell	Cluster ID	Split Cell	# of Chan.	State Channel #1	State Channel #2
HOWA7DS1	MD	Howard	B1	58	No	2	185-188	265-268
HOWAULS1	ULS	Howard	B3	66	No	2	193-196	273-276
KENT0JS1	MD	Kent	G2	76	No	2	689-692	769-772
KENT0LO6	MD	Kent	F1	63	No	2	805-808	885-888
KENT26X	X	Kent	E1	75	No	2	645-648	725-728
KENT32X	X	Kent	G3	77	No	2	693-696	773-776
KENT3KS4	MD	Kent	E3	69	No	2	653-656	733-736
KENT88X	X	Kent	B1	75	No	2	185-188	265-268
KENT92X	X	Kent	A1	63	No	2	25-28	105-108
MONT136X	X	Montgomery	B2	65	Yes-2	1	269-272	none
MONT137X	X	Montgomery	F2	65	No	2	809-812	889-892
MONT139X	X	Montgomery	F1	58	No	2	805-808	885-888
MONT140X	X	Montgomery	A1	58	Yes-2	1	105-108	none
MONT144X	X	Montgomery	F3	66	Yes-2	1	893-896	none
MONT14X	X	Montgomery	E2	65	No	2	649-652	729-732
MONT15X	X	Montgomery	D2	65	No	2	229-232	309-312
MONT18X	X	Montgomery	A3	66	No	2	33-36	113-116
MONT1LS1	MD	Montgomery	A1	58	Yes-2	1	25-28	none
MONT1RS1	MD	Montgomery	G1	58	Yes-2	1	765-768	none
MONT1X	X	Montgomery	D1	72	Yes-2	1	305-308	none
MONT2WSS2	MD	Montgomery	B2	65	Yes-2	1	189-192	none
MONT40X	X	Montgomery	F3	57	No	2	813-816	893-896
MONT5WS2	MD	Montgomery	C2	65	No	2	69-72	149-152
MONT80X	X	Montgomery	E1	58	No	2	645-648	725-728
MONT82X	X	Montgomery	D3	66	No	2	233-236	313-316
MONT83X	X	Montgomery	G3	66	No	2	693-696	773-776
MONT99X	X	Montgomery	C3	57	No	2	73-76	153-156
MONTULS1	ULS	Montgomery	D1	72	Yes-2	1	225-228	none
MONTULS2	ULS	Montgomery	E3	66	No	2	653-656	733-736
PRIN127X	X	Prince Georges	E2	73	No	2	649-652	729-732
PRIN128X	X	Prince Georges	D2	73	Yes-2	1	309-312	none
PRIN129X	X	Prince Georges	F3	80	Yes-2	1	893-896	none
PRIN1DS1	MD	Prince Georges	D3	80	Yes-2	1	233-236	none
PRIN1LO6	MD	Prince Georges	A2	73	Yes-2	1	29-32	none
PRIN2DS1	MD	Prince Georges	E3	80	Yes-2	1	733-736	none
PRIN2X	X	Prince Georges	F1	72	No	2	805-808	885-888
PRIN3X	X	Prince Georges	C3	80	No	2	73-76	153-156
PRIN4JS4	MD	Prince Georges	C3	66	Yes-3	1	153-156	none
PRIN5KS4	MD	Prince Georges	F3	80	Yes-2	1	813-816	none
PRIN71X	X	Prince Georges	F2	73	No	2	809-812	889-892
PRIN72X	X	Prince Georges	E3	80	Yes-2	1	653-656	none
PRIN73X	X	Prince Georges	G3	80	Yes-3	1	853-856	none
PRIN7JS4	MD	Prince Georges	B3	80	Yes-2	1	193-196	none
PRIN7WS1	MD	Prince Georges	F3	66	Yes-2	1	813-816	none
PRINCTY1	LG	Prince Georges	C2	79	No	2	69-72	149-152

25 kHz Site Label	Type	County	Cell	Cluster ID	Split Cell	# of Chan.	State Channel #1	State Channel #2
PRINCTY10	LG	Prince Georges	G2	88	No	2	689-692	769-772
PRINCTY2	LG	Prince Georges	D3	80	Yes-2	1	313-316	none
PRINCTY3	LG	Prince Georges	C3	66	Yes-3	1	73-76	none
PRINCTY4	LG	Prince Georges	G3	80	Yes-3	1	693-696	none
PRINCTY5	LG	Prince Georges	D2	73	Yes-2	1	229-232	none
PRINCTY6	LG	Prince Georges	C2	73	No	2	69-72	149-152
PRINCTY7	LG	Prince Georges	B1	72	No	2	185-188	265-268
PRINCTY8	LG	Prince Georges	G2	73	Yes-2	1	689-692	none
PRINCTY9	LG	Prince Georges	B3	80	Yes-2	1	273-276	none
PRINULS1	ULS	Prince Georges	G2	73	Yes-2	1	769-772	none
PRINULS2	ULS	Prince Georges	A2	73	Yes-2	1	109-112	none
PRINULS3	ULS	Prince Georges	G3	80	Yes-3	1	773-776	none
QUEE172X	X	Queen Annes	G2	82	No	1	689-692	769-772
QUEE27X	X	Queen Annes	C2	76	No	2	69-72	149-152
QUEE28X	X	Queen Annes	E2	76	No	2	649-652	729-732
QUEE344X	X	Queen Annes	C2	82	No	2	69-72	149-152
QUEE4DS1	MD	Queen Annes	D3	83	No	2	233-236	313-316
QUEE6DS1	MD	Queen Annes	D2	82	No	2	229-232	309-312
QUEE6KS4	MD-R	Queen Annes	E3	83	No	2	653-656	733-736
QUEE6WS1	MD	Queen Annes	F1	75	No	2	805-808	885-888
SOME1LS1	MD-R	Somerset	D1	113	No	2	225-228	305-308
SOME1WS1	MD	Somerset	A3	109	No	2	33-36	113-116
SOME2LC6	MD	Somerset	E3	109	Yes-2	2	733-736	none
SOME51X	X	Somerset	D3	112	No	2	233-236	313-316
SOME9DS4	MD	Somerset	G1	113	No	1	685-688	765-768
SOMEULS1	ULS	Somerset	D3	109	No	2	233-236	313-316
SOMEULS2	ULS	Somerset	E3	109	Yes-2	2	653-656	none
STMA12X	X	St. Marys	D3	94	No	2	233-236	313-316
STMA13X	X	St. Marys	G3	94	No	1	693-696	773-776
STMA48X	X	St. Marys	E2	101	No	2	649-652	729-732
STMA49X	X	St. Marys	F2	101	No	2	809-812	889-892
STMA50X	X	St. Marys	G2	101	No	2	689-692	769-772
STMA78X	X	St. Marys	C3	94	No	2	73-76	153-156
STMA79X	X	St. Marys	A3	94	No	2	33-36	113-116
STMA7JS4	MD	St. Marys	E3	94	Yes-2	2	653-656	none
STMA7KS4	MD	St. Marys	G1	107	No	2	685-688	765-768
STMA9WS4	MD	St. Marys	F3	94	No	1	813-816	893-896
STMAULS1	ULS	St. Marys	E3	94	Yes-2	2	733-736	none
STMAULS2	ULS	St. Marys	D2	101	No	2	229-232	309-312
TALB104X	X	Talbot	D1	90	No	1	225-228	305-308
TALB105X	X	Talbot	G1	90	No	2	685-688	765-768
TALB1JS1	MD	Talbot	G3	83	No	2	693-696	773-776
TALB2JS1	MD	Talbot	A1	90	No	2	25-28	105-108
TALB342X	X	Talbot	F2	82	No	2	809-812	889-892
TALB343X	X	Talbot	E3	89	No	1	653-656	733-736

25 kHz Site Label	Type	County	Cell	Cluster ID	Split Cell	# of Chan.	State Channel #1	State Channel #2
TALB345X	X	Talbot	B3	89	No	2	193-196	273-276
TALB5WS1	MD	Talbot	E1	90	No	2	645-648	725-728
WASH102X	X	Washington	F3	39	No	2	813-816	893-896
WASH116X	X	Washington	B3	25	No	2	193-196	273-276
WASH163X	X	Washington	C3	25	No	2	73-76	153-156
WASH1FO5	MD	Washington	F2	27	No	2	809-812	889-892
WASH1PAX	X	Washington	E1	26	No	2	645-648	725-728
WASH39X	X	Washington	E1	48	No	2	645-648	725-728
WASH3JS1	MD	Washington	D3	39	No	2	233-236	313-316
WASH41X	X	Washington	G1	26	No	2	685-688	765-768
WASH4WS3	MD-R	Washington	G3	25	Yes-2	2	693-696	none
WASH52X	X	Washington	D3	25	No	2	233-236	313-316
WASH53X	X	Washington	G3	25	Yes-2	2	773-776	none
WASH6RS1	MD	Washington	A1	26	No	2	25-28	105-108
WASH98X	X	Washington	B1	48	Yes-2	2	185-188	none
WICO110X	X	Wicomico	F1	103	No	1	805-808	885-888
WICO111X	X	Wicomico	C2	104	No	2	69-72	149-152
WICO1DS1	MD	Wicomico	E2	104	No	1	649-652	729-732
WICO3DS1	MD	Wicomico	D1	110	No	2	225-228	305-308
WICO9DS1	MD	Wicomico	C1	103	No	1	65-68	145-148
WICO9KS4	MD-R	Wicomico	G1	110	No	2	685-688	765-768
WICOULS1	ULS	Wicomico	G2	104	No	2	689-692	769-772
WORC109X	X	Worcester	F3	105	No	2	813-816	893-896
WORC112X	X	Worcester	C3	109	No	2	73-76	153-156
WORC113X	X	Worcester	E1	110	No	2	645-648	725-728
WORC114X	X	Worcester	B2	114	No	2	189-192	269-272
WORC115X	X	Worcester	G2	114	No	2	689-692	769-772
WORC161X	X	Worcester	E3	116	No	2	653-656	733-736
WORC1DS1	MD	Worcester	E2	117	No	2	649-652	729-732
WORC1LS1	MD	Worcester	F1	110	No	2	805-808	885-888
WORC1WS1	MD	Worcester	A1	110	Yes-2	2	25-28	none
WORC2DS1	MD	Worcester	D2	114	No	2	229-232	309-312
WORC3DS3	MD	Worcester	A1	110	Yes-2	2	105-108	none
WORC5KS4	MD	Worcester	A2	117	No	2	29-32	109-112
WORC5WS1	MD	Worcester	G2	117	No	2	689-692	769-772

RF Channel Assignments per site (12.5 kHz bandwidth)

12.5 kHz Site Label	Type	County	Cell	Clus. ID	Split Cell	# of Chan.	State Chan. #1	State Chan. #2	State Chan. #3	State Chan. #4
ALLE117X	X	Allegany	B1	23	No	2	185-186	265-266	none	none
ALLE118X	X	Allegany	B2	24	Yes-2	2	189-190	269-270	none	none
ALLE120X	X	Allegany	B2	14	No	3	189-190	269-270	231-232	none
ALLE162X	X	Allegany	A1	16	No	2	25-26	105-106	none	none
ALLE164X	X	Allegany	G2	24	No	4	689-690	769-770	651-652	731-732
ALLE166X	X	Allegany	C2	14	Yes-2	2	71-72	151-152	none	none
ALLE167X	X	Allegany	F2	14	Yes-2	2	811-812	891-892	none	none
ALLE1DS4	MD	Allegany	B2	24	Yes-2	2	191-192	271-272	none	none
ALLE2DS3	MD	Allegany	A3	15	No	4	33-34	113-114	695-696	775-776
ALLE4DS3	MD	Allegany	F2	14	Yes-2	2	809-810	889-890	none	none
ALLE54X	X	Allegany	E2	24	No	4	649-650	729-730	231-232	311-312
ALLE55X	X	Allegany	C3	15	No	3	73-74	153-154	853-854	none
ALLE56X	X	Allegany	F3	15	Yes-2	2	815-816	895-896	none	none
ALLE57X	X	Allegany	G3	15	No	3	693-694	773-774	855-856	none
ALLE5DS3	MD	Allegany	F3	15	Yes-2	2	813-814	893-894	none	none
ALLE63X	X	Allegany	B3	22	No	4	193-194	273-274	235-236	315-316
ALLEULS1	ULS	Allegany	E3	15	Yes-2	2	653-654	733-734	none	none
ALLEULS2	ULS	Allegany	E3	15	Yes-2	2	655-656	735-736	none	none
ALLEULS3	ULS	Allegany	D2	24	No	2	229-230	309-310	none	none
ALLEULS4	ULS	Allegany	C2	14	Yes-2	2	69-70	149-150	none	none
ANNE146X	X	Anne Arundel	G3	74	Yes-2	2	695-696	775-776	none	none
ANNE19X	X	Anne Arundel	B3	74	No	4	193-194	273-274	235-236	315-316
ANNE1JS4	MD	Anne Arundel	E1	67	No	3	645-646	725-726	67-68	none
ANNE1LC6	MD	Anne Arundel	F1	67	No	3	805-806	885-886	147-148	none
ANNE1RS1	MD	Anne Arundel	G3	74	Yes-2	2	693-694	773-774	none	none
ANNE1WS1	MD	Anne Arundel	A3	74	Yes-2	2	33-34	113-114	none	none
ANNE29X	X	Anne Arundel	B1	81	No	4	185-186	265-266	227-228	307-308
ANNE2LC5	MD	Anne Arundel	A3	74	Yes-2	2	35-36	115-116	none	none
ANNE30X	X	Anne Arundel	D1	81	No	4	225-226	305-306	687-688	767-768
ANNE3LC5	MD	Anne Arundel	E1	81	No	4	645-646	725-726	187-188	267-268
ANNE4LC5	MD	Anne Arundel	A1	67	No	4	25-26	105-106	807-808	887-888
ANNE5LC5	MD	Anne Arundel	A2	68	No	4	29-30	109-110	811-812	891-892
ANNE85X	X	Anne Arundel	D3	74	No	4	233-234	313-314	655-656	735-736
ANNE89X	X	Anne Arundel	A1	81	Yes-2	2	25-26	105-106	none	none
ANNE90X	X	Anne Arundel	G1	81	No	4	685-686	765-766	647-648	727-728
ANNEULS1	ULS	Anne Arundel	E3	74	No	4	653-654	733-734	75-76	155-156
ANNEULS2	ULS	Anne Arundel	B2	73	Yes-2	2	191-192	271-272	none	none
ANNEULS3	ULS	Anne Arundel	B2	73	Yes-2	2	189-190	269-270	none	none
BALC0DS1	MD	Baltimore City	B1	67	Yes-3	2	187-188	265-266	none	none
BALC1DO6	MD	Baltimore City	F3	60	Yes-2	2	815-816	895-896	none	none

