MaXentric Technologies LLC

MaXphone

Multi-Access Extension for Smartphones

PSCR Public Safety Broadband Stakeholder Conference 2014

Per Johansson

pjohansson@maxentric.com

DHS Wireless Broadband Technology Demonstrator

BAA DHS 12-10

MaXentric Technologies LLC

Outline

- **MaXentric**
- **UCSD/Calit2**
- **Problem Statement**
- **Proposed Solution: MaXphone**
- **Technical Approach**
- **Timeline**

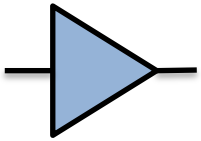
MaXentric Technologies LLC

MaXentric Technologies

- We design and build technologies for the next generation of mobile platforms
- Advanced technology research, development and service firm
- Principle offices in Fort Lee, NJ & San Diego, CA
- Founded in 2003
- 21 employees
- Focus on both military and commercial markets
  - Commercial customers: Verizon, Sprint, Cable Vision, XM, Sirius....
  - Government customers: Air Force, Army, DARPA, Navy, and NASA

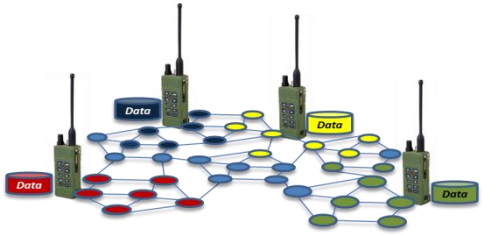
Areas of Expertise

Gbps mmWave wireless technologies



Highly linear, efficient power amplifiers

Advanced DSP systems



Novel Mesh Networking Protocols

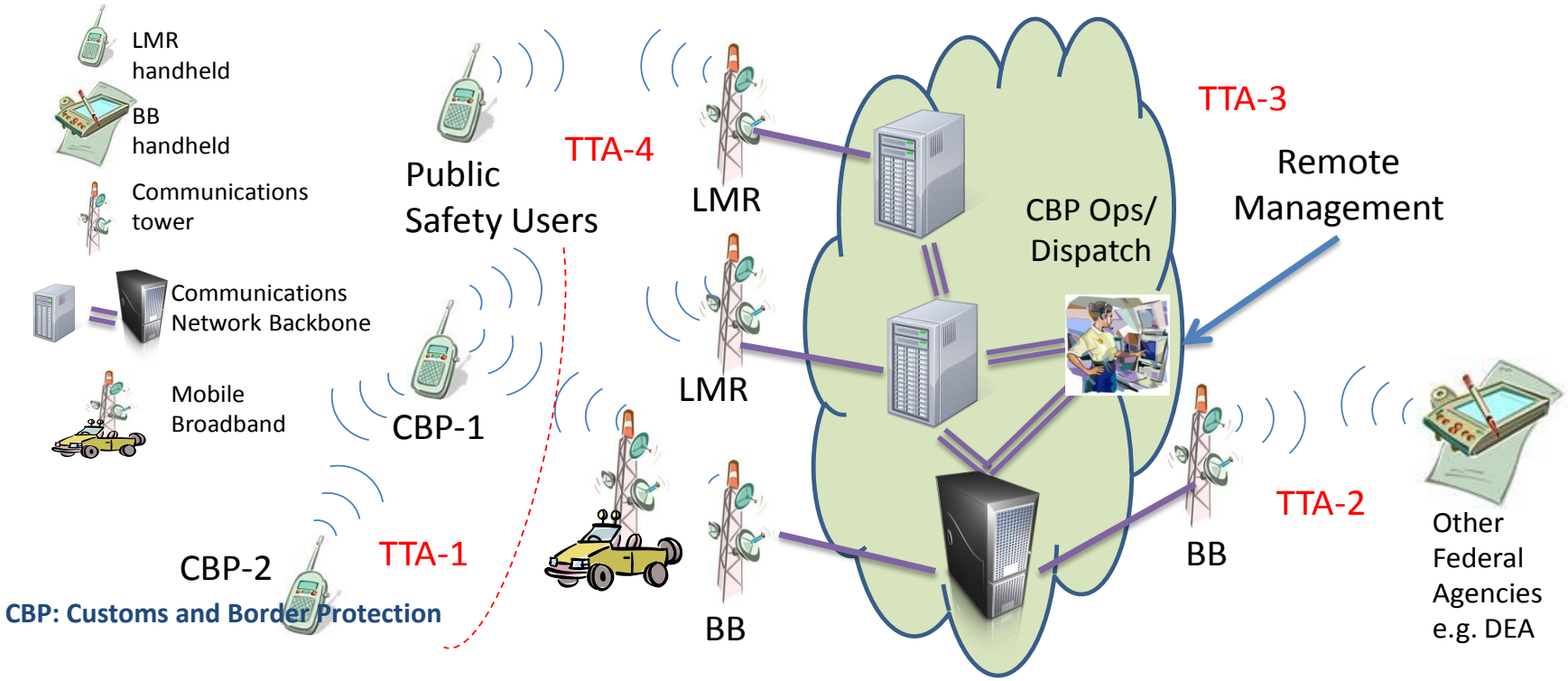
Calit2/UCSD

California Institute for Telecommunications and Information Technology

- One of four California Institutes for Science and Innovation
- Organized Research Unit (ORU) jointly with UCI
- Prototyping systems of emerging, transformational and disruptive technologies.
