

MISSION CRITICAL PUBLIC SAFETY NATIONWIDE BROADBAND SYSTEM RAN DEPLOYMENT



Jeff Anderson

Wireless Broadband Systems Architect

Chief Technology Office

Motorola Solutions

MOTOROLA SOLUTIONS SUPPORTS FCC'S NETWORK PRINCIPLES

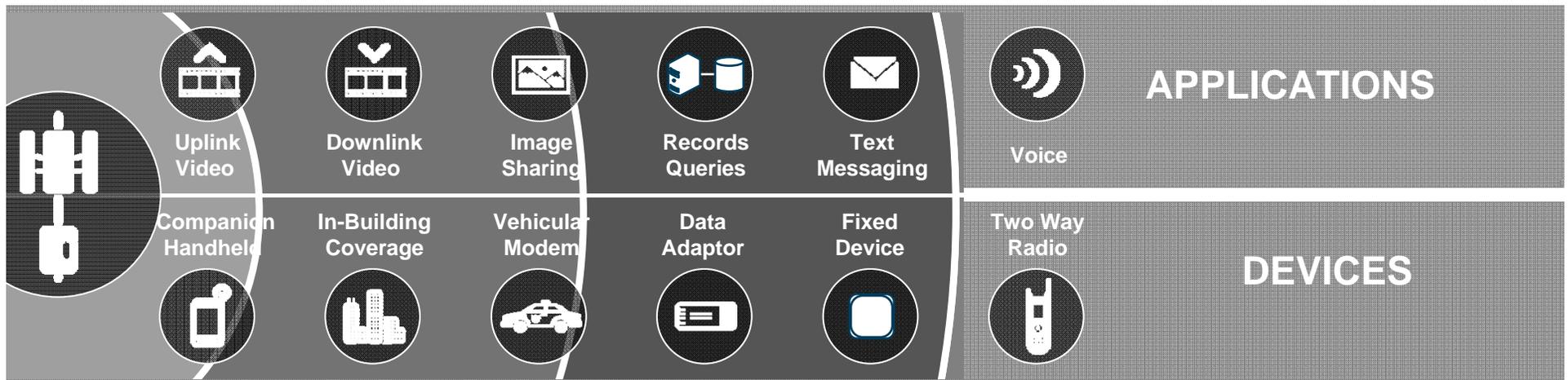
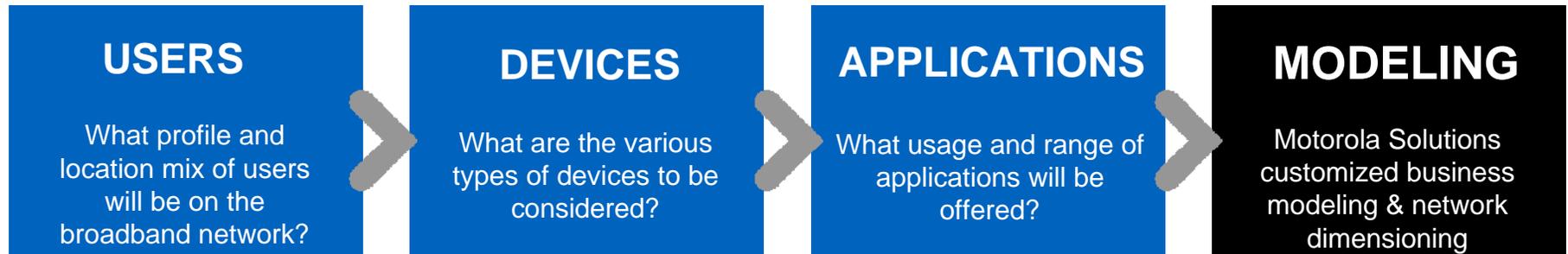


+ Interoperable networks	FCC embraces Public Safety recommendation of LTE Air Interface and Evolved Packet Core Technology Platform and Key System Interfaces per 3GPP Standards
+ Public safety applications	FCC embraces Public Safety recommendation of Internet Access, VPN to Home Network, Status/Information Homepage, Incident Command System and Field Servers
+ Quality of Service	FCC embraces Public Safety recommendation of standard 3GPP prioritization and QoS features and asks which features are currently available
+ Security	FCC embraces Public Safety recommendation of standard 3GPP security features and suggests additional protection User/Application security domains
+ National Network Roaming	FCC embraces Public Safety recommendation of standard 3GPP system mobility, handover and roaming features based on 3GPP standards
+ Interoperability Testing	FCC proposals for UE conformance and EPC interoperability testing and ask about further validation methods
+ Minimum levels of performance	FCC proposed stringent spectrum efficiency, coverage reliability and capacity to ensure baseline network operability and asks about appropriate performance parameters and criterion

