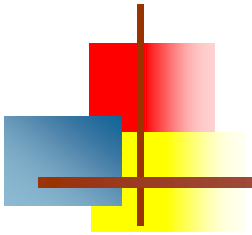
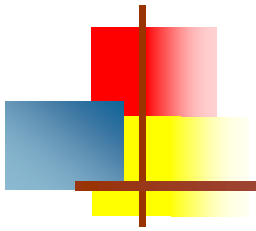


Introduction to Networks & Distributed Computing
CECS 327



Interconnection Devices

Interconnection Devices

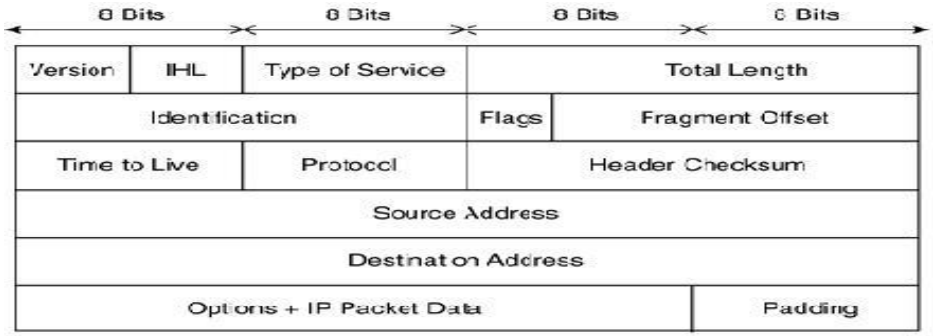
Repeaters, Hubs, Bridges, Switches & Routers

for LANs, MANs & WANs

Interconnection Devices - Router

Layer 3 Datagrams:

- An IP datagram is a packet of data passed across the network at Layer 3 of the network protocol stack.
- At Layer 3 (and above), IP addresses are used to send messages from one computer to another.
- IP addresses are software addresses that can be changed according to the network subnet to which they belong.
- IP datagrams have two IP addresses in their header: (1) the IP address of the source computer, and (2) the IP address of the destination computer.

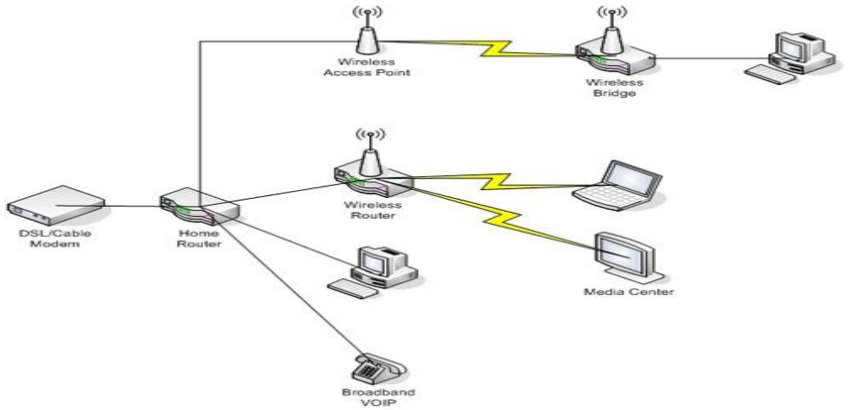


Interconnection Devices - Router

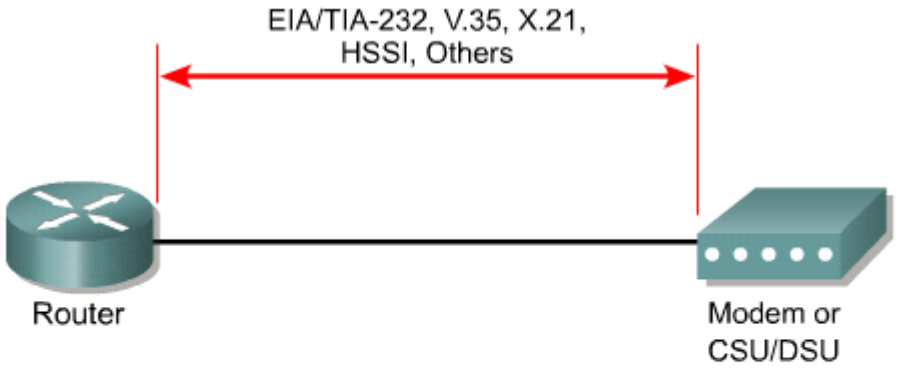
A **router** is a network interconnection device that accepts an IP datagram from an incoming port and forwards the datagram to the outgoing link that corresponds to the IP destination address in the datagram.

