

GUIDE TO DIGITAL

eVerge™ digital solutions



EVOLVE TO BETTER

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WHY DIGITAL?

Digital two-way radio technology was created to address the problem of overcrowded frequencies – referred to as achieving spectrum efficiency. With millions of analog radios in use, too many users in a frequency band impacts the quality and reliability of communications putting safety and productivity at risk. In certain countries, there are regulatory requirements being implemented that mandate manufacturers to only produce and sell digital two-way radios.

As a result, most radio manufacturers are primarily investing in developing new digital radio technology options to meet the growing needs for more efficient two-way radio communications. Digital transforms the way people communicate and use two-way radios on the job.

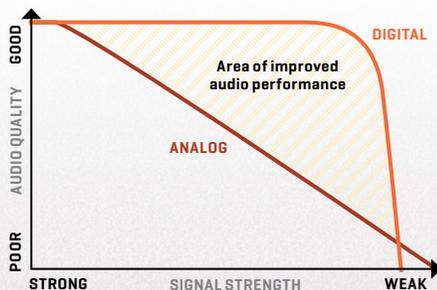
DIGITAL MAKES TWO-WAY RADIO COMMUNICATIONS BETTER

Users can achieve improved and expanded communications capabilities with the advancements of digital technology that overcome traditional analog performance challenges combined with a new set of features enabling users to do more – better.

Better Call Quality

Audio – digital applies error correction to eliminate noise and static and preserves voice quality over a greater range so users can hear what is being said crisp and clear. Use of the AMBE+2™ vocoder further improves speech transmission quality in noisy environment while achieving spectrum efficiency.

Coverage – digital enables users to make more calls to more places. A digital signal stays strong and clear until it reaches its maximum range. There is no deterioration in the signal providing greater usable range in areas where two-way communication was not possible in the past.



Analog Limitations

While analog radios have been used for years – there are limitations to its performance that many users have been conditioned to just accept:

- ▶ **Audio quality** – Background noise and static.
- ▶ **Inconsistent performance** – Irregular experience in transmitting and receiving calls.
- ▶ **Usable range** – Coverage gaps in how far radios will work effectively.
- ▶ **Lack of privacy** – No control over who can hear calls placed over the radio.
- ▶ **Channel congestion** – Distracting radio noise and chatter risking missed important calls.
- ▶ **Call management** – No easy ability to place direct calls to select individuals or groups.
- ▶ **Multiple Site Connectivity** – Can only be done in Digital.

Better Call Management

Control – A common desire amongst analog radio users is to control who receives a message and avoid broadcasting messages to a wide group of listeners. Digital makes this possible with unique IDs assigned to each radio. A user can selectively call specific individuals or groups by selecting the radio ID(s) to direct a message only to those who need the information.

Call Management Capabilities

- ▶ **Individual Call** – One user directly calls another user and cannot be heard by anyone else on the channel.
- ▶ **Group Call** – One user can call a select group of users. All parties in the group hear each other and cannot be heard by anyone outside the designated group who may be on the same channel.
- ▶ **All Call** – One-way voice transmit from one user to all users on a channel.
- ▶ **Late Entry** – While an individual or group call is in progress, latecomers are joined into the call.

Text Messaging – Digital enables sending/receiving free-form or preset text messages. Users have more ways to stay connected when voice communication is not feasible or messages need to be stored for reference.

Privacy – No extra encryption hardware is required to ensure private communications when operating in digital mode. Only the intended recipient(s) hear what is transmitted without the risk of significant loss in voice quality that can be experienced with analog scrambling.

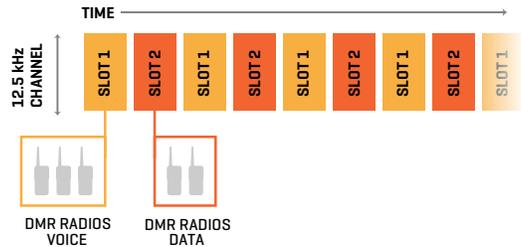
DO DIGITAL RIGHT

Not All Digital Radios Are the Same

Unlike analog radios where any brand of radio can work together, digital radios are manufactured based on one of two protocols: TDMA or FDMA. It is important to note that these two protocols are not compatible; this means FDMA radios will not work with TDMA radios when operating in digital mode. Over 74% of the digital radios deployed worldwide use the TDMA protocol for enhanced efficiency and power.

TDMA PROTOCOL

TIME-DIVISION MULTIPLE ACCESS



Uses the full 12.5 kHz channel and divides it into two independent time slots to achieve 6.25 kHz efficiency. This doubles the calling capacity in one frequency channel for two simultaneous digital conversations to occur in a single channel. Or, use one time slot for voice and the other for data such as text messaging. Achieve double capacity without relicensing or rebanding and avoid degradation in range performance or interference with adjacent channels.

