

Public Safety & First Responders

4.9 GHz Wireless Networks for Law Enforcement and Emergency Response



Communications is quite literally mission-critical for law enforcement agencies, fire departments, emergency medical service providers and other public safety organizations. In the past, first responders were limited to voice communications with each other and with command and control. The result was a potentially dangerous lack of situational awareness. More recently, the available options have expanded to narrowband data, text messaging, satellite video and other forms of communications. The many commercial advances in broadband wireless networking, however, have yet to be leveraged in public safety communications. But that is all about to change: The advent of licensing in the 4.9 GHz spectrum for the exclusive use of public safety agencies is certain to bring about the kind of breakthrough communications capabilities that are long overdue.

One of the more significant technological advances is the broadband wireless mesh network. Mesh networks form

instantaneously and automatically and heal themselves when a link is interrupted or broken. A mesh network can deliver the performance needed to support “multimedia” voice, video and data communications, and is compatible with virtually any existing equipment, network and software. The mesh itself is stable and secure, yet utterly simple to use and extraordinarily flexible. These and other characteristics make wireless mesh networks ideal for mission-critical public safety applications.

Firetide, the leader in commercial wireless mesh networking for businesses and service providers, now offers the HotPort® wireless mesh nodes, which support the 4.9 GHz public safety band. This application note highlights some of the many ways public safety agencies can utilize a HotPort mesh network for both routine operations and incident response. As will be shown, the full potential of sophisticated field communications for public safety personnel is now a practical and affordable reality with the HotPort mesh network.

Jurisdictional Overlay Networks

HotPort mesh networks can be deployed throughout an entire jurisdiction to provide broadband wireless communications on a routine, daily basis, or to supply a backhaul link to an on-scene incident response network (following page). Designed for maximum performance, scalability and ease of use, the wireless mesh creates an overlay network that can cover all or just a critical portion of any jurisdiction—from a small town to an entire county. Multiple mesh networks can be interconnected temporarily or permanently where greater coverage is required, potentially linking multiple agencies and/or jurisdictions in a mutual aid situation.

To provide broad coverage, jurisdictional mesh networks employ HotPort outdoor mesh nodes permanently mounted on rooftops, power or telephone poles, or telecommunications towers. HotPort outdoor nodes feature weatherproof enclosures and dual 10/100 Ethernet ports equipped with industry standard Power over Ethernet (PoE). The use of Ethernet ports affords maximum compatibility with commercial off-the-shelf (COTS) systems, including digital video surveillance cameras or access points, or for interfacing with other networks. Up to 70 Mbps of throughput, combined with traffic prioritization and other traffic management features, enables the HotPort mesh networks to support concurrent data and video/voice over IP (VoIP) multimedia communications.

Potential applications for the widespread broadband wireless access afforded by a jurisdictional mesh overlay network include:

- Remote access to centralized servers containing maps, national and local crime databases, motor vehicle registrations, hazardous material data, building blueprints, procedures, checklists, contact directories, rosters, skill set information, reports, etc.
- Video surveillance and recording with stationary or roving digital cameras
- Multimedia Instant Messaging to units in the field
- Broadcast of alerts and bulletins to precincts/stations and first responders
- On-line record retention to aid in filing reports or for planning purposes
- Backhaul communications between first responders on the scene and headquarters for enhanced situational awareness

A jurisdictional HotPort mesh network can provide broadband communications for both intra-agency and interoperable multi-agency needs, including mutual aid. Any organization authorized for 4.9 GHz—local/state police, SWAT, National Guard, fire, EMS, hospitals, FEMA, mass transit, utilities and others—can utilize the license granted to the jurisdiction. HotPort indoor nodes, which operate seamlessly with HotPort outdoor nodes, can be used to extend the jurisdictional mesh into command centers, city halls and other facilities on a temporary or permanent basis.

Firetide HotPoint® access points can optionally be deployed indoors or outdoors to provide first responders and other public safety officials with commercial Wi-Fi communications. Because the mesh is a multipoint-to-multipoint network, and not point-to-point, FCC restrictions on permanent installations do not apply. This same characteristic also allows a HotPort mesh to overcome the many line-of-sight obstructions that cause problems with other wireless technologies.



Firetide HotPort indoor mesh node



Firetide HotPort outdoor mesh node

Incident Response Communications

The self-forming, self-managing Firetide AutoMesh™ protocol used in a HotPort mesh network also makes the system ideal for temporary or ad hoc communications at the scene of any incident—in any terrain, whether metropolitan or rural. The nature of the incident can range from a fairly localized accident, stakeout, hostage or rescue situation to a major, widespread disaster caused by a fire, earthquake, storm, terrorist act or other catastrophic event. In the latter case, the only form of communications available may well be the mobile, self-forming incident response mesh network that accompanies first responders to the scene.

