



# Verizon's Commitment to Public Safety Broadband

**Bob DeRosa, Verizon Wireless, Public Safety Manager**



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## Serving those who serve



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# Network Enhancements 4G LTE – 5G



Verizon  
Private  
Core



Preemption



Mobile  
Broadband  
Priority



Wireless  
priority  
service



LTE deployable  
network



Mission-critical push-  
to-talk  
(PTT) features



Applications/5G  
Responder Lab



Situational awareness



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# VZW PTT+ / Public Safety Radio Interoperability

## Challenges

- Interoperable communications between agencies
- Private radio infrastructure expensive to scale (expand)
- Controlling who has communication access during an event

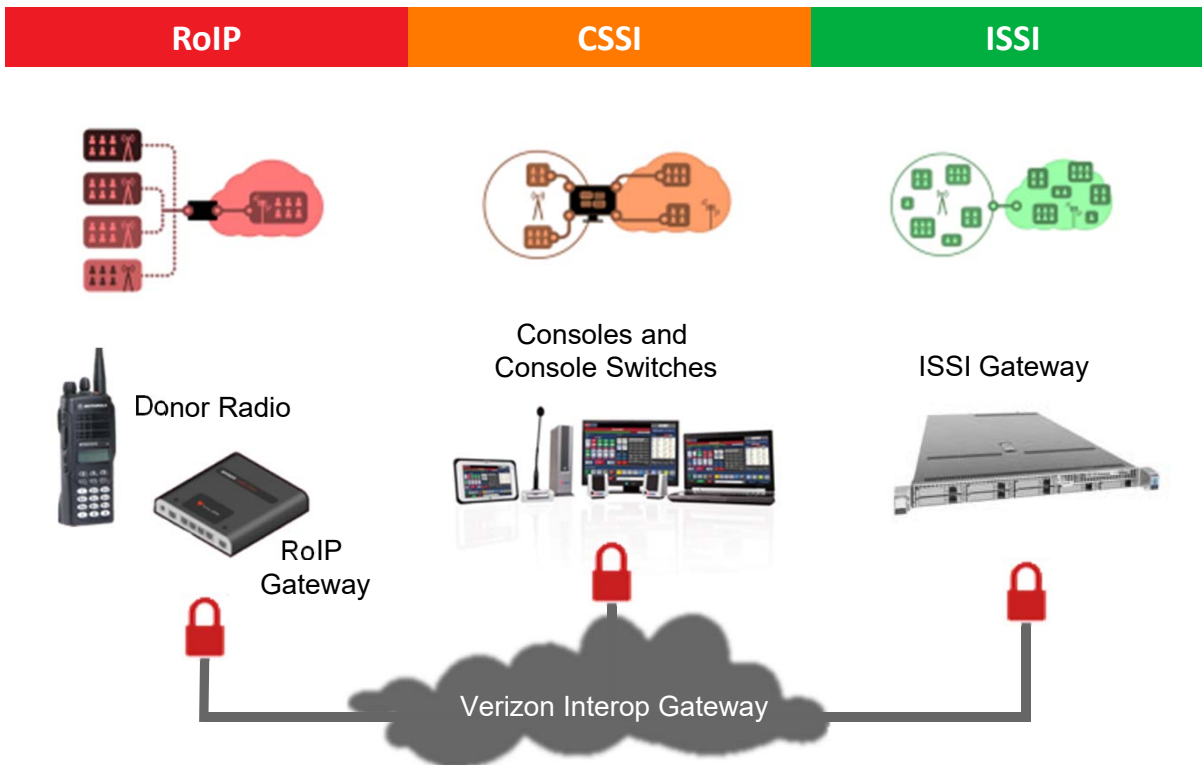
## Benefits

- Extended range of LMR communication
- Cost savings compared with private radio devices and network upgrades
- Enhanced features of LTE devices enable text, email and picture sharing compared with private radio devices
- Optional LMR Client, which provides a streamlined interface that simplifies the user experience to one screen



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## Three ways to interop LMR with PTT+



