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Communications & Security Solutions

Effective solutions are more than technology, they also include people, processes, training & practice.

Which system to use, which is the best; Analog, DMR, NXDN, P25, or TETRA?

There are 5 possible radio technologies competing to provide your next radio communications upgrade or new system; Analog, DMR, NXDN, P25, and TETRA. Each one has benefits and limitations, which can get confusing because vendors play up the strengths of the solutions they sell and play up the weaknesses of the solutions they don't offer.

Public Safety & P25

If you are a Public Safety agency, you should attempt to implement a P25 solution. P25 is not perfect and implementing P25 does not guarantee interoperability, however implementing P25 for all Public Safety agencies provides the most opportunities for system sharing and interoperability. P25 also offers other benefits, like the ability to use AES 256 bit encryption and share encryption keys.

P25 is highly effective for providing large shared systems, such as a large City, Province, or State wide system. Implementing interoperability is easiest if all the users are on the same radio system. In large systems, the cost of common infrastructure is shared across many users. Small P25 systems can be cost prohibitive, due to the costs to purchase and operate the common infrastructure, as well as the costs for radios.

Public Safety does not have unlimited funding, and Municipalities may have to pool their radio requirements into one system that serves all users, including Public Safety. For example, many Fire Departments serve a local Municipality, while Police and EMS are Regional, Provincial or have State wide responsibility. The Fire Department must operate on the local Municipal radio system and P25 may be beyond the Municipalities budget. It is important to keep focus on the real goal, which is to ensure that Public Safety agencies have effective and reliable radio communications. The non P25 radio system options are effective and reliable, and may better fit with Municipal requirements and budget.

Analog

Analog radio equipment is still available from almost all manufacturers and it can meet the US 12.5 kHz narrowband requirement. Upgrading an analog system may be the most cost effective solution. Components can be replaced independently, so a new repeater, or additional radios is possible, even if they are made by a different vendor. One thing to keep in mind is that many vendors now sell equipment which supports digital and analog, so you may need to think about the longer term future, when buying analog equipment in the short term.

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DMR, NXDN, TETRA

These three digital standards, DMR, NXDN and TETRA, all provide the same basic capabilities, 6.25 kHz channel equivalency, low speed data (GPS, Text) and of course, clear audio. Each also suffers from the limitations of digital, which either works or does not work. There are no scratchy, noisy signals from the fringe areas, like there is with Analog.

Determining which system is best really depends on requirements. Each system has its strengths and weaknesses and the impact of these depends on the requirements. If you only need 1 voice path, the benefit of a digital system with 2 or 3 voice paths on one RF channel may not be of value. Coverage area, capacity, trunked or conventional and frequency band all push and pull at the value proposition for each system. Even within vendors of the same technology standard, there are differences in capabilities. For example, not all vendors or technologies support 900 MHz.

Requirements Drive The Solution

Requirements should drive the solution, and requirements are about more than infrastructure. Radio communications is a tool, and the effectiveness of that tool depends on how well it meets the needs of the users. Most digital systems and vendors can deliver a solution that will provide push to talk voice communications with basic data (GPS & Text).

Having a big screen on the radio may not be useful for users who carry the radio on their belt and use a speaker microphone. Features like the ability to address an individual radio, can make the radio system more effective, so users are not disturbed by calls that don't relate to them. Life Safety means making sure the radio works where it is required. Close is not good enough. Coverage of 95% reliability is OK for many areas, but it is important to clearly define where the radio must work, like a fire pump room, or hazardous areas where workers are alone.

Comparing Vendors & Technologies

The matrix table on the next page identifies the 4 digital radio technologies; P25, DMR, NXDN & TETRA. Within the section for each digital radio technology is a list of vendors, with columns for different frequency bands. Within each frequency band is a column to indicate if the vendor provides Infrastructure and one to indicate if the vendor provides Radios.

Green boxes indicate that the vendor DOES provide this technology, in this frequency band and whether they provide Infrastructure, Radios, or both.

DIGITAL TECHNOLOGY & VENDOR SOLUTIONS IN NORTH AMERICA

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P25
RF Carrier = 12.5kHz, Talkpaths = 1 or 2

Manufacturer	VHF I	VHF R	UHF I	UHF R	700 I	700 R	800 I	800 R	900 I	900 R
Cassidian										
Codan (Daniels)	1		1		1		1			
EF Johnson										
Harris										
Hytera										
Icom										
Kenwood										
Motorola										
Power Trunk										
Relm	4		4							
Sepura										
Tait										
Thales		2		2		2		2		
Vertex										

NXDN
RF Carrier = 6.25kHz, Talkpaths = 1

Manufacturer	VHF I	VHF R	UHF I	UHF R	700 I	700 R	800 I	800 R	900 I	900 R
Cassidian										
Codan (Daniels)										
EF Johnson										
Harris										
Hytera										
Icom										
Kenwood										
Motorola										
Power Trunk										
Relm										
Sepura										
Tait										
Thales										
Vertex										

DMR
RF Carrier = 12.5kHz, Talkpaths = 2

Manufacturer	VHF I	VHF R	UHF I	UHF R	700 I	700 R	800 I	800 R	900 I	900 R
Cassidian										
Codan (Daniels)										
EF Johnson										
Harris										
Hytera										
Icom										
Kenwood										
Motorola										
Power Trunk										
Relm										
Sepura										
Tait										
Thales										
Vertex										

TETRA
RF Carrier = 25kHz, Talkpaths = 4

Manufacturer	VHF (Future TETRA Standard)	UHF I	UHF R	700 (Not In TETRA Standard)	800 I	800 R	900 (Not In TETRA Standard)
Cassidian							
Codan (Daniels)							
EF Johnson							
Harris							
Hytera							
Icom							
Kenwood							
Motorola							
Power Trunk							
Relm							
Sepura							
Tait							
Thales		3			3		
Vertex							

I = Infrastructure   R = Radios

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LEGEND:

I	Infrastructure (Repeaters, System Core)
R	Radios
🟩	Manufacturer offers this technology/frequency band
🟧	Manufacturer does NOT offer this technology/frequency band
1	Daniels offers conventional and trunking repeaters. No core infrastructure.
2	Thales only offers a tri-band P25 radio
3	Thales does provide TETRA infrastructure outside North America, but it is not known if they will be selling it in the North American market.
4	Relm only offers conventional repeaters for P25. No trunking or core infrastructure

Every effort is made to make this table as accurate as possible. Vendors are encouraged to provide corrections to the list.   admin@willowfalls.ca