Bringing Broadband Mission Critical Services and Device-to-Device to First Responders

17 March 2025

IWCE
Connecting Critical Communications

#IWCE25

Agenda and Presenters

- Walt Magnussen Ph.D.
  - Director TAMUS ITEC
- Kevin Graham
  - CEO TCCA
- Brittany Haile
  - Business Development Manager, Qualcom
- Steve Raucher
  - CEO Rapid Deploy
- Jarad Vandenheuvel
  - Chief Innovation Officer, Texas DPS

- DHS Support and MCX Background
- MCX Global Efforts
- MCX Sidelink Support
- MCX Support in Industry
- MCX – The need for Public Safety

TAMUS ITEC

- Established 2004
- Beginnings included NG911 Proof of Concept
- 2010 Contract with Harris County to support firs PSBN in US
- 2011 First Interoperability Institute
- 2019 Funded to begin 5G Testbed
- Current Contracts
  - DHS - MCX, Alternate PNT, NG911 Interoperability, NG911 Cyber Security
  - DOT – V2X
  - DOE – Securing Electric Substations
  - Industry – Qualcom, Crius, Squishy Robotics

MCX – DHS Funding

- Voice Interoperability Research Framework and Analysis Phase 1
  - Oct 2023 to March 2025
  - Establish Steering Group
  - Attend MCX Plugtest #8 – Malaga Spain Nov 2023
  - Audio Quality Testing – In lab and in Football Game 105,000 attendance
  - Cybersecurity Analysis
- Voice Interoperability Research Framework and Analysis Phase 2
  - Oct 2024 to Sept 2025
  - Host MCX Plugtest #9 – College Station, Texas Feb 2025
  - Video Quality Testing
  - Participate in EU MCX efforts –CCW June 2025

MCX What is it

- 3GPP Standard –Began Release 14, Enhancements through Release 19
- Includes Voice (MCPTT), Video (MCV), Data (MCD)
- Has it's own set of 3GPP QCIs 65,66,69,70

QCI	Bearer type	Priority	Packet delay	Packet loss	Example
1	GBR	2	100 ms	10^{-2}	VoIP call
2		4	150 ms	10^{-3}	Video call
3		3	50 ms		Online gaming
4		5	300 ms	10^{-6}	Video streaming
65		0.7	75 ms	10^{-2}	Mission critical PTT voice
66		2	100 ms	10^{-2}	Non-mission critical PTT voice
5	Non-GBR	1	100 ms	10^{-6}	IMS signaling
6		6	300 ms		Video, TCP based services
7		7	100 ms	10^{-3}	Voice, video, interactive gaming
8		8	300 ms	10^{-6}	Video, TCP based services
9		9			
69		0.5	60 ms	10^{-6}	Mission critical delay sensitive signaling
70		5.5	200 ms	10^{-6}	Mission critical data

IWCE 2025 Panel

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Kevin Graham, TCCA CEO

17 March 2025

Advancing global critical communications for a safer, more connected world

We drive standards, spectrum and interoperability

Standards	Spectrum	Interoperability
3GPP A GLOBAL INITIATIVE	ITU WRC DUBAI 2023	ETSI
5G ADVANCED 6G	Band 68	PLUGTESTS INTEROP EVENTS
TETRA	380 MHz	GCF Test Certify Connect
	400 MHz	TETRA
	High Power UE	
	D2D sidelink	
	6G	

Let's talk about 3GPP promise

Done already

Mission Critical Services defined in the standard

QPP (Quality, Priority and Pre-emption)

Interworking Function

On-going work

Device-to-Device (D2D)

Satellite-to-Device (NTN)

