JEM

Hurricane Katrina: Satellite technology stands tall

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INTRODUCTION

Satellite technology can help to address and alleviate a wide range of emergency management (EM), disaster response, and recovery-related problems. The use of satellite communications by international, federal, state, and local agencies has mushroomed over the past five years, and this trend is likely to accelerate in the wake of Hurricane Katrina.

It is safe to say that, in or around large population centers in particular, the larger the magnitude of the disaster in question, the greater the need for satellite technology to be deployed on scene quickly. The 2004 hurricane season and the tsunami in the Indian Ocean underscored the vital role that satellite technology can play. However, the tragic events of 2004 alone did not start the ball rolling; rather, they added considerable momentum to a process that began several years ago. The growing use of satellite technology by EM personnel at all levels is perceived as a timely, prudent, and logical development. It is a flexible and reliable tool that can quickly restore connectivity and greatly improve response when deployed with other vital wireless communications systems to help create a single hybrid network. [Satellite technology alone is not enough. One cannot overlook the important role played by the local Amateur Radio Emergency Service (ARES), the Radio Amateur Civil Emergency Service (RACES) teams, and the Salvation Army Team Emergency Radio Network (SATERN), for example.]

In the hours after Hurricane Katrina struck the Gulf region, satellite phones received a considerable amount of media attention and surfaced quickly as an effective, user-friendly, and widely deployed device that could support and coordinate disaster response. Well before the hurricane struck the Gulf Coast, live imagery from weather satellites closely monitored the storm's track and intensity. These remote images, after being viewed at the National Hurricane Center, probably helped trigger the initial round of zone-specific alerts and warnings to local and state officials in the regions most likely to be affected days before the storm made landfall.

As in the case of most large-scale disasters including the recent tsunami, satellite provided the American people and the rest of the world with an up-close look at the extent of the damage and suffering caused by Katrina in New Orleans and other impacted areas spread over 90,000 square miles. A field-tested combination of easily operated and portable satellite newsgathering equipment coupled to a vast global satellite-based TV news distribution apparatus provided a global audience with live coverage of the unfolding disaster. Indeed, the revelation that top EM officials failed to keep current on breaking news—especially the live coverage beamed via satellite of the deteriorating circumstances at the New Orleans Convention Center—underscored the fact that monitoring live TV news coverage must be designated as a vital intelligence-gathering activity. Updated information about the scope and scale of major disasters flows from a variety of sources, and TV news is one of them. The US Federal Emergency Management Agency (FEMA) either had no formal system in place to monitor, prioritize, and circulate inbound zone-specific TV news accounts, or the existing system failed. This is surprising in that FEMA has been an enthusiastic user of satellite communications for many years.

SATELLITE SUPPORT FOR LOCAL CHAINS OF COMMAND

With communications infrastructure over a wide

area completely knocked out by Hurricane Katrina, the isolation of state and local officials was immediate and complete.[1] In New Orleans, for example, no communications activity was performed by local officials for almost two days, until just after midnight on August 31. This de facto elimination of local government had its consequences. The breakdown of civil authority and the absence of a local chain of command in New Orleans compounded the sense of confusion and chaos at the grassroots level, probably contributing to the acts of lawlessness that were observed in the process.

Beyond the issue of how to best ensure continuity of government during any massive calamity, the need for the rapid restoration of a wireless infrastructure was paramount for response teams as well. Large contingents of National Guard, first responders, and other disaster personnel needed to be mobilized, and the healthcare sector, suffering its own communications meltdown, was being overwhelmed. In this instance, prepositioned satellite phones along with strategically placed higher bandwidth satellite data terminals for two-way traffic involving Internet Protocol (IP) data, email, and videoconferencing should have been in place well in advance of the disaster, as part of the mitigation and response planning equation. Hospitals, in particular, should have had this equipment at hand. Instead, although not absent entirely, emergency personnel had to await its arrival.

As Hurricane Katrina continued northbound, satellite gear came into play quickly both as part of the Emergency Management Assistance Compact (EMAC) and the US military response including the Army,[2] the US Northern Command via Joint Task Force-Katrina (JTF-K),[3] and the US Coast Guard, which activated satellite-based servers to restore its IT capabilities in the region after the existing system was destroyed by the storm.[4] The US Army Corps of Engineers deployed a large satellite network as well. In addition, the National Geospatial-Intelligence Agency (NGA), which oversees the nation's fleet of spy satellites, provided FEMA with satellite imagery both before and after the hurricane struck. FEMA obtained dozens of images of critical public infrastructure from the NGA on August 26. And, once the storm passed, FEMA got a bird's eye view of downtown New Orleans as well via a commercial satellite.[5]

