



ARES COMMUNICATOR

Information for Scott County Amateurs



October, 2010

Accurate, Reliable Emergency Communications

Volume 10, Number 10

Amateur Radio Not a Cellphone

ARRL Letter

In many states and localities, it is illegal to talk on a cell phone (without a hands-free device) while behind the wheel — doing so can result in a ticket and possibly a large fine. But on May 30, 2010, when a New York ham was talking on his mobile rig, he didn't think he was doing anything wrong. Except that the officer who pulled him over and cited him with a \$100 fine didn't quite see it that way.

Steve Bozak, WB2IQU, of Clifton Park, told the ARRL that when he was pulled over while driving to Troy — about 16 miles away — he assured the officer that he was not speaking on a cell phone, but on his handheld transceiver. But according to Bozak, the officer said "it was all the same to him." So Bozak decided to fight the ticket in court.

"Honestly, it's not the fine or the ticket, but that all the other hams who use mobile radios have to hide the fact we are mobile in Troy," he told the ARRL just days after he was cited. "I will do my best to settle this politely and correctly, for all of the ham community. So I will follow the course and have my day in court, to 'tell it to the judge.' This matter affects 38,000 hams in New York State."

Unfortunately, when Bozak had his day in traffic court, he lost his case. But he didn't give up and took his case to City Court where, on September 8, the judge dismissed the case in Bozak's favor. Bozak argued that his use "of a handheld Amateur Radio does not fit the definition of a mobile telephone, and as such, the present charge should be dismissed." The prosecutor's office did not submit a response in opposition.

Saying that New York's Vehicle and Traffic Law defines a **Cellphone** *cont'd on page 2*

The ARES COMMUNICATOR is published for the benefit of Amateur Radio Operators in Scott County and other interested individuals.
EDITOR: Bob Reid, Scott County Emergency Coordinator
Snail Mail: 13600 Princeton Circle
Savage, MN. 55378
E-Mail: N0BHC@aol.com
Phone: Home 952-894-5178 Portable 612-280-9328
Reader submissions encouraged!

USCG Auxiliary Radio Day

The U.S. Coast Guard Auxiliary will once again take to the ham bands with a number of Special Event stations. The 2010 Radio Day activity will take place on October 23rd this year.

There will be at least two stations active in Minnesota,



N0B and W0W. Look for them on the following frequencies:

N0B 28.400 – 21.400 – 14.247 – 7.267

W0W 28.335 – 21.325 – 14.330 – 7.235

Tune in and keep them busy on Saturday, Oct. 23,2010.

BREAK - OVER



ARES Activities

Weekly Net Monday 7 PM 146.535 mhz (s)

Breakfast Saturday, October 9th

Digital Monday October 11th

SELECTED TRAFFIC NETS

Designator	Freq.	Local Times	
MN Phone	3.860Mhz	Noon, 5:30pm	Daily
MN CW	3.605Mhz	6:30pm, 9:50pm	Daily

ARES

Scott ARES	146.535 S	7:00pm	Monday
Carver ARES	147.165+	8:30pm	Sunday
Bloomington	147.090+	9:00pm	Sunday

Neighboring Nets

North Dakota	3.937Mhz	6:30pm	Daily
South Dakota	3.870Mhz	6:00pm	Daily
Wisconsin	3.985Mhz	5:30pm	Daily

Cellphone - cont'd from page 1

“Mobile Telephone” as a “device used by subscribers and other users of wireless telephone service to access such service,” and that a “Wireless Telephone Service” is defined as “two-way real time voice tele-communications service that is interconnected to a public switched telephone network and is provided by a commercial mobile radio service,” the judge decided that Bozak’s handheld transceiver did not fit that description.

“A review of 47 C.F.R. §20.3 reveals that Citizens Band Radio Service is defined under private mobile radio service not commercial mobile radio service,” the decision read. “Therefore, the Court finds that the use of an Amateur Radio device does not fit the definition of a mobile telephone as defined under the Vehicle and Traffic Law” As such, the judge dismissed the case in Bozak’s favor.

“While the court cited the Citizens Band Service instead of the Amateur Radio Service, the ruling very is favorable to amateurs on the precise point of law raised,” said ARRL Regulatory Information Manager Dan Henderson, N1ND. “The principle of law is spot on. This is a great ruling in New York and exactly what we had thought would happen.”

