



Developments in European PPDR Landscape

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The fundamental issue

Sufficient Spectrum under Harmonised conditions

YES

NO

GOGO

GOCO

COCO

COCO

MNO

Government Owned
Government Operated
Spectrum allocated

Government Owned
Company Operated
Spectrum allocated

Company Owned
Company Operated
Spectrum allocated

Company Owned
Company Operated
Spectrum from auction,
Plus allocated spectrum

Mobile
Network Operator
Spectrum from auction –
No conditions

Mission Critical Operations possible

NO Mission Critical Operations possible

Timescales

Based on practical implementation of a harmonised European solution



Presentation on behalf of the TETRA + Critical Communications Association

F3

Blackout

F4

4-Up

F5

Night

F6

PTZ

F7

Full Screen

F8

F9

Send Links

F10

Snapshots

F11



Map View

Inbox

Video Controls

▲

Rec

Map

ra 2		

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Refresh

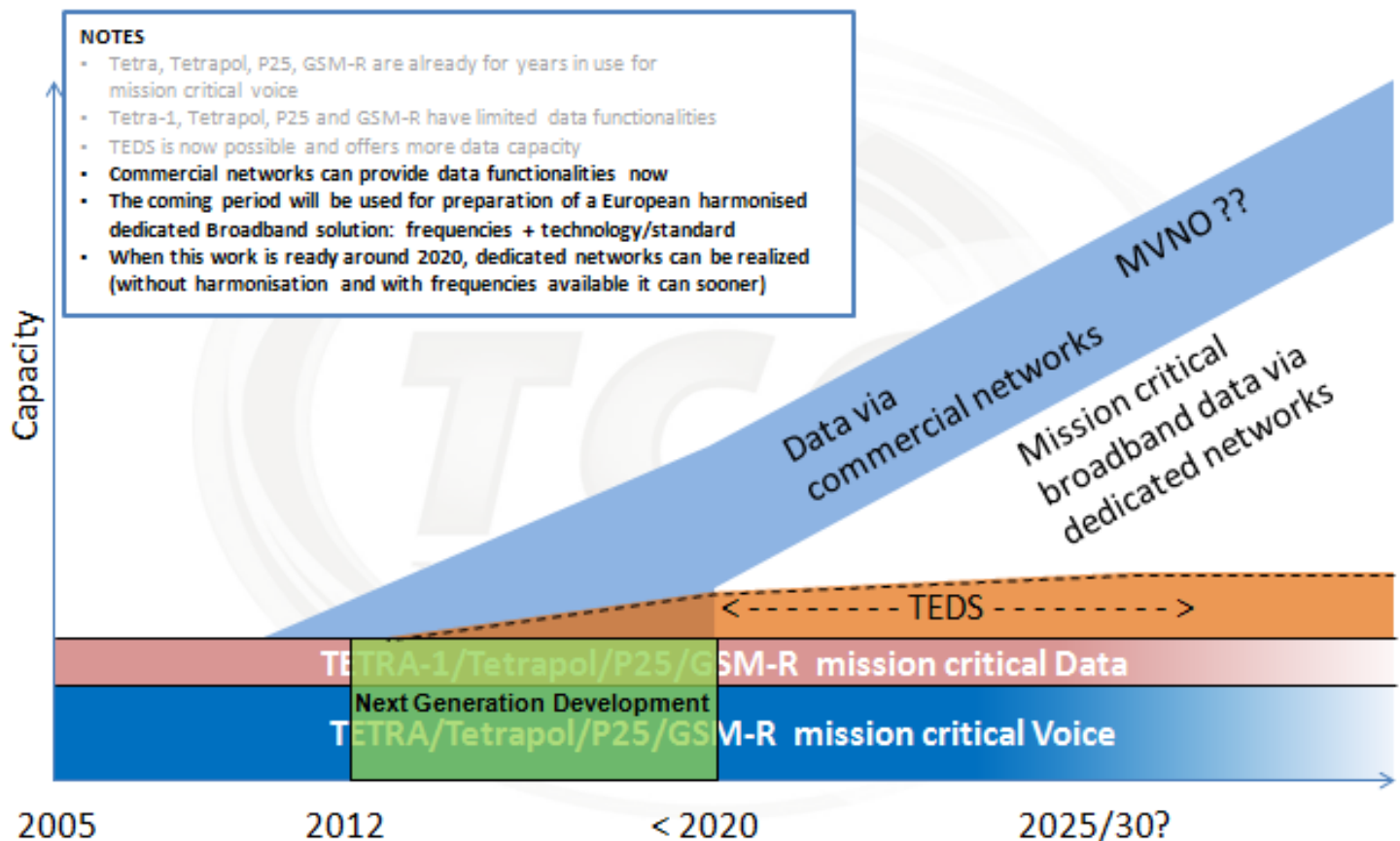
Small PTZ - Camera 2 ▼

49kbps



Timescales

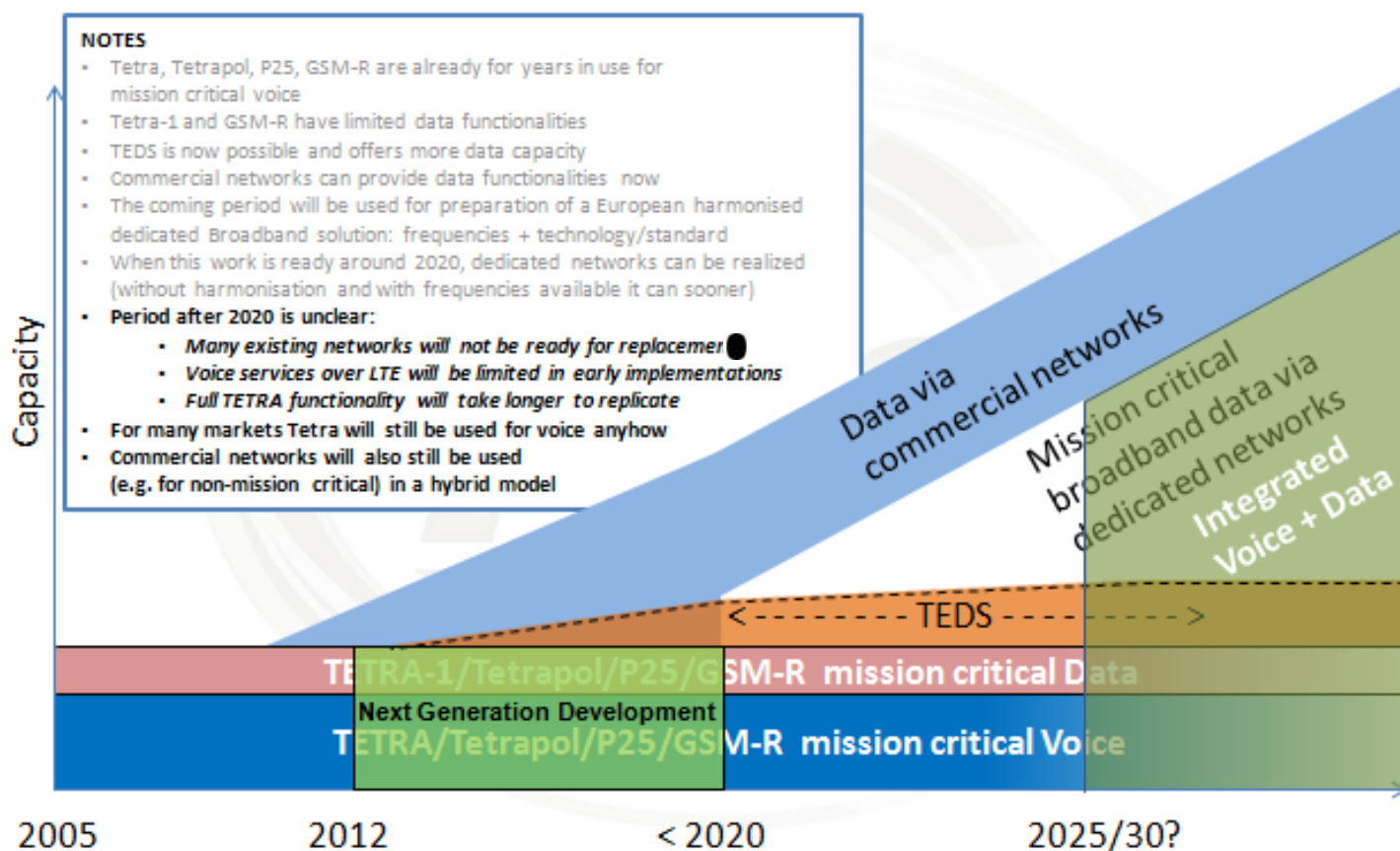
Based on practical implementation of a harmonised European solution



Presentation on behalf of the TETRA + Critical Communications Association

Timescales

Based on practical implementation of a harmonised European solution



Presentation on behalf of the TETRA + Critical Communications Association



THE EVOLUTION OF PUBLIC SAFETY COMMUNICATIONS

