

Capacity

Coverage



Bandwidth

ENTER

[click here for more information](#)

Kurt Jacobs

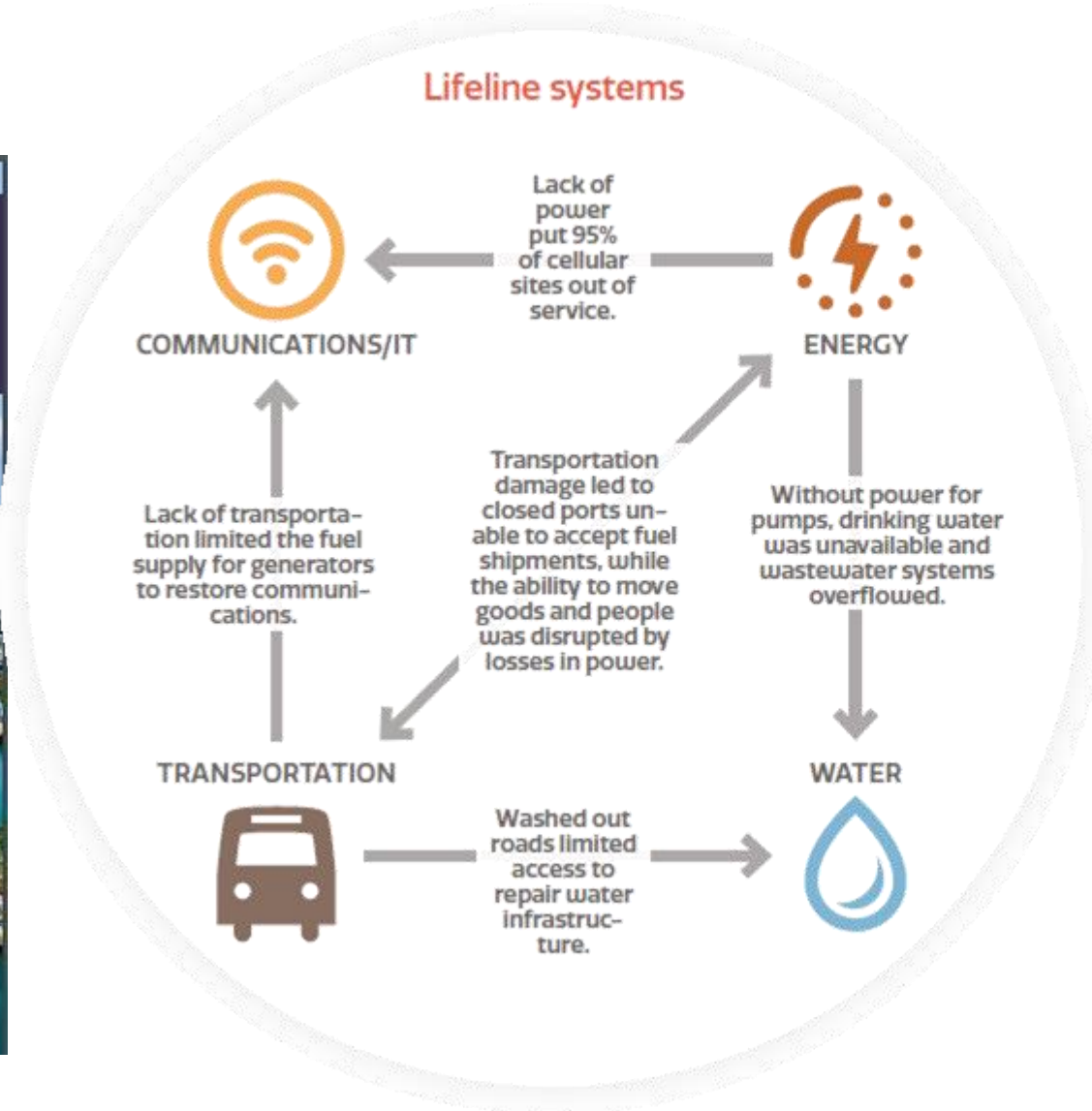
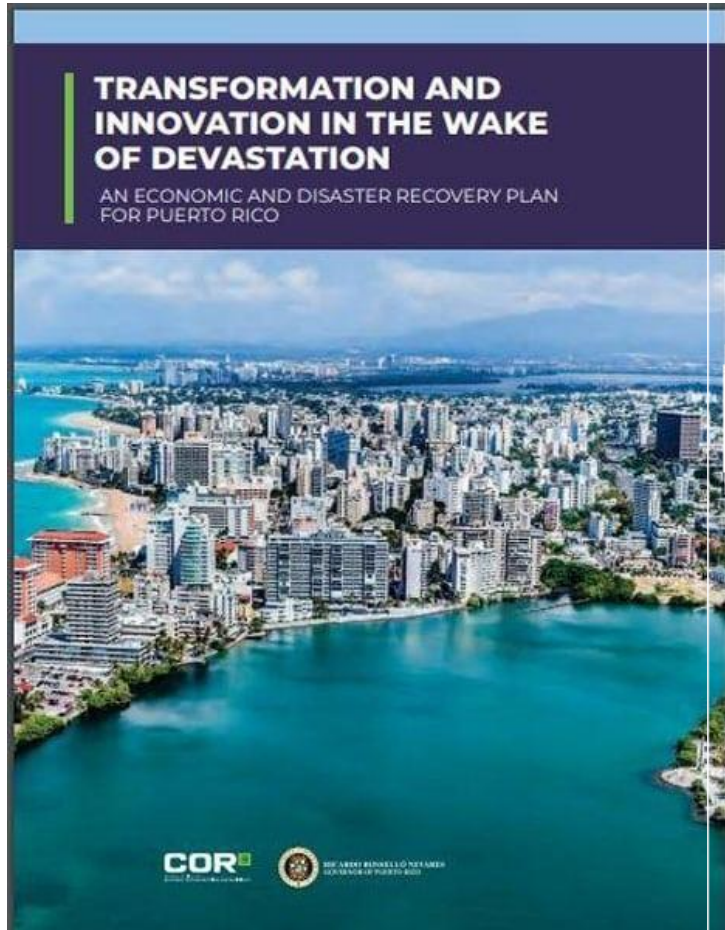
Director, JMA Wireless

FCC Broadband Deployment Committee



DenseNetworks.com

Connectivity Dependence – 4G World



And without those lifeline systems:



Many healthcare facilities were not open, and people were unable to travel to those that were.