BREAK - OVER

Scott County ARES Contacts

Emergency Coordinator
Bob Reid NOBHC
13600 Princeton Circle
Savage, MN 55378
952-894-5178
NOBHC@arrl.net

Asst. Emergency Coordinator
Bob Minor WONFE
5210 West 141st Street
Savage, MN 55378
952-894-2657
WONFE@arrl.net

Asst Emergency Coordinator
Daniel Vande Vusse NOPI
5722 West 141st Street
Savage, MN 55378
952-440-1878
NOPI@arrl.net



Test Your NIMS Knowledge

ARES members are familiar with the Incident Command System from their study of the FEMA Institute courses. Now it is time to see how much you remember from those courses! Each month you will have the opportunity to test your ICS knowledge on a questions dealing with one ICS area.

This month we will take a look at some of the concepts from the IS-100 course, Introduction to Incident Command System. This is the first of the FEMA courses all ARES members must complete before participating in any response activities. You can find the course materials at this site: <http://training.fema.gov/EMIWeb/IS/is100.asp>. Now, test your knowledge of the ICS.

Here is the question for this month:

ICS has been used to manage incidents such as fires, earthquakes, hurricanes, and acts of terrorism. Which of the following situations represents another viable application for the use of ICS?

- A. The planning and operation of the Central City annual Labor Day celebration, including a parade and fair.
- B. The oversight of the annual fiscal budget for the Brownsville Library, including the procurement of new books
- C. The oversight of safety issues associated with Mrs. Butler’s 10th grade chemistry class throughout the school year
- D. The management of nursing staff at the City General Hospital during weekend shifts

Check next month's ARES Communicator for the solution

September NIMS Knowledge Solution

Which position is the only one that is always staffed in ICS applications?

- B. Incident Commander



How to Become A Ham

(in 1958)

The following information was true in 1958. Things are little different in 2010!

The Federal Government favors ham operations and has made it relatively easy to become a licensed radio amateur.

TO GET YOUR LICENSE: You must be an American citizen, must pass an FCC exam (about as hard as learning to drive). Cost: nothing. To prepare for exam get in touch with a local ham club for details, or write the American Radio Relay League, La Salle Road, W. Hartford, Conn. and ask for How to Become a Radio Amateur and The Radio Amateur's License Manual. Each costs 50¢. Most newcomers to amateur radio start with the novice license (code speed five words per minute), good for one year only, then progress to the "general" classification (code speed 13 words per minute), good for five years and renewable indefinitely.

TO OUTFIT A STATION: You will need a receiver capable of covering popular ham bands (1,8-29.7 mcs.), Cost \$29,94 (Heathkit AR-3, assemble and wire at home) to \$695 (Collins 75A-4). You will need a transmitter. Cost: \$35.95 (Heathkit DX-20, assemble and wire at home) to \$2,095 (Collins KWS-1). You will need one or more antennas. A piece of wire between two trees with ordinary TV lead-in will work. Cost: pennies. Or it can be as elaborate as rotating beams for each band on a special tower. Cost: up to \$2,000. Finally, you will need basic home tools such as a screwdriver, a pair of pliers, a knife, a soldering iron.

WHERE TO BUY EQUIPMENT: If you cannot obtain the above-listed essentials, they can be ordered by mail from Harrison Radio Corp., 225 Greenwich Street, or Harvey Radio Co" 103 W. 43rd Street, both New York; from Allied Radio, 100 N. Western Avenue in Chicago; or from Henry Radio Stores, 11240 West Olympic Boulevard in Los Angeles.

BREAK - OVER



"Don't tell people how to do things, tell them what to do and let them surprise you with their results."

George S. Patton

Digital Operations

The connection of personal computers and amateur radio was only a matter of time. Knowledgeable and resourceful hams are always on the lookout for new solutions for current problems. The application of digital techniques to emergency communications was a natural. The forerunner in this area is titled Narrow Band Emergency Messaging System, NBEMS. The major software application in NBEMS is named Fldigi.

