Falcon Direct

MEMO

Subject: Coordination of VHF TDMA (MotoTRBO) Radio Systems

Background: Many prospective purchasers of VHF radio systems capable of meeting narrow band requirements have been *encouraged* by their suppliers to move up to digital for many alleged *benefits*. While we agree that there are benefits, we question to whom the benefits are given.

While we can see benefits in selecting equipment based on a federal interoperability standard (P25 open architecture), or an analog system capable of being upgraded to digital (FDMA, also known as IDAS), we can see no benefit in selecting a systems standard that meets neither federal standards, nor offers upgrade capability at reasonable cost. Worse yet, the selection of a sole source technology, such as MotoTRBO creates a situation that is beneficial neither to the user or the taxpayers when the purchase is made with federal grant money.

The biggest problem is ignoring or hiding a problem associated with VHF systems what has long been known by the manufacturer, the Federal Communications Commission, frequency coordinators, an co-channel system users. Yet the true situation is never presented to prospective purchasers. That is wrong! The purposed of this Memo is to give you the true facts so that you can make a decision based on facts, not fiction.

Let's start with an overview of the players. There are two major manufacturers of TDMA in the United States - Motorola, ranked number one for communications sales worldwide, and Hytera, ranked as number two. Hytera is playing by the rules. As for Motorola, you can make your own decision after reviewing the facts.

First, let's address some basic definitions, beginning with the Public Safety Communications Council (PSCC). This is an association consisting of four frequency coordinators responsible for coordinating the assignment of public safety 2-way radio frequencies in the United States. The agencies involved are the American Assn. of State Highway and Transportation Officials (ASHTO) responsible for coordinating all transportation related frequency assignments, the Association of Public Safety Communications Officials (APCO) responsible for coordinating law enforcement related frequency assignments, the International Forestry Conservation Communications Association (FCCA), responsible for forestry related frequency assignments, and the International Municipal Signal Association (IMSA) responsible for fire service related frequency assignments

Any application requesting approval of frequencies to be authorized by the Federal Communications Commission (FCC) must be approved through one or more of the aforementioned agencies The FCC relies on the input of these agencies to assure efficient use of available radio frequency spectrum. There are state chapters of PSCC associations that make recommendations to the applicable organization The PSCC does not set policy, but the recommendations of the PSCSS are generally approved by the FCC.

The problems associated with TDMA interference issues with VHF was first reported by the Washington state chapter in 2009 and by California shortly thereafter. Since that time, the problem has been reported in all states with requests to the manufacturer as well as to the PSCC and the FCC to come up with a solution.

The problem is that VHF frequencies are randomly selected whereas UHF frequencies can be assigned in pairs with uniform channel spacing. On February 3, 2012, the PSCC issued a notice that they would not coordinated any fixed station (i.e. base station or repeater) for an effective radiated power of more than 10 watts. A copy of this letter is available at www.info4u.us/PSCC020312.pdf. If the term effective radiated power (ERP) is unfamiliar to you, is means that the COMBINED output power plus the gain of the associated antenna is the ERP. The typical VHF base station antenna has an effective gain of 4X, which means the output power of the base station or repeater would typically be restricted to around 2.5 watts.

On May 4, 2012, the PSCC rescinded the 10 watt moratorium and replaced with stricter standards which prohibited the use of any transmission other than voice (i.e. no data, and no in-band signaling for multi-site systems). The new standard still required reduced power levels, but calculated based on a number of factors other than an arbitrary number. In essence, the new standards basically said that the VHF frequency band is unsuitable for wide area public safety radio use. A copy of this letter is available at www.info4u.us/PSCC2050412.pdf.

On October 26, 2012, the PSCC submitted more definitive recommendations to the FCC for final approval. See www.info4u.us/PSCC102612/pdf for a copy of this letter.

Now, let's sum all of this up in plain language.....

1) An application for licensing by public safety users must be submitted through a coordinator.

2) The coordinators will not approve the use of TDMA system (MotoTRBO) except under restrictive conditions relating to interference issues. The condensed version of these restrictions is available below:

The Public Safety Communications Council (PSCC) has proposed the following coordination standards for VHF public safety digital applications: (1) 250 km protection from proposed base station to co-channel and 7.5 kHz adjacent channel incumbent mobile licensees; (2) incumbent mobile receiver antenna height assumed equal to transmitter antenna height; (3) assumption of a 60 m receiver antenna if receiver antenna cannot be inferred from 2 above; (4) proposed digital systems will have a Longley-Rice study conducted at 50% (time), 50% (location), and 50% probability applied; and (5) a signal level of -110 dBm or greater at incumbent site will cause proposed station to fail the protection standard.

3) Applicants have two choices - They can accept the fact that coordinators will assign frequencies only in accord with the above restrictions, or they can request a waiver. If a waiver is requested, the FCC will be forced to either (a) reject the waiver of the basis of the recommendations made by PSCC, or (b) they can grant the waiver which effectively nullifies any input for the PSCC. This is not likely to happen without one or more lengthy test cases. The bottom line is if you want long range VHF communications involving base or repeater stations, go with analog, FDMA, or P25.