The future of TETRA
and TETRA Enhanced
Data Services

TETRA

STANDARDS DRIVEN
COMMUNICATIONS LIFELINE
FOR RAPID RESPONSE



INSTANT COMMUNICATIONS

With push-to-talk,
one-to-many services

Direct-mode, coverage
continuity off network

PUBLIC SAFETY OPTIMIZED DEVICES

Rugged, long-range
reception, instant PTT access

Always on, always listening,
Lasts an entire shift



HIGH AVAILABILITY SYSTEM DESIGN

With multiple levels of backup
for various failure modes

Optimized for demanding
coverage, availability models

GOVERNMENT- GRADE SECURITY

End-to-end group security
from radio to dispatch

Information assurance to
protect against cyber-threats



USERS REPORT THROUGH CENTRALIZED DISPATCH SERVICES

Hundreds of tailored features supporting
end-user specified public safety procedures



LARGE COMMUNITY OF VENDORS



750 IOP TESTS

160 TCCA MEMBER ORGANISATIONS



100%

PUBLIC SAFETY
ORGANIZATIONS RELY ON
PRIVATE MOBILE RADIO FOR
CRITICAL VOICE
COMMUNICATIONS

89%

PUBLIC SAFETY DECISION
MAKERS BELIEVE DATA IS
ALSO MISSION CRITICAL



YET, WHEN PUBLIC SAFETY NEEDS THAT DATA THE MOST THE PUBLIC NETWORKS ARE THE LEAST AVAILABLE



MADRID BOMBINGS 11 MARCH 2004

Coordinated bombings against the commuter train system three days before Spain's general elections

LONDON BOMBINGS 7 JULY 2005

A series of coordinated suicide attacks targeted civilians using public transport during the morning rush hour

