Digital radio: How did we ever live without it?

Why digital is better than analogue

Users who switch to digital radio from analogue communication often wonder how they ever managed before. But what's the difference between digital and analogue? And what makes digital so great for trunked radio systems?

Digital technology translates voice and data signals into digits, those 0's and 1's that make up binary code. Then it transfers those digits to another device and reassembles them into the original signal. Think of a digital clock: distinct, discrete numbers that tell the time.

For users, that means:

- **Better clarity:** Those 0's and 1's are very precise.
- **More capacity:** Digital technology can cram a lot of 0's and 1's into the space the analogue signal travels on.

Analogue technology, on the other hand, is the process of translating voice and data signals into continuous electronic pulses. For users, that means:

Richer quality: That's perfect if you're listening to Carlos Kleiber conduct the Vienna Philharmonic Orchestra's Symphony No. 5 by Beethoven. Not so great if you're trying to hear a dispatcher deliver instructions during an emergency.

So how do digital radio and analogue communications stack up?

Beyond compare: Digital radio systems vs. analogue communication

	Digital radio systems	Analogue communication
Voice clarity	You can hear your colleagues more clearly with digital radio technology, because the digits can be recovered - even at the fringes of your coverage area.	The electronic pulses that make up analogue technology deteriorate and get mixed with electronic noise during transition. That makes it harder to hear clearly what your colleague is saying at the other end of the line.
Background noise	Digital radio systems suppress noise and fading. The digital TETRA system from Cassidian, for example, eliminates traffic noise and even the sound of sirens, allowing dispatchers to clearly hear what their colleagues are saying at the other end.	Analogue communications are easily drowned out by background noise, especially at the edges of the coverage area. That is why users often can't hear each other on a conventional analogue radio.
Capacity	Digital radio technology uses bandwidth more efficiently. In fact, for each cell site, it offers three or four times the capacity of an analogue system.	Conventional analogue radio systems eat up a lot of bandwidth - three to four times the bandwidth of a digital radio system.
Group calls	Digital radio technology offers intelligent switching. That means users on group calls in different areas don't have to be on the same frequency, or channel, to hear each other. In a digital TETRA system, that maximises the number of talk groups an organisation can set up. Furthermore, it is easier to manage the access rights of different groups.	Analogue technologies can't provide intelligent switching. Users have to tune their radios to the same channel (frequency) to talk to each other. Those static channels reduce the number of talk groups organisations can serve.
Voice and data	With digital radio systems, users can access data with the same radio they use for voice communication. That's much more efficient than using separate systems. With the TETRA system that means that, wherever they are, users can: • Send and receive status messages • Find victims, accidents and each other quickly with GPS and other location-based services • Identify criminals, vehicles and other people and things through database queries • Fill in statements and other forms in the field, without returning to headquarters or the office	Analogue systems offer only very limited data capabilities. Noise and fading cause data errors that make even analogue's limited data capabilities too poor for professional use.

Security	Digital systems guarantee privacy. That's particularly important for emergency services and law enforcement agencies. TETRA's highly secure, over-the-air encryption exceeds the needs of even the most security-conscious organisations.	It's easy for criminals and others to eavesdrop on a conventional analogue radio system: they just need to buy some simple equipment over the counter at a corner shop. That means that users of analogue communication have used mobile hpones to exchange confidential information. Not only is switching to a mobile phone cumbersome, but making the same call to each of many team members wastes organisational resources and professional time.
Future proofing	Digital technology is the future of radio systems. Its wide variety of new, advanced features has already eclipsed analogue systems. And digital technology continues to demonstrate almost endless innovation, promising the potential of new, how-did-we-ever-live-without-this capabilities for many decades to come.	Analogue systems have already shown their limitations and reached their potential

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