12.5 kHz Site Label	Type	County	Cell	Clus. ID	Split Cell	# of Chan.	State Chan. #1	State Chan. #2	State Chan. #3	State Chan. #4
BALC3DS1	MD	Baltimore City	B1	67	Yes-3	2	185-186	145-146	none	none
BALC5JS1	MD	Baltimore City	B1	67	Yes-3	2	267-268	65-66	none	none
BALC7JS1	MD	Baltimore City	G2	68	No	4	689-690	769-770	651-652	731-732
BALC87X	X	Baltimore City	F3	60	Yes-2	2	813-814	893-894	none	none
BALT0DS1	MD	Baltimore	D1	67	Yes-3	2	225-226	727-728	none	none
BALT0WS4	MD	Baltimore	D2	68	Yes-2	2	229-230	309-310	none	none
BALT141X	X	Baltimore	C2	59	Yes-2	2	71-72	151-152	none	none
BALT145X	X	Baltimore	D2	68	Yes-2	2	231-232	311-312	none	none
BALT149X	X	Baltimore	E2	52	No	4	649-650	729-730	191-192	271-272
BALT151X	X	Baltimore	D3	60	No	4	233-234	313-314	195-196	275-276
BALT1DS3	MD	Baltimore	F1	51	No	4	805-806	885-886	67-68	147-148
BALT1JS1	MD-R	Baltimore	A2	52	No	4	29-30	109-110	811-812	891-892
BALT22X	X	Baltimore	G2	52	No	4	689-690	769-770	31-32	111-112
BALT23X	X	Baltimore	C3	60	Yes-2	2	73-74	153-154	none	none
BALT25X	X	Baltimore	A1	61	No	4	25-26	105-106	687-688	767-768
BALT2JS1	MD	Baltimore	E1	61	Yes-2	2	645-646	725-726	none	none
BALT2KS4	MD	Baltimore	C3	60	Yes-2	2	75-76	155-156	none	none
BALT2LP1	MD	Baltimore	E3	60	No	4	653-654	733-734	35-36	115-116
BALT4KS3	MD	Baltimore	D1	67	Yes-3	2	307-308	647-648	none	none
BALT5WS3	MD	Baltimore	A3	60	No	4	33-34	113-114	695-696	775-776
BALT7KS1	MD	Baltimore	G3	60	No	4	693-694	773-774	235-236	315-316
BALT84X	X	Baltimore	B2	68	No	4	189-190	269-270	191-192	271-272
BALT86X	X	Baltimore	C1	51	No	4	65-66	145-146	187-188	267-268
BALTULS1	ULS	Baltimore	G1	61	No	4	685-686	765-766	227-228	307-308
BALTULS2	ULS	Baltimore	B3	60	No	4	193-194	273-274	655-656	735-736
BALTULS3	ULS	Baltimore	D2	52	No	4	229-230	309-310	691-692	771-772
CALV10X	X	Calvert	B2	88	No	4	189-190	269-270	231-232	311-312
CALV11X	X	Calvert	D2	88	No	4	229-230	309-310	691-692	771-772
CALV134X	X	Calvert	A2	88	No	4	29-30	109-110	651-652	731-732
CALV135X	X	Calvert	B3	94	No	4	193-194	273-274	235-236	315-316
CALV160X	X	Calvert	G1	95	Yes-2	2	685-686	765-766	none	none
CALV5DS1	MD	Calvert	F2	88	Yes-3	2	811-812	889-890	none	none
CALV5KS4	MD-R	Calvert	F2	88	Yes-3	2	891-892	71-72	none	none
CALV77X	X	Calvert	F2	88	Yes-3	2	809-810	151-152	none	none
CALV9X	X	Calvert	E2	88	No	4	649-650	729-730	191-192	271-272
CALVULS1	ULS	Calvert	G1	95	Yes-2	2	687-688	767-768	none	none
CALVULS2	ULS	Calvert	A1	81	Yes-2	2	27-28	107-108	none	none
CALVULS3	ULS	Calvert	A1	95	No	4	25-26	105-106	647-648	727-728
CARO103X	X	Caroline	C1	90	No	4	65-66	145-146	187-188	267-268
CARO106X	X	Caroline	E2	91	No	4	649-650	729-730	31-32	111-112
CARO1JS1	MD	Caroline	B3	97	No	4	193-194	273-274	655-656	735-736
CARO2LS1	MD	Caroline	G1	84	No	4	685-686	765-766	227-228	307-308
CARO4DS1	MD	Caroline	D2	91	No	4	229-230	309-310	651-652	731-732
CARR147X	X	Carroll	A1	51	No	4	25-26	105-106	807-808	887-888
CARR17X	X	Carroll	B2	59	No	4	189-190	269-270	231-232	311-312
CARR1LC5	MD	Carroll	F3	42	No	4	813-814	893-894	35-36	115-116

12.5 kHz Site Label	Type	County	Cell	Clus. ID	Split Cell	# of Chan.	State Chan. #1	State Chan. #2	State Chan. #3	State Chan. #4
CARR1PAX	X	Carroll	C2	41	No	4	69-70	149-150	811-812	891-892
CARR20X	X	Carroll	E1	51	No	4	645-646	725-726	27-28	107-108
CARR21X	X	Carroll	D1	51	No	4	225-226	305-306	647-648	727-728
CARR35X	X	Carroll	F2	41	No	4	809-810	889-890	29-30	109-110
CARR36X	X	Carroll	C3	50	No	4	73-74	153-154	195-196	275-276
CARR38X	X	Carroll	B3	50	No	4	193-194	273-274	655-656	735-736
CARR4WS1	MD	Carroll	G1	51	Yes-2	2	687-688	767-768	none	none
CARR6DS3	MD	Carroll	B1	51	No	4	185-186	265-266	227-228	307-308
CARR7KS4	MD-R	Carroll	C2	59	Yes-2	2	69-70	149-150	none	none
CARR81X	X	Carroll	D2	59	No	4	229-230	309-310	651-652	731-732
CARR97X	X	Carroll	F3	50	No	4	813-814	893-894	75-76	155-156
CARRULS1	ULS	Carroll	G1	51	Yes-2	2	685-686	765-766	none	none
CECI0KS1	MD	Cecil	A3	70	Yes-2	2	33-34	113-114	none	none
CECI108X	X	Cecil	G3	70	Yes-2	4	695-696	775-776	235-236	315-316
CECI153X	X	Cecil	B1	63	No	4	185-186	265-266	647-648	727-728
CECI159X	X	Cecil	E3	70	No	4	653-654	733-734	853-854	933-934
CECI173X	X	Cecil	C3	53	No	4	73-74	153-154	815-816	895-896
CECI1JS1	MD	Cecil	E2	62	Yes-2	2	651-652	731-732	none	none
CECI1KS1	MD	Cecil	D3	70	No	4	233-234	313-314	655-656	735-736
CECI1PAX	X	Cecil	A1	54	Yes-2	2	25-26	105-106	none	none
CECI2KS4	MD-R	Cecil	D1	63	Yes-2	2	225-226	305-306	none	none
CECI2LS1	MD	Cecil	E1	63	No	4	645-646	725-726	807-808	887-888
CECI2WS1	MD	Cecil	G3	70	Yes-2	4	693-694	773-774	811-812	891-892
CECI7JS3	MD-R	Cecil	A3	70	Yes-2	2	35-36	115-116	none	none
CECI91X	X	Cecil	D1	63	Yes-2	2	227-228	307-308	none	none
CECI93X	X	Cecil	G1	63	No	4	685-686	765-766	847-848	927-928
CECI9DO6	MD	Cecil	A1	54	Yes-2	2	27-28	107-108	none	none
CECIULS1	ULS	Cecil	B2	62	Yes-2	2	191-192	271-272	none	none
CECIULS2	ULS	Cecil	B2	69	Yes-2	2	189-190	269-270	none	none
CHAR0WS2	MD	Charles	A3	80	No	2	33-34	113-114	none	none
CHAR130X	X	Charles	E2	79	No	4	649-650	729-730	31-32	111-112
CHAR131X	X	Charles	A3	86	No	4	33-34	113-114	695-696	775-776
CHAR132X	X	Charles	C1	87	Yes-2	2	65-66	145-146	none	none
CHAR133X	X	Charles	D1	87	Yes-2	2	225-226	305-306	none	none
CHAR1WS3	MD	Charles	D1	87	Yes-2	2	227-228	307-308	none	none
CHAR2KS4	MD	Charles	A2	79	No	4	29-30	109-110	811-812	891-892
CHAR3DS1	MD	Charles	G3	86	No	4	693-694	773-774	235-236	315-316
CHAR3KS4	MD	Charles	C1	87	Yes-2	2	67-68	147-148	none	none
CHAR46X	X	Charles	C2	93	No	2	69-70	149-150	none	none
CHAR47X	X	Charles	B2	93	No	2	189-190	269-270	none	none
CHAR4X	X	Charles	F2	79	No	4	809-810	889-890	71-72	151-152
CHAR5DS1	MD	Charles	G1	87	Yes-2	2	687-688	767-768	none	none
CHAR5X	X	Charles	E3	86	No	4	653-654	733-734	35-36	115-116
CHAR6X	X	Charles	D3	86	No	4	233-234	313-314	195-196	275-276
CHAR74X	X	Charles	B3	86	No	4	193-194	273-274	655-656	735-736
CHAR75X	X	Charles	B1	87	No	4	185-186	265-266	647-648	727-728

12.5 kHz Site Label	Type	County	Cell	Clus. ID	Split Cell	# of Chan.	State Chan. #1	State Chan. #2	State Chan. #3	State Chan. #4
CHAR76X	X	Charles	A1	87	No	3	25-26	105-106	845-846	none
CHAR7X	X	Charles	E1	87	No	4	645-646	725-726	807-808	887-888
CHAR8X	X	Charles	F1	87	No	4	805-806	885-886	27-28	107-108
CHARULS1	ULS	Charles	G1	87	Yes-2	2	685-686	765-766	none	none
DORC0KS4	MD	Dorchester	A2	96	No	4	29-30	109-110	651-652	731-732
DORC1DS4	MD	Dorchester	B2	96	No	4	189-190	269-270	231-232	311-312
DORC2DS1	MD	Dorchester	F2	96	Yes-2	2	809-810	889-890	none	none
DORC42X	X	Dorchester	E3	97	No	4	653-654	733-734	35-36	115-116
DORC43X	X	Dorchester	C1	95	No	4	65-66	145-146	187-188	267-268
DORC44X	X	Dorchester	G2	96	No	4	689-690	769-770	31-32	111-112
DORC45X	X	Dorchester	B3	102	No	4	193-194	273-274	75-76	155-156
DORC8DS1	MD	Dorchester	A3	97	No	4	33-34	113-114	815-816	895-896
DORC9DC5	MD	Dorchester	F2	96	Yes-2	2	811-812	891-892	none	none
FRED0KS3	MD	Frederick	B1	48	Yes-2	2	187-188	267-268	none	none
FRED101X	X	Frederick	C3	39	No	4	73-74	153-154	195-196	275-276
FRED138X	X	Frederick	D1	58	No	4	225-226	305-306	647-648	727-728
FRED154X	X	Frederick	G1	40	No	3	685-686	765-766	27-28	none
FRED155X	X	Frederick	C2	49	No	4	69-70	149-150	651-652	731-732
FRED156X	X	Frederick	E2	49	No	4	649-650	729-730	31-32	111-112
FRED157X	X	Frederick	G1	58	Yes-2	2	685-686	765-766	none	none
FRED158X	X	Frederick	D3	57	No	3	233-234	313-314	195-196	none
FRED1JS1	MD	Frederick	G2	41	No	4	689-690	769-770	31-32	111-112
FRED1PAX	X	Frederick	B1	40	No	4	185-186	265-266	67-68	147-148
FRED2JS4	MD	Frederick	F2	49	No	4	809-810	889-890	71-72	151-152
FRED33X	X	Frederick	E1	40	Yes-2	2	645-646	725-726	none	none
FRED34X	X	Frederick	A1	40	No	4	25-26	105-106	807-808	887-888
FRED37X	X	Frederick	E3	50	No	4	653-654	733-734	815-816	895-896
FRED3DS3	MD	Frederick	D2	49	Yes-2	2	231-232	311-312	none	none
FRED5JS3	MD	Frederick	D2	49	Yes-2	2	229-230	309-310	none	none
FRED95X	X	Frederick	E1	40	Yes-2	2	647-648	727-728	none	none
FREDULS1	ULS	Frederick	A2	49	No	4	29-30	109-110	811-812	891-892
GARR0WS2	MD	Garrett	G1	13	Yes-2	2	687-688	767-768	none	none
GARR119X	X	Garrett	F1	13	No	4	805-806	885-886	647-648	727-728
GARR121X	X	Garrett	A2	14	No	4	29-30	109-110	651-652	731-732
GARR122X	X	Garrett	C2	6	No	2	69-70	149-150	none	none
GARR123X	X	Garrett	C3	12	No	4	73-74	153-154	815-816	895-896
GARR124X	X	Garrett	G2	21	No	4	689-690	769-770	31-32	111-112
GARR165X	X	Garrett	D1	13	No	4	225-226	305-306	847-848	927-928
GARR168X	X	Garrett	D3	22	No	4	233-234	313-314	695-696	775-776
GARR169X	X	Garrett	F3	7	No	2	813-814	893-894	none	none
GARR170X	X	Garrett	B3	12	No	4	193-194	273-274	75-76	155-156
GARR171X	X	Garrett	B2	21	Yes-2	2	191-192	271-272	none	none
GARR172X	X	Garrett	A2	21	No	4	29-30	109-110	651-652	731-732
GARR2RS1	MD	Garrett	B2	21	Yes-2	2	189-190	269-270	none	none
GARR3DS1	MD	Garrett	G2	14	Yes-2	2	689-690	769-770	none	none
GARR4DS1	MD	Garrett	D2	21	No	4	229-230	309-310	691-692	771-772

12.5 kHz Site Label	Type	County	Cell	Clus. ID	Split Cell	# of Chan.	State Chan. #1	State Chan. #2	State Chan. #3	State Chan. #4
GARR58X	X	Garrett	C1	13	Yes-3	2	65-66	845-846	none	none
GARR59X	X	Garrett	E1	13	No	4	645-646	725-726	187-188	267-268
GARR60X	X	Garrett	B1	13	No	4	185-186	265-266	227-228	307-308
GARR61X	X	Garrett	D2	14	No	2	229-230	309-310	none	none
GARR62X	X	Garrett	G2	14	Yes-2	2	691-692	771-772	none	none
GARR64X	X	Garrett	C1	13	Yes-3	2	147-148	925-926	none	none
GARR65X	X	Garrett	G3	22	No	4	693-694	773-774	853-854	933-934
GARR66X	X	Garrett	A3	7	Yes-2	2	35-36	115-116	none	none
GARR67X	X	Garrett	F2	6	Yes-2	2	811-812	891-892	none	none
GARR68X	X	Garrett	F3	12	No	4	813-814	893-894	853-854	933-934
GARR69X	X	Garrett	C1	20	No	2	65-66	145-146	none	none
GARR70X	X	Garrett	E2	21	No	4	649-650	729-730	231-232	311-312
GARR7KS3	MD	Garrett	G1	13	Yes-2	2	685-686	765-766	none	none
GARR9JS3	MD	Garrett	E2	14	No	4	649-650	729-730	71-72	151-152
GARR9JS4	MD	Garrett	A1	13	Yes-2	2	27-28	107-108	none	none
GARR9KS1	MD	Garrett	A1	13	Yes-2	2	25-26	105-106	none	none
GARR9KS4	MD	Garrett	C1	13	Yes-3	2	67-68	145-146	none	none
GARRULS1	ULS	Garrett	F2	6	Yes-2	2	809-810	889-890	none	none
GARRULS2	ULS	Garrett	A3	7	Yes-2	2	33-34	113-114	none	none
HARF0DS3	MD	Harford	E2	62	Yes-2	2	649-650	729-730	none	none
HARF125X	X	Harford	F3	53	No	4	813-814	893-894	853-854	933-934
HARF148X	X	Harford	C2	52	Yes-2	2	71-72	151-152	none	none
HARF150X	X	Harford	B2	52	No	4	189-190	269-270	231-232	311-312
HARF152X	X	Harford	C1	61	Yes-2	2	67-68	147-148	none	none
HARF174X	X	Harford	A3	53	Yes-2	2	35-36	115-116	none	none
HARF1LC5	MD	Harford	B1	61	No	4	185-186	265-266	845-846	925-926
HARF1PAX	X	Harford	G3	53	No	4	693-694	773-774	655-656	735-736
HARF24X	X	Harford	D1	61	No	4	225-226	305-306	187-188	267-268
HARF2KS1	MD	Harford	C2	52	Yes-2	2	69-70	149-150	none	none
HARF2LC5	MD	Harford	F1	61	No	4	805-806	885-886	27-28	107-108
HARF3LC5	MD	Harford	E3	53	No	4	653-654	733-734	75-76	155-156
HARF4DS1	MD	Harford	C1	61	Yes-2	2	65-66	145-146	none	none
HARF4KS4	MD	Harford	A3	53	Yes-2	2	33-34	113-114	none	none
HARF7LC5	MD	Harford	E1	61	Yes-2	2	647-648	727-728	none	none
HARF8WS1	MD	Harford	D2	62	No	4	229-230	309-310	691-692	771-772
HOWA142X	X	Howard	E2	59	No	4	649-650	729-730	811-812	891-892
HOWA143X	X	Howard	F2	59	No	4	809-810	889-890	849-850	851-852
HOWA16X	X	Howard	C1	58	No	4	65-66	145-146	187-188	267-268
HOWA1JS1	MD	Howard	A2	59	Yes-2	2	31-32	111-112	none	none
HOWA2LC5	MD	Howard	G1	67	No	4	685-686	765-766	27-28	107-108
HOWA3LC6	MD	Howard	C3	66	Yes-3	2	155-156	853-854	none	none
HOWA5LC5	MD	Howard	A2	59	Yes-2	2	29-30	109-110	none	none
HOWA6DS1	MD	Howard	D1	67	Yes-3	2	227-228	305-306	none	none
HOWA7DS1	MD	Howard	B1	58	No	4	185-186	265-266	227-228	307-308
HOWAULS1	ULS	Howard	B3	66	No	4	193-194	273-274	655-656	735-736
KENT0JS1	MD	Kent	G2	76	No	4	689-690	769-770	651-652	731-732

