

# Interoperability, then and now, 1968 versus 2018



Photo courtesy of Universal-Macomb Ambulance Service, Inc. – Sterling Heights, MI

Comments and observations  
by Burch Falkner

Knowledge of history tends to change the perspective of modern day events. As a case in point, consider communications interoperability. Webster's defines interoperability as *the ability of a system to work with or use the parts or equipment of another system* (presumably for the benefit of all concerned).

Decades ago, some really smart people decided that communications interoperability was absolutely essential to meet the growing needs of public safety first responders. This led to the development of the APCO Project 25 or as it is more commonly known as the P25 standard, not to in any way be confused with Motorola's Astro 25 (a story for another time).

P25 was to be based on an open technical standard which would encourage the development of more competitive products with lower pricing, designed to a standard platform to allow communications among any and all users for local, regional, or even nationwide emergencies. We will discuss the progress of this noble objective shortly, but for now, let's digress a bit to review the history of interoperability.

Let's go back 50 years to 1968. At the national level, the FBI, Secret Service, and other related agencies were tied together with a nationwide VHF (160-170 MHz) radio system that worked virtually anywhere in the USA. The American National Red Cross had a Low Band (30-50 MHz) system that could cover hundreds of miles whenever and wherever needed as did the US Military.

At the state level, a wide area network with regional dispatch centers allowed state agencies to communicate anywhere in the state, both within their region as well as with other agencies as required. Both VHF and UHF systems were used with larger states such as California and Florida using Low Band as VHF was the most popular in many states.

At the county level, the Sheriff operated a system, generally VHF, that provided countywide coverage. In many cases this system was shared with local municipal users to coordinate local activities. Most states also had (and still do) frequencies available to link to other counties and/or to follow vehicle pursuits extending beyond local jurisdictions. The systems were bought, paid for, and maintained by the local communities in which they were used.

A relatively new development known as the Continuous Tone Coded Squelch system (CTCSS) was developed to provide the ability to serve different user groups operating on a common frequency with minimal interference. A later system, known as Digital Coded Squelch (DCS) was developed to provide additional codes when needed (along with locking out smaller competitors).

An emergency healthcare communications system was developed in the late 60's to provide VHF statewide networks for ambulance to hospital and hospital-to-hospital communications as well as a UHF system to transmit patient data information directly to hospital emergency rooms. The system is still in use. System planning and budgeting was fairly easy as is evidenced by the chart below (Portables weren't very efficient in 1968):

Desired Range	Power Required	Preferable Band	Budget Cost - Mobile-Base-Portable
100 miles	100 watts	30-50 MHz	\$10 - \$20 - \$250 per watt
50 miles	50 watts	150-170 MHz	\$10 - \$20 - \$250 per watt
15 miles	15 watts	400-470 MHz)	\$10 - \$20 - \$250 per watt

In the days before the first narrow banding from 50 to 25 kHz, a mile per watt was a pretty good way to estimate range with low band being best for statewide use, or VHF for county and municipal. In heavily populated, high-density metropolitan areas, UHF was used. Note: Experience indicates that narrow banding from 25 to 12.5 kHz as required by the end of 2012 has reduced operating range by about 15% for most analog systems users.

In 1968, most everybody had their own dispatcher who knew their community. There was no GIS, GPS, or call taker training, but the average response time was generally BETTER than it is today. Some small towns didn't have night dispatchers. They used a phone patch that allowed callers to talk directly to law enforcement officers! Volunteer fire members were equipped with bedside monitors mostly made by Plectron. Some were battery powered and could be used at the office or even in a vehicle. Some of them even recorded the message, which could be played back if needed.

Then along came LEAA!

LEAA (Law Enforcement Assistance Administration) was the grand daddy of all federal government funding programs for improved public safety communications in the 70's. Millions of dollars were spent for improved dispatch communications consoles, some of which only controlled two radios, along with new high tech communications systems involving portable radios (most of which didn't work, but nobody cared because they were getting "free" money). And thus began federal funding to support local needs which have evolved into our current programs.

Shortly after the introduction of LEAA, manufacturers were invited to design and produce, at government expense, a new generation of VHF and UHF modular portable radios that would provide new capabilities, rapid repair using replaceable modules, and lower cost to the user.

