Mobile High Speed Data Communications for Public Safety

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Agenda

- Background
  - Stats and Facts
- Public Safety Industry Needs
- Value Proposition/Business Case
- Future Enhancements
- Summary and Conclusions

Background

Terminology

WLAN / WAN

Limited Mobility

Public Safety

Private Networks

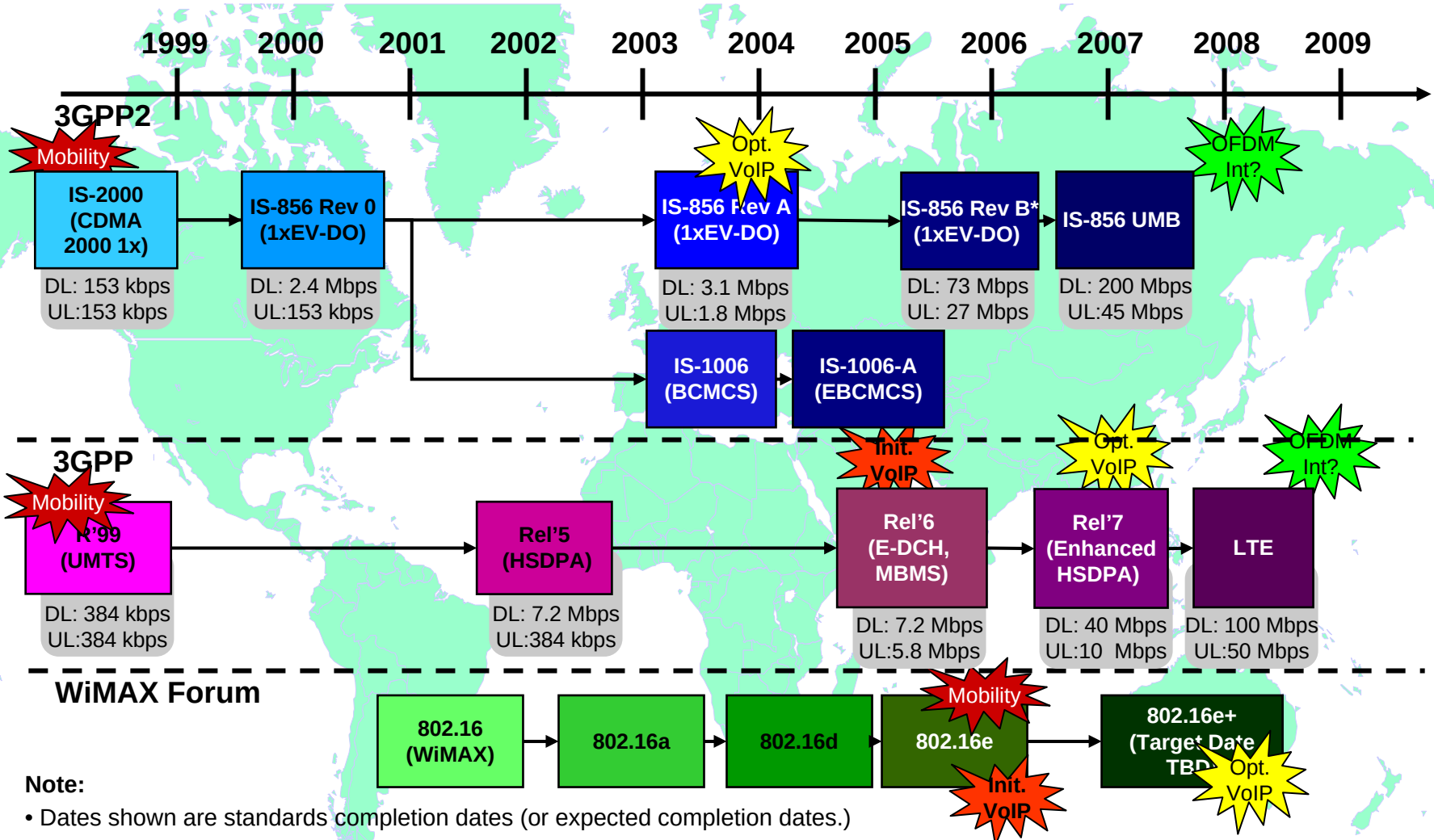
LMR
“Walkie Talkie”
Project 25

Cellular Systems

Mobile Networks

CDMA2000
WCDMA/UMTS
EVDO/EVDO RevA
HSDPA/HSUPA

Standards Technology Evolutions



Note:

- Dates shown are standards completion dates (or expected completion dates.)
- "Initial VoIP" not as spectrally efficient as "Optimized VoIP". "Optimized VoIP" for 802.16 is TBD.
- "Mobility" indicates when each particular standard supports mobility inter-operability between the terminal and BTS.

Organizations interested in emergency wireless communications

- Organizations responsible for the health and welfare of the public – Public Safety Organizations
  - Agencies such as police, fire, and emergency medical teams, i.e., first responders
  - Government agencies such as border patrol, FBI, homeland security, etc.
- Private and public enterprises that need efficient communications for closed-user-groups
  - Organizations such as private delivery and transportation, utility companies, public transportation, etc.

Members of the Public Safety Community as defined by PSWN

- Local, state, federal, and tribal law enforcement, fire, and emergency medical services (EMS) officials

Local

- Police Chiefs
- Fire Chiefs
- Ambulance & EMS Workers
- Local Emergency Personnel

State

- Members of State Dept. of Public Safety
- State Highway Patrol Officers
- Emergency Preparedness Officials
- State EMS Directors

Federal*

- FEMA
- Coast Guard
- Secret Service

Branches of:

- Dept. of Justice (FBI, INS, US Marshals Svc., DEA, Bureau of Alcohol, Tobacco & Firearms)
- Dept. of Interior
- Dept. of Agriculture (Forest Service)

Public Safety Community Comprises
52,000 local, 160 state and
30 Federal Agencies (totaling 2.5 million officers)

* Portions will move to the new Department of Homeland Security

First Responders & Others with a Public Safety and Security Mission

- **2,500,000 Public Safety First Responders (US)**
  - 28,713 Fire and 6,034 EMS Departments[1]
  - 960,000 Firefighters & 830,000 EMS Personnel
  - 15,221 Law Enforcement Agencies[2]
  - 710,000 Law Enforcement Officers
- **Others with a Public Safety and Security Mission (US)**
  - National Response and Federal Response Plan users
  - National Incident Management System (NIMS) users
  - National Security and Emergency Preparedness (NS/EP) users
  - Critical Infrastructure owners, operators, decision makers
  - Key municipal leadership and decision makers
  - Public health system (hospitals, CDC, etc.)
  - U.S. Department of Homeland Security
- **In US, an expanded group of public safety users of from 5 to 10 million people.**

Source: "SAFECOM Public Safety Wireless Interoperability," Dr. D. Boyd, U.S. Department of Homeland Security, Oct. 6, 2003 (original sources cited as 1. National Directory of Fire Chiefs and EMS Administrators and 2. National Directory of Law Enforcement Administrators).

The Current Situation

- Individual Public Safety authorities have their own networks that do not interoperate with each other.
- Typically large numbers of responders converge on the emergency site creating the need for high capacity and the potential for blocked calls.
- Bystanders collect at the site creating additional communication congestion and the requirement for priority calling.
- Disasters can occur anywhere creating the need for complete coverage.
- Today's Public Safety networks are mainly Land Mobile Radio (LMR) networks since it was thought that Public Safety needed unique radio access technology. The networks are voice-centric with limited data capability.
- LMR networks are expensive.
- Major disasters like the Indonesian tsunami, the Pakistan earthquake, 9/11, hurricane Katrina, etc., have shown the limitations of existing Public Safety networks.