Fldigi is a computer program intended for amateur radio digital modes operation using a personal computer and a transceiver. Fldigi operates (as does most similar software) in conjunction with a conventional radio transceiver, and uses the PC sound card as the main means of input from the radio, and output to the radio. These are audio-frequency signals. The software may also control the radio by means of another connection, typically a serial port.

Fldigi is multi-mode, which means that it is able to operate many popular digital modes without switching programs, so you only have one program to learn. Fldigi includes all the popular modes, such as DominoEX, MFSK16, PSK31, and RTTY.

Unusually, Fldigi is available for multiple computer operating systems; FreeBSD Linux OS X and Windows.

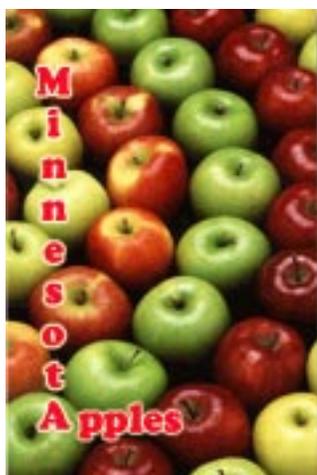
Fldigi software is provided to amateur radio operators at no charge. The software originally hit the scene as the major segment of the Narrow Band Emergency Messaging System, NBEMS. The software is available for download at the NBEMS site at: <http://www.w1hkj.com/NBEMS/>. The fldigi team has produced a "Beginner's Guide" that answers many questions about installing and using the software. The beginners guide includes chapters on: 1. Beginners' Questions Answered, 2. Setting Up, 3. Guided Tour, 4. Operating, 5. Special Keys, and 6. Credits.

All NBEMS users will benefit from a quick read of the Beginner's Guide. Of necessity, this Beginners' Guide contains only as much as you need to know to get started. You should learn how to make best use of the program by reading the Online Documentation. You can also access it from within the Fldigi program from the *Help* menu item.

You will find the Beginner's Guide PDF file located at: <http://www.w1hkj.com/downloads/fldigi/fldigi-beginners-3.20.pdf>

NBEMS Sites

FLDIGI Software: <http://www.w1hkj.com/NBEMS/>
FLDIGI Guide: <http://www.w1hkj.com/downloads/fldigi/fldigi-beginners-3.20.pdf>



Across
2. Large, firm, dense fruit that is excellent for baking and long-term storage. Tree is very vigorous and productive.

Introduced in 1940. Ripens late October.

3. Large, crunchy, juicy red fruit with a sprightly sweet-tart flavor. Excellent for both fresh eating and cooking. The fruit will store for 6 to 8 weeks. Tree is vigorous, upright and ripens late August to early September

5. Crisp and juicy with an exotic yellow flesh and a very sweet, unusual sugar cane or spicy cherry candy flavor. The fruit stores for 5 to 8 weeks.

Tree is very vigorous and fruit may be subject to premature drops. Introduced in 1977.

7. Intensely sweet, firm and juicy flesh. Stripped maroon-red and gold-yellow, 2 1/2" diameter fruit. Excellent for cider. Introduced in 2008. Ripens late September to mid-October.

11. Firm texture with a complex tart flavor. Good for fresh eating and cooking. Especially good pie apple. The fruit will store for 4 to 5 months. Tends to be biennial bearing. Introduced in 1922. Ripens late September to early October.

