Emergency Response — Natural Disasters in the United States.
As most headline-making natural disasters occur on both a regional and seasonal basis, the average person might not realize that there are on average 95 federal disaster declarations every year (see Figure 1: Federal Disaster Declarations since 1996). This amounts to nearly one disaster declaration every four days and as the chart shows the “totals” trend line is up over the past twenty years! As the seasons go, flooding usually occurs in the Midwest in the spring either due to melting snow or heavy rains, tornadoes often touch down in the Plains States during late spring and early summer, wild fires normally occur in the west throughout the summer, hurricanes typically hammer the Gulf coast and the East coast in late summer into early fall, and snow storms pound the upper Midwest and Northeast during winter. So Mother Nature is busy all year around across the country and emergency responders have to be prepared accordingly.

While not all of these disaster declarations result in the more dire “state of emergency” declaration, many of them still cause disruptions in power and communications systems. It’s an established fact that most emergency response and disaster relief operations require that communications systems, which are a lifeline to the outside world from a disaster site, need to be restored as soon as possible not only to save lives, but also to ensure the success of the relief efforts.

Satellite Communications — First on the Ground in Emergency Response.
During emergency response situations, whether they are due to natural disasters mentioned above or due to terrorist attacks, satellite communications (SATCOM) play a critical role. The ability of SATCOM providers to rapidly set up an alternate broadband communications infrastructure at a disaster site that provides emergency responders with prompt and continuing situational awareness is vital to the success of the overall emergency response effort.

At the outset, it is important to understand a critical element, which has been best described in a Global VSAT Forum (GVF)/Futron whitepaper, “Why Satellite Communications are an Essential Tool for Emergency Management and Disaster Recovery.”

“Deploying wireless communications is typically among the first priorities in any emergency response, rescue, or relief situation. However, terrestrial wireless equipment (cellular phones or land mobile radios) is only useful when communications towers and other fixed equipment are in place to connect wireless equipment to the local and global communications backbone. In the majority of emergency situations, this infrastructure has either been destroyed by the disaster (e.g. New Orleans after Hurricane Katrina) or was not available before the disaster (e.g. the earthquake in Pakistan). This reality makes it critical for local government and emergency workers to have access to a wireless communications network that is not dependent on terrestrial infrastructure.”

In such calamitous situations, there would be no real time information to propagate without a functioning wireless communications infrastructure on the ground at the disaster site. Fortunately, SATCOM offers the required and
necessary rapidly deployable infrastructure solution in these seemingly impossible circumstances. So this paper will describe exactly what role SATCOM plays in remote locations with and without existing terrestrial infrastructure, how the process works during dire emergency response in both situations using real examples, and also highlight SATCOM’s very critical role in effective and successful emergency management.

The Role of SATCOM During Emergency Response.
On August 2, 2015 Typhoon Soudelor, with winds gusting over 90 mph, passed directly over the Northern Mariana Islands causing widespread damage, including in Saipan, the second largest island (see Figure 2: Northern Mariana Islands). At the time, Kevin Bautista, Special Projects Coordinator for the Office of the Lieutenant Governor, told NBC News, “With the island-wide power outage, dissemination of public information and advisories from FEMA to the local government has been significantly limited. Many affected residents do not have access to the internet, the radio, or even the phone…”

In this specific case, as soon as an initial damage assessment had been completed, the Federal Emergency Management Agency (FEMA) contacted its SATCOM provider, Knight Sky. In fact, the Knight Sky team had proactively performed a comprehensive site analysis to determine which of its satellite networks (see Figure 3: Overview of Knight Sky’s satellite network connectivity to Saipan) was best suited to provide Saipan with the required coverage and bandwidth, including surge capacity (see Figure 4: NSS-9 global beam offers ideal satellite coverage over Saipan), for broadband communications access to the outside world for the required amount of recovery time.

As a result of timely coordination and teamwork, FEMA was able to deploy its own satellite terminal in Saipan within 12 hours and set up its command and control center to direct all of its emergency relief operations. While Knight Sky essentially provided FEMA with the required bandwidth and airtime for broadband connectivity, this rapidly deployed emergency SATCOM infrastructure enabled FEMA to send video images, participate in video teleconferencing, and deliver situational awareness back to its headquarters on the mainland. All of this critical communications capability was promptly setup on an island whose electrical infrastructure had been destroyed, and most of whose residents had been left without power.

