

Practical Network

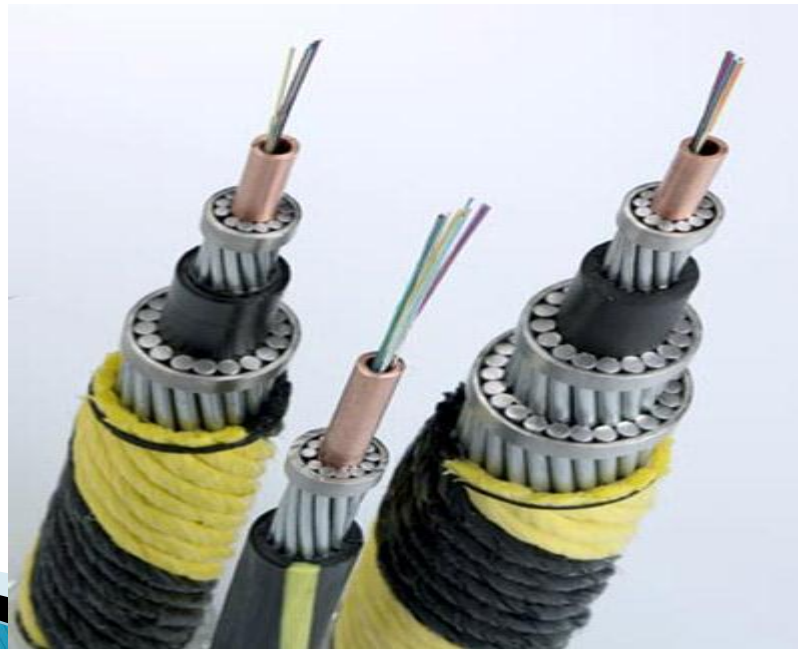
Third Class

L.3

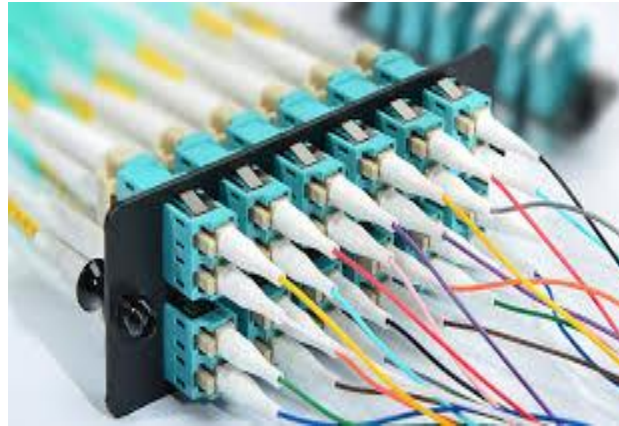
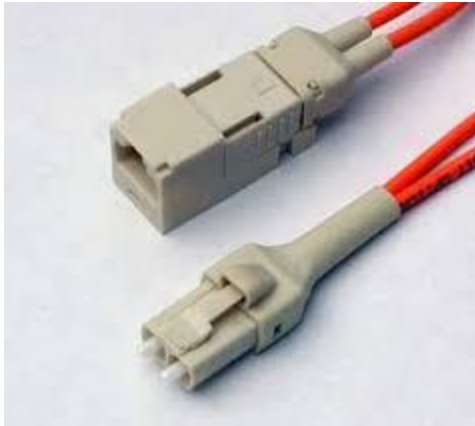
Mohanad Ali

2020





Connector of optical fiber cable



Hubs, Switches, and Routers

Introduction

Hubs, switches, bridge and routers are all devices that let you connect one or more computers to other computers, networked devices, or to other networks. Each has two or more connectors called ports into which you plug in the cables to make the connection.

Hub

A **hub** is typically:

- Least expensive
- Least intelligent
- Least complicated of the other three.
- Its job is very simple: anything that comes in one port is sent out to the others.
- Every computer connected to the hub "sees" everything that every other computer on the hub sees.

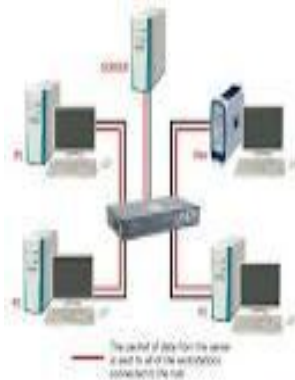
Hubs

There are two types of hubs:

- ❑ *Passive hubs* simply connect all ports together and usually not powered.
- ❑ *Active hubs* use electronics to amplify and clean up the signal before it is broadcast to the other ports.

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Shape of Hub



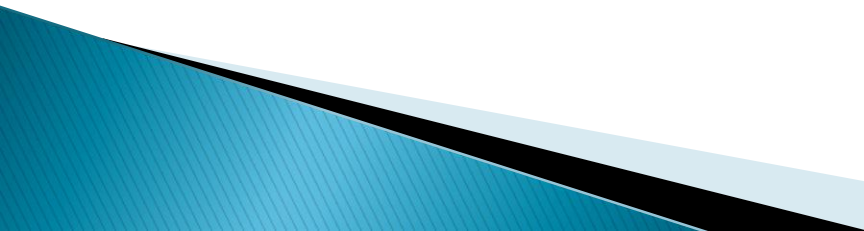
Switch

A switch is a device used on a computer network to physically connect devices together. (also called switching hub, bridging hub, officially MAC bridge)

