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FACTSHEET

Wireless 802.11 Standards

Introduction

Wireless networking is virtually synonymous with the deployment of equipment supporting one or more of the 802.11 family of standards. These have experienced a period of rapid growth of use in recent years, and the problems and caveats associated with networking to these standards are well documented. Essentially 802.11 can be viewed as a technology to both supplement and extend the traditional wired local area network (LAN).

Wireless Ethernet Standards

The original IEEE (Institute of Electrical and Electronics Engineers) standard was designated as 802.11 and used the unlicensed 2.4GHz radio frequency range. However, equipment with different physical components could not interoperate, so Task Forces were created to refine the standards further.

There are a number of different regulatory bodies involved in wireless networking. The IEEE defines the standards for the operation of wireless networking equipment worldwide. Within the UK, OFCOM (the Office for Communications) regulates the licensing of spectrum for wireless networking. The Wi-Fi® Alliance runs a testing and marketing scheme with vendors to guarantee that Wi-Fi® marked equipment complies with the relevant IEEE short range wireless technology standards and will interoperate with other Wi-Fi® marked hardware.

Today the main commercially available wireless access points and associated equipment usually comply with the characteristics of one of the 'big three' 802.11 protocols (802.11a, b and g). Further details can be seen overleaf. However there are also a number of other specialist 802.11 working groups on issues like security and quality of service. These are designated by other letters of the alphabet: see the table below.

802.11e	Looking at enhancements to provide Quality of Service.
802.11f	Developing an IAPP (Inter Access Point Protocol) to improve multi-vendor Access Point interoperability.
802.11h	Looking at enhancements to 802.11a to provide better management and control of channels in the 5GHz band.
802.11i	Recently ratified an enhanced security and authentication standard.
802.11n	Developing a standard capable of supporting bandwidth up to 100Mbit/s.

Future

802.11 is a popular technology and is likely to combine with emerging technologies like 802.16 (WIMAX, high-speed wireless) and 3-4G handheld (mobile phone) devices. Devices are now becoming available that can switch seamlessly between 3G and Wi-Fi®, and also work with the various 802.11 standards. Wireless LAN technology is also likely to improve in speed and quality in future through standards such as 802.11n.

Further Information

Further information about Wireless LANs is available at:

http://www.ja.net/development/wireless/

Wireless standards zone on the IEEE web site:

http://standards.ieee.org/wireless/

Three main wireless networking protocols under 802.11 in more detail:

	802.11a	**802.11b**	**802.11g**
UK Frequency	Unlicenced 5 GHz	Unlicenced 2.4 GHz	
UK Channel Allocation	Uses 19 channels with more non-overlapping channels available.	13 channels available. These channels overlap slightly, so in practice only 3 are completely free from mutual interference.	
Nominal Bandwidth	54Mbit/s	11Mbit/s	54 Mbit/s
Realistic maximum total throughput	~25Mbit/s	~6Mbit/s	~25Mbit/s
Interoperability	Since 802.11a radios transmit on a different frequency to 802.11b/g, these standards are unable to work together. However, dual-band hardware is available which includes radios for both 802.11a and 802.11b/g within the same access point.	13 channels available. These channels overlap slightly, so in practice only 3 are completely free from mutual interference.	
Range (omni-directional antenna)	Up to 50 metres, depending on the number and materials of any intervening walls. Generally 802.11a has a shorter range and is limited more by walls than 802.11b/g.	Up to 100 metres, depending on the number and materials of any intervening walls or barriers.	
Deployment considerations	• Where there is a need for higher performance (also consider 802.11g) • Where there is significant interference present in 2.4 GHz frequency band. • Where end-users are densely populated. • When you wish to limit coverage to a smaller area.	• Where the range requirement for the wireless network is significant. • Where there has already been a large investment in 802.11b client devices (e.g. in-built support in laptops, PDAs). • Where end-users are sparsely populated.	
Notes	Higher data rate, lower likelihood of interference but lower range.	802.11b is ubiquitous.	High data rate, 802.11b compatibility.

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