

## **Broadband Summit**

# **APPLICATIONS OF WIRELESS MESH NETWORKS IN PUBLIC SAFETY**

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# Discussion Outline

1. Overview of a Wireless Mesh Network
2. Applications to Public Safety
3. Public Safety “Ad-Hoc” Networks
4. Key Attributes of a Wireless Mesh Network

# What is a Wireless Mesh Network?

*“A wireless mesh network (WMN) is a communications network made up of radio nodes organized in a mesh topography”*

# Wireless Mesh Network Overview

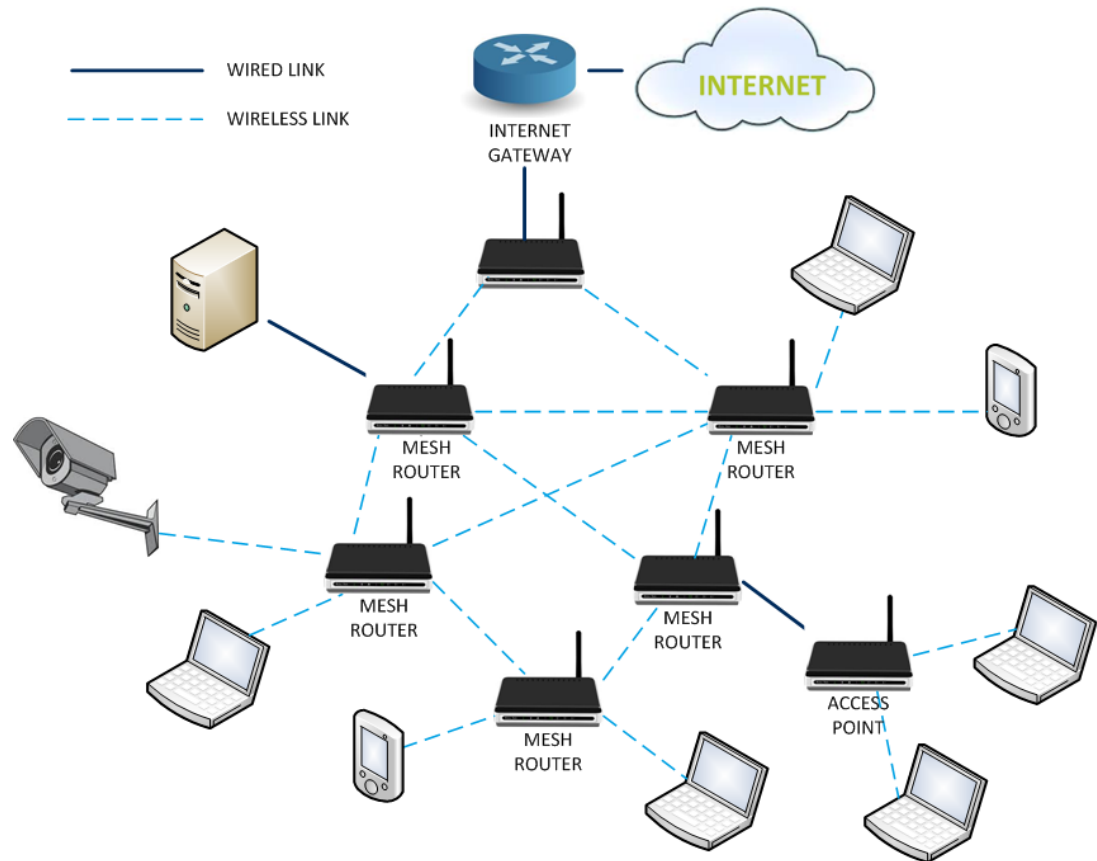
- Primary Components

