Motorola and MeshNetworks

Technology Update

Sept 27, 2004
WiFi / Broadband Technologies

Unlicensed/Enterprise

2.4GHz

5.2GHz

5.8GHz

Home
4.9 GHz Licensed Spectrum

- February, 2002:
  - FCC designates 50 MHz of spectrum at 4.9 GHz for broadband public safety use
  - Licensed Spectrum – Eliminate Interference
WiFi / Broadband Technologies

- **Unlicensed/Enterprise**
  - 2.4GHz

- **Licensed Broadband**
  - 4.9GHz Licensed

- **Unlicensed/Enterprise**
  - 5.2GHz
  - 5.8GHz

- **Home**
Data Options

Data Rate

100 M
54 M
10 M
4 M
2 M
1 M
200 K
56 K
19.6 K
9.6 K

Tier 4
Unlicensed Broadband
Hot Spot
Video Upload
Mass Data Transfer
Office Applications

Tier 3
Video Applications
Inter/IntraNet
Advanced AVL
Full report writing / Visual Site Information

Tier 1 & 2
Text based
Limited AVL
Limited report writing
Dispatch, Site Address

10 meters
100 meters
1 Kilometer
10 Kilometers

Personal
Local
Wide Area

Coverage
Motorola and MeshNetworks have Joined Forces

- **MeshNetworks offers** Innovative Broadband Technology
  - “Multi-hop” technology
  - “Self forming”, “self healing” network
  - “Ad-Hoc” mode supports connectivity between users in the absence of infrastructure
  - Full Mobility
    - 100 mph
  - Full Roaming

- **Motorola brings** the “Complementary Assets”
  - Product Development
  - Distribution
  - System Integration Expertise
What is "MESH" Technology?
Mesh-Type Networks / Peer to Peer / Ad-Hoc Technologies

- Two modes of operation
  - Multi-hop Ad-Hoc (without infrastructure)
    - WLAN (6Mbps peak rate)
  - Mobile Broadband Infrastructure using multi-hop routing
Here we have a minor traffic accident near a busy intersection.
Public Safety Example

The accident has been observed by a traffic monitoring video camera, which is wirelessly streaming the video back to Police HQ.

MeshNetworks' Multi-Hopping™ technology allows the stream to route through another Mesh-Enabled™ video camera. Every Mesh-Enabled device acts as a router/repeater, greatly increasing range and network coverage.
Public Safety Example

With its built-in geo-location, MeshNetworks allows dispatchers to identify the closest patrol car to the accident. The patrol officer can then access the real-time video feed. Note that the communications path between the car and dispatcher can be different from the path the video feed takes.
Public Safety Example
Public Safety Example

Video from the on-site patrol car can be monitored by dispatchers or sent to another Officer’s handheld computer. The Officer at the incident can also use the network to access local, state and federal databases wirelessly. Note that the patrolman’s handheld computer can hop though his police car - using it as a repeater booster.
Public Safety Example

Information about the accident can be shared wirelessly with other agencies. Here, Police dispatch has informed the DOT of the accident. They are able to wirelessly update the variable message sign, to inform the public of the accident ahead.
Public Safety Example

Officers can also file reports directly from the incident, without returning to the station - improving accuracy and increasing Police visibility within the community. Wide area broadband communications increase the safety and efficiency of law enforcement personnel.
Ad Hoc Example

Here, we have a hazardous waste spill in a busy section of town.
Ad Hoc Example
Ad Hoc Example

MeshNetworks enables high-speed networks to form instantly at an incident site. Video from the helicopter is sent to the officers on the ground to increase situational awareness. Broadband networking is supported, even if the incident occurs out of range of the main network.
Ad Hoc Example

Additional units can be instantly and automatically added to the local network.
With Multi-Hop users become the network...

Users can hop onto the main network at any time, if they are within range.
Agency interoperability – effective coordination during emergencies

Mesh-Enabled™ users and devices can leverage and interoperate with other agencies' MeshNetworks solutions, including those deployed to support Emergency Response and Intelligent Transportation Systems.
Wireless Modem Card

- Forms ad hoc peer to peer networks
- Supports client and infrastructure meshing
- Device driver support
  - Windows® support
  - Pocket PC® 2002/2003
- Host interface
  - Type II PCMCIA
- Over The Air network management
- Up to 6 Mbps burst data rates
- 2.4 GHz initially
- 4.9 GHz in 2005
- 0.5 watts
- External ‘whip’ antenna for enhanced coverage (not required)
Vehicular Mounted Modem

- Vehicle mounted
  - 12VDC Powered
  - Remotely mounted antenna
  - Robust package
  - 0.5 watts
- RJ45 Ethernet port
  - Supports up to 3 IP devices
  - Seamless handoff for all connected devices
Intelligent Access Point (IAP)

- Different “Site” than Today
- Wired Network Access
- Up to 6Mbps burst data rate per IAP
- Enhances network capacity
- Over The Air network management
- Position Location reference point
- NEMA 4 Enclosure
  - Antenna connector
  - RJ45 Data port
- 120vAC or 12vDC
- 5” x 5” size
Wireless Access Point (WAP)

- Ensures wireless coverage
  - Extension from IAP
- Automatic network balancing
- Over The Air network management
- Position Location reference point
- NEMA 4 Enclosure
Enhanced WAP

- All Wireless router features
- RJ45 Ethernet Port (enhancement)
  - Supports up to 3 devices
    - Camera
    - Sensors
    - Etc.
More Capabilities

• Network Management
Network Management

- Solaris (Sun) Based
- Powerful Network & Subscriber Management
- Authentication & Authorization
  - Supports standard IP VPNs
- Over the Air (OTA) upgrades
- Network Interfaces
  - 10/100Mbps Ethernet
  - Optional T1, E1 or DS3
More Capabilities

- Network Management
- Security
  - Supports VPN
  - Proprietary Air Interface - No Listening Devices
- Coverage Enhancement
  - Breadcrumbs
- Future Enhancement
  - Location Information
    - Via Users
    - Via Breadcrumbs
    - Via IAP’s / WAP’s
MESH Capabilities

- Ad-Hoc Communications
- Self Forming / Self Healing / Multi-hop
- Mobility
- Roaming (Site Handoff)
- System Management
- Location Information
- Coverage Extension
Thank You!

Any Questions?