Control Rooms

Certification

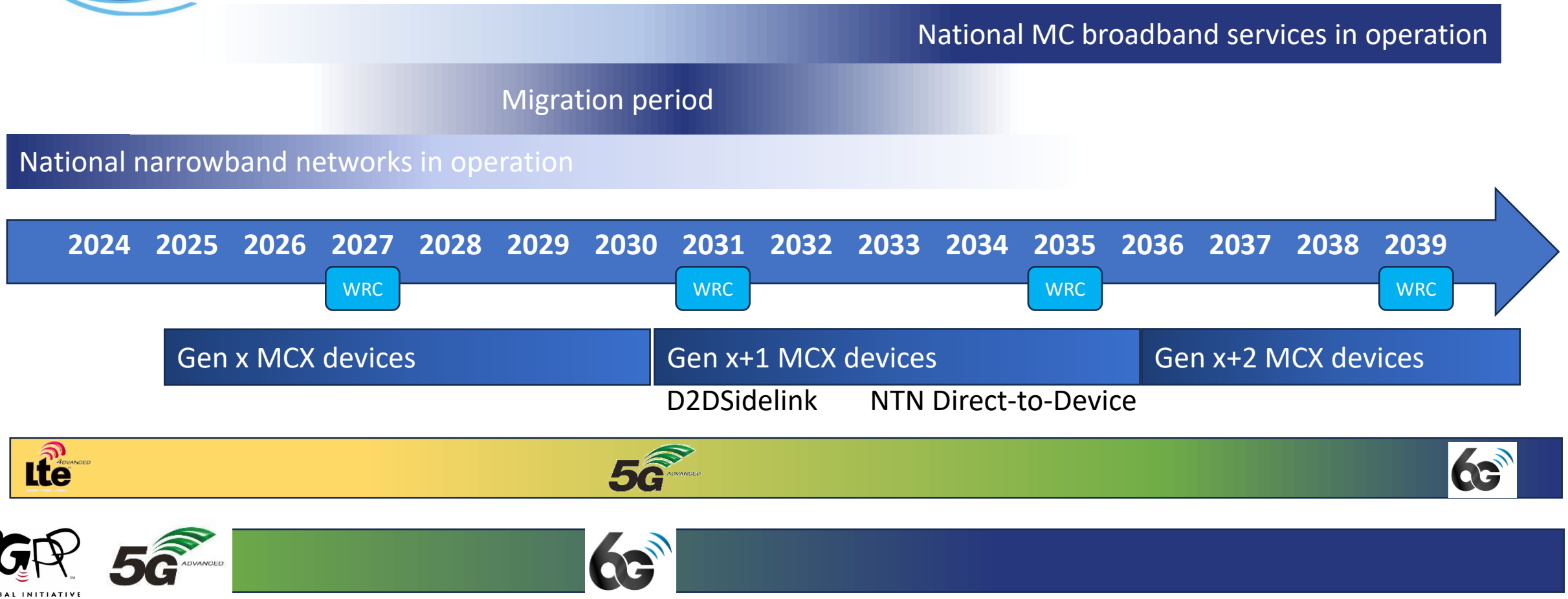
Coming up

6G

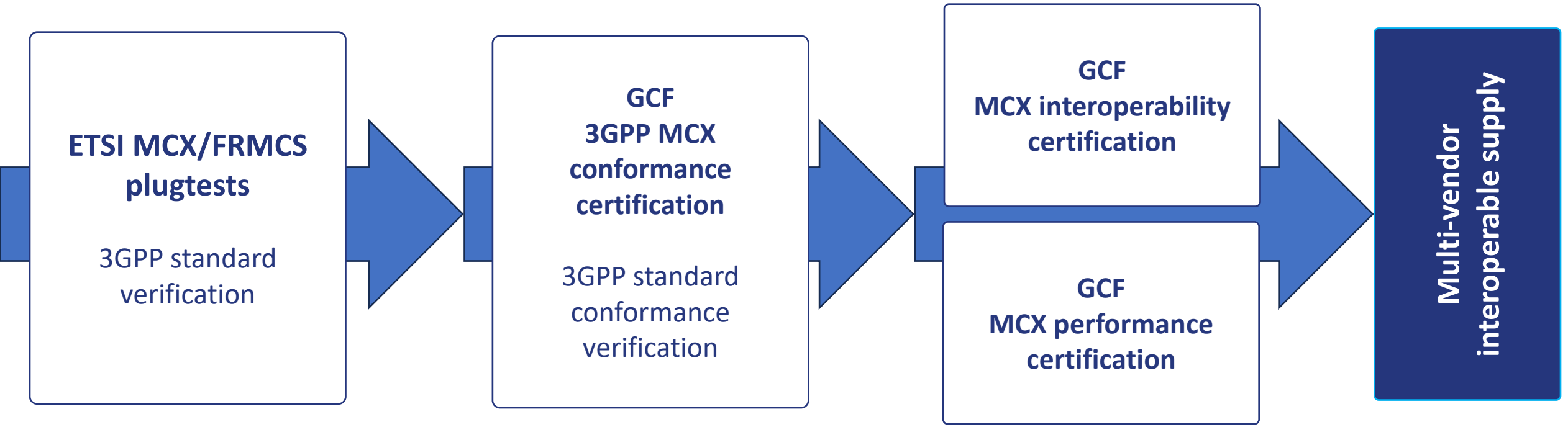
Sensing

XR

Putting things into context



Path to success – MCX interoperability



MCX testing & certification work with ETSI and GCF

Testing

- **ETSI plugtests FRMCS & MCX annually – standard verification & mutual cross-testing**

  Texas A&M College Station, 2/2025

  Next FRMCS –UIC 10/2025

Certification

- **GCF MCS workstream – conformance & field testing**
  - **Activation 6/2024**: Release 14 MCPTT conformance
- **Performance & interoperability in preparation**

Guidance: Include in procurement – demand certified products

Consultations, preparations and operation

European Critical Communication System for law enforcement and emergency services, EUCCS

- EU and Schengen
- Cross border Mission Critical Broadband Communications
- “Systems of systems”
- An EU-component
- A legislation
- Operational by 2030

EUCCS preparation (https://broadeu.net/)

What is going on outside Europe?

Consultations, preparations and operation

IWF status update overview

- Service Overview TETRA – IWF published and online meeting to define road ahead (April)
- Terms of reference drafted (July)
- ToR distributed and supported by 24 TCCA Members (September)
- TCCA Board approves to start the IWF WG (25th of September)
- **Virtual kick-off 2.12.2024 14:00-15:30 CET**
- First Focus: TETRA, TETRAPOL, P25, GSMR: standard to standard interworking functions into MCX/FRMCS


TCCA
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SAVE THE DATE
17-19 JUNE 2025
BRUSSELS EXPO, BRUSSELS, BELGIUM
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TCCA CCBG

https://tcca.info/broadband/critical-communications-broadband-group/

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Thank you

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Advancing global critical communications for a safer, more connected world

