What is a Wireless Mesh Network?

Traditional WLAN Architecture
What is a Wireless Mesh Network?

WLAN with Wireless Transit

IEEE 802.11 a/b/g

Wide variety of Wireless Transit technology
What is a Wireless Mesh Network?

Wireless Mesh

Access Point

Backbone Ethernet Network

IEEE 802.11 a/b/g

10/100BT Ethernet

Wireless transit with Inter-AP ‘Meshing’ protocol
Prototype Network Architecture

AP = Wireless Access Point
CAN = Community Area Network
NAP-R = Network Access Point Router
NOSS = Network Operations & Support Services
WG = Wireless Gateway
WMN = Wireless Mesh Network
Nortel Wireless Mesh Network Architecture

**Enterprise/ISP Backbone Network**
- Carry IP traffic between Wireless Gateways (WG) and other elements of the Enterprise / ISP Network (e.g. Border Gateways (BG), NOSS servers).

Diagram details:
- **AAP** = Wireless Access Point
- **CAN** = Community Area Network
- **NAP-R** = Network Access Point Router
- **NOSS** = Network Operations & Support Services
- **WG** = Wireless Gateway
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Nortel Wireless Mesh Network Architecture

Enterprise / ISP / Metro Distribution Network

- Carry IP traffic between Wireless Gateways (WG) and Network Access Point Routers (NAP-R).
- May be a Layer 3 routed, or
- May be a Layer 1 or Layer 2 transport domain

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Nortel Wireless Mesh Network Architecture

**Border Gateway**
- Incorporates all functions required to interface with the Internet-at-Large.
- Advertises reachability to the Internet-at-Large for IP addresses assigned to WMN subscribers and network entities.
- May also provide connectivity for other, non-WMN Enterprise / ISP entities.
- May also incorporate other inter-networking functions (e.g. NAT, firewall, redirection).
- Has no knowledge of WMN-specific mobility and security functions.

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Wireless Gateway
• Advertises reachability (within Enterprise / ISP Distribution Network) for one or more IP subnets assigned to WMN subscribers and network entities.
• Hides WMN-specific mobility and security functions from the rest of the Enterprise / ISP Distribution and Backbone Networks.
Nortel Wireless Mesh Network Architecture

Network Operations and Support Services
- Centralised monitoring and managing network operations.
- Interface to distributed elements of the WMN network through standard protocols i.e. DHCP, SNMP, RADIUS.

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Prototype Wireless Access Point
Radio Networking Technology

**Transit Link (TL) @ 5 GHz**
- Elevated dual-polar antennas with switched-beams.
- 802.11a

**Access Link (AL) @ 2.4 GHz**
- Elevated, dual-polar, diversity switched antennas.
- 802.11b/g

Existing utility pole or wall offering elevated mounting position

Mobile nodes using standard 802.11b/g NIC and software

Access and Transit links separated in space and frequency
Prototype Wireless Access Point
Swicthed Beam Antenna for Transit Links

- Antenna structure integrated into AP
  - A beam is selected for communicating with each of the neighbouring APs.

- Multiple degrees of freedom for each transit link
  - Beam
  - Frequency
  - Polarisation
  - Burst time

Access Link coverage is typically less than reach of Transit Link

Beam patterns overlap to avoid need for alignment during installation

Having multiple beams alleviates deployment difficulties, even if only a few are ever used in practice
Prototype Wireless Access Point
Transit Link Radio System

- 802.11a standard physical layer

- ‘Meshing’ protocol above the MAC layer for transit link discovery, establishment, monitoring, maintenance, re-establishment

- Automatic assignment of channels according to local conditions and AP neighbourhood

- Consideration - Availability of 5GHz band in different countries
Prototype Access Point
Wireless Mesh Applications

• Ad Hoc Networks

• Access Networks with minimal cable infrastructure

• Outdoor and indoor campus

• Public Metro Wireless Networks
Thank You