Emergency services were immobilized.



Many businesses were not open, stores could not get supplies, and people could often not get to those that were operational.

John Foley

Managing Director

Safer Buildings Coalition



DenseNetworks.com

Define the Problem

- There are over 5.6 million commercial buildings in the U.S
- People need to be able call 911 from inside those buildings
- First Responders need to be able communicate with each other inside and outside buildings
- **SBC survey shows that in a large percentage of buildings critical communication can't happen**





3 Pillars Of In-Building Public Safety Communications:

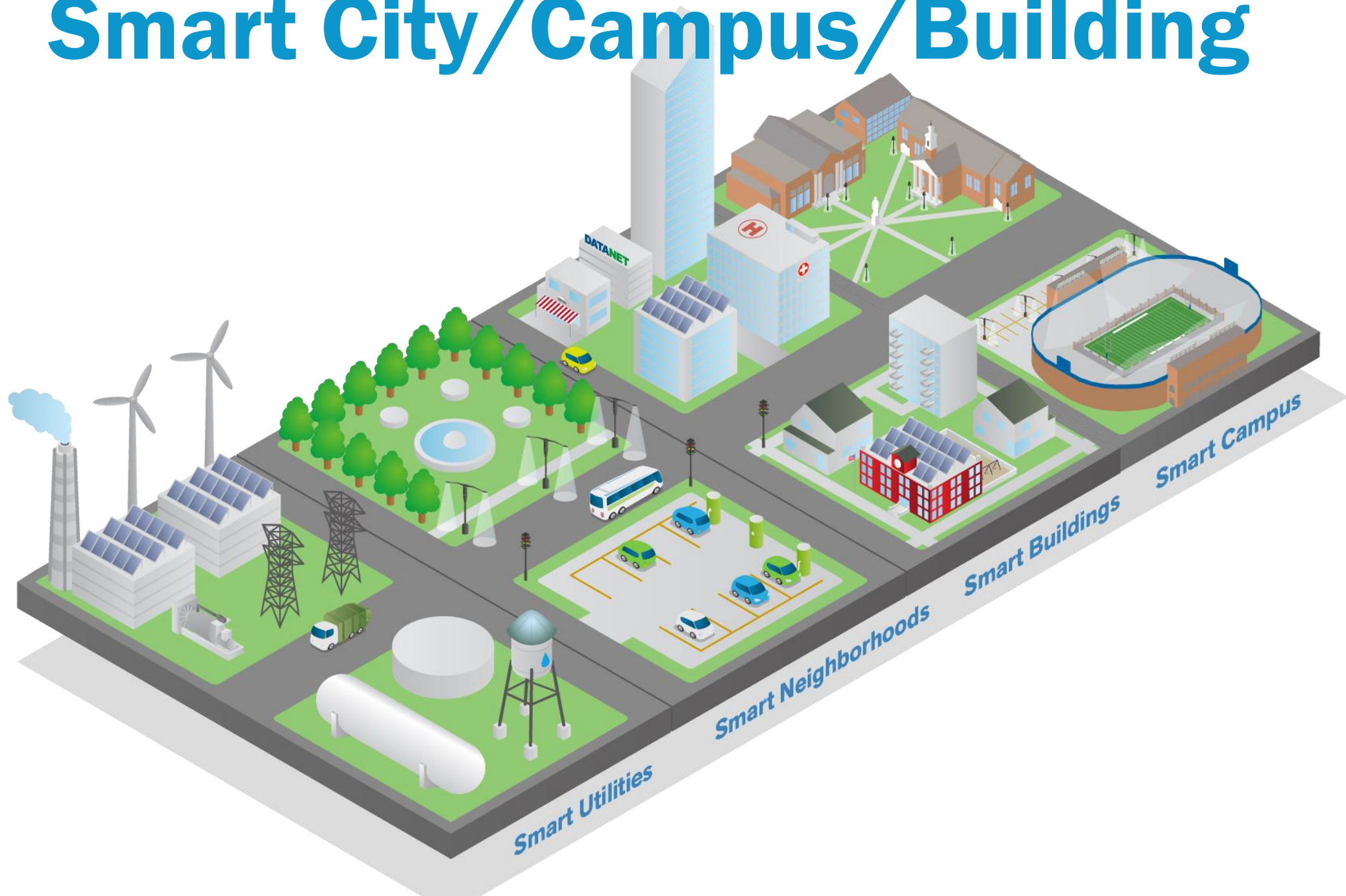
The **Safer Buildings Coalition** is an independent, not for profit organization.