A **router:**

- Forwards data depending on **IP addresses**, **not** Hardware (MAC) addresses.
- Isolates each LAN into a **separate subnet,** with separate IP addresses.
- Can route between **different LAN technologies**.
- Needs to be **set up** before they are used. Once set up, they can communicate with other routers and learn the way to parts of a network that are added after a router is initially configured.

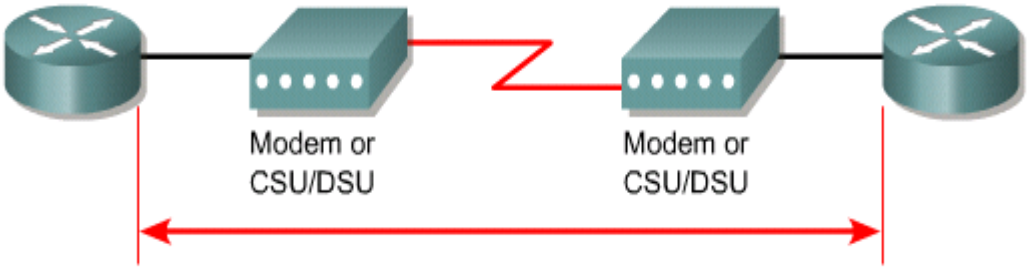


Interconnection Devices - Router



DTE	DCE
Data Terminal Equipment	**Data-Circuit Terminating Equipment**
User device with interface connecting to the WAN link	End of the WAN provider's side of the communication facility

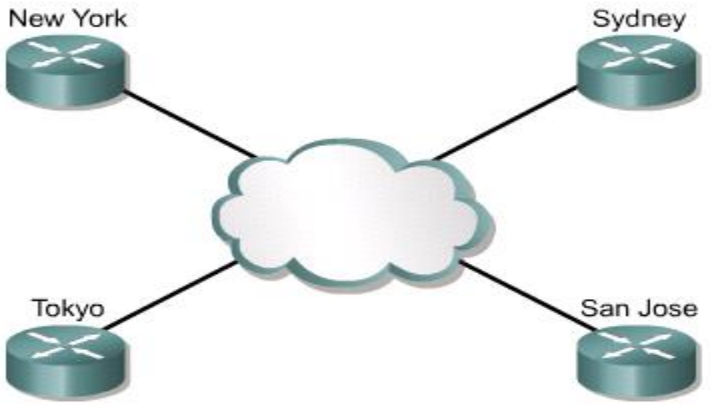
Interconnection Devices - Router

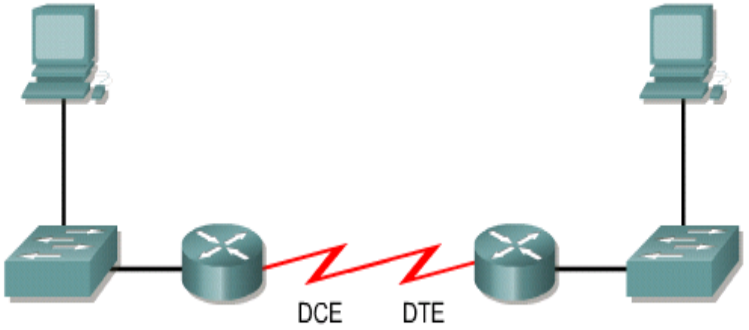


- HDLC – High-Level Data Link Control
- Frame Relay – Successor of X.25
- PPP – Point-to-Point Protocol
- ISDN – Integrated Service Digital Network (data link signal)