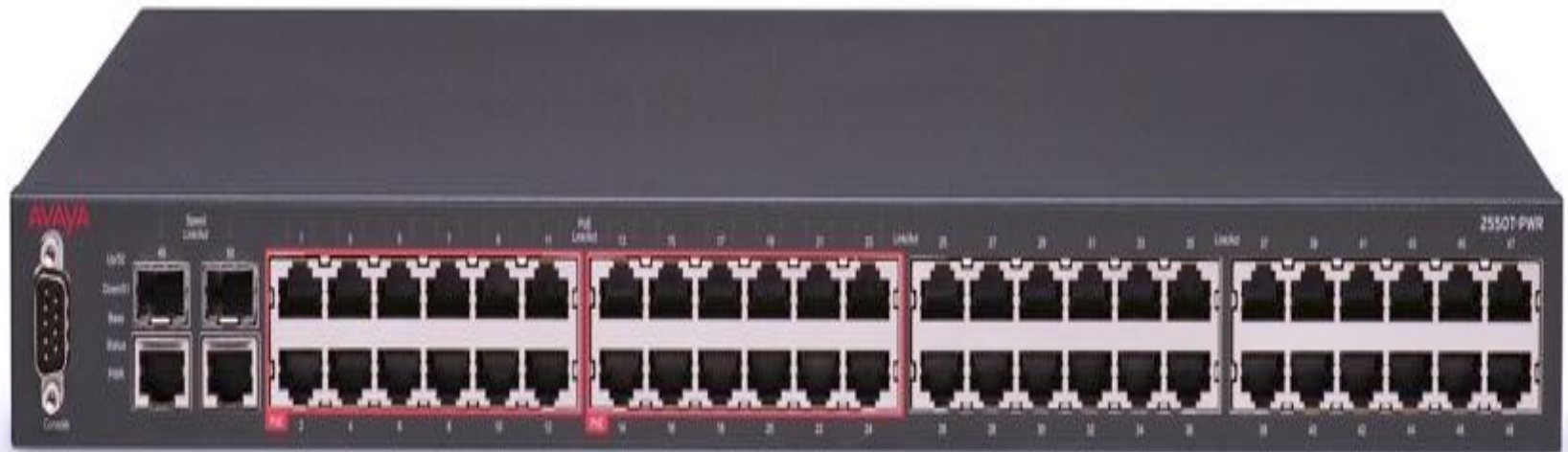
Multiple cables can be connected to a switch to enable networked devices to communicate with each other.

A switch is often considered more "intelligent" than a network hub. Hubs neither provide security, or identification of connected devices.

Switches manage the flow of data across a network by only transmitting a received message to the device for which the message was intended. Each networked device connected to a switch can be identified using a MAC address, allowing the switch to regulate the flow of traffic. This maximizes security and efficiency of the network.



Switch



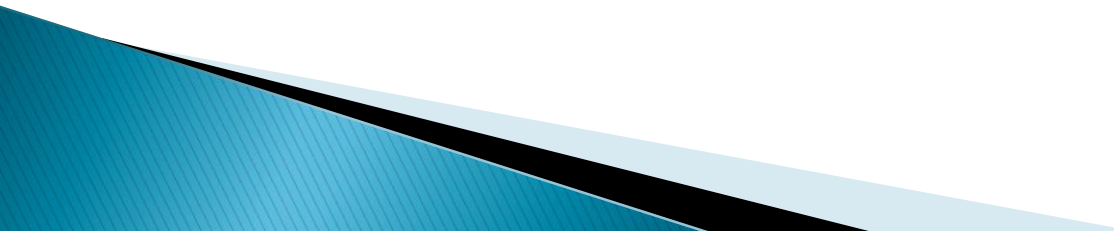


Router

A router is a networking device that forwards data packets between computer networks. Routers perform the traffic directing functions on the Internet.

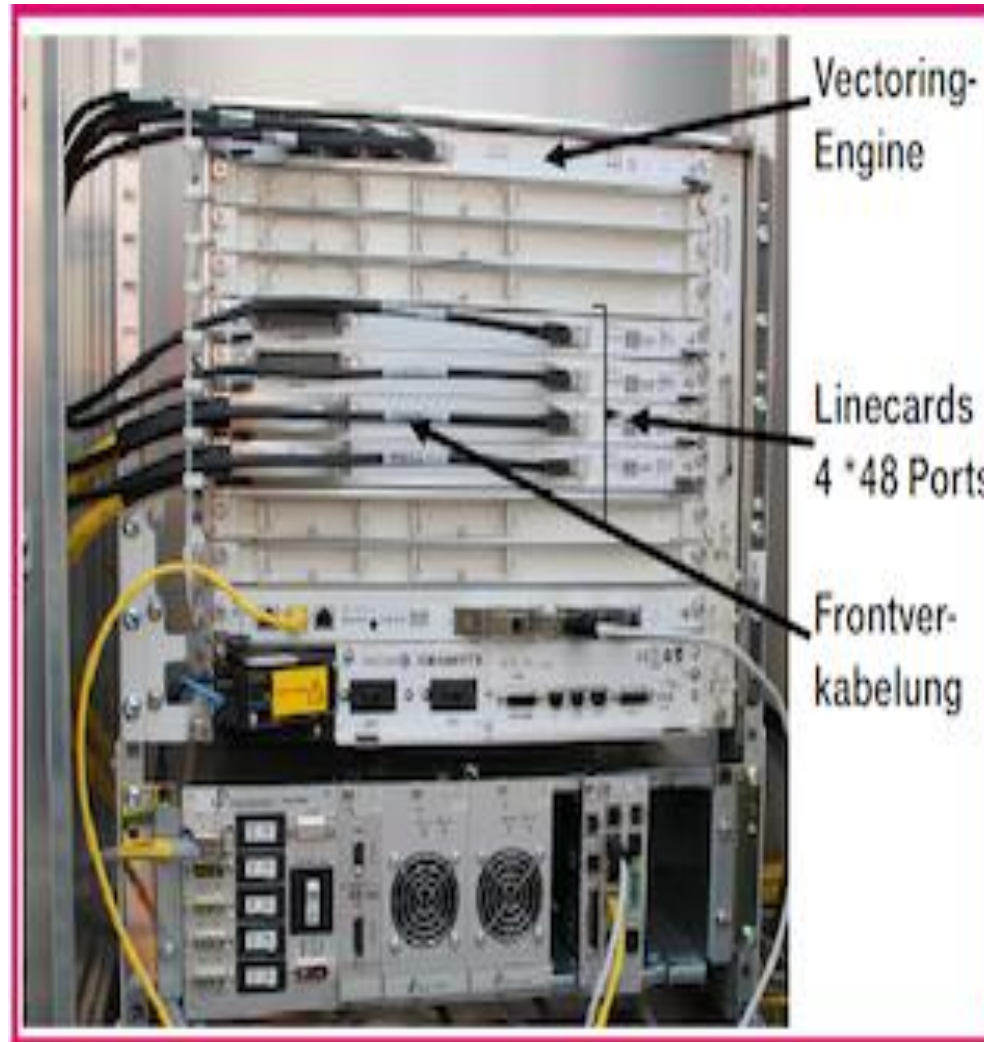
A router is connected to two or more data lines from different networks.

When a data packet comes in on one of the lines, the router reads the network address information in the packet to determine the destination. Then, using information in its routing table.



