ARINC | security

ARINC UrgentLink™

Background

Tragedies such as September 11th, Hurricanes Katrina and Sandy and the Joplin tornado have unfortunately demonstrated limitations associated with our current public safety communications infrastructure.

Many of the interoperability problems brought light after September 11th with first responders' inability to communicate have been resolved but, until now, issues concerning the physical limitations of our national communications infrastructure and how well it can survive a disaster have not been addressed.

A case in point: Katrina

Public safety communications are critical every day, but in a disaster situation they become even more vital. However, traditional communications infrastructure, by the very nature of its design, is vulnerable in the event of a disaster.

Hurricanes, tornados, earthquakes, as well as man-made scenarios such as bombs and cyber-attacks wreak havoc on physical communications infrastructure components such as power lines, telephone, cable systems, mobile phone towers and even public safety grade radio systems.

Examples abound and the statistics are disheartening. Analysis in the aftermath of Hurricane Katrina identified a series of significant communications infrastructure issues, among them:

- The city of New Orleans radio system was largely inoperative for three days.[1]
- At least 750,000 phones were out of service and 180 central offices, where phone calls are processed, were on backup generators.[2]
- Cell phone call processing was disrupted; cell phones with New Orleans area codes (504 and 985) could not receive calls for days.[2]
- Up to 2,000 cell towers were knocked out and responder Land Mobile Radio communications were significantly degraded.[3]
- A 400 ft. communications tower built for 150 MPH winds fell over.[1]

As a result, the situation for the New Orleans Police attempting to help citizens affected by the hurricane was dire: "Their radio system, cellular communications, and landlines went down simultaneously. They were without satellite phones. Because of flooding they couldn't even send couriers from one part of the city to another."[4]

During Katrina, it became clear that most – if not all – communication for hospitals, nursing homes, police stations and other critical infrastructure locations were impacted, essentially eliminating the ability for first responders and those they serve to communicate via voice or other electronic communications such as email.

Beyond Katrina, other examples of local infrastructure being damaged or wiped out can be found. In the Joplin, MO, disaster all cellular and landline phones were out[5] and multiple self-supporting radio towers were completely destroyed, mangled beyond recognition. After Hurricane Sandy, 25% of all cell phone towers in the impact area were out.[6] And this issue affects more than the United States: after the great east Japan earthquake and tsunami, local and regional communications were destroyed and no well-structured information systems remained.[7]

Critical public safety communications during a disaster

The need for disaster communications supporting first responders and other public safety and critical infrastructure personnel during a disaster is clear: without it, public safety is at risk.

During a disaster, there are three primary functions that disaster communications facilitate:

- Emergency requests for assistance
- Informing the public, or
- Coordinating response resources.

But what happens when the communications infrastructure fails? Examples include situations such as law enforcement and fire unable to respond to requests for help, emergency managers cannot coordinate disaster response or ask for the appropriate types of assistance, hospitals cannot properly respond to requests for assistance or report their capacity, critical infrastructure sites such as nuclear power plants and dams may have needs, risks, or failures that go unreported.

Public safety communications infrastructure challenges

Currently, there are extensive communications capabilities available but as Katrina and other recent disasters demonstrated, many of today's communications systems are built with local resources leaving them at risk to a disaster that can – often times simultaneously – render them inoperable.

Cable and phone systems can connect globally, but rely on wires or fiber that can be severed by an earthquake or other disaster.

Mobile phones and traditional public safety radio systems have their own unique challenges. Often, they are only able to communicate within several miles of their radio towers and those towers are subjected to the elements associated with the disaster.

Beyond that, all of the options noted require a large source of electrical power to operate, which can often be disrupted during an emergency. Generators can provide a temporary backup, but they too are subject to the impact associated with the disaster and shut down when they cannot be refueled.

While satellite phones overcome several of the physical limitations discussed, they are expensive, challenging to operate, require "line of sight" with the satellite so the user needs to be outside or have a fixed external antenna, and capacity is sometimes overrun during a disaster.

In some instances, Emergency Managers rely on Radio Amateur Civil Emergency Service (RACES) users to provide disaster communications, however this too has risks. The number of qualified RACES operators is low, and there is a unique skillset as well as a radio operator license required to manually work the radios. Availability is also an issue. In a disaster such as a hurricane, RACES operators can plan ahead to be on site, but if a tornado or earthquake occur, pre-planning is not an option.

A nationwide back up disaster communications network for public safety

Rockwell Collins has been actively engaged in developing and deploying mission-critical infrastructure and security systems for decades. We view the challenge associated with disaster communications as one that can overcome the existing infrastructure issues by providing a means of wirelessly connecting emergency responders and critical infrastructure sites within the disaster zone as well as outside the disaster zone, enabling those in need to reach out for assistance.

With the introduction of the company's new ARINC UrgentLink national disaster communications network, first responders in the field are able to communicate with public health, public safety and critical industries in the event of a natural or man-made disaster that renders local communications infrastructure inoperable. ARINC UrgentLink services include voice, text message and data file transfer for status updates.

How it works:

Rockwell Collins' ARINC UrgentLink uses Federal Communications Commission (FCC) licensed radio frequencies specifically authorized for disasters and the company's proprietary High Frequency (HF) network to provide a disaster communications network capable of enabling nationwide, highly reliable back up emergency communications.

