

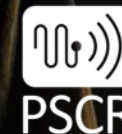
PSCR 2021

THE DIGITAL EXPERIENCE

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NIST





MISSION CRITICAL VOICE PORTFOLIO OVERVIEW

DON BRADSHAW MCV PORTFOLIO
LEAD

NLST

#PSCR2021



DISCLAIMER

Certain commercial entities, equipment, or materials may be identified in this document in order to describe an experimental procedure or concept adequately.

Such identification is not intended to imply recommendation or endorsement by the National Institute of Standards and Technology, nor is it intended to imply that the entities, materials, or equipment are necessarily the best available for the purpose.

*** Please note, unless mentioned in reference to a NIST Publication, all information and data presented is preliminary/in-progress and subject to change**

SUMMARY

- PSCR's Legislative Requirements
- Requirements Development/Strategic Planning
- Portfolio Focus Areas
- Internal and External Resource Structure
- Major Internal NIST Projects
- Federal Funding Opportunities/Externally-Funded Efforts
- Plans through FY2022

PSCR'S LEGISLATIVE REQUIREMENTS



LMR to Broadband (LTE/5G) – 47 USC 1443(b)(2)

“Accelerate the development of the **capability for communications between currently deployed public safety narrowband systems and the nationwide public safety broadband network**”



Direct Mode/MCPTT – 47 USC 1443(b)(4)

“Accelerate the **development of mission critical voice, including device-to-device ‘talkaround’ capability over broadband networks**”

PSCR'S LEGISLATIVE REQUIREMENTS



MCPTT– 47 USC 1443(b)(5)

“Accelerate the development of communications technology and equipment that can facilitate the eventual migration of public safety narrowband communications to the nationwide public safety broadband network”

REQUIREMENTS DEVELOPMENT/STRATEGIC PLANNING



PORTFOLIO FOCUS AREAS



Direct Mode Operations



Mission Critical Push to Talk (MCPTT)



LMR to Broadband



Public Safety Quality of Experience (QoE)

INTERNAL AND EXTERNAL RESEARCH STRUCTURE



MAJOR INTERNAL NIST PROJECT EFFORTS

- MCV QoE Measurements (671) ① ② ③ ④
- Device-to-Device (673) ① ②
- MCPTT Call Model (671/673) ① ②
- MCPTT Broadband On/Off Network Operations (673) ① ②
- LMR to Broadband (671) ② ③
- 3GPP Standards/List of Certified Devices (671) ① ②

① Direct Mode ② MCPTT ③ LMR to Broadband ④ QoE

FEDERAL FUNDING OPPORTUNITIES

- QoE Related to User Performance (MCV QoE) 2 4
- MCV Test Equipment (MCV TE) 2
- Coverage, Capacity, Resilience (2017 PSIAP) 2
- MCPTT/Direct Mode Modeling and Simulation (2017 PSIAP) 1 2
- Radio Propagation and Performance (2017 PSIAP) 2
- MCPTT Broadband On/Off Network Ops (PSIAP 2017) 1 2
- Soft. Def. Radio and Network Development (PSIAP 2017) 1 2
- End-to-End MCPTT (PSIAP 2017) 2

1 Direct Mode 2 MCPTT 3 LMR to Broadband 4 QoE

FEDERAL FUNDING OPPORTUNITIES

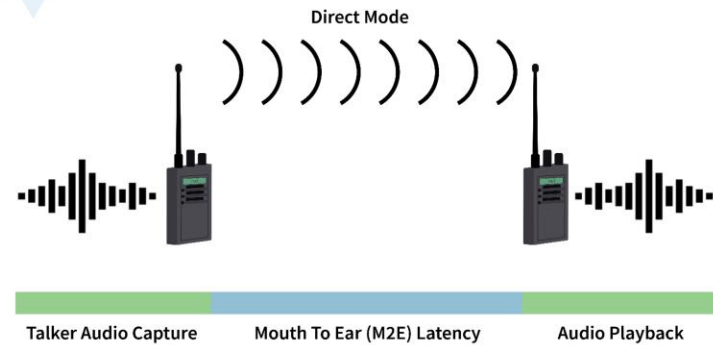
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1 Direct Mode 2 MCPTT 3 LMR to Broadband 4 QoE