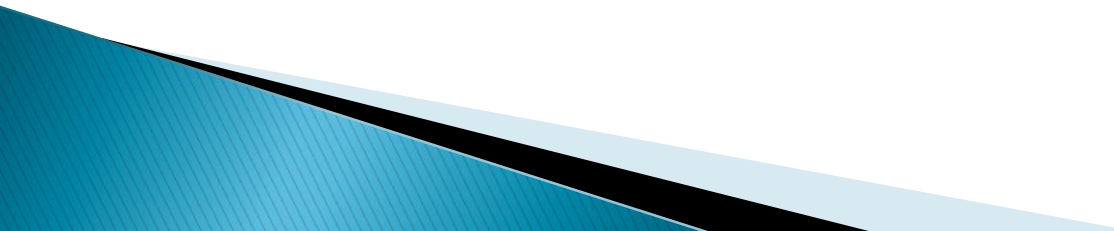


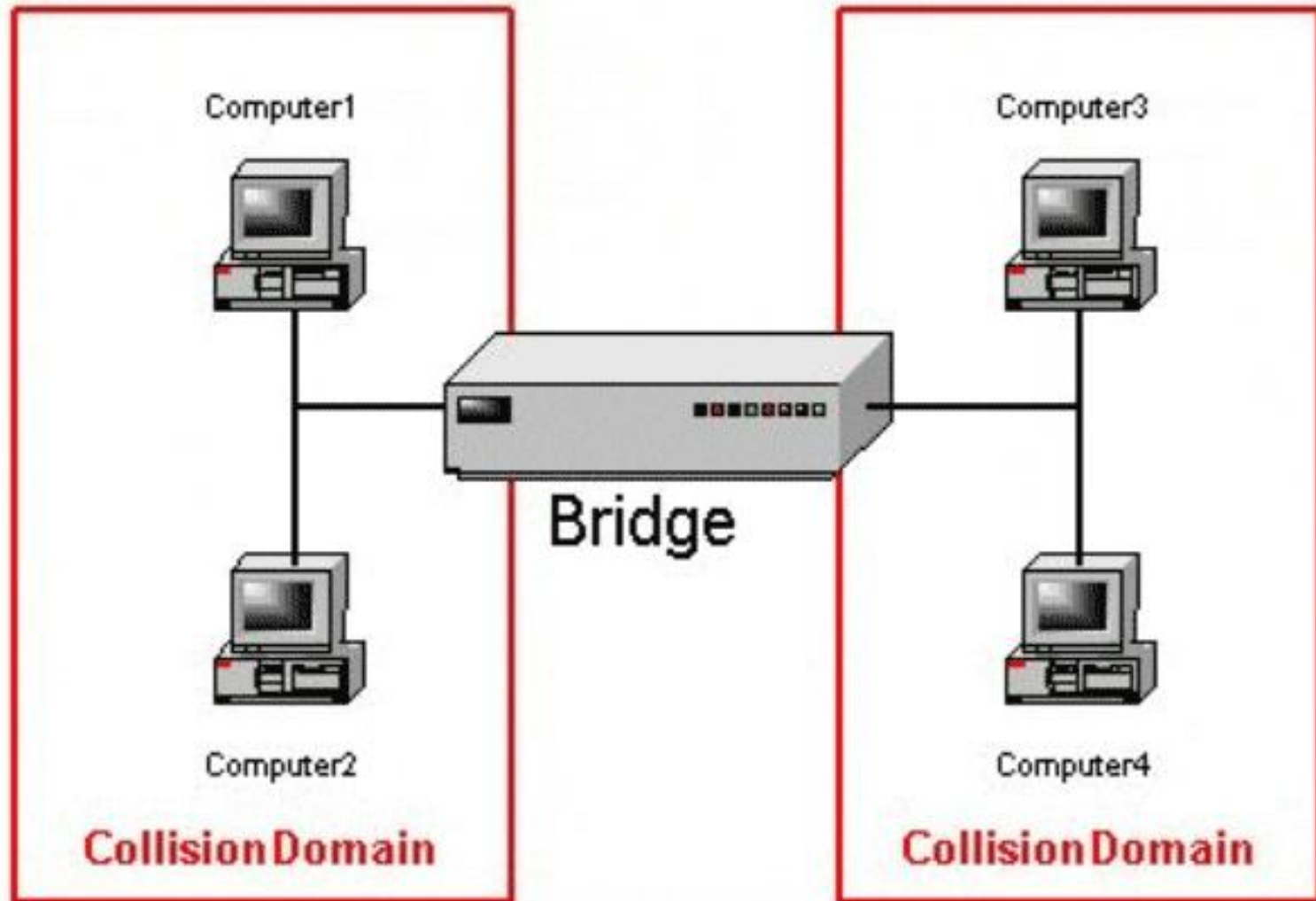
Router



Bridge Network

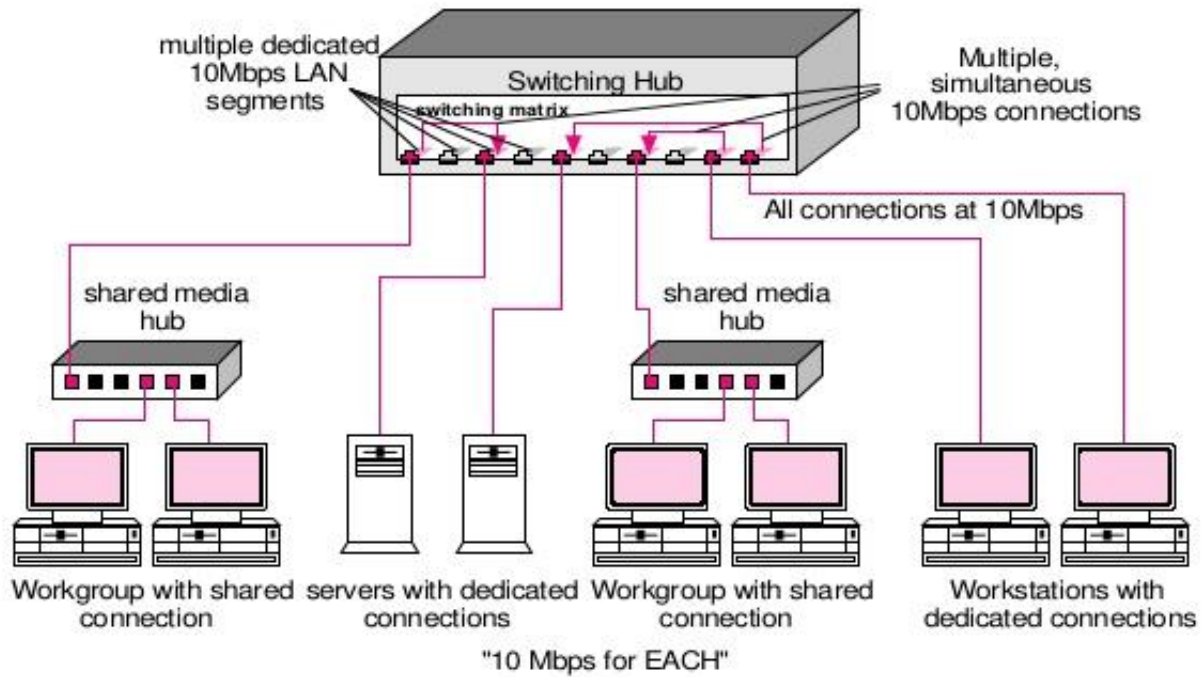
Is a network device that connects multiple network segments. In the OSI model bridging acts in the first two layers, below the network layer Bridges serve a similar function as network switches that also operate at Layer 2. Traditional bridges, though, support one network boundary (accessible through a hardware port), whereas switches usually offer four or more hardware ports. Switches are sometimes called "multi-port bridges" for this reason.





