COMPUTER NETWORK

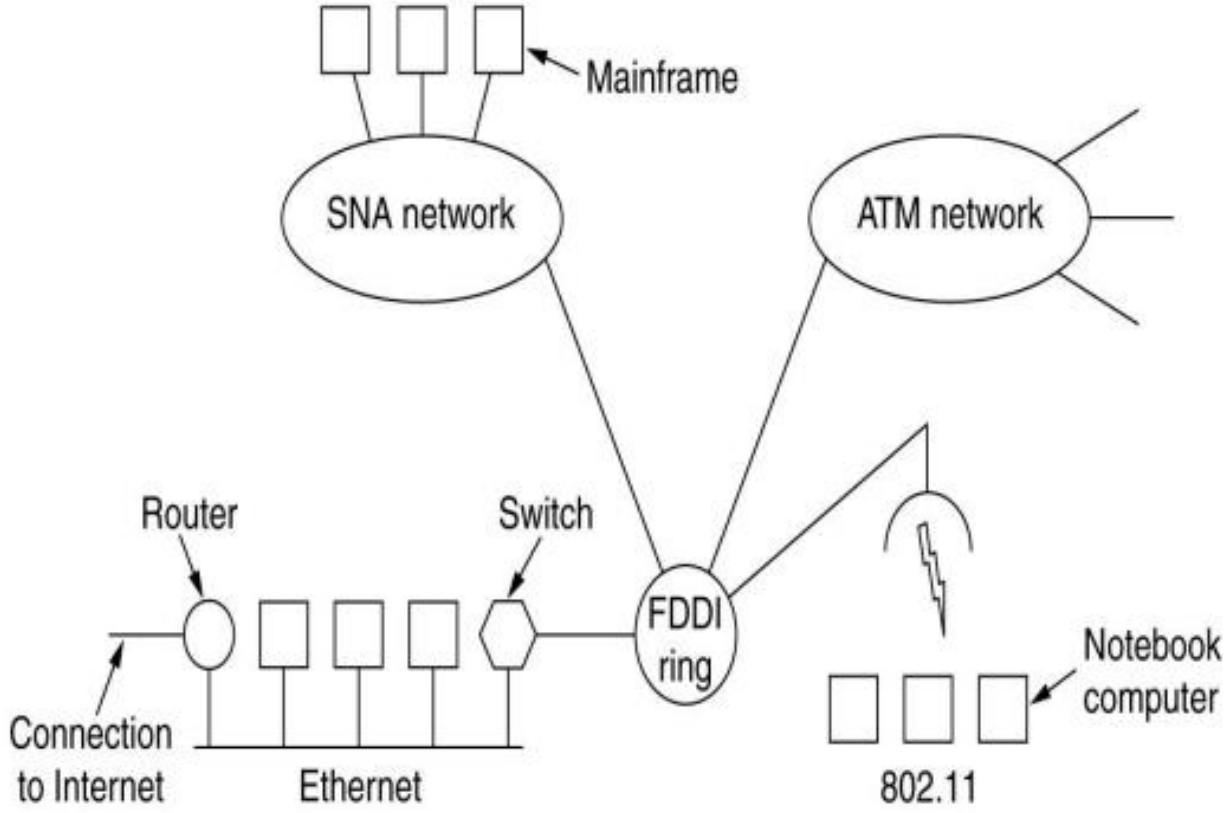
UNIT IV

INTERNETWORKING

- Internetworking : Internetworking refers to the process of connecting different networks to form a larger network.
- It involves using devices and technologies that allow data to flow between different types of networks, ensuring seamless communication across various infrastructures.