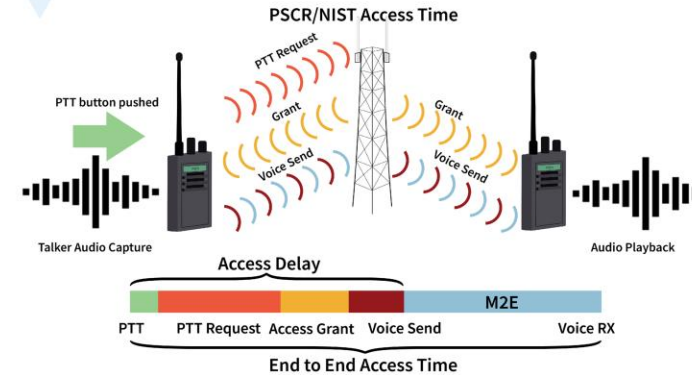
PROJECT OVERVIEWS – MCV QOE MEASUREMENTS

MISSION CRITICAL VOICE (MCV) QUALITY OF EXPERIENCE (QOE) MEASUREMENTS

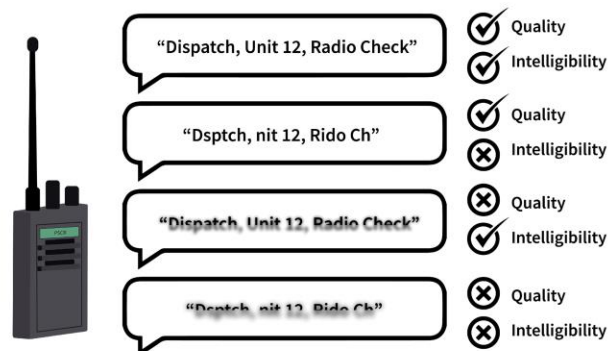
MOUTH TO EAR LATENCY