12.5 kHz Site Label	Type	County	Cell	Clus. ID	Split Cell	# of Chan.	State Chan. #1	State Chan. #2	State Chan. #3	State Chan. #4
KENT0LO6	MD	Kent	F1	63	No	4	805-806	885-886	27-28	107-108
KENT26X	X	Kent	E1	75	No	4	645-646	725-726	187-188	267-268
KENT32X	X	Kent	G3	77	No	2	693-694	773-774	none	none
KENT3KS4	MD	Kent	E3	69	No	4	653-654	733-734	75-76	155-156
KENT88X	X	Kent	B1	75	No	4	185-186	265-266	691-692	771-772
KENT92X	X	Kent	A1	63	No	2	25-26	105-106	none	none
MONT136X	X	Montgomery	B2	65	Yes-2	2	191-192	271-272	none	none
MONT137X	X	Montgomery	F2	65	No	3	809-810	889-890	849-850	none
MONT139X	X	Montgomery	F1	58	No	4	805-806	885-886	67-68	147-148
MONT140X	X	Montgomery	A1	58	Yes-2	2	27-28	107-108	none	none
MONT144X	X	Montgomery	F3	66	Yes-2	2	815-816	895-896	none	none
MONT14X	X	Montgomery	E2	65	No	4	649-650	729-730	71-72	151-152
MONT15X	X	Montgomery	D2	65	No	4	229-230	309-310	651-652	731-732
MONT18X	X	Montgomery	A3	66	No	4	33-34	113-114	695-696	775-776
MONT1LS1	MD	Montgomery	A1	58	Yes-2	2	25-26	105-106	none	none
MONT1RS1	MD	Montgomery	G1	58	Yes-2	2	687-688	767-768	none	none
MONT1X	X	Montgomery	D1	72	Yes-2	2	227-228	307-308	none	none
MONT2WSS2	MD	Montgomery	B2	65	Yes-2	2	189-190	269-270	none	none
MONT40X	X	Montgomery	F3	57	No	4	813-814	893-894	75-76	155-156
MONT5WS2	MD	Montgomery	C2	65	No	4	69-70	149-150	811-812	891-892
MONT80X	X	Montgomery	E1	58	No	4	645-646	725-726	807-808	887-888
MONT82X	X	Montgomery	D3	66	No	4	233-234	313-314	195-196	275-276
MONT83X	X	Montgomery	G3	66	No	4	693-694	773-774	235-236	315-316
MONT99X	X	Montgomery	C3	57	No	3	73-74	153-154	275-276	none
MONTULS1	ULS	Montgomery	D1	72	Yes-2	2	225-226	305-306	none	none
MONTULS2	ULS	Montgomery	E3	66	No	4	653-654	733-734	35-36	115-116
PRIN127X	X	Prince Georges	E2	73	No	4	649-650	729-730	811-812	891-892
PRIN128X	X	Prince Georges	D2	73	Yes-2	2	231-232	311-312	none	none
PRIN129X	X	Prince Georges	F3	80	Yes-2	2	815-816	895-896	none	none
PRIN1DS1	MD	Prince Georges	D3	80	Yes-2	2	233-234	313-314	none	none
PRIN1LO6	MD	Prince Georges	A2	73	Yes-2	2	29-30	109-110	none	none
PRIN2DS1	MD	Prince Georges	E3	80	Yes-2	2	655-656	735-736	none	none
PRIN2X	X	Prince Georges	F1	72	No	2	805-806	885-886	none	none
PRIN3X	X	Prince Georges	C3	80	No	2	73-74	153-154	none	none
PRIN4JS4	MD	Prince Georges	C3	66	Yes-3	2	75-76	153-154	none	none
PRIN5KS4	MD	Prince Georges	F3	80	Yes-2	2	813-814	893-894	none	none
PRIN71X	X	Prince Georges	F2	73	No	4	809-810	889-890	71-72	151-152
PRIN72X	X	Prince Georges	E3	80	Yes-2	2	653-654	733-734	none	none
PRIN73X	X	Prince Georges	G3	80	Yes-3	2	775-776	933-934	none	none
PRIN7JS4	MD	Prince Georges	B3	80	Yes-2	2	193-194	273-274	none	none
PRIN7WS1	MD	Prince Georges	F3	66	Yes-2	2	813-814	893-894	none	none
PRINCTY1	PG	Prince Georges	C2	79	No	4	69-70	149-150	651-652	731-732
PRINCTY10	PG	Prince Georges	G2	88	No	4	689-690	769-770	31-32	111-112
PRINCTY2	PG	Prince Georges	D3	80	Yes-2	2	235-236	315-316	none	none
PRINCTY3	PG	Prince Georges	C3	66	Yes-3	2	73-74	933-934	none	none
PRINCTY4	PG	Prince Georges	G3	80	Yes-3	2	693-694	853-854	none	none

12.5 kHz Site Label	Type	County	Cell	Clus. ID	Split Cell	# of Chan.	State Chan. #1	State Chan. #2	State Chan. #3	State Chan. #4
PRINCTY5	PG	Prince Georges	D2	73	Yes-2	2	229-230	309-310	none	none
PRINCTY6	PG	Prince Georges	C2	73	No	4	69-70	149-150	651-652	731-732
PRINCTY7	PG	Prince Georges	B1	72	No	2	185-186	265-266	none	none
PRINCTY8	PG	Prince Georges	G2	73	Yes-2	2	689-690	769-770	none	none
PRINCTY9	PG	Prince Georges	B3	80	Yes-2	2	195-196	275-276	none	none
PRINULS1	ULS	Prince Georges	G2	73	Yes-2	2	691-692	771-772	none	none
PRINULS2	ULS	Prince Georges	A2	73	Yes-2	2	31-32	111-112	none	none
PRINULS3	ULS	Prince Georges	G3	80	Yes-3	2	695-696	773-774	none	none
QUEE172X	X	Queen Annes	G2	82	No	4	31-32	111-112	689-690	769-770
QUEE27X	X	Queen Annes	C2	76	No	4	69-70	149-150	191-192	271-272
QUEE28X	X	Queen Annes	E2	76	No	4	649-650	729-730	71-72	151-152
QUEE344X	X	Queen Annes	C2	82	No	4	69-70	149-150	811-812	891-892
QUEE4DS1	MD	Queen Annes	D3	83	No	4	233-234	313-314	195-196	275-276
QUEE6DS1	MD	Queen Annes	D2	82	No	4	229-230	309-310	191-192	271-272
QUEE6KS4	MD-R	Queen Annes	E3	83	No	4	653-654	733-734	35-36	115-116
QUEE6WS1	MD	Queen Annes	F1	75	No	4	805-806	885-886	647-648	727-728
SOME1LS1	MD-R	Somerset	D1	113	No	4	225-226	305-306	187-188	267-268
SOME1WS1	MD	Somerset	A3	109	No	4	33-34	113-114	815-816	895-896
SOME2LC6	MD	Somerset	E3	109	Yes-2	2	655-656	735-736	none	none
SOME51X	X	Somerset	D3	112	No	4	233-234	313-314	195-196	275-276
SOME9DS4	MD	Somerset	G1	113	No	4	685-686	765-766	647-648	727-728
SOMEULS1	ULS	Somerset	D3	109	No	4	233-234	313-314	775-776	695-696
SOMEULS2	ULS	Somerset	E3	109	Yes-2	2	653-654	733-734	none	none
STMA12X	X	St. Marys	D3	94	No	4	233-234	313-314	695-696	775-776
STMA13X	X	St. Marys	G3	94	No	4	693-694	773-774	35-36	115-116
STMA48X	X	St. Marys	E2	101	No	3	649-650	729-730	31-32	none
STMA49X	X	St. Marys	F2	101	No	3	809-810	889-890	111-112	none
STMA50X	X	St. Marys	G2	101	No	4	689-690	769-770	651-652	731-732
STMA78X	X	St. Marys	C3	94	No	4	73-74	153-154	195-196	275-276
STMA79X	X	St. Marys	A3	94	No	4	33-34	113-114	815-816	895-896
STMA7JS4	MD	St. Marys	E3	94	Yes-2	2	653-654	733-734	none	none
STMA7KS4	MD	St. Marys	G1	107	No	4	685-686	765-766	227-228	307-308
STMA9WS4	MD	St. Marys	F3	94	No	4	813-814	893-894	75-76	155-156
STMAULS1	ULS	St. Marys	E3	94	Yes-2	2	655-656	735-736	none	none
STMAULS2	ULS	St. Marys	D2	101	No	4	229-230	309-310	691-692	771-772
TALB104X	X	Talbot	D1	90	No	4	225-226	305-306	687-688	767-768
TALB105X	X	Talbot	G1	90	No	4	685-686	765-766	27-28	107-108
TALB1JS1	MD	Talbot	G3	83	No	4	693-694	773-774	655-656	735-736
TALB2JS1	MD	Talbot	A1	90	No	4	25-26	105-106	807-808	887-888
TALB342X	X	Talbot	F2	82	No	4	809-810	889-890	651-652	731-732
TALB343X	X	Talbot	E3	89	No	4	653-654	733-734	75-76	155-156
TALB345X	X	Talbot	B3	89	No	4	193-194	273-274	655-656	735-736
TALB5WS1	MD	Talbot	E1	90	No	4	645-646	725-726	227-228	307-308
WASH102X	X	Washington	F3	39	No	4	813-814	893-894	75-76	155-156
WASH116X	X	Washington	B3	25	No	2	193-194	273-274	none	none
WASH163X	X	Washington	C3	25	No	4	73-74	153-154	195-196	275-276

12.5 kHz Site Label	Type	County	Cell	Clus. ID	Split Cell	# of Chan.	State Chan. #1	State Chan. #2	State Chan. #3	State Chan. #4
WASH1FO5	MD	Washington	F2	27	No	3	809-810	889-890	29-30	none
WASH1PAX	X	Washington	E1	26	No	3	645-646	725-726	107-108	none
WASH39X	X	Washington	E1	48	No	4	645-646	725-726	67-68	147-148
WASH3JS1	MD	Washington	D3	39	No	4	233-234	313-314	695-696	775-776
WASH41X	X	Washington	G1	26	No	3	685-686	765-766	27-28	none
WASH4WS3	MD-R	Washington	G3	25	Yes-2	2	693-694	773-774	none	none
WASH52X	X	Washington	D3	25	No	3	233-234	313-314	853-854	none
WASH53X	X	Washington	G3	25	Yes-2	2	695-696	775-776	none	none
WASH6RS1	MD	Washington	A1	26	No	4	25-26	105-106	687-688	767-768
WASH98X	X	Washington	B1	48	Yes-2	2	185-186	265-266	none	none
WICO110X	X	Wicomico	F1	103	No	4	805-806	885-886	67-68	147-148
WICO111X	X	Wicomico	C2	104	No	4	69-70	149-150	651-652	731-732
WICO1DS1	MD	Wicomico	E2	104	No	4	649-650	729-730	691-692	771-772
WICO3DS1	MD	Wicomico	D1	110	No	4	225-226	305-306	687-688	767-768
WICO9DS1	MD	Wicomico	C1	103	No	4	65-66	145-146	187-188	267-268
WICO9KS4	MD-R	Wicomico	G1	110	No	4	685-686	765-766	647-648	727-728
WICOULS1	ULS	Wicomico	G2	104	No	4	689-690	769-770	31-32	111-112
WORC109X	X	Worcester	F3	105	No	4	813-814	893-894	35-36	115-116
WORC112X	X	Worcester	C3	109	No	4	73-74	153-154	195-196	275-276
WORC113X	X	Worcester	E1	110	No	4	645-646	725-726	227-228	307-308
WORC114X	X	Worcester	B2	114	No	4	189-190	269-270	231-232	311-312
WORC115X	X	Worcester	G2	114	No	4	689-690	769-770	651-652	731-732
WORC161X	X	Worcester	E3	116	No	4	653-654	733-734	695-696	775-776
WORC1DS1	MD	Worcester	E2	117	No	4	649-650	729-730	691-692	771-772
WORC1LS1	MD	Worcester	F1	110	No	4	805-806	885-886	67-68	147-148
WORC1WS1	MD	Worcester	A1	110	Yes-2	2	25-26	105-106	none	none
WORC2DS1	MD	Worcester	D2	114	No	4	229-230	309-310	691-692	771-772
WORC3DS3	MD	Worcester	A1	110	Yes-2	2	27-28	107-108	none	none
WORC5KS4	MD	Worcester	A2	117	No	4	29-30	109-110	651-652	731-732
WORC5WS1	MD	Worcester	G2	117	No	4	689-690	769-770	31-32	111-112

Pair #	Site Alarm Wiring Termination 66 Punchdown Block Layout
1	High Temperature Alarm - Adjustable for over-temperature alert (may be integrated with HVAC system)
2	Low Temperature Alarm - Adjustable for under-temperature alert (may be integrated with HVAC system)
3	HVAC Failure Alarm - Derived from the HVAC controller
4	Generator Running Alarm - Closure when generator is running
5	Remote Generator Start - No transfer to load (a dry contact closure will remote start the generator but will not transfer to the load if commercial power is good)
6	Generator Transfer to Load (a dry contact closure will initiate a transfer to load. If the generator is off, it will start the generator)
7	Low Oil Pressure Alarm
8	Low Coolant Alarm
9	Generator Over Crank Alarm
10	High Coolant Temperature alarm
11	Transfer Panel Switched - Indicates that the transfer panel has switched to backup power
12	Equipment Room Door Alarm
13	Generator Room Door Alarm
14	Equipment Room Smoke Alarm
15	Equipment Room Heat Detector Alarm
16	Generator Room Smoke Alarm
17	Generator Room Heat Detector Alarm
18	Surge Suppressor Alarm
19	Strobe White Alarm (per strobe controller)
20	Strobe Red Alarm (per strobe controller)
21	Marker Alarm (per strobe controller)
22	Spare
23	Spare
24	Spare
25	Spare

State of Maryland

System Acceptance Test Program

Table of Contents

System Acceptance Test Program Overview

The contemplated system is very large and requires a multi-phased Acceptance Test Program that is intended to accommodate Factory and Field testing, and all functional, operational and performance testing.

The System Acceptance Test Program will be divided into multiple and successive "Levels" with respect to manufacturing, configuring, staging, installing, and field testing and acceptance of Land Mobile Radio Communication, Backhaul Network and Site Development equipment and systems.

Diagram 1 illustrates the process and flow of the System Acceptance Test Program:

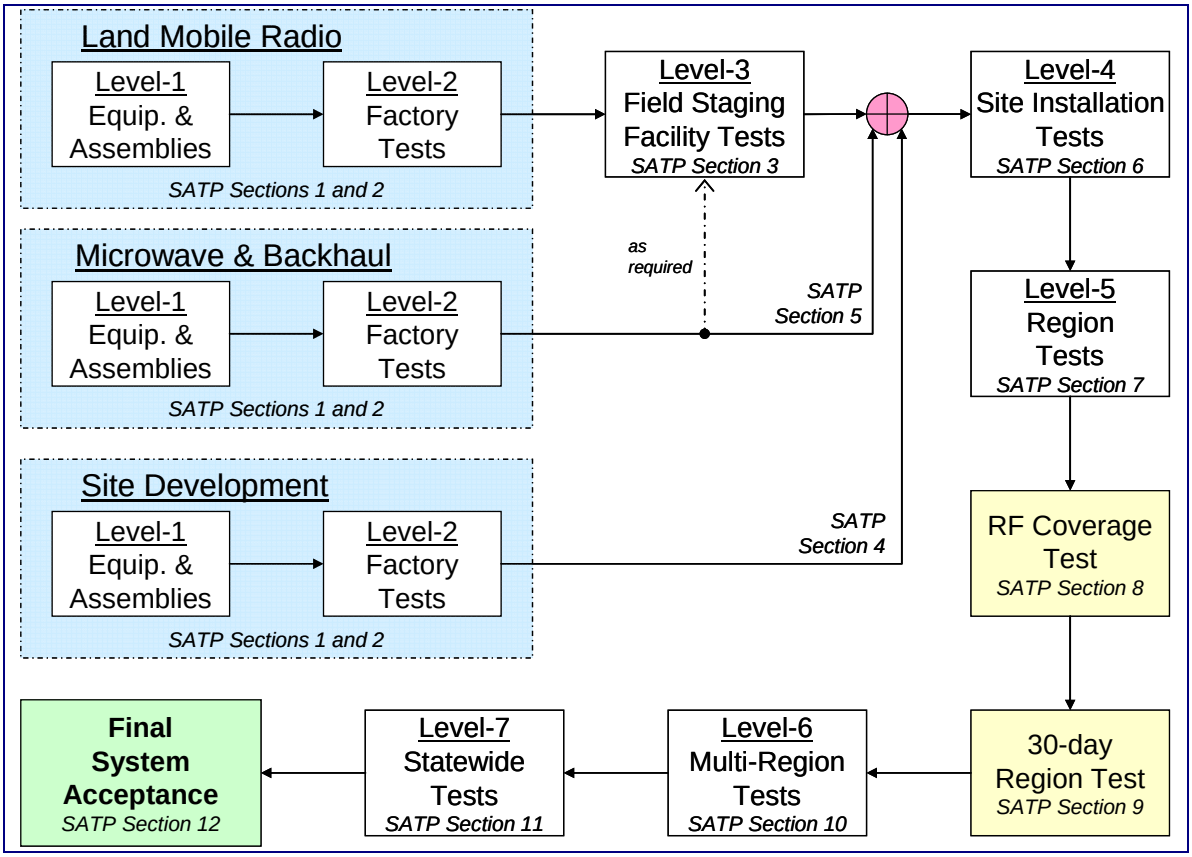


Diagram 1 - System Acceptance Test Program

Each Acceptance Level contains the following requirements:

1) Compulsory equipment performance specifications,
2) Operational modes and behaviors features and functionality,
3) Failure and fallback-and-return performance, functionality and behaviors, and
4) Acceptance criteria.