DEVICES, APPLICATIONS, AND ECONOMICS DRIVE DESIGN



Each customer has a unique mix of requirements, but still retain interoperability

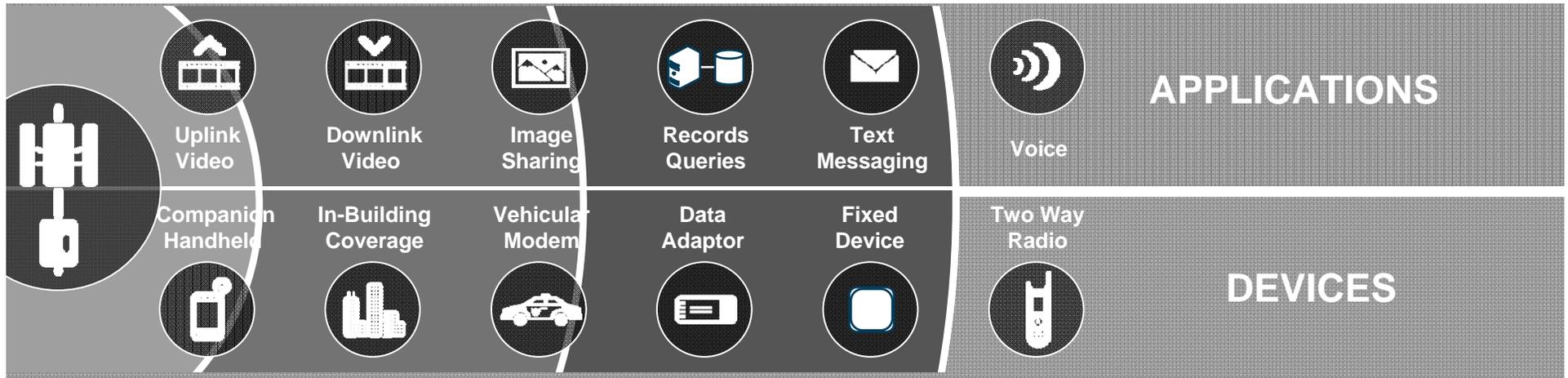
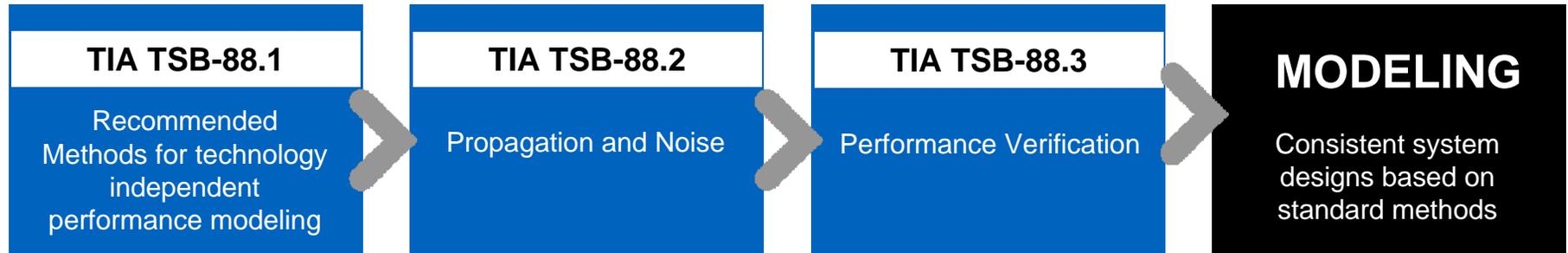


A consistent set of specifications for applications and device characteristics enables a consistent minimum level of operability

INDUSTRY CONSENSUS BASED RADIO NETWORK DESIGN METHODS



TIA TSB-88 “Wireless Communications Systems Performance in Noise and Interference Limited Situations”