- Interdisciplinary teams collaborating closely with industry and community partners.

MaXentric Technologies LLC

Wireless Broadband Technology Demonstrator Operational Vision



- **CBP-1 talks to public safety users, other Agencies, and CBP-2**
  - Communications initiated from either end
  - Communications connect over LMR or BB
  - CBP-1 talks to CBP- 2 without infrastructure
- **CBP-1 automatically switches between LMR and BB without losing connection to police or DEA**

- **Ops/Dispatch controls OTAP and OTAR across all CBP devices**
  - Talk groups include non-CBP devices
  - Coordinates encryption and talk groups with other agencies
  - Manages application deployment

MaXentric Technologies LLC

Problem Statement

- Design a device for operation in both LMR networks and Cellular Broadband networks
- Enabling interoperable applications between LMR and Cellular Broadband networks (PTT, text etc.)
- Hosting Cellular Broadband applications for First Responders

In addition:

- Leverage low-cost but high performance COTS components
- Allow open application development to support innovative/adaptive services

MaXphone

Multi-Access Extension for Smartphones

MaXphone

P25 LMR MaXjacket:

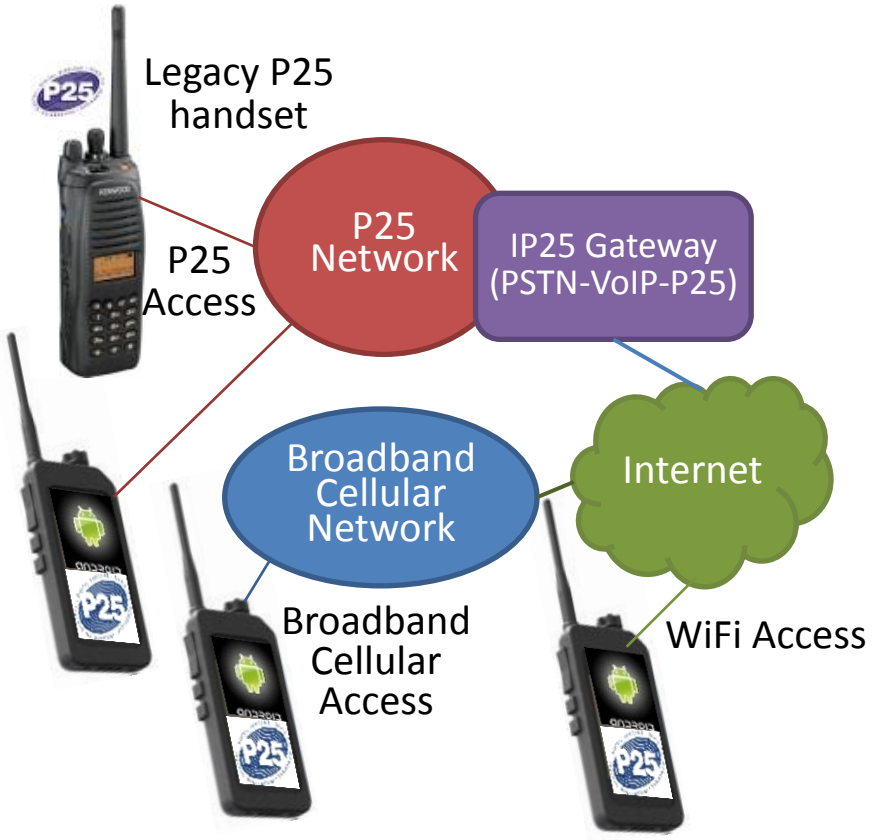
- Fits several smartphone brands
- SDR capability
- Multi-mode RF Front End
- Efficient Power Amplifier
- High energy battery pack
- P25 LMR radio features