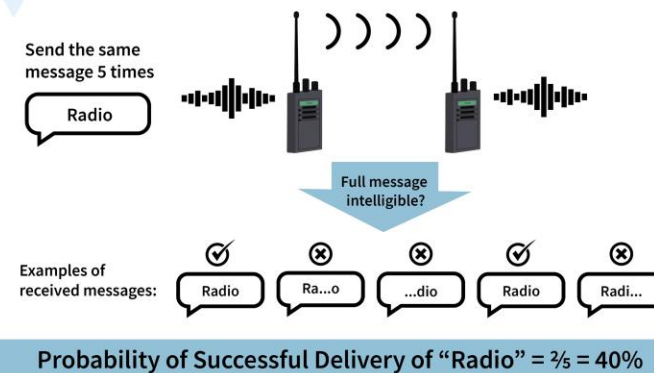
END TO END ACCESS TIME



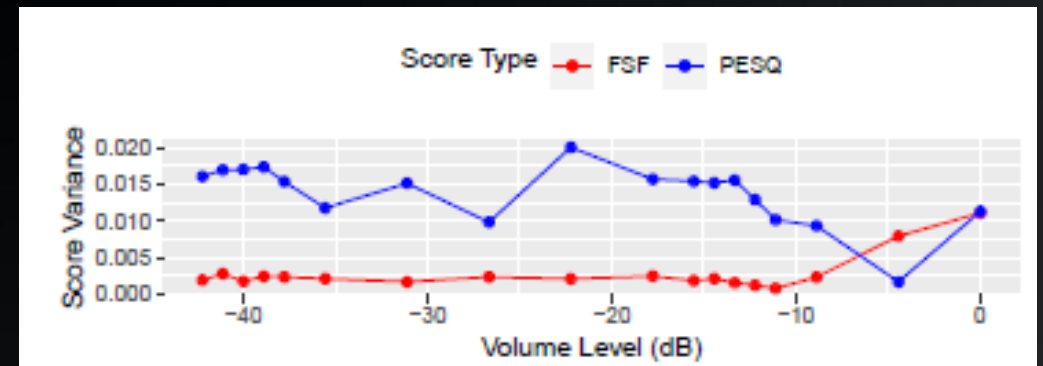
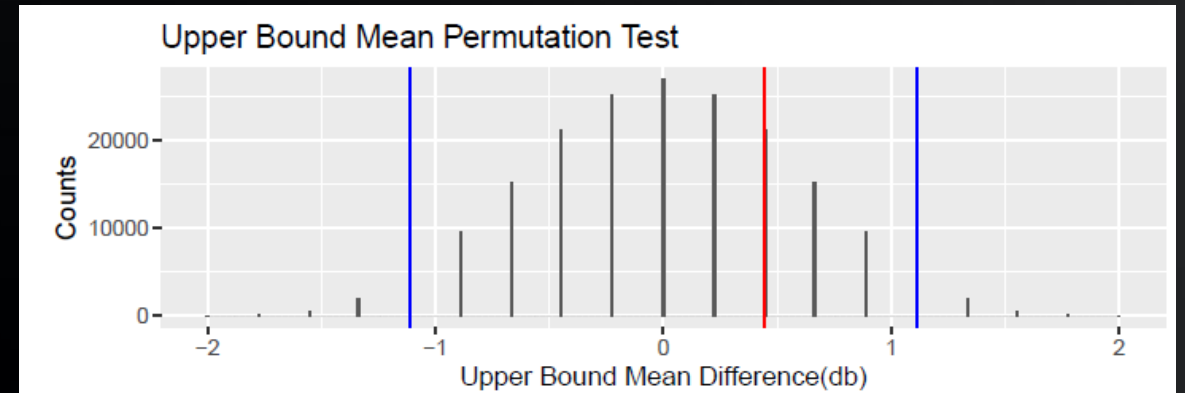
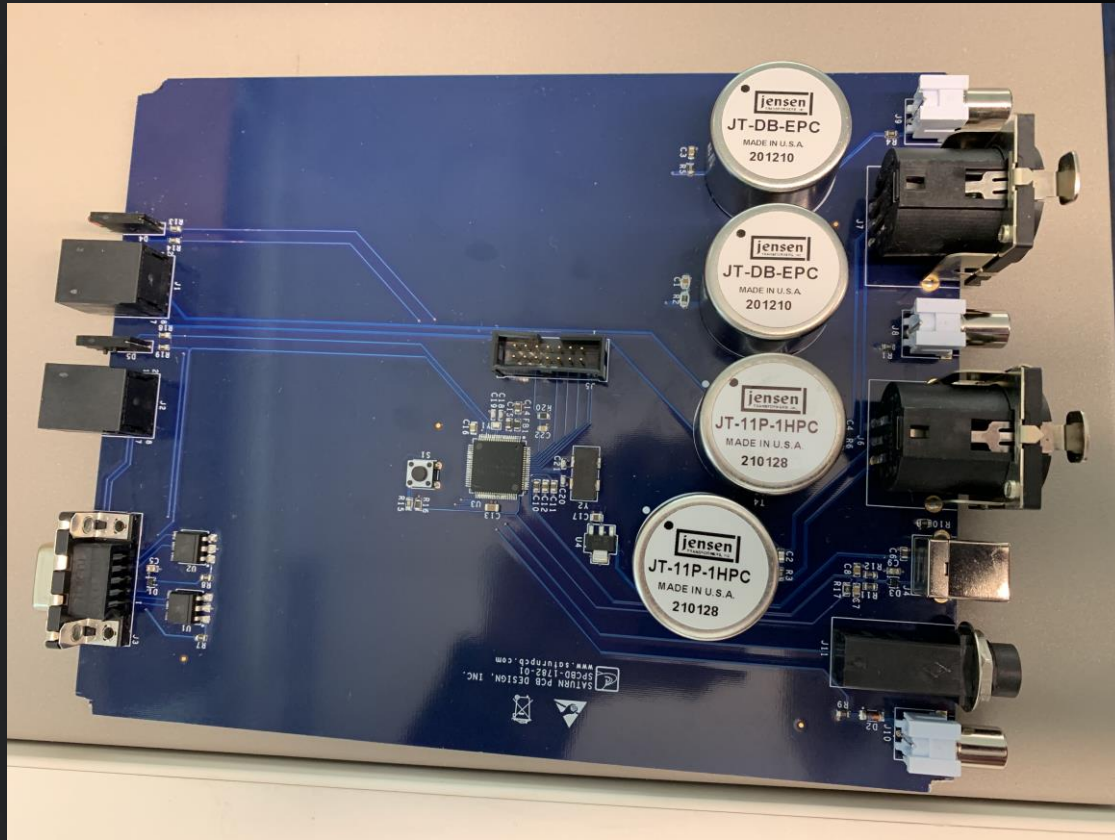
VOICE QUALITY & SPEECH INTELLIGIBILITY



