

CCNA 200-301, Volume I

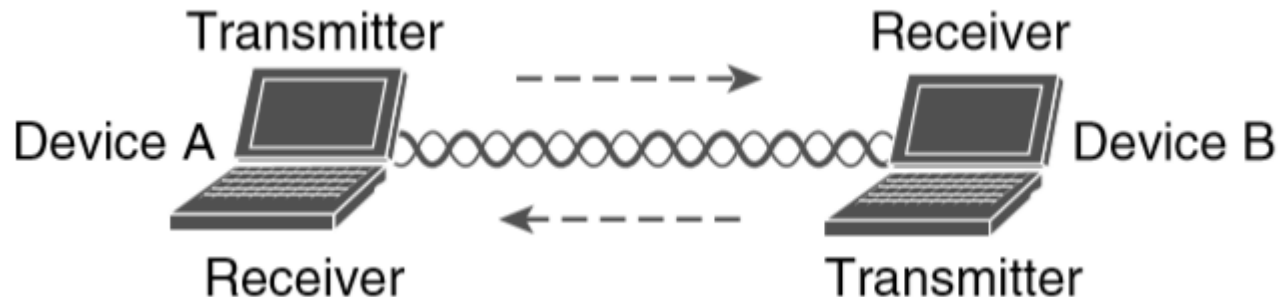
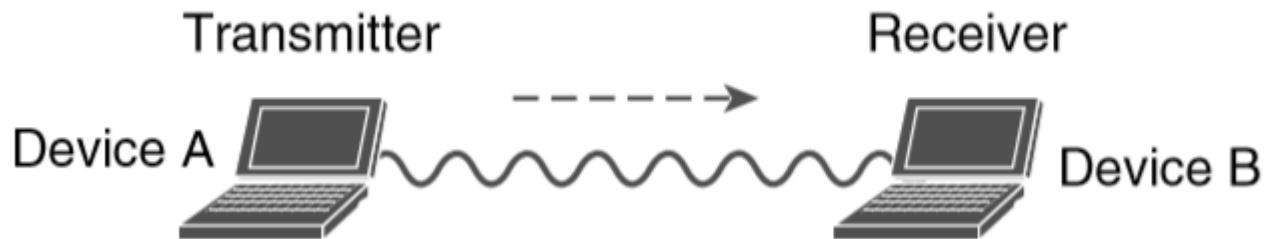
Chapter 26

**Fundamentals of Wireless
Networks**

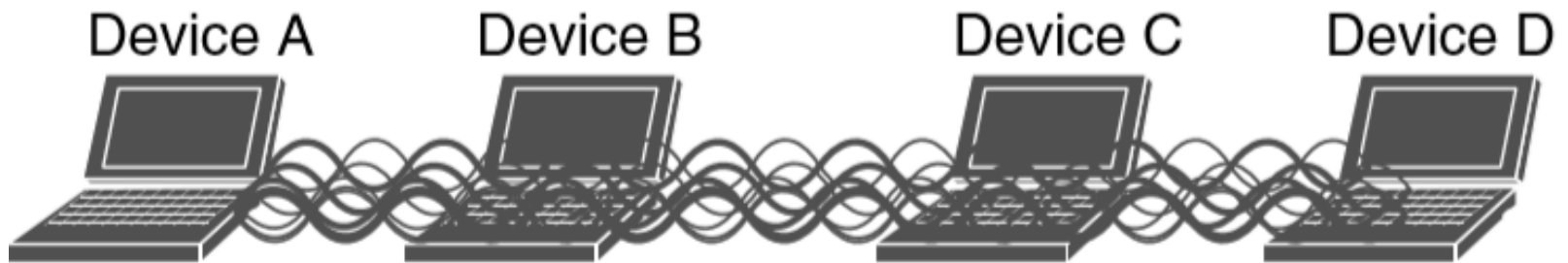
Objectives

- Comparing Wired and Wireless Networks
- Wireless LAN Topologies
- Other Wireless Topologies
- Wireless Bands and Channels

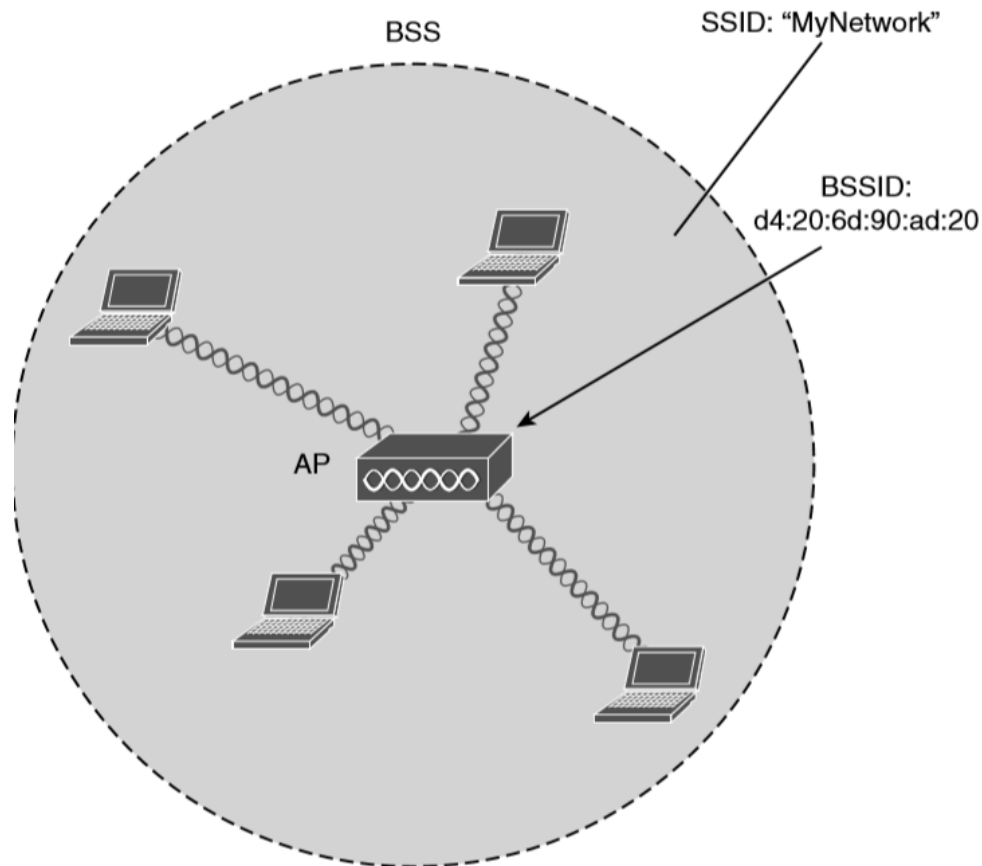
Unidirectional vs. Bidirectional Communication