- Mobile 911 Calls Must Get Out *with Location Accuracy*
 - Mobile Mass Notifications Must Get In
- First Responder Communications Must Work

Eric Toenjes, Graybar National Market Manager Wireless



Smart City/Campus/Building



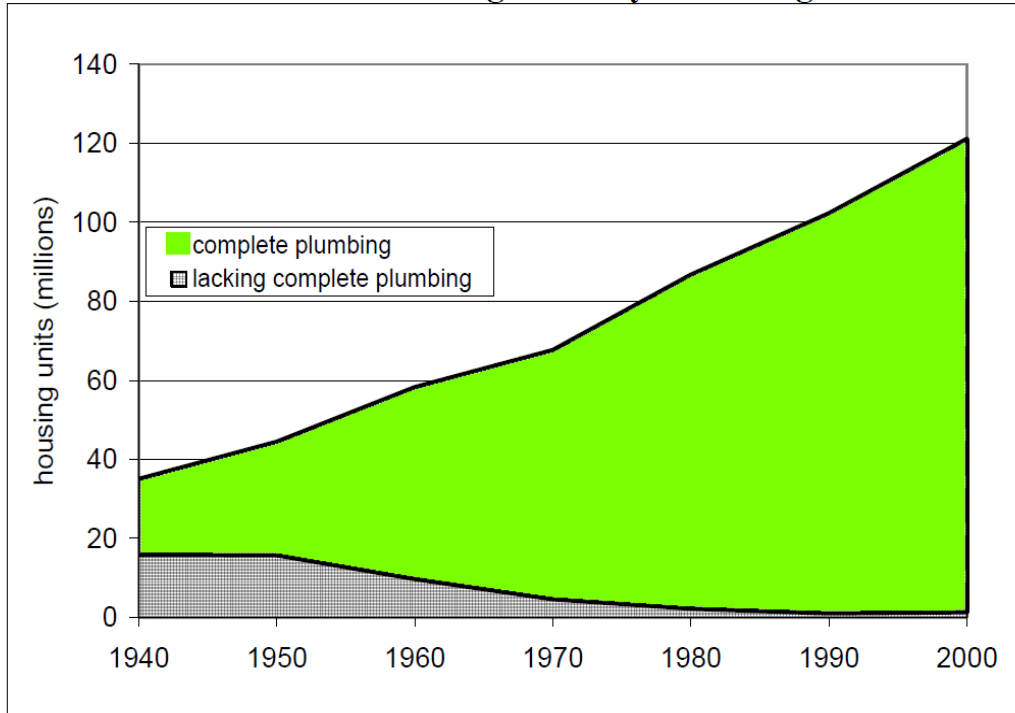


- IoT Sensors & Controls
- Security
- Access Controls
- IPTV
- Lighting Controls
- Building Automation
- Passive Optical Network
- WiFi
- Distributed Antenna Systems – cell, public safety, private radio, paging
- Voice
- Telemetry
- Any IP-based System

SHIFTING TIMES

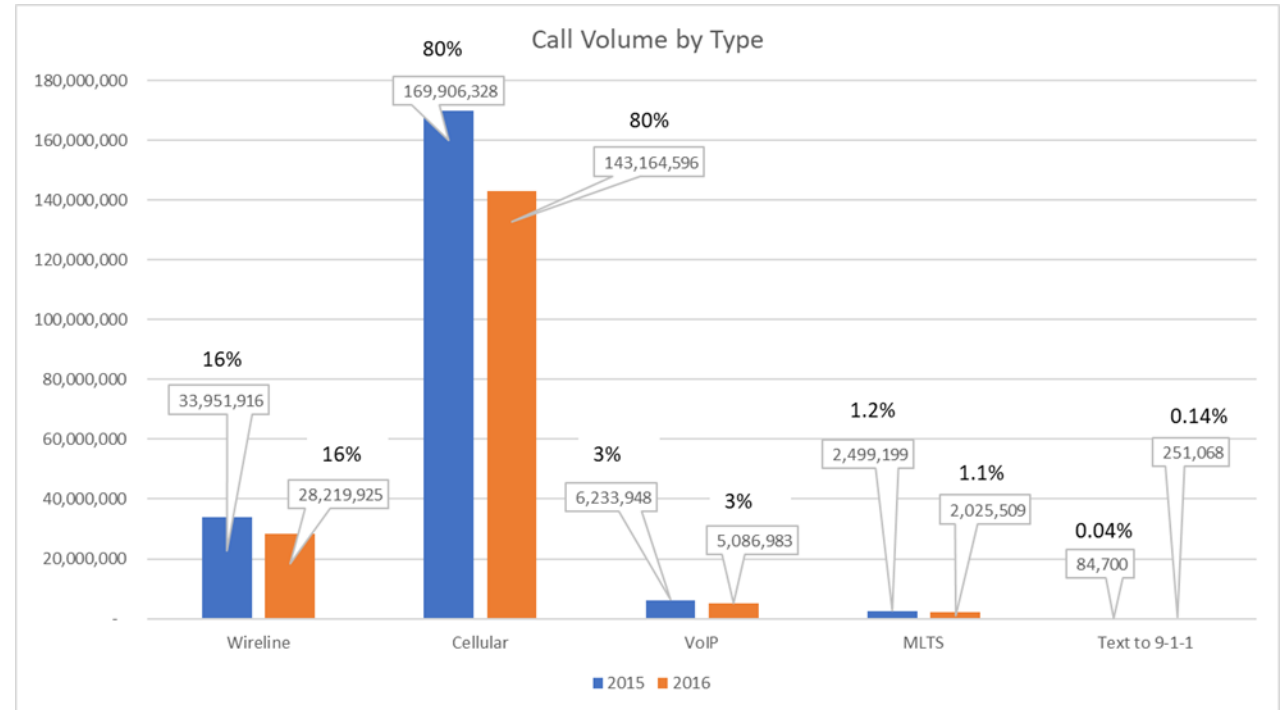


Housing Units by Plumbing



Source: U.S. Census 2002a

Would you buy a property without Plumbing?



