



DEFENCE AND SPACE
Secure Land Communications

Internet of Public Safety Things

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AIRBUS



- **3GPP 4G/5G**
- **ICT**
- **IoT**
- **Clouds**
- **Drones**
- **Analytics**

Mega Technology Ecosystems Shaping the Future of Critical Communications

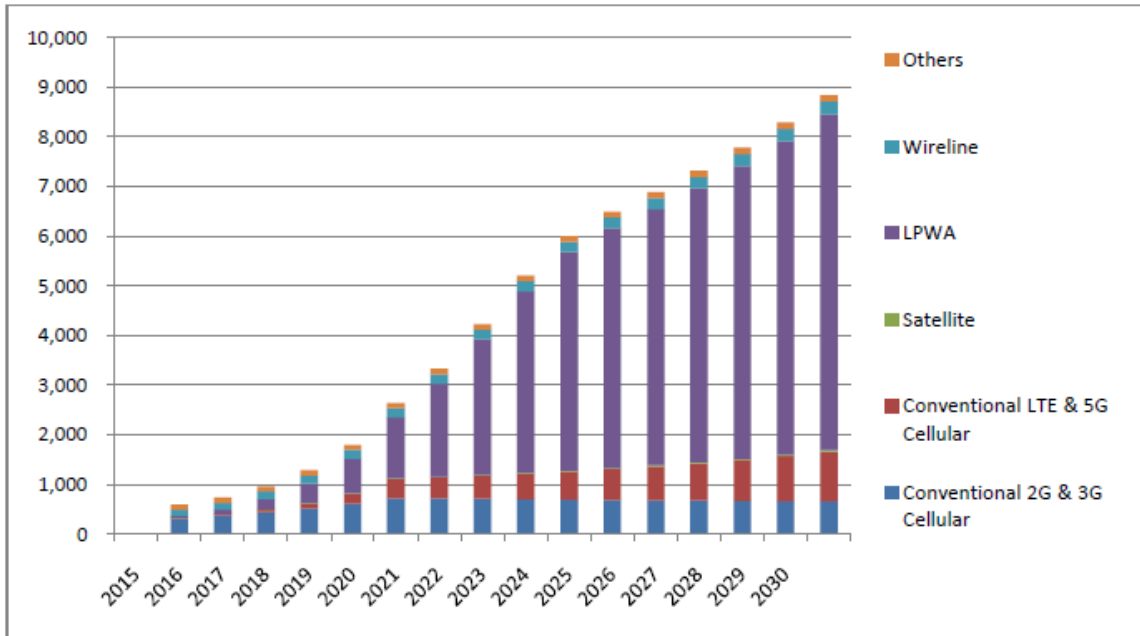
- Critical Communications following general technological evolution
- Digitalization changing business models and markets
- Public Safety operations evolving – more connected, more data and analytics for faster and better decisions
- Ground breaking change for Public Safety actors, including users, operators, industry and governmental bodies



