



DIGITAL PRIVATE MOBILE RADIO

WHICH TECHNOLOGY SOLUTION IS RIGHT FOR YOU?



DMR OR TETRA – WHICH DIGITAL RADIO TECHNOLOGY IS RIGHT FOR YOUR ORGANIZATION?

Private Mobile Radio (PMR) - sometimes called Professional Mobile Radio - was developed for business and professional users who need to keep in contact when in the field or at the frontline - and for organizations such as the police, fire and ambulance services where two-way communications are critical to their mission.

According to current estimates there are 40 million analogue radios in use globally with the vast majority of these being deployed private mobile radio communications. It is expected that more than 50% of this installed base will be digital radios by 2018. This migration from analogue to digital technology is being driven by government mandates, spectrum efficiency and end user benefits.

There are a number of benefits for the end user in the switch to digital private mobile radio which can probably best be summed up as better basics and enhanced features. These include better basics in the form of better audio quality, better coverage and better battery life as well as enhanced features in the shape of increased capacity, greater security, greater data capability and improved telephony.

OPEN STANDARDS

There are however many digital radio technologies out there in the marketplace – some of which are proprietary and some open standard. There are some key advantages to choosing an open standards technology in any marketplace – and these are as true for the PMR market as any other. Not least a large harmonized market supported by multiple vendors, which leads to more innovation, increased competition, lower prices, a greater choice of products and in PMR's case a much greater choice of applications for the end user.

Within this open standards arena there are three leading PMR technologies – TETRA, DMR and APCO P25 (which is outside the scope of this paper). TETRA and DMR are digital radio technologies recognized by the European Telecommunications Standards Institute (ETSI) and both are going from strength to strength. TETRA now has nearly 2 million users in over a 100 countries with the first network being deployed in 1997. In comparison DMR now has more than 1 million users, since first shipping in 2007 and is being used in more than 90 countries. Motorola has developed solutions under both standards: MOTOTRBO for DMR and Dimetra for TETRA.

KEY BENEFITS

Digital PMR

- Better audio quality
- Better battery life
- Better coverage
- Increased capacity
- Greater data capability

DMR

- 2 channels per 12.5Khz channel bandwidth
- Integrated voice and packet data
- Semi-duplex phone calls
- Up to 1,200 users on a single site
- Up to 15 sites

TETRA

- 4 channels per 25Khz channel bandwidth
- Integrated voice and multi-slot packet data
- Full-duplex phone calls
- Unlimited number of users supported
- Scalable to nationwide coverage



Both technologies offer better privacy, battery life and audio quality as well as group calls, private calls and greater data capability. But there are differences and these are in the details. And it is the details that are important in deciding which technology solution is right for your organization.

BLOCKERS AND ENABLERS

The key to choosing the right digital technology for your organization is to understand what it is you actually need and want from a radio system, not only today but your needs and intentions for the future as well.

However before considering the features and capabilities you require you also need to consider key enablers and blockers to your decision. The key enabler is undoubtedly spectrum. The first question should nearly always be is the frequency you need for a particular technology solution available?

Other considerations can include regulatory or compliance as well as environment factors – and these can also act as enablers or blockers. For example is a certain standard mandated by government as with TETRA for the emergency services across the

THE KEY ENabler IS FREQUENCY

MOTOTRBO (DMR)	Dimetra (TETRA)
FREQUENCIES SUPPORTED: <ul style="list-style-type: none"> • 136-174 MHz • 403-470 MHz • 450-512 MHz 	FREQUENCIES SUPPORTED: <ul style="list-style-type: none"> • 350-390 MHz • 380-430 MHz • 450-470 MHz • 806-870 MHz
CHANNEL SPACING: <ul style="list-style-type: none"> • 12.5 kHz 	CHANNEL SPACING: <ul style="list-style-type: none"> • 25 kHz
CHANNEL EFFICIENCY: <ul style="list-style-type: none"> • 2 Channels per 12.5 kHz 	CHANNEL EFFICIENCY: <ul style="list-style-type: none"> • 4 Channels per 25 kHz

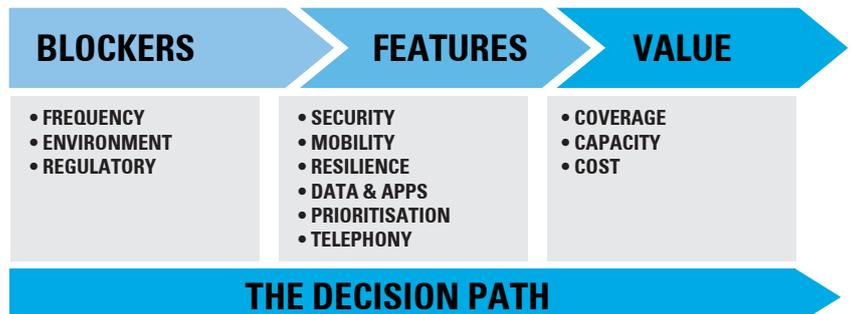
majority of the European Union (EU)? Similarly is there a restriction on the power of the radios you can use? Or perhaps most simply is the standard or technology approved for use in your country and your industry sector?

THE DECISION PATH

Assuming there are no blockers to using either technology, then the next step is to look at the specific features and capabilities you require. Security, mobility, prioritization, resilience and availability all need to be considered, as well as data capability and the applications required by your users.

SECURITY

When it comes to security you need to think about such things as confidentiality and authenticity. For example do your communications need to be secure from eavesdroppers? Do you need end-to-end encryption or is 16-bit over-the-air privacy enough?