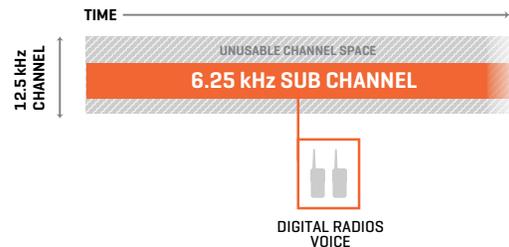
2 FOR 1: GET TWO DIGITAL VOICE PATHS FROM ONE 12.5 kHz CHANNEL.

Additional benefits of TDMA:

- Backwards compatible with legacy analog systems for easy, efficient conversion to digital.
- Reduced equipment cost – no extra repeaters or combining equipment required to get double the capacity.
- Longer battery life and greater power efficiency – TDMA reduces transmit time in half for improved battery performance increasing talk time length on a single charge. Less infrastructure equipment is required which leads to less energy needed to operate.
- More choices – TDMA is the most widely used digital mobile radio protocol in the world. Using TDMA digital radios gives users a more flexible radio system.

FDMA PROTOCOL

FREQUENCY-DIVISION MULTIPLE ACCESS



Splits a frequency band into narrow sub-channels and does not use the full capacity of the entire 12.5 kHz channel. As a band narrows, there is greater risk of interference, reduced sensitivity and potentially reduced range resulting in overall reduced performance quality. Relicensing or rebanding is necessary, adding more cost to implement.

ONLY ONE DIGITAL VOICE PATH IS ACHIEVED IN ONE 12.5 kHz CHANNEL WITHOUT RELICENSING.

Other limitations of FDMA:

- Increased equipment cost – a dedicated repeater is required for each channel. Combining equipment is also required for multiple frequencies to share a single base station antenna.
- Increased licensing cost – relicensing or rebanding is necessary to achieve increased capacity. Cannot fully operate two 6.25 kHz subchannels within 12.5 kHz channel. Once channel is relicensed or rebanded to get double the capacity on FDMA, the digital system can no longer communicate with a legacy analog system as it will be on a different frequency.
- Limited choices – Not a widely used protocol and very few brands available.

KNOW THE DIFFERENCE

	Achieve spectrum efficiency?	Extra equipment required?	Channels to repeater ratio	Use existing licenses?	More product and brand choices
TDMA	YES	NO	2:1	YES	YES
FDMA	NO	YES	1:1	NO	NO

EVOLVE TO BETTER

eVerge™ } Evolve to Better



Good enough is no longer good enough — you can afford better communication.

Leave analog limitations behind and evolve to better audio quality, better privacy and better range – all at a better cost with eVerge™ digital two-way radios. Analog compatible and precision-engineered to deliver value without sacrificing quality – giving you more capabilities and the flexibility you need to communicate at your best.

A EVX-530 SERIES PORTABLES

- ▶ Digital and Analog Operation
- ▶ 32 channels/2 groups [EVX-531], 512 channels/32 groups [EVX-534/539]
- ▶ IP57 Submersible
- ▶ Audio: 500 mW [EVX-531], 700 mW [EVX-534/539]
- ▶ All/Group/Individual Call
- ▶ Text Messaging
- ▶ Transmit Interrupt
- ▶ Direct/Dual Capacity Mode
- ▶ Site Search
- ▶ Basic/Enhanced privacy with 256b AES encryption [EVX-534/539]
- ▶ Mixed mode scan
- ▶ PTT ID

B EVX-5300/5400 MOBILES

- ▶ Digital and Analog Operation
- ▶ 8 character alpha numeric display [EVX-5400]
- ▶ 8 channels/1 group [EVX-5300], 512 channels/32 groups [EVX-5400]
- ▶ 4 W Loud Audio
- ▶ All/Group/Individual Call
- ▶ Text Messaging [EVX-5400]
- ▶ Transmit Interrupt
- ▶ Direct/Dual Capacity Mode
- ▶ Site Search
- ▶ Basic/Enhanced privacy
- ▶ Mixed mode scan
- ▶ PTT ID

C EVX-Link IP Connect Solution

EVX-Link Supports these features:

- ▶ Digital Operation
 - ▶ All/Group/Individual Call
 - ▶ Text Messaging
 - ▶ Site Search
 - ▶ PTT ID
 - ▶ Emergency Calls
 - ▶ Call Alert
 - ▶ Remote Monitor
 - ▶ Up to 32 Linked Coverage Areas Possible
- An EVX-5300 or EVX-5400 mobile radio is required for use with each EVX-Link unit.

D EVX-R70 REPEATER

- ▶ Digital and Analog Operation
- ▶ 16 channels
- ▶ Output power up to 45W
- ▶ Multicolored LED Status Indicators

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Learn more about TDMA protocol and digital mobile radio standards at:
www.dmrassociation.org

DMR
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