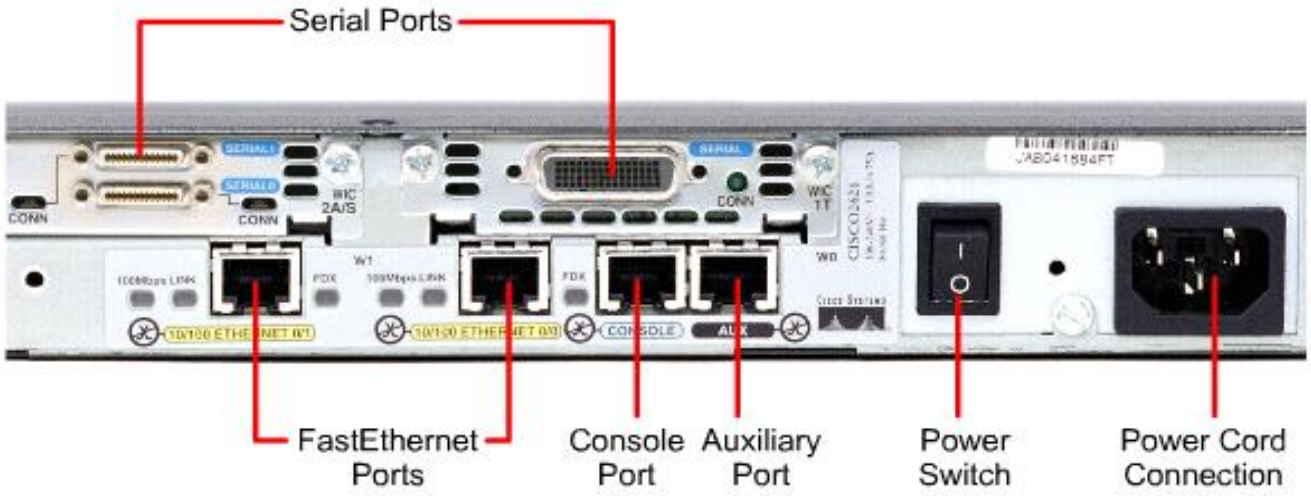
Interconnection Devices - Router

- While a router can be used to segment LANs, its major use is as a WAN device.
- They operate at Layer 3 of the OSI or TCP/IP model, making decisions based on network addresses.
- The two main functions of a router are the selection of best path for and the switching of packets to the proper interface.

