



Wireless Broadband Technologies





Summary

Important Wireless Trends

- Convergence
- Unlicensed spectrum systems
- Multiple antennas
- Mesh and *ad hoc* networks
- Cognitive radio



Opportunities

- Research
- Commercial
 - Manufacturer
 - Telco
- Future



Important Wireless Trends

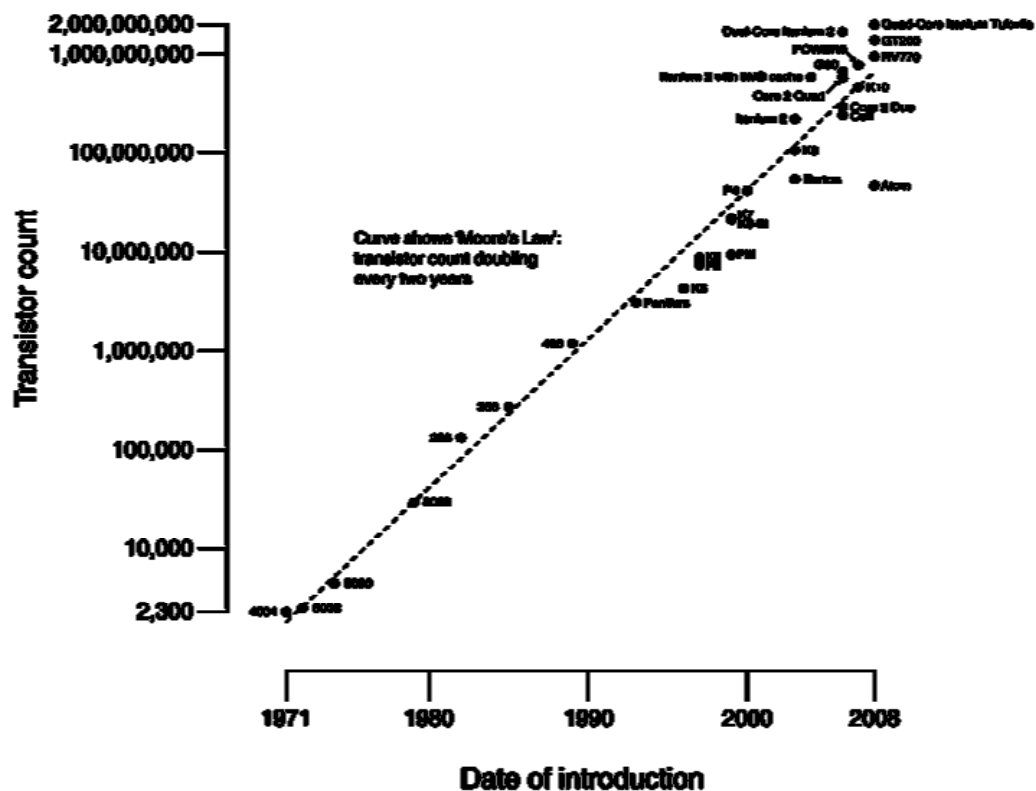


Life Sans Wires

Important ~~Wireless~~ Trends

Moore's Law

CPU Transistor Counts 1971-2008 & Moore's Law



Gordon Moore

“The complexity for minimum component costs has increased at a rate of roughly a factor of two per year ... Certainly over the short term this rate can be expected to continue, if not to increase.”
Gordon Moore, 1965