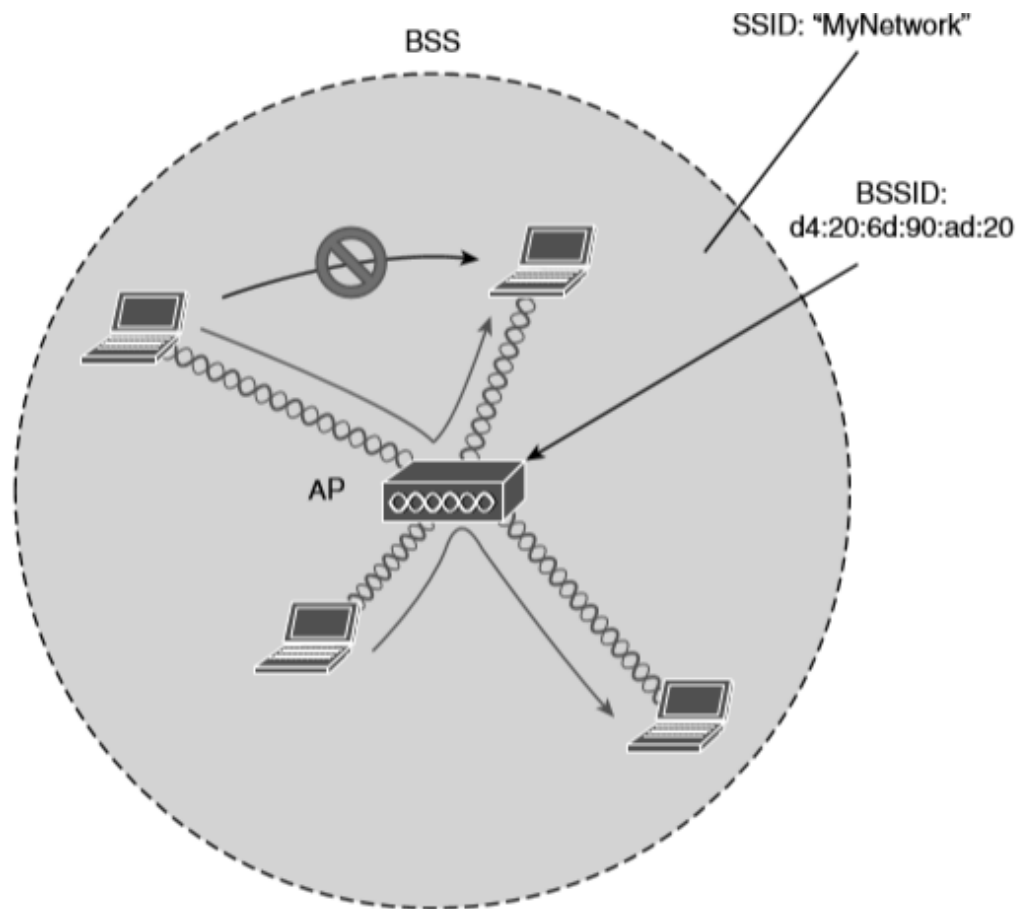
Interference from Simultaneous Transmissions