Sylvania won the contract. They came up with a pretty decent little portable. The only problem was that they had no earthly idea how to compete in a market dominated by more mature competitors. I'm not talking about the 800-pound gorilla or even big name manufacturers.

I'm talking about getting beat up by REPCO, a small manufacturer in Orlando, FL. Worse yet, Sylvania couldn't produce the radio at anywhere near the projected cost. Actually, the "cost" was about twice the selling price! So much for government-corporate partnerships!

Now, the question is - *What problems do we have in 2017 that we did not have in 1967? Have our cities become larger?* According to USA Today, the reverse is the case. Our cities are becoming SMALLER! I'm not just talking about Akron, Birmingham, Cleveland, and Detroit; I am talking about the majority of American cities with only minimal growth in cities like Chicago, Denver, and New York.

So, if the cities (and counties, and states) are not more populated, and the buildings are not higher, *why are our needs of today more complex today than in 1968, and how much more interoperable are we now than we were then?*

We have already concluded that we had pretty good interoperability in 1968 with equipment cost generally within the budgets of the users. Mobiles cost an average of \$500 each and base stations around \$1,000 (excluding antenna/site costs). Everybody could talk to everybody else on just a few channels.

Now, let's compare 1968 with 2017 in the Birmingham, Alabama metro area which generally reflects an overall picture throughout the USA.

In 1968, the Sheriff's Department used Low Band. Most municipal departments, both police and fire, as well as volunteer fire departments and ambulances operated on VHF analog. Interoperability was maintained with the State as well as local wrecker services on VHF. Now, let's take a look at today

Agency	Type System	Interoperable with.....
Jefferson County Sheriff	800 MHz proprietary	Adamsville, Bessemer, Birmingham, Irondale, Leeds, and Mt. Brook
Northern Corridor FD's (1)	VHF NXDN	Four cities in digital mode
Homewood, Vestavia PD's	UHF proprietary	Each other
Center Point Fire Dept	VHF MotoTRBO	Palmerdale & Trussville (2)
Most other Police Depts.	VHF analog	Each other
Most other Fire Depts. (3)	VHF analog	Each other

Today, the Sheriff and a handful of municipalities communicate on an 800 MHz system that is compatible with the offerings of only a single manufacturer through a single sales representative, maintained by a single service company.

There is no open competition, and the \$500 radio of fifty years ago has been replaced by a \$3,000 radio with no alternatives allowed. In fact, it is not possible for a user to purchase a "compatible" radio from the vendor of their choice.

- (1) The northern corridor system comprised of the Fultondale, Mt. Olive, and Warrior Fire Departments can operate in both the NXDN and analog modes. NXDN radios are available from two manufacturers through any authorized dealer. The cost of radios is approximately the same as 1967 pricing and the digital capability acts as an enhancement to analog operation. These departments, located on heavily traveled I-65; still have the ability to communicate with other departments operating in the analog mode.

Note: A portion of the federal funding used to pay for this system includes quad band (VHF, UHF, and 700 MHz capability for both conventional and trunking operation) portables. This user group is the only "system" in Jefferson County capable of meeting current interoperability standards.

- (2) The MotoTRBO system works only with other MotoTRBO radios and only then if allowed by the primary installer. So much for open standards.....

- (3) In this example, the police and fire departments operating on VHF analog have the highest level of interoperability of any group in Jefferson County, Alabama, a system basically unchanged since 1968.

Conclusion - After spending BILLIONS of dollars for interoperability, we are now farther from true interoperability in 2018 than we were in 1968! To confuse the issue even more, systems are continuing to be funded that further contribute to this LOSS of interoperability.

The tragedy is that an established interoperable system, based on open standards is being used in other countries around the world that efficiently handles voice (full duplex in fact), data, and vehicle location reporting. It meets both narrow band (12.5 kHz) as well as 6.25 kHz equivalent standards and the cost of the user equipment is a fraction of the cost of P25. It's called TETRA. So why is it not the standard in the USA for public safety use?

And now we have the new 4G LTE system known as FirstNet, exclusively managed by a cellular company (AT&T) that has not yet built out the "exclusive" 20 MHz network promised by FirstNet. For the most part public safety users will utilize the "regular" cellular band, shared with other users until the 7 Billion dollar allocated budget can be used to complete a nationwide network that is similar to the used by existing cellular providers at an average cost of 50 billion dollars to build.

Kind of makes you wonder doesn't it?

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