Non-ISSI LMR to LTE MCPTT

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#PSCR2019

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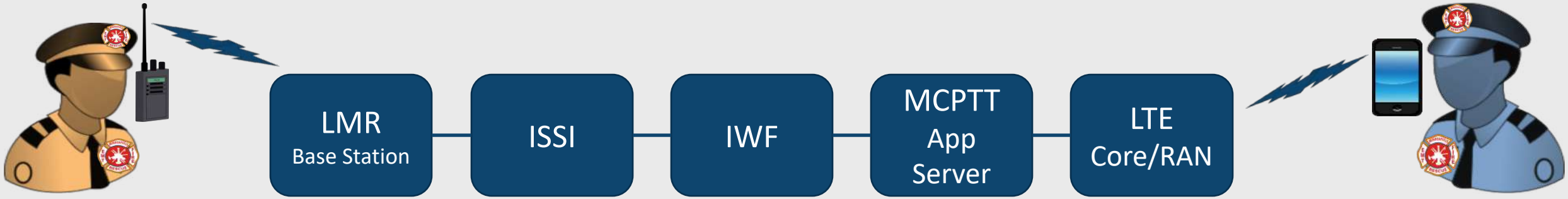
Executive Summary

- **Status of LMR to LTE Capabilities and Development**
- **The Missing Combination**
- **PSCR's LMR to LTE Strategy**
- **Recognized Challenges**
- **Current Research Project**
- **Success**

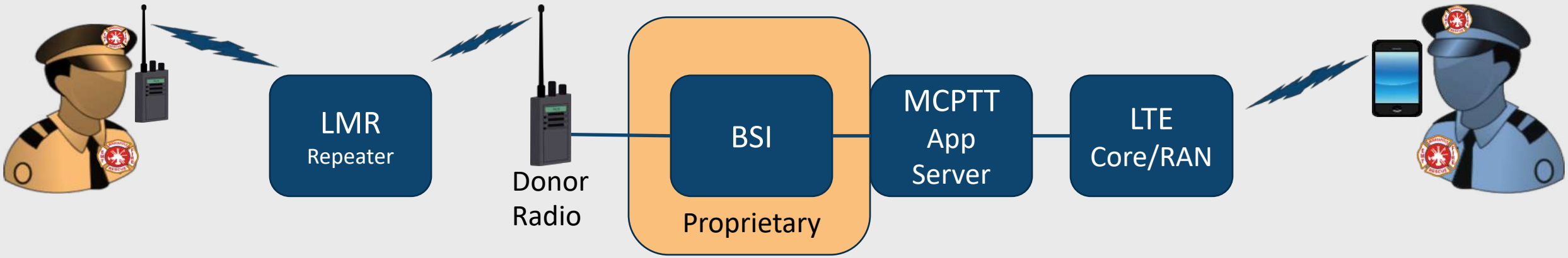
Status of LMR to LTE Capabilities and Development

- **Inter-RF Subsystem Interface (ISSI)**
  - **Designed for P25 to P25 System Interoperability**
  - **Focus of Government and Industry for LMR to LTE**
  - **Solution for Compatible Systems (Newer P25)**
  - **3GPP Interface Compliant Through Interworking Function (IWF)**