COTS Smartphone:

- Cellular Broadband Network Access
- WiFi Access
- SDR P25 radio Push-to-Talk “App”
- Public Safety smartphone “Apps”
- Bluetooth for peripherals
- Sensors & Computing

MaXphone
Network Scenario

- The **MaXphone** operates in LMR (P25), Broadband Cellular and WiFi networks
- The **MaXjacket** enables operation with legacy P25 radios (Push-to-Talk, Text etc.)
- LMR applications on the smartphone run over Broadband Cellular or WiFi networks and interwork with LMR devices via the **IP25 Gateway**
- **Legacy VoIP** clients can be reached over Broadband Cellular or WiFi
- **Broadband Applications** for First Responders supported over Cellular Broadband and WiFi access
- Bluetooth on phone for peripherals (headset, keyboard etc.)

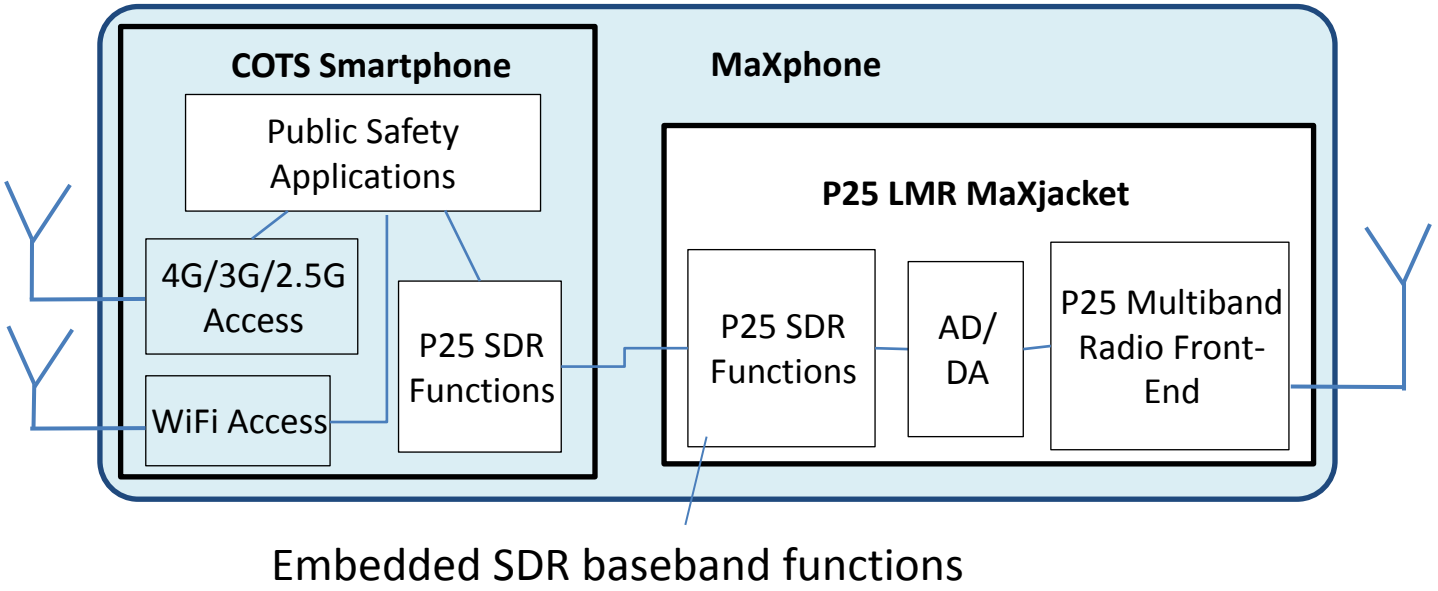


MaXentric Technologies LLC

MaXphone
Technical Approach

- MaXphone leverages the extremely fast development in commercial broadband networks & smartphone device capability seen in recent years
- An open source P25 SDR application (Linux) is ported to a combined Android and embedded Linux solution
- The MaXJacket LMR attachment is based on COTS components and contain the necessary P25 baseband and RF front-end functions for the P25 SDR solution
- First Responder Android applications are developed (for instance a Push-To-Talk “App”)

