WLAN TRENDS

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Declaration

I, Dong Wang, hereby declare that this paper is my own work and all the related work cites are shown on the references page.

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Table of Content

1. What is WLAN?

WLAN means wireless local area network. It links more than two computers or digital devices by using OFDM or DSSS modulation technology based to enable communication between these devices in an area with the limitation from 10m to 100m (subject to the real situation). WLAN have a nominal data transfer rate of between 11 and 54 Mbps, which is slower than the wired local area network that have the rate between 100Mbps to 1000Mbps. In such case, WLAN are mainly used with the mobile device like laptop, mobile phone, and PDA.

The Institute of Electrical and Electronics Engineers (IEEE) is the leading authority in the specification and ratification of standards relating to technology. Nowadays, WLAN standards have originated from the IEEE, such as IEEE 802.11a/b/g.

Currently wireless local area networks can be found in a lot of places such as universities, institutions, homes and business companies. The convenience of its mobility and flexibility makes more and more people used and improved this technology.

2.Type and component of WLAN

2.1 Two main types of WLAN

2.1.1 Ad-hoc networks

Ad-hoc networks are the simplest form of wireless network created by two or more wireless enabled computers communicating with each other directly. These types of WLANs are useful for creating small dynamic networks. However, these ad-hoc networks have similar limitations as wired peer to peer (P2P) networks and are only really suitable for occasional, small networks of a few computers.

2.1.2 Infrastructure networks

This type of WLAN requires one or more access points (APs) through which the network cards communicate. In a typical wireless LAN, a transmitter/receiver (transceiver) device, called an access point, is normally physically connected to the wired network using standard Ethernet cabling. It acts as a bridge between the wired network and the remote computer(s). At a minimum, the access point receives, buffers, and transmits data between the wireless LAN and the wired network infrastructure, using radio frequencies to transmit data to each user.

2.2 Network interface card (NIC)

The computer or device that wants to be accessed to WLAN must be built in or installed with this network interface card. It has different forms such as PCMCIA, PCI, CF and SD card.

2.3 Access Points (APs)

Access points can have a varying amount of intelligence and functionality built-in. There are two main types of AP. “Thick” APs are fully functional and can handle all processes. “Thin” APs only include radios and antennas and rely on controllers (WLAN switches/appliances) for other functionality including managing APs, security and authentication. There is also a third hybrid category with some limited radio frequency management functionality, but that still need controllers to function fully.

3. The related standards of WLAN

According to the IEEE specification and ratification of WLAN standards, there are several mainstream WLAN standards, just like 802.11a, 802.11b and 802.11g. The coming new standard is 802.11g which will be released around the end of 2009. And even the next generation standard, 802.11VHT (Very High Throughput) is already on the developing period. Then let's come to more detail information of these standards.

3.1 IEEE 802.11a

- It was ratified in 1999 by IEEE.
- It uses 5.8GHZ frequency.
- Nominal data rate of 54 Mbps with actual rates of between 17 to 28 Mbps
- Its signal range is between 35 to 120 meters from an access point and data rates begin to drop at a range of 10 to 15 meters from the AP.
- This standard uses OFDM (Modulation Tech.) .
- Compared to 802.11 b/g deploys three non-overlapping channels, 802.11 a is able to deploy eight non-overlapping channels in the UK.

3.2 IEEE 802.11b

- It was ratified in 1999 by IEEE.
- It uses 2.4GHZ frequency.
- Nominal data rate of 11 Mbps with actual rate between 4 to 7 Mbps.
- Its signal range is between 30 to 90 meters from an access point and data rates begin to drop at a range of 20 to 30 meters from the AP.
- This standard uses DSSS (Modulation Tech.).
- It provides three non-overlapping channels.

3.3 IEEE 802.11g

- It was ratified in 2003 by IEEE.
- It uses 2.4GHZ frequency.
- Nominal data rate of 54 Mbps with actual rate between 18 to 30 Mbps.
- Its signal range is between 30 to 100 meters from an access point and data rates begin to drop at a range of 20 to 30 meters from the AP.
- This standard uses OFDM (Modulation Tech.).
- It provides three non-overlapping channels.
- It is backwards compatible with 802.11b equipment.

3.4 IEEE 802.11n

- It will be released around the end of 2009 by IEEE.
- It uses 2.4GHZ and 5.8GHZ frequency.
- Nominal data rate of 600 Mbps with actual rate between 110 to 130 Mbps.
- Its signal range is between 70 to 160 meters from an access.
- This standard uses OFDM (Modulation Tech.).
- It is added with MIMO technology.
- It is backwards compatible with 802.11b/g equipment.

3.5 IEEE 802.11VHT

- It maybe uses sub-6GHZ or 60GHZ.
- Nominal data rate of XXXX Mbps with actual rate around 1 Gigabit per second.
- It will be used in wireless display technologies for HDTV, fast file transfer, and campus deployments
- It maybe comes to the market in 2011 or 2012.

4. Conclusion

Today 802.11g is the most common and widely used WLAN standard. The standard has been around for number of years and has become proven through endless installations by enterprise customers. 802.11g is backward compatible with the 802.11b standard. Both, 802.11b and 802.11g based systems encounter significant RF interference from microwave ovens and cordless phones. Another issue with 802.11g is that it uses only three non-overlapping channels. This substantially limits overall capacity of 802.11g based network and drives some customers' decision to migrate to 802.11a.

Then comes with the latest standard of WLAN, 802.11n will be released very soon. Here after are this new standard's advantages and improvements.

- Use of 52 subcarriers for data per 20 MHz channel as oppose to 48 subcarriers used in the 802.11a/g protocol allows increasing the maximum data rate from 54 MHz to 65 MHz
- MAC enhancements to introduce packet aggregation and block acknowledgment allows to increase throughput as well

- MIMO (multiple input multiple output) technology employed by 802.11n protocol adds spatial multiplexing functionality that takes advantage of multipath propagation to send multiple streams of data on a single channel. This functionality increases throughput. In addition, MIMO allows mitigating interference and as a result improves range.

With the coming application of 802.11n, the next generation standard is on the conceptual period too. It is 802.11VHT, means very high throughput of the network. People will use this standard to develop wireless display technologies for HDTV, fast file transfer, and campus deployments.

5. References

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