NETWORK BLACKOUTS 11 JULY 2012

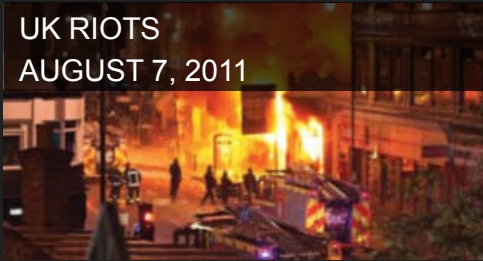
System failure in the networks result in millions unable to make calls or send text messages



YET, WHEN PUBLIC SAFETY NEEDS THAT DATA THE MOST THE PUBLIC NETWORKS ARE THE LEAST AVAILABLE



UK RIOTS
AUGUST 7, 2011



TURKEY EARTHQUAKE
OCTOBER 23, 2011



JAPAN QUAKE & TSUNAMI
JULY, 2012



HURRICANE KATRINA
AUGUST 23, 2005



US I-35 BRIDGE COLLAPSE
AUGUST 1, 2007



ORANGE FRANCE BLACKOUT
JULY, 2012



US EAST COAST
QUAKES
AUGUST 23, 2011

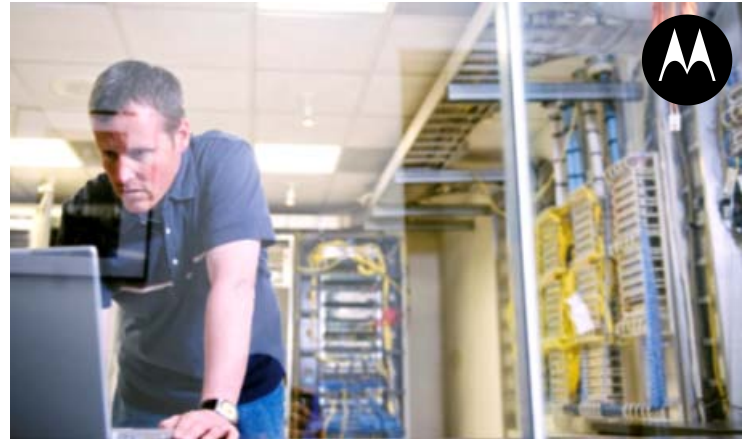


SAN DIEGO WILDFIRES
OCTOBER 2007



SAN FRAN BART
PROTEST
JULY 2011





UNIFY TETRA AND LTE?

A FUTURE-READY TETRA SYSTEM
ON A UNIFIED IP ARCHITECTURE

OFFERS A SEAMLESS ENTRY POINT INTO
PUBLIC SAFETY LTE BROADBAND

AND THE ABILITY TO OPERATE THE ACCESS
TECHNOLOGIES AS A SINGLE SERVICE



WITH A UNIFIED TETRA AND LTE SERVICE



MULTIMEDIA TALK GROUPS

PUSH-TO-IMAGE OR PUSH-TO-VIDEO, SENDING MULTIMEDIA CONTENT TO BROADBAND DEVICES CARRIED BY TALK GROUP PARTICIPANTS



RESOURCE TRACKING

REAL-TIME LOCATION AND TRACKING OF INDIVIDUALS, VEHICLES, CAMERAS, SENSORS FROM BOTH RADIO AND BROADBAND SYSTEMS

WITH A UNIFIED TETRA AND LTE SERVICE



The image shows a desktop monitor and a Motorola rugged tablet. The monitor displays the 'DYNAMIC PRIORITY' software interface, which includes two tables: 'PRIORITY LIST A' and 'PRIORITY LIST B'. The tablet displays a map with a red target icon and green location markers.

DYNAMIC PRIORITIZATION

DYNAMIC RESOURCE
PRIORITIZATION ACROSS RADIO
AND BROADBAND FOR USERS
MOST CRITICAL TO SERVING AN
INCIDENT

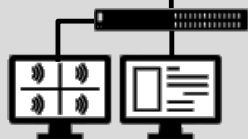
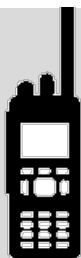
The image shows a Motorola TAC 1 rugged smartphone and a Motorola T4600 rugged radio. A blue Bluetooth symbol is overlaid between the two devices, indicating connectivity.

INCREASED AVAILABILITY

INCREASE AVAILABILITY OF MISSION
CRITICAL NETWORK WITH
COLLABORATING DEVICES AND
NETWORK COVERAGE FALLBACK

The image is a composite of two photographs of a control room. The left half is covered by a semi-transparent blue overlay. On the right half, a man in a dark suit is seen from the side, standing and looking at a large wall of multiple video monitors displaying various surveillance footage. In the foreground, there are desks with computer monitors, keyboards, and a specialized control panel with many buttons. One monitor in the foreground shows a blue circle graphic. In the top right corner of the right half, there is a small blue circular logo with a white stylized 'M' or mountain shape inside.

HOW DO
WE GET
THERE?



