

How to solve the backbone connection dilemma?

Is Microwave a Viable Alternative?



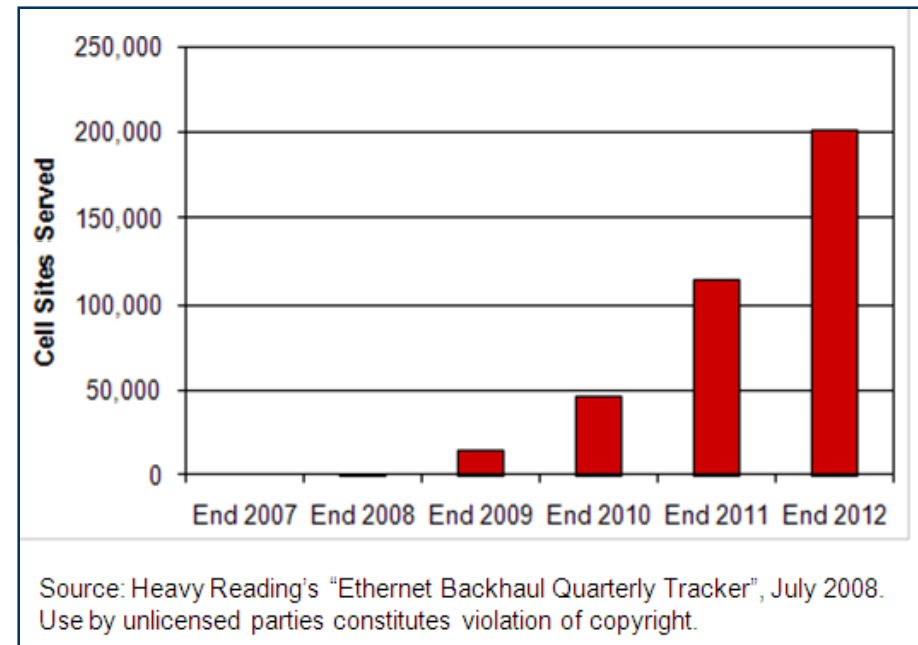

DragonWave

Wireless Broadband Ethernet



Application Wave is Coming

- **WiMax will drive huge bandwidths (ie. iPhones)**
- **Require ethernet backhaul with tremendous scale**
- **Challenge is to break the backhaul cost model**
 - Deliver >50 Mbps per site
 - Native Ethernet
 - Low Latency
 - Cost Effective

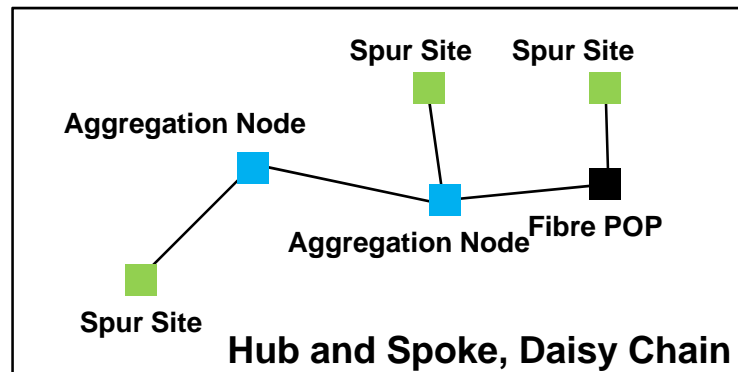
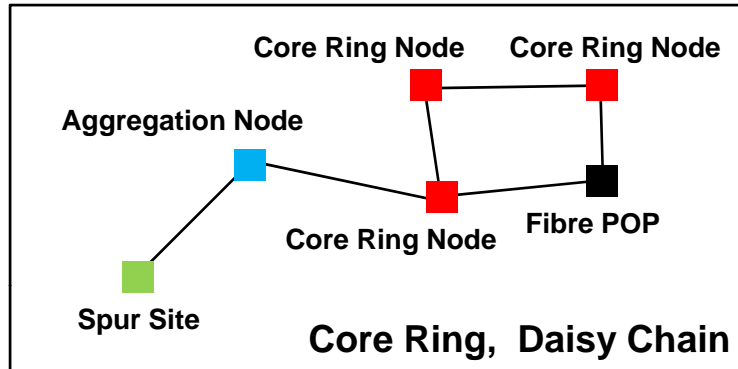


Ⓢ "The backhaul is probably the highest cost of deploying the network... Anyone who wants to roll out a real wireless broadband network nationwide needs a cheaper solution"

