CASE STUDY

Satellite & Wireless MESH Connectivity for Emergency Management & Law Enforcement

TRANSPONDR
SATELLITE. REIMAGINED

INTRODUCTION

In the aftermath of a natural or manmade disaster, telecommunications infrastructure can quickly be knocked offline for prolonged periods of time. The ability to communicate and maintain continuity of operations (COOP) is critical to any organization, particularly local government, emergency management, and law enforcement.

This document provides a high-level overview of satellite connectivity and wireless MESH connectivity in an emergency management setting, as well as a simple case study on a demonstration performed for Islamorada, Florida.

SATELLITE CONNECTIVITY

When cellular and terrestrial connectivity is lost due to infrastructure damage, prolonged power outages, or even cyber-attacks, satellite can often be the only form of connectivity available. With the right service provider, it provides a robust, reliable form of IP connectivity for internet, voice, and data services.

Beware of Contention - Certain forms of satellite connectivity, such as consumer-grade satellite, satellite phones, and BGAN, are often rendered inoperable due to high levels of ***contention***, or the ratio of how many users are attempting to share a bandwidth channel. These ratios are typically from 400:1 to over 1000:1. Demand for these lower-cost services skyrockets in disaster scenarios and manifests itself in services being unreliable or unavailable when it's needed most. Two common examples of contention are cellular network congestion during crowded events, or home internet slowdowns in the evening; however, the effects of high demand on satellite connectivity are exponentially worse.

Guaranteed Bandwidth – For emergency management, local government, and law enforcement users, satellite services provided by Transpondr's bandwidth partner, LBiSat, are dedicated and 100% guaranteed. Services are connected to a triple-redundant fiber backbone in Salt Lake City, Utah, meaning east coast customers will have completely geographically redundant service in the event of a large-scale regional outage; these outages can be caused by natural disasters, terrorist attacks, or cyber attacks on infrastructure. Services can be provided daily, hourly, or ongoing and are completely flexible to the customer's needs.

Bandwidth services cover all of North America, including Alaska, Hawaii, and the Caribbean, over the following satellites: Eutelsat 117, Intelsat Galaxy 18, SES 15, or EchoStar 105.

Satellite in Action – Transpondr personnel provided critical satellite communications connectivity to the City of Marathon, Florida in the aftermath of Hurricane Irma in 2017. The city had been completely offline for more than 72 hours and most of the Florida Keys had no power, water, or telecommunications. Once connected, the city was able to coordinate fire rescue, police, and medical resources, as well as communicate with evacuated residents to provide updates on recovery operations. Residents were also able to utilize phones to reconnect with loved ones.

CASE STUDY

Satellite & Wireless MESH Connectivity for Emergency Management & Law Enforcement

TRANSPONDR
SATELLITE. REIMAGINED

WIRELESS MESH NETWORKS

Wireless IP MIMO Radios – Silvus Technologies, the leader in IP MIMO technology, has provided wireless mesh connectivity solutions to military and defense users in some of the harshest environments on Earth. The StreamCaster series of IP MIMO Radios creates an encrypted wireless MESH network that can pass up to 100 Mbps of IP data. With the right antennas and positioning, extreme ranges of over 100 miles can be achieved.

- **Line-of-sight NOT required** –Silvus Technologies' proprietary waveform technology doesn't require line-of-sight and can penetrate obstacles much more efficiently than other RF and microwave technologies.
- **Self-Healing Mesh Network** – Each radio acts as a repeater for all radios in the network, meaning a radio at extended range can use the other radios to route the IP data back to the satellite data link site. All of this is done automatically with zero input required from the user.
- **FIPS 140-2 Level 2 Certified Encryption** – All data on the wireless network is 100% encrypted and secure.
- **Built-in Push-to-Talk** – Each radio can support a push to talk handset.

Extending the Range of Satellite Connectivity – When terrestrial telecommunications services are rendered inoperable and a satellite connectivity solution is deployed at a site, there is still the "problem" of extending connectivity to other sites within a geographic area. For local government, this could be city hall, a fire station, or a field emergency operations center (EOC).