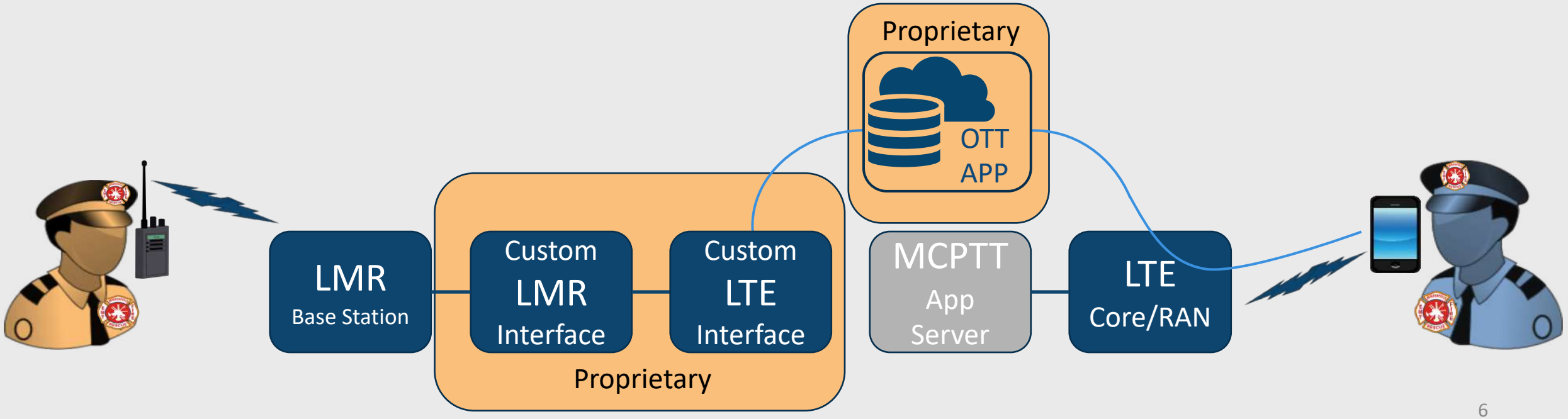
Status of LMR to LTE Capabilities and Development

- **Bridging System Interfaces (Radio Over IP <ROIP>)**
  - **Originally Designed for non-ISSI LMR Systems**
  - **Requires Donor Radios or System Level Connection**
  - **Proprietary Interfaces**
    - **May Include 3GPP IWF (DHS Small Business Innovation Research) Interface**



Status of LMR to LTE Capabilities and Development

- **Custom Solutions**
  - **LMR Infrastructure to LTE App**
  - **Do Not Inherently Function on LTE Devices**



The Missing Combination

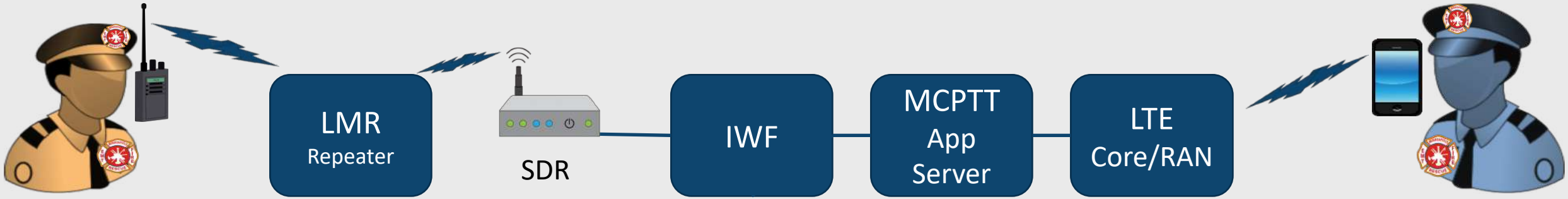
- **Air-Interface (RF) Based**
  - **Does Not Require Special Interface to Existing Systems**
- **Affordable**
  - **No Donor Radios Required**
- **3GPP Standards-Based**
  - **Compatible with IWF and Mission Critical Push-to-Talk (MCPTT) Servers**
  - **Does Not Require Middleware Service**
  - **No Special Apps**
- **Open Source**
  - **Competitive Environment for Companies**

PSCR's LMR to LTE Strategy

- **Overall Goal: Fill the Technology Gaps**
  - **ISSI is Being Addressed by Industry**
  - **ROIP and Other Custom Solutions Exist**
- **Timeframe**
  - **Full LMR to LTE Effort**
    - **Two to Three Years**
  - **Current Project**
    - **Six Months**

PSCR's LMR to LTE Strategy

- **Research Objectives**
  - **Research and Prototype Software Defined Radio (SDR) Solutions**
    - **"LTE core talks to the tower like it's a radio"**
    - **Focus on analog FM and non-ISSI compatible P25**
  - **Determine if Existing IWF and MCPTT Capabilities Are Sufficient**
    - **Target Efforts to Fill Gaps**
  - **3GPP Standards Involvement and Contributions**
  - **Position Industry to Benefit Public Safety**