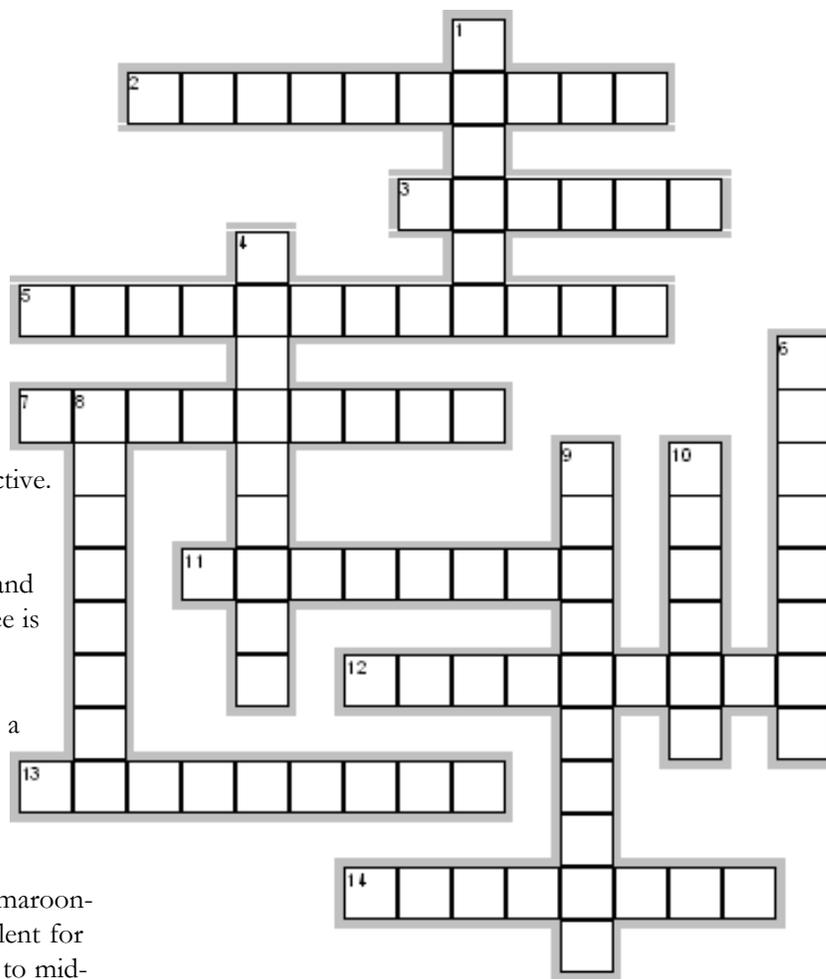
12. Golden to yellow-green fruit that is sweet, crisp, and juicy. Excellent for fresh eating and also good for cooking. The fruit will store for 2 to 3 months. Introduced in 1970. Ripens late September.

13. Savory, sweet tasting apple, with a slight tart balance and rich overtones. Amazingly slow to turn brown when cut. Appealing, large, bronze-red blush fruit. Excellent for fresh eating, snack trays, and salads. Introduced in 2006. Ripens mid-October.

14. Very hard and crisp with yellow flesh and an exotic sweet, spicy flavor. Good for fresh eating and cooking. The fruit will store for 6 months. Introduced in 1978. Ripens mid-October.

Down

1. Appealing red-striped apple with well-balanced flavor that is good for eating and cooking. The fruit will store for 4 to 5 months. Introduced in 1964. Ripens early to mid-October.



4. Striped red, juicy, moderately tart fruit good for eating and cooking. The fruit will store for 2 to 4 to weeks. Somewhat prone to biennial bearing. Introduced in 1977.

6. Very large fruit with sweet flavor and fine-grained flesh good for fresh eating, salad, and baked apples. Tree is vigorous and weeping. Introduced in 1943. Ripens mid-October.

8. Medium-size red and yellow apple with juicy flesh and a mild sweet flavor. Good for fresh eating with a storage life of 4 to 5 weeks. Introduced in 1970. Ripens mid-September.

9. Large, dappled red fruit with a well-balanced flavor, outstanding crispness and juiciness. Best for fresh eating and salads as the flesh is slow to brown. Fruit will easily store 7 or more months. With more than 3 million trees planted, this is easily the most popular U of M introduction to date. Introduced in 1991.

10. Bright red apple with soft, juicy flesh and a slightly tart flavor. Introduced in 1936. Ripens mid- to late August.

Soundcard Interface

There is a lot of discussion about interfacing a personal computer sound card to a transceiver. Each particular design has its fans. You can purchase a commercial unit, a kit, or roll your own! Prices range from FREE to over \$300.

Okay, I imagine 'free' got your attention. To eavesdrop on the digital modes all you have to do is position the microphone on your computer in front of your transceiver's speaker. In a reasonably quiet environment, you will be able to copy the digital signal with no problems. In a pinch, you can send a digital message by placing your transceiver mic near your computer speakers and acoustically couple the signal.

If you are curious about the sound card modes, take the no cost option and see what you have been missing. On the 20M band tune to 14.070 MHz USB and listen for the PSK signals. You will be an old hand at navigating the waterfall in no time!