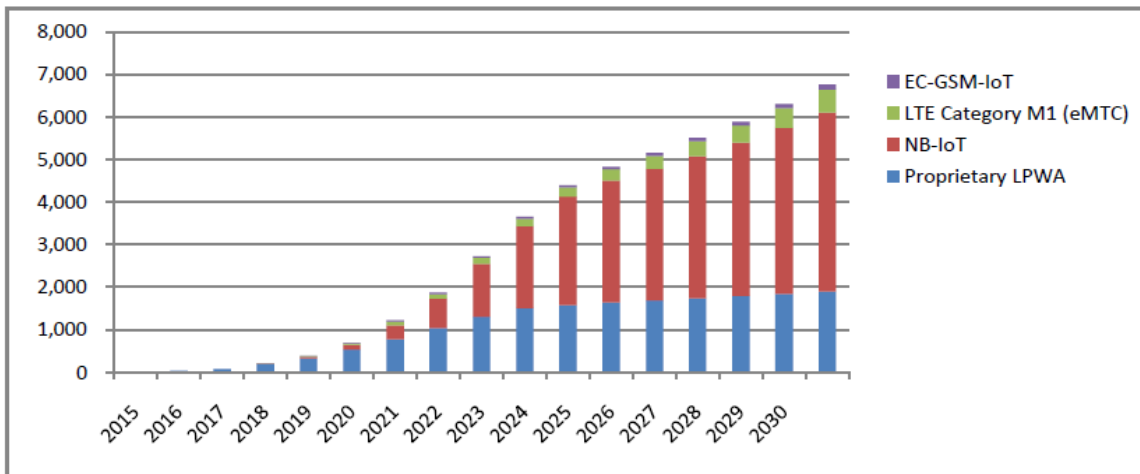
Internet of Things (IoT) - Basics

- IoT is an extension of the Internet
 - machines and sensors are connected to the Internet
 - these devices can be controled and used over the Internet
- Machine to machine (M2M)
 - Direct communication between devices using any communication channel, including wired and wireless
- Connected devices
 - 1M connected devices by 1992
 - 1B connected devices by 2004
 - Growing rapidly, fueled by new technologies

Low Power Wide Area Networks (LPWA)



