Survey of Hybrid Wireless Mesh Networks

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Introduction

- Background
  - Mobility
  - Ad Hoc Wireless Networks
  - Hybrid Wireless Mesh Networks
- Mesh Networking Principles
- Advantages
- Disadvantages
- Considerations
- Current Research
Stationary Wireless networks

- Client node
- Stationary Router node/ Base Station
Mobile Ad Hoc Networks (MANETs)

- **Client node**
- **Router node**
Hybrid Wireless Mesh Networks

- Client node
- Mobile Router node
- Stationary Router node/Base Station
Mesh Networking

Network Formation

- **Client node**
- **Router node**

1. Initial setup
2. Router node connection
3. Network formation
Mesh Networking (cont’d)

Node Loss

- **Client node**
- **Router node**
Client Access & Backhaul

One Radio  Two Radios  Three Radios

1st Gen  2nd Gen  3rd Gen
Advantages: Range and Power

- Router node
- Stationary Router node/Base Station
Advantages: Scalability

- Client node
- Mobile Router node
- Stationary Router node/ Base Station
Advantages: Throughput

- Client node
- Mobile Router node
Disadvantages: Throughput

- Client node
- Mobile Router node
Disadvantages: Interference

- Router node
- Stationary Router node/ Base Station

Heavy Co-Channel Interference

Co-Channel Interference
Disadvantages: Security

- Client node
- Mobile Router node
- Stationary Router node/Base Station
- Parasitic node
- Sniffer node
Considerations: Mobility Management

- **Client node**
- **Stationary Router node/Base Station**
- **Router node**

**Bad**

**Good**
Considerations: Device Power

Vs.
Considerations: Device Complexity

Vs.
Considerations: Gateways

- Client node
- Mobile Router node
Considerations: Network Topology & Routing

- Client node
- Mobile Router node
- Stationary Router node/Base Station

Dead Zone
Bridge Node
Long Data Path
Considerations: Network Topology (cont’d)

- **Client node**
- **Stationary Router node/Base Station**
- **Router node**

**Simple**

**Complex**
Current Research: Access Schemes

Carrier Sense Multiple Access (CSMA)

Sense  Buffer  Transmit

1\textsuperscript{st} Step  2\textsuperscript{nd} Step  3\textsuperscript{rd} Step
Current Research: Topology Schemes

- Client node
- Mobile Router node
- Stationary Router node/ Base Station

Clustering Approach
It depends.
Current Research: Capacity (cont’d)

FACTORS

- Number of channels per node
- Number of nodes
- Throughput

Rule of Thumb:
As nodes are added to a hybrid wireless network, the capacity will increase until you exceed the optimum number of nodes.
Recap

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- Advantages
- Disadvantages
- Considerations
- Current Research
Questions