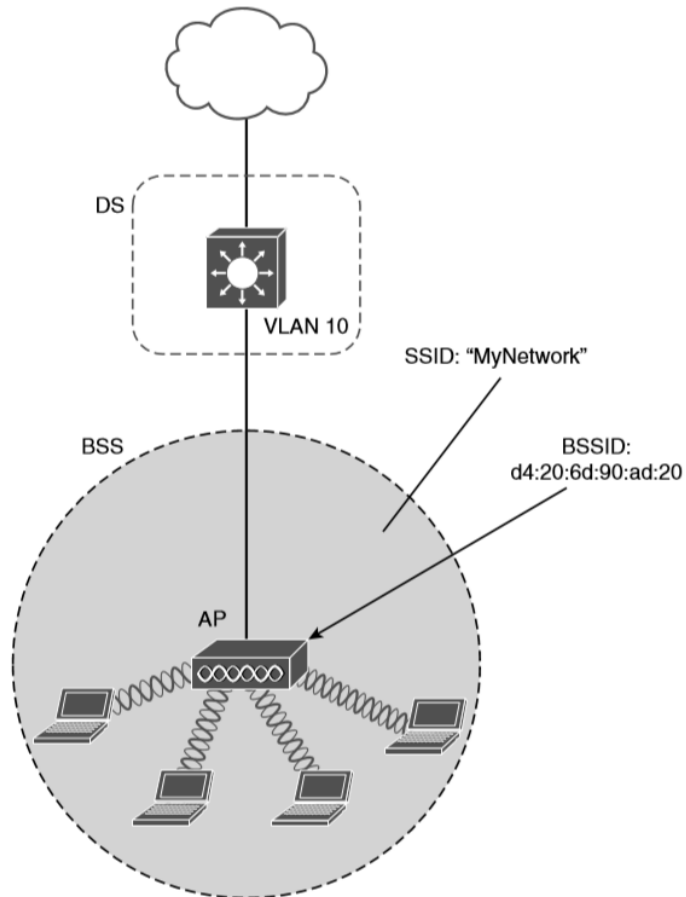
802.11 Basic Service Set



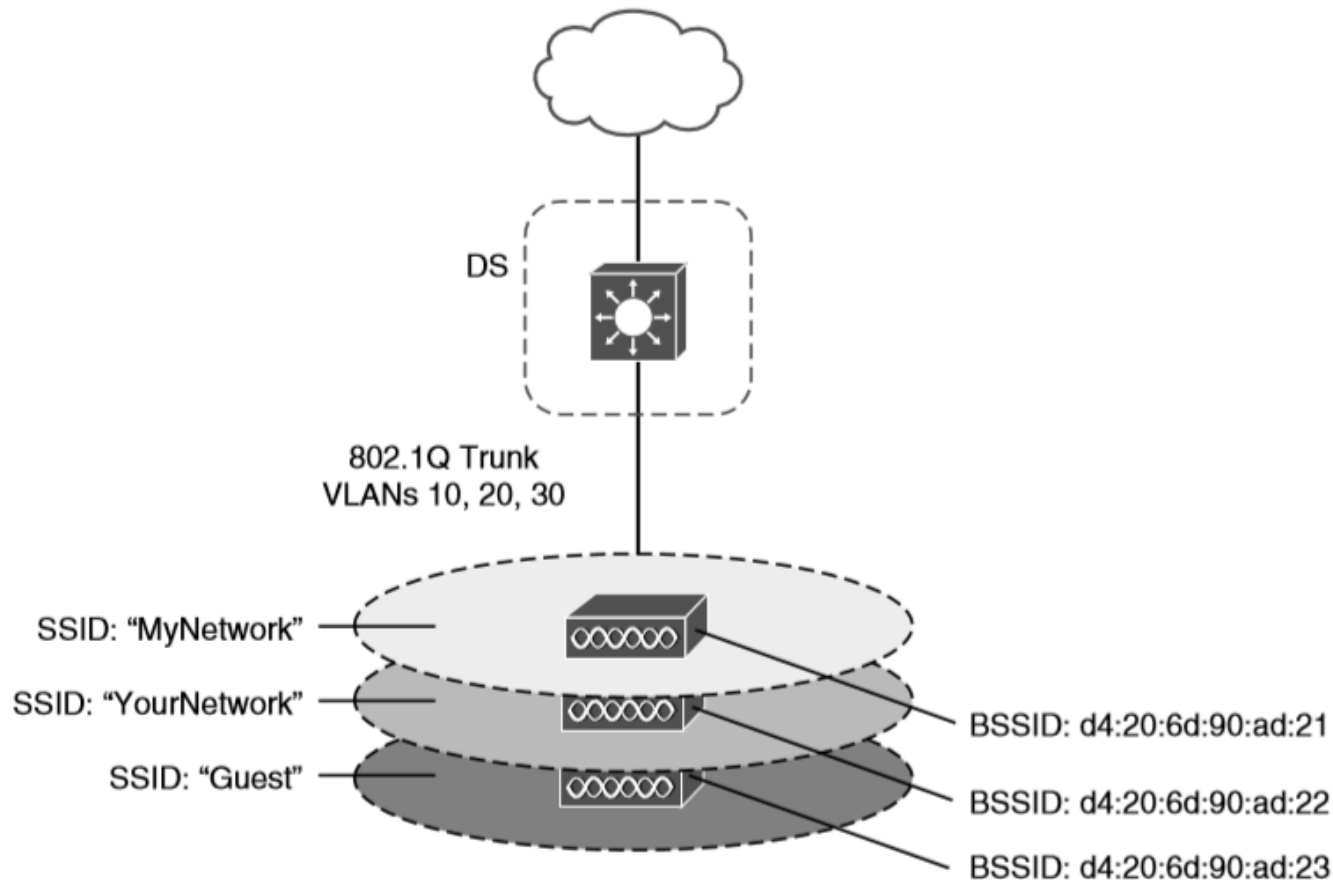
Traffic Flows Within a BSS



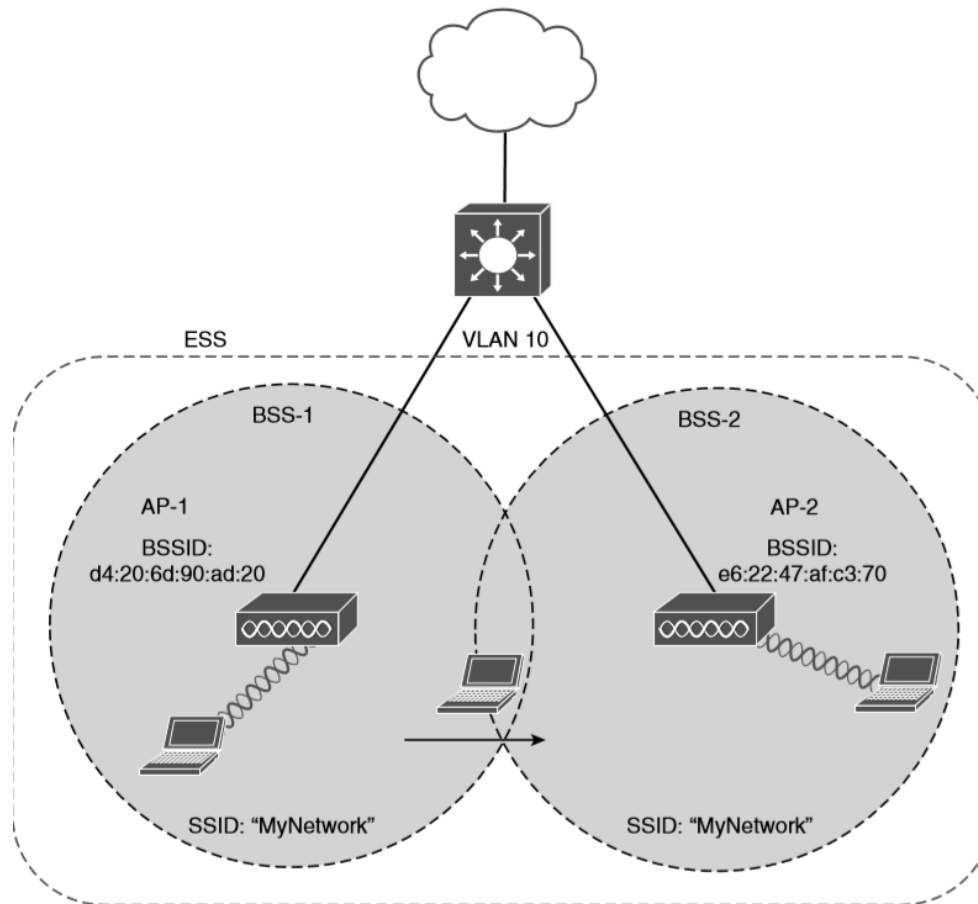
Distribution System Supporting a BSS