The State requires the ability to regression test any compulsory, operational, feature or function requirement of previous Acceptance Levels.

The State reserves the right to withhold acceptance and to transition equipment and subsystems to the next Acceptance Test level until all compulsory, operational, feature and functional tests, as well as regression of previous levels, are validated.

The State reserves the rights to waive any defects or postpone regression testing in any Acceptance Level.

Final System Acceptance requires the following:

1) Successful completion of all Acceptance Test Levels (Levels 1 through 7),
2) Successful completion of all site development installations and standards tests,
3) Successful completion of all backhaul network designs, performance and reliability tests,
4) Successful completion of all RF coverage acceptance tests,
5) Successful completion of the 30-day operational test,
6) Delivery of all testing, procedures and results documentation,
7) Delivery of all As-built and Configuration documentation for Site Development, Backhaul Network, RF Coverage Testing and Radio system design, and
8) Delivery of all operation, maintenance and training documentation.

1.0 Level 1: Equipment and Sub-system Assemblies

1.1. Level 1 Overview

The State requires that a complete documentation trail of all equipment provided must be made part of the record for the size of the system being contemplated. Level 1 addresses equipment and assemblies that are separately manufactured and tested to meet product specifications. Most equipment and assemblies will be integrated within a Factory Staging environment to begin performance and functional testing in a sub-system, site or regional equipment configuration.

Offeror Requirements

The Offeror shall provide equipment catalogue sheets and/or cut sheets that provide all mechanical and electrical specifications and product capabilities.

Contractor Responsibilities

The Contractor shall provide factory test sheets including measurements and parameter settings for all equipment items. In the event equipment electrically interfaces to two or more other pieces of equipment, the factory test sheet shall define the input and output measurements and parameter settings for each electrical interface.

1.2. Completion of Level 1 Testing

Equipment and sub-system assembly acceptance requires the successful completion and delivery of all equipment, subsystem and system testing procedures, testing results, and configuration documentation.

Once all Level 1 Equipment and Sub-system Assembly tests and documentation are successfully completed, then all equipment, sites, and subsystems of the Region can transition to Level 2 Factory Testing.

2.0 Level 2: Factory Staging and Acceptance

2.1. Level 2 Overview

The State requires that factory staging of complete sites of all equipment due to the volume and size of the system in order to accommodate the deployment schedule. Once equipment and sub-assemblies pass the Level 1 testing, they are configured into sub-system, site and regional equipment configurations for performance and functionality testing. Once Level 2 functional and performance testing is completed, sub-systems, sites and regional equipment configurations are transferred to a field staging location.

Each implemented Region contains a master trunked controller and audio routing and switching site ("Master site") where all radio sites are connected. Radio sites are connected to a specific Master site to form an implemented Region. Those radio sites would operate on an alternate Master site during a fail-over condition. Each Master site is connected to other Master sites to accommodate multi-region roaming and handoff, alternate routing between Master Sites. Any Master site can fail-over to any other Master site where one Master site and all associated Radio sites and operation is taken over by an alternate Master site.

2.2. Regression and Validation Tests

Level 2 Factory Staging and Acceptance Tests must be capable of demonstrating, validating and regression testing of all measurements, features, functions and performance of Level 1 Equipment and Sub-system Assemblies defined in Section 1.

2.3. Level 2 Factory Acceptance Testing

2.3.1. Configuration tests and management

Initial parameters and Configuration Management including channelization, addressing, routing, status, control and alarm monitoring shall be demonstrated.

2.3.2. Factory site capacity

In addition to at least two Master sites, Factory Staging capacity must accommodate at least 40 physical radio sites connected to one Master site. One or more of the radio sites shall be connected to an alternate Master Site to provide a functional demonstration and validation of regional roaming and handoff in the Factory.

The State requires testing more than 40 sites at the Factory Staging Level. The maximum capacity of radio sites that can be accommodated in the Factory Staging environment shall be identified with the proposal.

2.3.3. Complete Sites, subsystem configuration

The State requires complete site and subsystem, Regional and Multi-Regional testing to be performed. All sites, subsystems, regional and multi-regional configuration must include all proposed equipment including 3rd party manufactured equipment.

2.3.4. Master Site Fail-over

The State requires a minimum of two Master sites with complete routing and switching capabilities to be staged simultaneously throughout the process. Testing shall demonstrate fail-over between two Master sites whereby one Master Site takes over full trunked call and audio processing of a failed Master Site.

2.3.5. Master and Radio Site failures

Testing shall demonstrate behaviors of all Master and Radio site equipment and elements including but not limited to controllers, routers, interfaces, repeaters and loss of backhaul connectivity.

2.3.6. Master and Radio Site Loading

Testing shall demonstrate loading of the Master site. This shall be accomplished with a combination of connected-active radio sites and call traffic. Infrastructure management messaging such as status, alarms, and administrative payloads must be part of the loading of the Master controller CPU, routing and switching equipment. Network loading equipment shall consist of subscriber units, IP traffic loaders and other devices designed to load the CPU, routers, switching devices, interfaces, memory and processors of the Master site trunked controllers, site RF repeaters, and audio routing subsystems shall demonstrate full loading of the Master controller. Therefore, the physical radio sites in testing (Section 2.3.2) coupled with IP-based and other loading equipment shall be used demonstrate performance of the Region under fully loaded conditions.

2.3.7. Radio Site Busy Queue Processing

Testing shall load a radio site such that all radio channels are in use and demonstrate the system's ability to process busy queues and automatic channel allocation to the requesting radio unit when a channel is available and notification to the initiating voice radio, activating the channel and processing the call.

All Busy queue processing must be demonstrated when the voice and data traffic is queued and served at one site, at more than one site within a single Region and at more than one site in more than one Regions.

1) Priority Access: Voice radio units or talkgroups assigned a higher priority shall be granted access to a channel before lower priority units in the busy queue.

2) Voice Priority over Data: Any voice call request, including the lowest priority voice call request in the busy queue, shall be granted a channel prior to any data call request, including the highest data call priority request in the busy queue.

3) Ruthless Preemption: Testing shall demonstrate that voice calls can preempt data messages in process. If no data messages are in progress, then the lowest priority voice call will be preempted.

4) Console Priority: Testing shall demonstrate the capability of dispatch consoles, desktop consoles or other fixed location devices properly configured to override the outbound voice traffic to all units assigned to the talkgroup call even if a radio is continuing to make an inbound call. These units, properly equipped will be capable of full-duplex operation and continue to receive the inbound voice message, however, only the outbound voice message from these units will be received by the other radios.

5) Wireless Priority: Testing shall demonstrate the capability of properly configured RF devices to override the outbound voice traffic to all units assigned to the talkgroup call even if a radio is continuing to make an inbound call. Only the outbound voice message from these units will be received by the other radios.

6) Emergency Call: Testing shall demonstrate that Emergency Call activation provides the highest Priority Access. Configuration by talkgroup shall demonstrate the ability for an Emergency Call to preempt a data or voice call in progress. Configuration shall automatically lock in the present talkgroup and activate the microphone of the initiating unit.

7) Signaling and Alerting Functions: Signaling and alerting functions that remain on the site control channel shall be demonstrated while all site RF channels are allocated to calls. These alerts, including a silent Emergency alert, shall not be delayed or queued for the signaling to be processed to the target devices.

2.3.8. Combined Master Site loading and Radio site Busy Queue

With the Master and Radio site loaded and all channels used at a radio site, the performance of processing the busy queue to a successful channel shall be successfully demonstrated. Normal and Emergency calls, priority access process, including ruthless pre-emption and voice priority over data shall be demonstrated.

2.3.9. Radio Site failures

Testing shall demonstrate the loss and return to service of a radio site by all methods. These tests must identify if the return to service is either completely automatic or requires manual intervention. Manual intervention requires involvement of some or all of user staff, technical staff, remote network monitoring staff, or contractor staff of any kind including contracted maintenance staff and facilities. Automatic return to service requires no staff intervention of any kind. Site failure and return to service modes include, but not limited to:

1) Losses of site back-haul interconnect with the Master site, and return of that connectivity,
2) Losses of site trunked controllers, and
3) Losses of routers or other network equipment.

2.3.10. Radio site equipment failures

Testing shall demonstrate all site equipment failures and shall define if the equipment completely and automatically returns to service or if manual intervention by any staff is required. This includes, but is not limited to:

1) Losses of site transmitters and automatic return to service, and
2) Losses of site receivers and automatic return to service

2.3.11. Radio and Site Registration

Testing shall demonstrate radio unit registration as radios are powered on, off, and as they become idle. Testing shall demonstrate the site registration of radio units and infrastructure equipment from each of the manufacturer's equipment in the network, or system management status and visual displays.

2.3.12. Call Types

Testing shall demonstrate all Call types between each manufacturer, type and tier of radio product. Radio types are defined in this RFP as portable, mobile and RF Control Stations. Tiers are defined in this RFP as capabilities inherent by specific configuration and options of a particular radio (portable, mobile and RF Control stations). Applicable call types must be demonstrated for each tier within each radio type and for each radio manufacturer. Additionally, applicable Call types must be demonstrated for each configuration of Dispatch Console subsystems defined in this RFP. Call types include:

1) Local Talkgroup Call: Source and all target radios operating at a single site.

2) Regional Talkgroup Call: Source and target radios operating at more than one site within a single Region.

3) Multi-Region Talkgroup Call: Source and target radios operating at more than one site and more than one Region.

4) Local, Regional and Multi-Region Individual Call: Source radio and single target radio operating at the same site, two sites in one Region and one site in two Regions.

5) Local, Regional and Multi-Region Alerting: Source radio and single target radio operating at the same site, two sites in one Region and one site in two Regions.

6) Console Calls: Source radio, all target radios and dispatch console position shall demonstrate Local, Regional and Multi-Region calls.

7) Emergency Call: Source radio, all target radios and dispatch console position shall demonstrate Local, Regional and Multi-Region emergency calls.

2.3.13. Roaming and Hand-off

Testing shall demonstrate the ability of radio units to roam between sites in a single Region. The infrastructure shall hand-off calls in progress to the sites through which the radio unit continues its two-way radio communications. Hand-off types are as follows:

1) Source Radio Site hand-off: Testing shall demonstrate the ability of each Call type to commence at one site and the Source radio to be handed off to a different Site in the same Region while continuing to transmit audio and where neither the Source radio user, the Target radio user nor the Dispatch Console user are required to manually intervene to restart or continue the call, other than continue with the normal mechanics of two-way radio conversations. The Source radio continues to transmit audio to the Target radio and Dispatch Console users. Site hand-off time for the Source radio and audio loss period for the Target and Dispatch Console users shall be identified in the proposal for the Source radio roaming to a new site within the same Region and measured during this test.

2) Target Radio Site hand-off: Testing shall demonstrate the ability of each Call type to commence at one site and the Target radio is handed off to a different Site in the same Region while continuing to receive audio, and where neither the Source radio user, the Target radio user nor the Dispatch Console user are required to manually intervene to restart or continue the call, other than to continue with the normal mechanics of two-way radio conversations. The Target radio continues to automatically receive audio from the Source and Dispatch Console users. Site hand-off time and audio loss period for the Target radio shall be identified in the proposal for a Target radio roaming to a new site within the same Region and measured during this test.

3) Loss of System coverage and two-way connectivity: Testing shall demonstrate the behavior with respect to all Call Types of both a Source and Target radio as they exit the range of the system's RF coverage.

4) Reacquisition of System coverage and two-way connectivity: Testing shall demonstrate the behavior with respect to all Call Types of a Target radio that enters the range of the system's RF coverage while a talkgroup call is in process. Testing shall demonstrate the behavior of a target radio that enters the range of the system's RF coverage while an Emergency Call is in process.

2.3.14. Multi-Region Roaming and Hand-off

Testing shall demonstrate the ability of radio units to roam between sites associated to different Regions. The infrastructure shall hand-off calls in progress to the sites through which the radio unit continues its two-way radio communications. Hand-off types are as follows:

1) Source Radio Site hand-off: Testing shall demonstrate the ability of each call type to commence at one site and whereby the Source radio to be handed off to a different Site in a different Region while continuing to transmit audio and where neither the Source radio user, the Target radio user nor the Dispatch Console user are required to manually intervene to restart or continue the call, other than continue with the normal mechanics of two-way radio conversations. The Source radio continues to transmit audio to the Target radio and Dispatch Console users. Site hand-off time for the Source radio and the audio loss period for the Target and Dispatch Console users shall be identified in the proposal for the Source radio roaming to a new site within the same Region and measured during this test.

2) Target Radio Site hand-off: Testing shall demonstrate the ability of each Call type to commence at one site and the target radio is handed off to a different site in a different region while continuing to receive audio, and where neither the Source radio user, the Target radio user nor the Dispatch Console user are required to manually intervene to restart or continue the call, other than to continue with the normal mechanics of two-way radio conversations. The Target radio continues to automatically receive audio from the Source and Dispatch Console users. Site hand-off time and audio loss period for the Target radio shall be identified in the proposal for a Target radio roaming to a new site within the same Region and measured during this test.

3) Loss of System coverage and two-way connectivity: Testing shall demonstrate the behavior with respect to all Call Types of both a Source and Target radio as they exit the range of the system's RF coverage.

4) Reacquisition of System coverage and two-way connectivity: Testing shall demonstrate the behavior with respect to all Call Types of a Target radio that enters the range of the system's RF coverage while a talkgroup call is in process.

Testing shall demonstrate the behavior of a target radio that enters the range of the system's RF coverage while an Emergency Call is in process.

2.3.15. Late Call Entry

Testing shall demonstrate the ability for a radio to be joined to all Call types in process due to:

1) Powering up the radio,
2) Site busy queue condition,
3) Emergency call in process, and
4) Reacquisition of two-way radio service and connectivity

Offeror Requirements

The Offeror shall define all sub-systems, sites and regional equipment configurations that will be "factory staged" at the Offeror's facility. The State does not expect that all sites can be factory staged at one time, thus the Offeror shall define the maximum quantity of sub-systems, sites and regional equipment configurations that can be staged as well as how the Offeror will maintain the ability to accommodate additional factory staging of sites and regional equipment configurations.

The Offeror shall define all configurations (sub-systems, sites and regional equipment configurations), the goal of each test and criteria that would constitute successful Level 2 testing for the proposed sub-system, site and regional equipment configuration.

The Offeror shall define a schedule accommodating factory staging of the initial complement including readying all equipment for the test, and the testing procedures.

The Offeror shall define the remaining schedule based upon the capacity of the factory facility and projected available resources of the vendor.

Contractor Responsibilities

The Contractor shall reaffirm the maximum quantity of sites that can be staged in the factory as well as describe and quantify how it will maintain the ability to accommodate additional factory staging of sites and regional equipment configurations throughout the project.

The Contractor shall reaffirm all configurations (sub-systems, sites and regional equipment configurations), the goal of each test and criteria that would constitute successful Level 2 testing for the proposed sub-system, site and regional equipment configuration.

The Contractor shall reaffirm the proposed schedule accommodating factory staging of the initial compliment including readying all equipment for the test, and the test

procedure itself. The Contractor shall reaffirm the remaining schedule based upon the capacity of facility and projected resources of the vendor.

2.4. Completion of Level 2 Testing

Factory Staging Acceptance requires the successful completion of the Factory Staging testing requirements and delivery of all equipment, subsystem and system testing procedures, testing results, and Factory Staging Test-configuration documentation.

Once all Level 2 Factory Staging Tests and documentation are successfully completed, then all equipment, site, and subsystems of the Region can transition to Level 3 Field Staging Facility Testing.

3.0 Level 3: Field Staging Facility Testing

3.1. Level 3 Overview

The State requires a "Field Staging Facility" located within the State borders that will be utilized as a field staging facility. The field staging facility must be capable of receiving the initial set of equipment from Level 2 testing and providing site specific configuration management, cabling, Level 2 regression testing, Level 3 Acceptance Testing and Asset Management processing in order to document, validate test, and deploy the sub-systems, sites, regional and multi-regional equipment to the field.