The network relies on specialized HF radios to communicate. Unlike most other radios that work in "line of sight," HF radios work over hundreds or thousands of miles "beyond line of sight." In fact, the HF technology used in ARINC UrgentLink is the same HF technology that U.S. Customs and Border Patrol, the president and the U.S. military rely on when other forms of communications fail.[8]

ARINC UrgentLink users can communicate in a number of ways: through the system to other ARINC UrgentLink users nationwide, patched-in through the Rockwell Collins Operation Center to any phone, and/or to talk directly to one or more other ARINC UrgentLink radios in their area. In addition to traditional radio communications, status updates can be done via text message or file transfers.

ARINC UrgentLink users are all connected to Rockwell Collins' Operations Center, which provides 24/7/365 service. When an ARINC UrgentLink user needs to contact Rockwell Collins, he or she pushes one button to reach support personnel. Rockwell Collins radio operators can help ARINC UrgentLink users communicate effectively by connecting them to other ARINC UrgentLink users or to phones that have not been affected by the disaster. How does this work? If a user in Southern California needed to talk to the governor's office in Sacramento after a major earthquake disables local communications, ARINC UrgentLink enables him or her to connect to the Operations Center, who then places a call to the governor's office (in this example, connecting a radio to a phone) to coordinate the response to the disaster.

In addition to Operations Center support, ARINC UrgentLink customers can also talk directly to each other in a "peer-to-peer" mode within a disaster zone. Direct communications means that hospitals can coordinate resources with each other within a region, police and fire departments can reach emergency management, and critical infrastructure sites can report their status.

ARINC UrgentLink radios have a "one touch" calling capability, so they do not require a highly trained user or license to operate, allowing emergency managers, police, fire, hospital managers or others to easily access the system.

Rockwell Collins provides and maintains the radios as part of the ARINC UrgentLink service. The "intelligent" radios use Automatic Link Establishment (ALE) so they can determine the optimal way to connect to the other radios on their own, reducing the training requirements. With HF radio, atmospheric conditions that change over the course of a day directly affect the quality of radio calls. This normally requires a radio operator to manually use trial and error to determine the best frequency to use. ALE regularly tests connection quality and allows the radios to be aware of the optimal frequency to use at any point in time. The radios are also pre-programmed with the addresses for other radios with which they may need to communicate. Together, ALE and pre-programming greatly simplify the end-user experience.

Radio sites around the country provide overlapping coverage nationwide. If one site is compromised by a disaster, ARINC UrgentLink customers can reach at least one other site, and often more.

In addition to voice communications, ARINC UrgentLink users can also send short text messages (up to 90 characters) to other ARINC UrgentLink radio users as well as small file transfers. In many cases, data or text transmission are more efficient than voice for communicating large volumes of information such as a hospital reporting what resources it might have, such as an available bed count.

Why ARINC UrgentLink™

Rockwell Collins' ARINC UrgentLink overcomes the challenges faced by local radio and phone systems destroyed by a disaster by using radio technology that can reach thousands of miles.

The benefits of ARINC UrgentLink include:

- ARINC UrgentLink delivers nationwide voice and data coverage across the United States
- ARINC UrgentLink is not dependent on local infrastructure for communications connectivity
- ARINC UrgentLink allows users to communicate to sites both inside and outside of the disaster zone
- It has an easy-to-use interface that requires no radio expertise
- ARINC UrgentLink is an "always on" turnkey service
- In addition to voice, ARINC UrgentLink can provide small file transfers including both data or text transmissions

Notes:

[1] Paul Piper and Miguel Ramos, "A Failure to Communicate: *Politics, Scams, and Information Flow During Hurricane Katrina*," *Information Today*, June 2006. Retrieved Aug. 2015, from http://www.infotoday.com/searcher/jun06/Piper_Ramos.shtml

[2] Associated Press. "Katrina outages reveal phone system quirks," NBCNews.com, August 31, 2005. Retrieved Aug. 2015, from http://www.nbcnews.com/id/9120503/ns/technology_and_science-tech_and_gadgets/t/katrina-outages-reveal-phone-system-quirks/#.VbZClxNVhBc

[3] United States. Congress. Senate. Committee on Homeland Security and Governmental Affairs, *Hurricane Katrina: Managing Law Enforcement and Communications in a Catastrophe*, October 26, 2005. (Statement of Peter M. Fonash, Deputy Manager, National Communications System, U.S. Department of Homeland Security).

[4] Select Bi-partisan Committee to Investigate the Preparation for and Response to Hurricane Katrina, Final Report, A Failure of Initiative, Congressional Report: House Report 109–377, 202 and 208 (February 15, 2006).

[5] Moni Basu,"Radio stations chug along 24/7 in tornado-devastated Joplin," CNN.com, May 24, 2011. Retrieved Aug. 2015, from http://www.cnn.com/2011/US/05/24/missouri.tornado.radio/

[6] David Goldman, "Sandy knocks out 25% of cell service in its path," CNNMoney.com, October 31, 2012. Retrieved Aug. 2015, from http://money.cnn.com/2012/10/31/technology/mobile/sandy-cell-service-outages/

[7] Jonathan Zimmerman and William Coss, "The Great East Japan Earthquake of March 11, 2011," May 10, 2012. Retrieved Aug. 2015, from http://www.cert-la.com/radio/Great-East-Japan-Earthquake-and-Tsunami.pdf

[8] "Connectivity for Global Reach," HF Global Communications System, June 2002. Retrieved Aug. 2015, from http://www.hfindustry.com/meetings_presentations/presentation_materials/2002_jun_hfia/presentations/11_scope_command.pdf

About Rockwell Collins

Rockwell Collins is a pioneer in the development and deployment of innovative communication and aviation electronic solutions for commercial and government applications. Our ARINC information management services offer seamless, secure and reliable solutions to customers in the aviation & airport, rail and critical infrastructure sectors and enable mission-critical data and voice communications and management throughout the world.

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