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# Channel Alignment

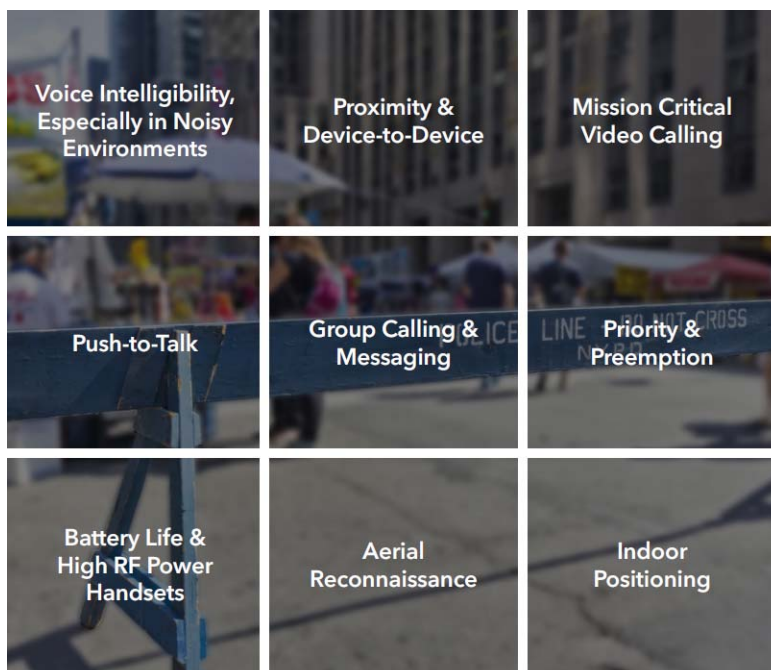
## Arvada Talkgroups ▶

DEC	HEX	Mode	Alpha Tag	Description	Tag
38090	94ca	DE	Arvada PD AC	Police All Call	Law Talk
38048	94a0	DE	Arvada PD 1	Police Dispatch	Law Dispatch
38049	94a1	DE	Arvada Rcrds	Police Records	Law Tac
38050	94a2	DE	Arvada PD 1	Police PD 1	Law Tac
38051	94a3	DE	Arvada PD 2	Police PD 2	Law Talk
38052	94a4	DE	Arvada PD 3	Police PD 3	Law Tac
38053	94a5	DE	Arvada PD 3	Police Car to Car	Law Tac
38055	94a7	DE	Arvada PD 4	Police Tac 1	Law Tac
38057	94a9	DE	Arvada PD 5	Police Tac 2	Law Tac
38060	94ac	DE	Arvada PD SE	Police Special Events	Law Talk
38056	94a8	DE	Arv PD Trng	Arvada PD Training	Law Tac
38054	94a6	D	Arvada ACO	Animal Control	Law Talk
38150	9506	T	Arvada FD 1	Fire Dispatch	Fire Dispatch
38151	9507	T	Arvada FD 2	Fire Automated Dispatch	Fire Dispatch
38152	9508	D	Arvada FD 3	Fire Tac 3	Fire-Tac
38153	9509	D	Arvada FD 4	Fire Tac 4	Fire-Tac
38154	950a	D	Arvada FD 5	Fire Tac 5	Fire-Tac
38160	9510	D	Arvada FD T1	Fire Training 1	Fire-Talk
38161	9511	D	Arvada FD T2	Fire Training 2	Fire-Talk
38162	9512	D	Arvada FD T3	Fire Training 3	Fire-Talk
38163	9513	D	Arvada FD T4	Fire Training 4	Fire-Talk
38164	9514	D	Arvada FD T5	Fire Training 5	Fire-Talk
38202	953a	T	Aravada Strs	Street Maintenance	Public Works
38000	9470	T	ArvadaRadio1	Radio Maintenance 1	Public Works
38001	9471	T	ArvadaRadio2	Radio Maintenance 2	Public Works
38002	9472	T	ArvadaRadio3	Radio Maintenance 3	Public Works



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# LMR/PTT+ Today / MC PTT Coming Soon



## Voice Intelligibility

Voice intelligibility is paramount in emergency response. Like consumer-grade smartphones, critical communication devices must be able to deliver clear audio (i.e., high audio Mean Opinion Score, or MOS). However, some will also require noise cancellation and other techniques to ensure intelligibility in loud or windy environments and while the user is wearing facial protection or other special gear.

## Proximity & Device-to-Device Communication

Proximity Services (ProSe) and Device-to-Device (D2D) operations allow devices to discover each other, to communicate directly, and to form meshes. These capabilities allow for communication without any base station or network for unserved areas or where networks have been disrupted.