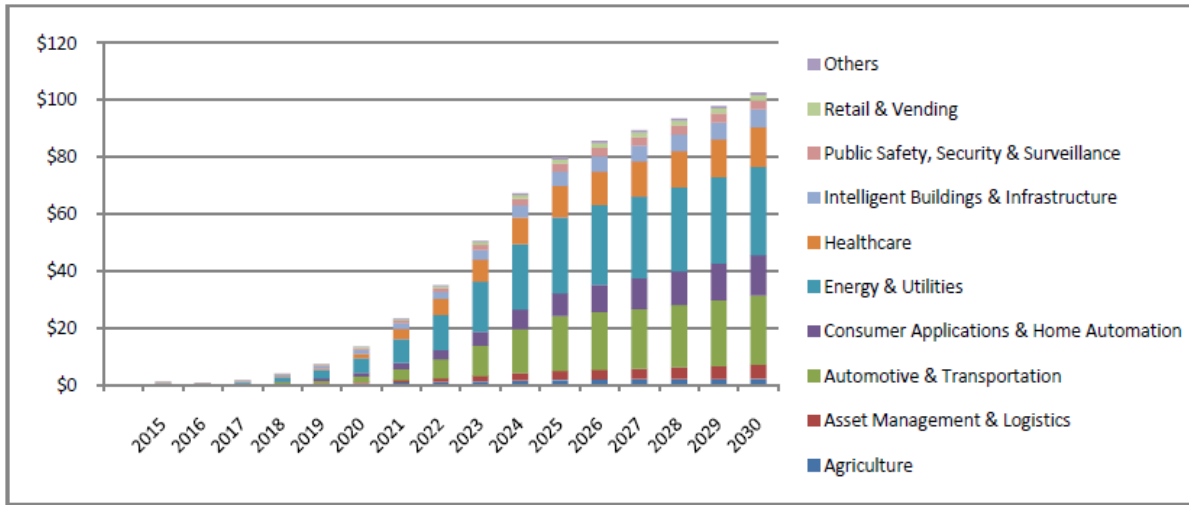
Wide area M2M connections by technology



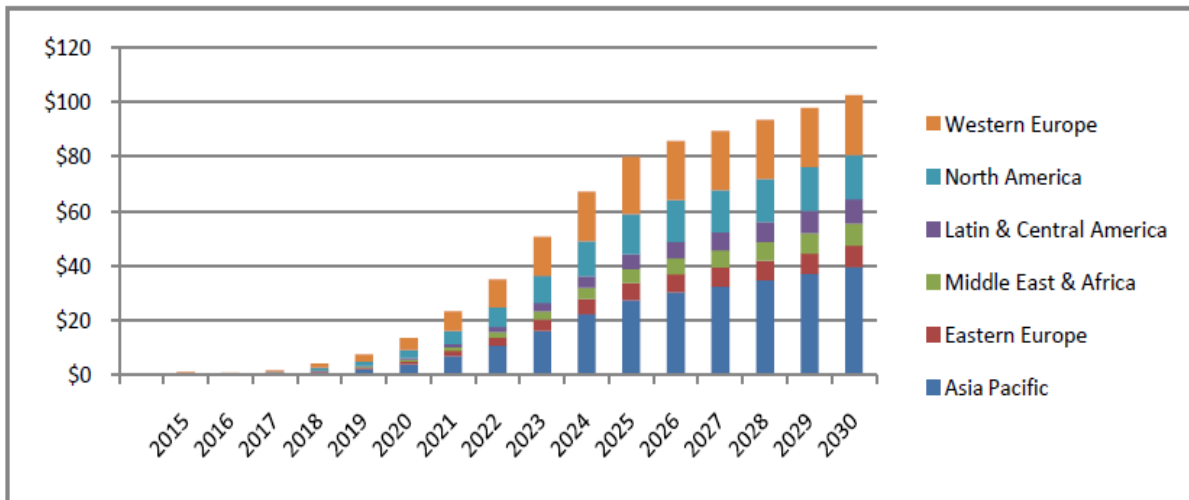
LPWA M2M connections : standards vs proprietary

- LPWA networks fulfill requirements of Public Safety and Utilities
 - Wide and deep coverage, also in rural areas
 - Affordable sensors and equipment
 - Sensors with very long battery life
- Currently existing LPWA technologies are proprietary
 - Limited size of ecosystem
 - Operating at unlicensed bands
- Market growth requires standards, strong ecosystem and licensed bands
- 3GPP rel13 introduced three LPWA technologies
 - EC-GSM-IoT
 - LTE Category M1
 - NB-IoT

