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Overview of the IEEE 802.11 Standard

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IEEE 802.11 Topology

The IEEE 802.11 topology consists of components interacting to provide a wireless LAN that enables station mobility transparent to higher protocol layers, such as the LLC. A *station* is any device that contains functionality of the 802.11 protocol (in other words, the MAC layer, the PHY layer, and an interface to a wireless medium). The functions of the 802.11 standard reside physically in a radio NIC, the software interface that drives the NIC, and the access point. The 802.11 standard supports the following two topologies:

- Independent Basic Service Set (IBSS) networks
- Extended Service Set (ESS) networks

These networks use a basic building block the 802.11 standard refers to as a BSS, providing a coverage area whereby stations of the BSS remain fully connected. A station is free to move within the BSS, but it can no longer communicate directly with other stations if it leaves the BSS.

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Extended Service Set (ESS) Networks

For requirements exceeding the range limitations of an independent BSS, 802.11 defines an Extended Service Set (ESS) LAN, as illustrated in [Figure 3.7](#). This type of configuration satisfies the needs of large coverage networks of arbitrary size and complexity.

Figure 3.6 An independent BSS (IBSS) is the most basic type of 802.11 wireless LAN.

Figure 3.7 An Extended Service Set (ESS) 802.11 wireless LAN consists of multiple cells interconnected by access points and a distribution system, such as ethernet.

The 802.11 standard recognizes the following mobility types:

- **No-transition** This type of mobility refers to stations that do not move and those that are moving within a local BSS.
- **BSS-transition** This type of mobility refers to stations that move from one BSS in one ESS to another BSS within the same ESS.
- **ESS-transition** This type of mobility refers to stations that move from a BSS in one ESS to a BSS in a different ESS.

The 802.11 standard clearly supports the no-transition and BSS-transition mobility types. The standard, though, does not guarantee that a connection will continue when making an ESS-transition.

The 802.11 standard defines the *distribution system* as an element that interconnects BSSs within the ESS via access points. The distribution system supports the 802.11 mobility types by providing logical services necessary to handle address-to-destination mapping and seamless integration of multiple BSSs. An *access point* is an addressable station providing an interface to the distribution system for stations located within various BSSs. The independent BSS and ESS networks are transparent to the LLC layer.

Within the ESS, the 802.11 standard accommodates the following physical configuration of BSSs:

- **BSSs partially overlap** This type of configuration provides contiguous coverage within a defined area, which is best if the application cannot tolerate a disruption of network service.
- **BSSs are physically disjointed** For this case, the configuration does not provide contiguous coverage. The 802.11 standard does not specify a limit to the distance between BSSs.
- **BSSs are physically collocated** This may be necessary to provide a redundant or higher-performing network.

The 802.11 standard does not constrain the composition of the distribution system; therefore, it may be 802 compliant or some non-standard network. If data frames need transmission to and from a non-IEEE 802.11 LAN, then these frames, as defined by the 802.11 standard, enter and exit through a logical point called a *portal*. The portal provides logical integration between existing wired LANs and 802.11 LANs. When the distribution system is constructed with 802-type components, such as 802.3 (ethernet) or 802.5 (token ring), then the portal and the access point become one and the same.

NOTE

Before deeming their devices as 802.11 compliant, manufacturers should follow the protocol implementation compliance procedures that the 802.11 standard specifies in its appendix. The procedures state that the vendor shall complete a Protocol Implementation Conformance Statement (PICS) pro forma. The structure of the PICS pro forma mainly includes a list of questions that the vendor responds to with yes or no answers, indicating adherence to mandatory and optional

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