Ⓢ John Saw, CTO ClearWire, Unstrung, May 2008



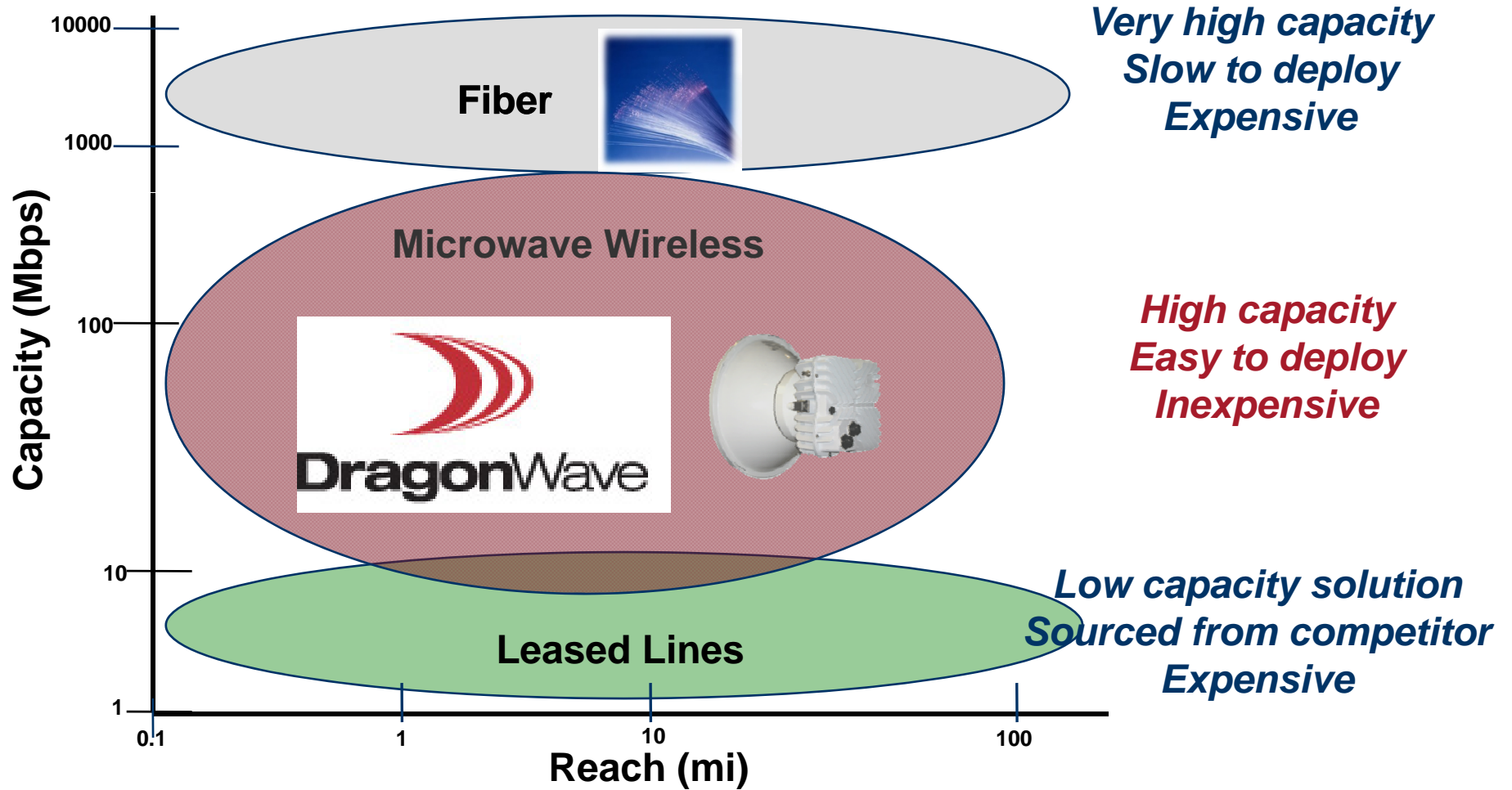
End to End Network Connectivity



- **Simple 6 node network**
- **Delivering connectivity to 5 remote sites is the goal**
- **Beyond architectures and redundancy options, underlying BH technology must be selected based upon your business economics:**
 - Fiber
 - Licensed or unlicensed
 - Microwave
 - Leased Line