## Mission Critical Video Calling

Video calling allows two-way real-time person-to-person calling while 3GPP's R14 Mission Critical Video (MCVideo) over LTE also provides for multi-party calls.

## Push-to-Talk

Push-to-Talk (PTT) is the "walkie-talkie" calling model between two or more parties where one speaker at a time has the ability to transmit voice. MC-PTT brings this "floor control" model of arbitration to LTE (as in, you have the floor, go ahead and speak).

## Group Calling & Messaging

Group calling and messaging features provide one-to-many, many-to-many and dispatcher modes allowing communications among various personnel, teams, patrol or departments.

## Prioritization & Preemption

Prioritization of first responder traffic, and the corresponding preemption of other traffic, are a cornerstone of LTE's ability to provide the robustness and reliability required for mission critical communications. In crowded networks, consumers can be dropped while first responders are recognized and given the highest priority access to resources at the RF layer, eNodeB, and core network.



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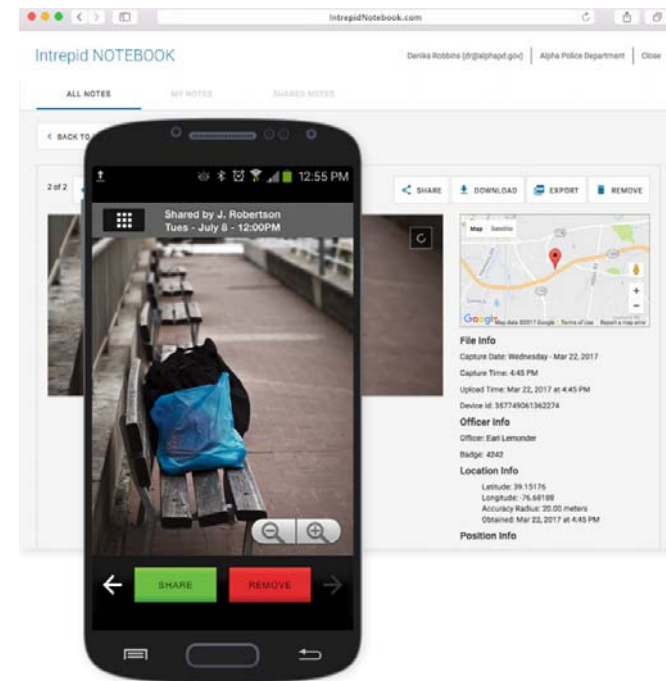
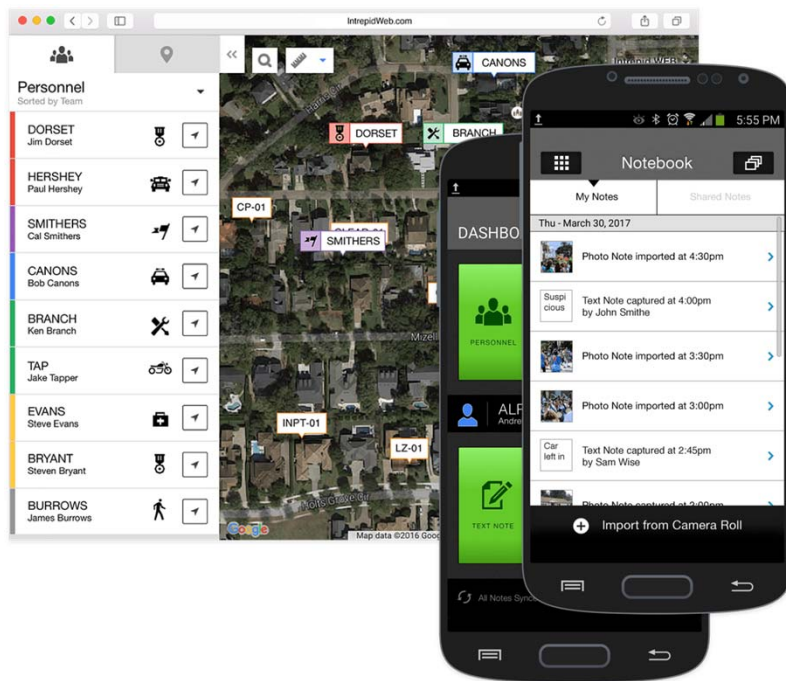
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## Mobile Command Centers



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# Intrepid Networks – Situational Awareness



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## Bounce Imaging – 360° Tactical Surveillance



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# We run to a crisis, not away.