Important Wireless Trends

Convergence

User Experience

- Drag-and-Drop, Plug'n'Play



Technologies

- Increase interoperability

Regulations

- Treat systems in isolation



EV-DO



GSM



L'opérateur de Téléphonie Haut Débit



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Important Wireless Trends

Unlicensed Spectrum Systems

User Experience

- Cheaper products and services

Technologies

- Maximise reliability – eg. dynamic frequency selection

Regulations

- Facilitate spectrum sharing – eg. ISM band





Important Wireless Trends

Multiple Antennas / MIMO

User Experience

- Increased throughput
- Fewer outages

Technologies

- Enable throughput

Regulations

- No impact



Important Wireless Trends

Mesh and *Ad Hoc* Networks

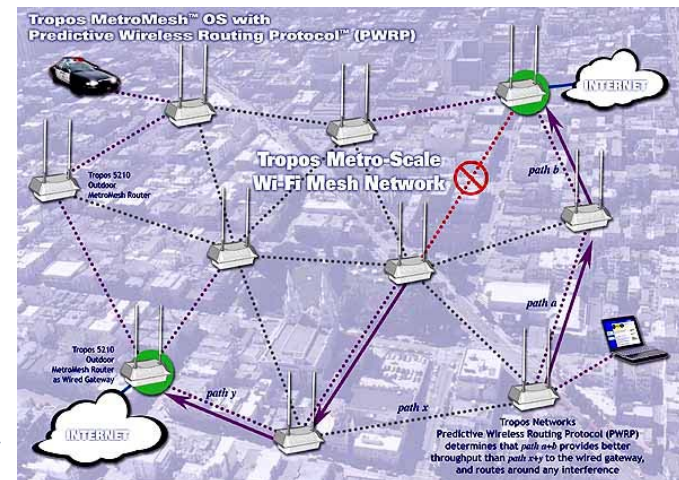
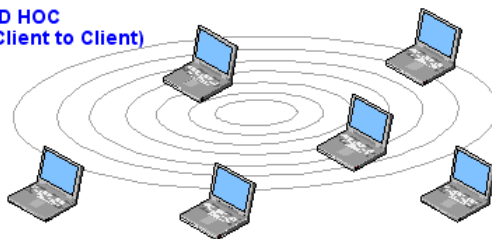
User Experience

- Connectivity

Technologies

- Enable services, reduce interference
- Admission control, network discovery
- QoS ?

AD HOC
(Client to Client)



Regulations

- Reduce interference ?

Important Wireless Trends

Cognitive Radio

User Experience

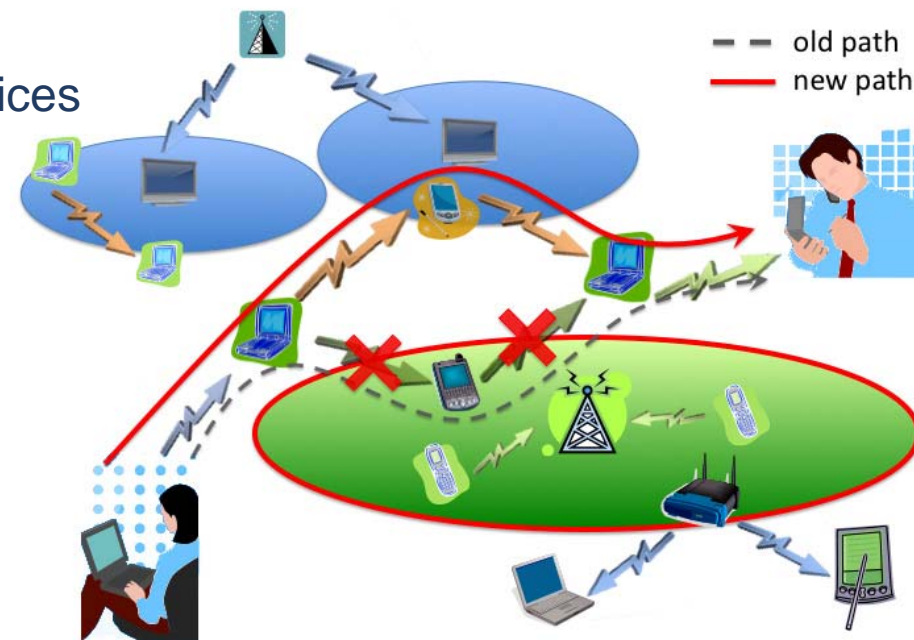
- Cheaper products and services
- Anticipate requirements

Technologies

- Add intelligence
- Manage interference

Regulations

- Change required
- Spectrum required





Opportunities



Opportunities Research

Technologies

- Broad perspective
- Niche problems
- Innovative solutions

Delivery Mechanisms

- IP intensive
- Shrink wrapped





Opportunities

Commercial – Manufacturers

Challenges

- Exploiting the niche
- Standards v proprietary
- Distribution

Threats

- NZ dollar
- Global spectrum dis-harmony
- “NZ Inc” approach ?





Opportunities Commercial – Telcos

Challenges

- Competition
- Business models
- Spectrum
- Technology partners

Threats

- Cost
- Shareholders' expectations



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Future Wireless Trends Where to from here?



Functionality



Fewer ...

- **Devices**
- **Batteries**





Future Wireless Trends Technology Puzzles



ncv

Responsibility

higher data rates





Future Wireless Trends

- Faster, smaller, cheaper – driven by Moore's Law
- Convergence – the wireless toaster
- Unlicensed spectrum systems – more to come
- MIMO – improved throughput and reliability
- Mesh and Ad Hoc Networks – coverage ++
- Cognitive radio – increased competition

