

EQUIPMENT SELECTION



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In a previous article we took a high level look at some of the communications options available to operators on the ground. We also covered some of the aspects that need to be considered when making the appropriate selection of a communications capability for a specific task.

In the coming issues we will look in more detail at the various types of technology and at the equipment manufacturers; what they have on offer, what works and what doesn't.

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The logical place to start this journey is with the simplest and most widely used form of communications; two-way radio. I can already hear some of you raising an eyebrow at that statement, and thinking that mobile phones have to be simpler and more widely used than radios. And that is an understandable assumption to make, but statistics show otherwise. Whilst mobile phones are essential for certain aspects of strategic command and control, at the tactical level two-way radio is by far the simplest, most reliable and most commonly used medium.

So what are the options we need to consider when deciding on the right equipment for the specific scenario that we face?

Within the past three years, two-way radio has undergone a significant transformation. I am talking about the transition from analogue to digital radios. It happened a long time ago in the mobile phone industry and the radio industry has taken much longer than it should have to catch up. But now it has happened it is moving with incredible momentum. There are currently four major manufacturers offering digital radios with many more in development. So the first and fundamental question you need to address is 'Analogue or Digital'?

In my opinion there is only one answer to this question – Digital. There are a whole bunch of technical reasons supporting this view but this isn't the forum to go into those. From a purely practical point of view, the features and capabilities that digital radios already offer, make them the obvious choice for forward looking operators and teams who want to be ahead of the curve.

For example, all of the current digital offerings come with some form of enhanced voice privacy, ensuring that your conversations remain private. Digital signals are far more difficult to intercept and decode than analogue signals, requiring expensive and complex equipment to achieve the task. Advanced features such as text messaging and private calls between radios on a network, are also standard features.

Another huge benefit is that all digital radios are 'backwards compatible'. This means they will work in analogue mode with any existing or legacy networks that you may be required to interface with in the course of your operations. With this in mind, and the fact that the price differential between the two isn't huge (digital is currently somewhere in the region of 20% more expensive), what is the incentive not to embrace the new technology and go digital?

One thing I haven't mentioned is coverage. There is a popular conception that digital radios provide greater coverage than their analogue predecessors: this is not true. Side-by-side coverage trials indicate little, if any difference in actual coverage; so why do people think this is the case?

The reason is one of voice quality or 'readability'. The farther two radios are apart, the weaker the signal becomes. With analogue radios this manifests itself by increasing distortion, interference, hiss and noise, to the point where the signal is so weak that it can no longer be understood.



Digital radios are no different. They are subject to exactly the same interference as analogue radios. However, because the signal is digital, and because the technology employed uses complex error correction techniques, even as it fades over distance, the digital signal can be 're-built' at the receiving radio. Any inherent errors introduced in the transmission path can be eliminated making the received audio constantly clear and readable, where the analogue signal becomes weak and distorted.

There will come a point where the signal is so badly distorted that even the digital radio cannot recover it. At which point the link will be lost. With the analogue radio you will know this is happening as the signal becomes weaker and less easy to understand. Whereas with the digital signal one minute it will be there and the next it won't, with little or no indication that you are reaching the edge of your usable coverage.

The next question to be asked is of frequency; UHF or VHF? This very much depends on your physical environment i.e. the type of ground or terrain in which you are operating. As a rule of thumb UHF is preferable in an urban or built up environment, whereas VHF is better for rural operations where longer distances between users are likely.

The technical reasons for this are complex but can be relatively easily characterised. UHF frequencies are more subject to an effect known as 'diffraction' which causes the signals to be bent by sharp edges such as buildings and other structures more commonly found in an urban setting.

VHF signals, being lower in frequency, are more prone to be absorbed by buildings and other structures, thereby weakening them considerably. On the other hand in the more open rural

environment, a VHF signal is more likely to follow the curvature of the earth's surface and, therefore, operate beyond the visual horizon giving you a greater operating range.

So we've addressed two of the main considerations so far; Analogue vs Digital and UHF vs VHF, but there is still much more to consider. What about power output, how much does this affect the distance over which you can operate? What about antennas, what are the different types and when would you use them? Licensing is something that is often overlooked but very important, both in the U.K. and when operating overseas. It would be very embarrassing indeed if your equipment got confiscated and someone ended up being fined, or worse, prosecuted, simply because they hadn't completed the correct paperwork and obtained the correct operating licence.

What are the options when mounting radios into vehicles and what are some of the major mistakes made? Finally, and possibly most importantly, which brand or manufacturer to choose? At the end of the day they all have their positive and negative points, often it is down to personal preference, but being able to make an informed choice is always helpful.

All of these we will be covering in the coming months. Choosing the right communications strategy, including equipment selection, for your specific circumstances can seem like a very daunting task. But remember, you are not alone! As with any other aspect of your job, never be afraid to seek expert advice. We are always available to discuss your particular situation and there is no such thing as a 'silly question'! Pick up the phone or drop me an email; it doesn't cost anything to talk and it's often the quickest way to get the answers you need!

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