We've earned the trust of our public safety partners by providing mission-critical responses to help agencies deliver when it matters most.

**98%**

During Hurricane Harvey, 98 percent of our network remained operational.<sup>1</sup>

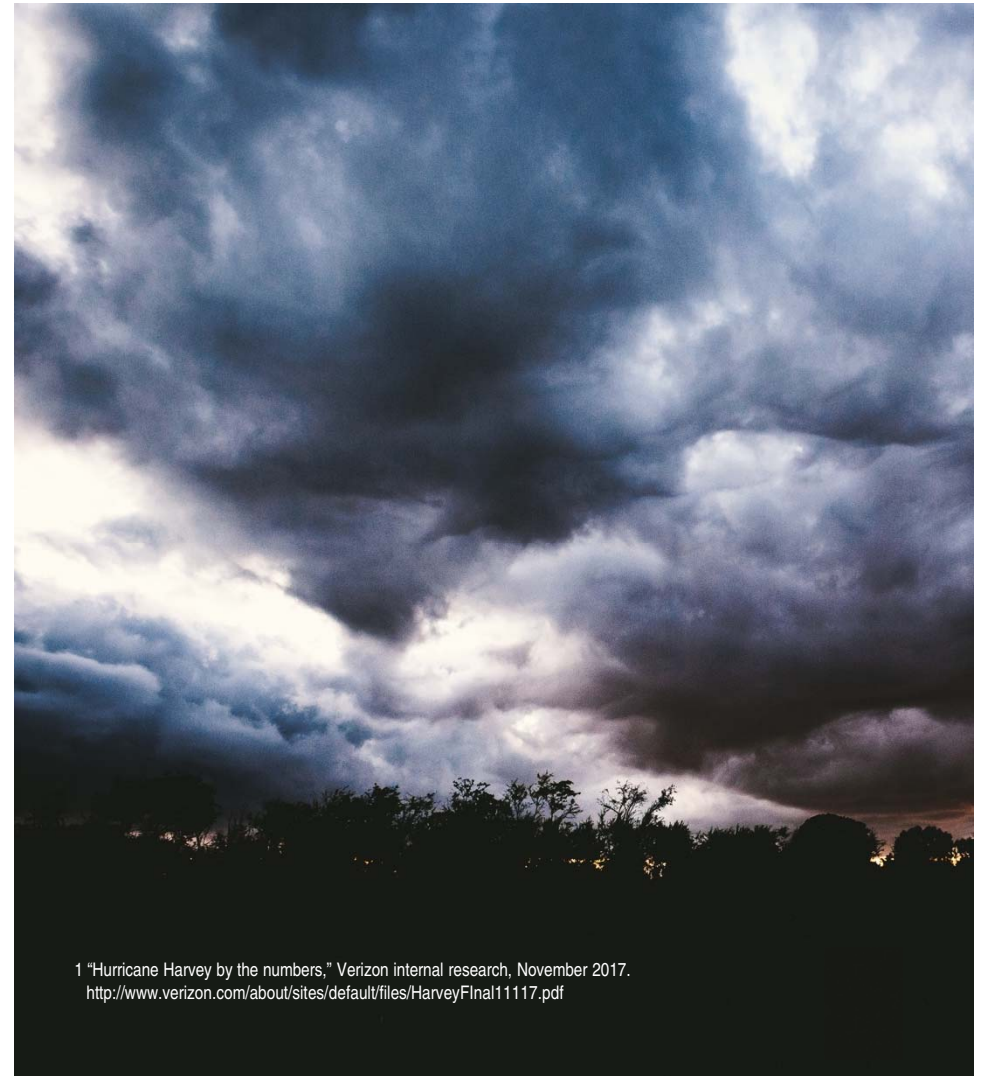
**97%**

During Hurricane Florence, 97 percent of our network remained operational at our lowest service level. Restored to 99% within 48 hours.

<https://www.verizon.com/about/news/hurricane-florence-network-updates>

Verizon is a true partner. We can help you maintain and restore vital services and protect lives with our proven platforms, solutions and connectivity.