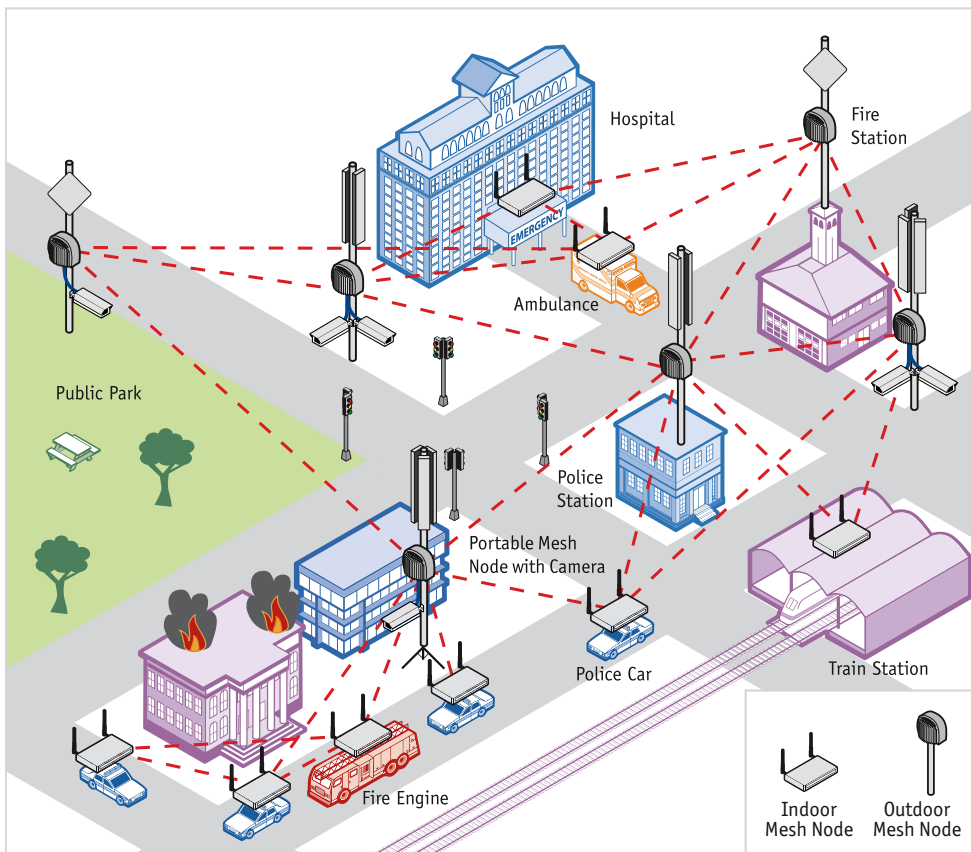
Incident response mesh networks employ HotPort indoor mesh nodes that are plenum-rated for mounting in trunks, under seats or elsewhere in vehicles or mobile command centers. The built-in 4-port 10/100 Ethernet switch can support mobile data terminals, digital video cameras, GPS receivers and most other on-board multimedia communications systems. HotPort outdoor mesh nodes equipped with high gain antennas can be mounted to portable stands to extend the range of the mesh and provide outdoor connectivity for video cameras and access points. With the exception of PoE, indoor and outdoor units also share the same robust HotPort feature set, including support for strong encryption, access control, traffic prioritization, Virtual LANs, LAN/WAN internetworking, mobility and more.

Possible applications for the instantaneous broadband wireless communications provided by an ad hoc HotPort mesh network include:

- On-the-fly creation of an on-scene Incident Command Center
- Full situational awareness by first responders on the scene, optionally integrated with GPS/GIS for real-time resource tracking
- Live video feeds of the incident from digital cameras, including those mounted on robotic vehicles
- On-scene collaboration, potentially with whiteboarding and videoconferencing
- Multimedia Instant Messaging for peer-to-peer and peer-to-group communications
- Incident area-wide broadcast of alerts and bulletins

A HotPort incident response mesh network begins to form immediately and automatically as the first two first responders reach the scene. The mesh continues to grow and adapt as first responders come and go, or move about the area. Security provisions can restrict participation, if required, or the mesh can be made available to all units and/or agencies. The network can scale to support 50 participants or more, and with its many available paths, a mesh topology becomes even more resilient as it grows.

Where backhaul is provided by an overlay jurisdictional mesh network or other means, first responders on the scene have access to the same server-based information listed above. Similarly, access points can be attached to the HotPort mesh to provide access for Wi-Fi enabled computers and PDAs that utilize commercial, unlicensed frequencies of 2.4 GHz and 5 GHz.



The Firetide HotPort mesh networks provide a reliable, high-performance wireless infrastructure for public safety jurisdictions. Instant deployment and mobility also enables first responders to set up temporary incident response communications at the scene of an incident.



About Firetide

Firetide wireless mesh networks provide “Reliable connectivity anywhere” for municipal, industrial and enterprise users. Firetide mesh nodes and access points deliver a high performance wireless infrastructure and access solution for Internet access, VoIP, video surveillance, and temporary networks wherever rapid deployment, mobility, and ease of installation are required.

For more information, visit www.firetide.com.

Firetide Public Safety Advantage

The many proven advantages of a HotPort mesh network are now available for licensed public safety agencies in the exclusive 4.9 GHz spectrum. The use of licensed spectrum enables public safety applications to take advantage of advances in commercial wireless technologies with minimal radio interference and maximum security. Here are just some of the capabilities public safety agencies get with a HotPort mesh network:

- Genuine broadband communications to support enhanced multimedia (data/video/voice) applications in a fully wireless environment
- Mission-critical stability and dependability with a fully self-healing mesh network that is remarkably resilient to outages and obstructions
- Solid security in any situation with provisions for strong encryption, rigorous access control and Virtual LAN segmentation
- Scalable capacity to create a jurisdictional/incident response mesh network environment with up to 1000 nodes
- Ease of use with a self-configuring, self-managing network
- Firetide HotPort mesh nodes are FCC Part 90 DSRC C-mask certified
- Full mobility to accommodate moving vehicles or vessels within range of the jurisdictional overlay and/or incident response mesh network
- Seamless compatibility with existing communication systems, protocols (e.g. IP, IPX, XNS, NetBEUI, etc.) and commercial off-the-shelf equipment, including mobile data terminals, laptop computers, and digital video cameras
- An industry-leading low total cost of ownership (TCO) based on a relatively modest capital expenditure and minimal on-going operational expenditures



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