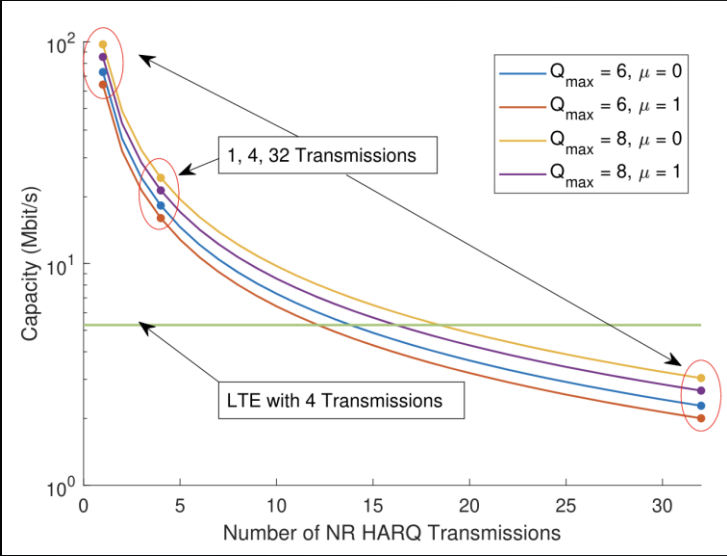
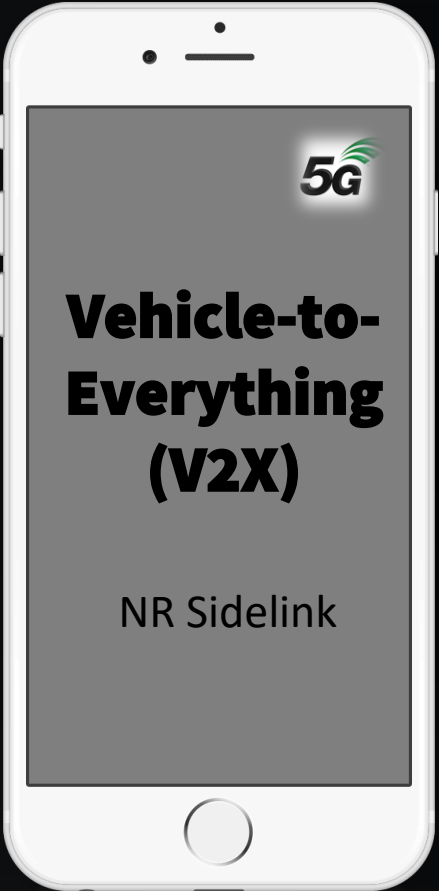
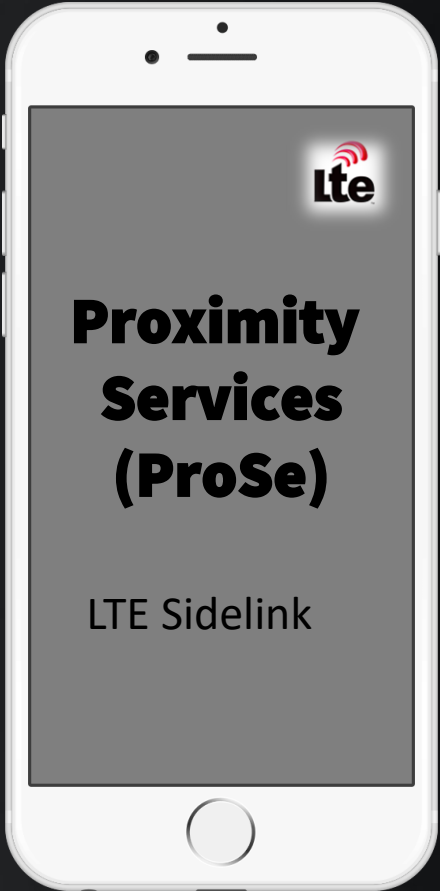
PROBABILITY OF SUCCESSFUL DELIVERY