80% of calls to 9-1-1 from Mobile

Source - DOT - NHTSA - 2017 National 911 Progress Report

“Must Do” Drivers

- Fire Codes Being Enforced Nationwide > EXPANSION
- Building Owners must meet code and satisfy tenant need for cellular coverage
 - Public Safety Agencies need to manage costs – improve capabilities: LTE is less expensive and more capable (but for now, less reliable)
- FCC Location Accuracy requirements driving innovation and investment

NYC Buildings *Certificate of Occupancy* Page 1 of 6
CO Number: 320100234T020

This certifies that the premises described herein conforms substantially to the approved plans and specifications and to the requirements of all applicable laws, rules and regulations for the uses and occupancies specified. No change of use or occupancy shall be made unless a new Certificate of Occupancy is issued. This document or a copy shall be available for inspection at the building at all reasonable times.

A. Borough: Brooklyn Address: 620 ATLANTIC AVENUE Building Identification Number (BIN): 3398156	Block Number: 01118 Lot Number(s): 27 Building Type: New	Certificate Type: Temporary Effective Date: 07/15/2016 Expiration Date: 10/13/2016
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This building is subject to this Building Code: 2008 Code
For zoning lot metes & bounds, please see BISWeb.

B. Construction classification: 1-B (2014/2008 Code) Building Occupancy Group classification: A-4 (2014/2008 Code) Multiple Dwelling Law Classification: None	No. of stories: 5 Height in feet: 122 No. of dwelling units: 0
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C. Fire Protection Equipment: Standpipe system, Fire alarm system, Sprinkler system, Fire Suppression system
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“The FCC estimates that a one-minute improvement in 9-1-1 dispatch time could save 10,000 lives each year”

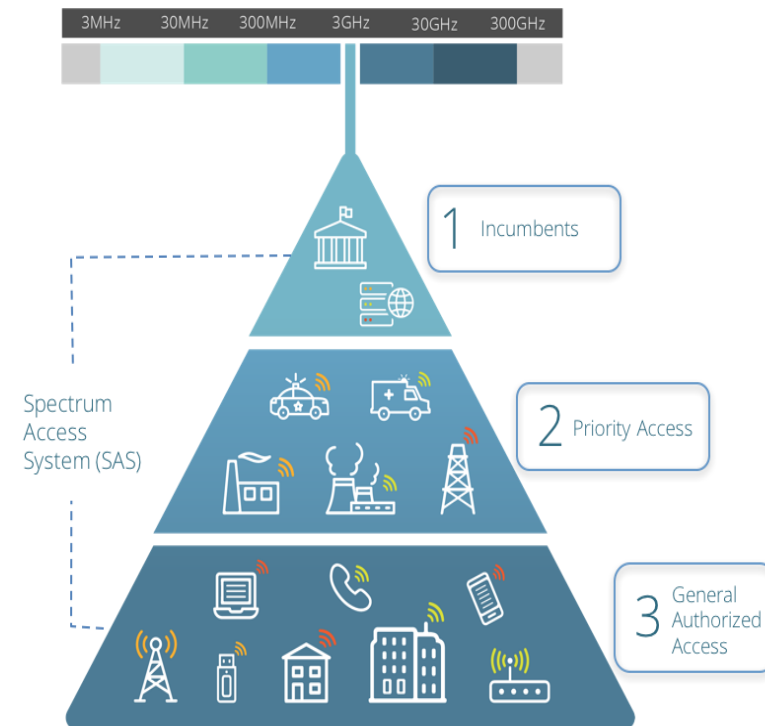
Good Bones –The Foundational Platform

-
- **Pathway** (Conduit, Chases, Cores, Raceway)
 - **Connectivity** (Fiber, Fiber, Fiber!, copper, patch panels)
 - **Power** (Centralized, sustainable, resilient, reliable, distributed, digital)
 - **Environmental** (Space, Cooling)
 - **Access** (Closets, Demarc, Physical Security)
 - **Documentation** (As-builts, Designs, Current / Accurate)