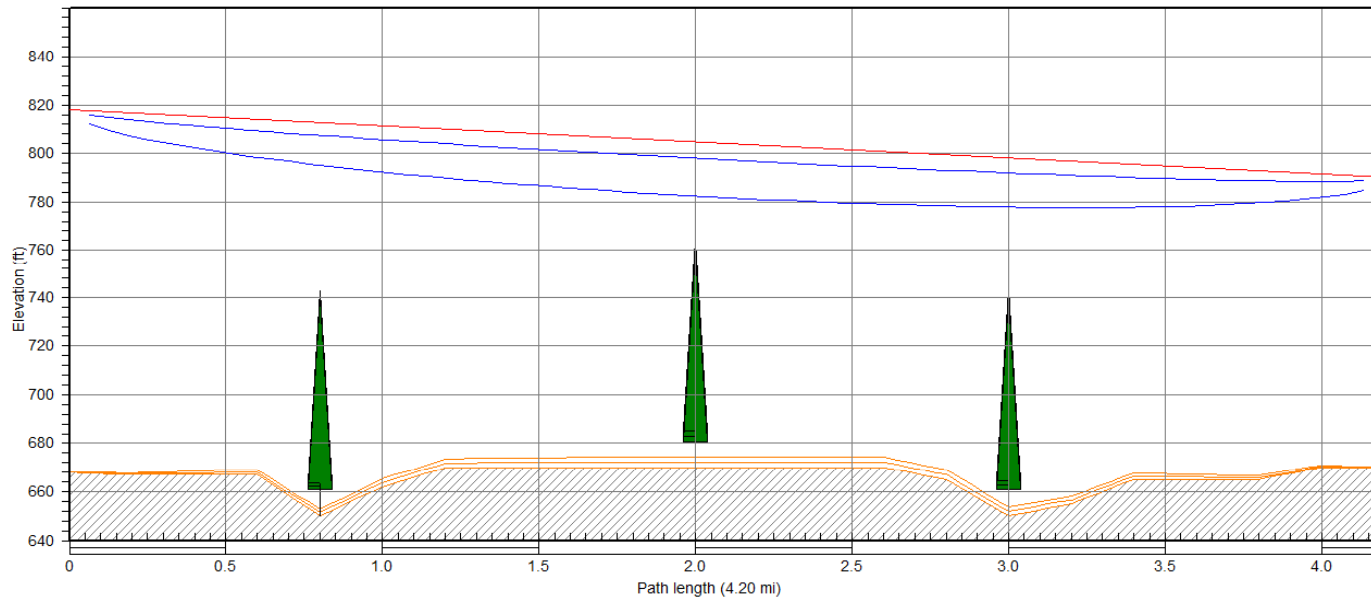


Alternative Backhaul Connection Technologies





Microwave fit for the rural LEC – 1st Obstacle



- Clear line of sight is required to deploy licensed MW in BH
- Terrain and tree obstructions will be the limiting factors for microwave deployment



Microwave Components

Components required for 1 radio link:

