CS 118 Book Notes

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Chapter 1

1.1 What is the Internet?

1.1.1 Three "Simple" Components

Definition: Network

A **network** is a logical grouping of hosts which require similar connectivity.

Definition: Host/End System

A **host (or end system)** is any *device* on a network that is either a source or destination for data packets. Hosts run network applications, and can initiate or receive communication over the network.

Definition: Communication Link

A **communication link** is the medium or path between two or more devices that data packets take. Different communication links[a] transmit data at different rates, also known as the *transmission rate*.

Definition: Bandwidth

Bandwidth is the maximum rate that data can be transmitted over the link (usually measured in Xbits per second [Xbps] where X = ***M****ega,* ***G****iga, etc.*).

[a] Communication links are made up of various physical media (e.g. coaxial cable, copper, optical fiber, radio, etc.).

Definition: Switch and Router

A **switch** is a device that receives packets from an incoming communication link and forwards them toward their destination[a] *within* a network; i.e. they facilitate communication *within* a network.

A **router** is a device that receives packets and forwards them toward their destination[a] between *different* networks; i.e. they facilitate communication between *different* networks.

Definition: Route/Path

A **route or path** is the sequence of communication links and packet switches traversed by a packet from the sending host to the receiving host.

[a] The source/destination addresses are stored in the header of packets!

Definition: Data Packets

Data packets (or just "packets") is a unit of data transmitted over a network. They consist of a header that stores metadata (e.g. source/destination addresses, protocol information, etc.), the actual data (or "payload"), and (***sometimes***) a footer.

Definition: Network Protocol

A **network protocol** defines the format and order of messages exchanged between two (or more) communicating devices, as well as the actions taken on the transmission and/or receipt of a message or other event.

We can define the Internet by defining its components:

(i) Hosts (end systems) that send and/or receive data.

(ii) Communication links that determine the path *packets* take.

(iii) Routers and switches that facilitate this by forwarding data packets.

1.1.2 Network Structure

Definition: Network Edge

Definition: Client and Server

Clients are usually desktops, laptops, etc. that typically send requests and receive data.

Servers[a] are usually more powerful machines that store/distribute Web pages, stream video, relay e-mail, etc.

[a] Most servers reside in large data centers.

Access Networks