CCNP BCMSN Notes - Wireless LAN Overview

Frame Transmission Carrier Sense Multiple Access/Collision Avoidance (CSMA/CA) is used in 802.11 WLANs to avoid collisions. The Distributed Coordination Function (DCF) handles the transmission of frames. If one station is currently transmitting, a station wishing to transmit must wait for the current station to finish plus the length of the DCF Inter-frame Space (DIFS) and a random back-off timer before it may transmit. Service Sets Service Set Identifiers (SSIDs) are used to logically group related wireless clients. Service set types:
           Independent Basic Service Set (IBSS) - An ad-hoc network where all clients communicate directly
           Basic Service Set (BSS) - Access is centralized on an access point   **Extended Service Set (ESS)** - An access point bridged the wireless network to a wired network An SSID can be mapped to a VLAN on an Ethernet network. Radio Frequency   2.4 GHz band = 2.412 - 2.484 GHz   5 GHz band = 5.150 - 5.825 GHz Types of interference: **   Reflection** - Signal is reflected off an object
           Refraction - Bending of a signal as it passes through material of varying density   **Absorption** - Signal strength weakens as it passes through an object   **Scattering** - A signal is reflected in many different directions   ** Diffraction** - The bending of a signal around an object which partially blocks its path
           Fresnel zones - The elliptical sphere of space which must remain clear between two line-of-sight wireless transmitters to prevent diffraction Measurements of signal strength:
       **   dB** - Logarithmic ratio to a reference signal
         ** dBm** - Reference to a 1.0 mW signal
          dBw - Reference to a 1.0 W signal Receivers are generally rated in negative dBm, noting their sensitivity. Antenna gain is expressed in dBi, referenced to a theoretical isotropic antenna which propagates a signal evenly in all directions. Effective Isotropic Radiated Power (EIRP) = Tx power (dBm) + antenna gain (dBi) - cable loss (dB). WLAN Antenna Categories   **   Omnidirectional** - Distributes signal in a donut-shaped area; low gain   **   Semi-Directional** - Produces an elongated but broad coverage area in one direction, includes Yagi antennas; medium gain
          Directional - Directs signal to a single point; high gain WLAN Standards **Frame Types   Management Frames** - Used for service advertisement and membership management
                 Beacons
                  Client association
                  Client authentication **   Control Frames** - Control traffic flow
                  Probe request/response
                  RTS/CTS messages **   Data Frames** - Contain data payload WLAN frames have a 32-byte header and 4-byte trailing checksum. **802.11b** Operates on the 14 channels within the 2.4GHz Industrial, Scientific, Medical (ISM) band. Only channels 1, 6, and 11 are non-overlapping. Direct Sequence Spread Spectrum (DSSS) modulation allows for varying speeds: 1.0, 2.0, 5.5, and 11.0 Mbps. Higher data rates require stronger signal strength. DSSS speeds can be mixed among clients within an AP cell, allowing each client to transmit at its fastest potential. **802.11g** Expands upon 802.11b with greater speeds and more complex modulation. 802.11g operates on the same frequencies and channels as 802.11b. Orthogonal Frequency Division Multiplexing (OFDM) allows for additional speeds of 6, 9, 12, 18, 24, 36, 48, and 54 Mbps. 802.11g is backward compatible with 802.11b, but if an 802.11b client joins an 802.11g cell, all clients must fall back to 802.11b.

802.11a Shares the same data rates and modulation techniques as 802.11g, but is not compatible with it or 802.11b. Operates on the 5 GHz Unlicensed National Information Infrastructure (U-NII) band. The U-NII was divided by the FCC into three smaller bands:
**   Lower band** - 5.5 to 5.25 GHz; indoor use
**   Middle band** - 5.25 - 5.35 GHz; indoor and outdoor use
**   Upper band** - 5.725 - 5.825 GHz; outdoor use Four non-overlapping channels are offered within each band (12 total). **Other Standards**
**   802.11e** - QoS for WLANs
**   802.11i** - Security enhancements
**   802.11n** - Improvements for higher throughput