Broadband Networking Primer:

Network Concepts and Applications

Al Taylor, KN3U

Presentation for MARC Members

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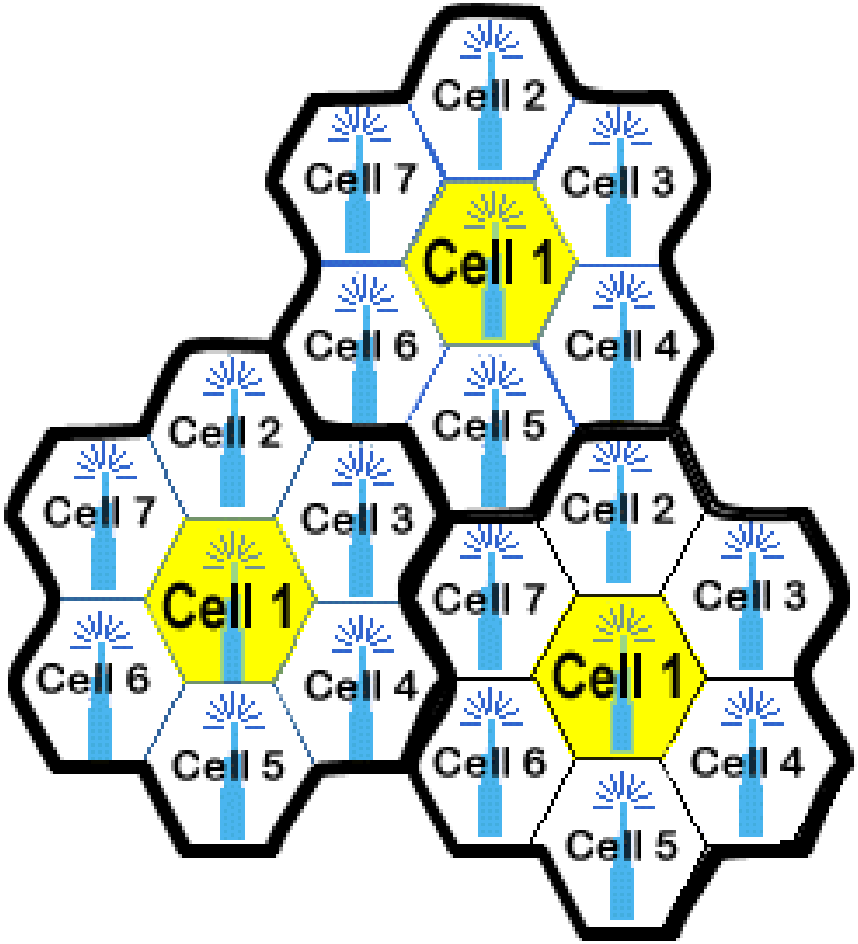