DEPLOY FUTURE READY TETRA NETWORK UNIFYING TETRA AND LTE



DEVICES



- **DEPLOY TETRA + TEDS RADIOS WITH BLUETOOTH FOR BROADBAND COLLABORATION**



RADIO ACCESS

- **DEPLOY TETRA + TEDS + PS LTE UNIFIED RADIO SITES WITH MTS4L**



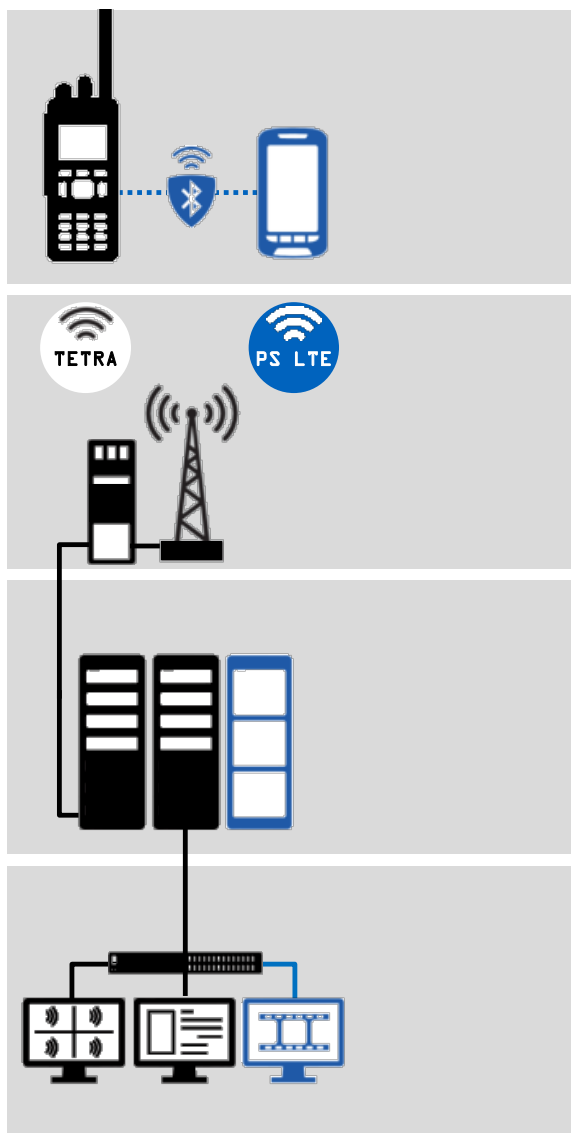
CORE

- **DEPLOY TETRA D8.x FUTURE-READY NETWORK CORE UNIFYING TETRA, TEDS & LTE**
- **SUPPORT GROWTH OF TETRA VOICE + DATA AND SIMPLE PLUG-IN WHEN READY FOR LTE**

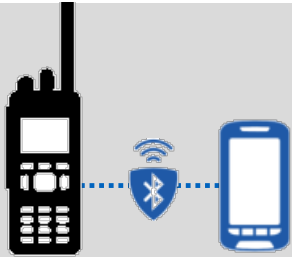


APPLICATIONS

- **IMPLEMENT UNIFIED SERVICES**
- **AUGMENT CONSOLE AND CAD APPS WITH PS DATA APPS SUPPORTED BY MSPD AND TEDS**



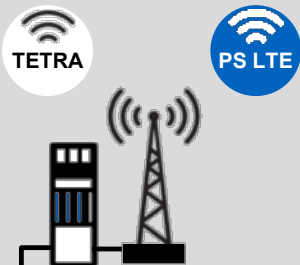
**TURN UP LTE
AND OPERATE
RADIO AND
BROADBAND AS
A UNIFIED
SERVICE**



DEVICES



- **DEPLOY DEVICES OPERATING ON PRIVATE LTE SPECTRUM**
- **ENABLE TETRA RADIO AND BROADBAND DEVICE COLLABORATION**



RADIO ACCESS

- **PLUG IN LTE BASE RADIOS INTO UNIFIED MTS4L TETRA RADIO SITE**
- **UTILIZE INTEGRATED PORTAL FOR VIEW INTO ALL O&M**



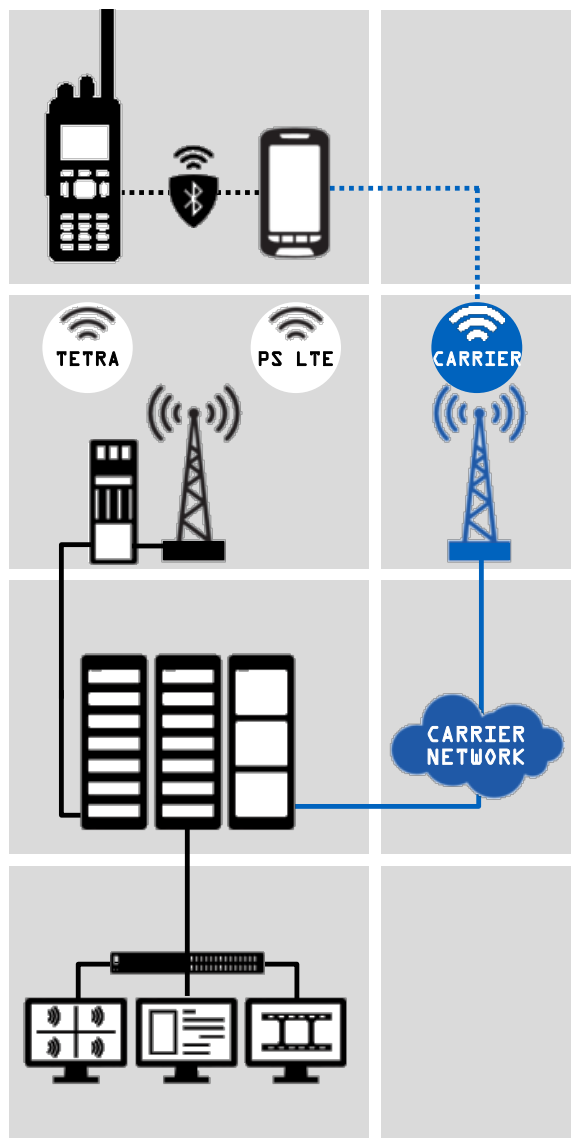
CORE

- **UPDATE TETRA CORE WITH LTE SOFTWARE, ADD LTE RAN SERVICING ELEMENTS**
- **LEVERAGE EXISTING UNIFIED SERVICES, ADD NEW**

