

# Digital PTT Technology Overview



**IWCE 2019 – Session M145**  
**Push-to-Talk & Future of Voice Track**  
**Changing Face of LMR**  
**Managing Your Legacy Networks**

- Overview of digital land mobile radio (LMR) standards
- Primary differences in digital LMR technologies
- Migration considerations





- **ETSI standard for digital radio**
  - User driven standards defined in ETSI documents (EN, TR, TS series)
- **Targeted at business/professional environments**
  - Designed to replace analog trunked technologies (MPT1327)
- **Typical LMR network architecture**
  - High sites, wide area coverage, less channel reuse
- **Compliance testing**
  - Interoperability (IOP) Process managed by the Technical Working Group (TWG) of the DMR Association

## • Modes

- Tier I (Unlicensed)
- Tier II (Conventional)
- Tier III (Trunked)

## • Architecture

- Conventional and trunked multicast, limited simulcast deployments
- 2-slot TDMA protocol

## • Dispatch equipment interface

- AIS (Application Interface Specification) protocol for use by dispatch consoles in either Tier 2 or Tier 3 systems

### Interfaces

- *Over the Air*
- *Voice and generic services*
  - ❖ *Call types and handling*
  - ❖ *Tier 2 (conventional)*
- *Data protocol*
  - ❖ *Call types and handling*
- *Trunking protocol*
  - ❖ *Tier 3 (Trunking)*



- **ITU recognized standard for digital radio**
  - **NXDN™ Forum maintains specifications and standards suite**
- **Targeted at business/professional environments**
- **Typical LMR network architecture**
  - **High sites, wide area coverage, less channel reuse**
- **Spectrally efficient (6.25 kHz channels)**

## ● Modes

### ➤ Conventional

- Peer-to-peer (direct)
- Repeated

### ➤ Trunked

- Single or multisite
- With or without dedicated control channel
  - Centralized or decentralized trunking

## ● Sites can be interconnected to form wide area networks via IP links\*

### Supports digital system feature sets:

- Individual and group call
- Low speed data service, e.g. SMS, GPS, status messages
- Roaming
- Digital scrambling (built in)
- Standards based encryption (AES/DES) option



- **Global open standard for digital radio**
  - User driven standards defined in Telecommunications Industry Association (TIA 102 series) documents
- **Targeted at public safety or “mission critical” environments**
- **Typical LMR network architecture**
  - High sites, wide area coverage, less channel reuse
- **Compliance testing**
  - Project 25 Compliance Assessment Program (P25 CAP) is a formalized, independent process for certifying products

- **Modes**

- Phase 1: FDMA
- Phase 2: 2 slot TDMA
- Conventional and Trunked
- Multicast, simulcast, and hybrid

- **Sites can be interconnected to form wide area networks via IP links\***

- **“Backward” support for legacy LMR systems**

**Defined interfaces:**

- **Common Air Interface (CAI)**
- **Subscriber Data Peripheral Interface**
- **Fixed Station Subsystem Interface (FSSI)**
- **Console Subsystem Interface (CSSI)**
- **Inter-RF Subsystem Interface (ISSI)**
- **Network Management Interface**
- **Data Network Interface**
- **Telephone Interconnect Interface**



- **ETSI open standard for digital radio**
  - User driven standards defined in ETSI documents (EN, TR, TS series)
  - EN: European Norm, TS: Technical Specification, TR: Technical Report
- **Targeted at public safety or “mission critical” environments**
- **Utilizes cellular-type network architecture**
  - Dense sites with channel reuse
- **Compliance testing**
  - Certification process managed by the Technical Forum (TF) of the TETRA critical communications association (TCCA)

- **Scalable architecture allowing network deployments**
  - Multiple site local area coverage systems to wide area national coverage networks
- **Provides four user communications paths on one radio channel (carrier)**
- **Supports both voice and data services**
  - Trunked, 4-slot TDMA

