

Narrow Band Solutions

A white paper presentation
by



FALCONDIRECT

Simple Solutions for Serious Situations!

Falcon Direct
36 - 20th Avenue NW
Birmingham, AL 35215
Phone 205.854.2611
E: ServingU@falcondirect.com



THE DOCTOR IS IN!

If you are suffering from that nasty *Narrow Band Virus*, cheer up - We've got a cure (actually several of them). The first thing you want to do is throw away the home remedies recommended by your friendly radio dealer. His or her job is not to give you relief. The role of a salesman is to sell. That's not a bad thing. Sales is a great profession. Just try to remember that you don't go to a shoe store to treat toe itch!

Now, let's define what happens when you narrow band a 2-way radio system. As a rule, you do NOT lose coverage from dispatch to a mobile. Coverage may not be as good as it once was, but in general base-to-mobile talk out coverage is least effected by narrow banding. In some cases, the talk out (transmit) power may need to be increased. This involves modifying your license for higher power (generally, but not always required), and then installing a power amplifier to increase power. Most repeater stations are rated at 50 watts. Increasing the power to 100 watts or more will help you get back the talk out coverage you lost when you *narrow banded*. Just remember, this solution will NOT improve talk back range from mobiles or portables. That is another entirely separate issue.

So, how do you improve talk back range? There are several options with the most common choice being to "go digital". That means throwing out all your old radios and replacing them with digital radios. There are two kinds of "digital" radios - *Mission Critical*, and *Operations Critical*. *Mission Critical* is recommended for public safety use (Police, Fire, EMS). There are three worldwide standards for Mission Critical - APCO 25 (or P25), TETRA, and Tetrapol. Only P25 is used in the USA for public safety. TETRA is used by larger utilities. Tetrapol is not used in the USA at all (to the best of our knowledge).

There are two different P25 operating standards - Phase one which is being phased out since it can only handle one conversation on a standard 12.5 kHz channel. Phase Two can handle two simultaneous conversations per channel in either conventional (user controlled repeater access) or trunked (automatic channel selection for multiple repeaters). Currently, TETRA cannot be used by public safety agencies although this could change in the future. Let's just say for now, that in the USA, there is only ONE Mission Critical system and that is P25 (with Phase Two being preferred over Phase One).

P25 Phase One radios use an operating protocol known as FDMA. Phase Two radios are based on a TDMA platform as is TETRA. As a general rule, Phase One radios cannot be upgraded to Phase Two. Phase One offerings by ICOM, Kenwood, Midland and Vertex, can be purchased for under a thousand dollars, but are not recommended. If you are going to P25, go ONLY with radios capable of the Phase Two operating mode. Models are available in the VHF, UHF, 700, and 800 MHz frequency bands. The best product, at the best price, is the American made KNG Series portable by Relm Wireless.

Operations Critical digital equipment is available in two operating platforms - DMR (Digital Mobile Radio) and NXDN. In the USA, DMR is by far the more popular protocol, based on an open operating standard (more about this shortly). DMR equipment is offered by Motorola (MotoTRBO), Harris (just a Hytera with a different name plate), Hytera (the real thing), Simco (Australia), Tait (New Zealand), and Vertex (MotoTRBO under a different skin).

Please note that *Operations Critical* equipment is NOT designed for Mission Critical use. This is not to say that it doesn't work well, but it was not designed for Mission Critical use - no matter what your local radio sales rep says. For many users, it can be a narrow band fix since the cost is considerably less than P25, but it is NOT designed for Mission Critical use.

There are three standards for *Operations Critical* systems - DMR, dPMR, and NXDN. DMR is based on the TDMA protocol (like P25 Phase Two). dPMR is something akin to digital CB in Europe. It is not used, to our knowledge, in the USA at this time. NXDN is a proprietary standard offered by ICOM in the USA. By far, DMR is the preferred standard for *Operations Critical* Systems since the user gets "two channels for the price of one", and the system is based on an open standard (as is the case with P25 Phase Two). The major providers of DMR systems in the USA are Motorola and Hytera with Tait coming on strong.

