

Wireless Networking

Matthew Cook
<http://escarpment.net/>

Wireless Networking

- Wireless Networking (Wi-Fi)
 - Introduction and Benefits
 - Wireless Devices
 - Considerations
 - Standards
 - Advice
- Bluetooth
- Ethernet over Mains
- Demonstrations

Demonstrations

And Questions?

Introduction

- Use of Radio Frequency to connect devices in a LAN or WAN topology.
- Ethernet type speeds.
- Low cost solutions.
- Multiple standards and speeds

4

Benefits

- Increased Mobility
- Simple and Flexible Installation
- Easy Scalability
- No need for wiring
- Ideal for listed buildings or private homes

5

Wireless Devices

Wireless APs (Access Points)

- Connect wireless clients to the wired network via a standard ethernet port.
- Supply limited Access Control
- Seamless roaming (Vendor specific)
- Act as ethernet Bridges

6

Wireless Devices...

Station Adapters

- Connect machine to AP
- Or Can support ad-hoc mode
- Can be PCI, PCMCIA or USB
- Support different levels of encryption
- Can connect external aerial

7

Wireless Devices...

Soho Wireless Routers

- A wireless AP, combined with a network hub or switch, firewall, NAT and broadband router
- Excellent value
- Space saving

8

Wireless Devices...

Appliances

- Wireless Camera
- Wireless enabled PDA
- Wireless enabled Mobile phone
- Wireless Sony Dog

9

Considerations

Range:

- One of the most important factors.
- AP and Station have a much greater range outdoors.
- Limited to 200-650ft indoors.
- Affected by interference from microwaves and other RF devices.
- Interference from physical structures.

Considerations...

Throughput:

- Not as good as a wired LAN
- Speeds between 11Mb and 54Mb
- Wireless is shared Ethernet
- Encryption increases overhead

Considerations...

Integrity:

- Generally stable form of communication
- Problems encountered with roaming
- Atmospheric problems
- Not as reliable as conventional Ethernet

Considerations...

Interoperability:

- Wi-Fi Standard should make this easier.
- IEEE 802.11 standard
- Works like a wired network due to the devices transparent protocol.
- Encryption Problems

13

Considerations...

Scalability:

- Can be extremely simple or quite complex
- Limited APs in range of each other
- Bleeding between channels
- Roaming can extend networks

14

Considerations...

Simple installation:

- Need very little information
 - Plug and play style
 - Diagnostic tools provided
- However there are some golden rules...

15

Considerations...

Security:

- WEP Encryption not enough (Silver or Gold)
- VPN technology such as PPTP has been cracked.
- MAC Addresses can be spoofed
- ESSIDs can be found

16

Considerations...

Safety:

- Output power of wireless systems is very low and much less than a mobile phone.
- Very little exposure to RF due to the nature of the rapidly fading radio waves.
- Wireless equipment must meet government and industry regulations for safety.

17

Standards

802.11 legacy

- Original Wi-Fi standard released in 1997
- 1 or 2Mb/sec
- IR or RF 2.4Ghz
- Dropped in favour of 802.11b

18

Standards...

802.11b

- Range of about 50metres
- Up to 8km (120km Line of Sight)
- Maximum throughput of 11 Mb/sec
- On average 5.5Mb/sec
- Runs in the 2.4Ghz spectrum
- Shared medium

19

Standards...

802.11a

- Released in 2002
- Maximum throughput of 54Mb/sec
- Range limited
- Runs in the 5Ghz spectrum
- Not widely adopted

20

Standards...

802.11g

- Released in June 2003
- Maximum throughput of 54 or 22 Mb/sec
- Fully backwards compatible
- Operates in the 2.4Ghz spectrum
- Most widespread now

21

Standards...

802.11n

- In January 2004 announced new standard for Wireless networking
- 100Mb/sec
- Better operating distances
- Standardization in 2005

22

Advice

- 802.11b is very cheap now
- 802.11g useful for greater bandwidth
- Use WEP
- Use MAC address limiting
- Check logs
- Paranoid people can use IPSec
- Use the same vendors equipment

23

Advice...

- Ask for advice from members of DARC
- Try and test Wi-Fi access in your location
- Purchase a Soho Wi-Fi router if you have broadband
- Don't buy a USB adaptor
- Use PCMCIA or built in Wi-Fi

24

Bluetooth

- Designed to allow low bandwidth wireless communications between devices.
- Primarily used in the mobile phone industry but also designed for home appliances.
- Range of about 10M at 1Mb/sec.
- Operates in the 2.4Ghz spectrum.
- USB dongles or built into laptops

25

Ethernet over Mains

- Maximum 14Mb/sec transfer speed
- 56-bit DES encryption
- Plug and Play Technology
- Does not work across phases or between consumer units
- Quite an expensive solution

26