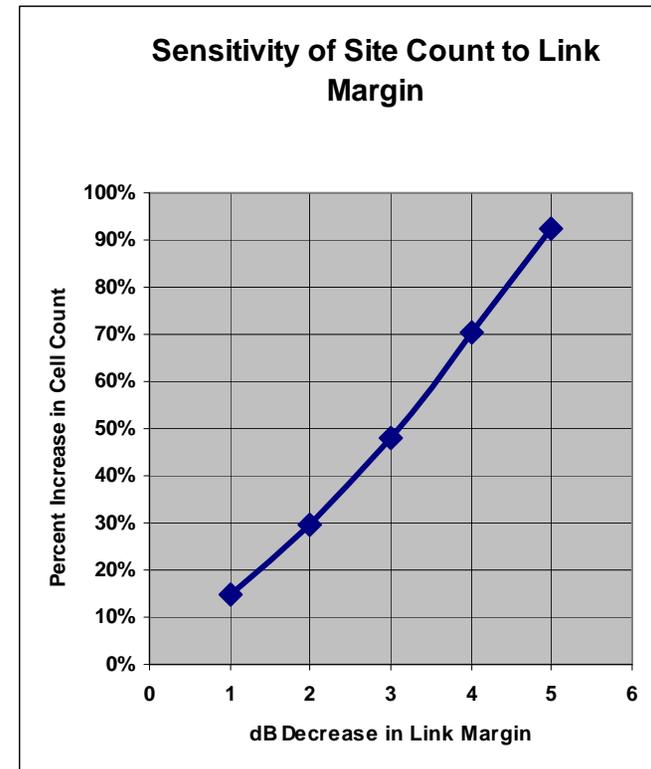


A consistent set of design and test methods enables a consistent minimum level of operability, so TSB-88 should be enhanced with LTE specifics

DESIGN SENSITIVITY TO RAN DEPLOYMENT VARIABLES



- **Significant Variances**
 - Target Capacity & Data Rates
 - UE Antenna/Body Loss
 - RF Propagation
 - LTE Rx Implementation
 - LTE Rx Velocity
 - Vehicle/Building Penetration Loss
 - Spectral Coexistence Issue
- **eNB Scheduler Implementation**
 - No 3GPP performance mandates
 - Cell average vs. cell edge spectral efficiency trade-offs



Even with a consistent set of design methods and criterion, an additional “overdesign” margin is required to ensure actual goals are met

DEPLOYMENT PHASING OF TECHNICAL REQUIREMENTS



Deployment Flexibility needed to maximize effectiveness of CapEx / OpEx

LTE	Phase 1 Urban Crime Hot Spot	Phase 2 Citywide Patrol Zones	Phase 3 Suburban Metropolitan Area	Phase 4 Rural High Power Mobile
Coverage	Portable	Portable	Mobile & Portable	High Power Mobile
Applications	High Resolution Multimedia	Medium Resolution Multimedia	High Resolution Images	Packet Data
User Density	50 – 100 Users/Sector	10 – 50 Users/Sector	5 – 20 Users/Sector	1 – 10 Users/Sector
User Throughput	Very High	High	Medium	Moderate

Each region will have unique requirements & deployment challenges

LTE Performance will Mature over Time

BALANCE OF FCC REGULATIONS AND FLEXIBILITY IS KEY



NPRM tentative operability conclusions are too stringent for all deployment scenarios

Interoperability Goals

Only enough regulation needed to ensure Nationwide Interoperability using LTE standards

Operability Goals

Only enough regulation needed to ensure a minimum level of performance to enable Nationwide operability using LTE standards

FCC 3GPP LTE/EPC technology platform framework selection is on the mark, only minor changes needed

Public Safety needs deployment flexibility for local geography, applications, loading and economic constraints

BROADBAND OPERABILITY RULES



Decisions should to be based on:

- **Experience**: Based on multi-vendor field test data with different RF environments, Public Safety devices, and Public Safety applications
- **Consensus**: With Public Safety and Industry input on the rules needed at a national level vs. decisions that can best be made locally/regionally
- **Flexibility**: To enable regional variable density phased network deployment needs for economic viability



THANK YOU

MOTOROLA, MOTOROLA SOLUTIONS and the Stylized M Logo are trademarks or registered trademarks of Motorola Trademark Holdings, LLC and are used under license. All other trademarks are the property of their respective owners. ©2011 Motorola Solutions, Inc. All rights reserved.