Recognized Challenges

- **Voice Encryption**
- **Security**
- **Usability**
- **Adoption of Products by Cellular Providers**
- **Adoption by 3GPP**

Current Research Project

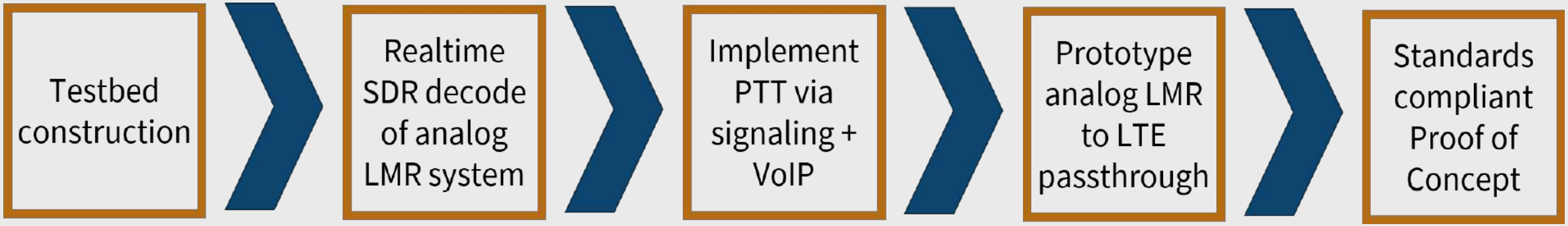
Innovative and affordable interworking of analog FM LMR radios in the LTE MCPTT world

Chris Walton, PSCR

Current Research Project

LMR to LTE Research Project

- **Research the integration of analog FM LMR radios into a MCPTT solution via 3GPP IWF.**
- **Leverage existing technologies for a highly standardized solution. Investigate using SDR (Software Defined Radios via GNU Radio).**
- **Feedback to the standards bodies.**