Wireless Networks Today

Public Safety	Commercial Wireless
Narrowband circuit-switched digital	Wideband packet-switched digital
Proprietary Solutions “Single-vendor interoperability”	Standardized Solutions Multi-vendor interoperability
Push-to-talk Group Voice User-to-user Voice	User-to-user Voice *Push-to-talk*
<10 kbps data (if at all) Lightweight client-server apps	Mbps data Video, Multi-media messaging, …

U.S. Government Trends Affecting Public Safety

- Budget crisis
  - *Technology purchases must be tied to performance*
- eGov/Paperwork Elimination Act
- Justice Information Technology Integration
  - *Improve communication between agencies*
- Analog systems migrating to digital
- Proposal to allocate 30MHz for Public Safety in new spectrum auction
- Homeland Security
  - *Security issues are drawing attention to needs*
  - *New source of funding (spending up 47% to 67% to over $2B)*

Public Safety Spending

US Federal Integrated Wireless Network (IWN) :
"estimated **$2.5 billion … $10 billion** over its expected 15-year life span…supporting 80K users"

New York State Public Safety Wireless Network: $2 Billion

Virginia Public Safety Wireless Network: $329 Million

Substantial Investments are being Made in Public Safety Wireless Communications.

Public Safety Industry Needs

Public Safety Industry Communication Needs

- **Reliability**
  - Dedicated access – looking for ways to ensure data is transmitted even during crisis times and congestion on network
  - Priority access – calls from senior members of staff get put in queue first as do certain transaction types, like “officer down” alerts
- **Coverage**
  - Government agencies serve all parts of the state
  - In-building, subways and tunnels are currently problems in metro areas
- **Security**
  - Current standard is at least 128 bit key encryption for data
  - HIPPA – Health Insurance Privacy and Portability Act – protects the transmission of patient health data – biggest concern for EMT
- **Interoperability**
  - Biggest issue with voice networks; some agencies may have troopers with a need to roam between various types of data networks (RDLAP, Mobitex, CDPD, WLAN)
- **Cost effective**
  - Limited budgets available for equipment outlay
- **High Speed Data**
  - Improved database queries and new applications to improve performance

Value Proposition/Business Case for Public Safety

Why 3G for Public Safety?

- It can take up to 8 minutes to download a mugshot over slower speed wireless data technology
- One major city police force fills out at least five forms, containing 200 pieces of information before completing an arrest and at least 30% of the data must be entered more than once.
- Public Safety agencies spend $3,000 and more per unit for mobile radios; mobile data devices are one tenth the cost
- PSWN estimates that most Public Safety communications equipment is at least 10 years old, with at least 30% operating beyond useful shelf life, and many agencies operating equipment 20 to 40 years old

Why 3G for Public Safety?

- Incident response will involve **multiple jurisdictions (Local, State and Federal)** with some using different communications technologies
  - Commercial wireless service may be the only common technology among the responders
- Day-to-Day operations increasingly need more **real-time data communications** to share learning/information from the field
- Public Safety agencies that have deployed mobile data have seen a significant **improvement in service delivery, officer safety and cost savings**
  - City of Vancouver estimates that eTicket applications run on PDAs will generate $393,000 over six years from increased ticket payments and fewer violations.
  - Sacramento Police department estimated that electronic database query systems run on handheld PCs would save each officer 1,824 hours per year and help them solve cases more quickly.
  - Pasco Texas Police department estimated that their electronic incident report form would save 30 minutes of process time which equated to $180 a day or $65,000 per year.

San Diego Police Department Project

- **Broadband Access PC Phone Project**
  - — The project started in Fall ’05 with the San Diego Police Department
  - — They gave officers in the field PDAs
  - — Applications included:
    - Cell phones with speed dial, call history, voicemail, email, calendar, task list, remote training, incident notification, notes (audio included), computer aided dispatch,
    - A client to access the ARJIS database – a database with info on past crimes, be on the lookout for,etc., and
    - A client to access California’s database of mug shots.

- **Quotes from officers that used the system**

“These things are great. Since we don’t have access to a computer in the office that has the ability to conduct records checks, the PDA has been invaluable. In the past we would have to drive to HQ or call someone but now we can do it anywhere.”

“We have also been added to the PD and Fire Department’s incident notification system which is email based. Now we are notified instantly of any major incident in the city. We can then notify the Mayor.”