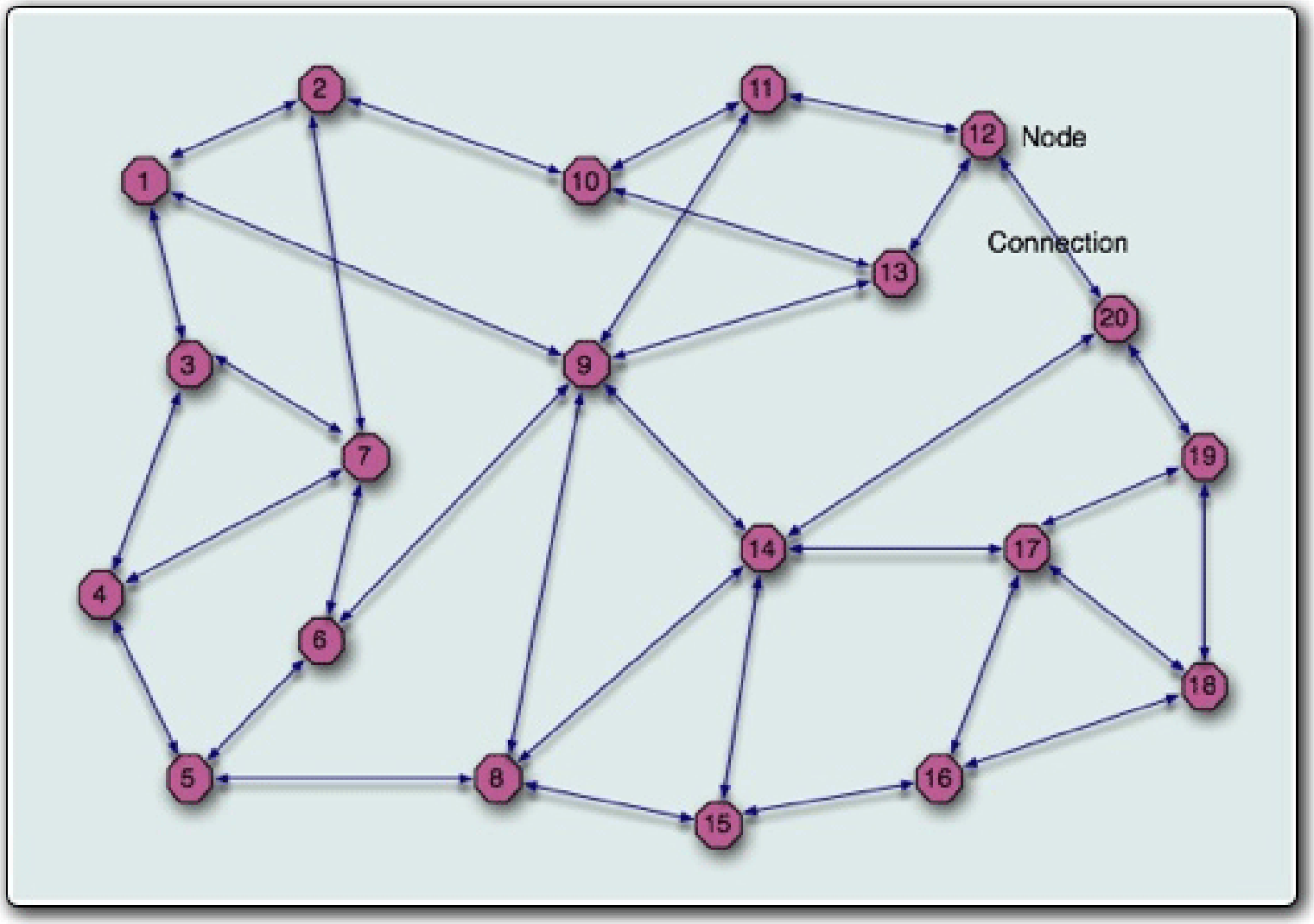
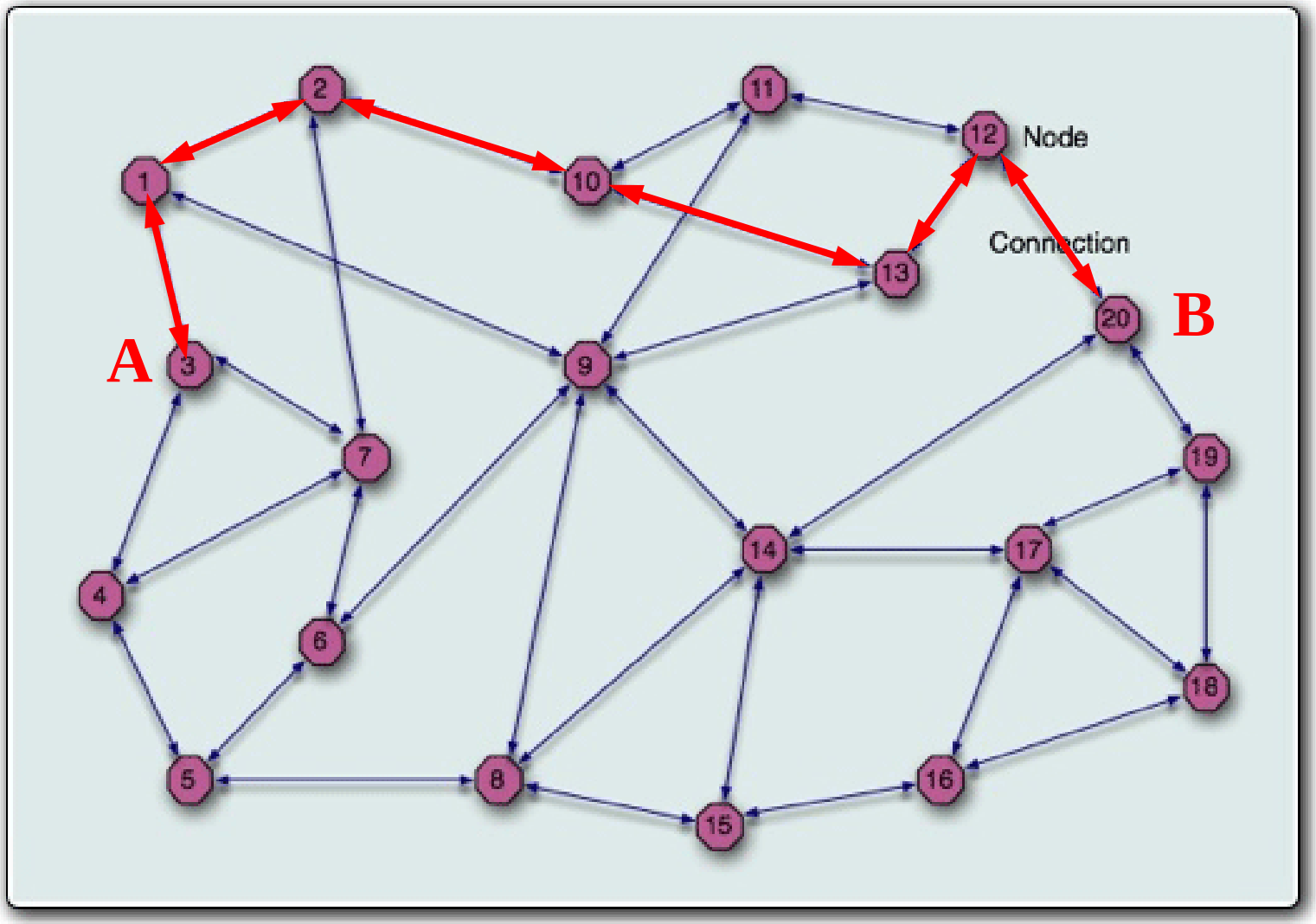
Cellular Network