Listed below are a FEW of the many interface products out there. A good place to start is Ernie's wm2u site. He has a good primer on sound card modes and methods and links to many interface products. Some of the links on Ernie's site are broken but don't let that stop you from clicking around.

Remember, the best interface for you is the one you actually use regularly! So, with no more excuses, let's get digitally active!

Sound Card Information Websites

Ernie Mills, Sound Card Interfacing <http://www.qsl.net/wm2u/interface.html>

Provides a brief history of sound card operation and basic interface schematics. This is THE site for Xcvr connection pin-out identification. Several links to interface manufacturers.

VE3ELB displays a couple of schematics for basic interfaces at: <http://ve3elb.ham-radio.ch/soundcard%20interface.html>

Tigertronics sells an external soundcard that connects to the computer via a single USB cable. You will find information about the SignalLinkUSB at: <http://www.tigertronics.com/slusbmain.htm>

cont'd col. 2

September Crossword Solution

STATE FAIR TRIVIA

Across

1. AGRICULTURE—Building where you check out the prize-winning produce.
4. CAROUSEL—Here we go 'round and 'round.
5. GRANDSTAND—A great place to watch Dan Patch race.
8. MIDWAY—where the rides are!
10. FISHPOND—Let's see if that big Exos lucius is back this year.
11. COLISEUM—Showy equine venue.
13. SPACETOWER—A high altitude view of the area.
14. HAUNTED—house that promises a spooky show.

Down

2. GIANTSLIDE—Wheel! a bumpy ride top to bottom.
3. FOODBUILDING—The spot to cure hunger.
6. CAMPGROUNDS—Nomad's temporary home.
7. CATTLE—barn called the hamburger hotel.
9. FINEARTS—Not your everyday art - the "good" stuff.
12. SKYRIDE—Overhead voyage from Underwood St. to the midway.
13. SWINE—Barn for the bacon.

HAPPY BIRTHDAY



U.S. Navy

235 yrs
Oct. 13, 1775

Westmountain Radio offers a number of Rig Blaster interfaces at: <http://www.westmountainradio.com/content.php?page=rigblaster>

Buck Rogers, K4ABT, of BuxComm fame offers what was the original sound card interface the "Rascal" here: <http://www.buxcomm.com/catalog/>

Cell Phones Powered by Conversation ?

Chatty teenagers could be the world's next renewable energy source.

Scientists from Korea have turned the main ingredient of calamine lotion into a tiny material that converts sound waves into electricity. The research could lead to panels that can charge a cell phone from a conversation or provide a boost of energy to the nation's electrical grid generated by the noise during rush hour traffic.

"Just as speakers transform electric signals into sound, the opposite process — of turning sound into a source of electrical power — is possible," said Young Jun Park and Sang-Woo Kim, the two corresponding authors of a new article in the journal *Advanced Materials*.

"Sound power can be used for various novel applications including mobile phones that can be charged during conversations and sound-insulating walls near highways that generate electricity from the sound of passing vehicles," the co-authors added.

Harvesting energy from phone calls and passing cars is based on materials known as piezoelectrics. When bent, a piezoelectric material turns that mechanical energy into electricity.

Lots of materials are piezoelectric: cane sugar, quartz and even dried bone creates an electrical charge when stressed. For decades, scientists have pumped electricity into piezoelectric materials for use in environmental sensors, speakers and other devices.

Over the last few years, however, scientists have made dramatic advances in getting electricity out of piezoelectric devices. Most of these devices, which are not yet available for consumer purchase, would generate power as a person walks, runs or, in this case, talks. The U.S. Army is even looking at partially powering some vehicles by channeling the physical impact of a bullet into a small electrical current. The Korean scientists, however, want to harness a different kind of power source: sound waves.

Using zinc oxide, the main ingredient in calamine lotion, Young Jun Park, Sang-Woo Kim and their colleagues created a field of nanowires sandwiched between two electrodes. The researchers blasted that sandwich with sound waves, which at 100 decibels were not quite as loud as a rock concert. A normal conversation is about 60-70 decibels.

The sound waves produced a mild electrical current of about 50 millivolts. The average cell phone requires a few volts to operate, several times the power this technology can currently produce.

cont'd col. 2

High School Student Essay Contest

Beginning in September 2010, students from every high school in the state are encouraged to enter Minnesota's newest contest: "A Legacy of Leadership: The Ronald Reagan Essay Contest".