Most DMR systems currently sold are known as Tier II (think commercial grade). Tier I is the aforementioned dPMR digital CB. Tait equipment is a little more expensive than either Hytera or Motorola since Tait equipment is built on a Tier III standard. This simply means that Tait radios can operate in the conventional or trunked mode using an open standard. This is an optional cost feature (less than \$100 for Hytera). Tier II radios are not designed for open standard trunking.

Production costs are a little higher for Tait since all products are built in New Zealand and the average pay for Tait employees is close to ninety thousand dollars annually, and every Tait employee is an owner. Hytera products are built in a modern plant in Shenzhen, China. Motorola, to the best of our knowledge is built in Malaysia, not generally well known for engineering talent, quality production, or decent wages. Additional information on Tait products and services is available at www.taitradios.us. On a closing note, Hytera does not offer P25 radios in the USA where their focus is on DMR and TETRA (mainly for public utilities). See www.info4u.us/DMR.pdf for more information on Hytera DMR radios.

The point is that you can upgrade from analog and move to digital with the result normally being that you will recover the range you lost (both transmitting and receiving) when you narrow banded. For small agencies (rural sheriff's departments for instance), a simple switch to digital can be a great solution. As previously noted, you should purchase ONLY open standard equipment. For P25, choose only Phase Two which gives you two talk paths (sub channels if you prefer) on a single channel or slightly less expensive DMR Tier III. Both systems will allow you to purchase from the manufacturer of your choice for operation in either conventional or trunking modes.

Whatever you do - DON'T get trapped into purchasing a proprietary operating system. This can save you a LOT of money in the long run.



The more you study, the smarter you get, or at least that's the way it SHOULD work!

So the word is that you have to "go digital" to recover what you lost when you narrow banded your existing radio system. Obviously, there is some cost involved. There are also some things the sales rep may have forgotten to tell you. For instance, did you know that there are no digital fire pagers? There is a lot more that you may not have been told. For a few examples, please visit a special web site at www.info4u.us/Analog_Planner.pdf.

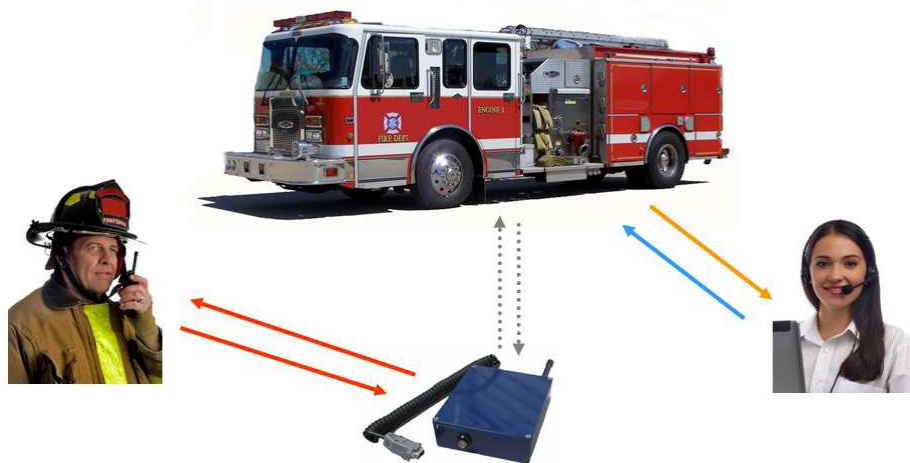
In areas where an open standard digital network exists, either statewide or county, we normally recommend joining the network for law enforcement agencies. The primary reason is that although digital radios, in particular P25 Phase Two radios are more expensive than other radios; the actual operating cost may be less than building a private digital radio system. The reason being that you have not investment in infrastructure (repeaters, towers, and associated equipment), nor maintenance of the infrastructure, nor licensing responsibility.

We normally do NOT recommend purchasing radios for use on a third party network by either emergency medical service or fire departments since in many case, the existing analog radio system can be enhanced through a soft upgrade to meet local area needs at minimal cost. Additionally, in many counties there may be only one or two police departments in addition to the Sheriff. In that same county, there may be a dozen or more fire departments with some individual departments having as many or more radios than the Sheriff and/or local police departments.