Switches

Switch-Based LAN Architecture

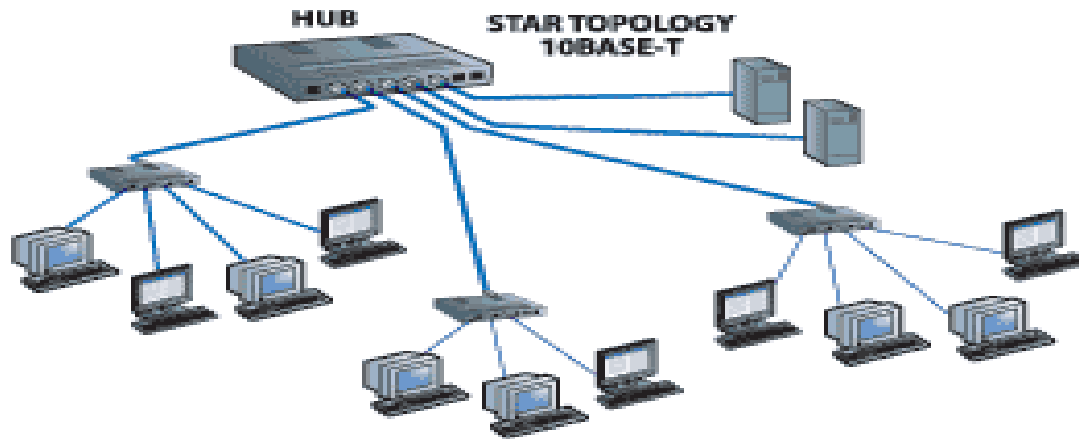


Topology Examples

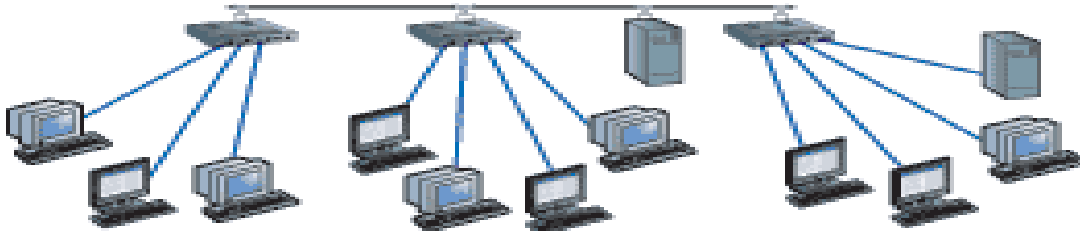
REPEATER

BUS TOPOLOGY
10BASE2