Some state emergency planners would like to see this remote imaging capability made available directly to state and local EM personnel.[6] In fact, the US Army Space and Missile Defense Command/Army Forces Strategic Command dispatched a Spectral Operation Resource Center team to Camp Shelby in Mississippi to support JTF-K with updated data from DigitalGlobe and Space Imaging observation satellites.[7] National Guard civil support teams from around the country arrived with their unified command suite (UCS) vans and satellite-equipped SUVs known as advanced liaison vehicles (ADVONs). The Pennsylvania Army National Guard brought to Mississippi its modular and easily transported Interim Satellite Incident Site Communications Set (ISISCS),[8] a vastly upgraded IP-based satellite communications system that can support other National Guard rapid response teams. National Guard units also deployed point-to-point Ground Mobile Forces (GMF) Tactical Satellite Communication Systems provided by the Defense Information Systems Agency (DISA). In addition, FEMA dispatched satellite-equipped Mobile Emergency Response Support (MERS)/Mobile Air Transportable Telecommunications System (MATTS) teams from as far away as Massachusetts.

Early arrivals to the region included a pair of satellite-equipped SUVs designated as emergency communications response vehicles (ECRVs), dispatched by the Arizona chapter of the American Red Cross.[9] Satellite-equipped trucks, buses, and vans were sent by companies like Microsoft and MCI, including one sent to New Orleans that became the ad hoc command post for the Vancouver Urban Search and Rescue Team.[10] These units were in addition to a number of infrastructure restoration and mobile interoperability enhancement vehicles from agencies like the Charlottesville, VA, Fire Department which sent its new vehicle to Mississippi. This is just a quick and incomplete

snapshot of the satellite equipment that descended on the Gulf Coast in the wake of Hurricane Katrina.

SATELLITE TECHNOLOGY USE INCREASING BUT NEEDS MORE COORDINATION

In a recent article, Fire Chief Charles L. Werner of Charlottesville, VA, Fire Department, coined the acronym SWEET, which stands for:

S = simple to deploy (with little or no training or technical support)
W = within one hour (to comply with Project SAFECOM Rapidcom guidelines)
E = easy to adapt when new devices are to be added (without technical support)
E = easy on the pocketbook (fits into the reasonable grant-funding stream)
T = tested and durable for the environment.[11]

Although these guidelines were intended for on-scene interoperability solutions, any satellite equipment—satellite-based IP data systems in particular—deployed for EM and disaster response purposes should meet the SWEET test. This is an important consideration as the list of state and even local EM satellite communications projects continues to grow. In April, for example, during the Department of Homeland Security's (DHS's) Top Officials Three (TOPOFF3) exercise, the CT Department of Public Health discovered the real value of its new redundant voice-only telemedicine emergency satellite communications network, known as MEDSAT. It handled requests between hospitals for additional equipment and updates on the numbers of patients arriving, their status, and the need for decontamination, among other things.[12] Thanks to a grant from the US Health Resources and Services Administration, Kentucky is launching a similar satellite-based back-up communications system for its hospitals, local health departments, and healthcare organizations. Although other states are looking at satellite-based redundant voice-only systems (including Maine, which plans a statewide deployment), there may be a call for a federally funded initiative to enable data traffic as well.

In addition, the Los Angeles County Office of Emergency Management is rolling out a satellite network for its first responders known as the Emergency Satellite Communications Network. The network will serve as the backbone for the Emergency Management Information System, which connects and supports fire, law enforcement, health, and safety agencies countywide.

Given this level of activity, the DHS needs to create an Office of Emergency Satellite Communications (OESC). This agency could coordinate the satellite resources, assets, and procurement strategies of all the different agencies now under one roof at the DHS. At the same time, it could have a distinct state and local outreach and training mission, perhaps making military surplus satellite communications gear available to state and local governments as needed.[13] Perhaps, the Assure Emergency and Interoperable Communications for First Responders Act of 2005 (S. 1725), new legislation calling for the creation of an Office for Emergency Communications, Interoperability, and Compatibility within the DHS, could be amended to put more emphasis on the role of satellite-related training as it pertains to emergency response deployments for operators and EM personnel alike, could be expanded and standardized under the OESC.

Direct broadcast satellite (DBS) technology from DirecTV or The DISH Network

Network deserves a second look, too. Given the role of DBS services in providing critical information right up until the satellite dishes were blown away, as well as providing post-Katrina emergency information and dedicated recovery channels, more needs to be explored in terms of their potential role in EM. Among other things, the CDC should consider integrating DBS technology into the operations of both the Office of Terrorism Preparedness and Emergency Response and the Health Alert Network.

Installing DBS receivers at all rural and urban health centers makes good sense. Low cost, off-the-shelf DBS set-top box technology and the existing terrestrial backhaul network that DBS providers already have in place should be available for broadcast-quality transmissions from

either CDC headquarters in Atlanta, federal officials in Washington, DC, or both. DBS technology could provide instant video connections to all health centers on a regional, state, or national basis using existing video networking capabilities.