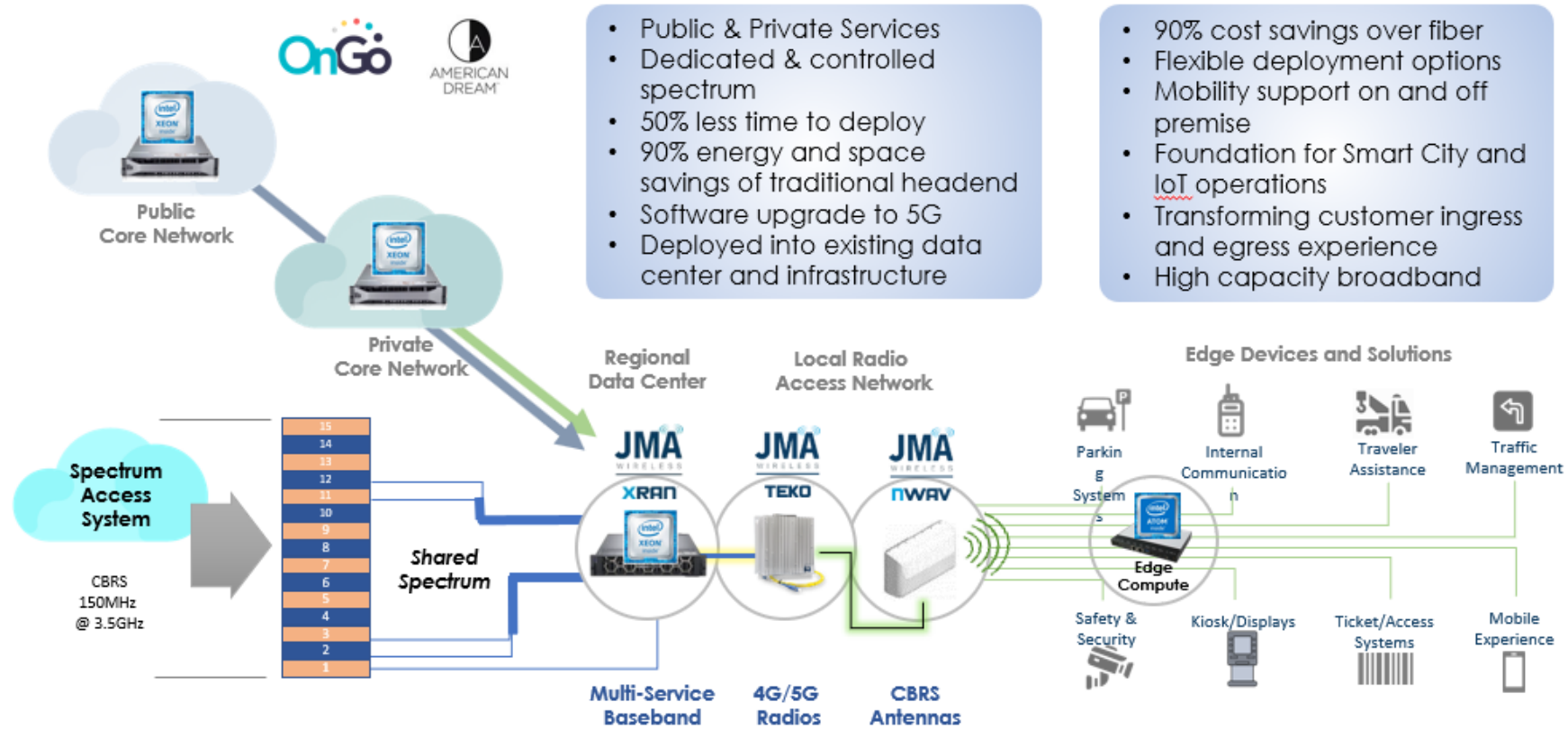


Planning for the Future CBRS Private LTE Network

- Tiered Approach
 - Incumbents
 - Priority Access
 - General Authorized Access
- Spectrum Access System (SAS)
- Evolved Packet Core (EPC)
- Radio Access Network (RAN)
- The OnGo Ecosystem



American Dream Entertainment & Retail Experience



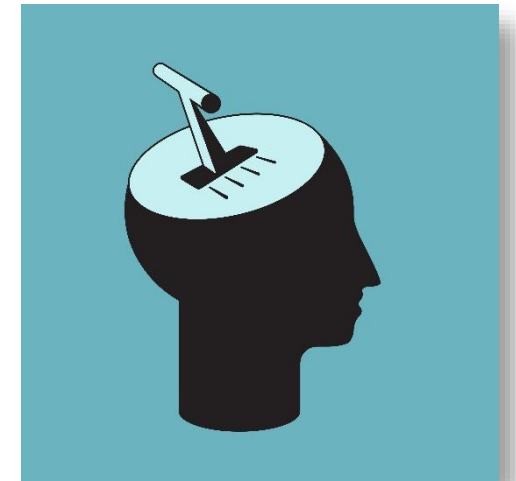
- Public & Private Services
- Dedicated & controlled spectrum
- 50% less time to deploy
- 90% energy and space savings of traditional headend
- Software upgrade to 5G
- Deployed into existing data center and infrastructure

- 90% cost savings over fiber
- Flexible deployment options
- Mobility support on and off premise
- Foundation for Smart City and IoT operations
- Transforming customer ingress and egress experience
- High capacity broadband

SHIFTING MINDSETS



- **Must Do -> Socially & Technically Conscious “Want to Do”**
- **Public Safety -> Safety of the Public**
- **Products & Silos -> Platforms**
- **Internet of Things -> “Social Network of Things”**



Social Network of Things—a time when devices and people are connected through pervasive internet access, a rich web of sensors, advances in artificial intelligence, deep APIs and cultural changes – **CauseIT.Org**