WORK STATION FILE SERVER



MIXED TOPOLOGY AND MEDIA



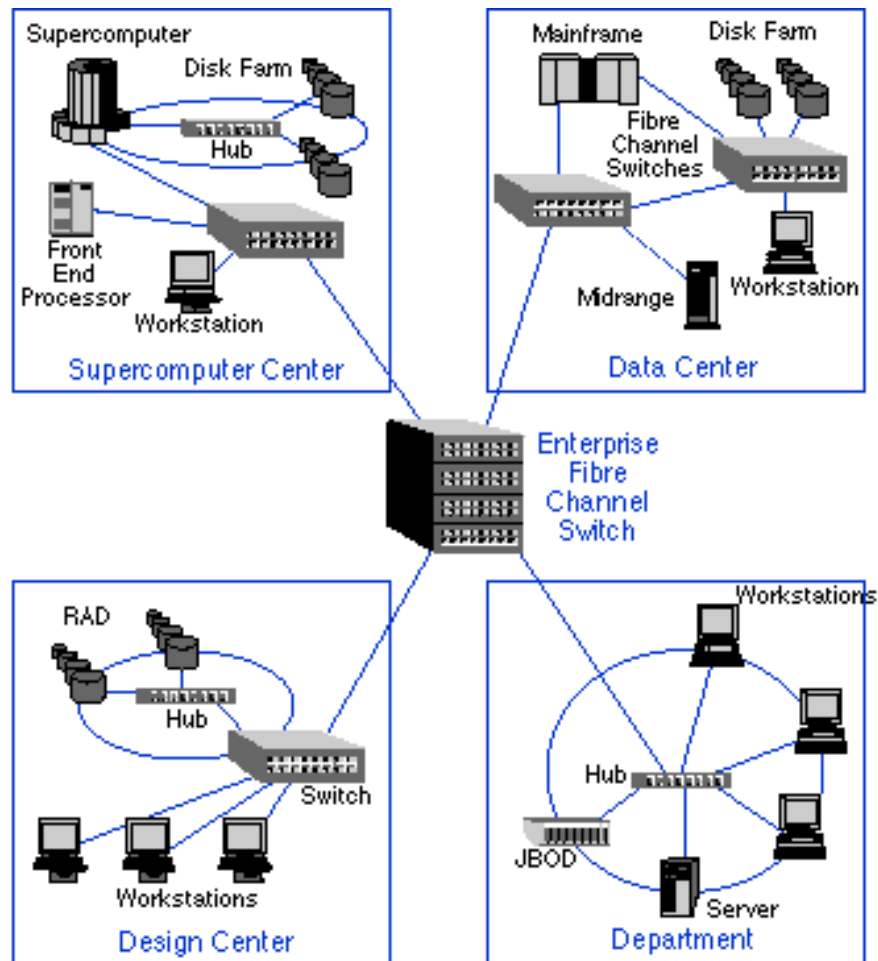
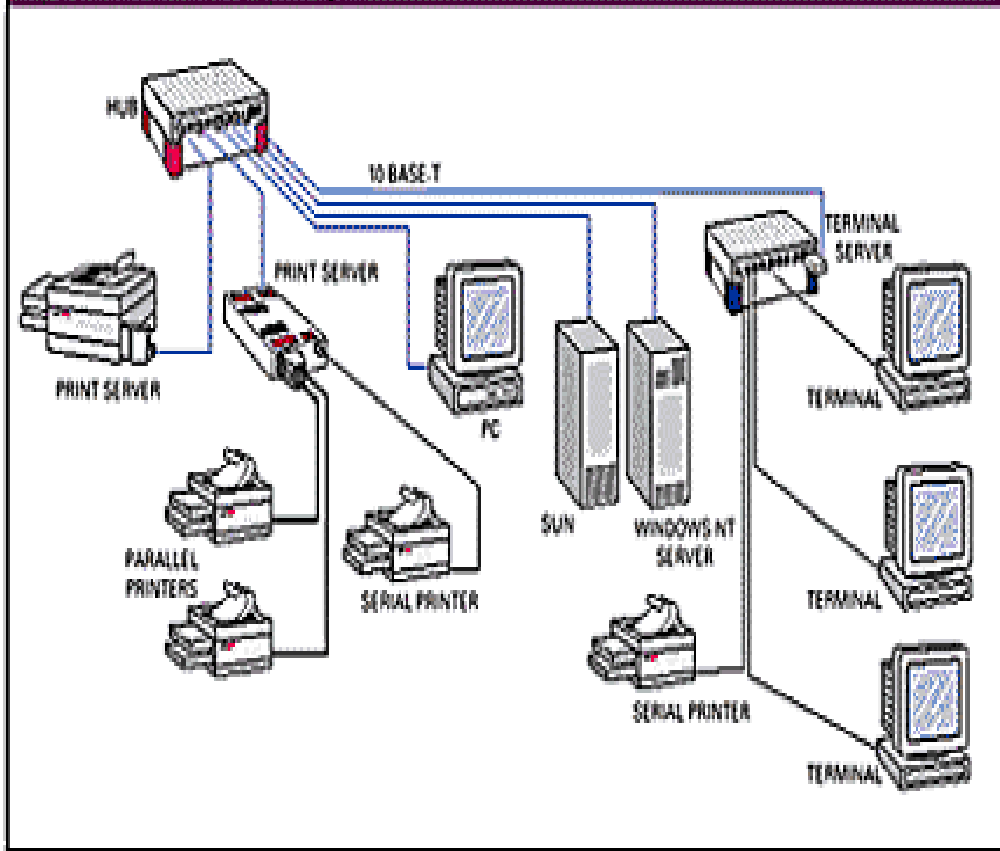
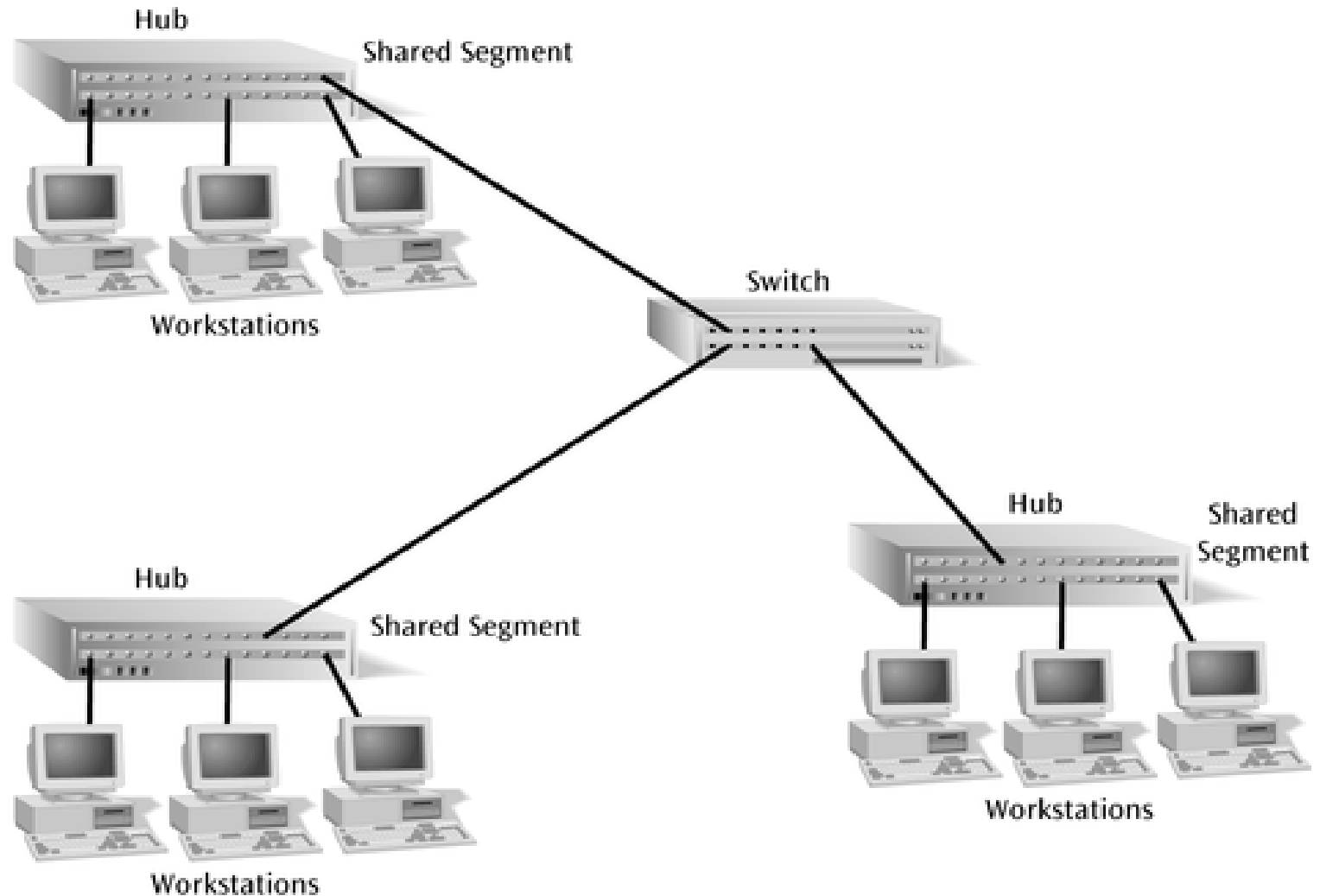