The field staging facility should be capable of accepting a continuous stream of additional sub-systems, sites, regional and multi-regional equipment configurations from Level 2 Factory testing process and continue the ability to configure, test, and deploy these sub-systems, sites, regional and multi-regional equipment configurations to the final field installed location.

3.2. Regression and Validation Tests

Level 3 Field Staging Testing must be capable of demonstrating, validating and regression testing of all measurements, features, functions and performance of:

1) Level 1 Equipment and Sub-system Assemblies defined in Section 1, and
2) Level 2 Factory Staging and Acceptance Tests defined in Section 2

3.3. Level 3 Field Staging Tests

Field Staging Facility site capacity: The maximum capacity of radio sites that can be accommodated in the Field Staging environment shall be identified with the proposal. In addition to the three Master sites, Field Staging capacity must accommodate at least 60 radio sites connected to one Master site. One or more of the radio sites shall be connected to each of the alternate Master Sites to provide a functional demonstration and validation of regional roaming and handoff in the Field Staging facility. The third Master Site is anticipated to remain at the field staging facility to provide regression testing, configuration management and control as well as to provide a connectivity portal between the field staging facility and the deployed regional Master Sites and network management and configuration systems.

Level 3 Testing: Level 3 Field Test shall at a minimum duplicate all Level 2 Factory Testing and demonstrations. Offerors shall define tests that are not to be performed in both Level 2 and Level 3 Testing. Offerors shall describe additional capabilities and tests

in Level 3 that are not performed in Level 2 Testing. The following list defines the minimum Level 3 Acceptance Testing and Regression testing requirements:

1) Configuration management,
2) Staging facility Capacity,
3) Complete Sites, subsystem configuration,
4) Master Site Fail-over,
5) Master and Radio Site failures,
6) Master and Radio Site Loading,
7) Radio Site Busy Queue Processing,
8) Combined Master site loading and Radio site Busy Queue,
9) Radio Site failures,
10) Radio site equipment failures,
11) Radio and Site Registration,
12) Call Types,
13) Roaming and Hand-off,
14) Multi-Region Roaming and Hand-off, and
15) Late Call Entry.

Offeror Requirements

The Offeror shall identify a suitable Field Staging Facility location and identify address, define the size of the testing area, the warehousing area, and the number of vendor personnel anticipated to be located at the Field Staging Facility.

The Offeror shall define all sub-systems, sites, regional and multi-regional equipment configurations that will be "field staged" at the field staging facility. The State does not expect that all sites can be field staged at one time, thus the Offeror shall define the maximum quantity of sub-systems, sites, regional and multi-regional equipment configurations that can be staged as well as how the Offeror will maintain the ability to accommodate additional field staging of sites and regional equipment configurations as equipment is deployed to the field for Level 4 Installation testing and as equipment is received from the Level 2 Factory staging processes.

The Offeror shall define all configurations (sub-systems, sites, regional and multi-regional equipment configurations), the goal of each test and criteria that would constitute a successful Level 3 testing for the proposed sub-system, site, regional and multi-regional equipment configuration. This will include the additional or unique testing at the Field Staging Facility that is not performed at the Level 2 Factory Staging Facility.

The Offeror shall define a schedule accommodating field staging of the initial complement including readying all equipment for the test, and the test procedure itself.

The Offeror shall define the remaining schedule based upon the capacity of the field staging facility and projected available resources of the vendor.

Contractor responsibilities

The Contractor shall confirm the field staging location address, the size of the testing area, warehousing area, and the number of vendor personnel anticipated to be located at the Field Staging Facility.

The Contractor shall reaffirm all sub-systems, sites, regional and multi-regional equipment configuration that will be "field staged" at the Field Staging Facility. The State does not expect that all sites can be field staged at one time, thus the Contractor shall confirm the maximum quantity of sub-systems, sites, regional and multi-regional equipment configurations that can be staged as well as how the Contractor will maintain the ability to accommodate additional field staging of sites and regional equipment configurations.

The Contractor shall confirm all configurations (sub-systems, sites, regional and multi-regional equipment configurations), and the goal of each test and criteria that would constitute a successful Level 3 testing for the proposed sub-system, site, regional and multi-regional equipment configuration. This will include the additional or unique testing at the field staging facility that is not performed at the Level-2 factory staging facility.

The Contractor shall define a schedule accommodating field staging of the initial complement including readying all equipment for the test, and the test procedure itself.

The Contractor shall define the remaining schedule based upon the capacity of the field staging facility and projected available resources of the vendor.

3.4. Completion of Level 3 Testing

Field Staging Acceptance requires the successful completion of the Field Staging testing requirements and delivery of all equipment, subsystem and system testing procedures, testing results, and Field Staging Facility Tested-configuration documentation.

Once all Level 3 Field Staging Tests and documentation are successfully completed, then all equipment, site, and subsystems of the Region can transition to Level 4 Site Installation and Pre-Commissioning Testing.

4.0 Site Development Installation and Testing

Responders shall provide turn-key design, deployment and acceptance testing for all aspects of site development, construction and civil work including but not limited to:

1) New tower design including foundation, grounding and all improvements for existing towers,
2) New shelter design including electrical capacity and distribution, HVAC, foundation, grounding and all improvements for existing shelters,
3) New Commercial Electrical Power service design, interface to site compound, transfer switches, emergency power generators, UPS and shelters,
4) New emergency power generator design including transfer switches, capacity, fuel supply and grounding,
5) New UPS design including capacity, backup time, distribution, bypass switches and grounding, and
6) New site compound design including civil studies, all civil work, gates, fences, grounding systems, access roads and all improvements for existing site compounds.

All site development work shall conform to State site installation and standards practices.

All responses and costs shall include compliance to the State site installation and standards practices.

Site Development Acceptance will not be achievable without successful completion of the Site Development installation standards, requirements and delivery of all Site Development testing procedures, testing results, As-built, operation, training and maintenance documentation.

4.1. Site Development Testing Overview

The State requires that acceptance testing be performed of all site development work performed and equipment provided. Testing will be performed as work is completed and equipment is installed.

4.2. Site Development Testing

Site Compound Construction: Testing and inspections will be performed by State personnel or selected third-party contractor to verify that all site compound construction is performed in accordance with the site design documents and installation standards. The tests and inspections to be performed include, but are not limited to, the following:

1) Verify site access road construction,
2) Verify Site Plan,
3) Verify site compound construction,
4) Verify site grounding system construction,
5) Test site grounding system resistance,
6) Verify fencing and gate construction, and
7) Verify existing site compound improvements.

Tower Construction: Testing and inspections will be performed by State personnel or selected third-party contractor to verify that all tower construction is performed in accordance with the site design documents and installation standards. The tests and inspections to be performed include, but are not limited to, the following:

1) Verify tower foundation construction,
2) Perform tower and shelter foundation concrete slump tests,
3) Verify tower erection,
4) Verify tower grounding system construction,
5) Test tower grounding system bonding to site grounding system,
6) Verify tower lighting system installation,
7) Test tower lighting systems, and
8) Verify existing tower modifications.

Shelter Construction: Testing and inspections will be performed by State personnel or selected third-party contractor to verify that all shelter construction is performed in accordance with the site design documents and installation standards. The tests and inspections to be performed include, but are not limited to, the following:

1) Verify shelter foundation construction,
2) Perform shelter foundation concrete slump tests,
3) Verify shelter installation on foundation,
4) Verify shelter exterior and interior grounding system construction,
5) Test shelter exterior grounding system bonding to site grounding system,
6) Test shelter interior grounding system bonding to shelter exterior grounding system,
7) Verify shelter electrical system installation,
8) Test shelter electrical systems,
9) Verify shelter HVAC installation,
10) Test shelter HVAC systems,
11) Verify other shelter ancillary equipment installations,
12) Test other shelter ancillary equipment installations, and
13) Verify existing shelter modifications.

Commercial Electrical Power Construction: Testing and inspections will be performed by State personnel or selected third-party contractor to verify that all electrical service construction is performed in accordance with the site design documents and installation

standards. The tests and inspections to be performed include, but are not limited to, the following:

1) Verify shelter service entrance construction,
2) Verify electrical service grounding system,
3) Test electrical service grounding system bonding to site grounding system,
4) Verify electrical distribution construction,
5) Test electrical distribution systems,
6) Verify surge suppression installation, and
7) Test surge suppression systems.

Emergency Power Generator Installation: Testing and inspections will be performed by State personnel or selected third-party contractor to verify that all emergency generator installation is performed in accordance with the site design documents and installation standards. The tests and inspections to be performed include, but are not limited to, the following:

1) Verify generator foundation construction,
2) Perform generator foundation concrete slump tests,
3) Verify generator shelter foundation construction,
4) Perform generator shelter foundation concrete slump tests,
5) Verify generator shelter construction,
6) Verify generator installation,
7) Verify transfer switch installation,
8) Verify generator grounding,
9) Test generator ground bonding to site grounding system,
10) Perform generator start-up,
11) Perform generator operational tests,
12) Perform transfer switch operational tests, and
13) Test generator alarm reporting.

UPS Installation: Testing and inspections will be performed by a State personnel or selected third-party contractor to verify that all UPS installation is performed in accordance with the site design documents and installation standards. The tests and inspections to be performed include, but are not limited to, the following:

1) Verify UPS installation,
2) Verify UPS distribution installation,
3) Verify UPS bypass switch installation,
4) Verify UPS grounding,
5) Test UPS ground bonding to site grounding system,
6) Perform UPS start-up,
7) Perform UPS operational tests,
8) Perform UPS bypass switch operational tests, and.
9) Test UPS alarm reporting

4.3. Completion of Site Development Testing

Final Site Development Acceptance requires the following:

1) Successful completion of all Site Development site installations and standards tests,
2) Resolution of all Site Development punch list items,
3) Delivery of all Site Development testing procedures and test results documentation,
4) Delivery of all Site Development Design, Configuration, and As-built, documentation, and
5) Delivery of all Site Development Operation, Maintenance and Training documentation.

5.0 Backhaul Network Testing

Responders shall provide turn-key design, interfaces, deployment and acceptance testing for all aspects of the Backhaul Network including but not limited to:

1) Microwave path and multiple-path route design, performance and reliability guarantee (Single path 99.9999% reliability, Route 99.9995% reliability),
2) Fiber optic route design, performance and reliability guarantee,
3) Complete testing and validation of microwave radio equipment, fiber optic equipment including transmitters, receivers, transmission media and interfaces,
4) Complete testing and validation of interface design and functionality between all radio site equipment (RF base stations, site alarms, legacy site equipment, etc.) and new microwave and fiber equipment,
5) Complete testing and functional validation of routers, switches and alternate routing equipment,
6) Complete testing and validation that primary and alternate backhaul equipment, paths, routes provide equivalent bandwidth for the voice traffic loading of the RF channel, and
7) Complete testing and validation of electrical power requirements for all backhaul equipment.

All Backhaul network design, interface, deployment and testing shall conform to design requirements specified in this RFP.

All responses and costs shall include full compliance to the Backhaul Network design, interface, deployment and testing standards.

Backhaul Network Acceptance will not be achievable without successful completion of the Backhaul Network testing requirements and delivery of all Backhaul Network testing procedures, testing results, As-built, operation, training and maintenance documentation.

5.1. Backhaul Network Testing Overview

The State requires that acceptance testing be performed of all backhaul network work performed and equipment provided. Backhaul Network acceptance testing will be developed and performed for all aspects of the proposed backhaul network, including, but not limited to the following:

1) Transport network equipment,
2) Local access network equipment,
3) Routing and switching network equipment,
4) Alternate routing network equipment,
5) Network Management System (NMS) equipment, and

6) DC Power Plant equipment.

Testing will be performed as work is completed and equipment is installed.

5.2. Backhaul Network Testing

Transport Network Equipment: Testing and inspections will be performed to verify that all transport network equipment is provided and installed in accordance with the Backhaul Network design documents and installation standards. The tests and inspections to be performed include, but are not limited to, the following:

1) Perform factory acceptance tests,
2) Perform equipment staging tests,
3) Verify transport network equipment installation,
4) Perform microwave path acceptance tests, as required,
5) Perform fiber path acceptance tests, as required,
6) Perform transport network terminal and ancillary equipment testing,
7) Perform transport network route testing, and
8) Perform transport network alternate route and route recovery testing.

Local Access Network Equipment: Testing and inspections will be performed to verify that all local access network equipment is provided and installed in accordance with the Backhaul Network design documents and installation standards. The tests and inspections to be performed include, but are not limited to, the following:

1) Perform factory acceptance tests,
2) Perform equipment staging tests,
3) Verify local access network equipment installation,
4) Perform microwave path acceptance tests, as required,
5) Perform fiber path acceptance tests, as required,
6) Perform local access network terminal and ancillary equipment testing,
7) Perform local access network route testing, and
8) Perform local access network alternate route and route recovery testing.

Routing and Switching Network Equipment: Testing and inspections will be performed to verify that all routing and switching network equipment is provided and installed in accordance with the Backhaul Network design documents and installation standards. The tests and inspections to be performed include, but are not limited to, the following:

1) Perform equipment staging tests,
2) Verify routing and switching network equipment installation, and
3) Perform routing and switching network equipment testing.

Alternate Routing Network Equipment: Testing and inspections will be performed to verify that all routing and switching network equipment is provided and installed in

accordance with the Backhaul Network design documents and installation standards. The tests and inspections to be performed include, but are not limited to, the following:

1) Perform equipment staging tests,
2) Verify alternate routing network equipment installation, and
3) Perform alternate routing network equipment testing.

Network Management System (NMS) Equipment: Testing and inspections will be performed to verify that all NMS equipment is provided and installed in accordance with the Backhaul Network design documents and installation standards. The tests and inspections to be performed include, but are not limited to, the following:

1) Perform equipment staging tests,
2) Verify NMS equipment installation, and
3) Perform NMS equipment testing.

DC Power Plant Equipment: Testing and inspections will be performed to verify that all DC power plant equipment is provided and installed in accordance with the Backhaul Network design documents and installation standards. The tests and inspections to be performed include, but are not limited to, the following:

1) Verify DC power plant equipment installation,
2) Verify DC power plant distribution installation,
3) Verify DC power plant grounding,
4) Test DC power plant ground bonding to site grounding system,
5) Perform DC power plant start-up, and
6) Perform DC power plant operational tests.

5.3. Completion of Backhaul Network Testing

Final Backhaul Network Acceptance requires the following:

1) Successful completion of all Backhaul Network design, performance and reliability tests,
2) Resolution of all Backhaul Network punch list items,
3) Delivery of all Backhaul Network testing procedures and test results documentation,
4) Delivery of all Backhaul Network Design, Configuration, and As-built, documentation, and
5) Delivery of all Backhaul Network Operation, Maintenance and Training documentation.

6.0 Level 4: Site Installation and Pre-Commission Testing

6.1. Level 4 Overview

Once radio site equipment have passed through Level 1, Level 2 and Level 3, and once appropriate Site Development and Backhaul Network acceptance testing have been completed at the physical site location, then the radio site equipment will be ready for installation at the final field location. *The State will issue task orders when it is ready to coordinate the equipment for contractor installation and Level 4 Testing.*

6.2. Regression and Validation Tests

Level 4 Site Installation and Pre-commissioning Tests must be capable of demonstrating, validating and regression testing of all measurements, features, functions and performance of:

1) Level 1 Equipment and Sub-system Assemblies defined in Section 1,
2) Level 2 Factory Staging and Acceptance Tests defined in Section 2, and
3) Level 3 Field Staging Facility Testing defined in Section 3.

6.3. Prerequisite to Commencement of Level 4 Testing

Level 4 Site Installation Acceptance Testing requires the following to be successfully completed:

1) Acceptance of requirements defined in Section 4 Site Development Testing of this System Acceptance Test Program document, and
2) Acceptance of requirements defined in Section 5 Backhaul Network Testing of this System Acceptance Test Program document.

6.4. Level 4 Site Installation and Pre-commission testing

The State requires complete site and subsystem testing to be performed for all sites and equipment associated to a site deployment. All sites and subsystems and configuration must include all proposed equipment including 3rd party manufactured equipment. Testing shall provide validation of configuration, measurements and operation for deployed sites including:

1) Configuration management,
2) Staging facility Capacity is not applicable to this Level,
3) Complete Sites, subsystem configuration,

4) Master Site Fail-over,
5) Master and Radio Site failures,
6) Master and Radio Site Loading,
7) Radio Site Busy Queue Processing,
8) Combined Master site loading and Radio site Busy Queue,
9) Radio Site failures,
10) Radio site equipment failures,
11) Radio and Site Registration,
12) Call Types,
13) Roaming and Hand-off,
14) Multi-Region Roaming and Hand-off, and
15) Late Call Entry.