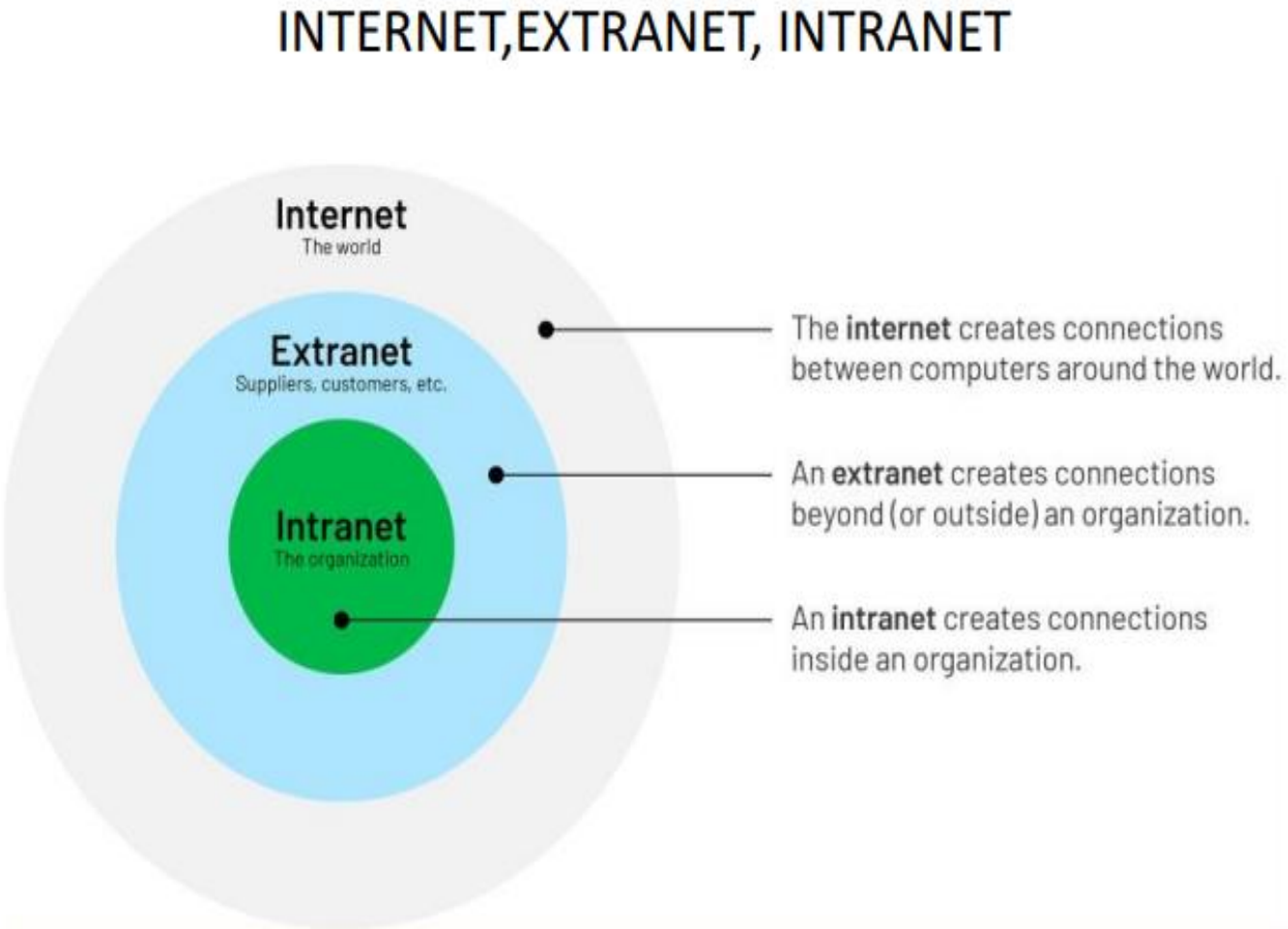
- Example of internetworking is the Internet itself.

A collection of interconnected networks.



- As an example of how different networks might be connected, consider the example of Fig .
- A corporate network with multiple locations tied together by a wide area ATM network.
- At one of the locations, an FDDI optical backbone is used to connect an Ethernet, an 802.11 wireless LAN, and the corporate data center's SNA mainframe network.