Figure 1.1 Fibre Channel meets the demands of IT systems

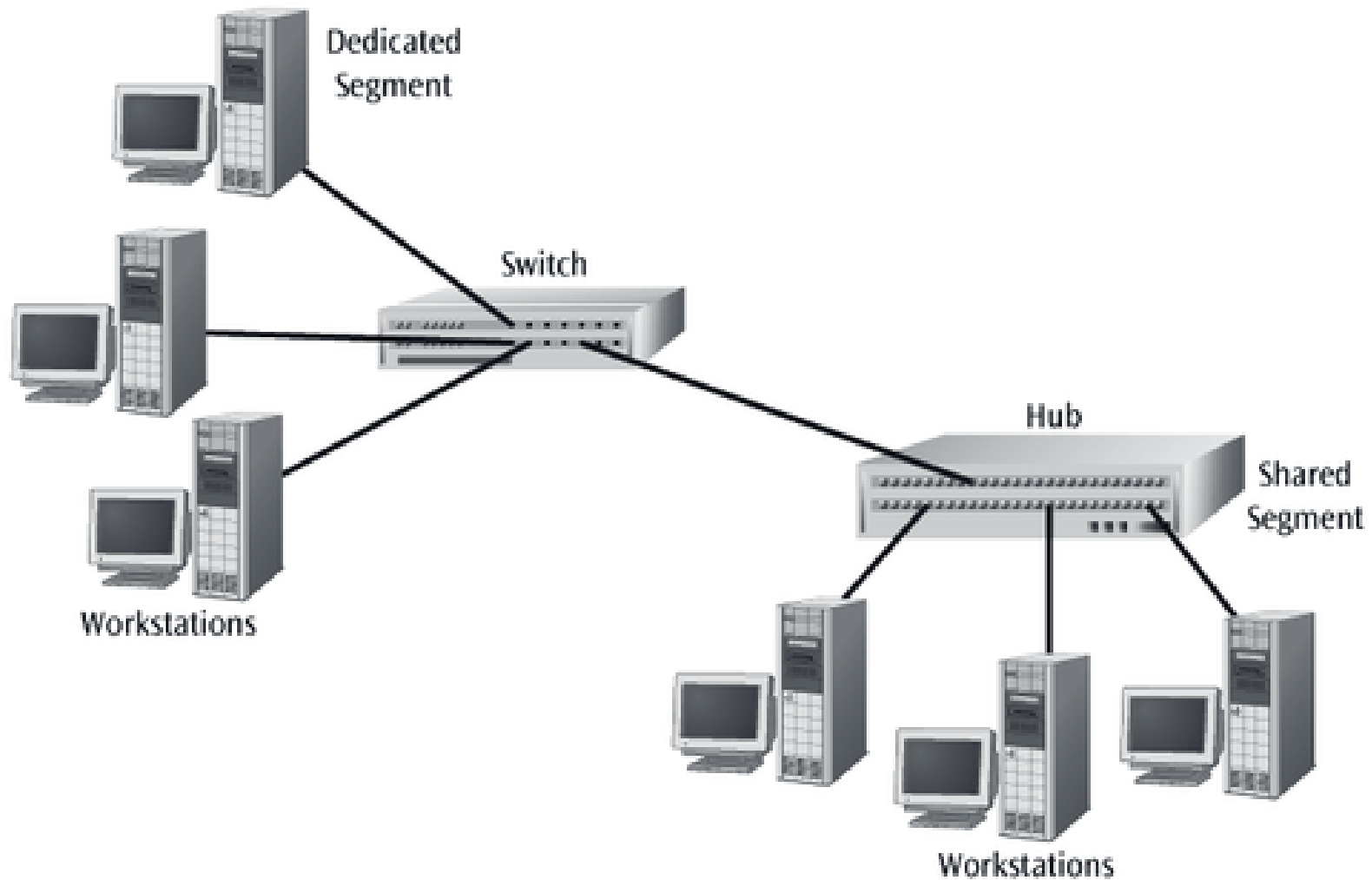
Terminal/Printer Server Example



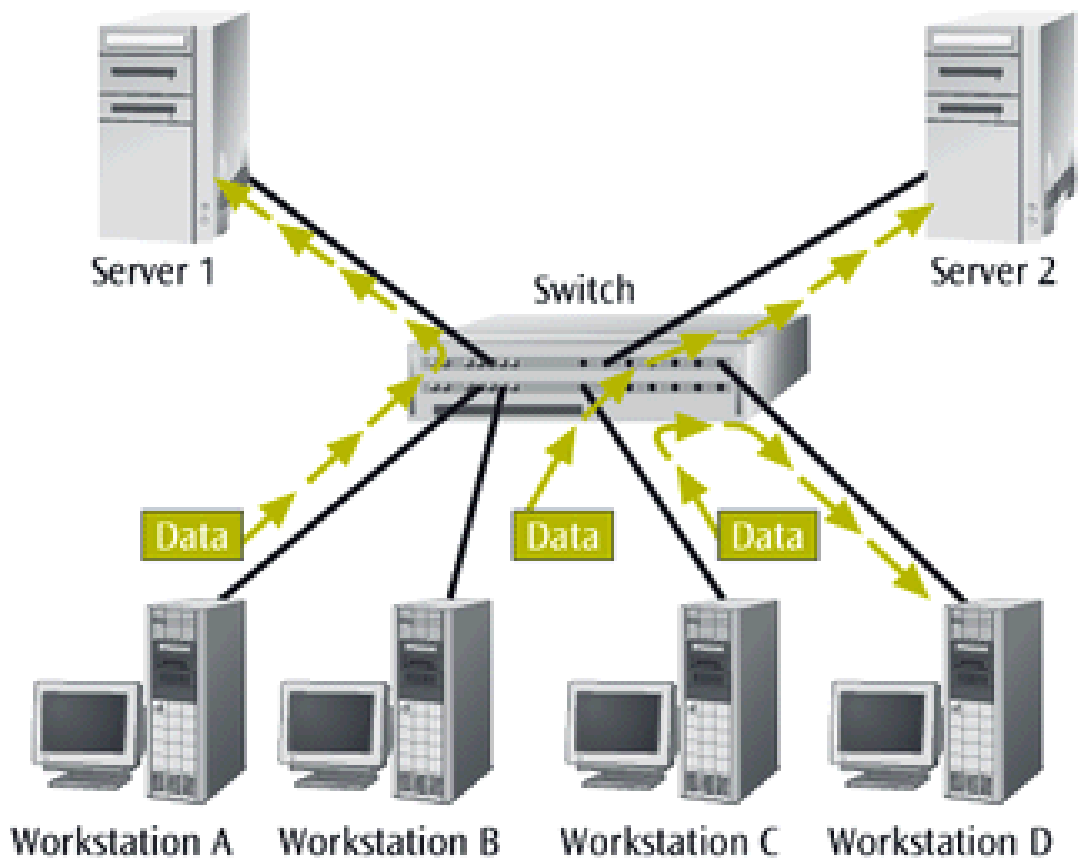
Workstations connected to a shared segment of a LAN