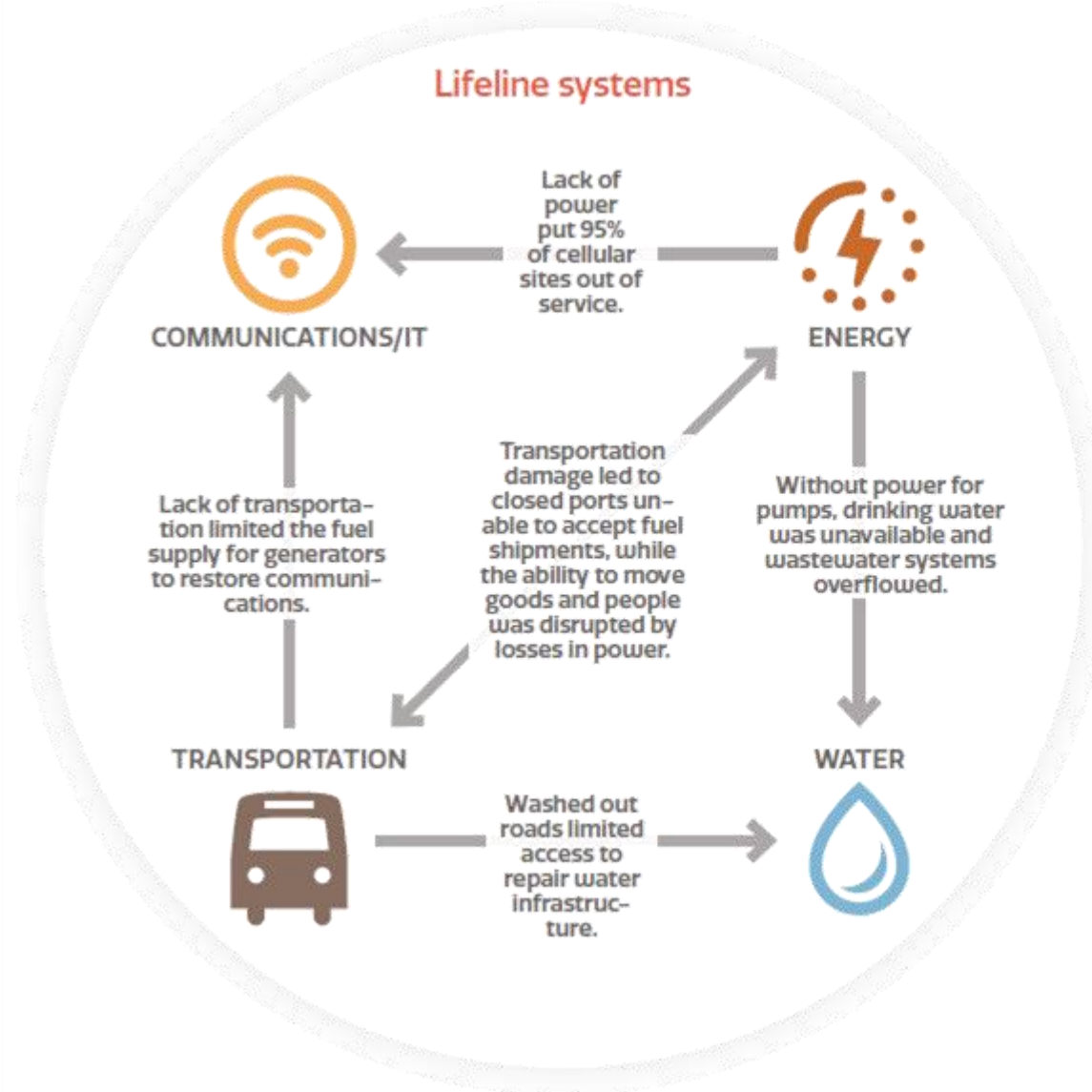
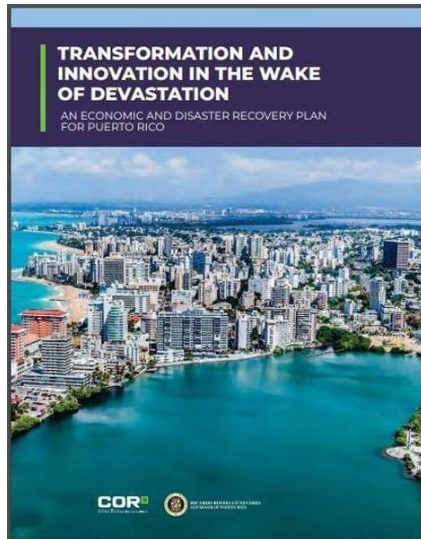
The Future of Public Safety is Smart

- Smart Cities
 - Smart Communities
 - Smart Buildings
- IoLST (Internet of Life Saving Things)
- Smart-Enabled Location Accuracy
- Commercial Cellular, Other Mobile Wireless Services Augment LMR*
 - DAS, Small Cell, CBRS, LAA, other
- **NET:** Public Safety is not a stand-alone discussion. It is an integral part of the **Safe-Smart Building Opportunity**



