

Interconnection Devices

جامعة الانبار

قسم الهندسة الكهربائية

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Hub

- A hub is a network hardware device for connecting multiple devices together and making them act as a single network segment. It has multiple input/output (I/O) ports, in which a signal introduced at the input of any port appears at the output of every port except the original incoming.
- A hub is a physical-layer device (Layer 1).



Repeater

- A repeater is a physical-layer device (Layer 1) that acts on individual bits. When a bit, representing a zero or a one, arrives from one interface, the repeater simply re-creates the bit, boosts its energy strength, and transmits the bit onto all the other interfaces.



Switch

- A switch is a device that operates at the Link layer (Layer 2). It takes in packets being sent by devices that are connected to its physical ports and sends them out again, but only through the ports that lead to the devices the packets are intended to reach.
- The role of the switch is to receive incoming link-layer frames and forward them onto outgoing links.
- Switches forward packets based on MAC addresses.





Router

- A router is a device that connects two or more subnetworks. It serves two primary functions: managing traffic between these networks by forwarding data packets to their intended IP addresses and allowing multiple devices to use the same Internet connection.
- See Network Layer lecture for more details on router architecture.

	Hubs	Routers	Switches
Traffic isolation	No	Yes	Yes
Plug and play	Yes	No	Yes
Optimal routing	No	Yes	No

Table 5.1 ♦ Comparison of the typical features of popular interconnection devices

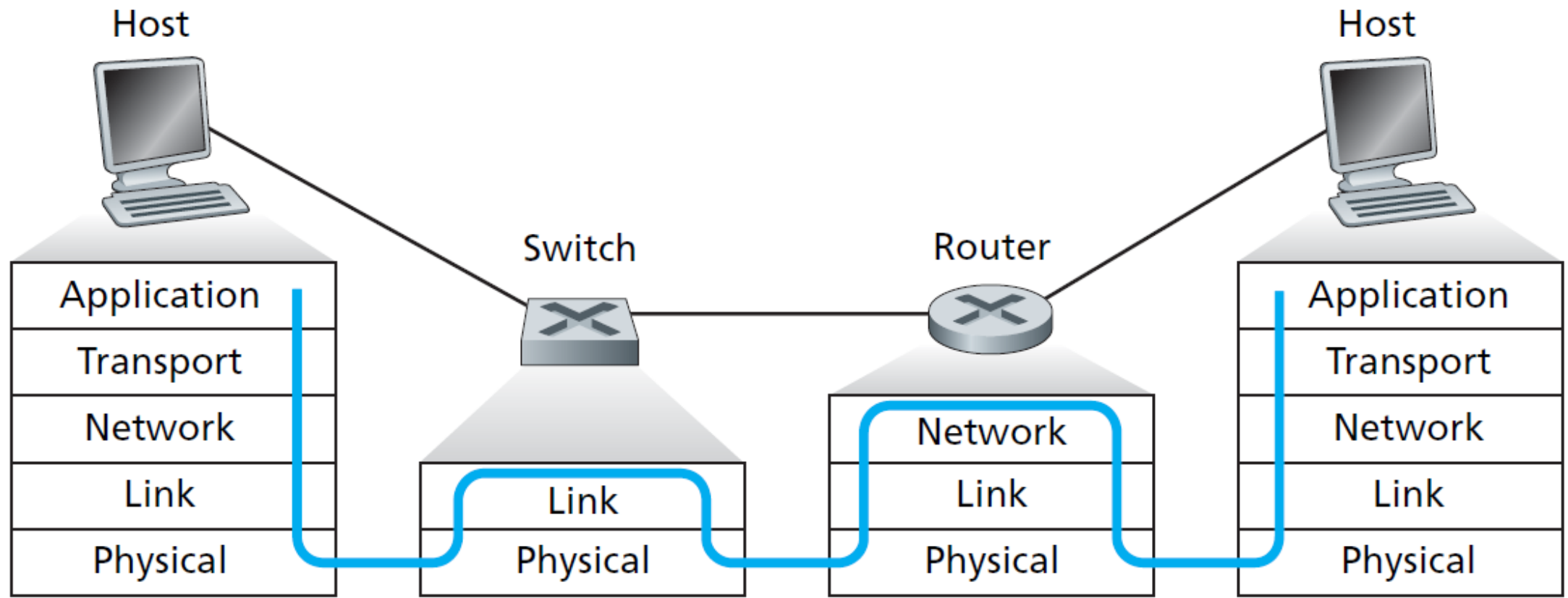


Figure 5.24 ♦ Packet processing in switches, routers, and hosts



Wireless Router

- A wireless router is a device that performs the functions of a router and also includes the functions of a wireless access point.
- It is used to provide access to the Internet or a private computer network.
- Depending on the manufacturer and model, it can function in a wired local area network, in a wireless-only LAN, or in a mixed wired and wireless network.