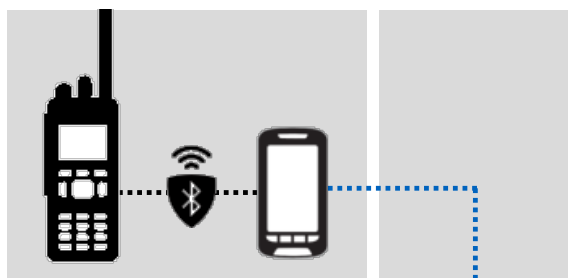


APPLICATIONS

- **RUN CRITICAL MULTIMEDIA APPS OVER PS LTE**
- **ADD NEW PUBLIC SAFETY VIDEO APPS**



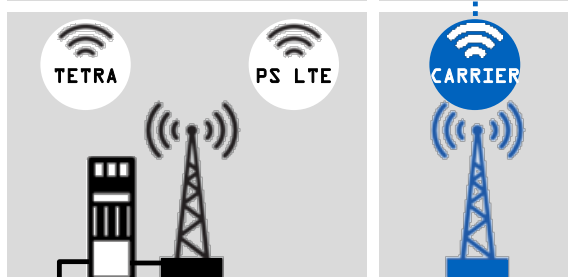
**ESTABLISH
PUBLIC
CARRIER
PARTNERSHIP
FOR
EXPANDED
COVERAGE**



DEVICES

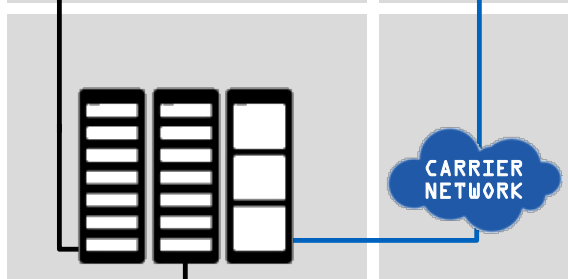


- **ENABLE BROADBAND DEVICES TO ROAM ONTO PUBLIC CARRIER 3G/4G NETWORKS**



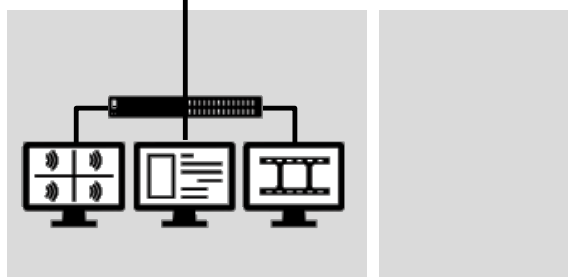
RADIO ACCESS

- **ESTABLISH PUBLIC CARRIER PARTNERSHIP**



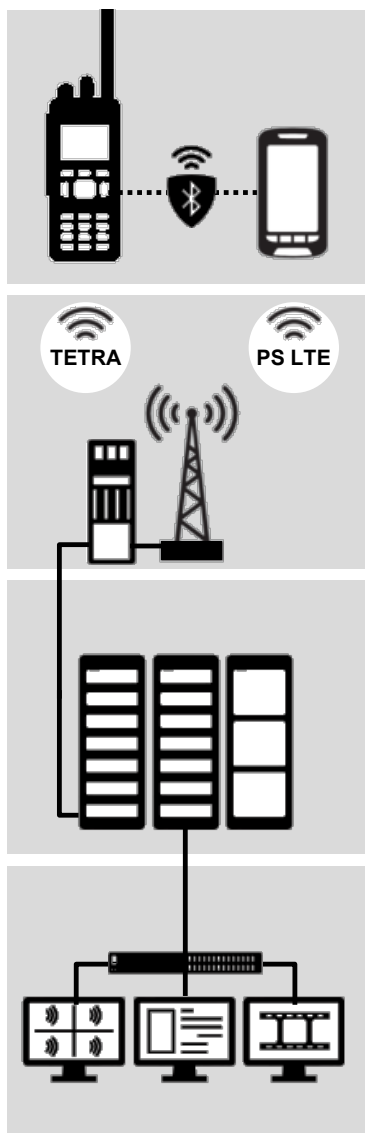
CORE

- **REACH CARRIER AGREEMENTS ON PRIORITY AND CONTROL**



APPLICATIONS

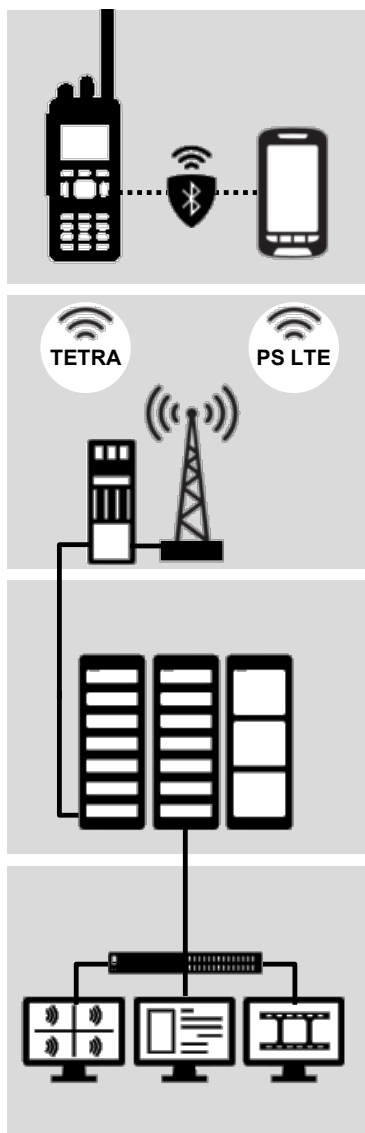
- **SECURE MOBILE DATA AND MAINTAIN SESSION PERSISTENCE WITH PRIVATE/PUBLIC MOBILE VPN**



TRANSFORMING PUBLIC SAFETY WITH UNPRECEDENTED NEXT GENERATION USE CASES



- REPORT RESPONDER EMERGENCY INFORMATION TO PARTNER
- DYNAMIC GEOFENCING TALKGROUP REGROUPING
- LTE DEVICE AS CONTROL HEAD FOR COVERT COMMUNICATIONS
- CENTRALIZED DEVICE PROVISIONING MANAGEMENT
- COVERAGE EXTENSION EMERGENCY ROUTING
- VIEW LOCATION OF ALL RESPONDERS ASSIGNED TO AN INCIDENT
- VIEW LOCATION OF ALL RESPONDERS AFFILIATED TO A TALKGROUP
- OPTIMIZED MULTI-DEVICE LOCATION REPORTING
- DATA PUSH TO TETRA TALKGROUP MEMBERS
- RESPONDER SENDS MESSAGE TO PEER RESPONDER
- APPLICATION SENDS MESSAGE TO APPLICATION DEFINED GROUP
- SEND MESSAGES TO RESPONDERS AFFILIATED TO A TETRA TALKGROUP
- QUERY RESULTS PRESENTED TO DEVICES NEAR RESPONDER
- PRIORITIZED TETRA DATA SERVICE THROUGH COLLABORATIVE LTE DEVICE
- RESPONDER RETRIEVES PRESENCE INFORMATION
- EMERGENCY PRESENCE STATE
- APPLICATION INTERFACE FOR PRESENCE STATE