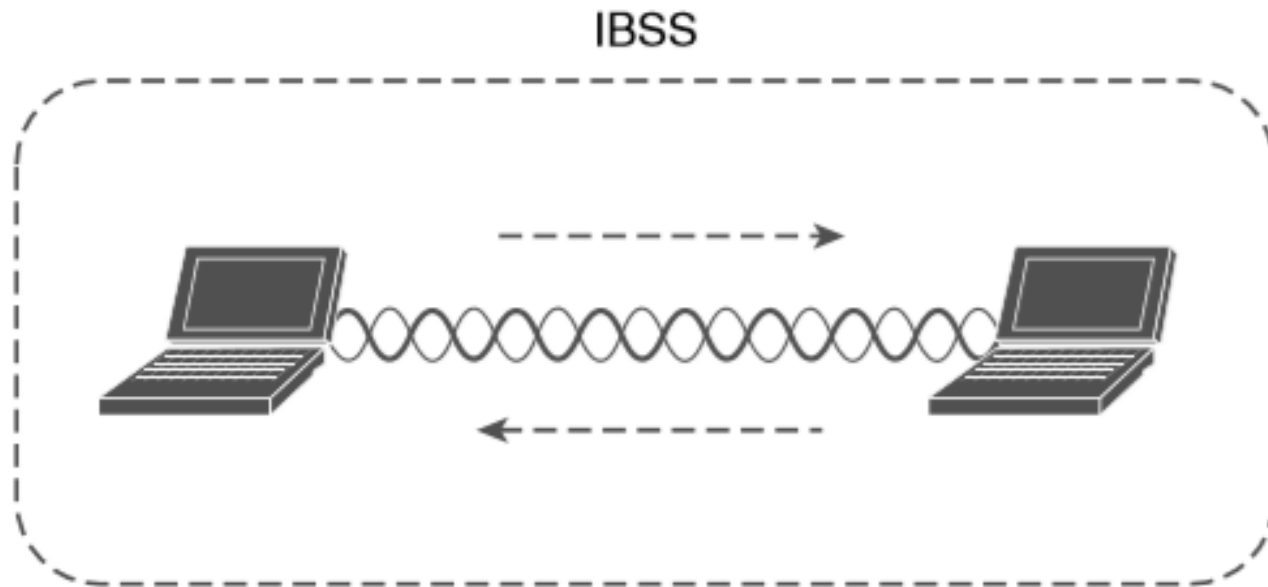
Supporting Multiple SSIDs on One AP



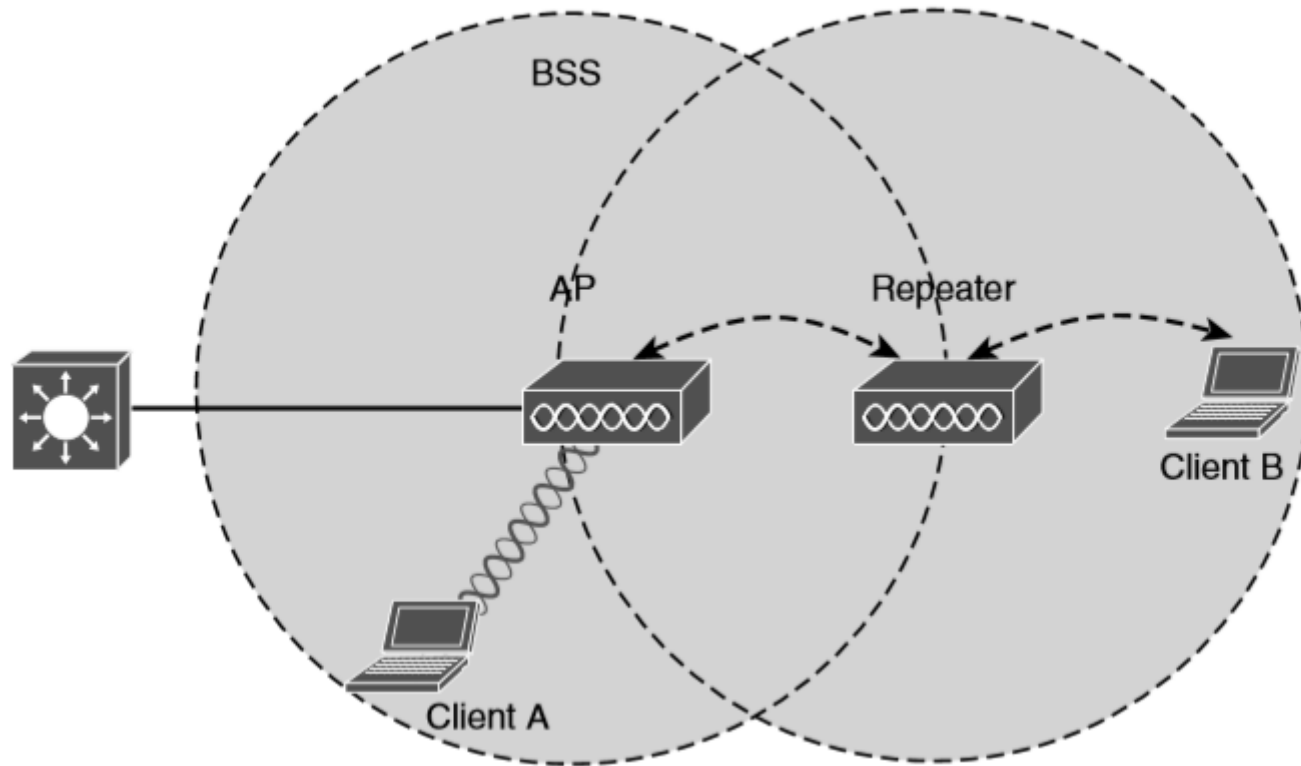
Scaling Wireless Coverage with an 802.11 Extended Service Set