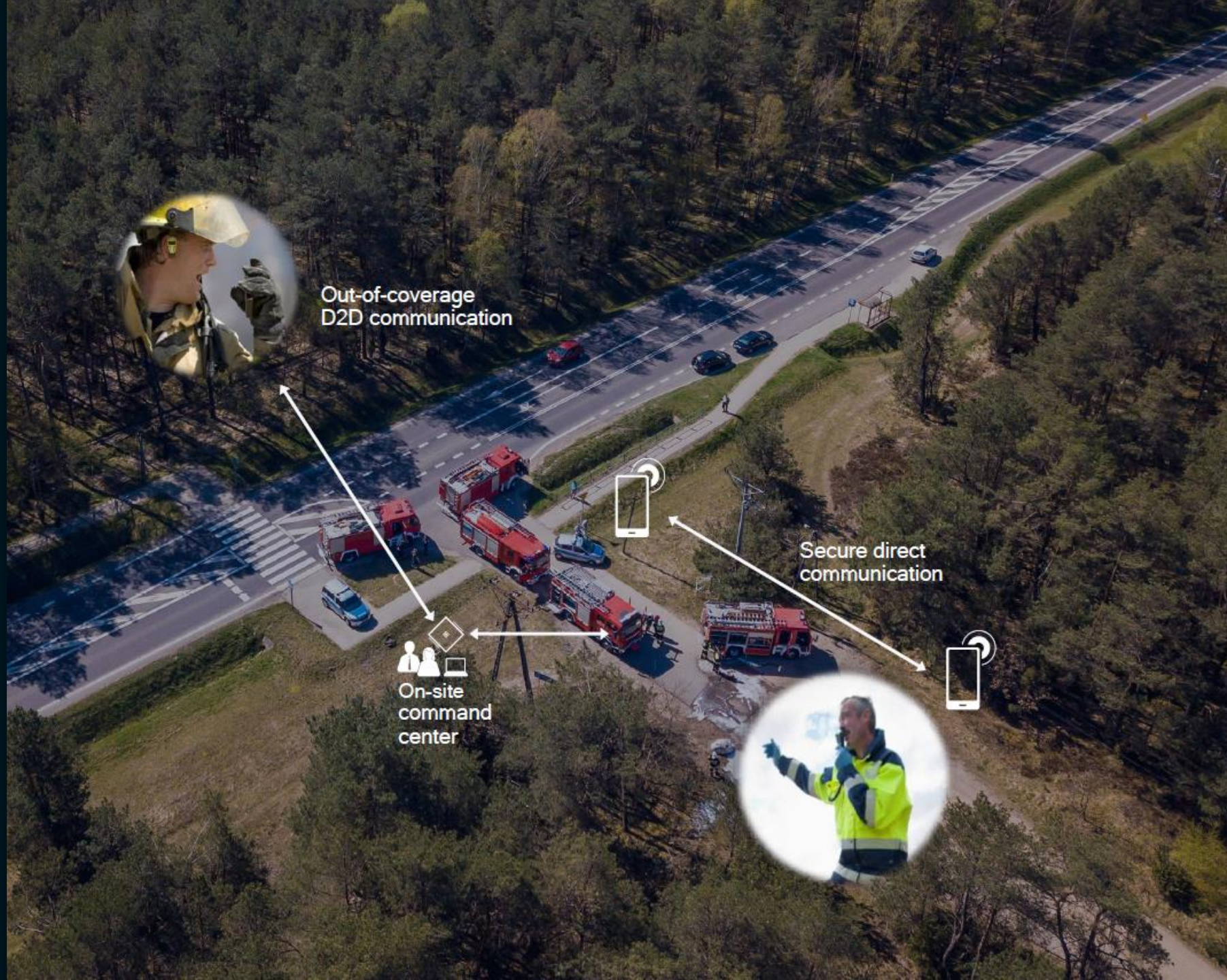
Qualcomm

December 19, 2024

The Need for Device-to-Device (Sidelink) in support of Mission Critical Services

Public Safety Needs

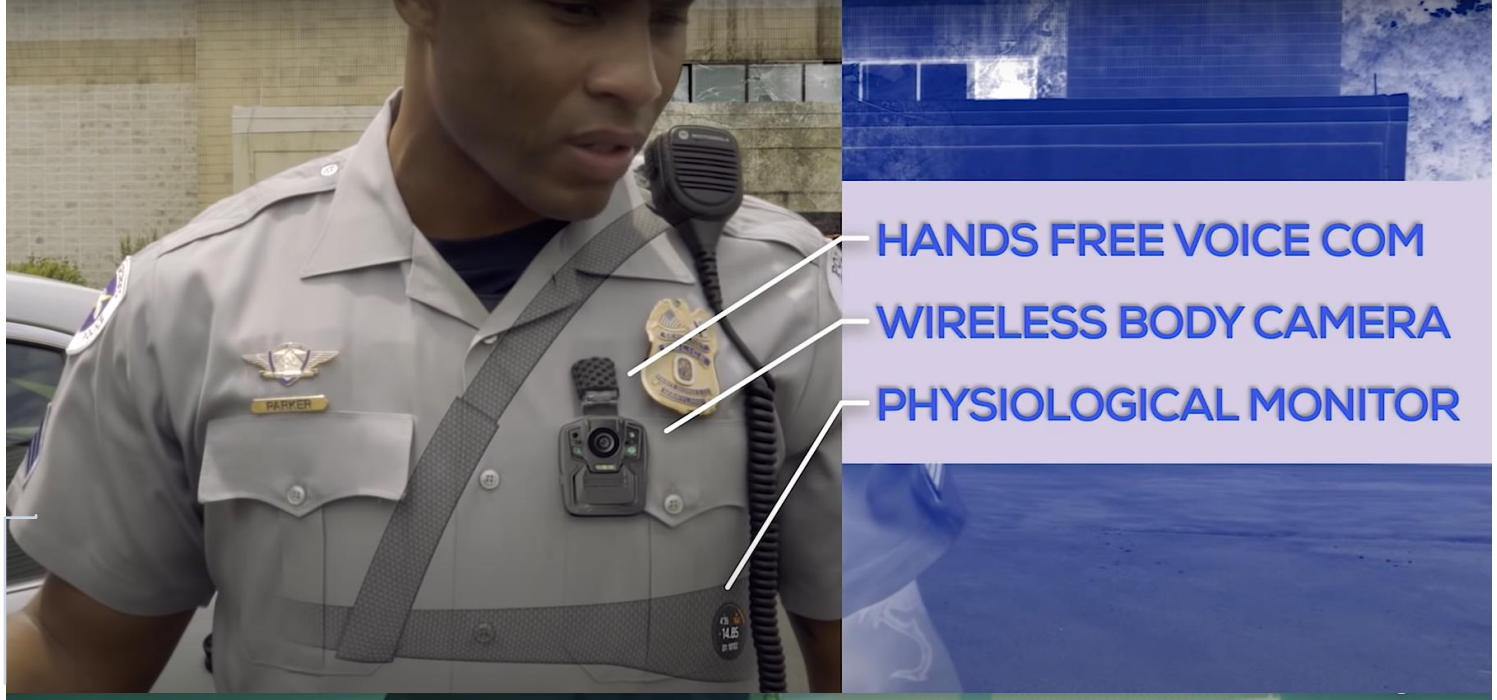
- D2D connectivity via sidelink provides out-of-coverage (and off-network) comms without network timing/ configuration
- Distributed operations can work at scale
- Fills a key communications gap for mission critical PTT that first responders have long sought



D2D connectivity on Wearables

Real-time context with IoT sensors for First Responders

- Communications indoors thru walls and ceilings
- Situational Awareness info provided in a cognitively effective manner (despite smoke/noise)
- On-device AI/aggregation of data enables analytics catered to first responders