* Land Mobile Radio

Connectivity Dependence – 4G World



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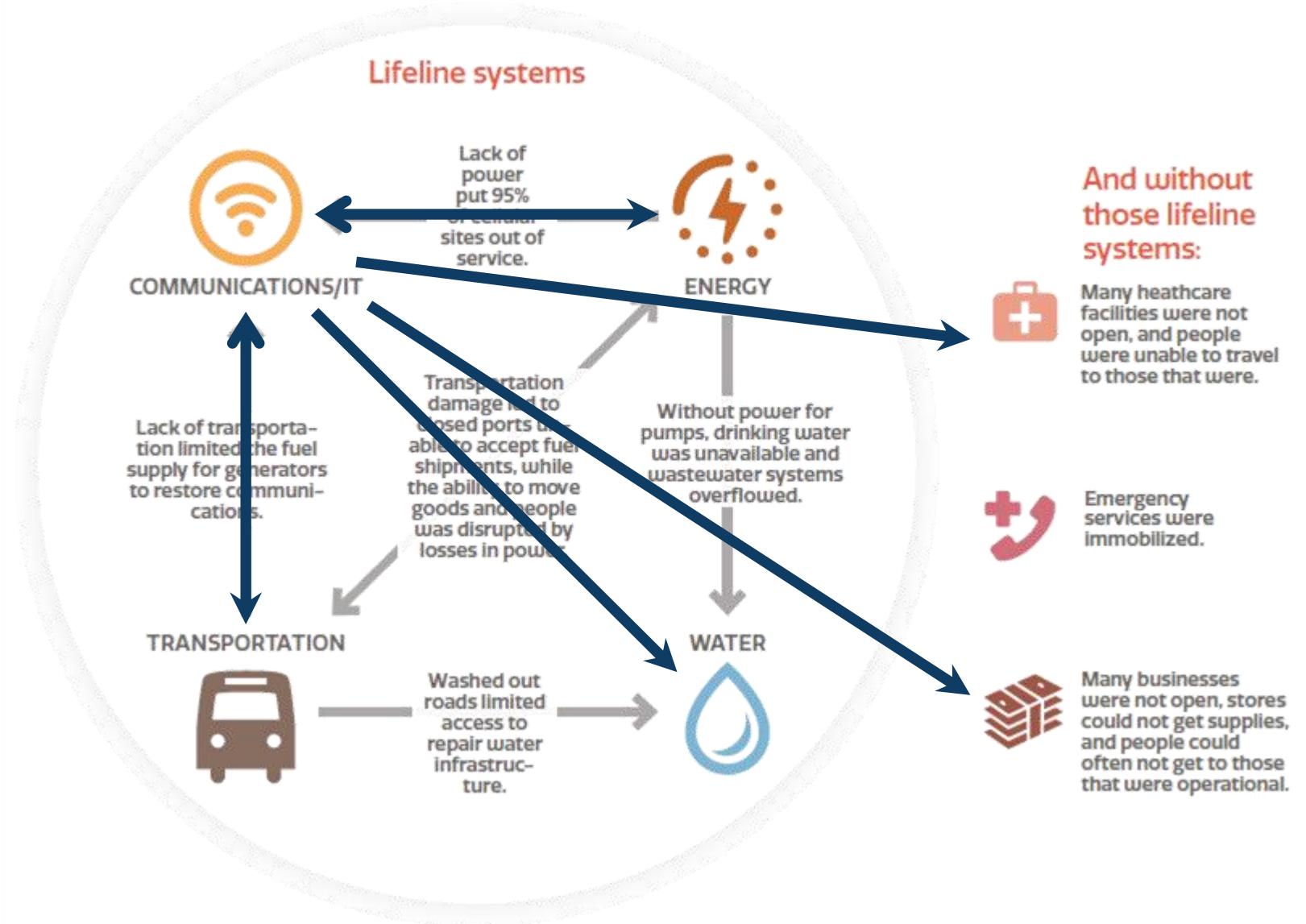


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Connectivity Dependence – 5G World

- Smart Grid
- Smart Health
- Smart Enterprise
- Smart Water
- Smart City
- Autonomous and Connected Vehicle



5G Technology Basket

“Its all good but you don’t have to eat everything!”



5G

Spectrum: Expanded, Shared, Dynamic, mmWave

Topology: Distributed, User & Control Separation

Antennas: Massive MIMO, Beam Forming

Edge Computing: Applications, APIs

Security: Authentication, Privacy

Radio: New Radio (NR), Software, Micro Cells

IoT: Low Power, Low Latency, NB-IoT, CAT-M

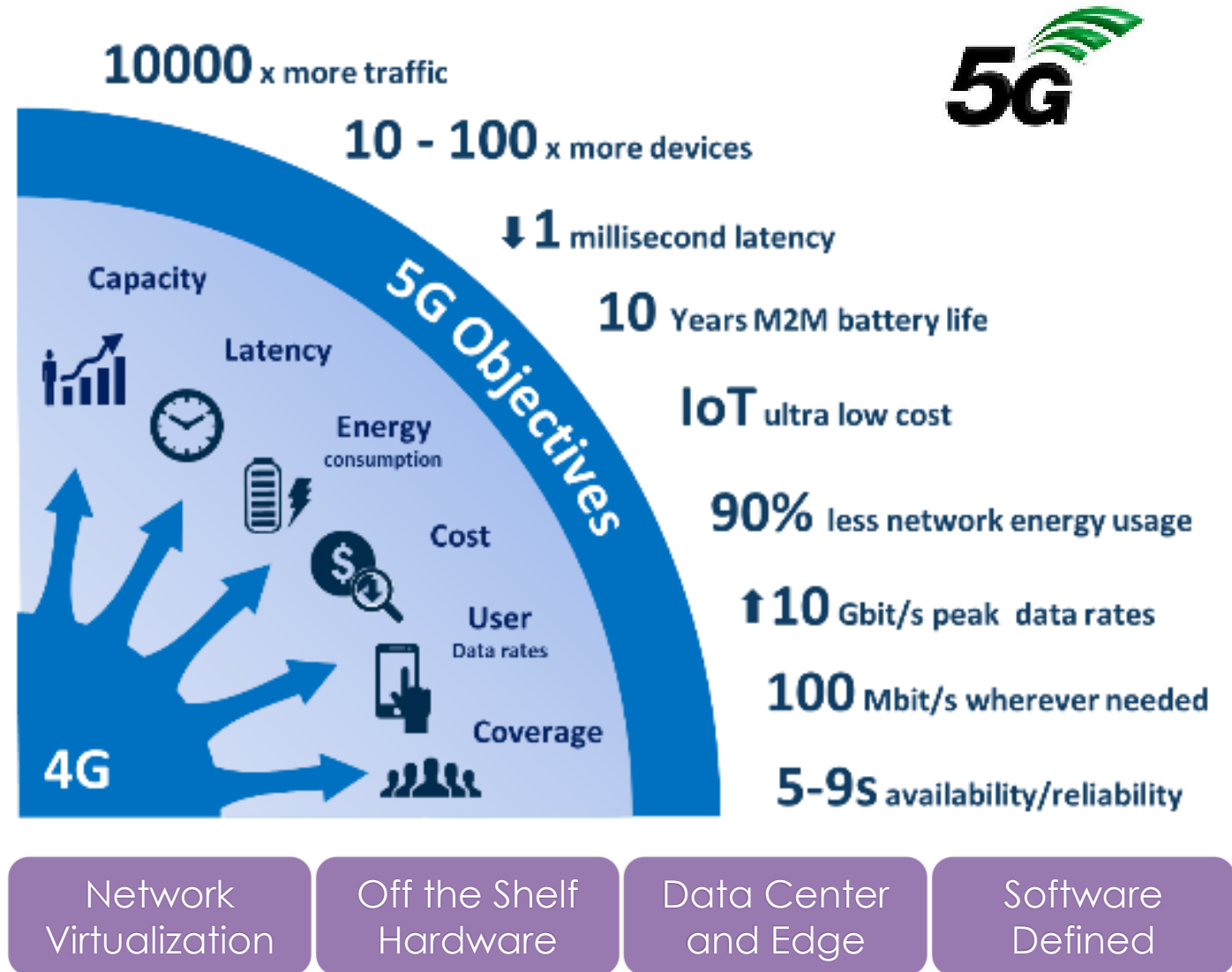
Network: Slicing, Virtualization, SDN, SON, COTS

