



Peering into the Alphabet Soup: Relative Advantages of 802.11a, b & g

Abstract

IEEE 802.11 Wireless LAN technology has been a runaway success. However, the continuing evolution of this communications standard has resulted in a great deal of confusion among end customers and even industry insiders. Some advances in the standard, such as 802.11a, 802.11b and 802.11g have opened up new spectrum or resulted in dramatic increases in data rates. This paper briefly describes how the IEEE 802.11 standard has evolved and takes a more detailed look at the relative merits of 802.11b, 802.11a and 802.11g.

Why the Confusion?

The IEEE and equipment manufacturers often get a lot of criticism due to the confusion that inevitably surrounds the development of new networking technologies. At least in the case of the IEEE, this criticism may be a bit misdirected. The IEEE acts a technical standards development body. It makes no pretense at being a marketing organization, nor does it make any attempt to craft consumer- friendly messaging. Instead, the IEEE focuses exclusively on the essential (but often arcane) work of developing standards.

IEEE 802.11 actually has a rather long heritage. The first meeting of the IEEE 802.11 Working Group was held in 1990. The standard itself specifies a radio frequency signaling method and a set of related parameters, collectively referred to as the Physical Layer (PHY). It also describes the behavior of the Medium Access Controller (MAC), which determines when each radio in a given network can transmit without interfering with other users.

Completing the original IEEE 802.11 Standard took seven years (NOTE: Blinking or rubbing your eyes won't help...this is not a misprint). When it was finalized in 1997, it described the MAC much as it exists today. The original PHY, however, only supported data rates up to 2 Mbps in the 2.4 GHz band. While this was perfectly adequate for some applications, it immediately became clear that higher data rates were absolutely essential before 802.11 could enjoy wide market adoption.

Two new Task Groups were formed to develop extensions to the 802.11 Standard. Task Groups are simply designated with letters of the alphabet (TGa, TGb, etc.) in the order in which they are formed. Thus began the "alphabet soup" syndrome that characterizes WLAN technology to this day. The first Task Group formed was Task Group A, which was chartered with establishing a standard to support higher data rates in the then newly opened 5 GHz band. The work of this Task Group eventually resulted in the 802.11a extension to the original standard.

As you may have guessed by now, the next group formed was Task Group B, whose efforts eventually resulted in IEEE 802.11b. This group was chartered with developing higher data rates in the 2.4 GHz band while supporting backward compatibility with equipment conforming to the original 802.11 Standard. The result was wildly successful. IEEE 802.11b has been widely adopted and lead to the establishment of the Wi-Fi Alliance which tests equipment from literally hundreds of vendors to ensure interoperability.

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