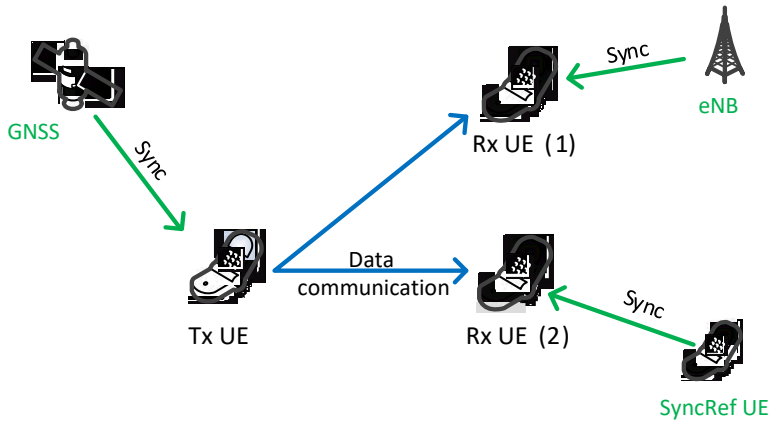
Supports Different Communications Configurations

- Enables near real-time reporting and communications by delivering backhaul network connectivity using existing cellular infrastructure.

- Resources managed by connected devices
- Does not require network coverage for connectivity
- 3GPP standardization enables interoperability and lower device costs

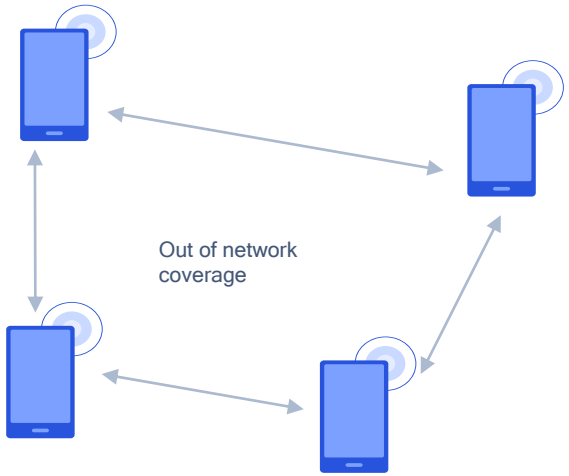
Enhanced Positioning Without Timing From the Network

Self-Synchronization and Positioning



- Synchronization mechanism is de-coupled from communications.
- Receiving devices communicating with a transmitting device need not derive its time/frequency synchronization from the transmitting device.