- 2 x antenna's
- 2 x radio's
- 2 x modem's
- 1 x install kit
- 2 x cables

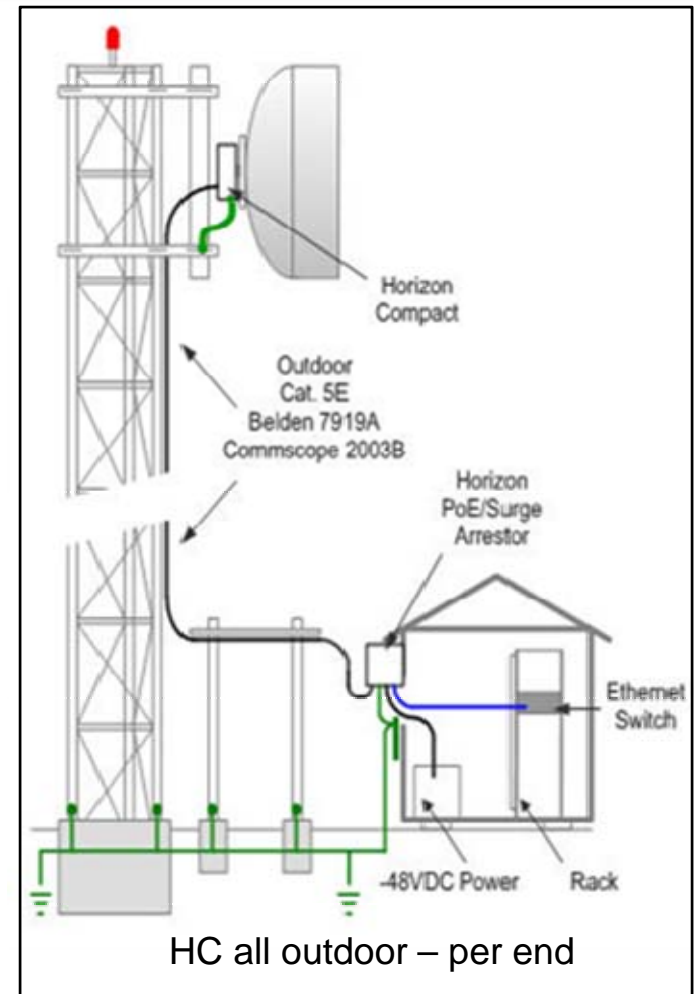
Deployment configurations

➤ Split Mount

- Antenna & radio outdoor
- Modem indoor rack mounted

➤ All outdoor

- Antenna, Radio/modem mounted outdoors
- Zero rack space required





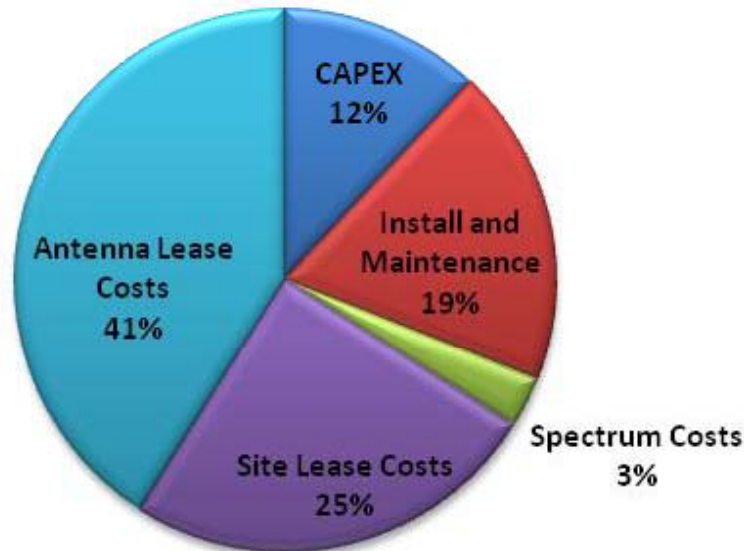
Microwave Technological Improvements

- › **High volume production (assembly link man.)**
 - Lower manufacturing costs, increased MTBF performance
- › **Adaptive modulation and coding**
- › **RLS software feature – imitates a fiber cable pull**
 - 50ms switch time
- › **Native Ethernet transport**
- › **All outdoor deployment option using Cat5e cable**
- › **Low power consumption (25 Watts)**
- › **High capacity – 1.6Gbps across single path**
- › **Flex bandwidth scaling – pay as you grow**
- › **Smaller antenna's = 0.6 inch vs. 12 inches**
- › **Reliable carrier grade performance 99.999%**
 - Predictable rain models and licensed spectrum



MW Back Haul Cost Challenges

10 Year Total Cost of Ownership



CAPEX

\$1,340 - \$52/Mbps or
Approx. \$13K to \$42K

*Cost per mbps will vary
with BW ordered*

The MW Backhaul cost is dominated by site and antenna lease costs



Ethernet Microwave addresses Network Requirements

Next Gen Network Requirements

› Flexible IP networking

- › Converged services
- › lowest cost networking



Native Ethernet

› Carrier Grade – support critical services

- › High Availability (99.999)
- › Interference free
- › Environmentally hardened



Fast Mesh -continuous connectivity
Operates in licensed spectrum

› Scalable -- Today's and future needs



High capacity and in service scalable

› Service Enabling

- › VOIP, mobility & video
- › Converged network – Ethernet & T1



Ultra-Low delay
Flexible QoS

› Affordable – first and lifetime cost



Cost effective



Conclusion

- **Microwave Backhaul network ownership provides significant economic benefits**
- **Microwave should be considered when:**
 - Line of sight is available between two locations
 - Zoning, antenna and site leasing is economically viable
 - Reliability performance objective can be met with microwave
 - Bandwidth capacity > 10 Mbps full duplex
- **Microwave is quick and relatively easy to deploy**



› **Presenter contact information:**

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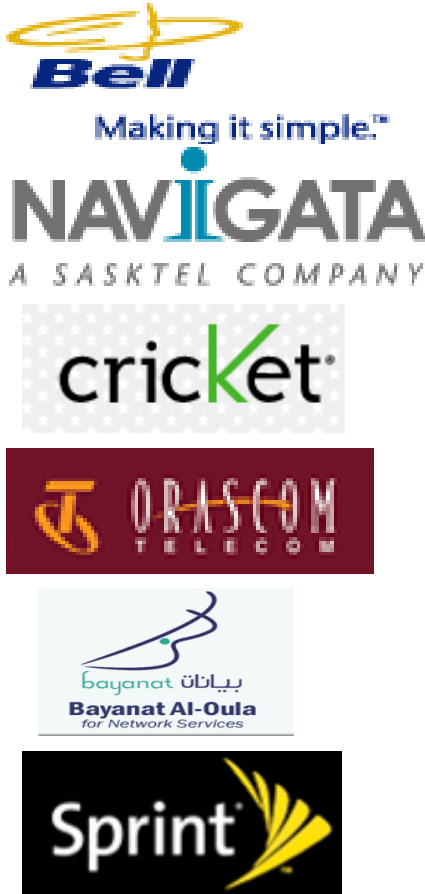
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A Sampling of Customers

⑩ Service Providers



⑩ Next Generation Wireless



⑩ Enterprise