- **Clients:**

- Cell phones,  
laptops,  
servers

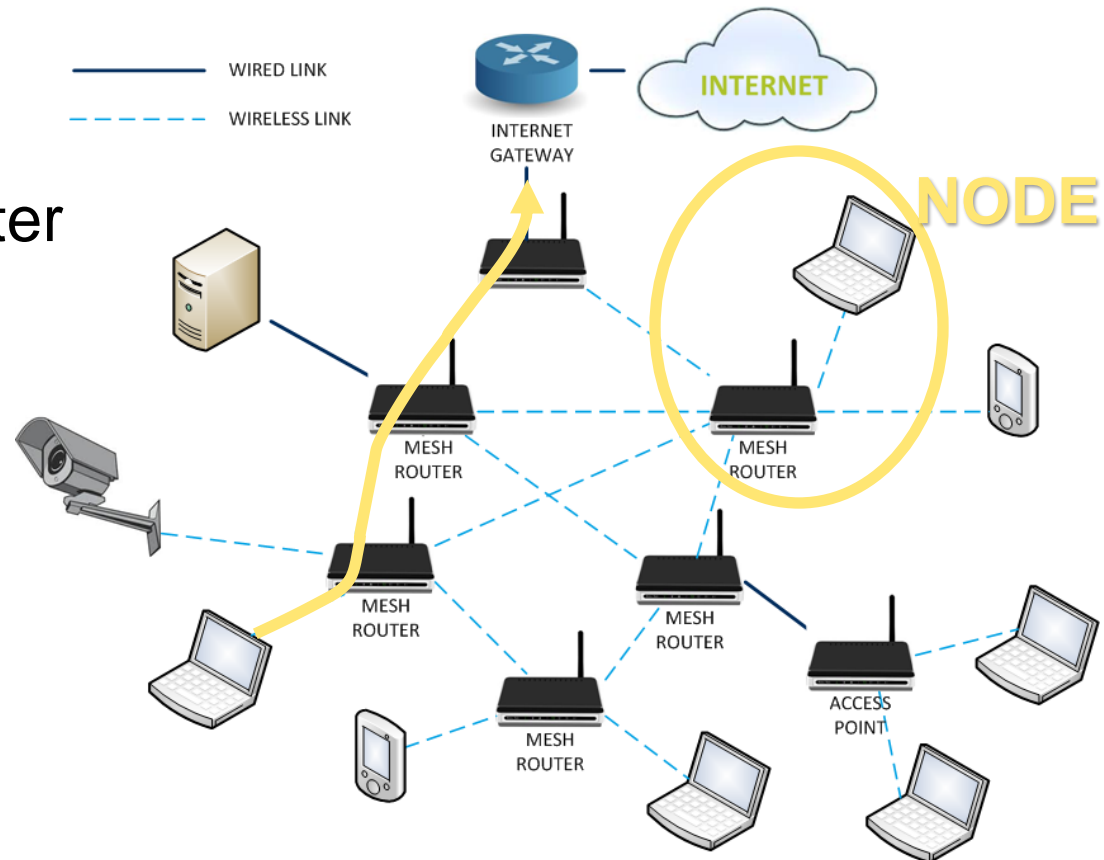
- **Routers (Mesh)**

- **Gateways**



# Information Flow and Nodes

- **Nodes** = Client+Router
- Multihop path
- Client to Client
  - Typically voice
- Client to Internet
  - Mainly data



# History of Wireless Mesh Networks

- Mesh Networks first developed for military applications
- Broadband internet in rural applications
- Radio development over the past decade
  - Size, cost, and power requirements has declined
  - Multiple radios within one device
  - Cost and availability