PROJECT OVERVIEWS – MCV QOE MEASUREMENTS



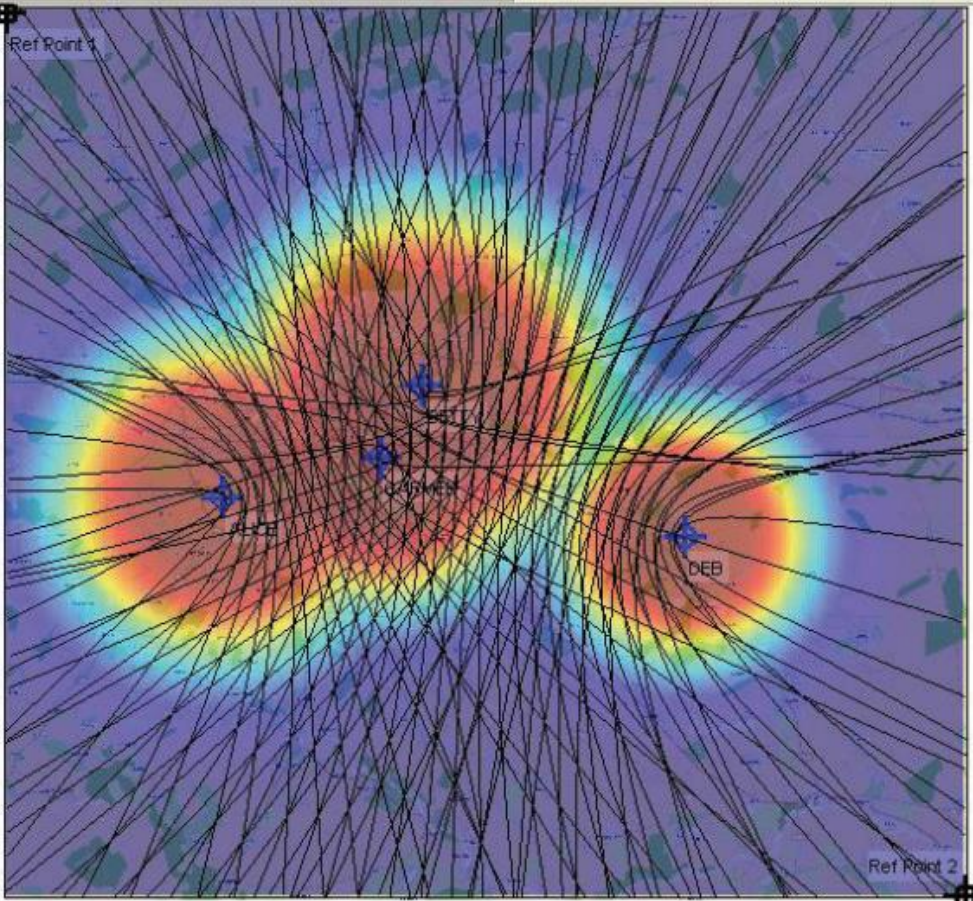
PROJECT OVERVIEWS: DEVICE-TO-DEVICE



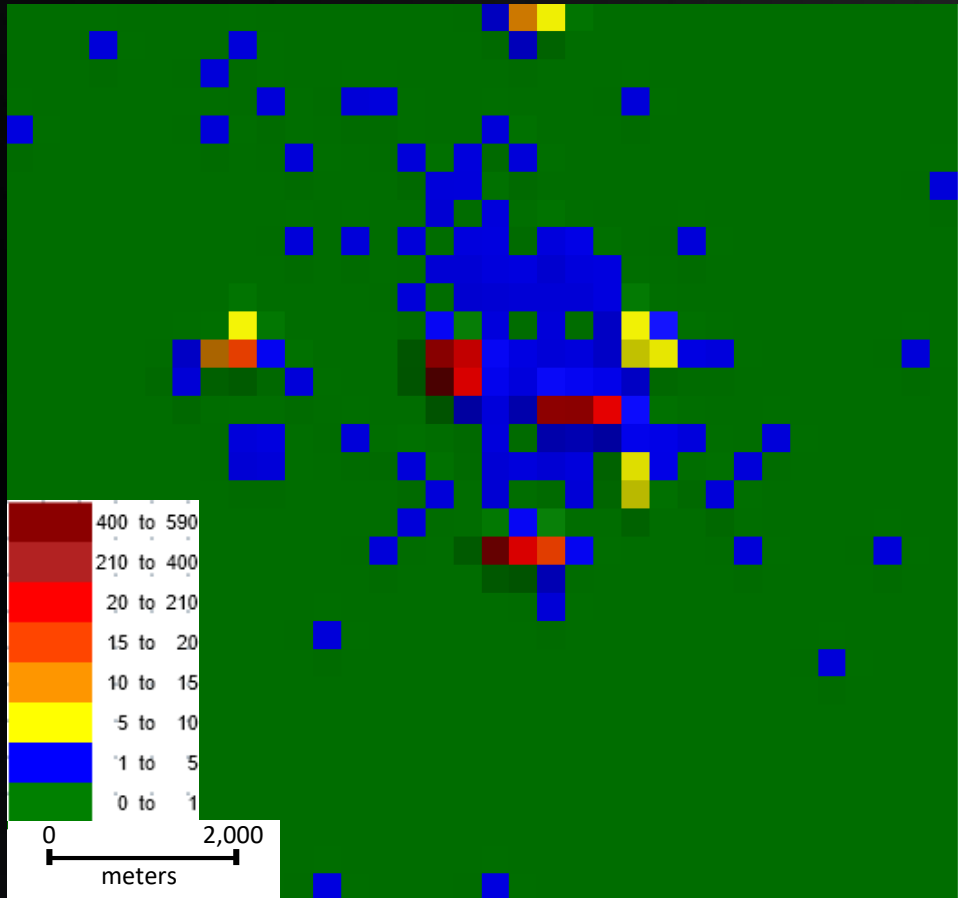
NR vs LTE Sidelink Capacity Under Ideal Conditions