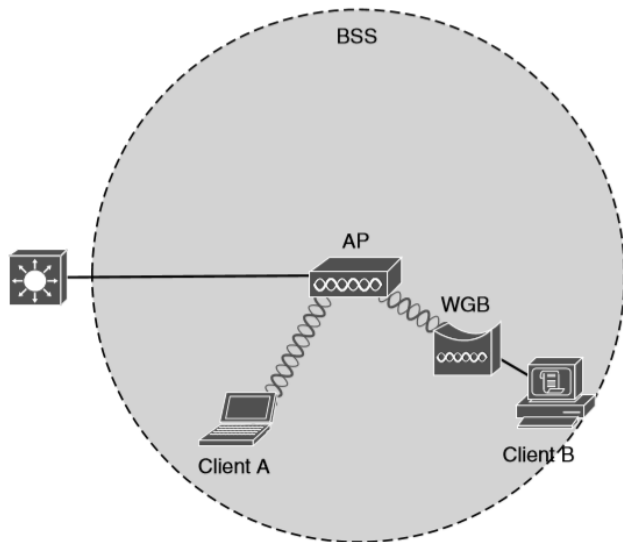
802.11 Independent Basic Service Set



Extending the Range of an AP with a Wireless Repeater



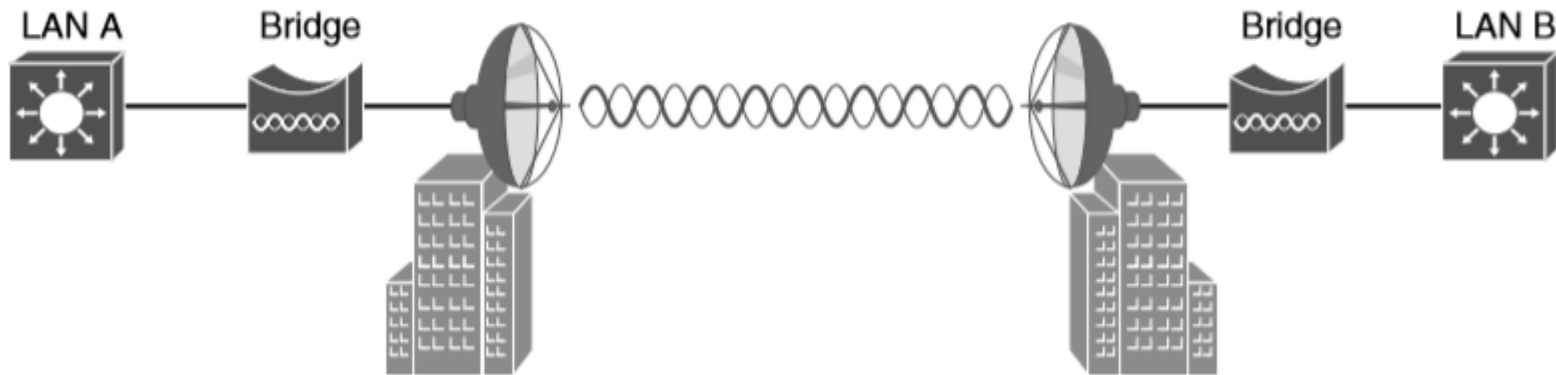
Nonwireless Device Connecting Through a Workgroup Bridge



You might encounter two types of workgroup bridges:

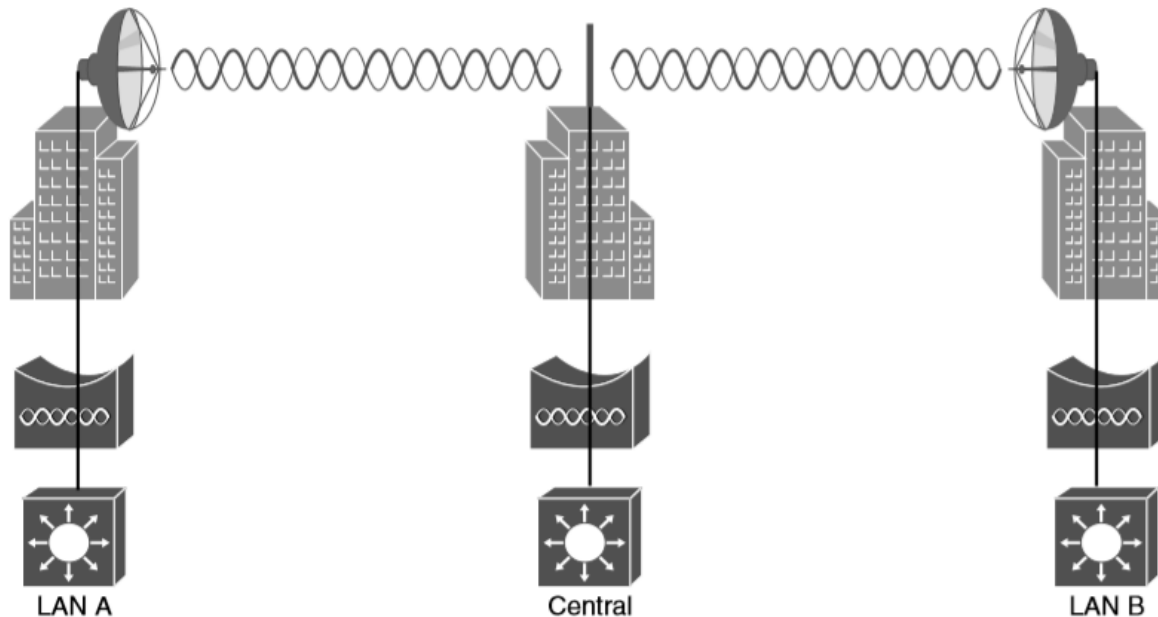
- Universal workgroup bridge (uWGB): A single wired device can be bridged to a wireless network.
- Workgroup bridge (WGB): A Cisco-proprietary implementation that allows multiple wired devices to be bridged to a wireless network

