Analog Voice -- Still the Best
for Hospital Emergency Communications

Background

Historically, Amateur Radio operators have used a combination of voice modes (FM, SSB, AM) and Morse code for emergency communications. Every ham has equipment that supports voice modes. Voice is simple to use and no specialized gear is required. Morse requires a special skill, but this is not of great consequence to this discussion. The point is that these modes work and they require a minimum of equipment and setup time.

Over the years, many hams have been innovators and experimenters with new modes of over-the-air communications. Advanced technologies are now coming along at an ever-increasing rate and more hams than ever are finding ways to incorporate them into their daily Amateur Radio experience.

At a first glance, these alternative technologies may appear to be ideal for Amateur Radio's disaster communications, too. Electronic messaging, imaging, email over the ham radio waves -- it all sounds great. But are they right for emergency and disaster communications? What are the hidden realities of adding this technology to well-established voice networks? What are the advantages and disadvantages of individual hams equipping themselves for these technologies? Should hams ask their served agencies to purchase them for hams' use when disaster strikes? Which, if any, are practical when an agency's regular communications fail?

First, let's describe the most popular alternative communications systems.

Digital Modes:
1. <u>WinLink</u>: An email system over ham radio with gateways to the Internet may seem ideal, but it requires specialized hardware and experienced users who know how to make it work. It means going into the field with computers and other specialized gear that can be prone to failure or mis-configuration. The hardware is proprietary and expensive.
2. <u>Traditional packet radio – AX.25</u>: It has been around for years and at one time was quite popular as a store-and-forward messaging and mail system among hams. Now it has fallen out of mainstream ham use because of the Internet. Like WinLink, it requires computer hardware, specialized radio modems and experienced users to make it work.
3. <u>APRS</u>: Automatic Position Reporting System. It is the radio equivalent of cell phone SMS with a limited message length of 256 characters. It can also transmit precise location data. Its main advantage is that it is more simple and easy to use than #1 and #2. However, it still requires extra transceivers, antennas, and modems. Once a message is sent, there is no way to tell if it actually got through unless and until a reply is received. This is unreliable in a disaster scenario.
4. <u>PSK31, MFSK, JT65, etc</u>: Digital keyboard-to-keyboard with these very narrowband modes is mostly found on HF bands for long distance skywave use. They aren't practical for local messaging.
5. <u>Mesh Network</u>: A network of low-power peer radio devices intended to send messages over long distances by placing nodes in key locations such that the messages move in short "hops." There must be many such nodes in place to provide redundancy, otherwise one failure can disrupt all message traffic.

Imaging modes:
1. <u>Slow-scan television (SSTV)</u>: Provides a still image with very low resolution, in about 5-20 seconds. It requires specialized hardware and thus it is of very limited value.
2. <u>Fast-scan television (ATV)</u>: Provides a full motion image using the old analog broadcast television format (NTSC). Besides the need for specialized hardware, it is "temperamental" because it takes a lot of "fussing" to get a good quality picture from point to point. A snowy picture isn't useful to a served agency. There are a very limited number of Amateur Radio "channels" assigned to this mode.

Combined Voice/ Digital modes:

1. <u>D-Star</u>: You may be familiar with Voice-over-IP phones (VoIP). Skype is an example, Cisco has others. D-Star is essentially a VoIP radio system. With that come problems, particularly configuration issues. The IT is hard to set up and get running for the non-expert.   It is relatively expensive and relies on a repeater infrastructure to function as a network.
2. <u>IRLP</u>: Internet Repeater Linking Project (Protocol): A method of linking multiple repeaters via the Internet. It requires specialized hardware and knowledge to configure and operate. IRLP is useful for covering large areas via multiple repeaters, but relies totally on the Internet, which is highly vulnerable in large scale disasters. It uses VoIP and is repeater-to-repeater only.
3. <u>Echolink</u>: Similar to IRLP in that it uses VoIP, but it is computer-to-computer linking via the Internet. The computer can be at a repeater, or not. It does not require any specialized hardware, and the software is free. It relies on the Internet so it has the same vulnerability as IRLP.

What is the common thread?

In emergency communications when there are threats to life and property, time is of essence. In the hospital environment, every second counts in providing patient care communications. Traditional voice links provide the fastest and most uncomplicated way of communicating. Almost every ham has the requisite equipment and anyone can speak on a radio as a third party. It doesn't require extensive technical training or specialized hardware.

Contrast this against the modes described above. Each of them has some Achilles heel – either it requires specialized hardware, is difficult to configure and maintain, or is vulnerable to the same outages as regular communications are. Hospitals don't need to send/receive pictures and they rarely send long-list messages.

Digital and imaging systems require manpower to set up and operate. That manpower must be extracted from the same pool of communicators who make themselves available to provide emergency ham radio voice communications. The time required to get any of these alternative systems up and operating reliably becomes a detriment, because instead of being on the air handling voice traffic, the hams are engaged in getting these other systems going. This is not a good use of the limited number of hams who can make an emergency response.

So while all of these high-tech communications systems sound really great at first glance, when you get right down to it, simple voice radios are all that are really needed to effectively handle the immediate emergency communications needs of almost any agency, especially hospitals.

In a long, protracted event such as Hurricane Katrina, when human and equipment resources can be brought in to supplement the local hams and their voice networks, some of these digital/imaging systems can make sense. American Red Cross made use of packet radio to exchange sheltering information, but that was only after the immediate needs were first taken care of by voice modes.

Voice communications via a standard VHF/UHF FM is, and most likely will be for some time, the system of choice for local and regional communications in the early stages of an evolving disaster. It is ubiquitous, flexible and easy to operate. In most areas, the voice repeater infrastructure is highly robust and redundant. If necessary, effective voice communications can take place without repeaters. That's why HDSCS sticks to voice communications -- it just makes sense.

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