PROJECT OVERVIEWS: MCPTT CALL MODEL

Location Estimation



Number of Calls Per Square (300 m x 300 m)



PROJECT OVERVIEWS: MCPTT ON/OFF NETWORK OPERATIONS



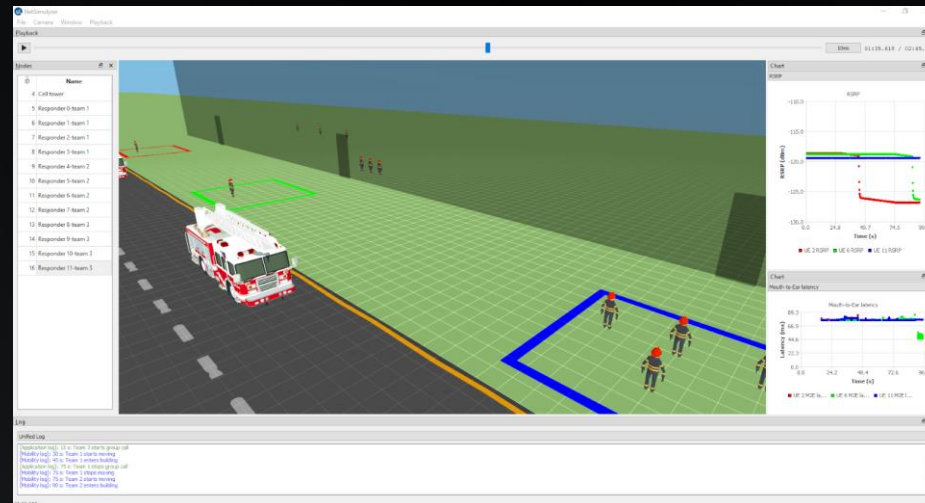
On-Network

Modeling and Simulation Capabilities:
Group Calls, Relay

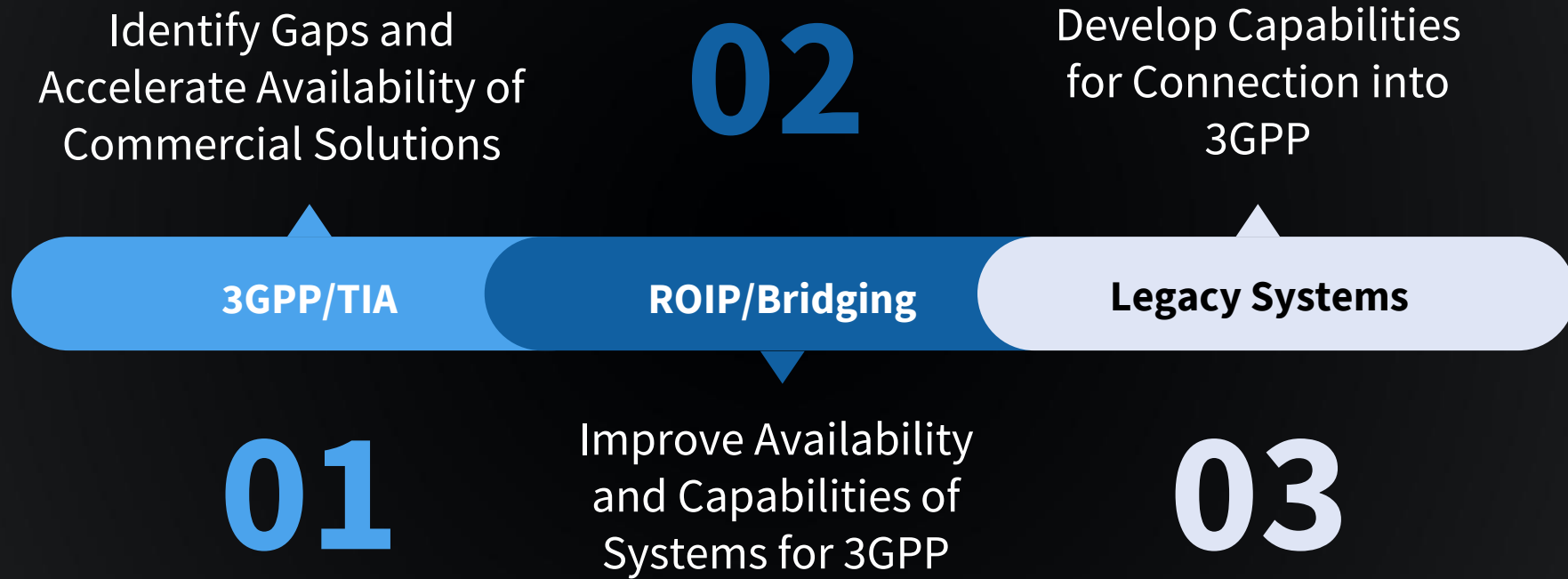


Off-Network

Modeling and Simulation:
Private Calls, Group Calls,
Broadcast Group Call



PROJECT OVERVIEWS: LMR TO Broadband



PROJECT OVERVIEWS: 3GPP STANDARDS/LIST OF CERTIFIED DEVICES

3GPP TS 36.579-7 V14.0.0 (2020-09)

**3rd Generation Partnership Project;
Technical Specification Group Radio Access Network;
Mission Critical (MC) services over LTE;
Part 7: Mission Critical Data (MCDATA) User Equipment (UE)
Protocol conformance specification
(Release 14)**



TITLE:
NIST List of Certified Devices

DATE:
01/08/2021

32.00

SYNOPSIS:

The Middle Class Tax Relief and Job Creation Act of 2012 (Act) [5] defined responsibilities for the National Institute of Standards and Technology (NIST) [1] in regards to the Nationwide Public Safety Broadband Network (NPSBN) and the First Responder Network Authority (FN) [2]. AT&T was awarded the contract by FN to partner with FN and to build the NPSBN. One requirement of the Act is that the Director of NIST shall ensure the development of a list of certified devices that meet appropriate protocols and standards for access to, use