

# Wireless

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## INTRODUCTION

Many people in higher education have been computing for years, including faculty, staff, and students. Everyone has expectations of what they want and need on campus and that includes access anywhere and anytime to e-mail, data, and other electronic materials and documents accessible by computer only. As Cossey (2005) writes, “wireless technology has the potential to be a valuable enabler.” Wireless technology allows users to go mobile or without wires and to communicate with others and send data using mobile phones, personal digital assistants (PDAs), laptops, or handheld games. Typically, this wireless communication involves using radio waves or infrared waves to transport signals instead of cables.

Technically, wireless technology is a set of standards defined by a, b, g, and n modifications. Wi-Fi is the more common term used for wireless local area networks (LANs) (Bitter & Legacy, 2005). The International Electrical and Electronics Engineers (IEEE) Association created the 802.11 wireless LAN standards. The 802.11b/g/n wireless standards function at the 2.4 GHz band, as do microwaves, some cordless phones, and baby monitors, while the 802.11a wireless standard functions at the 5.0 GHz band. At the 5 GHz band, the 802.11a standard has much less interference but must be in line of sight with the access point to be effective.

Wireless technology is not only designated for computers and networks but for peripherals like game controllers, mice, keyboards, mobile phones, laptops, digital cameras, and speakers. Peripherals usually work at much closer areas and have much slower speeds. Bluetooth is used in many situations, at usually shorter distances, typically 10 meters or less, and as a rule less secure. Bluetooth is designated by the industry as a personal area network (PAN). Bluetooth uses a short-range radio standard protocol signal to communicate with other Bluetooth enabled devices and does not have to be in line of sight. Ultra-wideband technology is another low-power radio signal device and has very fast speeds but little of the hassle of Wi-Fi. It is being

heralded as a compliment to Wi-Fi. Instead of using cables to connect speakers, stereo, computer, and high definition television equipment, one can now connect those components wirelessly and minimize the clutter that surrounds all of it (Fleishman, 2007).

## THE WIRELESS TECHNOLOGY MOVEMENT IN EDUCATION

Reducing the hard-wiring has aesthetic implications on campus by reducing untidiness and disarray. Wireless campuses also allow teachers the ability to move more freely, whereas before they had to have all computers connected, they now only have to have one dropped line connection (Roblyer, 2005). As long as the wireless access point is in range of the main router or access point, computers or mobile labs should not have any problems logging on the LAN or onto the Internet. Many schools have hot spots that are easy to access during breaks or at lunch.

In England at the Dulwich Picture Gallery, students are given palm hand-held computers equipped with wireless technology. These computers are installed with a software program titled *Street Access* that allows them to preview all of the gallery's paintings. The students may view all of the paintings at their own pace and study each gallery or theme in any manner they choose. When students become more accustomed to the gallery, they retrieve the palm, update the answers to questions, and save to a local server. All of the work completed is accessible from any computer. More activities and questions can be given based on the lesson plans to motivate deeper thinking concerning the arts (“Art for all,” 2004).

According to a report given at EDUCAUSE by Kenneth C. Green (2006), director of the Campus Computing Project, greater than 50% of college classrooms have wireless access. One of the reasons, Green states, is that more students are buying laptops and need Internet access around campus. Faculty are also moving work around campus and need to access internal and external

networks and having wireless access helps give them easier and much quicker access than searching for available hard wired hookups or connections.

## ADVANTAGES OF USING WIRELESS TECHNOLOGY

Over the past few years, more and more K-12 schools have instituted wireless networks because of cost savings, better security, and ease of setup. Instant wireless “hotspots” can be created almost anywhere with a wireless access point, laptops, and an outlet, therefore creating a mobile computer lab (Roblyer, 2005). Teachers can take students anywhere inside or outside of a building as long as there is somewhere they can access an electrical source and connect to a fixed access point. There are also savings in older buildings with asbestos where hard wiring is a more costly effort. The cost of hard-wiring in many older buildings can be cost prohibitive, and in some cases setting up wireless LANS can save districts money. If a wired network is already in place, it can also be cost effective in expansion plans where wireless networks might be used to expand the infrastructure to the existing network (Walrey, 2004).

There are more than a few advantages of using wireless networks instead of wired networks in computer labs at schools. For instance, Brunswick, a college-preparatory school in Connecticut, has a laptop program because the administration feels that the “21<sup>st</sup> century learner” needs to be unbound and not restricted to a wired computer lab (Rajala, 2003). Desktop setups can sometimes be heavy and cumbersome, which at times is counterproductive to learning. Desktop computers do not allow the learner to meander, investigate, and expand boundaries.

Rajala (2003) further reasons that wireless technology adds portability with lightweight laptops or even pocket-sized PDAs. There are many wireless base stations around schools, airports, and coffee shops. This allows for anytime, anywhere Internet access where students can upload and download information and check e-mail.

According to the National Centre for Technology in Education (NCTE) (Kim, Holmes, & Mims, 2005), mobile phones have and can be used for learning intentions. Mobile phones allow students to study and complete class work anytime and anywhere. The NCTE

has stated that educators could use mobile phones in the educational setting to improve literacy, assist and collaborate project-based learning activities, access Internet resources, and implement writing exercises using SMS text services (Kim, Holmes, & Mims, 2005).

## CONCERNS

One of the chief problems with any wireless network is security. Green (2006) found for a third straight year that hacking network systems and stealing information data are among administrators’ and information systems engineers’ greatest concerns at colleges and universities. There are several types of risks when setting up public wireless systems. A user who is not permitted to access the network can attempt to connect by setting up a laptop or PDA that is unauthorized or by setting up an unauthorized access point. It is suggested by Internet Security Systems that all organizations create measures to correctly inspect for illicit or rogue access points and computers on their networks (Internet Security Systems, 2001).

According to Internet Security Systems (2001), to intercept data an attacker needs to be within 300 feet of an access point;

Wireless, however, creates a whole new vulnerability because someone does not have to walk into a building to attempt to access your system. They can walk up or drive into a parking lot, open their laptops and start searching for access points. (Burton, 2005)

A hacker may capture sensitive data including usernames, passwords, addresses, phone numbers, social security numbers, and school identification numbers. An unscrupulous hacker could sell this information to a third party. A hacker may also send a flood of requests to an access point thus causing a “denial of service” attack to those computer users that need access to the network.

There are also several types of encryption methods that users can choose to incorporate when using a wireless network. The first is *wireless equivalent privacy* (WEP). WEP has a 40-bit key and a 128-bit key, but both can be cracked quickly with the correct software. The Wi-Fi Alliance created *Wi-Fi protected access* (WPA and WPA2) that incorporates much better encryption methods than WEP. WPA2 is fully supported in Windows Vista and current versions of Mac OS X.

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