# Characteristics of the traditional Public Safety Network

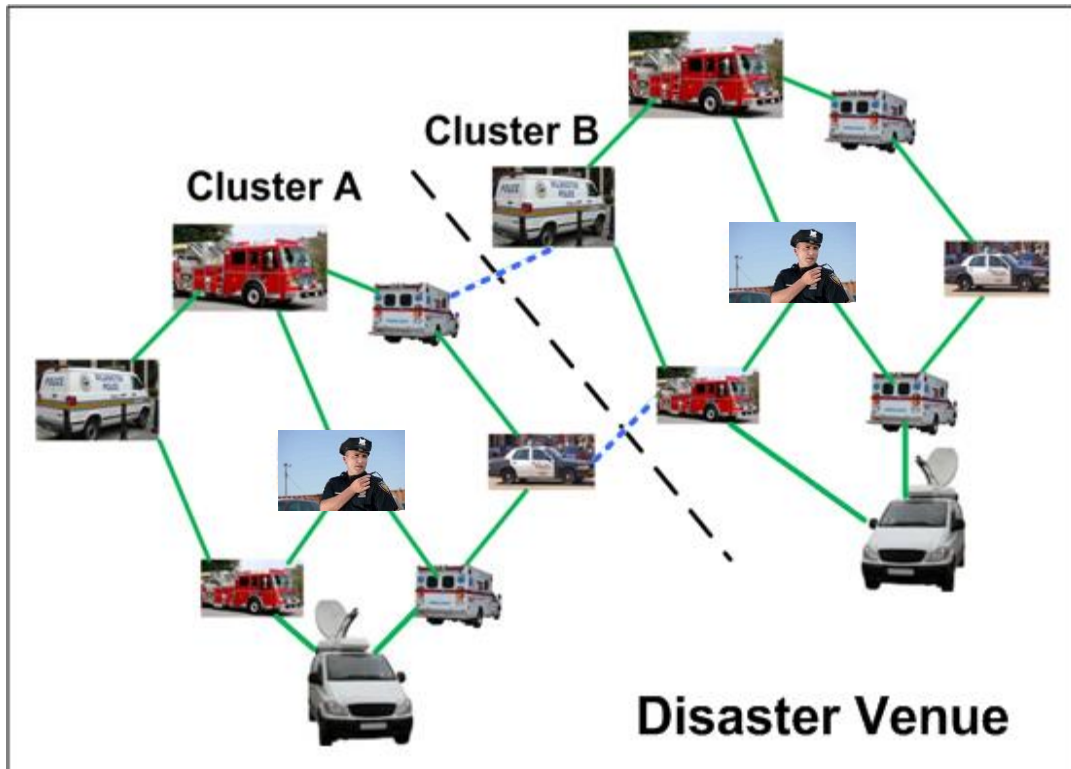
- Need reliable and efficient communications
- Resilience of Existing Radio Systems in Disaster
  - Dependence on point to point communications
  - Limited degree of redundancy
  - Minimal broadband capability
- Network failures – (9/11, Hurricane Katrina, Boston Marathon)
  - Interoperability between agencies
  - Reliance on terrestrial communications infrastructure
  - Cellular Networks become overloaded

# Public Safety “Ad-Hoc” Network

- An “Ad-Hoc” Network does not replace the traditional Public Safety radio system
- Today’s wireless technology can provide temporary, infrastructure-less and fast-deployable broadband wireless communications at the scene and to the command and control center.



# Public Safety Ad-Hoc Network



- The nodes may be vehicular or personal radios
- Satellite terminals are used to link the scene to command and control
- The nodes may be deployed in two or multiple clusters
- Nodes may move around and be associated with different nodes or clusters
- Standard Protocols are necessary within cluster



**Command and Control**

# Comparison of Technologies

Attribute	Cellular	Push to Talk - LMR	Ad-hoc Mesh Network
Availability in an Emergency	Poor	Good	Excellent
Bandwidth	Good	Poor	Good
Capacity Available to First Responder	Low	Good	High
Coverage	Wide Area	Wide Area	Limited

# Attributes of Wireless Mesh Networks

- Low upfront investment
- Low maintenance costs
- Cost effective wide area coverage
- Self configuring - Easy and rapid deployment
- Inherently redundant
- Self healing and resilient

# Q & A



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