Dynamic and Self-Organizing



- Resources managed dynamically by connected devices.
- Does not require network coverage or a SIM.
- Timing derived from GNSS or synchronized to one device (by default, whichever got the latest update from the network or GNSS)

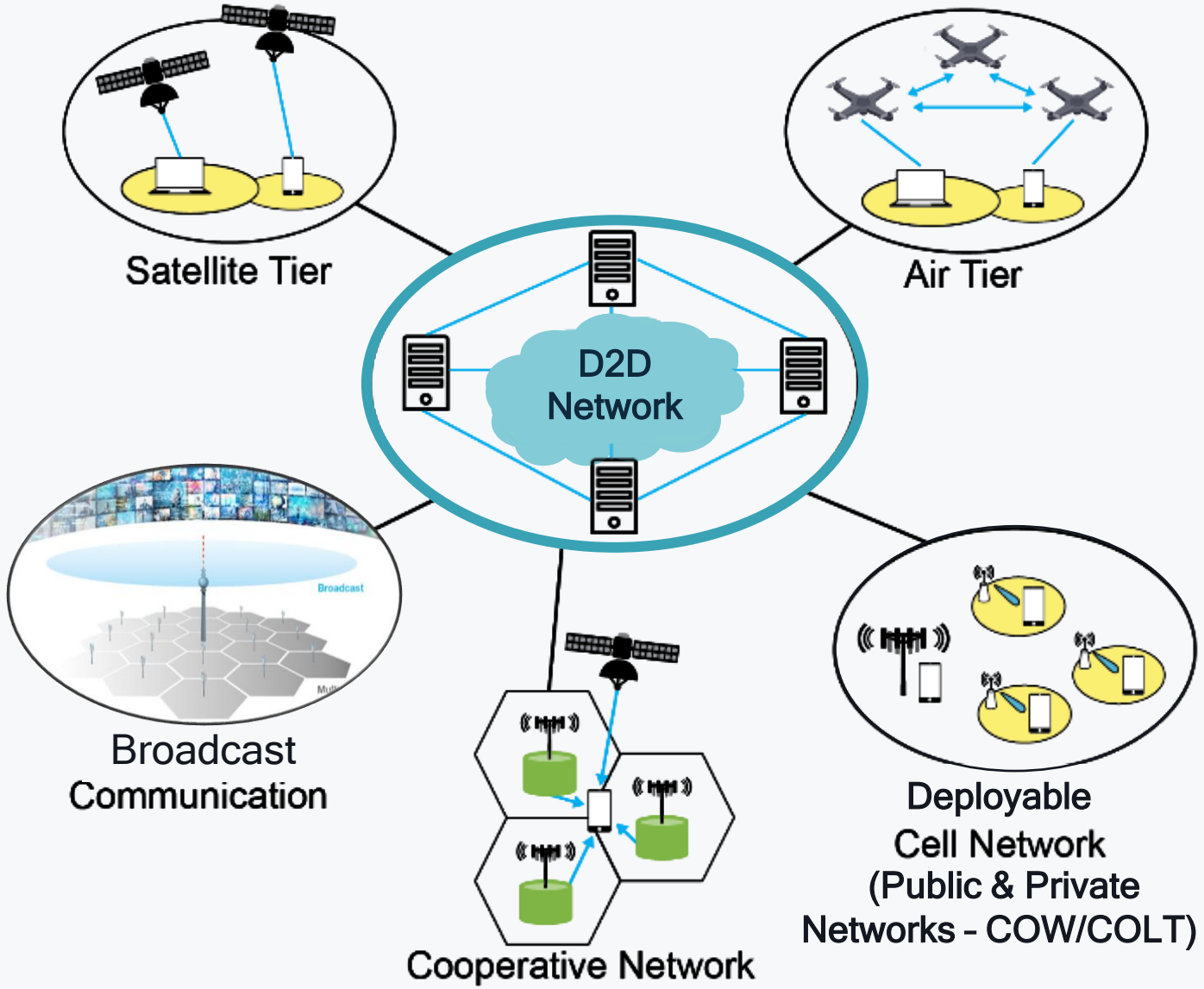
Supports indoor and out-of-range communications through Distributed Time Synchronization

Extends connectivity

Extending available communications technology by several miles and to hard-to-reach places

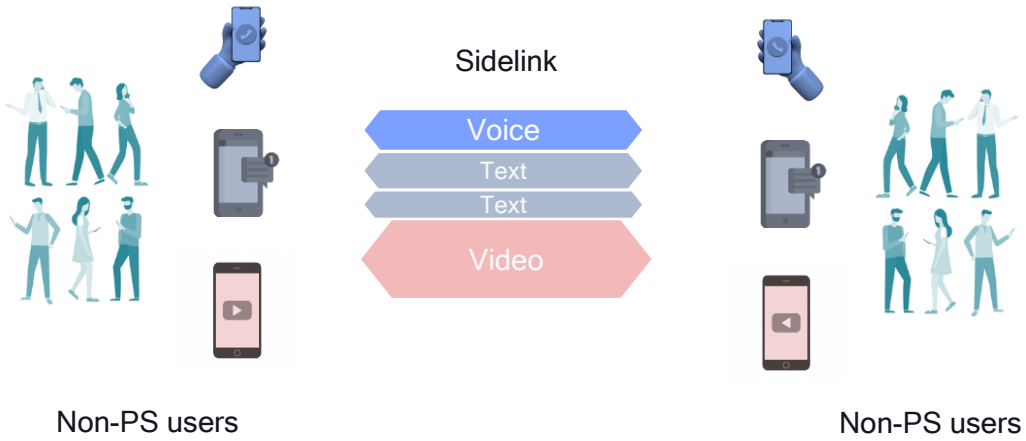
- Satellite direct to phone may fail in dense forests/indoors/dense urban environments
- Cellular towers may fail when exposed to natural disasters
- Deployable networks cannot maintain coverage through rubble, downed infrastructure etc.
- Wi-Fi networks may fail when optical fiber networks are disrupted
- D2D connections can fill communication gaps with relays and off-network P2P self-organized mesh networking