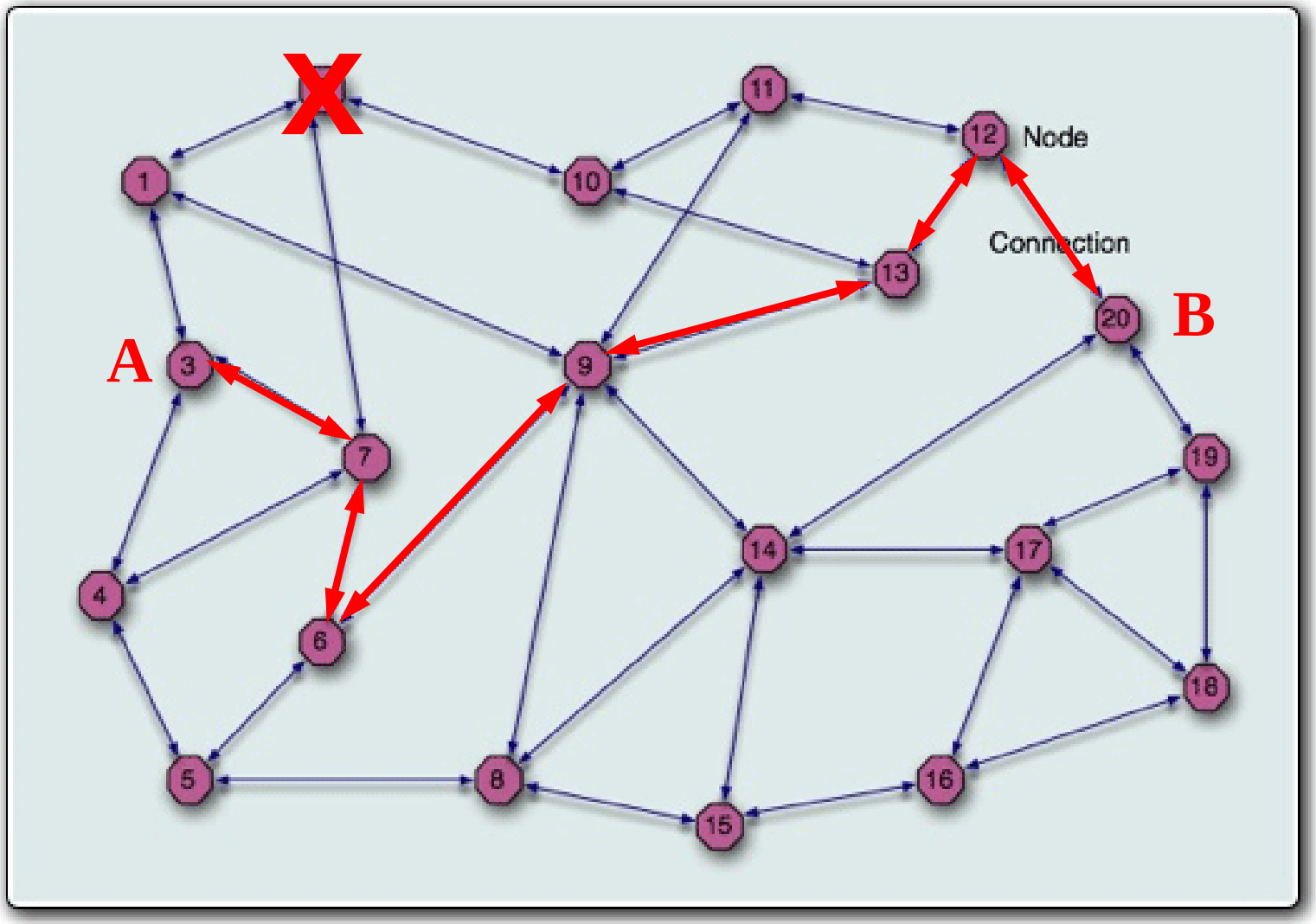
Mesh Network Concept



Mesh Network Concept



Mesh Network Concept



Mesh Network Concept

www.broadband-hamnet.org

AirMax Concept (WiFi on steroids)

- Now for a completely different concept
- Let’s say you have a business that occupies several floors of a large office building
- You install a local area network (LAN) to provide a variety of network services to your employees throughout the building
- The network is based on switches in data closets on each floor of the building

AirMax Concept (WiFi on steroids)

- The switches are connected via fiber to servers in a central location (similar to backhaul in a cellular network)
- The servers host your VoIP telephone system, your email, and other business applications, as well as providing access to the Internet via a corporate firewall.

AirMax (WiFi on steroids)

- Business is so good, you need to construct another building next store to house all of your new employees.
- You add additional server capacity and bury fiber optic cables underground to link all of your new employees into the corporate LAN.
- This growth pattern may continue until your corporate LAN has grown into a campus-wide network linking several buildings

AirMax (WiFi on steroids)

- As time goes by, you run out of space on your campus and have to lease office space in a building a mile across town.
- You really want all of the employees in that new satellite building to be a part of your corporate LAN, but stringing Ethernet cable or a fiber optic cable across town is going to be prohibitively expensive.
- Is there an option?

AirMax Concept (WiFi on steroids)

- Sure there is! Implement a two-way microwave link between your new location and the existing campus.
- You'll have the usual switches in data closets at the new location, and they will be connected to your existing server farm at the old location.
- The pair of digital microwave radios functions exactly like a garden-variety Ethernet cable (or fiber-optic cable, depending on the data rate supported by the link)

AirMax Concept (WiFi on steroids)