LPWA Market Forecast



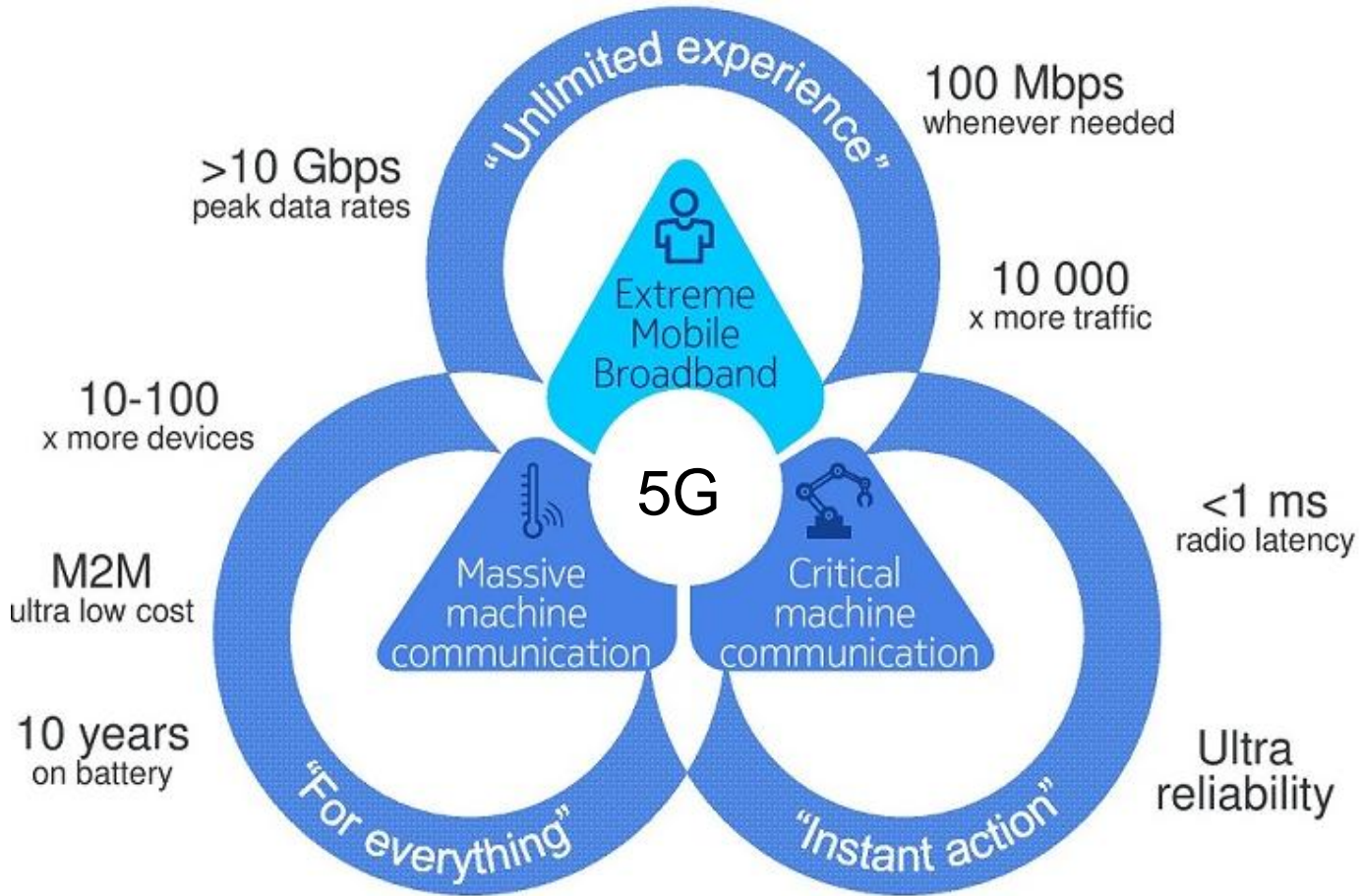
Revenue by verticals



Revenue by regions

- Dominating market verticals
 - Energy & Utilities
 - Automotive & Transportation
- Public Safety identified as one of the verticals – volumes pretty moderate
- Many other small verticals / applications areas
- Dominating regions
 - Asia Pacific
 - Western Europe
 - North America
- New value chain
- Total market value 100+ BEur by 2030
- 7B connected LPWA devices by 2030

IoT and 5G Linkage



- Critical application verticals (e.g. autonomous cars, industrial solutions) require
 - High reliability
 - Low latency
 - Security
- Flexible prioritization of different user groups
 - Network Slicing
- M2M
 - Large number of sensors
 - Cost efficiency
 - Long autonomy of sensors
- 5G is the first technology level where all these aspects are available

IoT - What's There In for Mission Critical Users



- IoT will be applied by Public Safety and Critical National Infrastructure users as well, application areas are nearly endless
- Sensors are providing large amount of information, complementing conventional information sources
- Applications needed for the collected big data
- Vehicle for improved efficiency and proactivity for mission critical user organizations
- When applications (and availability of the required data) become part of operational procedures, basic mission critical requirements must be fulfilled
 - Service availability (coverage, resiliency,...)
 - Traffic prioritization
 - Security

Public Safety Use Case – Gunshot Detection



- Sensors installed in high crime areas
- Sensors triangulate the origin of a gunshot
- Gunshot data sent to connected police stations
- Patrol officers in cars receive the gunshot data
- Police respond to the scene