Point-to-Point Outdoor Bridge



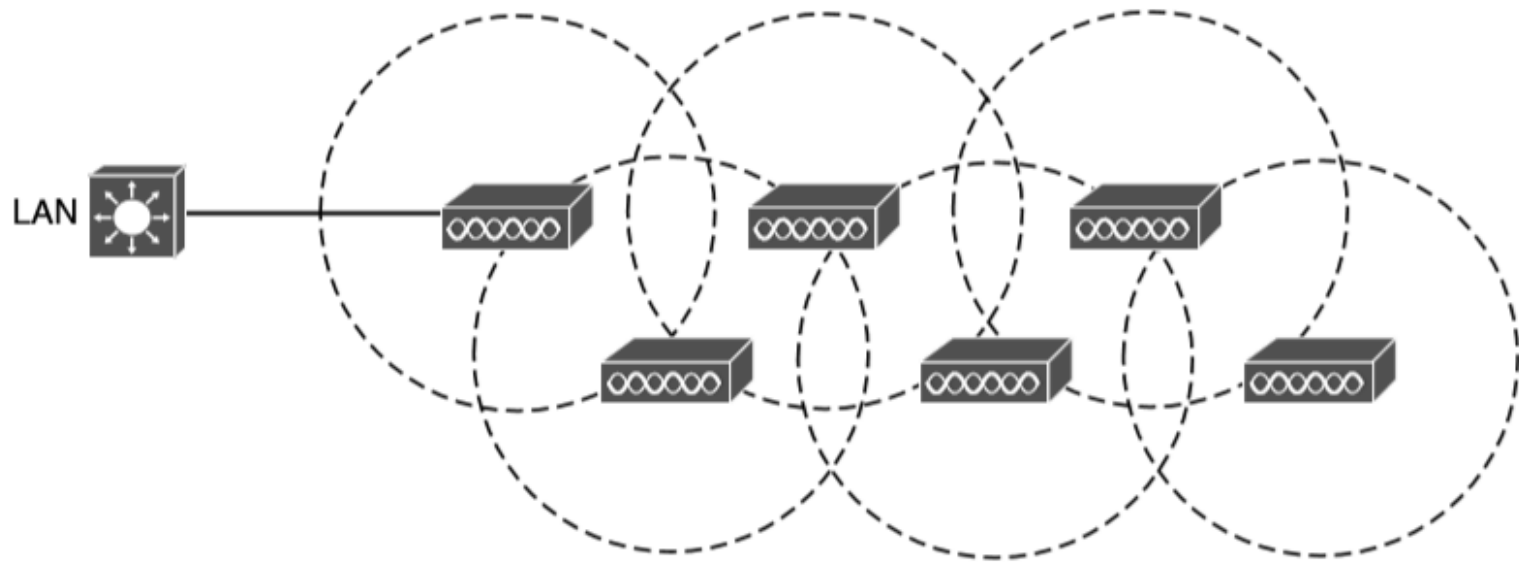
If the LANs at two locations need to be bridged, a point-to-point bridged link can be used. One AP configured in bridge mode is needed on each end of the wireless link. Special purpose antennas are normally used with the bridges to focus their signals in one direction—toward the antenna of the AP at the far end of the link. This maximizes the link distance.

Point-to-Multipoint Outdoor Bridge



A point-to-multipoint bridged link allows a central site to be bridged to several other sites. The central site bridge is connected to an omnidirectional antenna, such that its signal is transmitted equally in all directions so that it can reach the other sites simultaneously. The bridges at each of the other sites can be connected to a directional antenna aimed at the central site.

