4G Wireless Broadband in the 4.9 GHz Public Safety Band

White Paper
White Paper: 4G Wireless Broadband in the 4.9 GHz Public Safety Band

Introduction

The frequency band from 4940-4990 MHz was assigned by the FCC in 2003 for Public Safety applications. Commonly referred to as the 4.9 GHz band this FCC allocation provides municipalities the opportunity to obtain licensed spectrum for the deployment of broadband citywide wireless networks designed to improve and streamline the effectiveness of local government agencies in the pursuit of public safety.

The FCC rules allow for mobile and fixed services, and both Point-to-Point (PtP) and Point-to-Multipoint (PtMP) topologies are permitted for carrying voice, data, or video traffic. The spectrum cannot be used for commercial, i.e. revenue-producing, services. Qualified agencies can easily acquire licenses online through the FCC Universal Licensing System.

Benefits of 4G Wireless Broadband

Deploying safe city-related wireless applications requires reliable, secure network infrastructure with high capacity and low latency to ensure quality of video, data and voice applications. High-quality broadband communications between citywide stationary and mobile units with centralized control are essential and real-time intra agency communications enhance the municipality's ability to combat crime, respond to natural disasters or major accidents, and protect critical infrastructure.

A broadband wireless solution based on Alvarion’s 4G solution in the 4.9 GHz band meets the challenges for a citywide public safety network. The Alvarion product portfolio has many key features and advantages, including:

- A full range of products to address the wide range of public safety related applications
- Products for PtP, PtMP and WiFi Mesh topologies
- Reduced deployment and operating costs (CAPEX and OPEX)
- Fixed and mobile broadband connectivity
- Rapid implementation
- Applicable for virtually any terrain including Non-Line-of-Sight (NLOS)
- Large channel BW; 10, 20 or 40 MHz, with capacity for high quality video transmission
- Video multicasting for improved utilization of channel resources
- Embedded exclusive software technology which increases video reliability and quality over the wireless link
- Inherent QoS to simultaneously support voice, data and video
- Capacity sufficient for backhaul "Roaming” WiFi hot spots to quickly address critical site-specific communication requirements for emergencies arising from major accidents, natural disasters, etc
- Enhanced interference mitigation and management for greater cell coverage
- Migration path for a future-proof solution
Applications

A citywide 4G network can support a wide range of applications and citywide services that fall under the umbrella of public safety.

Typical applications include:

- **Law Enforcement and First Responders:**
  - Video surveillance for crime prevention and suspect identification and apprehension
  - Mobile access to centralized resources and databases
  - Mobile connectivity for timely and secure communications between mobile units and central office for location-based information and coordinated incident response

- **Intelligent Traffic Systems:**
  - Traffic monitoring and centralized control for traffic lights
  - Timely driver alerts for changing road conditions and potential hazards for accident prevention

- **Public Transit Systems:**
  - Fleet management with data collection

- **Medical Services:**
  - Mobile access for first responders
  - Video, data, and voice access to central command in administering aid to the injured

- **Fire Protection Services:**
  - Mobile broadband connectivity for first responders
  - Vehicular installed WiFi hot spot to provide video images to centralized command center

- **Critical Infrastructure Protection:**
  - Video surveillance for streets, public areas, and critical facilities such as: seaports, airports, train stations, sports stadiums, special events, etc.
  - Video surveillance and monitoring of municipal infrastructure such as electrical power plants and substations

- **Intra-agency Communications and Coordination:**
  - A single intra-facility broadband communications network for coordination between the varied services required in response to major incidents or disasters
  - Enables access to common databases and other central resources

A well designed 4G citywide WiMAX wireless network can address multiple public safety and municipal agency requirements. In most cases, capacity and coverage will be sufficient with a common network to address additional multiple public service applications. These additional applications and services may include:

- Broadband access to address digital inclusion initiatives
- Educational networks (e-Education)
- Broadband Internet access in public areas
- Advanced metering systems for data collection and usage monitoring

With 4G QoS, network traffic resulting from this wide range of applications can be managed and prioritized so that emergency-related communications take precedence over non-emergency traffic.
Alvarion Products for the 4.9 GHz Band

Alvarion is a world leader in the development and deployment of broadband wireless products and has a complete portfolio of products for the 4.9 GHz Public Safety band.