Networking Cables

- Coaxial cable.
- UTP
- Fiber Optic.

Coaxial cable.

- It is a type of electrical cable consisting of an inner conductor surrounded by a concentric conducting shield, with the two separated by a dielectric (insulating material).
- coaxial cable consists of two copper conductors, but the two conductors are concentric rather than parallel. With this construction and special insulation and shielding, coaxial cable can achieve high data transmission rates.
- Coaxial cable is quite common in cable television systems.
- Television systems have recently been coupled with cable modems to provide residential users with Internet access at rates of tens of Mbps.
- Coaxial cable is a type of transmission line, used to carry high-frequency electrical signals with low losses.



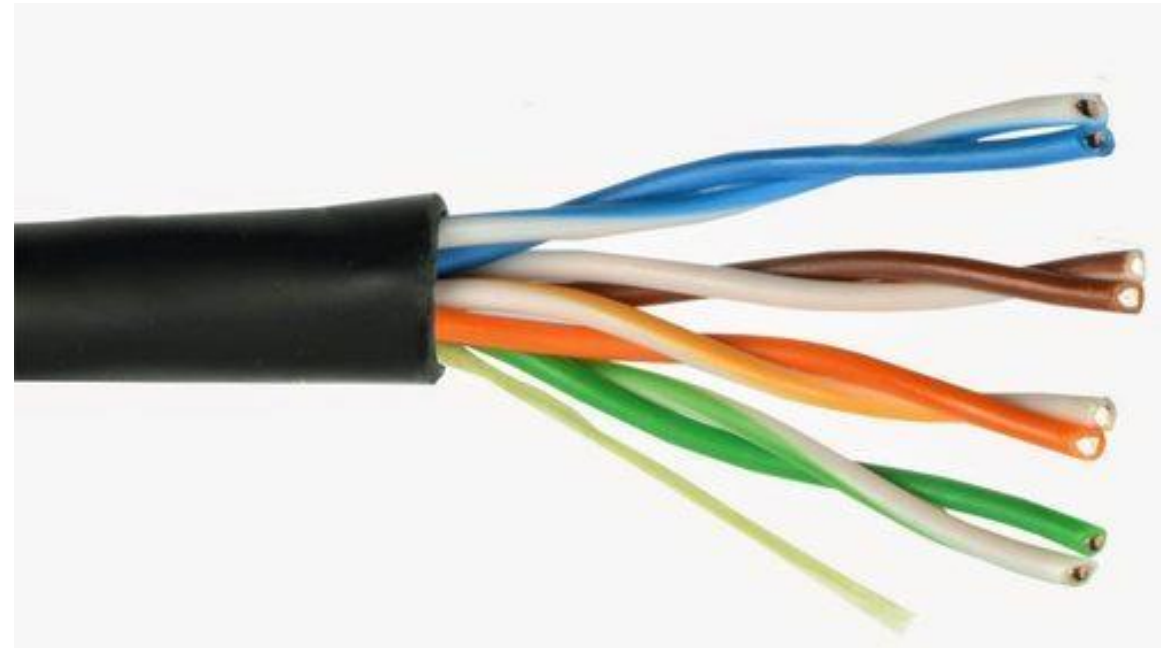
UTP

- UTP (Unshielded Twisted Pair):
- UTP is a copper cable used in telephone wiring and local area networks (LANs).



UTP

- Twisted pair consists of two insulated copper wires, each about 1 mm thick, arranged in a regular spiral pattern. The wires are twisted together to reduce the electrical interference from similar pairs close by. Typically, a number of pairs (for example, 4) are bundled together in a cable by wrapping the pairs in a protective shield. A wire pair constitutes a single communication link.
- **UTP** is commonly used for computer networks within a building, that is, for LANs. Data rates for LANs using twisted pair today range from 10 Mbps to 10 Gbps. The data rates that can be achieved depend on the thickness of the wire and the distance between transmitter and receiver.



Fiber Optic

- An optical fiber is a thin, flexible medium that conducts pulses of light, with each pulse representing a bit. A single optical fiber can support tremendous bit rates, up to tens or even hundreds of gigabits per second. They are immune to electromagnetic interference, have very low signal attenuation up to 100 kilometers, and are very hard to tap.