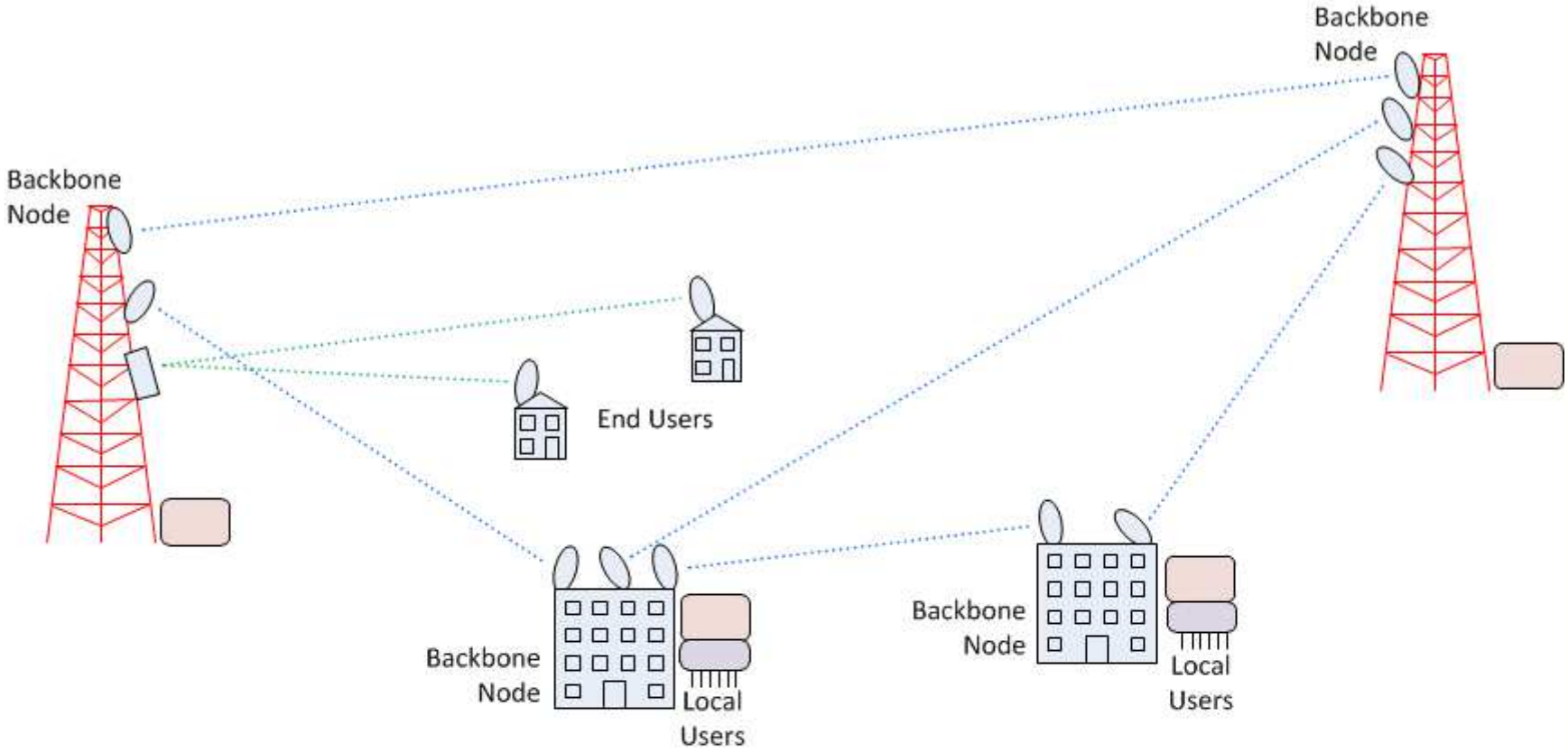
- The resulting network is often called a metropolitan-area network, because it extends the reach of a conventional corporate LAN over distances spanning an entire metropolitan area
- And that's exactly the technology we are employing to build a regional broadband network that we propose to use to support a variety of Amateur Radio and emergency communications applications

AirMax Concept (WiFi on steroids)

AirMax Concept (WiFi on steroids)

Sector antenna at central node

Client nodes



LEGEND

- Digital Microwave Radio – Dish Antenna
- Digital Microwave Radio – Sector Antenna
- Backbone Router
- Network Switch

METROPOLITAN AREA NETWORK

Using AirMax Wireless Technology

WiFi On Steroids

AirMax concept – Pros and cons

- LAN functionality can be extended over a wide geographic area, with distances of up to 50 miles between nodes.
- But unlike a mesh network, an AirMax network must be designed and configured using fixed IP addresses

AirMax concept – Pros and cons

- Like a mesh network, if enough AirMax nodes are interconnected with multiple other nodes, traffic can automatically reroute around a failed node

AirMax concept – Pros and cons

- Like a mesh network, an AirMax network does not scale well if there are too many users, and is only as strong as the weakest link between any two end-users
- But an AirMax network has much more raw capacity, and operates over much greater distances, than a mesh network based on surplus Linksys routers

AirMax concept – Pros and cons

- An AirMax link can be used to join together two isolated mesh networks into one large mesh, combining the best features of both architectures

Possible Amateur Radio applications

- Satellite receiver links for repeaters
- Linked repeaters
- Repeater control channels
- Provide telephone and/or internet access to repeater at residential rates
- Digital ATV
- Experimentation
- Learning about technology
- Recruiting new high-tech hams

Possible emcomm applications

- Provide backup communications among EOCs, hospitals, and other served agency locations
- Project network services to a field staging area or disaster site, either from a central location or from the nearest point where internet service is available
- Implement live video coverage of incident
- Provide backhaul for portable repeater
- Implement VoIP telephone system at field location