- SINGLE SIGN-ON ACROSS TETRA AND LTE DEVICES
- CONVERGED AUTHENTICATION AND AUTHORIZATION ADMINISTRATION
- COMMON DEVICE CREDENTIAL PROVISIONING
- CENTRALIZED KEY MANAGEMENT
- CONVERGED HOST-BASED SECURITY CONTROLS
- HANDHELD SYNCHRONIZES AUTOMATICALLY WITH IN-VEHICLE COMPUTER
- STRESS MEASUREMENTS TRIGGERS GROUP CALL
- KEY WORDS TRIGGERS GROUP CALL
- ACCESS TETRA TALKGROUP TO SEND OUT IMAGE
- EMERGENCY TRIGGERS VIDEO SECURITY NETWORK TO AUTOMATE CAMERAS
- TETRA OVER THE AIR SOFTWARE DOWNLOAD USING LTE
- TETRA OVER THE AIR CODEPLUG UPDATE USING LTE
- TETRA OVER THE AIR UPLOADS USING LTE
- MULTI-AGENCY RESPONSE MULTI-NETWORK TALK GROUP
- TETRA INITIATED MULTI-DEVICE EMERGENCY
- TETRA INITIATED EMERGENCY TEXT
- DYNAMIC RESPONDER ADDRESS BOOK
- COMMON TETRA AND LTE DEVICE MANAGEMENT
- ALL POINTS BULLETIN MULTIMEDIA MESSAGING
- COMMON NETWORK FAULT MONITORING ACROSS LTE AND TETRA
- COMMON NETWORK PERFORMANCE MONITORING ACROSS LTE AND TETRA
- COMMON CONFIGURATION MANAGEMENT ACROSS LTE AND TETRA
- COMMON BILLING SYSTEM TO PRODUCE BILLS FOR TETRA AND LTE
- INTEGRATED BILLING CROSS-APPLICATION ACROSS TETRA AND LTE
- INTEGRATED OPERATIONS & MGMT PORTAL FOR TETRA & LTE
- COLLABORATIVE DEVICE REGISTRATION AND MUTUAL AUTHENTICATION
- DETERMINE IF USER IS INSIDE OR OUTSIDE THEIR VEHICLE
- DETERMINE WHICH DEVICES ARE CURRENTLY ASSOCIATED WITH A USER
- DETERMINE CAPABILITIES OF EACH DEVICE ASSOCIATED WITH A USER
- DYNAMICALLY ADJUST THE QOS OF A USER'S VIDEO SESSION
- USE HOME PROVISIONING CREDENTIALS TO GAIN AUTHORIZATION ON FOREIGN SYSTEMS
- SUPPORT COMMON SMARTCARD ACCESS AND CREDENTIALING FOR TETRA AND LTE USERS
- TETRA AND LTE RF COVERAGE REPORTING