This contest encourages students to explore the leadership, legacies and values of America's 40th President, Ronald Reagan. President Reagan is often described as a bold and unwavering champion of freedom and liberty.



The Freedom Foundation of Minnesota seeks to encourage students to learn about that legacy of leadership and the lasting effects of his presidential policies. The topic of the essay is an answer to the question: What was President Ronald Reagan's most important public policy achievement?

Students competed entries must be submitted online at FreedomFoundationofMinnesota.com, or emailed to Reagan@freedomfoundationofminnesota.com by midnight on January 5, 2011. One finalist will be selected from each school. The finalists will be judged in a statewide competition with winners being awarded one of three scholarships of up to \$5,000. Complete details available at: <http://freedomfoundationofminnesota.com/reagan>

BREAK - OVER

"You don't lose until you give up."

David Wachs

cont'd from col. 1

The new research is interesting, said Michael McAlpine, a scientist at Princeton University who also builds energy harvesting devices.

"But the real question though is whether there is enough ambient noise to act as a power source as for a cell phone," said McAlpine. A consumer probably wouldn't want to attend a rock concert or stand next to a passing train to charge their cell phone.

The Korean scientists agree: 50 millivolts is not a lot of power, but they also say their research is proof of concept. As they continue their work, they expect to get a higher power output.

BREAK - OVER

Illinois Exercise: Lessons Learned

Joe Tokarz, KB9EZZ, EC/OES, La Salle County, Illinois
ARES E-letter Sep 8, 2010

(Ed Note: This after-action review holds valuable lessons for Scott ARES members.)

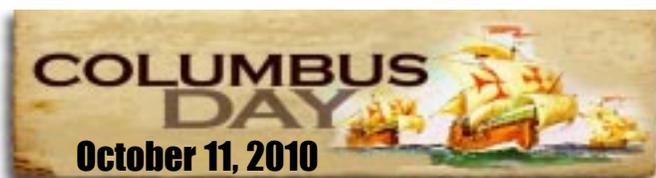
On July 28, 2010, at the request of the LaSalle County (Illinois) EMA Director, hams provided backup communications between the County Emergency Operations Center (EOC) and the township EOCs within the emergency planning zone during the Biennial FEMA-Graded Exercise at the LaSalle County Nuclear Station. Served agencies included the LaSalle County EOC at Ottawa, Township EOCs at Marseilles and Seneca, and the Illinois Valley Chapter of the American Red Cross at Peru. Amateur groups providing the support included the Starved Rock Radio Club, LaSalle County Amateur Radio Emergency Services, and LaSalle County Radio Amateur Civil Emergency Service.

The exercise is conducted every two years. Nuclear Accident Reporting System (NARS) messages were handled using 2 meter voice: the LaSalle County EOC conducted roll call, and transmitted the NARS messages.

An observer from the Department of Homeland Security complimented the hams for "impressive communication skills." The observer noted how we enforced accurate message handling. The mentoring of newer hams was also recognized by the DHS observer as a "Strength."

Lessons Learned

1. Continued practice of sending NARS (*formal traffic*) messages via voice is needed.
2. Once communications is established, backup simplex and other repeater communications should be tested and verified for lowest output power needed for reliable communications.
3. The EOC needs to identify all stations calling and determine if they may be from another served agency.
4. Better antennas are needed for some locations.
5. Operators need to bring go-bags with radios with battery and power supply (as backup).
6. Power Pole connectors are needed at all sites for standardization and efficiency.
7. The EOC needs to issue each net station a tactical call.



Public Safety Radio Not Ready

9 Years After 9/11, Public Safety Radio Not Ready

By Edward Wyatt

The inability of most firefighters and police officers to talk to each other on their radios on Sept. 11, 2001, at the World Trade Center — one of the most vexing problems on that day nine years ago — still has not been completely resolved.

The problem, highlighted in the 9/11 Commission Report, was seen again in 2005 after Hurricanes Katrina and Rita. Public safety officers from different jurisdictions arrived at the scene of those disasters only to find that, unable to communicate with each other by radio, they had to resort to running handwritten notes between command centers.