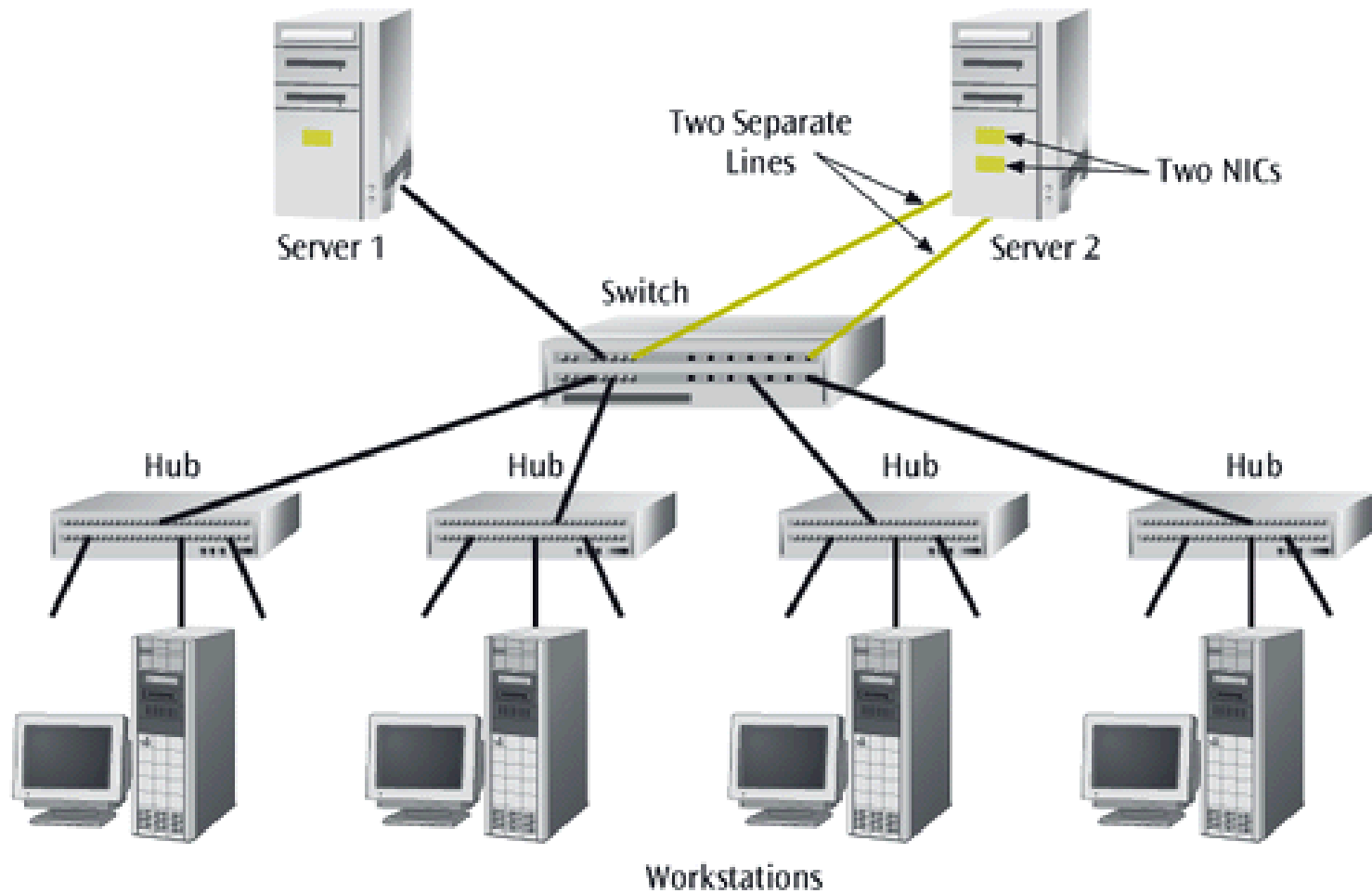
Workstations connected to a dedicated segment of a LAN