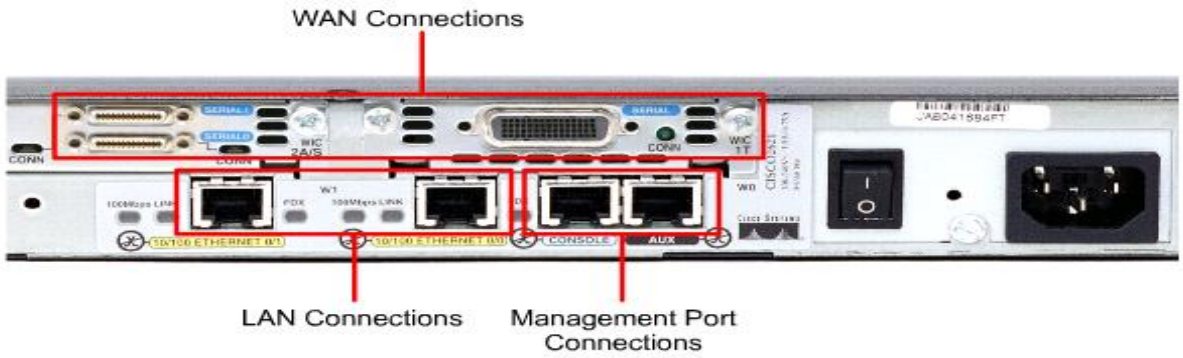




Interconnection Devices - Router



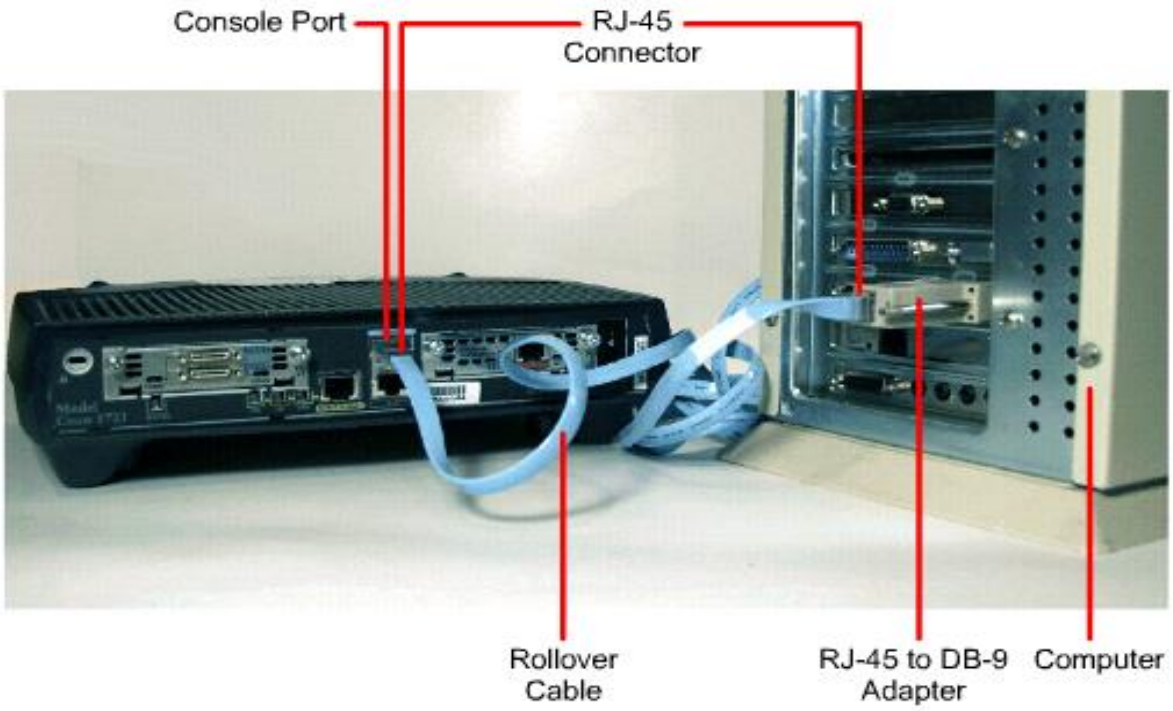
Interconnection Devices - Router



The three basic types of connections on a router are:

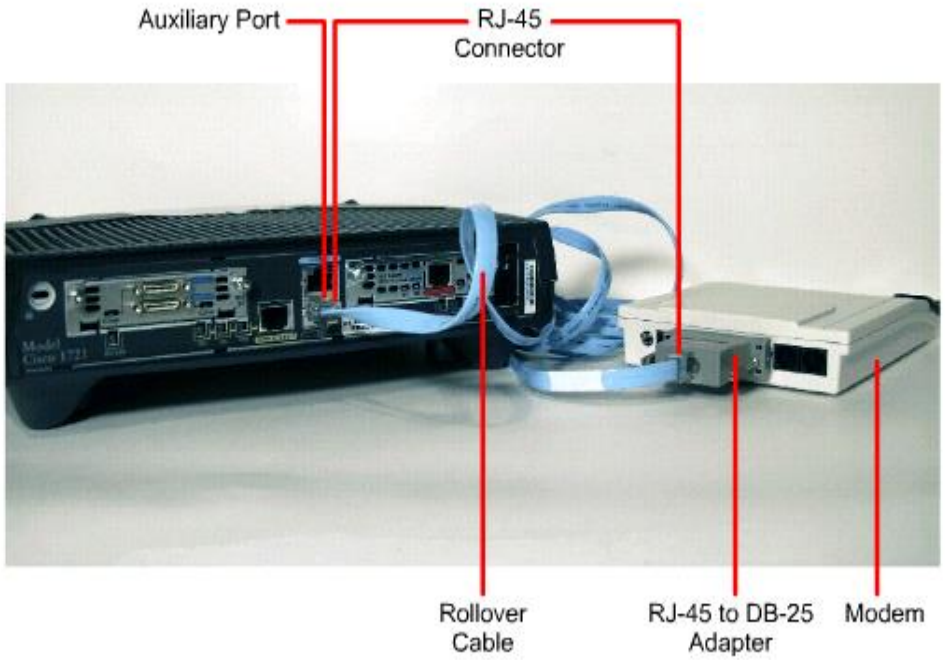
- LAN interfaces: allow the router to connect to the Local Area Network media.
- WAN interfaces: provide connections through a service provider to a distant site or to the Internet.
- Management ports: The management port provides a text-based connection for the configuration and troubleshooting of the router.