Interoperability: Path from 4G (NSA), Coexist with 4G (SA)

5G Objectives

- User vs. Edge vs. Core
- Not just about speed and scale
 - Energy/Power
 - Availability/Reliability
 - Cost
 - Ease of Deployment
- Different users will value different objectives
- Builds on 4G infrastructure

- Other technology and business shifts are concurrently happening



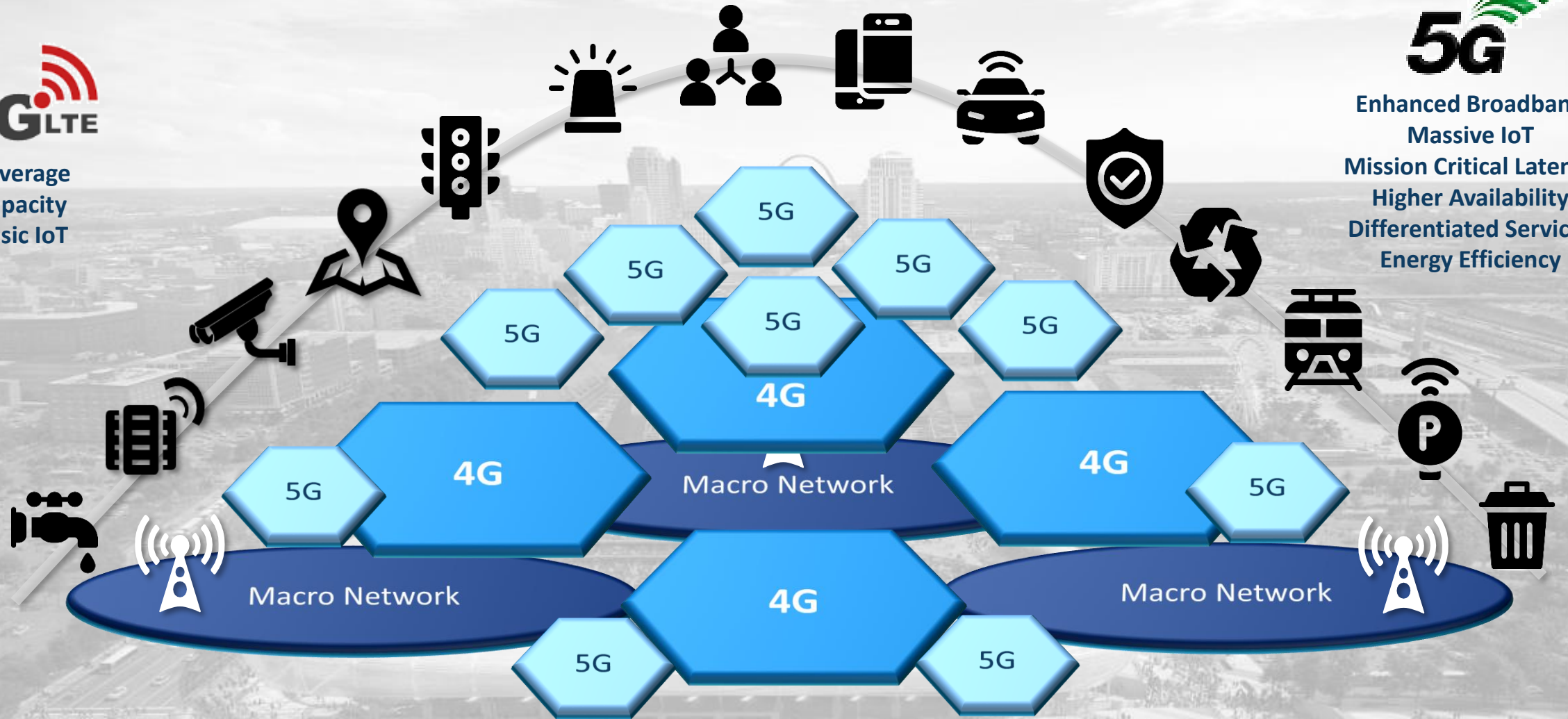
Smart City Network Densification

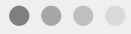
4G LTE

Coverage
Capacity
Basic IoT

5G

Enhanced Broadband
Massive IoT
Mission Critical Latency
Higher Availability
Differentiated Services
Energy Efficiency





Small Cells



LTE in Public Safety



- All the major carriers count numerous Public Safety Agencies as customers
- DRIVERS:
 - Applications, Data Capabilities
 - COST
 - Situational Awareness, Interoperability
 - Able to call Civilian and other Agencies
 - In-Building Coverage
 - FirstNet
- Lines Getting Blurrier – Public Safety not just LMR!