LAST MILE CONNECTIVITY

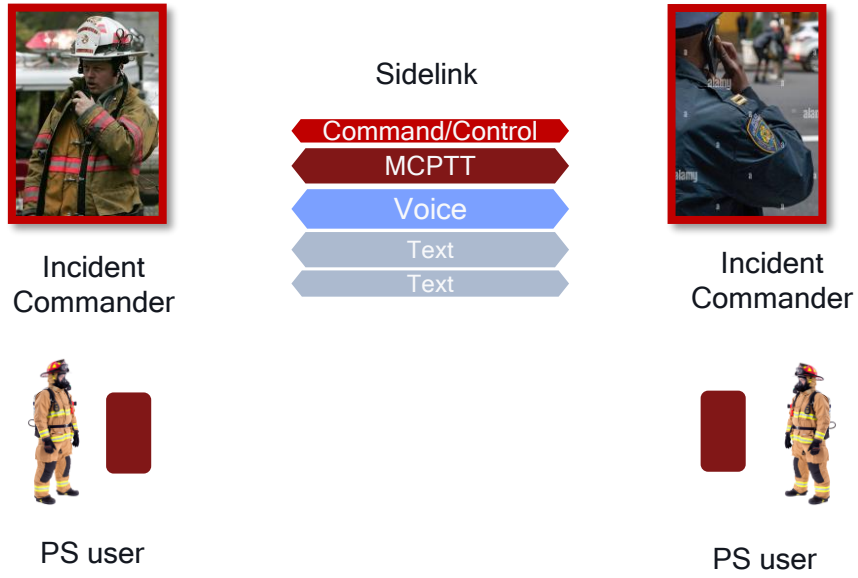


Priority and Preemption Over General Public Users

Public users use spectrum across device types for commercial or public safety use (e.g., to call for help)



Tiered priority within public safety communications: First Responders use spectrum for Mission Critical PTT/Voice with higher priority over public use. Incident Commanders use the same spectrum for Command/Control with highest priority.



Priority: Distance-based coverage enables priority PS communications

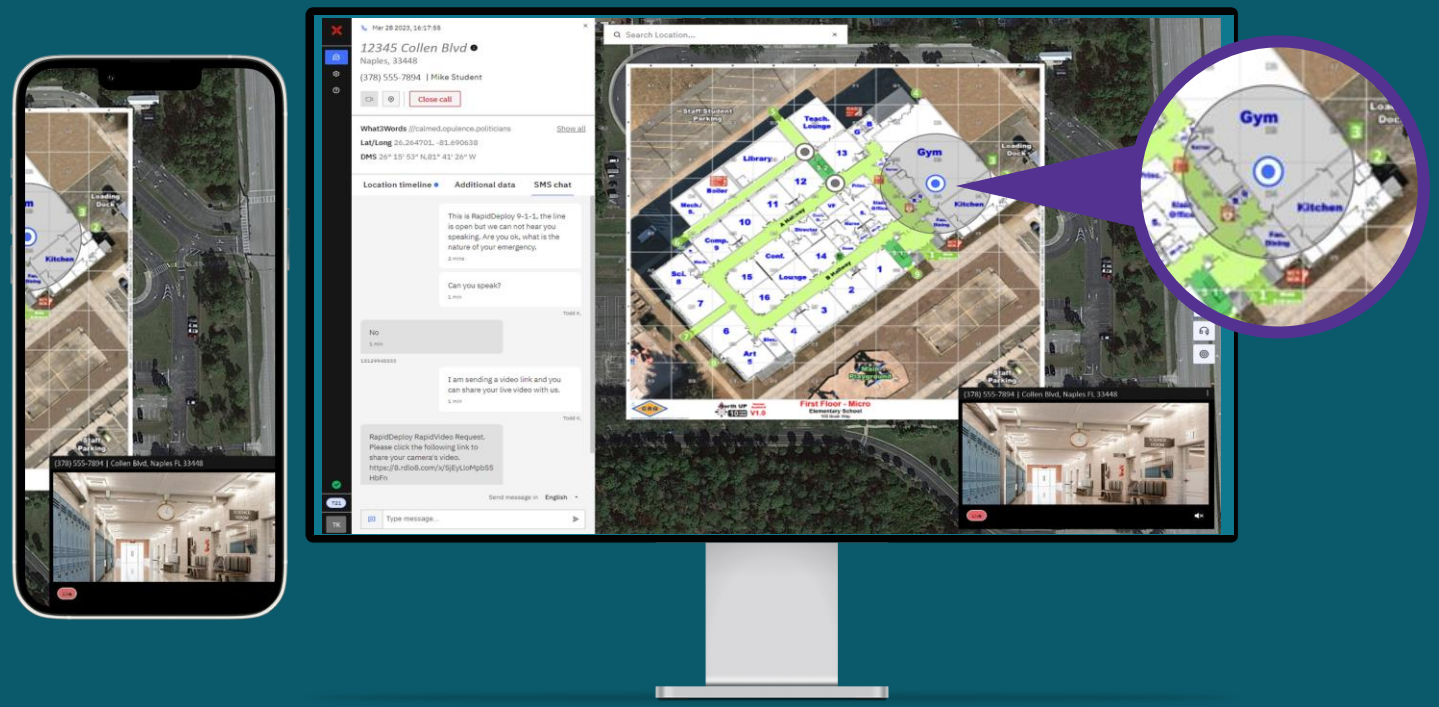
Preemption: PS users gain spectrum access even if general public is using the spectrum

Security features

- Both hop-by-hop security and end-to-end security are applied.
- Trustworthy position, navigation, and timing (PNT): Location Engine in QC's Modem includes AI/ML based multimodal fusion capable of precise, reliable PNT.
- Digital certificates can be used to authenticate data between/among devices in a mesh network to prevent an attacker from injecting false data.
- Data transmitted does not contain personally identifiable information and is anonymized.