**verizon**✓



1 "Hurricane Harvey by the numbers," Verizon internal research, November 2017.  
<http://www.verizon.com/about/sites/default/files/HarveyFinal11117.pdf>

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## Verizon's Crisis Management Structure

### 23 Crisis Management Teams (CMTs)

- Led by Senior Management - cross functional command and control
- Local Response by Local Teams - teams support each other
- Emergency Operations Center (EOC) - locations and resources
- **Annual team exercises to enhance response capabilities**
- Conduit for Customer needs during an emergency
- "Battle Tested"





# Operation Convergent Response 2019

**Join us at Operation  
Convergent Response  
#OCR2019**

November 19 – 21, 2019  
Guardian Centers, Perry, GA

[Learn more](#)



## Scenarios

### Wildfire

Experience the challenges faced by responders in the aftermath of a wildfire and the modern technologies to address them.

### Cyberattack on Critical Infrastructure

Flooding, health risks and other environmental concerns impact a community devastated by cyber-attacks on critical utility infrastructures.

### Tunnel Emergency

Examine the key challenges responders encounter in tight, isolated situations and watch cutting edge tech drive better outcomes in a subterranean environment.

### Complex Terror Attack

Experience the fallout of a multi-layered terrorist attack and solutions to defend the response mission.

### Airport in Crisis

Explore how emerging technologies help solve complex problems such as airspace incursions, perimeter breaches, pandemic outbreaks and other common situations to major transportation hubs.



## What to Expect

- Realistic crisis scenarios, enabling you to be immersed in live-action exercises demonstrating how innovative technology is key to a Ready, Respond, Recover, Rebuild™ crisis management strategy
- Experiential activities, giving you hands-on access to technology and tactical drills
- Solutions showcase
- OCR Talks™, including keynotes, educational classes, tech talks, and more



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# What is the Verizon Crisis Response Team?



- **24/7/365 team of Verizon employees**
- **National structure facilitated by calling one number for assistance**
- Live support line contact 800-981-9558
- **Immediate field response based on request**
  - Equipment Requests – Phones/Data Devices
  - Additional Network Coverage – mobile deployables
- **Response based upon geography**

# Network Deployed Equipment

- Cell on Wheels (COW)
- Cell on Light Truck (COLT)
- Repeater on a Trailer (RAT)
- Solar Powered Repeater on a Trailer (SPOT)
- Mobile Connectivity Trailer (MCT)



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# Network Power Strategy

- Generator on a Trailer
- Tested Regularly
- Maintained Throughout Deployment



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# Tornados & Flooding

**With customers nationwide, Verizon is aware of and responds to national disasters to support our communities**



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# Fire & Earthquake

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# 5G, Priority/Preemption and Interoperability

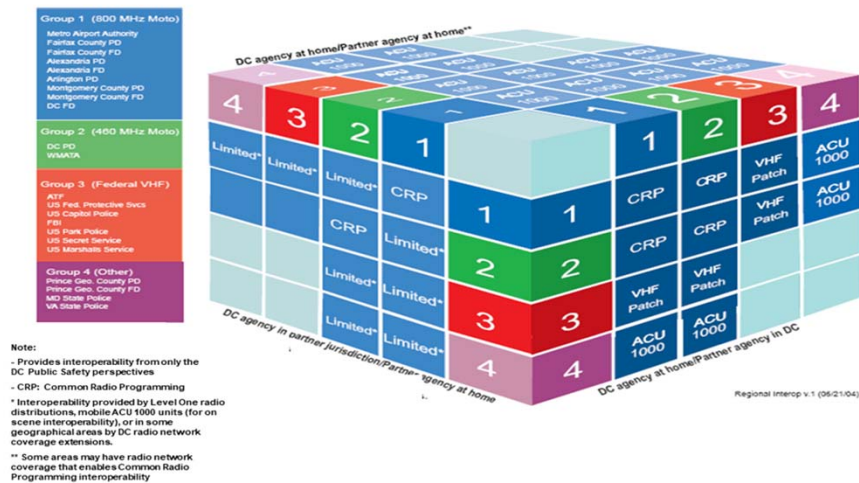
**Robert LeGrande, II, Founder, The Digital Decision, LLC**