- There are three variants of internetwork or Internetworking, depending on who administers and who participates in them :
- Internet
- Extranet
- Intranet

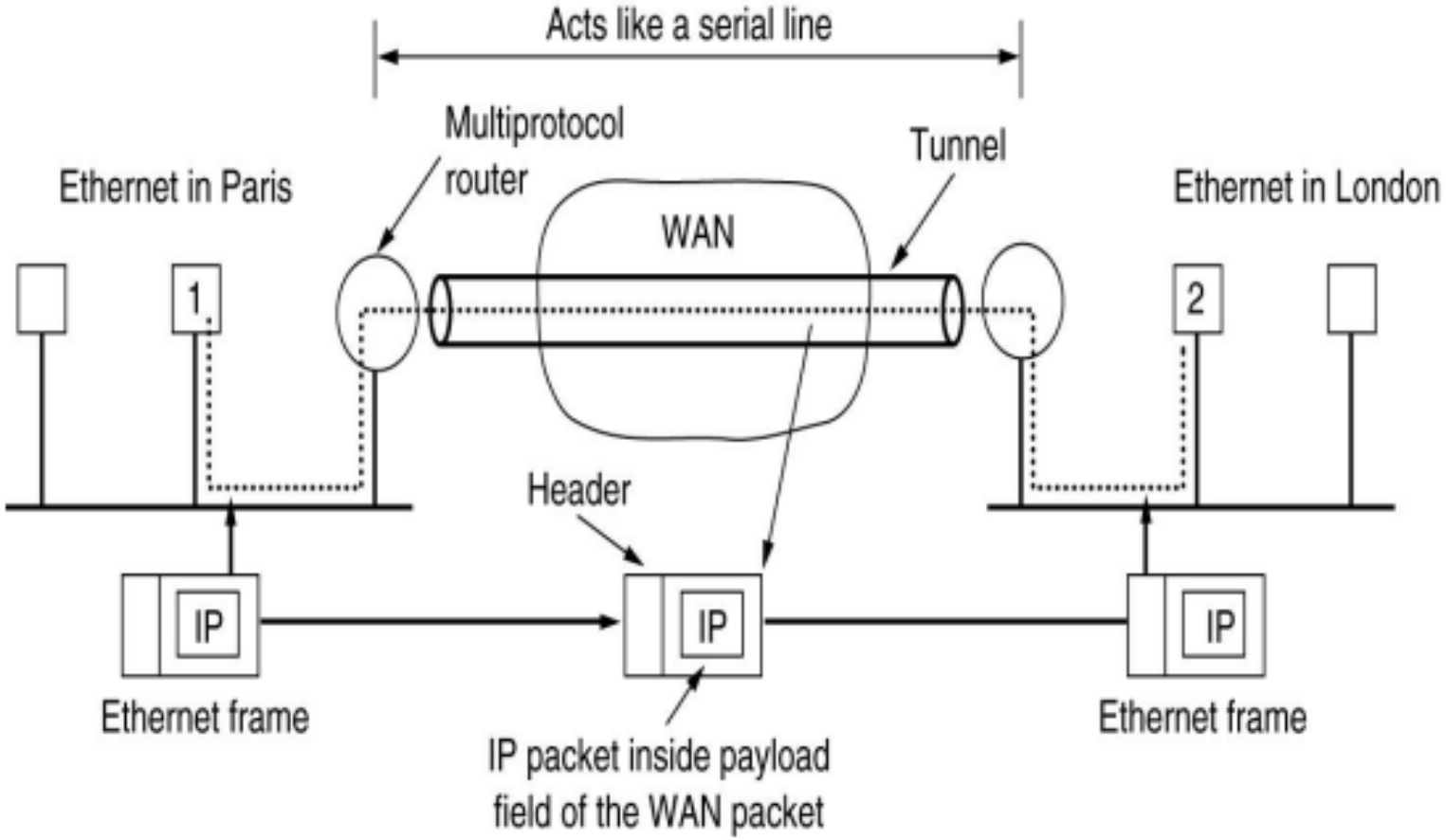


- **Internet –** A selected Internetworking, consisting of a worldwide interconnection of governmental, academic, public, and personal networks based mostly upon the ARPANET.
- An **Extranet** is an organization's private network and its available only for selected users. It's a way to connect to third parties like vendors, customers, and partners in a secure and controlled way.
- An **Intranet** is a private local network that enables employees within an organization to create content, communicate, and collaborate.