Building a Common Operating Picture

NG911 technology connects all first responders with the same data, in real-time, through instant access and communication with each other.



- Precision Location
- Live Video Integration
- Indoor Mapping
- Panic Buttons
- Situational Awareness
- Text and Translation
- Interagency Messaging
- Actionable Intelligence

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Response Matters

Lightning moves first responders beyond incident location for faster, more effective, and safer response.

Seamless collaboration and communication
enhances the effectiveness and coordination of incident response

Maximize interoperability
by connecting PSAP and field responders with real-time data and situational awareness

Better emergency response outcomes
driven by direct access to mission critical information, enhanced coordination, and modern communication

Faster, more efficient response
instant access to the right information to resolve incidents in the moments that matter

Improved unit safety and preparedness
with enhanced situational awareness, visibility, and communication across responders

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Mission-Critical Information Directly from the PSAP to the Field

Collaboration, communication, and one common operating picture for all field responders across disciplines.

Device-Based Location
real-time tracking of responders in the field

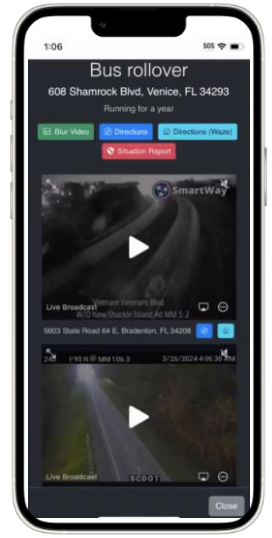
Native navigation
with one-click driving directions

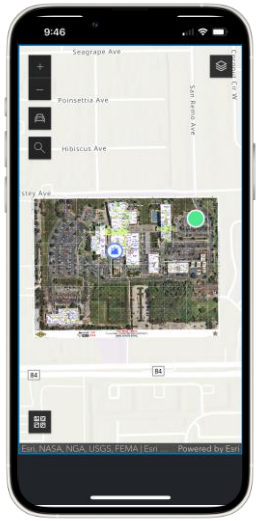
Critical mapping layers visualized
inclusive of authoritative data and commercial maps configured in the PSAP/ECC

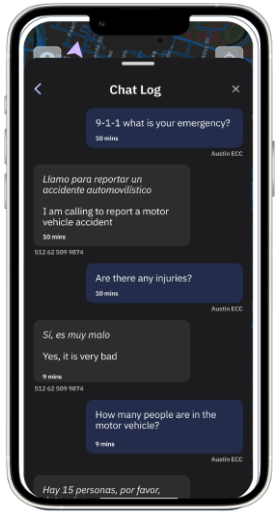
Live incident boards & cctv
for a common operating picture and cctv video sharing for large-scale incidents

Instant access to RapidVideo
connecting citizens with first responders via live video capabilities

Real-time alerts
to notify first responders when a 911 call is received within close proximity







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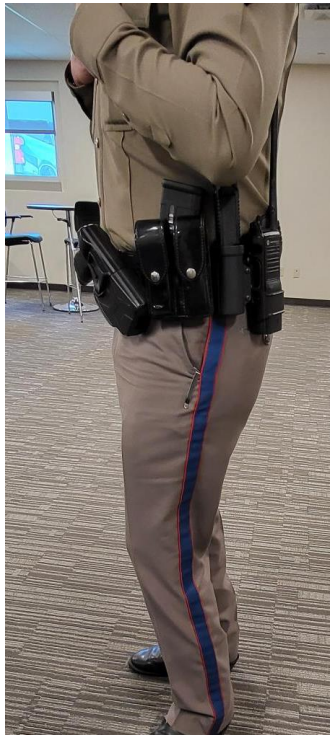
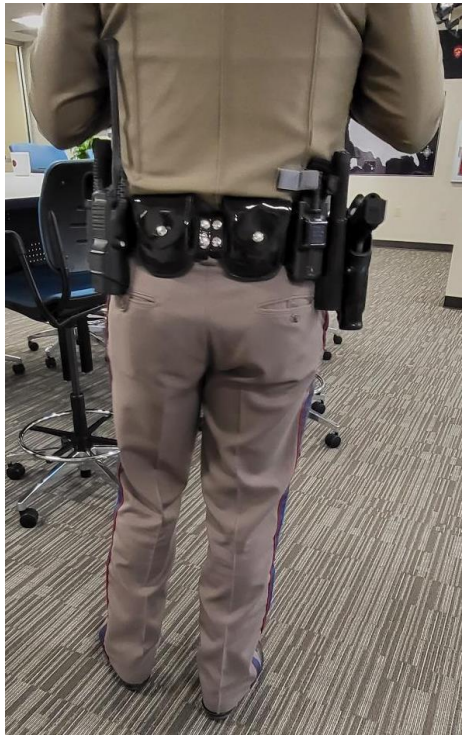
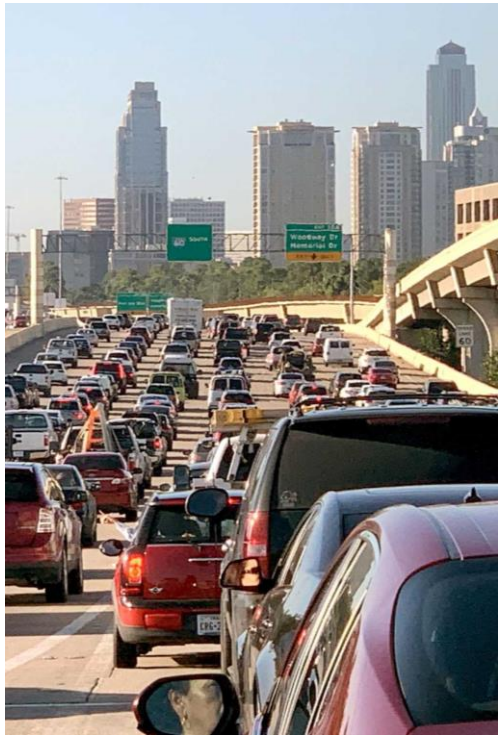
The Power of Interoperability