Silvus IP MIMO Radios can be strategically placed across a geographic area to connect specific locations or to create a blanket wireless mesh network for on-the-move applications. They can be placed on buildings, antenna towers, vehicles, or even personnel.

Reconnecting HF/VHF Networks - The other "problem" that many emergency management entities may face post-disaster is the loss of local terrestrial HF, UHF, and VHF land mobile radio networks, which rely on a network of repeaters and towers. When power outages extend beyond the capacity of backup batteries and generators, these critical radio networks are often knocked offline.

Silvus radios can be interfaced to HF/UHF/VHF radios to provide an ad-hoc mesh repeater network. The analog voice from the HF radio is converted to IP data in a process call RoIP, or "Radio-over-IP," then broadcast to all other Silvus radios in the network. That voice data is converted back to analog and broadcast out to the nearby HF/UHF/VHF radios. This process essentially replaces the downed land mobile radio repeater network with handheld, portable IP MIMO radios.

FREQUENCY BAND OPTIONS

(all bands listed in MHz; dual band configurations available)

BAND	RANGE	BAND	RANGE
UHF (042)	400-450	S Band (235)	2200-2500
900MHz ISM (091)	902-928	2.4GHz ISM (245)	2400-2500
Lower L (137)	1350-1390	Low C Band (455)	4400-4700
Extended L (139)	1350-1440	Federal C-1 (467)	4400-4940
Middle L (147)	1452-1492	High C Band (485)	4700-5000
Upper L (182)	1790-1850	5.2 GHz ISM (520)	5150-5250
Broadcast B (206)	2025-2110	5.8 GHz ISM (580)	5725-5875
Federal S (225)	2200-2300		

CASE STUDY

Satellite & Wireless MESH Connectivity for Emergency Management & Law Enforcement

TRANSPONDR
SATELLITE. REIMAGINED

CASE STUDY IN THE FLORIDA KEYS

Transpondr, with support from LBiSat and Silvus Technologies, performed a live demonstration for Islamorada, Village of Islands in the Florida Keys to simulate the deployment of a MESH satellite connectivity solution.

EOC Site - A 7 Mbps satellite IP data link was deployed at the Islamorada Emergency Operations Center (EOC) in the center of the main island, along with a Silvus StreamCaster 4400 IP MIMO Radio and a high-gain 19dBi panel antenna. The IP radio was connected to a Cisco Meraki router, which was connected to the iDirect satellite modem.

The fire chief agreed to attach the panel antenna to a fire truck ladder and raise it to approximately 75 feet to simulate installation on the building's existing radio antenna boom.

Fire Station 21 Site – A Silvus StreamCaster 4200 IP MIMO Radio and another 19dBi antenna were set up on the roof of fire station 21, which is approximately 6 miles from the central EOC location. Although the roof was lower than the existing antenna tower and did not have direct line-of-sight over the trees, there was more than enough signal strength and IP data throughput between the two sites.

A WiFi dongle was connected to the SC4200 Radio on the station 21 rooftop, and five users were able to connect their smartphones and laptops to the internet via the satellite antenna at the EOC that was 6 miles away.

