4.2.2 Ethernet Specifications

Ethernet standards are defined by the IEEE 802.3 committee. The following table compares the characteristics of various Ethernet implementations:

Category	Standard	Bandwidth	Cable Type	Maximum Segment Length
Ethernet	10BaseT	10 Mbps (half duplex) 20 Mbps (full duplex)	Twisted pair (Cat3, 4, or 5)	100 meters
	10BaseFL	10 Mbps (full duplex)	Fiber optic	1,000 to 2,000 meters
Fast Ethernet	100BaseTX	100 Mbps (half duplex) 200 Mbps (full duplex)	Twisted pair (Cat5 or higher), uses 2 pairs of wires	100 meters
	100BaseFX	100 Mbps (half duplex) 200 Mbps (full duplex)	Fiber optic	412 meters 2,000 meters
Gigabit Ethernet	1000BaseT	1,000 Mbps (half duplex) 2,000 Mbps (full duplex)	Twisted pair (Cat5e or higher)	100 meters
	1000BaseCX (short copper)		Special copper (150 ohm)	25 meters, used within wiring closets
	1000BaseSX (short)		Fiber optic	220 to 550 meters depending on cable quality
	1000BaseLX (long)			550 meters 5 kilometers
10 Gigabit Ethernet	10GBaseT	10 Gbps (full duplex only)	Twisted pair (Cat6 or 7)	100 meters
	10GBaseSR/10GBaseSW		Multimode fiber optic (with OM3 fiber)	300 meters
	10GBaseLR/10GBaseLW		Single mode fiber optic	10 kilometers
	10GBaseER/10GBaseEW		Single mode fiber optic	40 kilometers

You should also know the following facts about Ethernet:

- The maximum cable length for UTP Ethernet "T" implementations is 100 meters for all standards.
- Ethernet standards support a maximum of 1024 hosts on a single subnet.
- 10GBase standards ending in W (e.g., 10GBaseSW) are used for SONET implementations.
- You may also see 10Base2 and 10Base5 Ethernet implementations, both of which are older implementations that use coaxial cable.
- The 10GBaseSR standard can also be used with Optical Multimode 4 (OM4) fiber, which increases the supported distance to 400 meters.

Cat5e supersedes the Cat5 specification. The original Cat5 cable specification published by the IEEE 802.3 committee supported gigabit Ethernet, but Cat5 did not reliably perform at gigabit speed in the real world. Cat5e was developed to reliably support gigabit Ethernet.

The following two Ethernet specifications (IEEE 1905.1-2013) provide additional functionality:

Type	Description
Ethernet over HDMI	Ethernet over HDMI allows network-enabled entertainment devices to share data through an HDMI Ethernet Channel (HEC), without additional Ethernet cables. Typically, this is done by connecting a single device, like a TV, to the network with an Ethernet cable. The TV then shares the network connection by using HDMI with any other entertainment device that has HEC functionality.
Ethernet over	Ethernet over Power Line allows for network communications to be transmitted over existing AC power lines. An Ethernet over Power Line device is plugged in to an AC power outlet. An Ethernet network cable is then plugged in to the device. Another Ethernet

Power Line	over Power Line device is connected to the same AC circuit. These devices multiplex the AC copper power lines to transmit digital network signals at a frequency higher than the AC electrical power already on the circuit.