of, or compatibility with the NPSBN that FN and AT&T build and maintain. This requirement is carried out by the Public Safety Communications Research Division (PSCR) [3] of the NIST Communications Technology Laboratory. This document lists devices that have been certified to meet appropriate protocols and standards for access to, use of, or compatibility with the NPSBN that FN and AT&T build and maintain, in accordance with the process document: "Process Document for the NIST List of Certified Devices" [4]. **NIST does not test nor certify the devices.**

NOTE: If a device does not appear in the Active List sheet of this document, then the device has not been certified to meet appropriate protocols and standards for use on the FN NPSBN. The NIST List of Certified Devices applies only to the NPSBN built and maintained by FN and AT&T, and does not apply to any other commercial network.

PROJECT OVERVIEWS – MCV QOE FFO

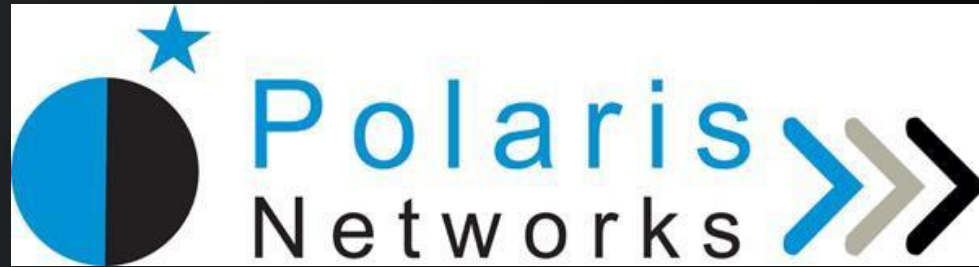


GEORGIA TECH RESEARCH INSTITUTE



TRUSTEES OF COLUMBIA UNIVERSITY

PROJECT OVERVIEWS: MCV TEST EQUIPMENT



PROJECT OVERVIEWS: SMALL BUSINESS INNOVATION RESEARCH



PROJECT OVERVIEWS: INTERWORKING FUNCTION ACQUISITION



PLANS THROUGH FY2022



**PULLING
THE FUTURE
FORWARD**



Measurement and Modeling Capabilities

Trusted, scientific measurements and modeling for public safety policy and technology decisions