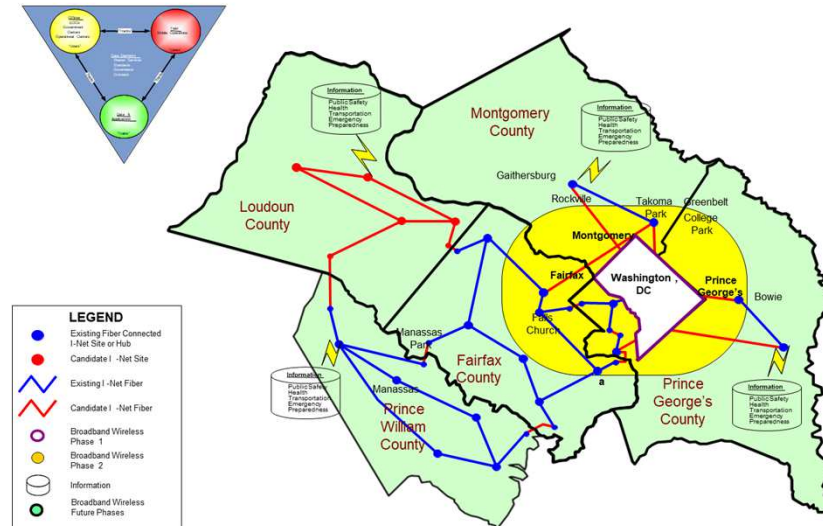
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# District of Columbia 2002 Public Safety Interoperable Communications Plan