Field Deployment Capacity and Configuration: Radio sites will be deployed and tested to their respective deployed Master Site. The State understands the status of the Deployed Master site may require provisional configuration or routing to accommodate deployed radio site testing. The Master Site located at the field staging facility and deployed Region routing and configuration plans can be used to accommodate and accelerate deployment and Level 4 testing.

Offeror Requirements

The Offeror shall define the field validation measurement and functional performance testing of all equipment at the site upon installation.

It is the intention of the State that sites shall be installed and tested for all specifications and functionality to the extent that functionality exists entirely within equipment at the site. Additionally, the State requires that functionality shall be tested if the site has connectivity to either an installed regional equipment configuration or to the field staging regional equipment. Therefore, the Offeror shall also define additional testing to be documented and recorded at this stage, including but not limited to:

1) All equipment specification,
2) Site functionality, equipment and operation modes, and
3) Functional testing of the site with connectivity to the installed regional equipment configuration or multi-regional equipment configuration located at the field staging facility.

The Offeror shall describe the testing methods related to the site and equipment. The Offeror shall describe functional testing that can be achieved to the installed regional equipment configuration or the multi-regional equipment configuration at the field staging location.

Contractor Responsibilities

The Contractor shall confirm all Level-4 field installation tests including but not limited to:

1) All equipment specification,
2) Site functionality, equipment and operation modes and,
3) Functional testing of the site with connectivity to the installed regional equipment configuration or multi-regional equipment configuration located at the field staging facility.

The Contractor shall confirm the testing methods related to the site and equipment. The Contractor shall confirm functional testing that can be achieved to the installed regional equipment configuration or the multi-regional equipment configuration at the field staging location.

6.5. Completion of Level 4 Testing

Site Installation Acceptance requires the successful completion of the Site Installation and Pre-Commissioning testing requirements and delivery of all equipment, subsystem and system testing procedures, testing results, Configuration and As-built documentation. Physical inspection of the equipment installation is part of Level 4 testing. Level 4 testing cannot be completed until all punch-list items either resolved or waived to the State's satisfaction.

In addition to the Land Mobile Radio testing defined in Section 6 of this System Acceptance Test Program document, Level 4 Site Installation Acceptance shall require:

1) Acceptance of requirements defined in Section 4 Site Development Testing of this System Acceptance Test Program document, and
2) Acceptance of requirements defined in Section 5 Backhaul Network Testing of this System Acceptance Test Program document.

Once all Level 4 Site Installation Tests and documentation are successfully completed, including Land Mobile Radio Testing, Site Development Testing and Backhaul Network Testing, then all equipment, sites, and subsystems can transition to Level 5 Region Acceptance Testing.

7.0 Level 5: Regional Testing

7.1. Level 5 Overview

It is the State's intention to deploy the system in regional equipment configurations consisting of the Master site regional switching and processing site and equipment along with all associated RF sites related to the particular region.

The State requires that the first regional equipment configuration deployed will include two regional Master sites with switching and processing equipment configured with the capability to provide automatic switching for high availability such that each Master site can provide complete fail-over to the alternate Master site. These two Master sites will be installed at their final location. The initial two Master Sites must be installed in different regions. This failover capability requires proper connectivity and bandwidth which is defined by the proposed system design. RF sites are deployed and, once passing Level-4 testing, are connected to the appropriate Master site and regional switch. Subsequent master sites and regional switches are deployed afterwards and will provide proper failover capabilities between Master sites.

Once a regional equipment configuration set of sites is installed and has passed Level-4 testing, regional functionality and performance testing will confirm proper operation of the sites and the radio subscriber units for the regional equipment configuration. That regional configuration then will be readied for a Region Functional Test.

7.2. Regression and Validation Tests

Level 5 Site Regional Testing must be capable of demonstrating, validating and regression testing of all measurements, features, functions and performance of:

1) Level 1 Equipment and Sub-system Assemblies defined in Section 1,
2) Level 2 Factory Staging and Acceptance Tests defined in Section 2,
3) Level 3 Field Staging Facility Testing defined in Section 3, and
4) Level 4 Site Installation and Pre-commissioning defined in Section 6.

7.3. Level 5 Regional Testing

The State requires complete site and subsystem, Regional and Multi-Regional testing to be performed for all sites and equipment associated to each region. All sites, subsystems and regional configuration must include all proposed equipment including 3rd party manufactured equipment. Testing shall provide validation of configuration, measurements and operation for deployed sites including:

1) Configuration management,
2) Staging facility Capacity is not applicable to this Level,
3) Complete Sites, subsystem configuration,
4) Master Site Fail-over,
5) Master and Radio Site failures,
6) Master and Radio Site Loading,
7) Radio Site Busy Queue Processing,
8) Combined Master site loading and Radio site Busy Queue,
9) Radio Site failures,
10) Radio site equipment failures,
11) Radio and Site Registration,
12) Call Types,
13) Roaming and Hand-off,
14) Multi-Region Roaming and Hand-off, and
15) Late Call Entry.

Field Deployment capacity and configuration: Radio sites will be deployed and tested to their respective deployed Master Site. The regional test must demonstrate fail-over of the Master site to any alternate Master site with all radio sites of any Master sites operating on the functioning Master Site and without loss of any radio sites originally connected to the failed Master site. The State understands the status of the deployed Master site may require provisional configuration or routing to accommodate deployed radio site testing. A deployed Region or Master Site, or the Master Site located at the field staging facility can be used to accommodate Level 5 testing.

Offeror Requirements

The Offeror shall define the functional validation and testing that the Master site(s), regional switch(es) and RF sites require in order to become activated as part of a deployed regional equipment configuration. This will include, but not be limited to, all functional two-way call processing between two subscriber units, dispatch operators and CAD Host such as individual call, emergency call, talkgroup call and mobile data messages.

The Offeror shall describe how the initial regional deployment consisting of two Master site and regional switch configurations and set of RF sites will be tested and validated.

The Offeror shall describe how subsequent Master sites and regional switches are to be deployed and tested with previously deployed master sites, regional switches and radio sites.

The Offeror shall describe how early deployed sites can be tested as part of a deployed regional configuration, and later routed and activated as part of the final regional equipment configuration.

The Offeror shall describe how sites deployed after the regional equipment configuration can be added, tested and activated as part of the deployed regional equipment configuration.

Contractor Responsibilities

The Contractor shall confirm the functional validation and testing that the Master sites, regional switches, and RF sites require in order to become activated as part of a deployed regional equipment configuration. This will include but not be limited to all functional two-way call processing between two subscriber units, dispatch operators and CAD Host such as individual call, emergency call, talkgroup call and mobile data messages.

The Contractor shall confirm how the initial regional deployment consisting of two Master site and regional switch configurations and RF sites will be tested and validated.

The Contractor shall confirm how subsequent Master sites, regional switches and radio sites are deployed and tested with previously deployed Master sites.

The Contractor shall confirm how early deployed sites can be tested as part of a deployed regional configuration, and later routed and activated as part of the final regional equipment configuration.

The Contractor shall confirm how sites deployed after the regional equipment configuration can be added, tested and activated as part of the deployed regional equipment configuration.

7.4. Completion of Level 5 Testing

Region Acceptance requires the successful completion of the Region testing requirements and delivery of all equipment, subsystem and system testing procedures, testing results, Configuration, As-built and Operations documentation.

Once all Level 5 Region Tests and documentation are successfully completed then all equipment, site, and subsystems of the Region can transition to RF Coverage Acceptance Testing.

8.0 RF Coverage Acceptance Testing

8.1. Overview of RF Coverage Acceptance Testing

The State requires that RF Coverage Acceptance begin at the Region Level and proceed in parallel with the remaining compulsory equipment, functional site and subsystem and operational feature testing. The State understands that the project is large and a complex relationship of manufacturing, staging, testing, deployment schedules exist which must be managed to the site construction schedules and backhaul availability.

The State requires that RF coverage acceptance testing will be performed on a Regional basis.

8.2. Audio Quality Performance

The State agrees with certain portions of TIA TSB 88 coverage testing methodology. That methodology does not accommodate particular concerns of the State and therefore the State will generally follow TIA TSB 88 with modifications to address these concerns defined in this RF Coverage Acceptance Test.

The system design shall be based upon Actual Audio Quality ("AAQ") of "3.4" using qualitative voice testing for the proposed technology defined by TIA TSB 88. An AAQ of "3.4" is an equivalent passing result as defined in TIA TSB 88 for a DAQ of "3.4".

The State requires that all tiles will be tested for Actual Audio Quality and deemed pass or fail based upon an AAQ score of "3.4". Prior to each AAQ test, vendors shall provide a complete tile list. Actual Audio Quality (AAQ) testing will not commence until all identified tiles are served by its complement of deployed and operational radio sites. Tiles are defined later in this RF coverage acceptance test.

8.3. Automated Measurement Tests

Automated Measurement Tests ("AMT") shall provide a method to measure and record RF signal strength, data error rates and other RF channel performance parameters. Automated Measurement Test are for informational purposes only for the voice system and do not constitute acceptance of any voice performance criteria.

AMT shall use calibrated reference receivers and calibrated data error rate detection recording equipment. AMT data and results will be continuous measurements of signal strength, data error rates and other performance parameters along a defined "drive route". The drive route shall circumnavigate both the interior and exterior of the Region in order

to assure both Source and Target radios traverse single site coverage, multi-site coverage from sites with in the Region, multi-site coverage from sites associated with other Regions (as appropriate) and coverage from sites external to the Region under test. All measurements shall be geo-referenced with GPS data and time stamps in order to provide a repeatable drive route and measurement process.

Prior to each Regional AMT test, vendors shall provide a complete drive route map and associated tile list. AMT testing will not commence until all drive routes and tiles are identified and approved by the State and the Contractor advises the State that it is prepared to perform the AMT test for the data system. AMT testing will be performed concurrently with voice quality testing (AAQ).

The State requires AMT to be performed to obtain a baseline measurement and repeatable measurement process for system maintenance of signal strength and data error rates along specific drive routes. AMT is not a substitute for voice quality testing and is performed for informational purposes only.

8.4. Tiles and tests per tile

The State requires uniform tile pattern for RF coverage testing throughout the Region and State geographic area. AAQ and AMT testing procedures will utilize this common set of uniform tiles.

Tiles shall be 1 square mile (approximately 2.6 square kilometers). Tiles shall be geo-referenced to a State plane coordinate system. Tiles shall be defined to include geographic area of ten miles beyond the State borders into all adjacent States and the District of Columbia. Tiles shall be defined to include a geographic area of ten miles into the Atlantic Ocean from the State coastline. Tiles shall be defined to encompass the Chesapeake Bay within the State coastline and up to ten miles beyond the State boundary.

RF coverage acceptance test plans, documentation and electronic files shall uniquely enumerate tiles beginning at the far western edge of the coverage area and proceeding east to the far eastern edge of the coverage area. Tiles running from west to east shall be labeled alphabetically beginning with A and proceeding sequentially Tiles beginning at the extreme southern edge of the coverage area and proceeding north to the extreme northern edge of the coverage area shall be labeled numerically beginning with 1 and proceeding sequentially. Therefore, the extreme south-western tile will be labeled A-1.

Region testing shall incorporate all tiles within a 3-mile border of the State in the case of land based tiles and 10- miles beyond the State coastline or State border in the case of the Atlantic Ocean tiles.

AAQ testing requires a single Push-to-Talk (PTT) two-way voice test per tile. A single AAQ test within a tile passes only if both:

1) Two-way message occurs, and
2) Both teams score the DAQ Test equal to or greater 3.4.

A single AAQ test within a tile fails if there is either:

1) One part of the two-way message is not received, or
2) If either part message is scored less than the DAQ score of 3.4.

A Region requires 95% of all tiles, including bordering tiles assigned to adjacent Regions and other States, to pass the Actual Audio Quality Testing.

8.5. RF Coverage – Portable In-Building Voice Quality Test [Field Test]

This Acceptance Test Procedure (ATP) is used by the State for verification of portable in-building coverage in the State of Maryland defined service area based upon evaluating the voice quality of digital calls made in randomly selected buildings throughout the test area boundaries. The test may be used to verify coverage in specific or mandatory buildings.

The coverage design will be evaluated on the success in providing the required in-building coverage throughout the State's service area. The basic network coverage design shall be applicable to vehicles, aircraft, railroad trains, and water vessels traveling at speeds up to 150 mph. It is the desire of the State of Maryland to have coverage provided within these buildings from the 700 MHz infrastructure, with limited in-building enhancements for certain critical buildings.

Measurement and verification methodologies are provided to ensure an understanding and compliance of coverage acceptance testing. At least 95% of all test locations within the state shall meet or exceed the required coverage threshold for both voice and data. It should be noted that contractor-provided coverage maps will be used only for analysis of alternatives and will have no bearing on the acceptance of the system provided.

The Contractor shall supply a GPS receiver to provide accurate position information for each grid; industrial grade measurement receivers to provide RSSI data for a single or multiple sites; a computer with an internal clock that coordinates and records the grid location; and a roof mounted antenna. The grid pattern is overlaid onto street maps and a test route determined. The test route should pass through each grid at least once but not more than twice, as far as is practically possible.

Buildings are categorized as either non-critical or critical. These are characterized as either 12 dB or 24 dB buildings depending on if they are inside or outside the defined

urban 24 dB coverage area. The Contractor shall guarantee the coverage inside buildings within the Channel Performance Criterion [CPC] identified below.

Design Criteria

Service Area	The geographic boundaries of the State of Maryland, plus 3 miles, except for the Atlantic Ocean coast of the State where the requirement is 10 miles from the border. This geographic area includes all urban, suburban, rural, and open areas, including navigable waterways.
CPC	DAQ 3.4
CPC Area Reliability	95% [Contour reliability of 95%]
Building losses	24 dB within the specified urban area boundaries, and 12 dB outside this area
Two types of buildings:	Non-critical buildings, Critical buildings and Special Coverage Areas

This ATP is in conformance with the principles set forth in the Telecommunications Industry Association (TIA) Telecommunications Systems Bulletin TSB88-B, titled "Wireless Communications Systems - Performance in Noise and Interference-Limited Situations - Recommended Methods for Technology-Independent Modeling, Simulation, and Verification". TSB88-B has defined Channel Performance Criterion (CPC) as the specified minimum design performance level in a faded channel. TSB88-B also provides a set of Delivered Audio Quality (DAQ) CPCs that define subjective voice quality performance applicable to both analog voice and digital voice systems. These DAQ definitions are provided in Table 1.

Table 1. Delivered Audio Quality Scale Definitions

Delivered Audio Quality	Subjective Performance Description
DAQ 5.0	Speech easily understood.
DAQ 4.5	Speech easily understood. Infrequent Noise/Distortion.
DAQ 4.0	Speech easily understood. Occasional Noise/Distortion.
DAQ 3.4	Speech understandable with repetition only rarely required. Some Noise/Distortion.
DAQ 3.0	Speech understandable with slight effort. Occasional repetition required due to Noise/Distortion.
DAQ 2.0	Understandable with considerable effort. Frequent repetition due to Noise/Distortion.
DAQ 1.0	Unusable, speech present but unreadable.

TSB88-B defines a service area as a boundary of the geographic area of concern for a user, and states that validated service area reliability shall be determined by the percentage of test locations in the service area that meet or exceed the specified CPC. The

State proposes a Bounded Area coverage design for the State of Maryland as defined in TSB88-B wherein coverage predictions are made out to the boundary of the defined service area and coverage is verified throughout the service area out to the boundary edges. To accomplish coverage verification, the State's service area will be divided into multiple grid patterns to obtain a uniform distribution of grids throughout the jurisdictional service area, to provide a test confidence level of 99%. The grid pattern is to be overlaid onto maps provided by the Contractor.

RF coverage using this ATP is verified by evaluating the voice quality of digital test calls from a portable radio in randomly selected buildings throughout the State's defined jurisdictional boundary service area. Simulated in-building voice quality tests will be performed in any grid where there are no buildings to test. At each random building or simulated building or outdoor location, a test call is placed from the portable user to the dispatcher (an inbound call), as well as from the dispatcher to the portable user (an outbound call). The inbound and outbound test calls at each location are graded using the DAQ definitions in Table 1. Scores that equal or exceed the State's specified CPC of DAQ3.4 are considered acceptable (PASS), and those lower than DAQ3.4 are not acceptable (FAIL).

If a random building fails a voice quality test then additional tests may be made to determine if the loss characteristics of the failed test locations within the building exceed the State's specified 12 or 24 dB random building loss levels.

8.6. Test Equipment and Preparation

Portable radios from each manufacturer as proposed will be used for the voice quality test. The portable radio will be worn on the belt and equipped with a shoulder-mounted speaker/microphone (SM) without shoulder-mount antenna. The State will supply a vehicle for driving to the test locations and the Contractor will provide the vehicle location equipment and associated software.