Even as the federal government’s relief mission was nearing completion, FEMA continued to use Knight Sky’s critical SATCOM services at the time of writing this paper in early October.
Where There’s Smoke, There’s a… SATCOM Terminal!

During the summer of 2015, the western wildfires captured much of the nation’s attention. Wildfires typically start out in the wilderness, where there is no existing communications infrastructure, before they threaten residential and commercial habitation and supporting infrastructure. It is in these remote areas that SATCOM plays a leading role in supporting governmental emergency management and public safety information efforts.

Per the Incident Information System website (Inciweb) report on the Gasquet Complex fires, “lightning caused fires started around August 3rd when a storm system came through creating multiple ignitions across the greater northwest part of California.” To aid with the dissemination of accurate and timely information with regards to its firefighting efforts, the U.S. Department of Agriculture – Forest Service (USDA-FS) proactively contacted its SATCOM provider, Knight Sky. In this case, unlike in Saipan, Knight Sky deployed a trailer full of equipment – see Figure 5: Typical Satellite Equipment Trailer, which included a satellite terminal – with a technician to the Gasquet Complex base camp. The technician commissioned all of the equipment into service, including setting up phone kiosks for USDA-FS personnel, to support a wide range of communications at the site.

An Incident Command Post (ICP) is the command and control (C2) center for all communications at the base camp. The Knight Sky technician installed the satellite terminal with an 8MB x 2MB (uplink/downlink) broadband connection in a suitable location at the Gasquet base camp site, including equipping the ICP with the necessary computers loaded with USDA’s I-Suite C2 software, telephones, and local area networking capabilities. The C2 Manager was thus able to conduct all of his situational awareness activities with headquarters, including video teleconferencing, video imaging, voice, data and fax communications. While the WiFi option was not used at Gasquet, ICP communications can also be supported by a Wireless Access Point by connecting it to a router on the satellite terminal thus enabling wireless broadband access to other facilities within the base camp. With satellite-enabled WiFi access, the entire base camp crew can then avail of standard business applications, including email and web access, on their communication devices, such as laptops, tablets and smartphones throughout their stay at the remote base camp site – see Figure 6: Typical Incident Command Post Setup.

Knight Sky provided SATCOM services for twelve days at the Gasquet Complex, utilizing a flexible service plan that allowed the USDA-FS to procure services in the amount and the duration that was required by them to meet their emergency communications needs.

The western wildfires are just another instance of the critical role that SATCOM plays in successful emergency management. Finally, it should be noted that while the Gasquet situation did not require the Forest Service to request a “surge” in bandwidth capacity for its communications needs, SATCOM providers are often asked to provide additional “bandwidth-on-demand” at disaster sites. Based on actual emergency response situations on the ground, Knight Sky has always been able to meet surge requests from FEMA and other emergency responders as needed.
Conclusions.
This paper has clearly established that SATCOM plays a critical role in emergency management:

- As SATCOM is invariably the “go to” infrastructure for rapidly establishing post-disaster, two-way broadband communications, SATCOM providers must always be ready with an end-to-end solution that includes the necessary space segment, required bandwidth with readily available surge options, conforming link budgets, assured network availability, appropriate satellite terminals, easy service provisioning and diligent 24x7 support.

- SATCOM providers must be proactive and prepared for emergencies to ensure that ensuing relief operations are successful – so they need to have the necessary satellite equipment configured, tested and ready to ship at very short notice, which requires very timely coordination skills.

- SATCOM providers must be able to consistently accommodate “surge capacity” requests throughout the relief operations to ensure the efficacy of the overall disaster response efforts.

In emergency management, SATCOM professionals work diligently to make near “instant communications” possible, and thus empower disaster relief operations to be timely and effective.

About Knight Sky
Knight Sky LLC, which was founded in 2003, is a leading provider of end-to-end managed satellite network services. Knight Sky is dedicated to supporting the United States government and its citizens during times of crisis and critical need with secure, reliable, and scalable emergency satellite and wireless communications services. Knight Sky is headquartered in Frederick, MD, from where it operates a global satellite network with a 24x7x365 Network Operations Center and Help Desk.

For over a decade, Knight Sky has successfully met the challenge of broadband access anywhere, anytime demanded by its customers. Knight Sky’s primary charter has been to build, operate, and maintain a national satellite and wireless network infrastructure for contingency communications, when terrestrial communications are no longer viable as a result of man-made or natural disasters. This strategy has helped alleviate individual government agencies’ needs for in-house expertise while lowering their operating expenses.