Regional Public Safety Wireless Communications Interoperability

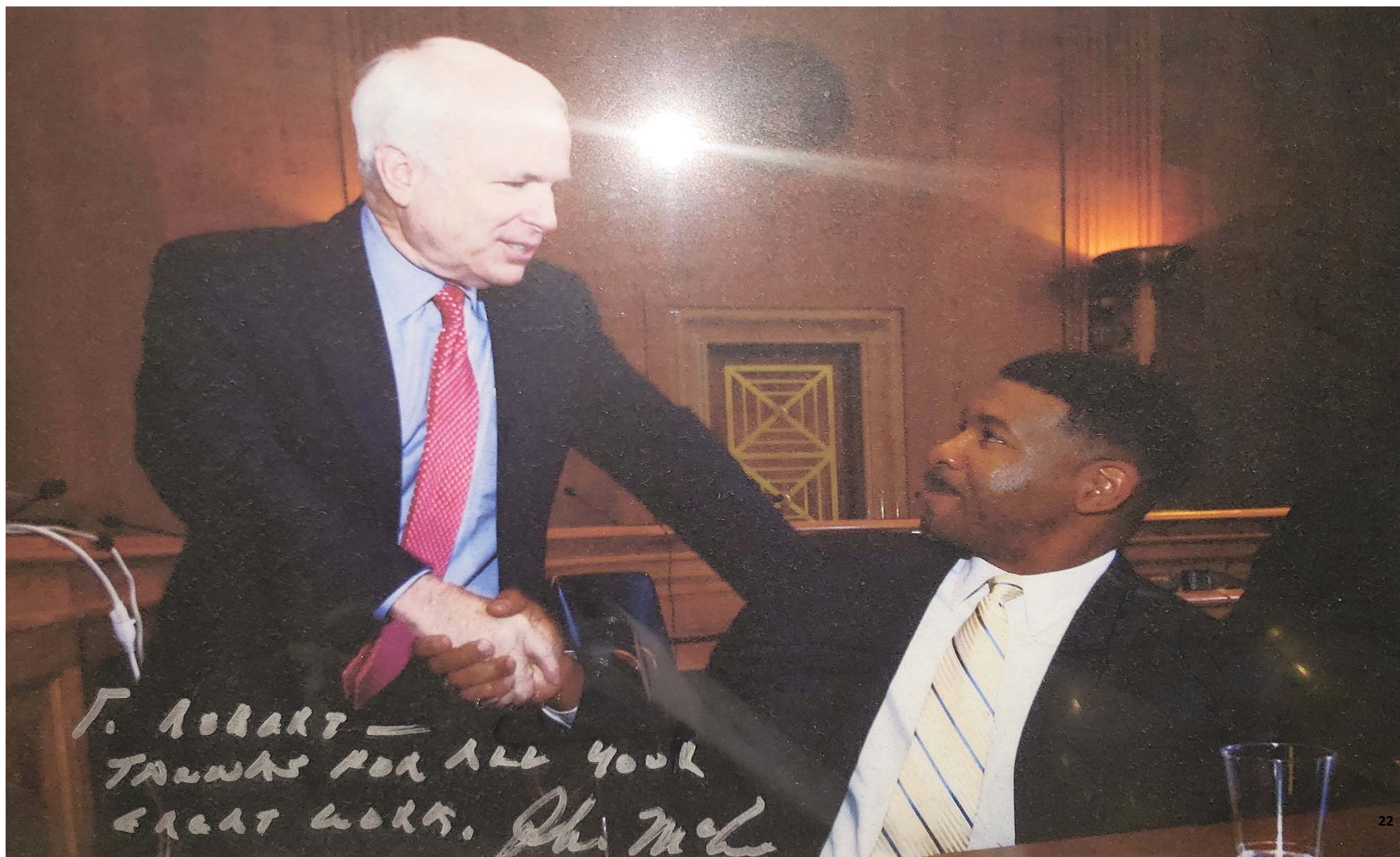


## Established a Comprehensive Interoperability Communications Plan for The National Capitol Region



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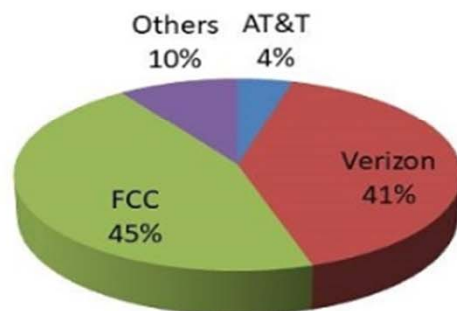
T. ROBERT —  
THANKS FOR ALL YOUR  
GREAT WORK. Phil Mc

## Verizon 5G mmWave Spectrum Positions

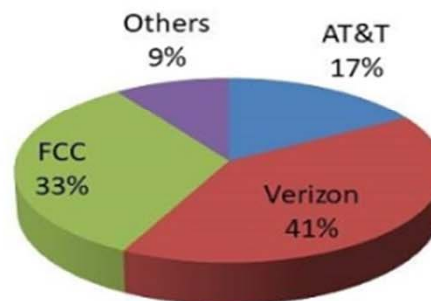
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### Millimeter Wave Spectrum Control

Total Millimeter Wave Spectrum  
Without FiberTower's Terminated  
Licenses



Total Millimeter Wave Spectrum  
With FiberTower's Terminated  
Licenses



Based upon National Weighted Average Spectrum Depth (MHz)  
Millimeter Wave – Spectrum Ownership Analysis Tool (July 2017)



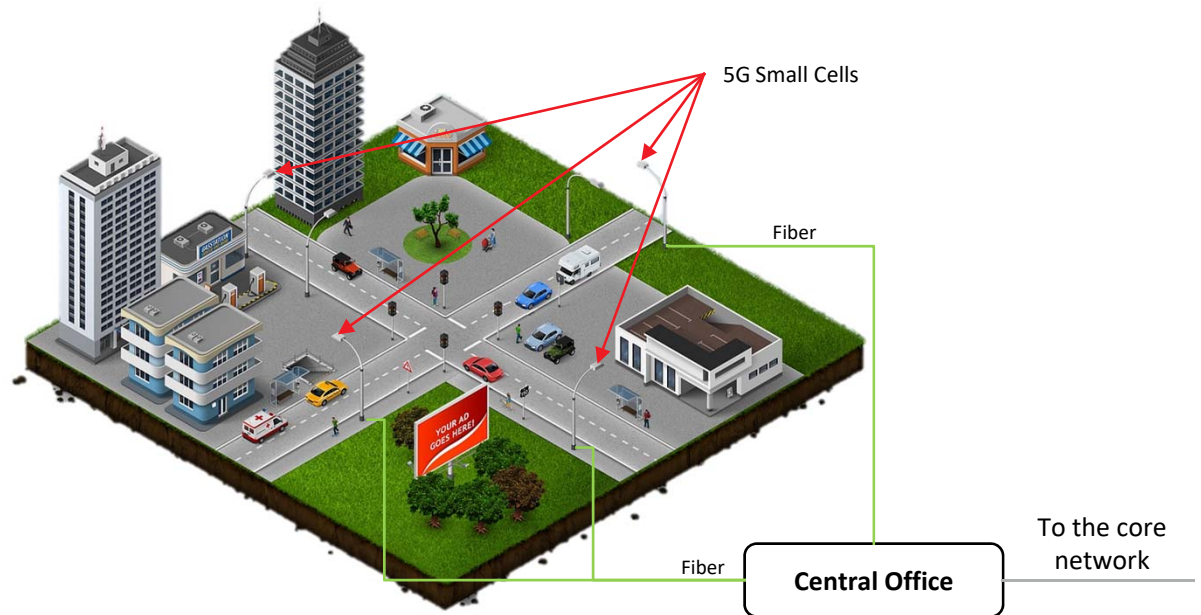
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# 5G mmWave