The State representative will drive the State-supplied vehicle for the field team and the Contractor representative will assist with navigation to the test points. The test data will be recorded immediately after the grid test is completed and collected mutually at the end of each test day. In order to comfortably accommodate the field team and all required testing equipment, the State will provide full sized vehicles with sufficient leg-room in both the front passenger seat and rear passenger seats. At the beginning of each test day, the individual field teams will be assigned a block of grids to be tested for the day. Each test team will be expected to conduct coverage test for eight (8) hours a day for several weeks in each phase of testing excluding weekends, and holidays. It is anticipated that there will be a lunch break in addition to the eight (8) hours required per day.

A GPS receiver package will be utilized in the test team's transport vehicle, to assist the test team in determining that the building under test is within the proper grid. A laptop computer will be loaded with a geographical database that will display the State's test

grids with the service area. In conjunction with this GPS receiver, the laptop computer will track the transport vehicle's location on the map display. In this way, the test team will know which grid they are in, and can easily determine if the building they are preparing to test is in the proper grid.

Prior to performing the tests, each site that provides coverage to the test grid must be audited to verify that the radio system is operating properly. The audits will verify the antenna configuration, the power into the antenna, the antenna installation, and the frequency of the test transmitter. The Contractor shall provide all test equipment necessary to perform the site audits.

8.7. Test Planning

8.7.1. State Grid Size and Test Location

TSB88-B recommends that coverage verification be made at a statistically significant number of random test locations, uniformly distributed throughout the service area. To accomplish this, the service area is divided by a grid pattern as an aid to test planning.

The State recommends a 1-mile by 1-mile grid pattern to obtain an even or uniform distribution of test grids throughout the State's service area. The grid pattern is overlaid onto street maps and a building is randomly selected within each grid, and, to the extent possible, selected building locations in adjacent grids should not be clustered close to one another (e.g. minimum separation of 0.2 x 0.75-mile grid pattern definition). Simulated in-building voice quality tests will be performed in any grid where there are no buildings accessible to test.

A State test grid is defined as one having it's centerpoint in the State service area. Any grid that is along the border of the State of Maryland service area will be tested according to the following definitions:

1) If that grid is more than 75% water, then the grid will be tested as a simulated in-building grid.
2) If that grid is less than 75% water, then the portion of land which is inside State of Maryland service area will be tested using the building test.

Any grid that is inaccessible for testing will have coverage waived and will not be scored or counted statistically. If the field test team is denied access to test a randomly selected building within a grid, then other buildings will be randomly selected making every effort to locate an accessible building for testing. If the team is unable to test any buildings within a grid then a simulated building test shall be performed for that grid. The State may at its sole discretion decide not to test any random buildings within a grid or any simulated building grid. Any grid not tested at the State's discretion will have coverage scored as a PASS.

Along the border of the service area, any grid with more than 1/3 of its area within the service area will be tested. Such tests will be performed in the portion of the grid that is within the service area. The final selection of test grids will be mutually agreed to by State of Maryland and the Contractor prior to the coverage test. The Contractor will prepare the final grid file for the coverage acceptance test.

8.7.2. In-Building Grid Size and Test Location

A statistically significant number of random test locations uniformly distributed throughout each selected building will be tested. For each grid and at each agreed upon test location within a building, the portable user to dispatcher [inbound], and the dispatcher to portable user [outbound] test calls are performed using the metrics in Table 1. If the message is not understood on the first attempt, then the test point is marked as "FAIL". The audio quality test is then repeated for each manufacturer radio within the building as specified elsewhere.

8.7.3. Non-Critical Buildings

Non-critical buildings are all those buildings not identified as a "Critical Building" and within the service area. For the purposes of coverage testing, a building will be randomly selected by the State in each grid. Large buildings are defined as up to 24 dB signal penetration if inside the defined 24-dB urban area boundary, or up to 12 dB outside of this area. Each building to be tested will be as close as practical to the grid center within each grid, and to the extent possible, selected building locations in adjacent grids should not be clustered close to one another.

Test the ground floor - four corners and center. Results need to pass all five locations. Below grade, elevators, shielded rooms, etc., will not be tested.

If the building fails, it will be notated. There can only be 5% of building failures in the State [need to pass 95% of test grids of each building]. Therefore, an occasional fail is acceptable up to 5% of the overall in-building tests. For example, if there are 500 buildings tested, up to 25 buildings in the State can fail.

If the overall 95% in-building coverage commitment is not met, then the failed buildings may have to be measured for penetration losses, as outlined below.

If it is determined that more than 5% of the Regional service area has failed, then corrective action shall be taken by the Contractor. This action shall be at no cost to the State, either for the corrections or for re-tests to verify adequacy of the corrections. It shall be understood that a failed test point is a symptom of a weak coverage area. No correction will be acceptable that is designed to specifically correct only the failed test point; distributed antenna systems in a failed building are specifically prohibited as a method to correct this coverage deficiency. Allowed corrective actions include (but are

not limited to) reorienting antennas and adding new sites. The failed test grid and each grid bordering on the failed test grid shall be retested. If such modifications have potential to impact coverage elsewhere, then those areas shall also be included in the re-test. The State plans to be fair and reasonable as to what areas (if any) will be re-tested.

Unless otherwise specified, test grids will include stairwells but will exclude elevators, areas with metal or screened walls, floors and areas below grade level such as basements, parking garages, utility tunnels, and boiler rooms, and any other location in the building where radio coverage is not planned, or expected, or permitted. The Contractor and the State will mutually identify all areas of each random building that will be excluded from testing. Test grids that are within excluded areas of a building will not be tested and will not be counted in the reliability calculations.

8.7.4. Critical Buildings and Special Coverage Areas

As discussed, it is the intent of the State of Maryland to provide primary coverage inside critical buildings using the 700 MHz communications system infrastructure; in-building enhancements within critical buildings will be addressed by the State under separate contract.

The list of Critical Buildings can be found in Appendix 8, *Critical Facilities*. The list of Special Coverage Areas are defined in Appendix 9, *Special Coverage Locations*. All critical buildings and Special Coverage Areas will require testing to identify the level of coverage provided by the contractor's coverage design.

Large Critical Buildings: Critical buildings that exceed the maximum building loss (12 dB or 24 dB) for their grid is considered to be outside the wide-area 95% overall test. Such buildings are termed “Large Critical Buildings”. Large Critical Buildings will be tested in detail to provide the State with an understanding of the locations and extent of dead spots on each floor, both above and below grade. The Contractor shall provide a test report to the State for each such building that includes a floor plan depicting dead spots. This data will be used by the State to identify in-building signal enhancements. The State reserves the right to either award such interior enhancement to the Contractor, or to release a separate competitive procurement for such work.

The test plan is based on evaluating coverage at a minimum of 20 random locations inside each critical building with each test point no greater than 75-feet from the previous test point. Initial tests will be conducted on the first three [3] floors of the building, and continuing upward until three [3] consecutive floors pass. In addition to, or on each of the floors, testing will be performed in elevators, stairwells, and basements. Basement locations will include electrical, mechanical and boiler room locations.

Small Critical Buildings: Critical Buildings that are within the building loss (12 dB or 24 dB) for their grid are considered “Small Critical Buildings”. In such case, that building will be used to verify coverage in that grid. Unlike randomly selected buildings,

Small Critical Building tests will include a minimum of 20 random locations inside each critical building with each test point no greater than 75-feet from the previous test point.

The State of Maryland may, at its discretion, decide to test only a single location near the middle of each floor and forego testing all remaining planned test locations within a random building if it determines that the building is adequately covered. Likewise, the State may, at its discretion, decide to test only a subset of locations within a building and forego testing all remaining planned test locations within that random building if it determines that the building is adequately covered. The State also reserves the right to waive testing of any building in any grid that it likewise determines that coverage is adequate. Testing of any grids within a building or any random building waived by the State of Maryland will have coverage scored as a PASS.

8.8. Grading of Building Test Locations

The voice quality test requires two Contractor representatives and two State representatives. One Contractor and one State representative will be the Field team, will travel to the randomly selected building in each grid, walk to the agreed test grids in the building, perform the inbound calls, and grade the outbound calls. The second Contractor and State representatives will be the Base team, will remain at the dispatch location, grade the inbound calls, and perform the outbound calls.

To reduce the time required for the coverage test, more than one Field team may operate at a time, and a single Base team may support more than one Field team.

The voice test call at each location within a building consists of a short message representative of typical public safety call duration's and includes the identification of the building and location being tested. The suggested inbound test message is “TESTING BUILDING YYY, GRID NUMBER XXX,”. To ensure that the message is understood, the dispatcher then repeats the inbound test message. The dispatcher will then make a similar outbound test call. The suggested outbound test message is “CONFIRMING BUILDING YYY, GRID XXX”. The field team will then verify receipt of the dispatcher’s test message.

Each of the representatives grades each test call using the Table 1 DAQ definitions and records the test score for each test location. PASS or FAIL determination is made separately for the inbound and outbound calls at each location. For each call direction, a test location is deemed to PASS if it meets or exceeds the State’s requirement for DAQ 3.4 voice quality for each manufacturer’s subscriber radio from both graders. If both graders agree that the voice quality does not meet the defined DAQ 3.4 criteria, then that test location fails for the direction being graded. If a score differs between testers at a location that results in a failing score from only one tester, that location will need to be tested again to determine the cause of the discrepancy. If the discrepancy cannot be rectified, then that grid will be marked as “FAIL”.

8.9. Digital Voice Quality Analysis

An individual test grid location within a building is determined to PASS the digital voice quality test if both the inbound and outbound digital calls at that location have been scored as a PASS.

1) Any grids within the building waived testing by the State as previously discussed will be scored as a PASS.
2) A random building is deemed to meet the digital voice coverage requirement if the percentage of test grid locations that receive a PASS score equals or exceeds the State's specified 95% acceptance criteria.

If a random building does not meet either the digital voice quality coverage acceptance requirements, then additional tests may be made, at no cost to the State, to determine if the loss characteristics of the failed test grid locations within the building exceed the 12 or 24 dB building loss category specified by the State.

1) If the measured building loss at a failed test grid is less than or equal to the State's specified building loss category, then the test grid will remain recorded as a FAIL.
2) If the measured building loss for the failed test grid is greater than the State's specified building loss category, then that test will be discarded and another building will be tested in the affected grid.
3) The PASS/FAIL determination for the building is then recomputed discarding all test results that have a measured building loss greater than the specified building loss.
4) In order to expedite the process, the State's will defer building loss measurements of failed test grids/buildings until all randomly selected buildings have been tested.

8.10. Building Loss Measurement Procedure

If a building fails the voice quality test, the Contractor may elect to measure and compare the signal strength inside the building to an on-street signal strength measurement. Measurements will be taken both immediately around the building as well as inside the building in a small area centered on the face and corner of each side of the building (i.e., the A face, the AB corner, the D face, etc.). The building loss will be defined as the difference between the mean of the outside measurements and the mean of the inside measurements. There are several possible outcomes based upon the results of this measurement.

1) If the building loss is less than the maximum limit for that location (either 12 dB or 24 dB), then the grid is marked as "FAIL".
2) If the building loss exceeds the maximum limit for that location (either 12 dB or 24 dB), then a different building within that grid will be tested.

8.11. Simulated Building Test Grid Testing and Analysis

Simulated in-building voice quality tests will be performed in those grids where there are no buildings accessible for test. Portable in-vehicle test calls will be performed at a selected test location near the center of each such grid, to the extent possible, with the portable radio user inside the test vehicle. Portable radios worn on the left hip with a D-clip attachment will be used to simulate in-building operations. The portable radio user will not remove the radio from the belt loop or raise it above seat level. The portable radio user will conduct the simulated in-building test only speaking into the speaker microphone clipped to the user's shoulder boards or collar.

At each test location the portable user to dispatcher (inbound) and the dispatcher to portable user (outbound) test calls are performed. If the message is not understood on the first attempt, the location is marked as a "FAIL". Message content will be similar to that used for the random building tests.

Each of the test team representatives grades each test call using the Table 1 DAQ definitions and records the test score for each test location. PASS or FAIL determination is made separately for the inbound and outbound calls at each location. For each call direction, a test location is deemed to PASS if it meets or exceeds the State's requirement for DAQ 3.4 voice quality from both graders.

Separate digital voice tests are required for each manufacturer's device at each simulated building grid.

A simulated building test grid is determined to PASS the voice quality test if both the inbound and outbound digital calls at that location have been scored as a PASS.

8.12. Test Acceptance

The PASS/FAIL scoring for each random building, mandatory building, and simulated building tested in the State of Maryland is then summed. Included will be any grids and buildings where the State waived testing and that were scored as PASS as discussed earlier.

The portable in-building digital voice quality test is deemed to meet the coverage requirements if the percentage of all test grids that receive a PASS score equals or exceeds the State's minimum 95% acceptance criteria.

The installed radio system in the State of Maryland is deemed to meet the portable in-building voice quality coverage requirement if the digital voice quality tests meet the 95% acceptance criteria.

8.13. Results Presentation

A test report is provided by the Contractor that includes:

1) The total number of test grids in the tested Region in the State of Maryland, the number of random building grids, the number of simulated building grids, and the number of Water grids;
2) The name/address and GPS coordinates of the random building tested within each grid;
3) The number and location of individual test locations within each building;
4) A copy of the inbound or outbound grading templates used by each grader for each building, including locations that had testing waived;
5) A copy of the inbound or outbound grading templates used by each grader for each simulated building and mandatory building;
6) The PASS/FAIL score for each random building, simulated building, and mandatory buildings;
7) Building loss measurement data if required for a building;
8) The overall percentage PASS calculation for the voice quality tests; and
9) A statement of overall coverage test acceptance or failure for the State of Maryland.

8.14. Data Application Testing

This Acceptance Test Procedure (ATP) is used for wireless data RF coverage and functionality based on automated data collection and verification. This procedure provides an accurate, statistically valid, repeatable, objective, and cost-effective method to verify wireless data coverage and functionality requirements are met.

The coverage design will be evaluated on the success in providing the required coverage throughout the State's service area. The basic network coverage design shall be applicable to vehicles, aircraft, railroad trains, and water vessels traveling at speeds up to 150 mph. It is the desire of the State of Maryland to have coverage provided from the 700 MHz infrastructure, with limited in-building enhancements for certain critical buildings.

Realizing there are physical barriers which may produce "dead spots", the system shall provide portable coverage 95% of the time while being operated on the hip, inside of a structure, providing a net error free data throughput of 7.2 kbps minimum per 6.25 kHz channel bandwidth. Coverage measured by using a mobile antenna, of unity gain, at a height of 1 meter above ground level — roughly equivalent to a passenger-car fender or trunk lid.

8.14.1. Supported Data Types

Supported applications that transmit and receive various forms of data content, including but not limited to:

1) Short Messaging (e.g. up to 254 bytes),
2) Text and American Standard Code for Information Interchange (ASCII) data,
3) Image and Graphics (e.g. JPEG files),
4) Binary files (e.g. MP-3 files), and
5) Video (e.g. from streaming to full motion).

All above data message shall automated via continuous looping for the vehicles traversing the drive route.

The State requires GPS based automated units to collect RF signal performance parameters throughout the service area. Parameters will include RSSI bit/block error rate.

8.14.2. Data Transfer

The data types listed in subsection 8.14.1 shall be supported for the following transfer modes in both conventional and trunked operation:

1) Radio-to-radio
   i. Radio-to-many-radios
   ii. Radio-to-dispatcher
   iii. Dispatcher-to-radio
   iv. Dispatcher-to-many-radios.

2) Data Spectral Efficiency
   i. Net data-throughput efficiency shall be defined as the actual number of bits per second per Hertz of channel width transferred, excluding overhead/control, forward error correction, and retransmission.
   ii. Net data throughput efficiency shall be at least 0.576 bits per second per Hertz of channel width.

8.14.3. Setup

The Contractor provides all mobile test equipment for the signal strength measurements. The test equipment consists of four modular units: a GPS receiver to provide accurate position information for each measured data point; industrial grade measurement receivers to provide RSSI data for a single or multiple sites; a computer with an internal clock that coordinates and records the test data; and a roof mounted antenna. The test equipment may contain multiple receivers to facilitate gathering data simultaneously from several multi-site or simulcast sites at common measurement locations.

8.14.4. Drive Route Planning

Section 7 of TSB88-B recommends that measurements be made at a statistically significant number of random test locations, uniformly distributed throughout the service area. The service area is divided by a grid pattern as an aid to the development of a drive test route with an approximately equal distance traveled in each grid. Thus, a large

number of test samples is collected and evenly distributed throughout the defined service area.

