Lecture 1
Introduction to Internetworking and TCP/IP

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Internetworking

- **Internetworking** refers to the **process** of **connecting** two or more computer **networks** so that they can **communicate** and **share resources.**
- The **goal** of **internetworking** is to **enable** seamless **data exchange**, regardless of differences in **hardware, software**, or **topology.**
- The most widely known and successful **example** of **internetworking** is the **Internet,** which **connects** millions of *private, public, academic, business*, and *government networks* **worldwide.**
- Interconnecting **different types** of **networks** to build a **large, global network** is the **core idea** of the **Internet** and is often referred to as **internetworking.**

Why internetworking?

- A **Point-to-point link** connects **only two** devices.
- **LAN technology** is designed to provide **high speed** communication over a **small geographical area**, e.g. A single Ethernet(LAN) can interconnect no more than 1024 hosts.
- **WAN technology** is designed to provide communication across different cities, countries and continents but their **rate of data transfer** is not very high.
- **Wireless networks** are limited by the **range** of their **radio signals.**
- It has been established that **isolated LAN** and **WAN** have **limited potential** and **usefulness.**
- Thus to build a **global network**, we need a way to **interconnect** these **different types** of multi-access networks.

Internetworking issues

- **Addressing**
- Whenever two stations want to communicate with each other they must have some address.
- **Packetizing**
- Apart from data other information like source address, destination address and various other things have to be put together in the form of a packet known as packetizing.
- **Routing**
- Routing is required as the packet passes through a sequence of networks.
- **Flow Control, Error Control and Congestion Control**
- These techniques **are** required for ensuring **reliability** in **data communication.**

Internetworking issues

- **Fragmentation and Reassembling**
- Some time due to **network constraint** it may be necessary to **fragment** a particular **packet** into a number of packets as it goes through a network.
- Then at the other end or in the **destination node** they have to be **put together**, they have to be **reassembled.**
- **Security**
- **Network security** has to be maintained as the data passes through the network, security has to be maintained with the help of suitable **encryption/decryption** technique.

Internetworking devices

- **Hardware:**
  - **Repeater/Hub:** are essentially layer-1 relay, they act as some kind of relay.
  - **Bridge/Switch**: are layer-2 relay
  - **Router**: are layer-3 relay
  - **Gateway:** are layer-7 relay, can operate in all seven layers.
- **Software:**
  - **TCP/IP protocol suit** for Internetworking.

TCP/IP Protocol Suit