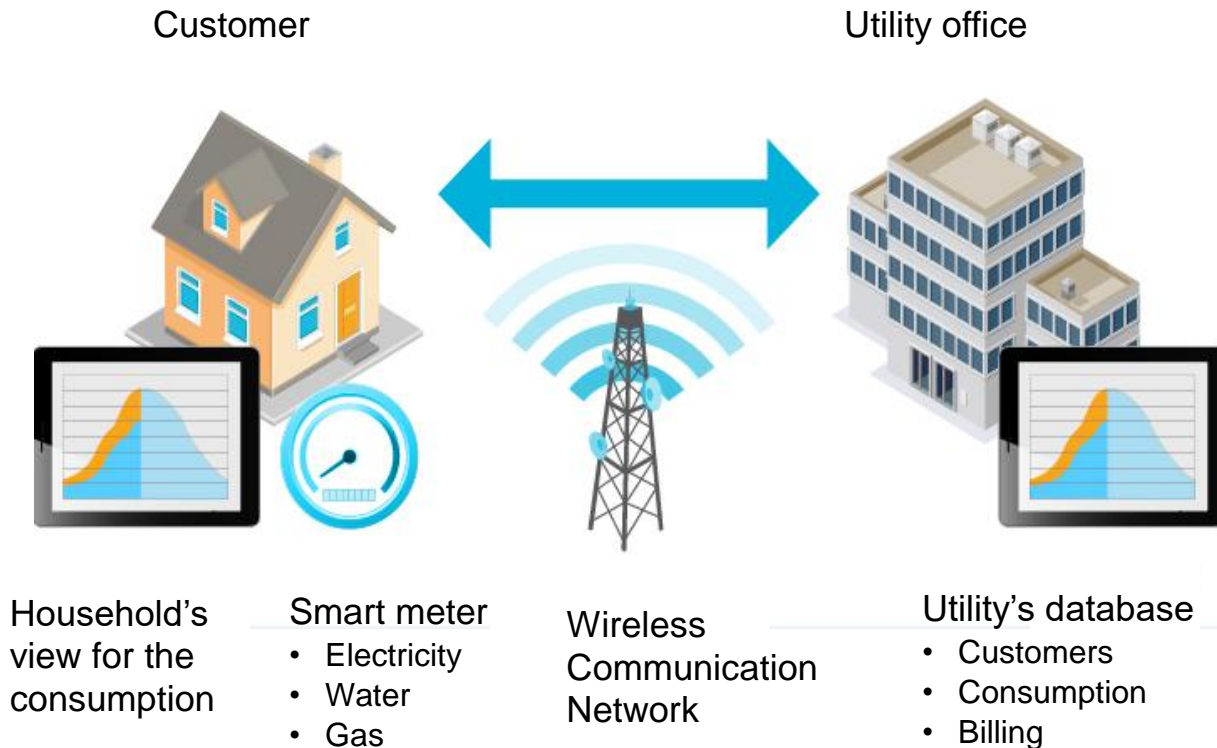
- Already in use in several cities
- Statistics are showing lowering number of gun crime and homicides