Tunneling

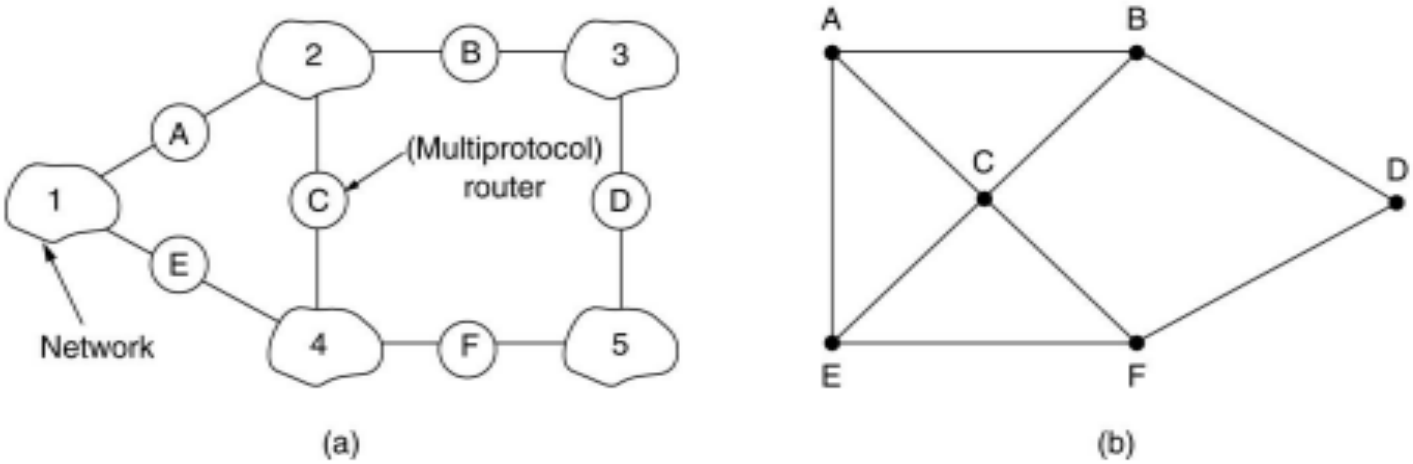
- Tunneling is a protocol that allows for the secure movement of data from one network to another.
- Tunneling involves allowing private network communications to be sent across a public network, such as the Internet, through a process called encapsulation.
- If they are two geographically separate networks, which want to communicate with each other, they may deploy a dedicated line between or they have to pass their data through intermediate networks.

Tunneling a packet from Paris to London



- Tunneling is configured at both ends.
- When the data enters from one end of Tunnel, it is tagged.
- This tagged data is then routed inside the intermediate or transit network to reach the other end of Tunnel.
- When data exists the Tunnel its tag is removed and delivered to the other part of the network.
- Both ends seem as if they are directly connected and tagging makes data travel through transit network without any modifications