“The ability to send and receive emails, including attachments is a big plus. I routinely communicate via email with other Dignitary Protection Units in San Diego, Washington, DC and other places we travel with the Mayor. It’s much easier to go over advanced [planning] on an email than it is to send or receive faxes, which is what we did before we had the PDAs.”

Wireless Mobile High Speed Data Enables the use of critical new applications previously limited by low bandwidth of pre-3G solutions

- Mapping/Location Based Services – Automatic Vehicle Location, critical infrastructure protection
- Video Streaming – incident scenes, security
- Digital Image transfer – disaster scene
- Large files transfer- records, on-line manuals, emergency protocol
- Biometrics – facial recognition
- Bioterrorism detection and response – sample analysis, plume tracking, ID dangerous substances

GPS/GIS Location Based Services

Route Navigation

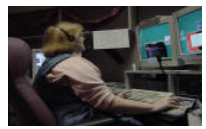
First Responder Tracking

Incident Mapping

Video Services

Real-time Car Video

Disaster Surveillance



Dispatch Centers

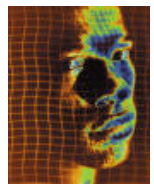
Multimedia Data Collection/Retrieval

Images from site

Patient Monitoring

Image from Crime Databases

Biometric Services

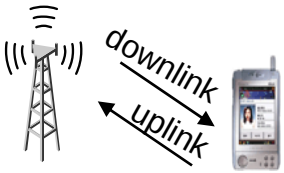


Facial Scan

Retinal Scanners

Mobile Fingerprint

Speed Comparisons



		Cellular Digital Packet Data	Project 25	Commercial Mobile Radio: CDMA2000 1x EV-DO Rel 0	Commercial Mobile Radio: CDMA2000 1x EV-DO Rel A	Commercial Mobile Radio: HSDPA
		12.1 kbps down 9 kbps up	9.6 kbps down 9.6 kbps up	2.4 Mbps down 153.6 kbps up	3.1 Mbps down 1.8 Mbps up	1.8 Mbps down 384 kbps up
Mugshot download	352x375 pixels jpeg 20 kbytes	13 secs	17 secs	0.07 secs	0.05 secs	0.09 secs
	287x308 pixels gif 47.2 kbytes	31 secs	39 secs	0.16 secs	0.12 secs	0.21 secs
High resolution incident still photo	Download:	93 secs	117 secs	0.47 secs	0.36 secs	0.62 secs
	1400x1050 pixels jpeg 140 kbytes Upload:	124 secs	117 secs	7.29 secs	0.62 secs	2.92 secs