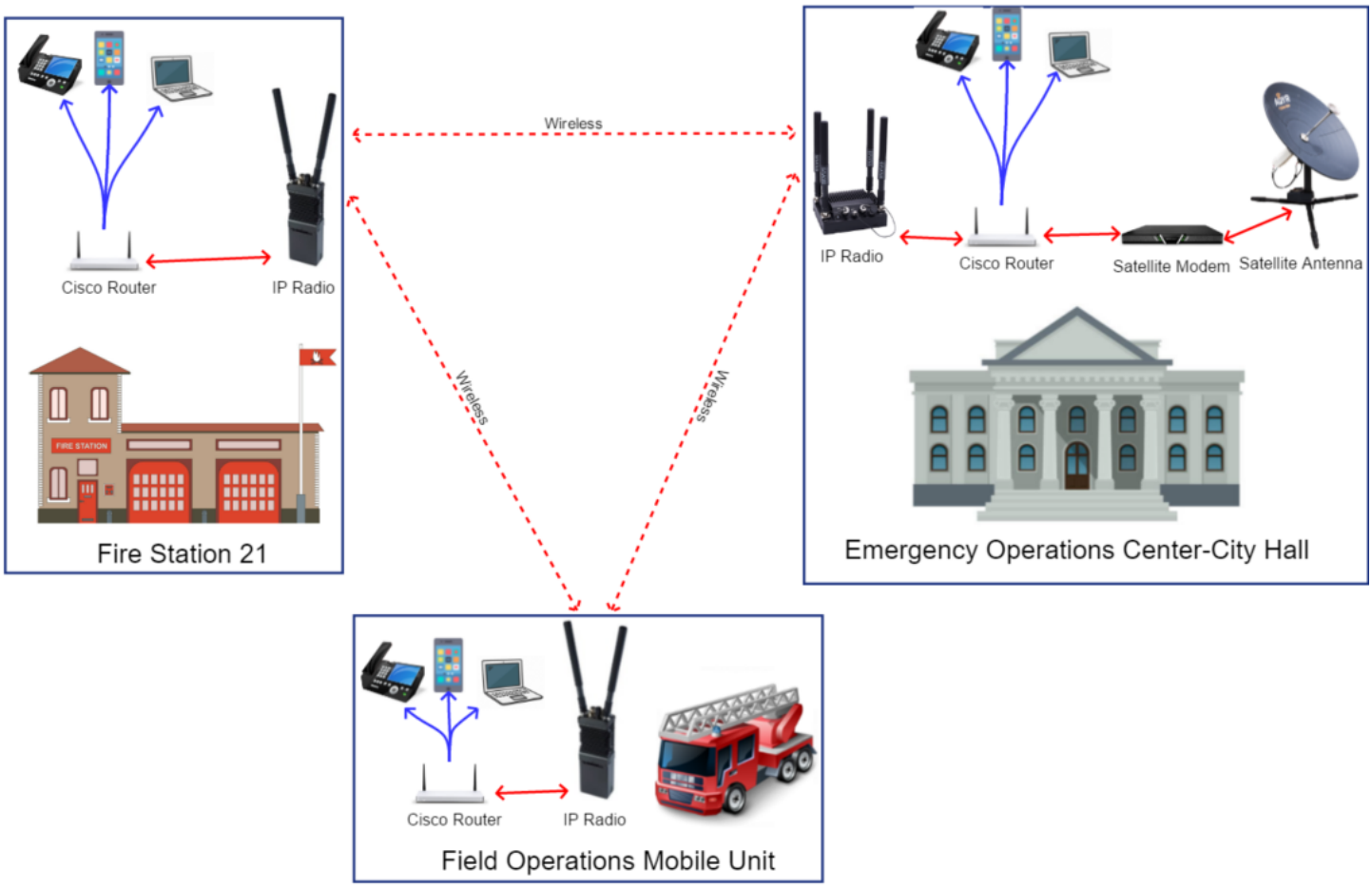
Mobile Handheld Connectivity – Once the two radios and panel antennas were set up at the EOC and Station 21, a StreamCaster 4200 radio with small 2 dBi omni-directional antennas was placed in a vehicle and driven across the island. The handheld radio remained connected with at least one of the other two radios the entire time. This capability enables the user to remain connected on-the-move or to establish field operations sites within an affected area.

CASE STUDY

Satellite & Wireless MESH Connectivity for Emergency Management & Law Enforcement

TRANSPONDR
SATELLITE. REIMAGINED

CASE STUDY DIAGRAM



TRANSPONDR
SATELLITE. REIMAGINED

LBiSat

SiLVUS
TECHNOLOGIES

www.transpondr.com | info@transpondr.com | (800) 821-4553