The needs of a fire department are very different from those of law enforcement. A single personal 2-way radio can serve all the functions required for law enforcement use. Not so with a fire department where there are needs for station monitors, remote siren and/or door controls, personal pagers and/or low cost pager/radios, plus mobile radios in vehicles. An existing statewide VHF radio network is available for hospitals in most states that provides communications between hospitals, and rescue vehicles. The system has long been paid for and is still operational. Inside the hospital, low cost pager/radios are now available to serve the various needs for hospital communications. In some cases, a single hospital can have more radios in use than an entire Sheriffs Department.

Schools also have to be considered. Due to budgetary restrictions, high tier mission critical radios are simply beyond budget constraints. We DO recommend that every hospital, and every school, and possibly every fire department be equipped with ONE network radio for compatibility with wide area public safety networks such as the MISWIN system in Mississippi. However, everyday communications needs are normally best served by VHF or UHF radio systems. More info on upgrading analog systems follows on the next page.

THE PICTURE TELLS THE STORY!



The cure for *Poortalkitis* on the fire ground is.....

called a *BlueBox*! One of the most common results of narrow banding is that of portable radios not being able to talk back to dispatch from the fireground. We call this *Poortalkitis*! What we need is the power of the mobile radio in our hand! There are several alternatives - Bluetooth microphones with a range of up to 300 feet (such as [TecNet](#)), wireless headsets such as the ones made by [FireCom](#) with a range of up to a thousand feet, vehicular repeaters such as the ones made by [Pyramid Communications](#) (very pricey but they have great range) and the pocket repeaters such as the ones available from [ICOM](#) which depend on the portable radio picking up directly from dispatch (not a great solution, but it works sometimes).

Of all the alternatives, *BlueBox* is the best because of the way it works! First is ease of installation. It just plugs into the back of an existing mobile radio, most any mobile radio with an accessory connectors providing -12 VDC, Ground, Receive, and Transmit audio. We currently have models available for BK/ReIm, and most models of Kenwood and Motorola dash mount mobile radios as well as Maxon and TecNet mobiles.

There are two *BlueBox* models - *BlueBox-V* for VHF and *BlueBox-U* for UHF. The price is the same for either - \$695 with flex antenna and custom cable to connect to your mobile radio. No programming is required on your mobile. The *BlueBox-V* is default tuned to 155.040 MHz and the *BlueBox-U* is tuned to 453.750 MHz with a DCS code of 074. Either model can be custom programmed to the frequency of your choice at no additional charge. These frequencies are used as a control link between an associated portable radio and the applicable *BlueBox*. The *BlueBox* uses audio connections to the associated mobile radio for receiver and transmit control of channel selected in the mobile.

A control channel should be installed in officer radios (Chief, Assistant, and Captain normally). We will program three portables of your choice for \$100. To operate the *BlueBox* involves nothing more than setting your mobile radio on the desired channel, turning on the *BlueBox*, and selecting the control channel on your portable. Range is up to one mile and it works perfectly! For additional information on *BlueBox*, call Falcon Direct at 800.489.2611.

NEED BETTER PORTABLE COMMUNICATIONS?



The cure for *Awfultalkitis* between portables is.....

the *DoubleTalker* repeater mobile above, technically known as the TecNet TM8000R. Three versions are available - a VHF model, a UHF model and a cross band VHF/UHF model. You have a choice of the mobile version TM8000R-MV for VHF or MU for UHF priced at \$695. If you prefer, you can have a fixed station version which includes an AC power supply for an additional \$150 (\$845). These are designated at the BV and BU models. Antennas are not included.

Here's what they do and how they work. These units are designed to provide portable-to-portable communications over a wide area. The mobile version will provide extended communications on a large scene extending over several miles or more such as a wild fire. The fixed station model is designed for installation in a centralized location, such as a fire station to provide portable to portable communications for a local fire district.

The [TM8000](#) radios have a power output of 50 watts in VHF or 40 watts in UHF with up to 512 channel capability. Normally the top radio is set to your local operating frequency and the bottom radio for your control frequency from associated portable radios. In a typical mobile installation, the top radio would be connected to your mobile antenna and the bottom radio to a magnet mount antenna which is available for \$50 additional.

Like any repeater, you either need to use two antennas (one for transmit and the other for receive) or a duplexer (which allows you to connect two radios to a single antenna). The only additional cost is for programming of a control channel in existing portable radios.

For additional information, Call Falcon Direct at 800.489.2611 for the cure to Awfultalkitis. You'll be glad you did!