The State recommends a 1-mile by 1-mile grid pattern to obtain an even or uniform distribution of grids throughout the State of Maryland jurisdictional boundary service area. The grid pattern is overlaid onto street maps and a drive test route determined. The drive route should pass through each grid at least once but not more than twice, as far as is practically possible.

Signal strength, bit or block error rate and other measurements and two-way messaging functionality will be made in all accessible grids within the State's defined service area boundary. Test measurements along the drive route that are outside of the defined service area boundary will not be counted. Any accessible grids within the service area boundary that the State decides not to test will have coverage scored as a PASS in the reliability calculations.

8.14.5. Data Measurements

All data is collected with the AMT equipment mounted inside the test vehicle (standard passenger vehicle) with an external antenna mounted on the outside and centrally located on the vehicle's roof, with no other equipment installed on the roof.

Each radio system base station site transmits an unmodulated carrier on one selected channel, and measurements of this signal are made at equal distance intervals throughout the entire drive route. With the test vehicle in motion along the drive route, a local mean signal measurement is made every .1 mile (typically) by averaging a minimum of 200 data points within a 20 wavelength measurement window. By sampling the radio environment in this way, the estimated mean value is within ±1 dB of the actual value with 95% confidence. Vehicle velocity must not exceed 150 miles per hour to ensure adequate number of points over the measurement window.

8.14.6. Drive Test Data Analysis

The data records collected from the drive test are post-processed using all mean measurements within the State of Maryland jurisdictional boundary service area.

Post processing will compare to Vendor RF predictions and develop baseline measurements for system performance monitoring (Section 8.3).

The minimum acceptable signal level at a data terminal is adjusted to the mobile measurement reference point using defined loss factors (e.g. excess signal required to penetrate each random building category, body loss, etc.). 95% of service area must provide bit error rate less than or equal the deign requirements including adjustments for building and body loss factors. A comparison is made between the mean measurement

points in the service area and this adjusted minimum level, denoted the adjusted signal threshold.

Points that equal or exceed the adjusted signal threshold value are recorded as PASS and those below are recorded as FAIL.

The installed radio system coverage is deemed to meet the coverage requirements if the ratio of the number of PASS points to the total number of points in the service area equals or exceeds the validated service area reliability percentage acceptance criteria that is shown.

8.14.7. Results Presentation

The data records are plotted on a map showing the test grids, the areas tested and the test results. Different pen colors are used to show ranges of measured mean signal levels. A test report is also provided that summarizes the test results.

8.14.8. Offeror Requirements

Offeror shall describe two-way Bit/Block error rate and Received Signal Strength testing.

The Offeror shall define handoff threshold parameters and settings for subscriber units to automatically evaluate, select and become active as it travels between radio sites.

The Offeror shall define any and all infrastructure (base station, site or regional Master site) and radio subscriber device parameters that are modifiable to change the radio subscriber site-to-site roaming and handoff behavior. For parameters modified on infrastructure equipment, the Offeror shall define how the radio subscriber is updated, and how the radio subscriber maintains the update for the particular site.

The Offeror shall define how one site can be independently modified in roaming/hand-off threshold parameters compared to other sites and how that configuration is maintained for the infrastructure and subscriber radio units.

Offeror shall define the ability to have the roaming and handoff parameters adjusted for the outbound link (base to subscriber) and the inbound link (subscriber to base) and the ability to measure and set these parameters independently.

Offeror shall affirm that the RF link budget and all roaming/hand off threshold parameters are accounted in the RF prediction maps and calculations to meet the stated coverage requirements.

8.15. Completion of RF Coverage Testing

RF Coverage Acceptance requires the following:

1) Successful completion of all RF Coverage testing requirements,
2) Resolution of all RF Coverage Testing punch list items, and
3) Delivery of all RF Coverage Testing, AMT and AAQ procedures and test results documentation.

Once RF Coverage Testing and documentation are successfully completed, then all equipment, site, and subsystems of the Region can transition to the 30-day Operation Test.

9.0 Thirty-day Operation Test

9.1. Thirty-day Operation Test Overview

Once State-wide coverage testing has been successfully completed, all regional equipment configurations and RF sites shall undergo a 30-day Operation Test. The test requires a contiguous 30-day period where there are no failures or performance degradation affecting 5% of the capacity or capability of a radio site, a Master Site and switching equipment, a Region or the State.

9.2. Thirty-day Operation Test

State-wide and all Regional configuration and 3rd party equipment: The State requires all Regions to be deployed and configured including 3rd party manufactured equipment. The Thirty-day Operation test must demonstrate all features and functions of State-wide system and have no failures as defined in the Thirty-day Operation Test requirements in this section.

RF Channels (base stations and capacity) – A failure of 5%, or greater, of the RF base stations deployed at a radio site, or 5% of the radio site's talkgroup capacity will constitute a radio site failure.

Radio sites –Failure of 5% of the radio sites within any one Region will not be accepted. Failure of 5% of the radio sites within one Region will constitute a Region failure. Failure of 5% of radio sites within more than one Region will not be accepted. Failure of 5% of the radio sites between two or more regions constitutes one or more Region failures. Failure of 15% of radio sites across the State will not be accepted. Failure of 15% of the radios sites when distributed between Regions, multiple Regions and Statewide configurations constitutes either a Multi-region or a State-wide failure.

Master Site and Region Switch – any failure of any Master site or any regional switching equipment will not be accepted regardless of the number of Regions comprising the State-wide design and regardless of any capacity, performance and functionality retained during the failure for a radio site, a Region, Multi-Regions and State. Any Master site and regional switch located at the Field Staging Facility must also pass the Thirty day operational test and is not considered part of the capacity of any Region, Multi-Region or State configuration.

Operational Performance Testing –

1. Demonstrate and verify that the system is capable of, but not limited to, supporting at least 100,000 unique addresses, 5,000 talk groups, OTAP, OTAR,

voice data contention and the grade of service at the system upper operational boundaries.

2. Demonstrate and verify total access delay time plus latency time between two subscriber radios in any two or more cells of the system is less than 700 milliseconds from push to talk (PTT) to reception and passage of voice information.

3. Demonstrate that all equipment performs as specified through a 30-day, minimum, field test of all system functions and features by field operators and dispatchers and by repeating of specific tests as deemed appropriate.

9.3. Completion of 30-day Testing

Thirty-day Acceptance requires the successful completion of the Thirty-day acceptance testing requirements, results, and documentation.

Once all Thirty-day Operation Tests and documentation are successfully completed, then all equipment, site, and subsystems of the Region can transition to Level 6 Multi-Region Testing.

10.0 Level 6: Multi-Regional Testing

10.1. Level 6 Overview

Once two Regions have passed Level 5 Region Testing, then Multi-region testing can commence. The State requires that equipment, sites and subsystems associated to any Region will have passed all previous Acceptance Test levels and regression testing. Level 6 will be the formal validation and acceptance of inter-Regional features functionality and performance for deployed Regional Master Sites, subsystems, radios sites and all equipment.

Once the first two regions are deployed and pass Level 6 Multi-region testing, subsequent regions will be tested for their formal Level-6 Multi-Regional acceptance.

10.2. Regression and Validation Tests

Level 6 Multi-Region Testing must be capable of demonstrating, validating and regression testing of all measurements, features, functions and performance of:

1) Level 1 Equipment and Sub-system Assemblies defined in Section 1,
2) Level 2 Factory Staging and Acceptance Tests defined in Section 2,
3) Level 3 Field Staging Facility Testing defined in Section 3,
4) Level 4 Site Installation and Pre-commissioning defined in Section 6, and
5) Level 5 Regional Testing defined in Section 7.

10.3. Level 6 Multi-Region Testing

The State requires complete site and subsystem, Regional and Multi-Regional testing to be performed for all sites and equipment associated to each region. All sites, subsystems and regional configuration must include all proposed equipment including 3rd party manufactured equipment. Testing shall provide validation of configuration, measurements and operation for deployed sites including:

1) Configuration management,
2) Staging facility Capacity is not applicable to this Level,
3) Complete Sites, subsystem configuration,
4) Master Site Fail-over,
5) Master and Radio Site failures,
6) Master and Radio Site Loading,
7) Radio Site Busy Queue Processing,
8) Combined Master site loading and Radio site Busy Queue,
9) Radio Site failures,

10) Radio site equipment failures,
11) Radio and Site Registration,
12) Call Types,
13) Roaming and Hand-off,
14) Multi-Region Roaming and Hand-off, and
15) Late Call Entry.

Field Deployment capacity and configuration: Radio sites will be deployed and tested to their respective deployed Master Site. The Multi-region test must demonstrate fail-over of the Master site to any alternate Master site with all radio sites of any Master sites operating on the functioning Master Site and without loss of any radio sites originally connected to the failed Master site.. The State understands the status of the Deployed Master site may require provisional configuration or routing to accommodate deployed radio site testing. A deployed Region or Master Site, or the Master Site located at the field staging facility can be used to accommodate Level 5 testing.

Offeror Requirements

The Offeror shall describe all multi-region features and functions.

The Offeror shall clearly identify any and all features, functions or performance capability that has not yet been performed in previous Levels.

Contractor Responsibilities

The Contractor shall confirm all multi-region features and functions to be tested.

The Contractor shall confirm any and all features, functions or performance capability that has not yet been performed in previous Levels.

10.4. Completion of Level 6 Testing

Multi-region Acceptance requires the successful completion of the Multi-region testing requirements and delivery of all equipment, subsystem and system testing procedures, testing results, Configuration, As-built, Operations and Maintenance documentation.

Once all Level 6 Multi-Region Tests and documentation are successfully completed, including Site Development Testing, Backhaul Network Testing, RF Coverage Testing, and 30-day Operation Test then all equipment, site, and subsystems of the Region can transition to Level 7 State-wide Acceptance Test.

11.0 Level 7: Statewide Acceptance Test

11.1. Level 7 Overview

Once all Regions have passed Level 6 Multi-Region tests, then statewide testing is performed. The State requires that equipment, sites and subsystems associated to all Regions will have passed all previous Acceptance Test levels and regression testing.

Level 7 will be the formal validation and acceptance of State-wide features and functionality and performance for all Regional Master Sites, subsystems, radios sites and all equipment.

11.2. Regression and Validation Tests

Level 7 Statewide Acceptance Testing must be capable of demonstrating, validating and regression testing of all measurements, features, functions and performance of:

1) Level 1 Equipment and Sub-system Assemblies defined in Section 1,
2) Level 2 Factory Staging and Acceptance Tests defined in Section 2,
3) Level 3 Field Staging Facility Testing defined in Section 3,
4) Level 4 Site Installation and Pre-commissioning defined in Section 6,
5) Level 5 Regional Testing defined in Section 7, and
6) Level 6 Multi-Region Acceptance Tests as defined in Section 10.

11.3. Level 7 Statewide Testing

The State requires complete site and subsystem, Regional and Multi-Regional testing to be performed for all sites and equipment associated to each region. All sites, subsystems and regional configuration must include all proposed equipment including 3rd party manufactured equipment. Testing shall provide validation of configuration, measurements and operation for deployed sites including:

1) Configuration management,
2) Staging facility Capacity is not applicable to this Level,
3) Complete Sites, subsystem configuration,
4) Master Site Fail-over,
5) Master and Radio Site failures,
6) Master and Radio Site Loading,
7) Radio Site Busy Queue Processing,
8) Combined Master site loading and Radio site Busy Queue,
9) Radio Site failures,
10) Radio site equipment failures,

11) Radio and Site Registration,
12) Call Types,
13) Roaming and Hand-off,
14) Multi-Region Roaming and Hand-off, and
15) Late Call Entry.

Field Deployment capacity and configuration: Radio sites will be deployed and tested to their respective deployed Master Site. The Statewide test must demonstrate all features and functions of the final deployed Region subsystems of Master sites, backhaul and interconnect, radio sites and equipment.

Offeror Requirements

The Offeror shall describe all statewide features and functions.

The Offeror shall clearly identify any and all features, functions and performance capability that have not yet been performed in previous Levels.

Contractor Responsibilities

The Contractor shall confirm all state-wide features and functions to be tested.

The Contractor shall confirm any and all features, functions or performance capability that has not yet been performed in previous Levels.

11.4. Completion of Level 7 Testing

State-wide Acceptance requires the successful completion of the State-wide Acceptance Testing requirements and delivery of all equipment, subsystem and system testing procedures, testing results, Configuration, As-built, Operations, Maintenance and Training documentation.

Once all Level 7 State-wide Tests and documentation are successfully completed, then all equipment, site, and subsystems of all Regions can transition to Final Acceptance.

12.0 Region System Acceptance

Region System Acceptance occurs when all equipment, assemblies, sub-systems, sites and regional equipment configurations have passed all Acceptance Test Program Levels defined (Level 1 Equipment though Level 5 Regional), including Site Development, Backhaul Network, and RF Coverage Testing, and contractor has delivered in final form all test documentation, results, and all as-built drawings and all as-configured documentation.

12.1. Completion of Region Acceptance

Region System Acceptance requires successful completion of the System Acceptance Test Program requirements (Levels 1 through 5) and delivery of all testing procedures, testing results, and all final Radio System Design, Configuration, As-built, Operations, Maintenance and Training documentation.

Region System Acceptance requires successful completion of all Site Development testing procedures, testing results and delivery of all final Site Development Design, Configuration, As-built, Operation, Maintenance and Training documentation.

Region System Acceptance requires successful completion of all Backhaul Network testing procedures, testing results and delivery of all final Network Design, Configuration, As-built, Operation, Maintenance and Training documentation.

Region System Acceptance requires successful completion of all RF Coverage testing procedures and testing results documentation.

Region Acceptance requires successful completion of all 30-day tests.

Region System Acceptance will not be achievable without successful completion of:

12.1.1. Level 1 through Level 5

The successful completion of all Level 1 through Level 5 System Acceptance Test Program requirements and the delivery of all final Level 1 through Level 5 testing procedures, testing results, and all Radio System Design, Configuration, As-built, Operation, Maintenance and Training documentation.

12.1.2. Site Development

The successful completion of all Site Development Acceptance Test Program requirements and delivery of all final Site Development testing procedures, testing

results, and all Site Development Design, Configuration, As-built, Operation, Maintenance and Training documentation.

12.1.3. Backhaul Network

The successful completion of all Backhaul Network Acceptance Test Program requirements and delivery of all final Backhaul Network testing procedures, testing results, and all Backhaul Network Design, Configuration, As-built, Operation, Maintenance and Training documentation.

12.1.4. RF Coverage

The successful completion of all RF Coverage Acceptance Test Program requirements, and the delivery of all RF Coverage testing procedures and results documentation.

12.1.5. 30-day Test

The successful completion of all 30-day Acceptance Tests.

13.0 Final System Acceptance

Final System Acceptance occurs when all equipment, assemblies, sub-systems, sites and regional equipment configurations have passed all Acceptance Test Program Levels defined (Level 1 Equipment though Level 7 Statewide) , including Site Development, Backhaul Network, RF Coverage and 30-day Operation Testing, and contractor has delivered in final form all test documentation, results, and all as-built drawings and all as-configured documentation.

13.1. Completion of Final Acceptance

Final System Acceptance requires successful completion of the System Acceptance Test Program requirements (Levels 1 through 7) and delivery of all testing procedures, testing results, and all final Radio System Design, Configuration, As-built, Operations, Maintenance and Training documentation.

Final System Acceptance requires successful completion of all Site Development testing procedures, testing results and delivery of all final Site Development Design, Configuration, As-built, Operation, Maintenance and Training documentation.

Final System Acceptance requires successful completion of all Backhaul Network testing procedures, testing results and delivery of all final Network Design, Configuration, As-built, Operation, Maintenance and Training documentation.

Final System Acceptance requires successful completion of all RF Coverage testing procedures and testing results documentation.

Final Acceptance requires successful completion of all 30-day tests.

Final System Acceptance will not be achievable without successful completion of:

13.1.1. Level 1 through Level 7

The successful completion of all Level 1 through Level 7 System Acceptance Test Program requirements and the delivery of all final Level 1 through Level 7 testing procedures, testing results, and all Radio System Design, Configuration, As-built, Operation, Maintenance and Training documentation.

13.1.2. Site Development

The successful completion of all Site Development Acceptance Test Program requirements and delivery of all final Site Development testing procedures, testing results, and all Site Development Design, Configuration, As-built, Operation, Maintenance and Training documentation.

13.1.3. Backhaul Network

The successful completion of all Backhaul Network Acceptance Test Program requirements and delivery of all final Backhaul Network testing procedures, testing results, and all Backhaul Network Design, Configuration, As-built, Operation, Maintenance and Training documentation.

13.1.4. RF Coverage

The successful completion of all RF Coverage Acceptance Test Program requirements, and the delivery of all RF Coverage testing procedures and results documentation.

13.1.5. 30-day Test

The successful completion of all 30-day Acceptance Tests.