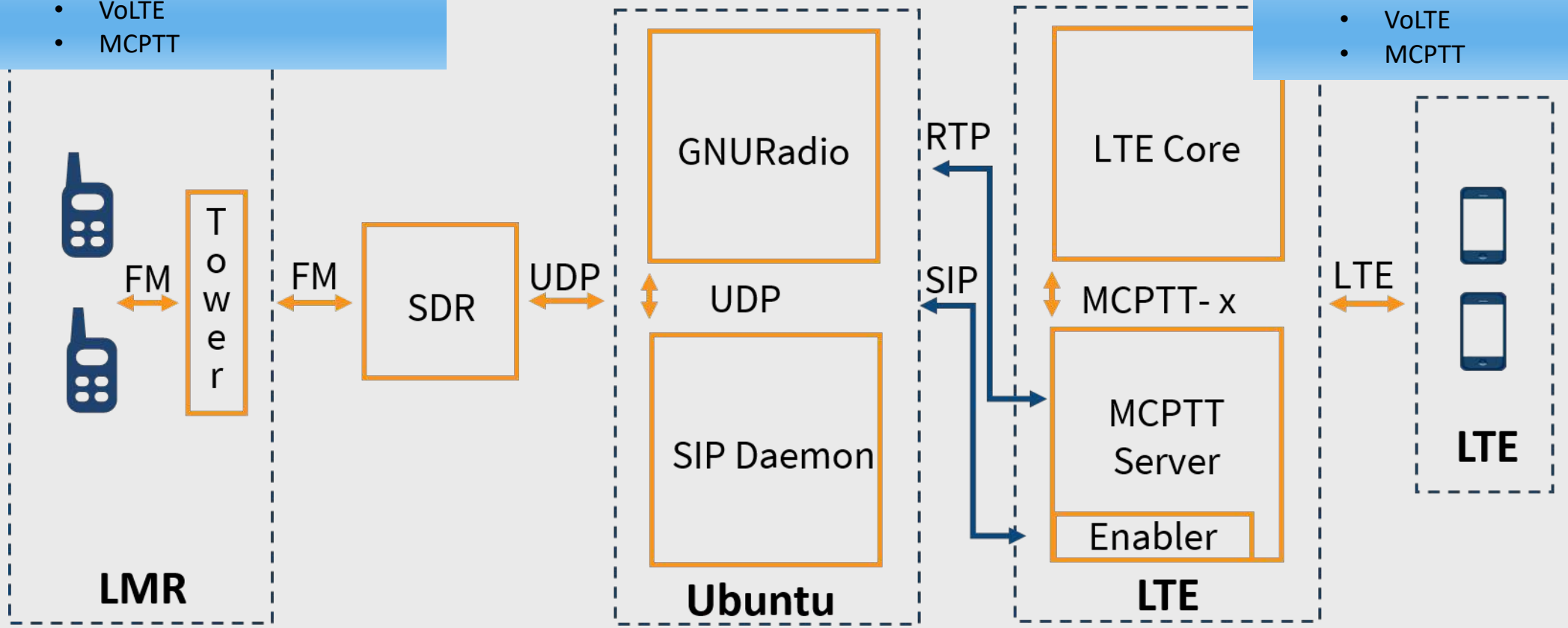


Current Research Project

RTP – Real Time Transport Protocol
- Paired with SIP and RTCP
- Transports digitized audio, video
  - VOIP
  - VoLTE
  - MCPTT

Target Architecture

SIP – Session Initiation Protocol
- Signaling protocol for session control
- Enables audio and video services
  - VOIP
  - VoLTE
  - MCPTT

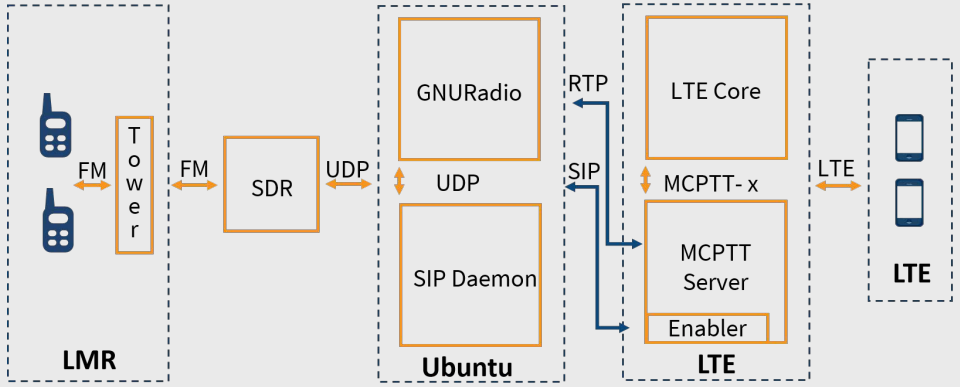


Current Research Project

Current Milestones

Accomplishments (to date)

- SDR development of an analog FM receiver
- Implementation of basic audio and in-band signaling
- Ability to initiate SIP based VoIP calls in a scripted testing environment
- Voice pass thru from the analog LMR to a LTE UE



Next Steps

- Development of a standards-compliant media plane control to handle floor control across platforms
- Drive toward R16 IWF compliant solution
- Research co-existence and/or integration with ISSI

Current Research Project

Challenges – Standards publication across various bodies

- **LTE**
  - **3GPP – 3rd Generation Partnership Project**
    - **Stage 3 R16 work (Jun19)**
- **P25**
  - **TIA – Telecommunications Industry Association**
  - **ATIS – Alliance for Telecommunications Solutions**
    - **Study on Interworking P25 LMR – MCPTT (Jun19)**
      - **Base on R15 IWF**
- **ETSI**
  - **ETSI – European Telecommunications Standards Institute**
    - **TCCE (TETRA and Critical Communications Evolution) WG4**
      - **Complete work AFTER 3GPP R16 is published**
      - **Will be used by TIA and 3GPP to update future standards**

Success

- Publicly Available Technology for Non-ISSI Legacy LMR to LTE
- Integration and Testing of a Prototype System
  - Bridge PSCR LMR and LTE test beds
- Use of Open Source Software Solutions
  - Low cost and enduring solution
- Use of Software Defined Radios
  - No Donor Radios
- Technology and Path for Companies to Develop Products
- 3GPP Compliance and Support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Demos

BACK TOMORROW

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8:00 AM