Future Wireless Enhancements

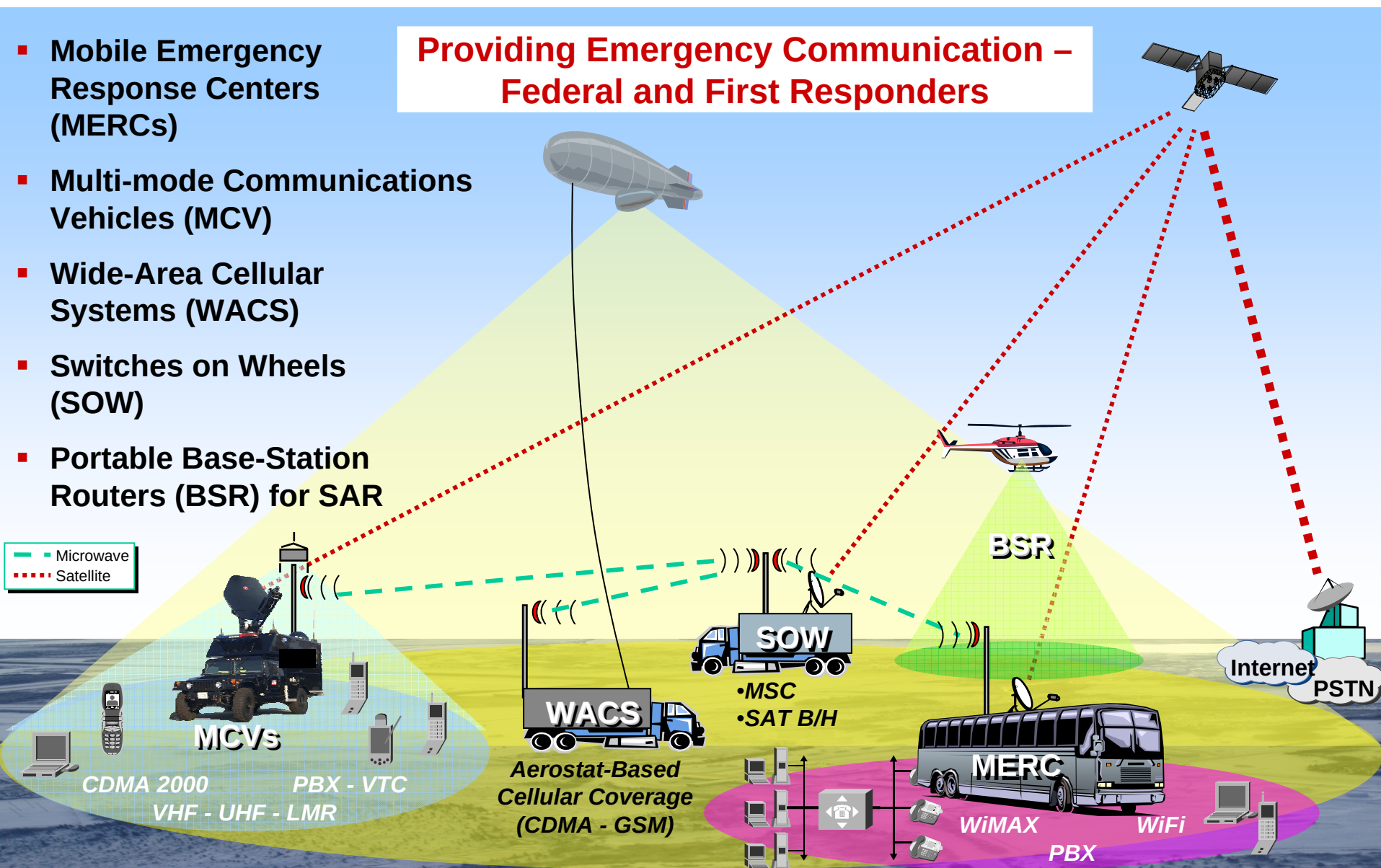
Future Wireless Enhancements

- Push-to-Talk
- Broadcast/Multicast
- EV-DO Rev A / HSUPA (Higher Data Rates>3Mbps)
- Enhanced Access Assurance & Priority Service
- Improved Geolocation
- VoIP
- Better In-Building Coverage
- Integrated Sensor Applications

A future Public Safety Scenario…

- **Mobile Emergency Response Centers (MERCs)**
- **Multi-mode Communications Vehicles (MCV)**
- **Wide-Area Cellular Systems (WACS)**
- **Switches on Wheels (SOW)**
- **Portable Base-Station Routers (BSR) for SAR**

Providing Emergency Communication – Federal and First Responders



Real-Life Deployment

Katrina Search and Rescue Operations with US Coast Guard

Summary and Conclusions

Summary and Conclusions

- **3G wireless (EV-DO, Rev A; WCDMA, HSDPA) high-speed data services are available to public safety officials today**
  - Fully interoperable with all systems supporting IP interfaces
  - Applicable for rapid data collection/retrieval and new applications like location based services, video services, biometric services, etc.
  - Dedicated spectrum for Public Safety applications is under discussion
- **3G wireless has significant economies of scale**
  - Lower infrastructure and handset costs
  - Innovation guarantying long term viability
- **Future 3G wireless communication features will allow deployment of scalable, multi-media "push-to-talk" capabilities**

3G wireless systems are secure, widely deployed with proven reliability and have the features necessary for improving the performance of Public Safety organizations

Thank you!