Internetwork Routing



(a) An internetwork. (b) A graph of the internetwork

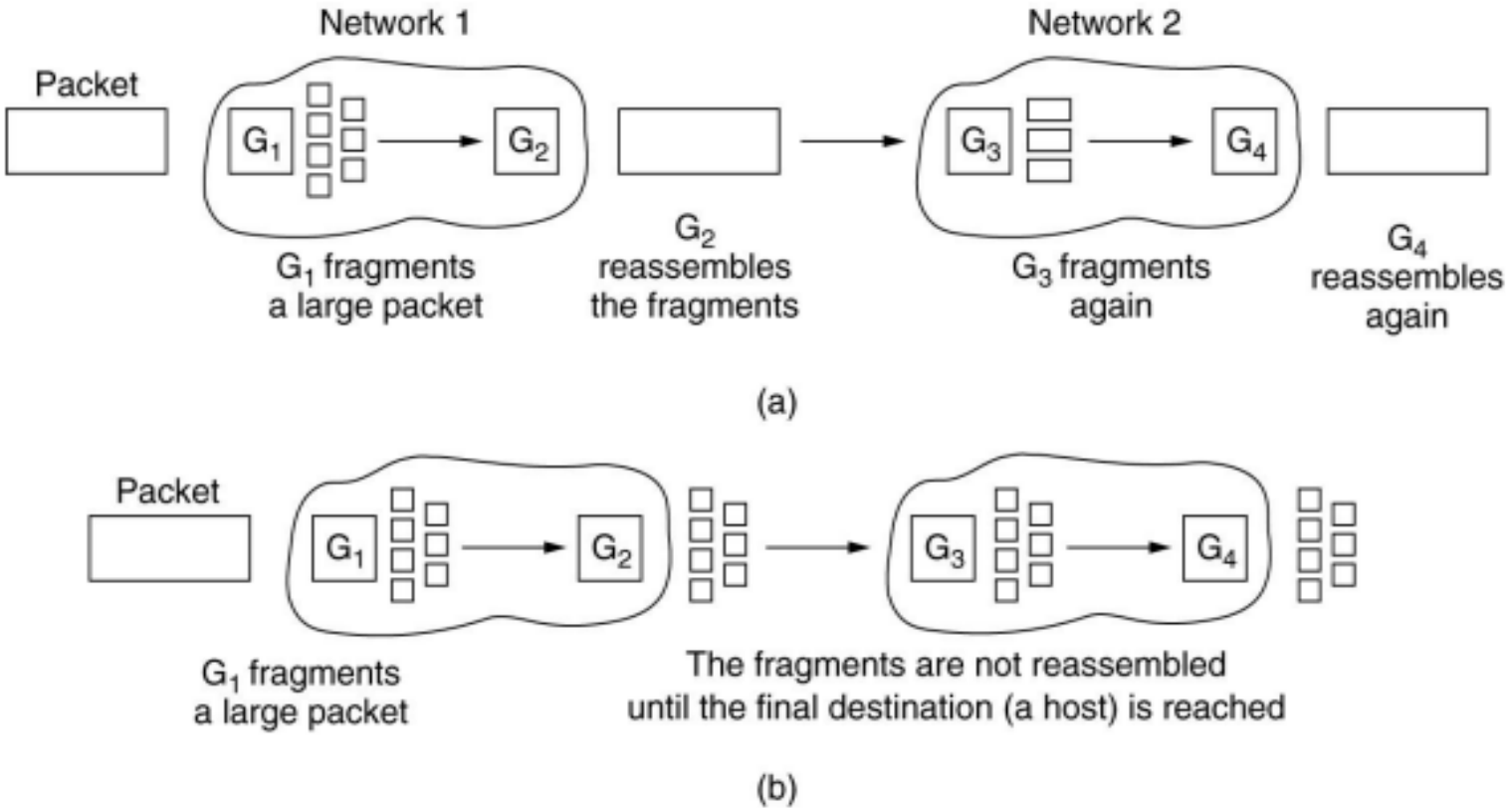
- Internetworking is the process or technique of connecting different networks by using intermediary devices such as routers or gateway devices.
- Internetworking ensures data communication among networks owned and operated by different entities using a common data communication and the Internet Routing Protocol.

- Packet Fragmentation

- Most Ethernet segments have their maximum transmission unit (MTU) fixed to 1500 bytes.
- A data packet can have more or less packet length depending upon the application.
- Devices in the transit path also have their hardware and software capabilities which tell what amount of data that device can handle and what size of packet it can process.

- If the data packet size is less than or equal to the size of packet the transit network can handle, it is processed neutrally.
- If the packet is larger, it is broken into smaller pieces and then forwarded. This is called packet fragmentation.
- Each fragment contains the same destination and source address and routed through transit path easily.
- At the receiving end it is assembled again.

- Transparent and Non Transparent Fragment



(a)Transparent fragmentation. (b) Nontransparent fragmentation.

- Transparent Fragmentation - the router doing the fragmentation breaks up oversized packets and addresses them all to the same exit router.
- The exit router re-assembles the fragments and forwards original packet. This is called transparent fragmentation because it is invisible to the other networks in the path and to the hosts.
- Problems in Transparent Fragmentation:

  1) All packets must exist the same router; doesn't work for a connectionless network.

  2) Overhead and delay involved with repeated fragmentation and reassembly.

- Nontransparent Fragmentation - once a packet is fragmented, it is not reassembled until it reaches the destination.
- Problems in Nontransparent Fragmentation: •

  1) Overhead is increased since the ratio of data to header is worse.

  2) Every host must be able to reassemble.

  3)Multiple layers of fragmentation are possible.