Land Mobile Radio (LMR) Basics
“Communications 101”
Webinar
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Purpose

Today’s webinar will focus on providing an introduction to land mobile radio technology for criminal justice professionals who are unfamiliar or would like to learn more about how modern LMR systems work.
Outline

• History of Public Safety Radio
• Land Mobile Radio Equipment
• Public Safety Radio Spectrum
• Overview of Public Safety Radio Operation and Systems
• Project 25 Compliance Assessment Program
• Analog or Digital
• Project 25 (P25)
• Land Mobile Radio Industry Specific Terms
History of Public Safety Radio

Photo Courtesy U.S. Library of Congress
History of Public Safety Radio
History of Public Safety Radio

The 1939 P280 desktop two-way radio monitor operated a base station (not shown), allowing communications between dispatchers at police headquarters and radio-equipped police cars.

The Motorola Police Cruiser one-way radio was designed to receive broadcasts in police cars. This 1936 ad showed (left to right) the radio receiver, speaker and controls.
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**LMR User Equipment “Handheld Radios”**

- Handheld Radios
- Mobile Radios
- Radio Repeaters
- Dispatch Equipment
**LMR User Equipment “Handheld Radios”**

- Full Key Pad, Limited Key Pad and No Key Pad Radios
- Dual and Multi-Band Radios
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**LMR User Equipment “Mobile Radios”**

- Single Band Radio
- Single Band with Remote Control Head Radio
- Dual Band Dual Remote Control Heads
- Multi-Band Radio
**LMR Dispatch Equipment “Dispatch Radios”**

- Consoles
- Rack Mounted Radios
- LMR Base Station Radios
- Stand Alone Radios
LMR System Equipment “Repeater Sites”

Rack Mounted Repeater Radios
Public Safety Allocated Radio Spectrum

- 25-50 MHz
- 150-174 MHz
- 220-222 MHz
- 450-470 MHz
- 470-512 MHz
- 764-776 MHz
- 794-806 MHz
- 806-824 MHz
- 851-869 MHz
- 4940-4990 MHz

*Requires TV Clearing in most urban areas (TV Channels 60-69)

4.9 Public Safety Broadband Spectrum
**Simplex** – Portable to Portable Radio Operation

Radio (A) transmits

Radio (B) receives when radio (A) is finished transmitting, then radio (B) can transmit and radio (A) receives.
**LMR Conventional Radio System**

**Duplex – Repeater Operation**

Radio (A) transmits
**LMR Conventional Radio System**

Satellite Receivers – Repeater Operation

Radio (A) transmits
**LMR Conventional Radio System**

**Simulcast** – Repeater Operation
**LMR Conventional Radio System**

*Simulcast* – Repeater Remote Site Operation
**LMR Trunked Radio System**

Trunked – Single Site Operation
**LMR Trunked Radio System**

Trunked – Multisite Operation

Radio (A) transmits
**LMR Trunked Radio System**

Spectral Efficiencies of Trunking
Common Geographical Areas
Supported by Trunked Radio Systems

Citywide – radio systems used to support fire, police and EMS and, in some cases, other municipal services (i.e. Departments of Public Works and Transportation, etc.).

Countywide – radio systems used to support Sheriff’s Department, local Police Departments, County/Local Fire Services and EMS.

Statewide – statewide radio system used to support both local and State agencies (may also support Federal users when working daily with State and local agencies or during joint operations).

Regional – (multiple states or counties) radio system that encompasses a wide geographic area, crossing areas of service and jurisdictional lines.
Example of a Statewide Trunked Radio System
Project 25

*The acceleration of standards is a key component of both data and voice interoperability.*

- P25 is a suite of eight standards intended to help produce interoperable and compatible equipment.
- At the request of Congress, DHS is working with ITS, NIST, DoJ, and the P25 Steering Committee to develop and implement a Compliance Assessment Program (CAP).
- P25 CAP will validate that P25-standardized systems are P25-compliant and that equipment from different manufacturers can interoperate.
Labs are assessed by independent parties prior to being recognized for participation by DHS.

Labs assess/validate equipment as being P25-compliant.

Upon validation, manufacturers declare equipment P25-compliant and submit a Summary Test Report reflecting test results.

An independent Governing Board (GB) represents the collective interests of buyers, sets Program policies, and assists in the administration of P25 CAP.

Summary Test Report

Provides ‘at-a-glance’ summary reviews of test results
The Debate Over Analog or Digital Radio Systems
Questions?
For Additional Information

Visit our Websites:
http://www.commtechcoe.org
http://www.ojp.usdoj.gov/nij/topics/technology/communication
http://www.justnet.org

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