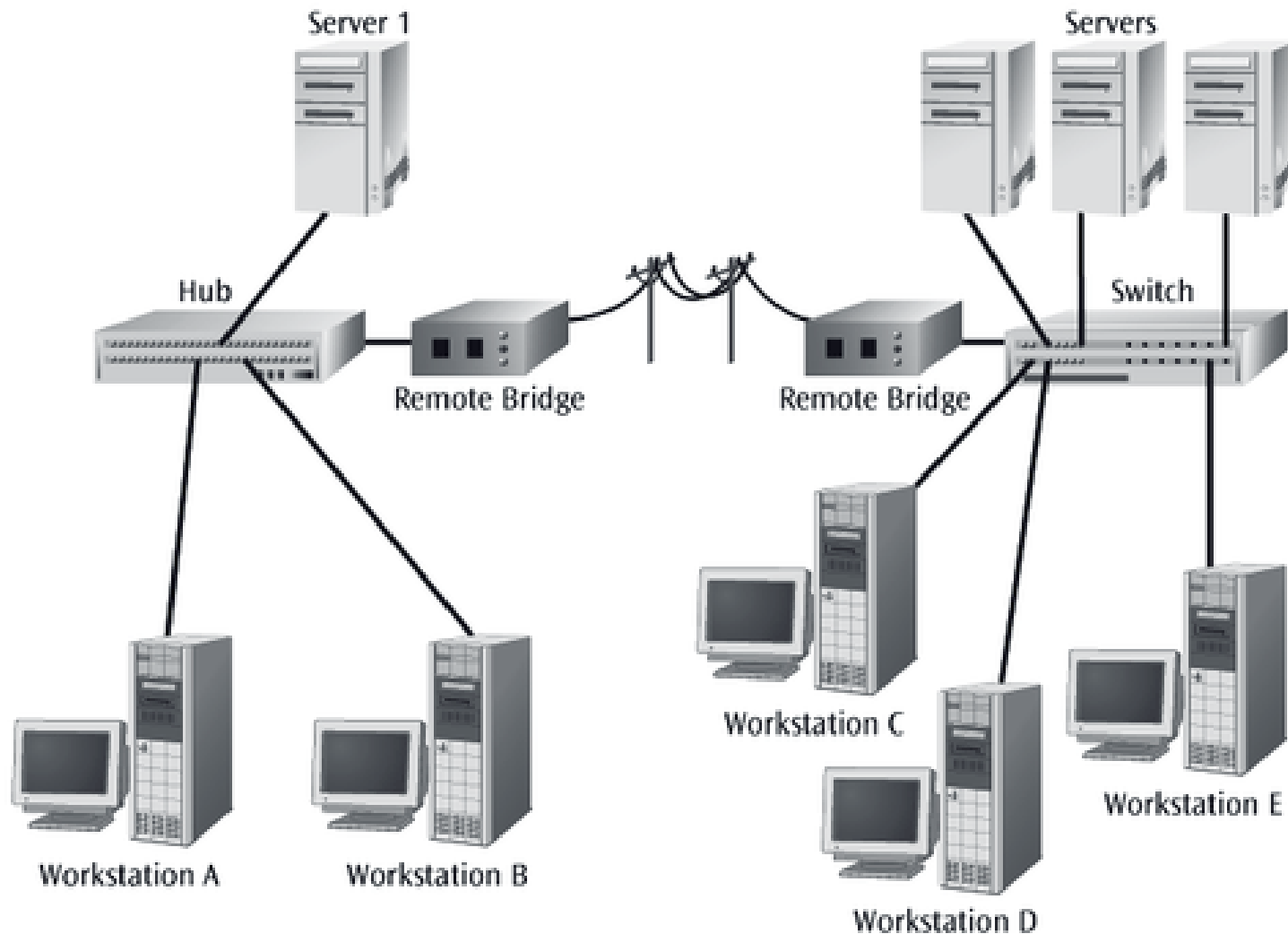
A Switch with Two Servers Allowing Simultaneous Access to Each Server



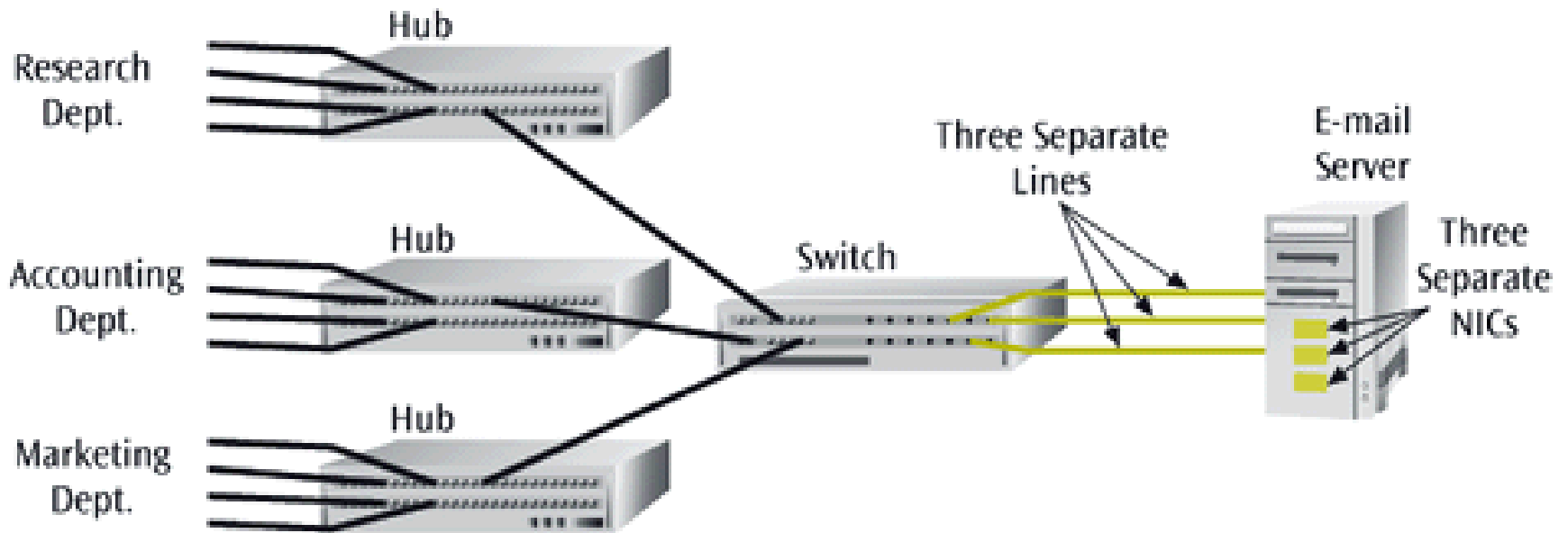
A server with two NICs and two connections to a switch



A pair of remote bridges and switch combination designed to isolate network traffic



Switch providing multiple access to an e-mail server



Connections (in general)

Bridges for LANs and hubs.

Switches for LANs and workstations.

Routers for LANs and WANs (the Internet).

EXERCISE

- ❑ Connect 2 buildings 3 storey high with a distance of 500m between each building.
- ❑ Each floor is occupied by the Finance Department, Administration Department and Computing Department.
- ❑ Your report should have the following items. Anything extra is encouraged.
 - ❑ a. Introduction
 - ❑ b. Network Diagrams
 - ❑ c. Devices that will be used.
- ❑ You are required to use MS Visio to draw the Network Diagrams.