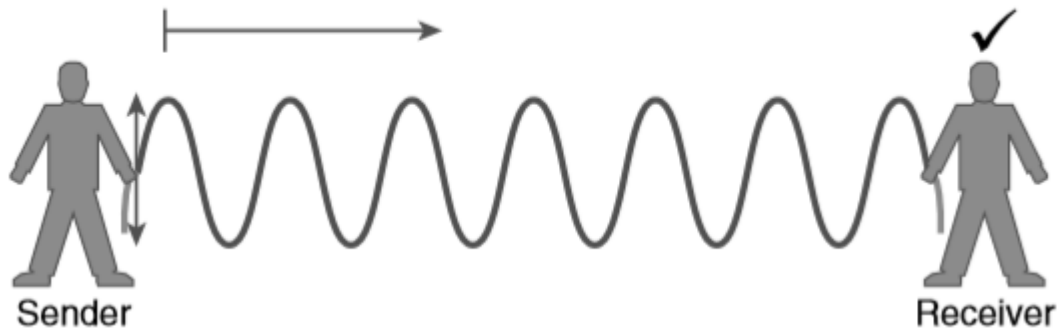
Typical Wireless Mesh Network



RF Overview

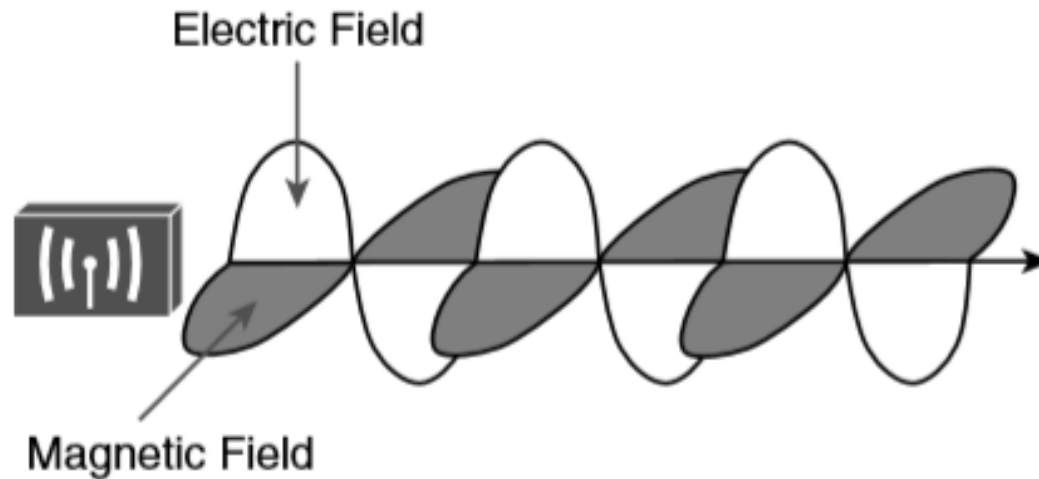


Failed attempt to pass a message down a rope

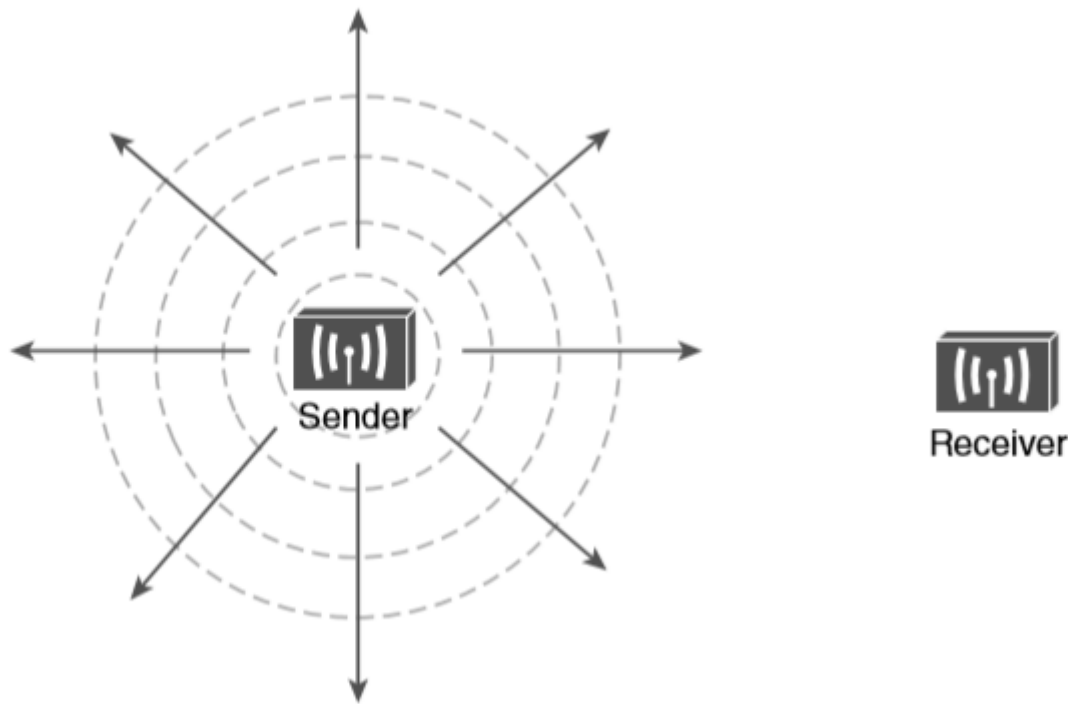


Sending a continuous wave down a rope

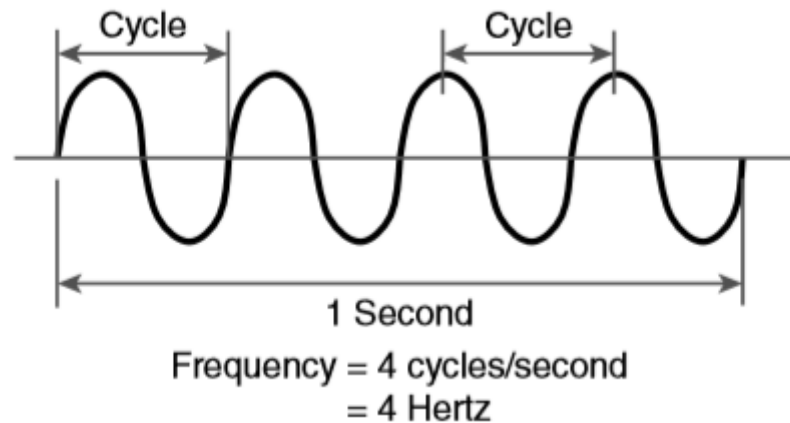
Traveling Electric and Magnetic Waves



Wave Propagation with an Idealistic Antenna



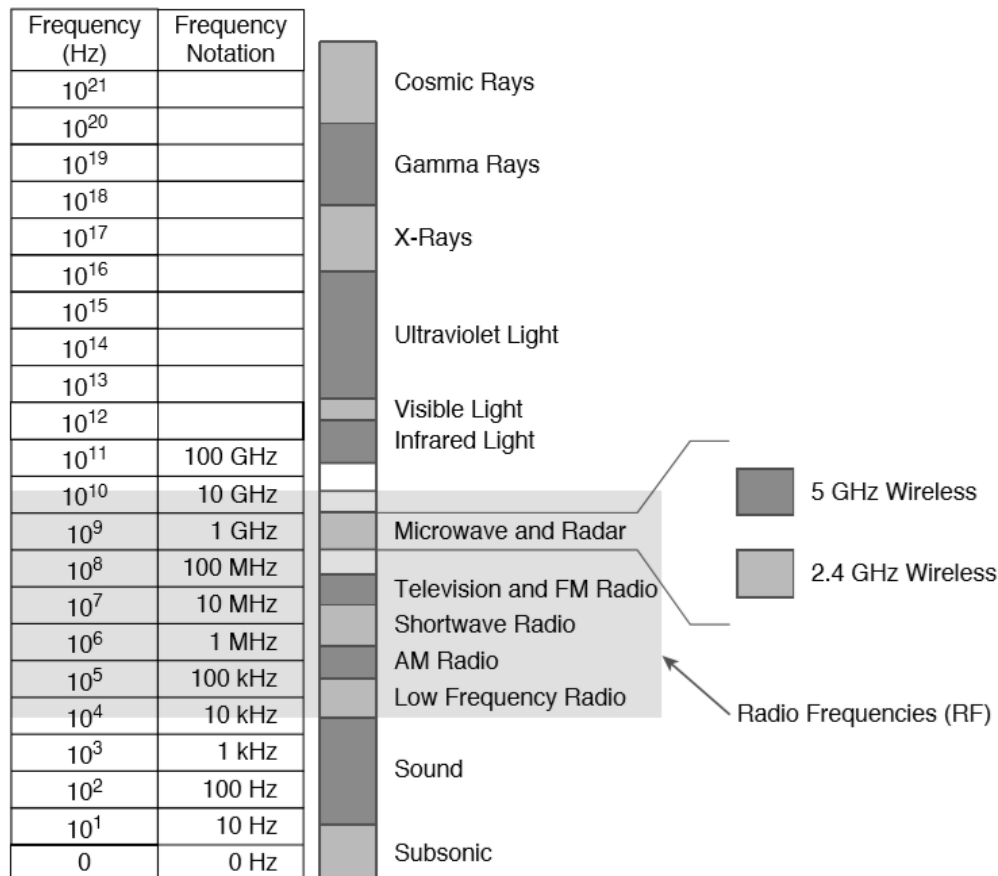
Cycles Within a Wave



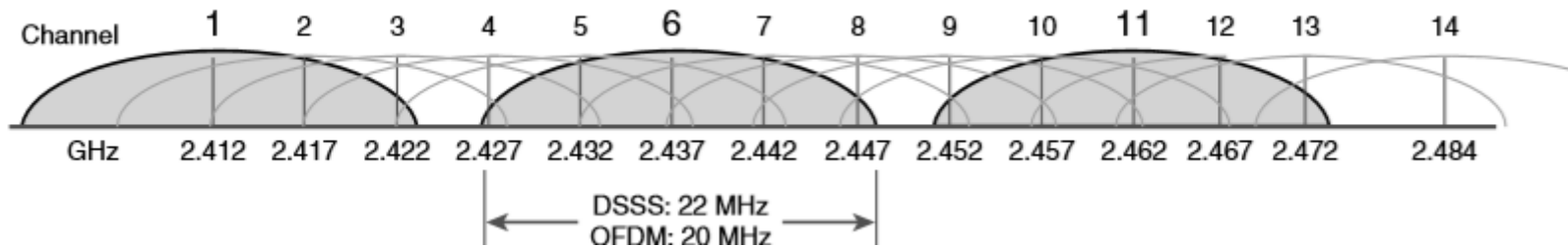
Frequency Unit Names

Unit	Abbreviation	Meaning
Hertz	Hz	Cycles per second
Kilohertz	kHz	1000 Hz
Megahertz	MHz	1,000,000 Hz
Gigahertz	GHz	1,000,000,000 Hz

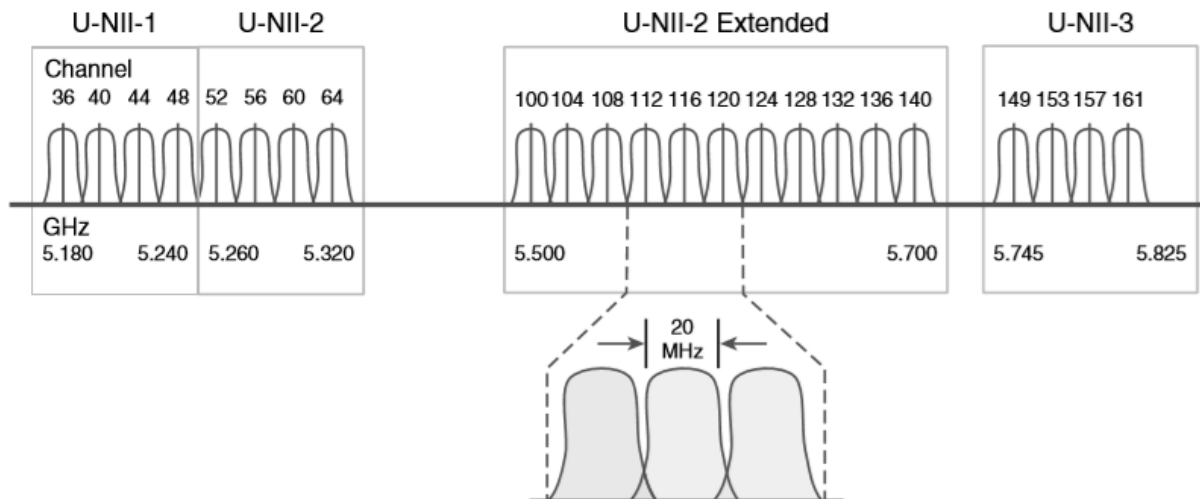
Continuous Frequency Spectrum



Wireless Bands and Channels



Channel Layout in the 2.4-GHz Band



Channel Layout in the 5-GHz Band

Basic Characteristics of Some IEEE 802.11 Amendments

Amendment	2.4 GHz	5 GHz	Max Data Rate	Notes
802.11-1997	Yes	No	2 Mbps	The original 802.11 standard ratified in 1997
802.11b	Yes	No	11 Mbps	Introduced in 1999
802.11g	Yes	No	54 Mbps	Introduced in 2003
802.11a	No	Yes	54 Mbps	Introduced in 1999
802.11n	Yes	Yes	600 Mbps	HT (high throughput), introduced in 2009
802.11ac	No	Yes	6.93 Gbps	VHT (very high throughput), introduced in 2013
802.11ax	Yes	Yes	4x 802.11ac	High Efficiency Wireless, Wi-Fi6; expected late 2019; will operate on other bands too, as they become available