

Intro to DMR

(Digital Mobile Radio)

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Digital Voice Advantages

- No background noise/static. Signal is either there or not.
- Forward error correction allows no loss of quality even after losing some data bit.
- Linking doesn't degrade voice quality.

What is DMR

- ETSI (European) standard first ratified in 2005 for professional mobile radio.
- Open standard. Multiple vendors.
- Made for PMR, not for amateur radio.
- Capable of digital voice and data transmission.
- Voice uses DVS1 AMBE+2 vocoder
- Text messaging with most handsets.
- Digital voice can be encrypted.
- Three tiers
 - DMR Tier I – Unlicensed. Similar to a digital FRS.
 - DMR Tier II – Conventional DMR. What hams are using.
 - DMR Tier III – Trunked. No amateur use yet.

TDMA

- Time division multiple access
- 12.5 kHz channels (narrowband)
- Allows two conversations on the same repeater/frequency pair at the same time with not additional hardware over an analog system
- Improved battery life
- 6.25 kHz “equivalent” channel bandwidth
- You program a frequency and time “slot” (1 or 2)

Color codes, radio IDs, & talkgroups

- Color codes
 - Similar function to CTCSS/PL tones on analog systems.
 - Used to prevent adjacent systems from interfering.
- Radio IDs
 - Used to identify a specific user on the system.
 - Allows for “private” calls between two users.
- Talkgroups
 - Allows a group of users to only hear traffic for them.
 - Similar to talkgroups on trunked systems, but with a single frequency/timeslot.

Amateur use of DMR

- Must have a registered radio ID
- Encryption not allowed
- Private calls typically discouraged
- Some radio settings need to be a certain way not to cause issues.

Amateur DMR Linking

- Mostly Motorola repeaters. The linking method is still proprietary.
- c-Bridge used to make linking more flexible.
- Talkgroups used instead of direct linking.
- A repeater will subscribe to specific talkgroups.
- A local PTT is sometimes required to activate the network talkgroup on a repeater
- Local traffic overrides network traffic.

Radios

- Connect Systems CS700 UHF / CS701 VHF
 - \$179 ham radio price
 - \$5 programming cable
 - Free programming software
- Motorola
 - \$400 - \$600 are common prices for good used and ham-friendly dealers.
 - \$60 - \$100 programming cables
 - \$250 - \$300 for 3 year CPS subscription
- Hytera and others

Comparisons

- DMR Tier II
 - 6.25 kHz*, 4800 bps, 4FSK, AMBE+2
- D-STAR
 - 12.5 kHz, 4800 bps, GMSK, AMBE
 - Geared for ham radio. Callsigns used, etc.
- NXDN – Kenwood NEXEDGE, Icom IDAS
 - 6.25 kHz, 4800 bps, 4FSK, AMBE+2
 - 12.5 kHz, 9600 bps, 4FSK, AMBE+2
- Yaesu System Fusion
 - Similar to NXDN, but specifically made for ham radio.
- P25 Phase I
 - 12.5 kHz, 9600 bps, C4FM/CQPSK, IMBE
- P25 Phase II
 - TDMA, 6.25 kHz*, 12000 bps, H-DQPSK/H-CPM, AMBE+2



Questions?

Links

Request subscriber/radio ID:

http://www.dmr-marc.net/request_subscriberID.html

Natural State Experimenters: <http://k5nsx.com/>

DMR Activity Monitor: <http://dmr.watch/>

DMR-MARC: <http://www.dmr-marc.net/>

DMR Association: <http://dmrassociation.org/>

Connect Systems: <http://www.connectsystems.com/>