The Need for Device-to-Device

- Human factors: training, culture, capacity
- A convenient PACE plan
- We will congest any network

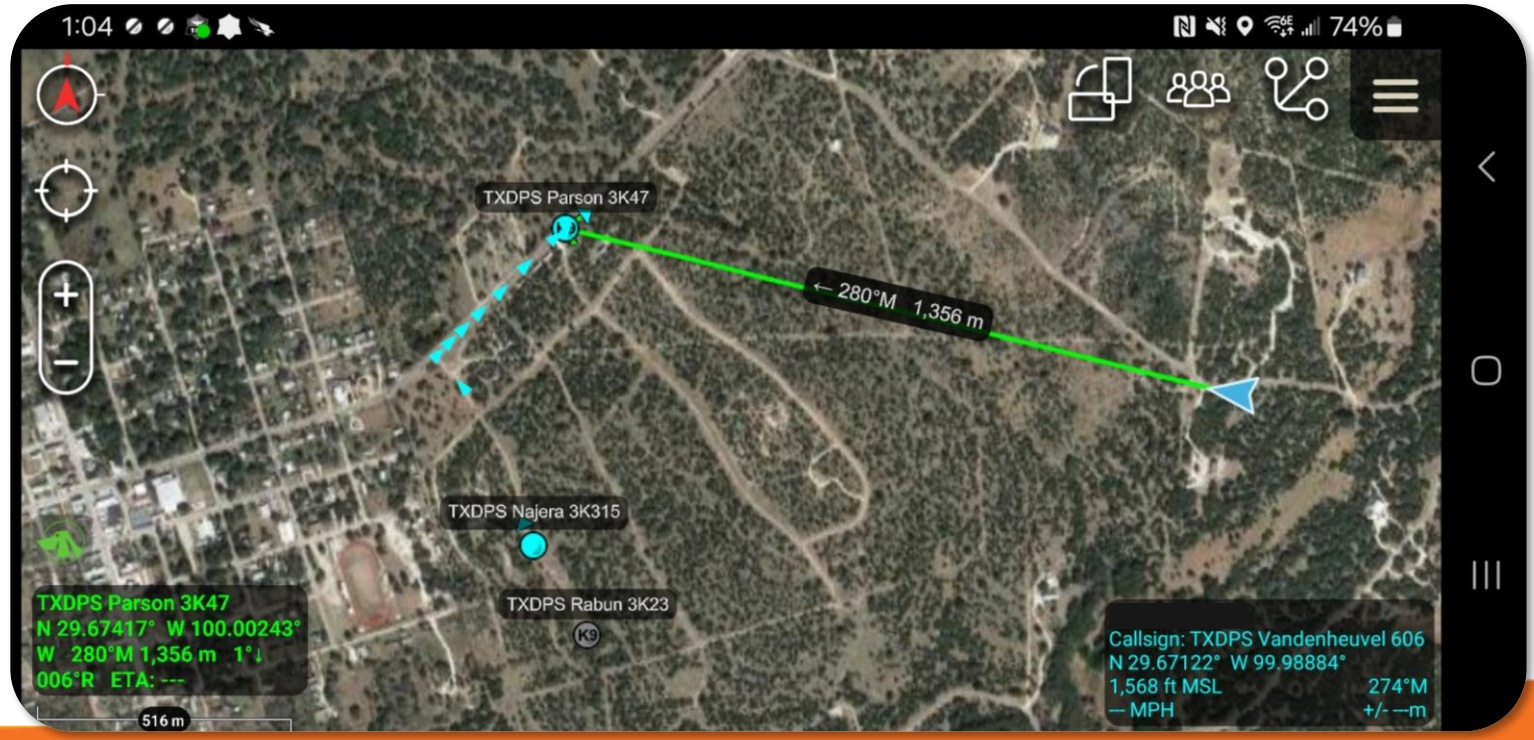






Team Awareness Kit

- The data that’s actually mission critical is small
- The flagship use case for device-to-device that’s ready now
- Join the ecosystem



MCX What is left to do

- Continue Plugtests
- MCX Certification – GCF/DHS
- Sidelink Chipset Develop – Qualcom
- Sidelink HPUE??? – FCC/EU Regualtors
- Harmonize Spectrum – Band XX – FCC/TCCA/ETSI/DOD
- Chipsets into Devices – Industry – Handset manufacturers
- Operational Procedures – Public Safety – MCX Talkgroups
- MCD – Is there a use case for MCD IOT in US?