BreezeMAX® Extreme 5000: An all-outdoor, zero footprint base station solution for quick and easy deployment

- IEEE 802.16e-based, all-outdoor, all-in-one solution that integrates the base station, antenna, Access Service Network (ASN)-gateway, and GPS receiver to provide a ruggedized all-outdoor, self-contained solution
- Easy to deploy on towers, rooftops, and existing power or light poles. A typical base station installation can be accomplished in a matter of hours
- Enhanced coverage and capacity capabilities with advanced Interference Mitigation techniques and multiple model types offering to best support deployment needs
- BreezeMAX Extreme provides MIMO Matrix A and Matrix B and Maximum Ratio Combining (MRC) advanced antenna techniques with a 10 MHz or 20 MHz channel BW to deliver high capacity with over 80 Mbps per sector
- BreezeMAX Extreme solution is an 802.16e WiMAX™ solution that supports mobility with handoffs and can be configured to work in mixed mode networks

BreezeACCESS® VL: A cost-optimized, widely deployed base station solution for Public Safety applications

- Support for up to six sectors or deployed as a standalone single sector solution in an all-outdoor configuration
- Can support multiple frequency bands in the same chassis, i.e. 900 MHz and 4.9 GHz

Alvarion subscriber units for uplink applications and mobility

- BreezeACCESS VL SU-Video is specifically designed for video surveillance systems. Asymmetric throughput provides 8 Mbps uplink and 2 Mbps downlink, Video Power Supply (VPS) provides a cost-effective solution for an easy-to-install video surveillance camera and wireless backhaul
- SU-Mobile provides an integrated antenna and mounting for devices in vehicles for mobile data and video access

Alvarion end-to-end PtMP solutions provide:

- Automatic Transmit Power Control: To optimize cell transmission and enable better network deployment and interference control
- Automatic Channel Selection: Built in Spectrum Analyzer Mode with automatic noise floor and clear channel selection
• **Guaranteed QoS**: Configurable information rate (MIR/CIR) setting per subscriber unit with wireless link prioritization

• **Security**: Hardware-based AES128 with FIPS 197 and FIPS 140-2 options; no tradeoff in capacity with encryption

• **BreezeACCESS VL 4.9 GHz high power mask solution**: Enhanced filter selectivity provides 12 to 16 dB less interference to adjacent channel providing improved collocation flexibility for multi-sector PtMP deployments

**BreezeNET®**: This product family provides a solution for high capacity PtP links. Supported by high gain antennas at each end of the link, these PtP links can provide up to 250 Mbps capacity over a range up to 60 km.

• LOS + NLOS technology

• Automatic self configuration

• Built-in spectrum analyzer with automatic clear channel selection

• Scans 20 MHz as well as 10 MHz channels

• Automatic Transmit Power Control (ATPC)

• Signal to Noise Ratio (SNR) LED indicator for fast antenna alignment

**BreezeMAX Extreme Wi²**: This product family provides a solution for further extending the WiMAX base station connectivity and coverage with WiFi

• Ruggedized all-outdoor solution is easy-to-install and can be backhauled by the WiMAX PtMP network to provide WiFi coverage to selected areas and venues within or as an extension to the WiMAX PtMP coverage area

• Mobile Access Point: Mounted on a vehicle, Wi² can act as a “roaming” hotspot to provided added communications capability when responding to a major incident

• Wi² Controller for centralized management and control and Wi² NMS for managing multiple controllers

---

**Conclusion**

The FCC allocation of 50 MHz of spectrum in the 4.9 GHz band provides eligible municipalities and government agencies the opportunity to deploy a licensed broadband network for enhanced capability in addressing citywide public safety requirements. Alvarion is a recognized leader in WiMAX technology and has the deployment experience and a complete portfolio of 4G WiMAX products in the 4.9 GHz Public Safety band to meet the cost and performance requirements for the Safe City.
About Alvarion

Alvarion (NASDAQ: ALVR) is a global 4G communications leader with the industry’s most extensive customer base, including hundreds of commercial 4G deployments. Alvarion’s industry leading network solutions for broadband wireless technologies WiMAX, TD-LTE and WiFi, enable broadband applications for service providers and enterprises covering a variety of industries such as mobile broadband, residential and business broadband, utilities, municipalities and public safety agencies. Through an open network strategy, superior IP and OFDMA know-how, and ability to deploy large scale end-to-end turnkey networks, Alvarion is delivering the true 4G broadband experience today (www.alvarion.com)