Public Safety Use Case - First Responder Monitoring



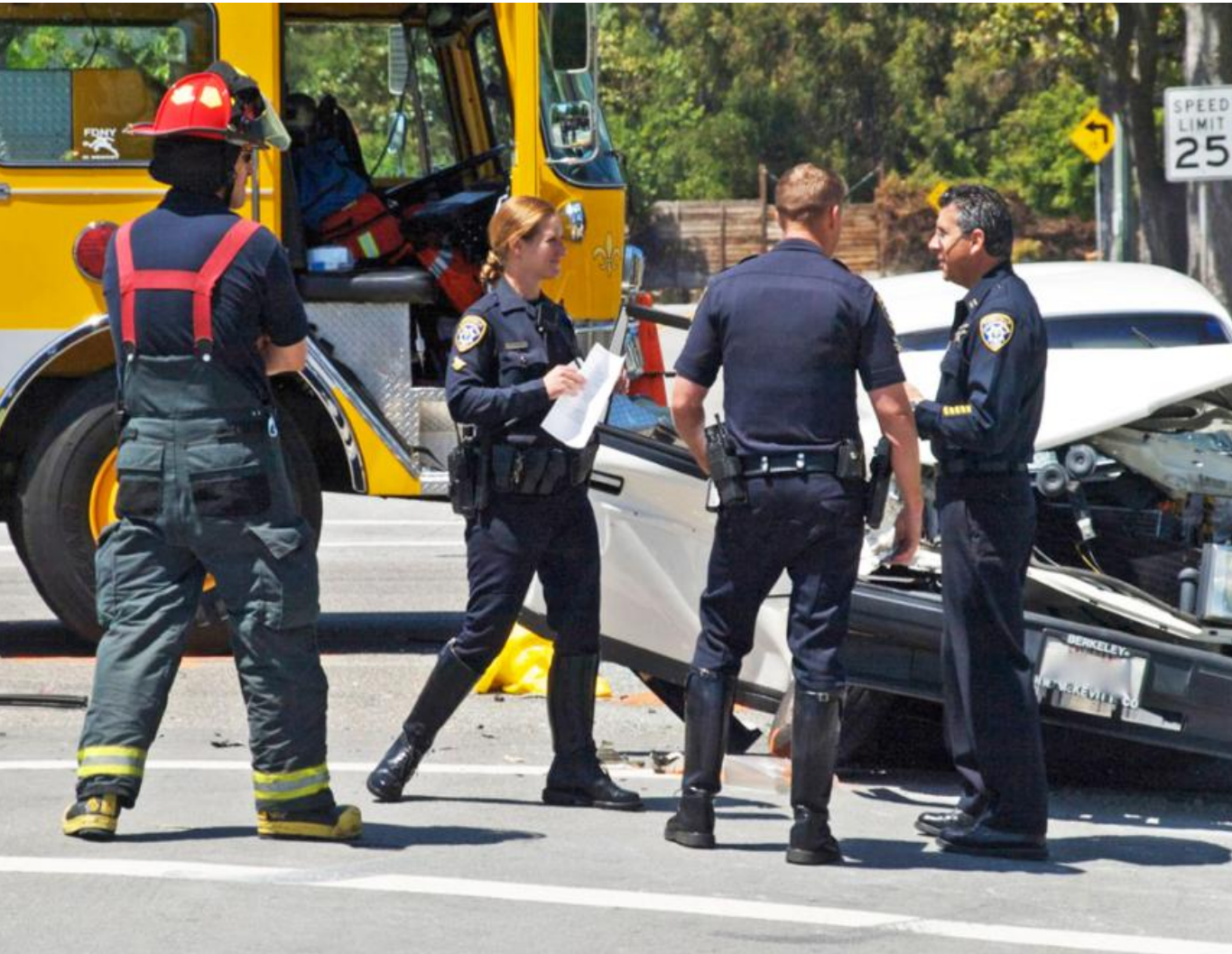
- Location monitoring
- Information about health conditions and body functions sent to control center
- Detection of abnormal movement
- Gun lock/unlock information sent to control center
- Improved first responder safety
- Improved situational awareness in control center

Utilities Use Case – Smart Metering



- Both for electricity, water and gas
- Meter sends data to utility office via wireless network, data stored in database
- Households can view their own consumption data from the database
- LPWA networks are ideal solution because of their coverage and battery autonomy performance
- Significant operational savings for utilities, but also better service for households