MaXphone
Technical Approach



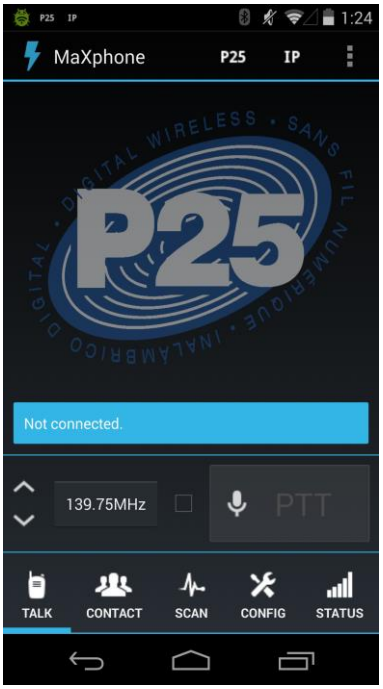
- Include SDR processing elements on the jacket
- Offloads the phone from baseband processing
- Allows optional function placement
- Less sensitive to phone upgrades

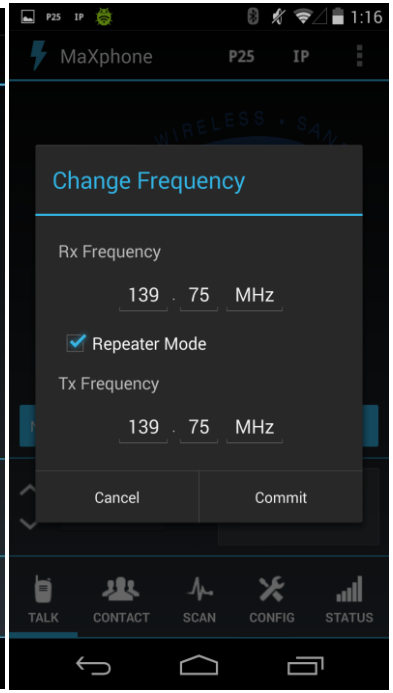
MaXentric Technologies LLC

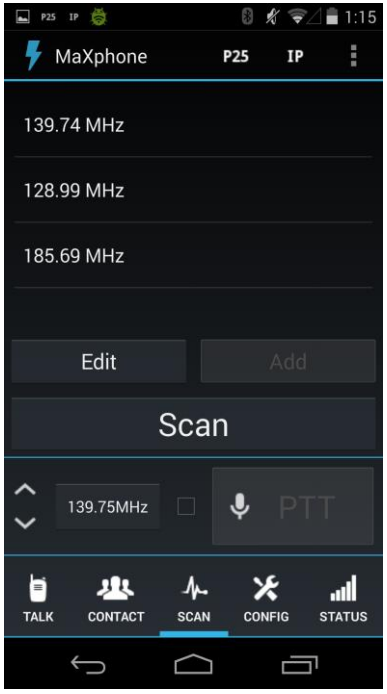
MaXphone

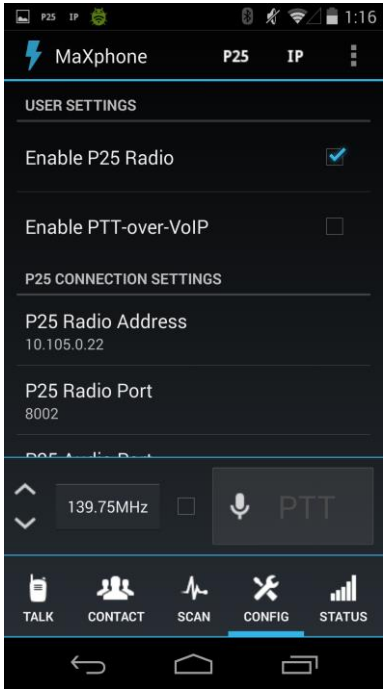
Android SDR P25 GUI

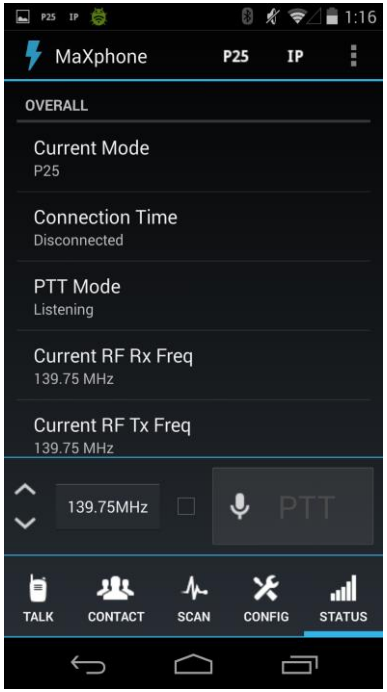
- Push-To-Talk (PTT) GUI
- Frequency Selection
- P25 or IP (4G or WiFi) mode selection
- Radio Scan List setting
- Radio Configuration & Status