Operational Capabilities

Technology improvements to bring real capabilities to market for public safety



Comparison of LMR and LTE/5G

Leverage work across program for comparing LMR and broadband for MCV

PLANS THROUGH FY2022: MEASUREMENT AND MODELING CAPABILITIES



Measurement System

For public safety and industry to have a common trusted baseline



Modeling and Simulation

Tools for industry and academia to model and simulate MCV implementations



QoE and Performance

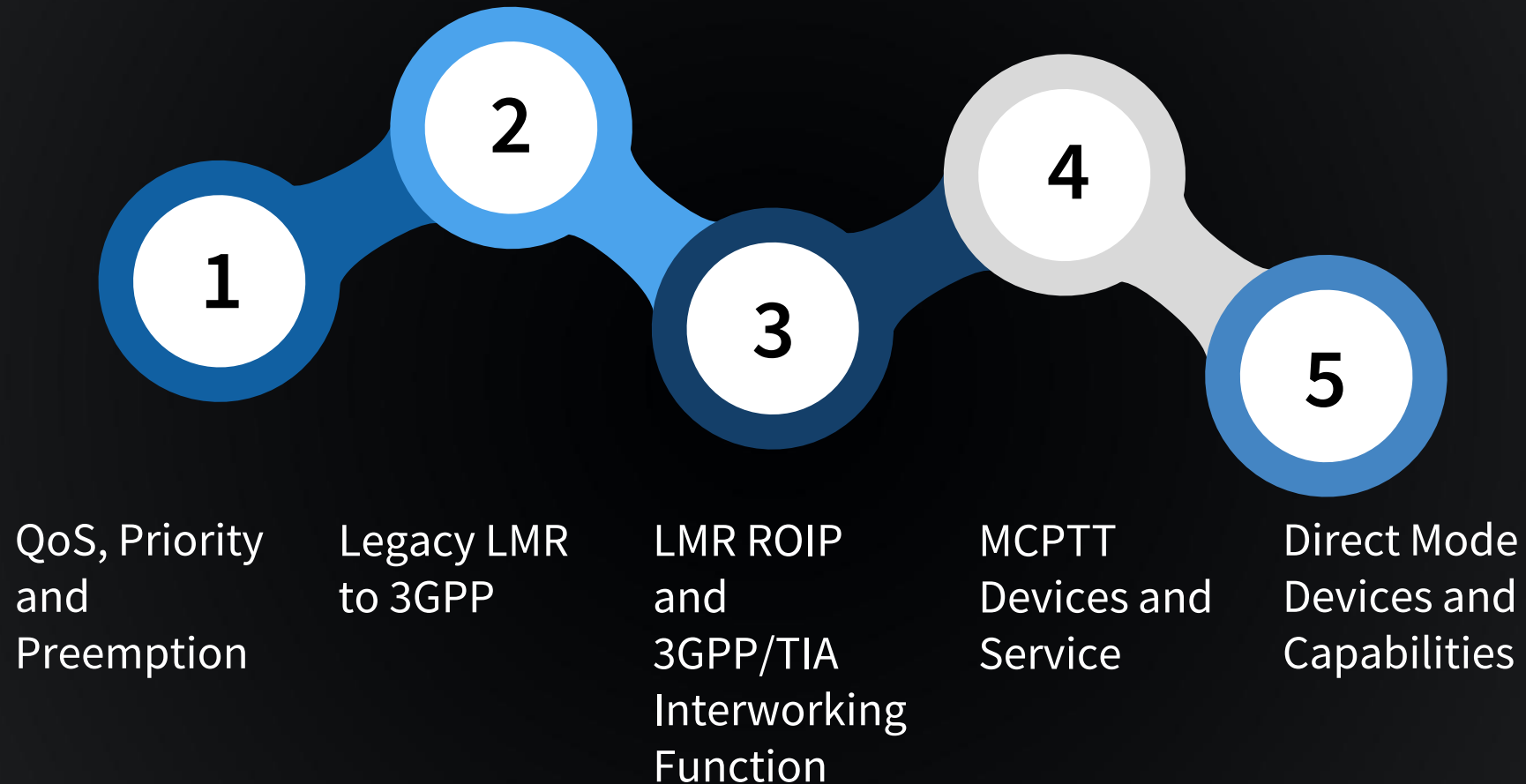
Data and models that correlate public safety user performance with measurements



Test Equipment

Measurement equipment for industry to implement 3GPP test cases for MCV

PLANS THROUGH FY2022: OPERATIONAL CAPABILITIES



PLANS THROUGH FY2022: COMPARISON OF LMR AND BROADBAND



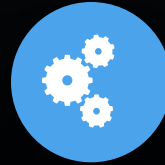
MCPTT Call Model

Current real public safety user LMR measurements, model development



Measurement System

Black-box system performance metrics referenced to public safety users



Public Safety User QoE

Real public safety user data referencing system to job success



Real System Measurements

Measurements of real, deployed LMR and broadband systems



Modeling and Simulation

Combine all components and compare LMR and broadband in same environments



THANK YOU

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