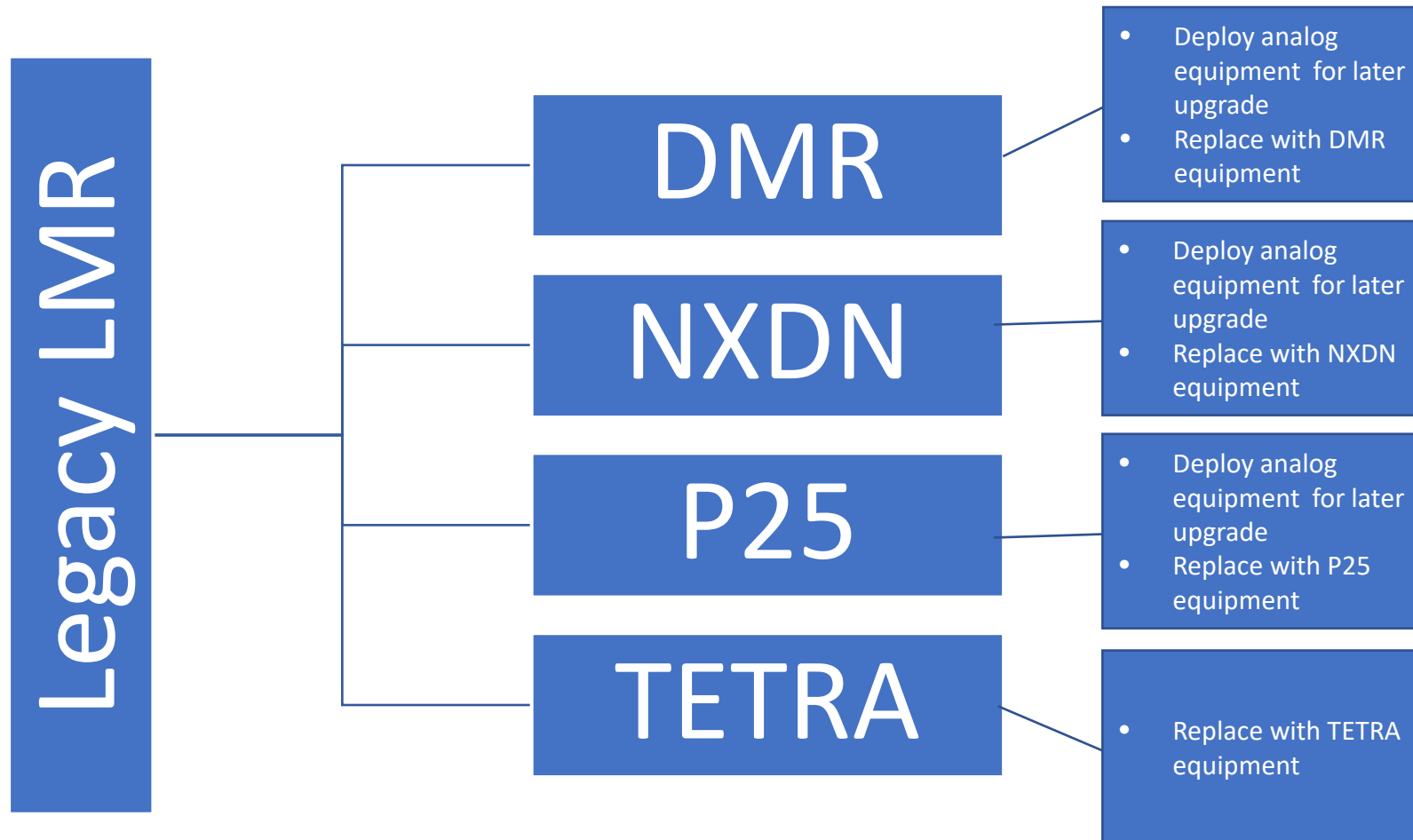
**Defined interfaces:**

- **Air Interfaces**
- **Infrastructure: base station to radio terminals**
- **Direct Mode Operation (DMO)**
- **Peripheral Equipment Interface**
- **Remote Dispatcher Interface\***
- **Manufacturer specific**
- **PSTN/ISDN/PABX**
- **Inter-System Interface (ISI)**
- **Network Management Interface**

# LMR Standards Summary

|                                      | P25   | NXDN  | TETRA   | DMR   |
|--------------------------------------|---|---|---|---|
| <b>Market Target</b>                 | Mission Critical  | Business Critical   | Mission Critical  | Business Critical   |
| <b>Infrastructure Configurations</b> | Simulcast,<br>Multicast,<br>Conventional  | Single site and multisite,<br>centralized and decentralized trunking (limited),<br>Conventional   | Multicast   | Simulcast (limited),<br>Multicast,<br>Conventional  |
| <b>Subscriber Equipment</b>          | Higher Cost   | Lower Cost  | Median Cost   | Lower Cost  |
| <b>Coverage</b>                      | <ul style="list-style-type: none"> <li>➤ Higher power equipment</li> <li>➤ High sensitivity receivers</li> <li>➤ Fewer sites than DMR, TETRA</li> </ul> | <ul style="list-style-type: none"> <li>➤ Higher power equipment</li> <li>➤ Fewer sites than TETRA</li> <li>➤ More sites than P25</li> </ul> | <ul style="list-style-type: none"> <li>➤ Lower power equipment</li> <li>➤ More sites than DMR, NXDN or P25</li> </ul> | <ul style="list-style-type: none"> <li>➤ Higher power equipment</li> <li>➤ Fewer sites than TETRA</li> <li>➤ More sites than P25</li> </ul> |
| <b>Data</b>                          | <ul style="list-style-type: none"> <li>➤ Low Speed</li> </ul>   | <ul style="list-style-type: none"> <li>➤ Low Speed</li> </ul>   | <ul style="list-style-type: none"> <li>➤ Medium Speed</li> </ul>  | <ul style="list-style-type: none"> <li>➤ Low Speed</li> </ul>   |

## MIGRATION PATHS



- **Commercial 3G and 4G LTE**

- Widely used by public safety, utilities, and transit for broadband mobile data services
- Mission critical PTT standards in development

- **Wide Area Digital Services (Public or Metro-area Wi-Fi)**

- Reporting, large file upload and download, system updates
- Typically provides limited coverage

- **Local Area Digital Services (Internal Wi-Fi)**

- Reporting, large file upload and download, system updates
- Targeted Coverage

## OTHER CONSIDERATIONS

- **Choose the technology that fits your organizational needs**
  - These should be considered tools in the toolkit
- **Look beyond the capital cost to the ongoing support costs**
  - That includes incremental refreshes...
- **Don't be afraid to ask questions!**
  - Once you make a choice, you are now on that technology(s) treadmill

## ***For More Information . . .***

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**Thank You!!**

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