Despite \$7 billion in federal grants and other spending over the last seven years to improve the ability of public safety departments to talk to one another, most experts in such communications say that it will be years, if ever, before a single nationwide public safety radio system becomes a reality.

In the meantime, public safety and homeland security officials have patched together voice networks in some regions, including New York, that link commanders at various agencies. But the focus in Washington has turned to the development of the next generation of emergency communications, wireless broadband, which seeks to succeed where radio has failed.

Many of the issues that helped shape the current dysfunctional public safety radio networks threaten the creation of a uniform standard for wireless broadband communications.

Administration officials acknowledge it will take years to build a nationwide public safety system. "We're talking about an endeavor that will take 10 or so years to get completed," said one official. "We're starting with a new generation of technology, and that gives us a much better chance to succeed than we had with the legacy systems."

Complicating the debate is the demand by public safety officials that they control their own networks. At issue is a section of the airwaves created when television stations converted from analog to digital signals, freeing up additional space for other applications. A 10 megahertz band was set aside for public safety to build a wireless broadband network, as part of a 24 megahertz allocation. Congress also instructed the F.C.C. to auction off an additional 10 megahertz band that would include a network built to public safety specifications.

BREAK - OVER

Sensitive touch for 'robot skin'

Pressure Sensitive Transistors!

“Artificial skin” that could bring a sensitive touch to robots and prosthetic limbs, has been shown off. The materials, which can sense pressure as sensitively and quickly as human skin, have been outlined by two groups reporting in *Nature Materials*. The skins are arrays of small pressure sensors that convert tiny changes in pressure into electrical signals. The arrays are built into or under flexible rubber sheets that could be stretched into a variety of shapes.

The materials could be used to sheath artificial limbs or to create robots that can pick up and hold fragile objects. They could also be used to improve tools for minimally-invasive surgery. In one approach, Ali Javey at the University of California, Berkeley, and his colleagues built up layers of criss-crossed nanometre-scale wires topped with a thin rubber sheet.

The “skins” match human skin’s ability to sense tiny pressure changes quickly. Together, the stack acts as what is known as a thin-film transistor, or TFT, with a pressure-sensitive layer on top. The amount of electrical current running through the device is dependent upon how much pressure is exerted on the rubber sheet; more pressure allows more current to flow.

The team demonstrated the flexibility of their TFT stacks by bending them to a radius smaller than that of a pencil without changing the skin’s performance. “Javey’s work is a nice demonstration of their capability in making a large array of nanowire TFTs,” said Zhenan Bao of Stanford University, whose group demonstrated the second approach.

The heart of Professor Bao’s devices is micro-structured rubber sheet in the middle of the TFT - effectively re-creating the functionality of the Berkeley group’s skins with less layers. “Instead of laminating a pressure-sensitive resistor array on top of a nanowire TFT array, we made our transistors to be pressure sensitive,” Professor Bao explained to BBC News. “Our microstructured rubber can bounce back to its original shape much faster and enable higher sensitivity,” she added.

The overall flexibility of the Stanford group’s skins appears to be lower, and Professor Bao concedes that to develop her group’s approach further, better conductive rubber will be needed.

Nevertheless, both groups demonstrate that their skins can register a pressure in a tenth of a second, over a large

range - from five grams per square centimetre to 40 times that high. Those numbers rival the response of human skin, made with relatively inexpensive manufacturing techniques.

John Boland, a nanotechnologist from Trinity College Dublin, praised the two approaches in a critique for *Nature Materials*. “Perhaps the most remarkable aspect of these studies is how they elegantly demonstrate that it is possible to exploit well-established processing technologies to engineer low-cost innovative solutions to important technical problems,” he wrote.

However, he notes that there are still “significant opportunities for further innovation”, such as reducing the distance between the sensors in the arrays to maximise the detail they could “feel”, as well as improvements that could make large-area arrays possible and affordable.

BREAK - OVER



ARES Breakfast
Saturday October 9th
7:30AM
Perkins Restaurant
Savage, MN

NECOS Schedule October 2010

4 Oct KB0FH Bob
11 Oct KC0YHH Tony
18 Oct N0PI Dan
25 Oct W0NFE Bob
1 Nov KB0FH Bob
8 Nov KC0YHH Tony