Applying IoT for Mission Critical Users



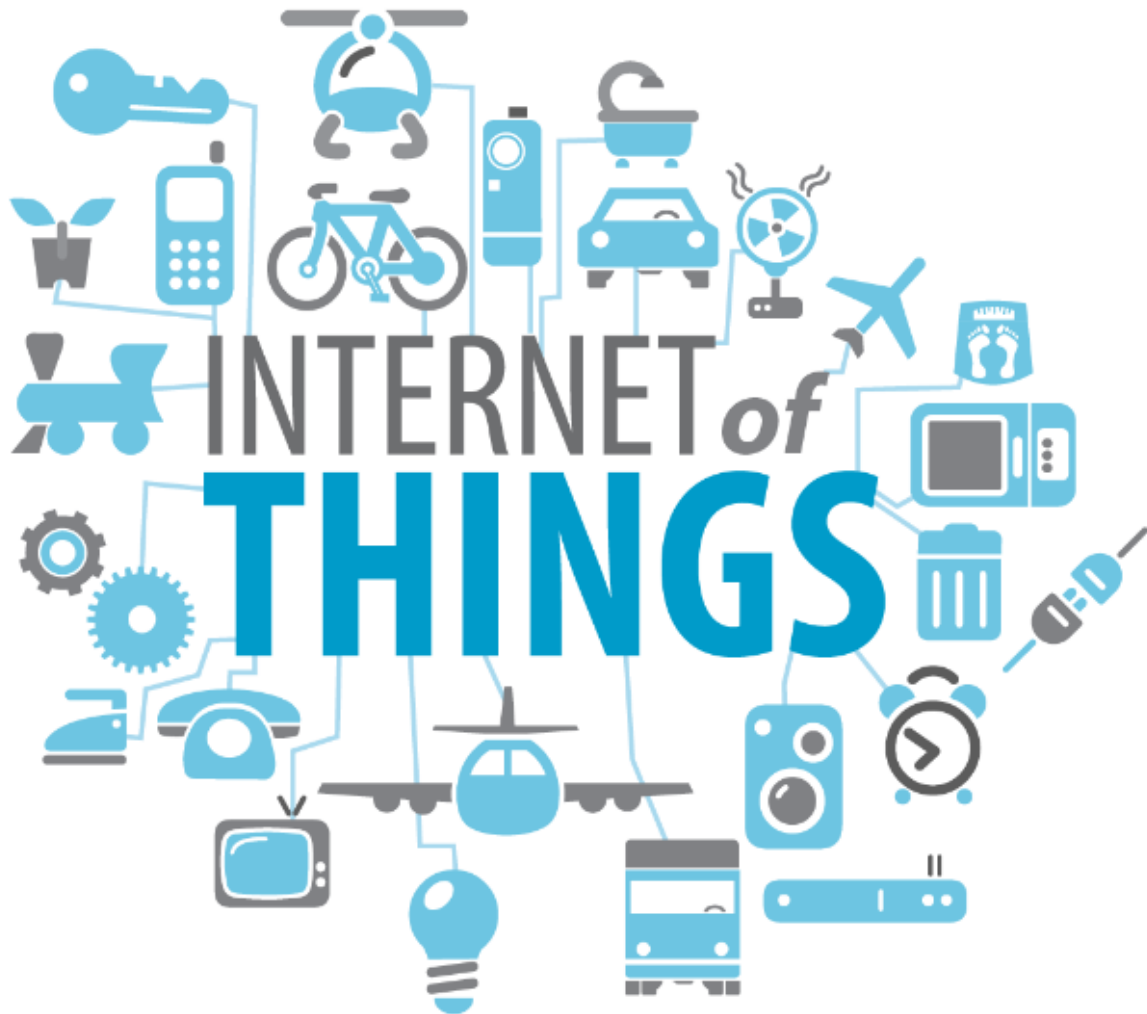
- Benefits

- ✓ Improved efficiency, improved situational awareness
- ✓ Safety of mission critical users
- ✓ Improved proactivity
- ✓ New techno can compensate reduced workforce of first responders
- ✓ Cost savings for longer term

- Challenges

- ✓ Information security and data privacy
- ✓ Regulatory aspects
- ✓ Human resistance vs new technology
- ✓ Moderate volume of mission critical sensors
- ✓ Huge amount of collected data

Conclusions



- 5G triggers huge IoT market growth
- Public Safety and Utilities will be among those market verticals which will apply IoT
- LPWA networks are fitting to Mission Critical use
- IoT will bring significant benefits, but also challenges
- IoT applications will become part of operational procedures – Mission Critical requirements need to be met