TRANSFORMING PUBLIC SAFETY WITH UNPRECEDENTED NEXT GENERATION USE CASES



- REPORT RESPONDER EMERGENCY INFORMATION TO PARTNER
- DYNAMIC GEOFENCING TALKGROUP REGROUPING
- LTE DEVICE AS CONTROL HEAD FOR COVERT COMMUNICATIONS
- CENTRALIZED DEVICE PROVISIONING MANAGEMENT
- **COVERAGE EXTENSION**
- **EMERGENCY ROUTING**
- VIEW LOCATION OF ALL RESPONDERS ASSIGNED TO AN INCIDENT

COVERAGE EXTENSION EMERGENCY ROUTING

- INTEGRATED FULLY-CONNECTED TALKGROUP
- OPTIMIZED DEVICE LOCATION REPORTING
- DATA PUSH TO TETRA
- APPLICATION SENDS MESSAGE TO APPLICATION DEFINED GROUP
- SEND MESSAGES TO RESPONDERS AFFILIATED TO A TETRA TALKGROUP
- QUERY RESULTS PRESENTED TO DEVICES NEAR RESPONDER
- PRIORITIZED TETRA DATA SERVICE THROUGH COLLABORATIVE LTE DEVICE
- RESPONDER RETRIEVES

- SINGLE SIGN-ON ACROSS TETRA AND LTE DEVICES
- CONVERGED AUTHENTICATION AND AUTHORIZATION ADMINISTRATION
- COMMON DEVICE CREDENTIAL PROVISIONING
- CENTRALIZED KEY MANAGEMENT
- CONVERGED HOST-BASED SECURITY CONTROLS
- HANDHELD SYNCHRONIZES AUTOMATICALLY WITH IN-VEHICLE COMPUTER

MULTI-AGENCY RESPONSE MULTI-NETWORK TALK GROUP

- STRESS MEASUREMENTS
- TALKGROUP CALL
- KEYWORDS TRIGGERS GROUP
- ACCESS TETRA TALKGROUP TO
- VIDEO TRIGGERS VIDEO
- NETWORK TO
- SOFTWARE
- TETRA OVER THE AIR CODEPLUG UPDATE USING LTE
- **MULTI-AGENCY RESPONSE**
- **MULTI-NETWORK TALK GROUP**
- MULTI-AGENCY RESPONSE MULTI-NETWORK TALK GROUP
- TETRA INITIATED MULTI-DEVICE EMERGENCY
- TETRA INITIATED EMERGENCY TEXT

- COMMON TETRA AND LTE DEVICE MANAGEMENT
- **ALL POINTS BULLETIN MULTIMEDIA MESSAGING**
- COMMON NETWORK FAULT MONITORING ACROSS LTE AND TETRA
- COMMON NETWORK PERFORMANCE MONITORING ACROSS LTE AND TETRA
- COMMON CONFIGURATION MANAGEMENT ACROSS LTE AND TETRA

ALL-POINTS BULLETIN MULTIMEDIA MESSAGING

- COMMON BILLING SYSTEM TO
- INTEGRATED MULTIMEDIA CROSS-APPLICATION ACROSS TETRA AND LTE
- INTEGRATED OPERATIONS & REGISTRATION AND MUTUAL AUTHENTICATION
- DETERMINE IF USER IS INSIDE OR OUTSIDE THEIR VEHICLE
- DETERMINE WHICH DEVICES ARE CURRENTLY ASSOCIATED WITH A USER
- DETERMINE CAPABILITIES OF EACH DEVICE ASSOCIATED WITH A USER
- DYNAMICALLY ADJUST THE QOS OF A USER'S VIDEO SESSION
- USE HOME PROVISIONING

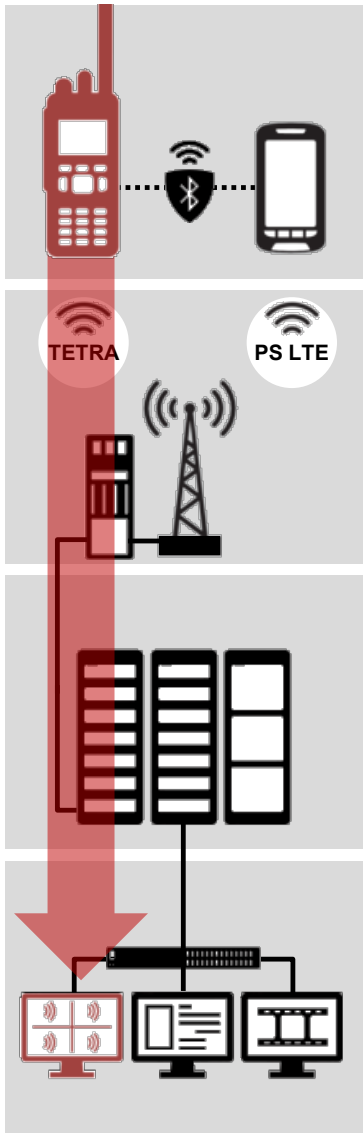
USE CASE:

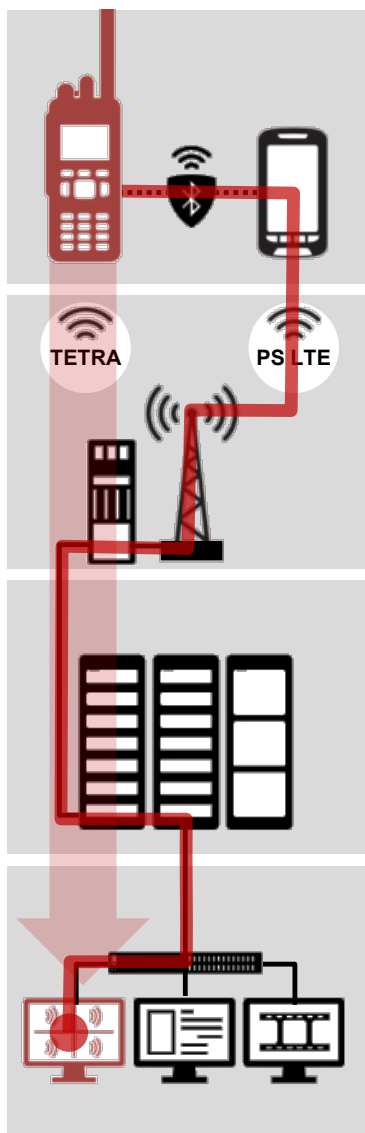
COVERAGE EXTENSION

EMERGENCY ROUTING

Responder In Jeopardy Hits Emergency Button

TETRA NETWORK
DESIGNED TO ENSURE
INSTANT DELIVERY OF
EMERGENCY MESSAGE TO
DISPATCH AND FIELD TEAM





USE CASE:

COVERAGE EXTENSION

EMERGENCY ROUTING

Responder In Jeopardy Hits Emergency Button

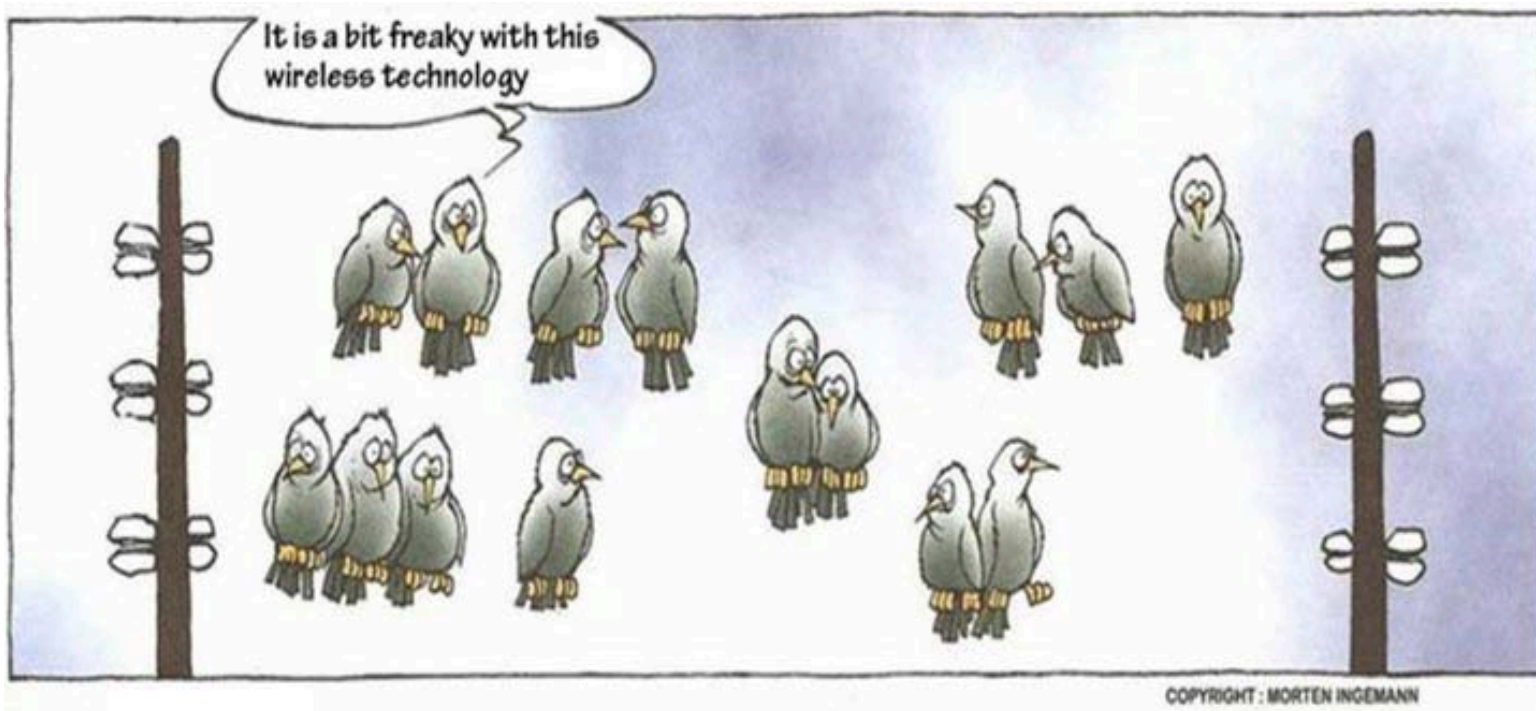
- TETRA coverage is temporarily impeded while PS LTE network has coverage to Responder
- Responder's LTE bearer dynamically sets to highest priority
- Emergency SDS is converted to text message and routes through PS LTE device and network
- "Hot-Mic" activates, audio transmits over PS LTE
- Audio picked up by team members; emergency beacon activated at TETRA console





THANK YOU

Questions ?



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Spectrum Saves lives
Market forces don't