Titan HST

POLICY PRIMER

When Communications Infastructure Fails During a Crisis

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All communities, at some point, will face a large-scale emergency or disaster. The Northeast with snow and ice storms, the Pacific Northwest, has a substantial earthquake threat, Southwest faces wild-land fires every year along with the risk of the looming earthquake, the Southeast has hurricanes and the tornadoes of the Midwest.

These situations place particular stress on communication systems. In the recent past, the community would use copper or fiber supported landlines. According to a 2017 report by the U.S. Center for Disease Control National Health Information Survey (NHIS), only 42.8% of American households still use a landline phone. The State of California Governor's Office of Emergency Services (CalOES) stated more than 80 percent of 911 calls in California in 2018 were made by cellphone.

The increasing connection between power failures and communications outages arises from the transformative effect of wireless devices. Cell phone devices have shown to be very useful; however, they become almost useless if the communication infrastructure breaks down.

Public Safety and Telephony

One of the immediate indicators of a significant event occurring is the wide-scale failure of communication systems. In 2008 a relatively small earthquake in Chino Hills, California, disrupted phone service 40 miles to its south. The outage impacted the State of California's Southern Region Emergency Operations Center (SREOC). It also interrupted 911 service to Seal Beach, Los Alamitos, Cypress, parts of Long Beach, and La Palma.

The fall of 2019 saw the rise of the Public Safety Power Shutoff (PSPS). The PSPS is the product of the wildland fires that plagued California in 2017 and 2018. In Northern California, Verizon has redundant power sources for its cell towers. Most cell towers have some form of backup power. These methods can provide power for days or longer, depending on whether the generators can be refueled.

Even with the backup power, the communications system still failed in the Kincade Fire. Powerful winds spurred the spread of the fire that forced the evacuation of 185,000 people in Sonoma County. Pacific Gas & Electric, the state's largest utility. The FCC reported that one-quarter of the 436 cellphone towers were not functioning.

Marin County had more than half of the 280 towers out of service related to the pre-emptive power cuts imposed by Pacific Gas & Electric.

According to one Sonoma County official, the mass communication system failed to reach some of the residents because of cell tower failure. And to make matters worse, when the power was restored, the cell tower pushed out an old message telling residents that just returned to their homes to evacuate.

The Lessens of the Camp Fire

The FCC wrote to cellular carriers to express concern about service reliability as California's wildfire season neared, asking for an account of steps being taken "to promote the continuity of communications for public safety officials and residents."

In Paradise, a Sierra foothill town rebuilding after it was devastated by fire last year, the combination of the power shut-off and uncertain communications was causing renewed anxiety in Sonoma. Sonoma being aware of the issues in Paradise, was very proactive in their approach to the wind event that proceeded the Kincade Fire.

Internet of Things and Mesh Networking

As we see rapid growth in the Internet of Things (IoT), including smart homes, smart offices, and digital cities, there may be an answer to the communications problem. The connection between mesh and IoT allows short range device-to-device communication without the need for cell towers.

By the year 2025, an estimated 75 billion IoT sensing devices will be in use. Over the last ten years, Bluetooth Low Energy (BLE) has become the most used communication technology for IoT.

The Mesh Network Solution

As we discussed earlier in this paper, disasters can occur at any time in any community. The typical damage to the infrastructure will have an impact on the ability to communicate via phone. As a result, jurisdictions sending mass notifications see a significant failure rate, and people become isolated during the first hours of an event. The disruption in cell service hinders first response coordination and relief efforts.

Using the existing IoT infrastructure with Mesh Networking, Titan Health & Security Technologies (Titan HST) has built an emergency network to allow device-to-device communication. The smartphone that most people have is all that is needed.

The Titan HST app is designed to complement the existing network solutions by utilizing mesh networking over a combination of WiFi and BLE protocols. The Titan HST app is based on the mesh topology, where there is not a single point of failure. Each device relays information to the next as they communicate with each other.

The mesh network allows building a system that is easily adaptable and relocatable and improves the reliability of the network. The integration of mobile devices allows for the creation of networks with variable topology. Mesh networking provides for interoperability between devices and across platforms