

A+ Core 1 and Core 2 CertMaster Perform 15.0

5.1.1 LANs and WANs

Local Area Network (LAN)

A **local area network** is a group of computers connected by cabling and one or more network switches that are all installed at a single geographical location. A LAN might span a single floor in a building, a whole building, or multiple nearby buildings (a campus). Any network where the nodes are within about 1 or 2 km (or about 1 mile) of one another can be thought of as "local." LAN cabling and devices are typically owned and managed by the organization that uses the network.

Most cabled LANs are based on the **Ethernet** standards maintained by the Institute of Electrical and Electronics Engineers (IEEE). The IEEE 802.3 standards are designated xBASE-Y, where x is the nominal data rate, and Y is the cable type. For example:

- 100BASE-T refers to Fast Ethernet over copper twisted pair cabling. Fast Ethernet works at 100 Mbps.
- 1000BASE-T refers to Gigabit Ethernet over copper twisted pair cabling. Gigabit Ethernet works at 1000 Mbps (or 1 Gbps). 1000BASE-T is the mainstream choice of standard for most LANs.
- 10GBASE-T refers to a copper cabling standard working at 10 Gbps.

The majority of LANs will use copper cabling, which uses electrical signaling to communicate data.

Oftentimes, the backbone of the LAN or some special Ethernet networks will transmit data over fiber optic cabling, which uses pulses of light to communicate data.

Wide Area Network (WAN)

Where a LAN operates at a single site, a **wide area network** spans multiple geographic locations. One example of a WAN is the Internet, a global network of networks. A company dedicated to facilitating access to the Internet from local networks is called an Internet Service Provider (ISP).

Most private or enterprise WANs use cabling and equipment leased from an ISP to interconnect two or more LAN sites. For example, a company might use a WAN to connect branch office sites to the LAN at its head office.

Wireless LANs

A **wireless local area network** (WLAN) uses radios and antennas for data transmission and reception. Most WLANs are based on the IEEE 802.11 series of standards. IEEE 802.11 is better known by its brand name, **WiFi**.

Wi-Fi and Ethernet technologies complement one another and are often used together as segments within the same local network. This allows computers with wired and wireless networking adapters on the same LAN to communicate with one another.

Metropolitan Area Networks

The term **metropolitan area network** (MAN) can be used to mean a specific network type covering an area equivalent to a city or other municipality. It could mean a company with multiple connected networks within the same metropolitan area - basically, a MAN will be larger than a LAN but smaller than a WAN.

Personal Area Networks

A **personal area network** (PAN) refers to using wireless connectivity to connect to devices at a range of a few meters. A PAN can be used to share data between a PC and mobile devices and wearable technology devices, such as smartwatches. It can also connect PCs and mobile devices to peripheral devices, such as printers, headsets, speakers, and video displays. The most common example of a PAN is wearable Bluetooth devices such as earbuds and smartwatches connected to the cellphone on a person.

As digital and network functionality continues to be embedded in more and more everyday objects (typically referred to as the Internet of Things or "IoT"), appliances, and clothing, the use of PANs will only grow.

Storage Area Network

A Storage Area Network (SAN) refers to a specialized network that is dedicated to storage devices. Servers can connect to the storage devices as if they are directly attached. The key characteristics of a SAN include:

- **Dedicated Network** - The SAN must be attached to a dedicated network that is independent of the LAN. This ensures that the SAN traffic does not interfere with other network operations.

- **Block-Level Access** - Data sent across the SAN is transferred in raw chunks of data with no file system structure called blocks. This allows for efficient data transfers and flexible storage management options.
- **Consolidated Storage** - Multiple types of storage, such as RAID arrays and tape drives, are joined together in the SAN, which sets up centralized storage resources for servers.
- **High Speed** - SANs will typically utilize high-speed connections such as Fibre Channel or Internet Small Computer System Interface (iSCSI) for data transfer.

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