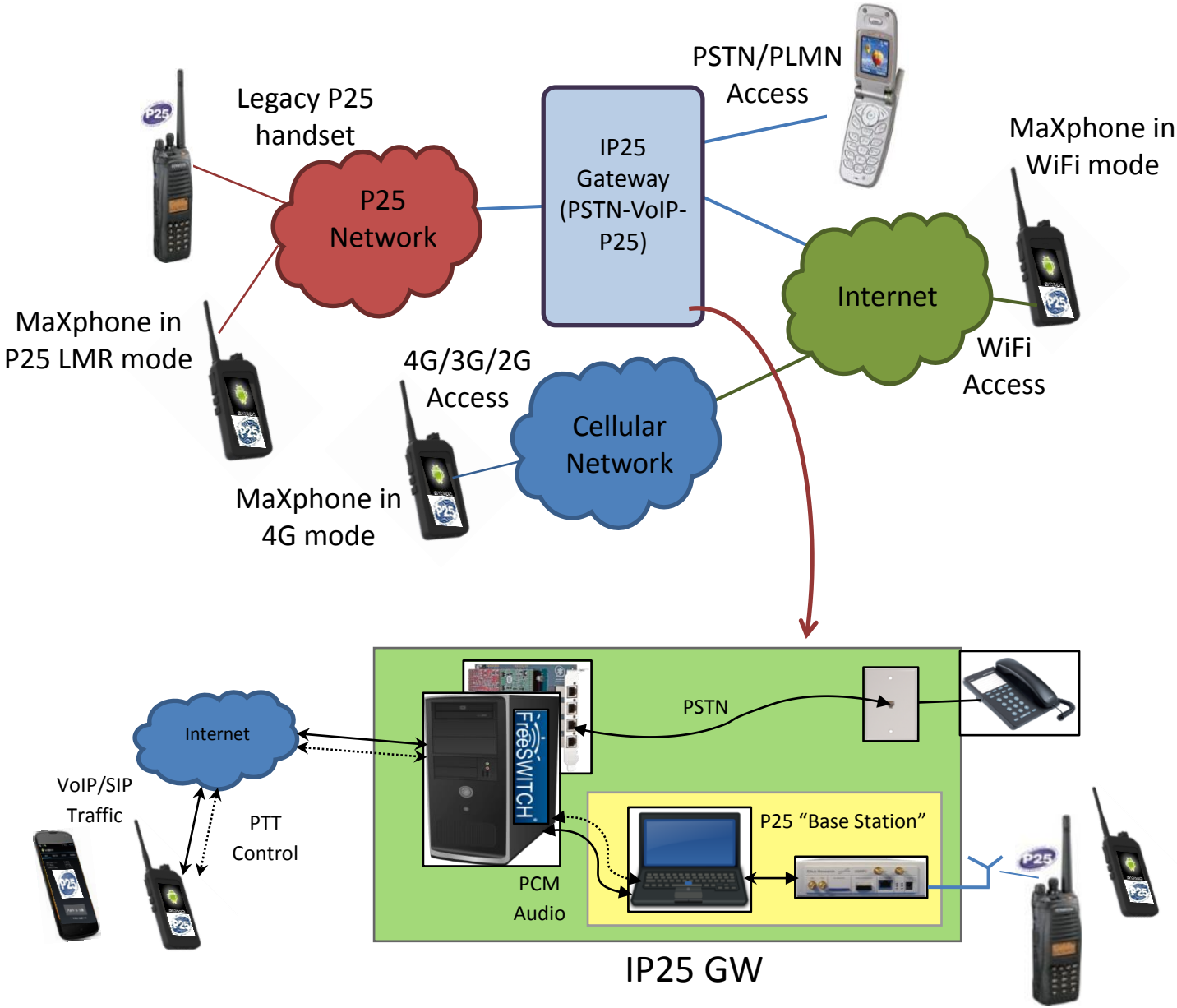






MaXentric Technologies LLC

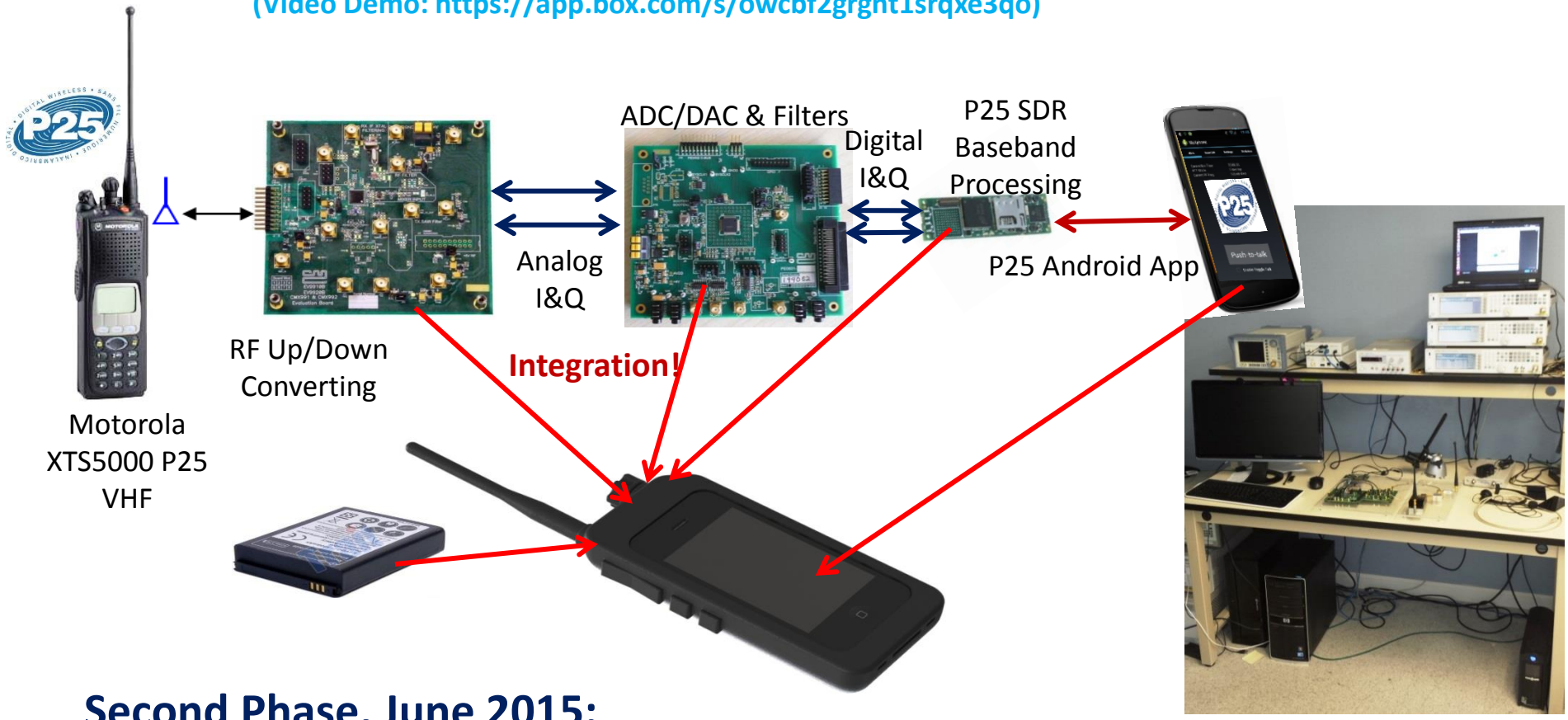
IP25 Gateway



MaXphone Timeline

First Phase, May 2014:
Proof-of-Concept Lab Prototype

(Video Demo: https://app.box.com/s/owcbf2grgnt1srqxe3qo)



Second Phase, June 2015:
Field Testing Prototype MaXphone (10 units) with Integrated MaXjacket

MaXentric Technologies LLC

Thanks!