MOBILITY

With mobility you need to think about whether or not your users need uninterrupted coverage when on the move or simply coverage at a number of different sites. Or do they need coverage over a wide area giving them real mobility? Is subscriber roaming enough or do they need voice and data call-handover between sites as they move around?

RESILIENCE AND AVAILABILITY

Questions about resilience and availability also need to be considered. How important is it for your users to maintain communications at all times and do you need to minimise the risk of loss of service in a disaster. For example, is a disaster recovery solution required and if so does it need to come into operation automatically.

MOBILE DATA AND APPLICATIONS

Mobile data is increasingly becoming a differentiator between radio technologies. The first question to ask is does your organization need data applications, and if so, which ones, for what purpose and in which languages? Are short data messages enough or do you need long texting? Are the applications you need available on one platform but not the other?

CALL PRIORITIZATION

Prioritization can also be an issue. Do you need to be able to prioritise between different groups of users? Or is an emergency call function and transmit interrupt enough to meet your needs.

KEY FEATURE COMPARISON

MOTOTRBO (DMR)

- 2-slot TDMA per 12.5 kHz channel
- Air interface encryption
- One way authentication
- Short Data Messaging up to 40 characters
- Integrated voice + Packet data
- Up to 100 watt base station
- 5 watt portable, 50 watt mobile
- Fewer sites required for coverage
- Up to 1,200 users on a single site
- Up to 15 sites
- Semi-duplex telephone calls
- Manual geographic redundancy
- Subscriber roaming
- Priority call

Dimetra (TETRA)

- 4-slot TDMA per 25 kHz channel
- Air interface + End-to-End encryption
- Mutual authentication
- Long texting up to 1000 characters
- Integrated voice
 - + Multi-slot packet data with pre-emption
- Up to 40 watt base station
- Up to 1.8 watt portable, 3 to 10 watt mobile
- More sites required for coverage
- Unlimited number of users supported
- Scalable to nationwide coverage
- Full-duplex telephone calls
- Automatic geographic redundancy
- Voice and data call-handover
- 15 priority classes

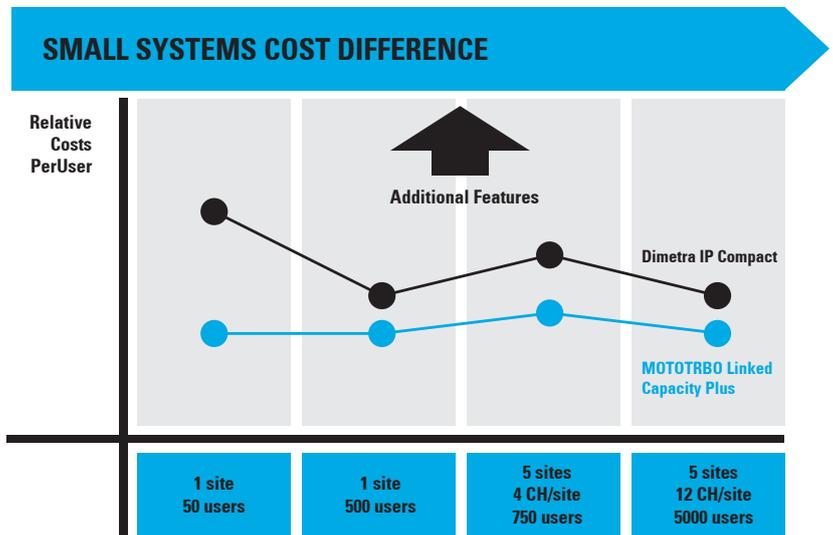


COVERAGE AND CAPACITY

Once you are clear on the features you need your decision may also be clear. However the value of the technology in terms of coverage, capacity and cost can be a deciding factor. For example is coverage a more important issue than capacity for your organization?

The cost of a radio system relates very much to the coverage required and the user density. For example in rural or less populated areas TETRA may require more sites to provide similar coverage to DMR. In an urban or built environment TETRA may give you more capacity than DMR. The type of environment can often be decisive in the choice of technology. TETRA however is almost infinitely scalable, so if coverage is needed over a larger area then it might be the only realistic choice.

For a single site network with a limited number of users the difference in cost between a TETRA system and a DMR system can be quite pronounced. However, for a higher capacity or multi-site system, the difference in cost between the two technologies would be much less. But it is worth remembering that as well as different costs there would also be a difference in the features offered by the two systems.



MOTOROLA TECHNOLOGY

No technology is an automatic choice for any organisation. However, some markets do have a natural affinity towards DMR or TETRA. For example organisations that need high security or operate in extreme environments where radio communications are a lifeline show an affinity for TETRA and the benefits and features it brings. Whereas those organizations that do not require the advanced features of TETRA but still have a need for the inherent advantages that digital radio brings show more of an affinity for DMR.

The difference between DMR and TETRA is really in the details, but those details matter when it comes to making the right choice for your organization. It is true to say that a one size solution does not fit all implementations. There are differences in frequency, capacity and coverage, as well as data capabilities and cost - and understanding these differences alongside your needs will ensure you make the right decision for your organization.

Motorola Solutions has the expertise and the experience, as well as the technology to help organizations choose the right digital radio technology for them, be it TETRA or DMR.

For more information visit:

MOTOROLA.COM/TETRA
MOTOROLA.COM/MOTOTRBO

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RADIOCOMUNICACIONES
info@anfer.com www.anfer.com
Tel. (+34) 963 311 410 Fax. (+34) 963 311 411