



## Why the shift to digital?

The answers may surprise you! Before sharing the top user reasons for switching to digital, let us tell you what the reasons are NOT! Government mandates for switching to 12.5 kHz by 2013 and the original FCC proposal to switch to 6.25 kHz by 2018 are NOT the reasons why major user groups are switching to digital.

Without getting technical, we can say right up front that there is no requirement for you to switch to digital communications UNLESS you have applied for and been granted funds for interoperable P25 communications equipment under the terms and conditions of the 2009 Assistance to Firefighters Grant. Additional information is available at [www.info4u.us/Ready4P25.pdf](http://www.info4u.us/Ready4P25.pdf).

There is a great deal of confusion between the term *narrow band* and *digital*. They are not the same! Narrow banding (Conversion for 25 kHz to 12.5 kHz bandwidth) is an FCC requirement that has nothing to do with the operating mode of the equipment (i.e. analog or digital)

The FCC has authorized, actually mandated, operation on 12.5 kHz (think half inch) and proposed 6.25 kHz (think quarter inch). All licensees are required to convert to 12.5 kHz by 2013 and the FCC has proposed a switch to 6.25 kHz by 2018. The result will be three to four times more useable frequencies and improved communications through the use of digital technology (Recommended for 12.5 kHz and technically required currently for 6.25 kHz operation).

The three most popular digital technologies available in the US are MotoTRBO, NXDN, and P25 with NXDN being the choice of the American railroads and P25 by all federal government agencies as well as the proposed standard for state, county, and municipal interoperable communications.

Additional information follows. We also have provided more detailed information at [www.the-end-of-confusion.us](http://www.the-end-of-confusion.us).

By the way, we haven't forgotten that we promised to tell you the top five reasons why many users are switching to digital. It isn't all about mandatory standards. There are some significant benefits for switching to digital. We'll tell you more on the following page!

*Burch H. Falkner*

WhyDigital.ltr

# The top five reasons people switch to digital!

## Number 5

**Technical benefits** – Digital radios consume less current than analog radios. This means portable batteries operate longer between charges. This leads to longer intervals between charges and that means longer battery operating life before replacement. Most digital radios use memory free, high capacity Lithium-Ion batteries that are smaller and lighter than the old Nickel-Cadmium or even Nickel Metal-Hydrate batteries. Lower current consumption means less vehicle battery drain and longer operating life when fixed stations are operating on battery backup in an emergency situation.

## Number 4

**Advanced features** – There are some really beneficial options that can easily be incorporated in a digital communications system. The reason is that digital communications systems convert everything to data (including voice). This means it is fairly easy to add 2-way text messaging and GPS either for finding directions, fleet dispatch, or vehicle tracking. The most popular at this time is text messaging.

## Number 3

**Privacy** – The difference in 2-way radio and cellular communications is that cellular communications are designed for one-to-one communications whereas 2-way radio is designed for one-to-many communications. This is great for group coordination, dispatch, and other activities where a large group of people need to communicate with each other. The shortcoming of the one-to-many communications is the lack of privacy. Analog systems can easily be monitored by the public – not so with digital. Of equal importance, digital radios systems allow user groups, or even individuals, to communicate with each other in PRIVATE while still being available to monitor group activity. This is a huge benefit!

## Number 2

**Elimination of Noise** – Static, hiss, and fringe area communications are words that do not apply to digital communications. With an analog system, as the signal levels degrades with distance, noise intensifies until the noise is actually greater in the fringe areas than the actual communication signal. You may be able to hear a transmission, but it is unintelligible because of noise – Not so with digital. If you've got a signal – it's crystal clear since there is no noise. A digital system sounds like it is talking farther than analog. Actually it doesn't. It just gives you maximum communications capability that sounds great!

## Number 1

**Elimination of interference** – Every since 2-way radios became practical for vehicular and personal use; we have been conditioned to accept the fact that interference from other users that may be sharing the channel must be accepted. We have been told that there is no such thing as a private channel. We have added privacy options such as tone coded squelch and more recently, digital coded squelch but we still have interference UNLESS we use digital radios. We may still share channels with other users. In some cases, this may be beneficial where Police, Fire, and EMS share a frequency for common emergency use. The difference in digital is that we can either segment or combine different users on the same channel with unwanted interference being a thing of the past. Better yet, we get better utilization of available frequency spectrum – truly a win-win benefit.

As a final comment, it should be noted that interoperability to communicate with other users and compliance with mandatory government regulations are important, but the real reasons for going digital are as shown above. On the next page, we will provide a comparison of the three technologies followed by pricing guides.

# Digital Radio Systems Comparison Guide

The following information is provided as an aid to public safety communications users in reviewing the available offerings in digital communications. This information is based on published information with no objective other than giving those we serve the best available resources in separating fact from sales claims. This information is current to the best of our knowledge as of April 10, 2010.

FEATURE	MotoTRBO	NXDN	APCO P25
Open Standard (i.e. multiple vendors)	No (1)	Yes	Yes
Primary vendors	Motorola	ICOM/Kenwood	See Note 2
6.25 kHz single channel capable	No	Yes	Yes
SAFECOM recommended standard	No	No	Yes
DHS approved standard	No	No	Yes
FEMA grant funding approved	No	No	Yes
Alabama DHS plan approved	No	No	Yes
Secure from public monitoring	Yes	Yes	Yes
Text messaging capability	Yes	Yes	Yes
Lower battery drain than analog	Yes	Yes	Yes
Typical Cost – Mobile or portable radio	Under \$1,000	Under \$1,000	\$1,000 to \$6,000
Typical Cost – Repeater/Base Station	Under \$2,500	Under \$2,500	\$10,000 - \$30,000
Major user approvals	None known	Railroads	US Government
Advanced level security at optional cost	No	No	Yes, AES/FIPS
Trunking option capable	Yes	Yes	Yes
2-Tone Paging capable (See Note 3)	Yes	Yes	Yes
Public safety recommended (Note 4)	No	No	Yes
Mixed mode capable repeater ( Note 5)	Yes	Yes	Yes
Vehicle repeater option	No	Yes	Yes
GPS option capable	Yes	Yes	Yes

Note 1 – Selecting a technology offered by a single vendor can have long term negative consequences in terms of potential escalating prices or even worse, discontinuation of the products Remember BetaMax?

Note 2 – APCO-25 (P25) is available for more vendors in the US than any other technology. Vendors include E.F. Johnson, Harris, ICOM, Midland, Motorola, Tait, and others. Features and functionality vary with price range and manufacturer

Note 3 – Compatibility with 2-tone paging systems is generally a requirement for volunteer fire and rescue agencies. This capability was not available in MotoTRBO radios sold before 2010.

Note 4 – APCO-25 is the only digital technology recommended for public safety use in manufacturers published literature.

Note 5 – Mixed mode repeater operation allows a smooth migration from analog to digital since both analog and digital radios can be used as older analog radios are being phased out. This also allows interoperability with non-digital radio users. This capability is an extra cost option/upgrade on MotoTRBO. It is standard with NXDN and P25.

Conclusion – There are some very obvious conclusions that can be made from the aforementioned facts. While both the MotoTRBO and NXDN systems are well suited for commercial and institutional use, it has to be concluded that the only one of the three technologies specifically designed and approved for public safety use is APCO P25. See also [www.info4u.us/D-Mobiles.pdf](http://www.info4u.us/D-Mobiles.pdf), [www.info4u.us/D-Portables.pdf](http://www.info4u.us/D-Portables.pdf) and [www.info4u.us/D-Base.pdf](http://www.info4u.us/D-Base.pdf) for product information.

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