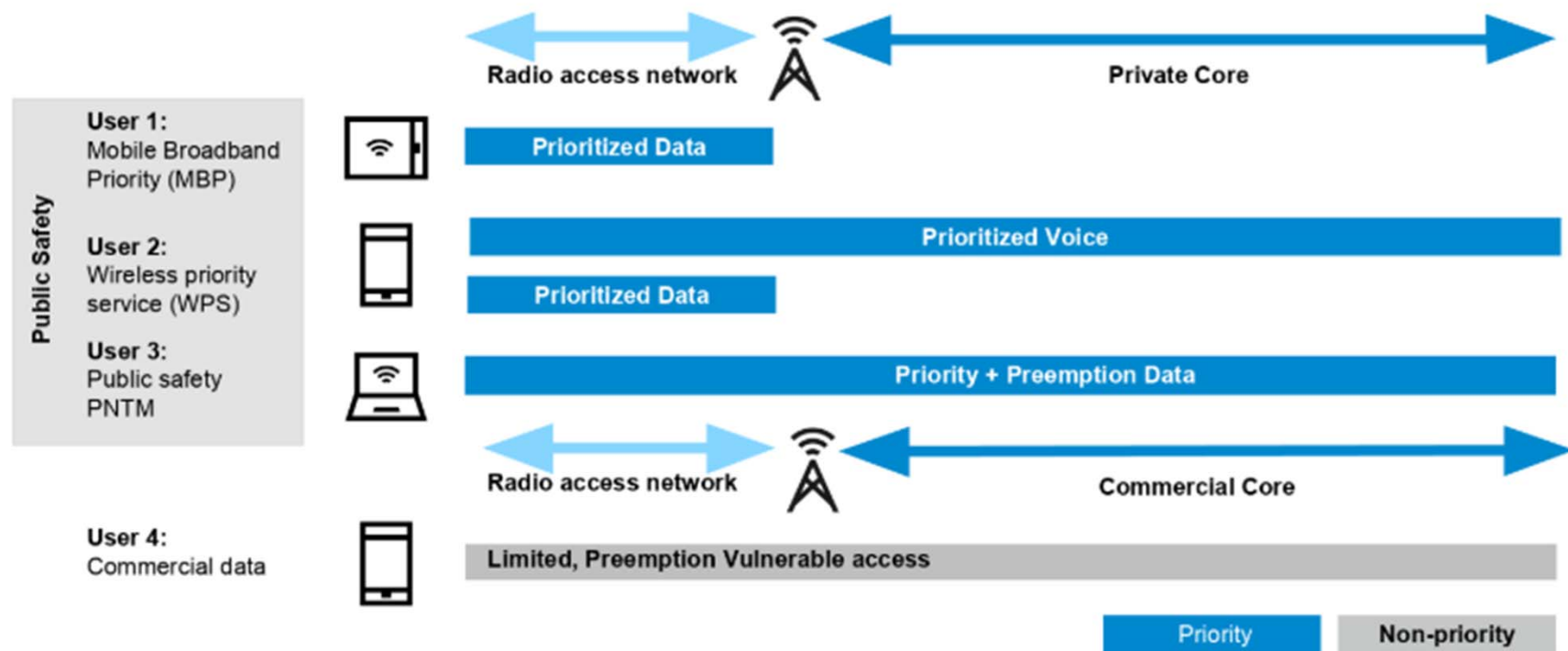
## Key Advantages:

1. Extreme high capacity and user data rate
2. Viable for mobile communications offering multi-user Gbps
  - Advances in antenna and beam-forming/tracking technologies
  - Scalable deployments are feasible due to very narrow beams



Dense mmWave deployment + fiber transport = Multi-Gbps Capabilities

# Priority services during congestion



# Thank you.



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