With more public health resources being devoted to bioterrorism response, more funds should flow to projects like the one at the University of California/ Davis Health System and the California Governor's Office of Emergency Services. This collaborative project involves the use of portable satellite terminals to mitigate biohealth events. Using existing satellite bandwidth reserved by California's EM network operators, the system can establish direct links with all existing telehealth networks statewide and enables remote examinations of clinical subjects. It also enables rapid links to both human and animal disease experts anywhere in the state, instantaneously coordinates human and animal health management resources, and reliably transmits recommendations to health providers and county public health departments.[14]

In addition to these satellite coordination efforts, a means of quickly extending the National Guard wide-area network (WAN) (known as GuardNet) directly to state EOCs and mobile command posts should be in place.[14] Perhaps under the National Interagency Fire Center, which already has the capability to deploy large numbers of radios to affected areas, a larger telecom "push package" could be delivered via helicopter to state or city officials who are cut off from a fully equipped command center and need to get up and running from an alternative location such as the Hyatt in New Orleans. The telecom package could include a National Guard satellite link, satellite data and phone gear, and even a full VHF base station. In fact, the planning for Hurricane Rita as this issue was going to press suggests that FEMA has already taken steps to address this gap by deploying two-man communications teams in support of civilian authorities in Texas well in advance of the storm. Exactly what they will operate in terms of equipment is unclear. Options such as a slimmed down version of ISISCS, for example, make sense but must include terrestrial radio and other wireless resources. Interoperability remains a concern.

The role of satellite radio warrants closer scrutiny. In the wake of Hurricane Katrina, both Sirius Satellite Radio and XM Satellite Radio quickly inserted radio channels into their menu of services that were dedicated to Katrina rescue and relief efforts. Satellite radio can provide a reliable broadcast link to very small, wind-resistant antennas deployed over a vast area. A concept known as the Mobile Enhanced Situational Awareness network (MESA), which relies on existing satellite radio networks, is currently being evaluated. It is seen as a valuable redundant voice and data platform capable of handling voice communications and even updated GIS data.

While many EM operations would benefit from software-defined radio (SDR), it remains a work in progress. SDR-based hybrid satellite wireless networking solutions are not just a pipe dream, however. SDR development is well under way as part of the Department of Defenses' Joint Tactical Radio System program. The Army's Communications-Electronics Command (CECOM) Research, Development, and Engineering Center is working on a prototype SDR-based public safety interoperability system made up of integrated radio systems including VHF or UHF, analog FM, APCO Project 25, GSM, and the military waveform known as SINCGARS. A prototype mobile GSM cellular base station installed in the back of a Humvee was demonstrated earlier this year at Fort Dix using a Globalstar satellite backhaul to support as many as 30 Type-1 secure handsets over a 3-5 mile range.[15]

CONCLUSION

The satellites are always there—high overhead day and night—and they should be easily accessed in times of emergency. The EM community is aware of the importance of satellite technology. Slowly but surely, the federal government is beginning to understand that from the standpoint of ensuring the success of a rapid response under a unified command as well as a coordinated recovery, satellite technology matters. Now is the right time for decision makers to

R. David Paulison appointed new acting head of FEMA

In the wake of the resignation of Michael Brown on September 13, 2005, President Bush has designated R. David Paulison, former Administrator of the US Fire Administration, as Acting Under Secretary of Homeland Security for Emergency Preparedness and Response and head of the Federal Emergency Management Agency.

Paulison is a 30-year veteran of fire and emergency services. He served as director of the Preparedness Division of the Emergency Preparedness & Response Directorate/FEMA from 2003 to 2004. He has served as the administrator for the US Fire Administration since December 2001. Mr. Paulison oversaw programs to reduce life and economic losses due to fire and related emergencies in partnership with fire protection and emergency service communities.

Before joining FEMA, Mr. Paulison was chief of the Miami-Dade Fire Rescue Department. He oversaw 1,900 personnel with a $200 million operating budget and a $70 million capital budget. He also oversaw the county's emergency management office. He began his career as a rescue firefighter and rose through the ranks to deputy director for administration before becoming chief. His emergency management experience includes Hurricane Andrew and the crash of ValuJet Flight 592.

A native of Miami, Mr. Paulison has a BA from Florida Atlantic University and completed the Program for Senior Executives in State and Local Government at Harvard University's John F. Kennedy School of Government. He was selected as fire chief of the year by Florida in 1993 and holds positions in several professional associations. He is also past president of the International Association of Fire Chiefs.

"I'm honored that President Bush and Secretary Chertoff have entrusted me with this responsibility. It's a job I'm proud to take on," Paulison said. "We are looking forward. There are people in the Gulf Coast still hurting in shelters and elsewhere, and we are going to take care of them." (Source: FEMA news release, September 13, 2005.)

ensure that satellite technology is readily available in support of EM at all levels.

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