Interconnection Devices - Router

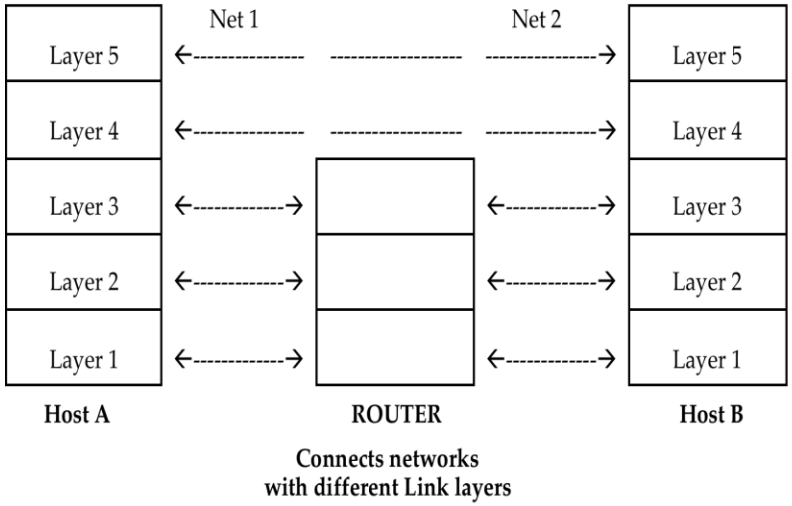


Interconnection Devices - Router

The router can also be configured from a remote location by dialing to a modem connected to the console or auxiliary port on the router.

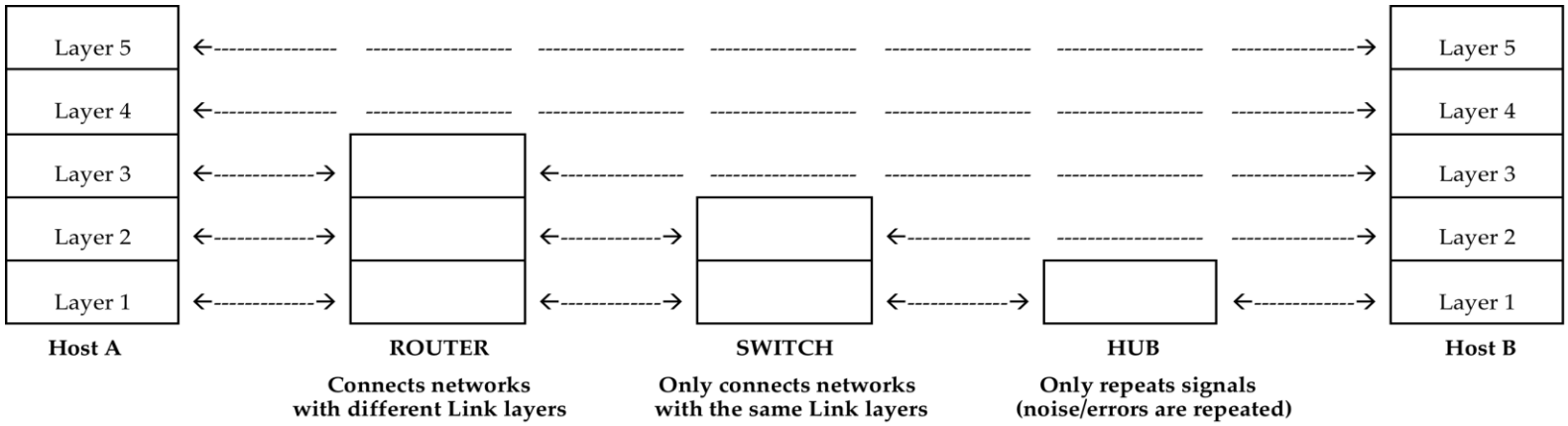


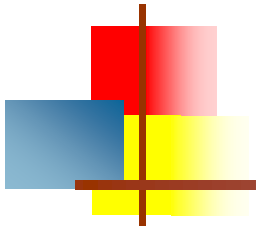
Interconnection Devices - Router



Interconnection Devices - Router

No.	Layer Name	Name of a "Packet" used at the layer	Address Typed used at layer	Names of Interconnection Device in Each Layer	End-to-end or link-to-link operation
5	Application	Message	IP Addresses	Protocol Translator	End-to-End
4	Transport	Segment	IP Addresses		End-to-End
3	Internet	IP Datagram	IP Addresses	Router	Link-to-Link
2	Network Interface or Link	Frame	MAC Addresses	Switch or Bridge	Link-to-Link
1	Physical	bits	---------	Hub or Repeater	Link-to-Link





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- Computer Networks, Fifth Edition: A Systems Approach (The Morgan Kaufmann Series in Networking).
- Computer Networks and Internets (5th Edition)
- Some slides by Dr. Tracy Bradley Maples