

MICROSOFT OFFICIAL COURSE

Module 1

Understanding Network Infrastructure

Module Overview

- Network Architecture Standards
- Local Area Networking
- Wide Area Networking
- Wireless Networking
- Connecting to Internet
- The OSI Model
- Adapters, Hubs and Switches
- Routing
- Media Types

Lesson 1: Network Architecture Standards

- Network Components and Terminology
- Network Architecture
- Network Media Access Control Methods
- IEEE 802 Standards

Network Components and Terminology

- Data
- Node
- Client
- Server
- Peer
- Network adapter
- Hub
- Switch
- Router
- Media
- Transport protocol
- Bandwidth

Network Architecture

Most common network architecture types:

- Ethernet
- FDDI (Fiber Distributed Data Interface)
- Token ring

IEEE 802 Standards

IEEE 802 standards:

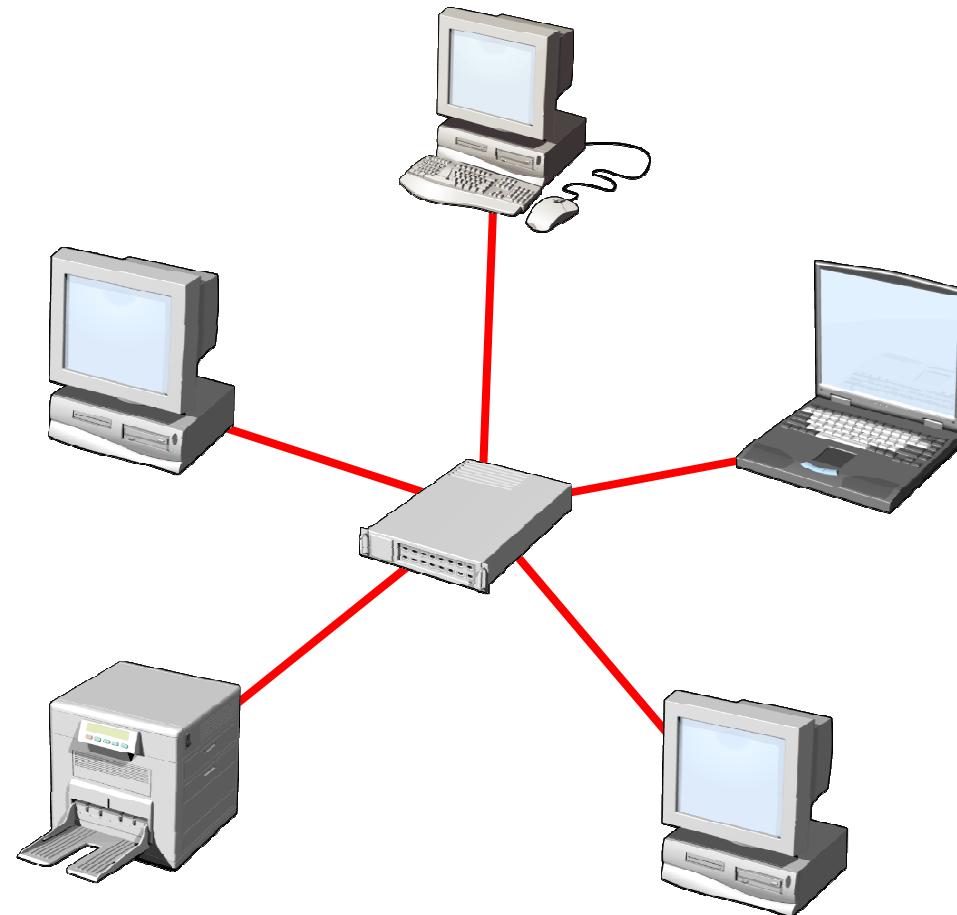
- IEEE 802.3 – Ethernet networks
- IEEE 802.5 – Token ring networks
- IEEE 802.11 – Local wireless networks
- IEEE 802.16 – Broadband wireless networks

Lesson 2: Local Area Networking

- What Is a LAN?
- How Nodes on a LAN Communicate
- Physical Components of a LAN
- LAN Physical Topologies
- LAN Logical Topologies

What Is a LAN?

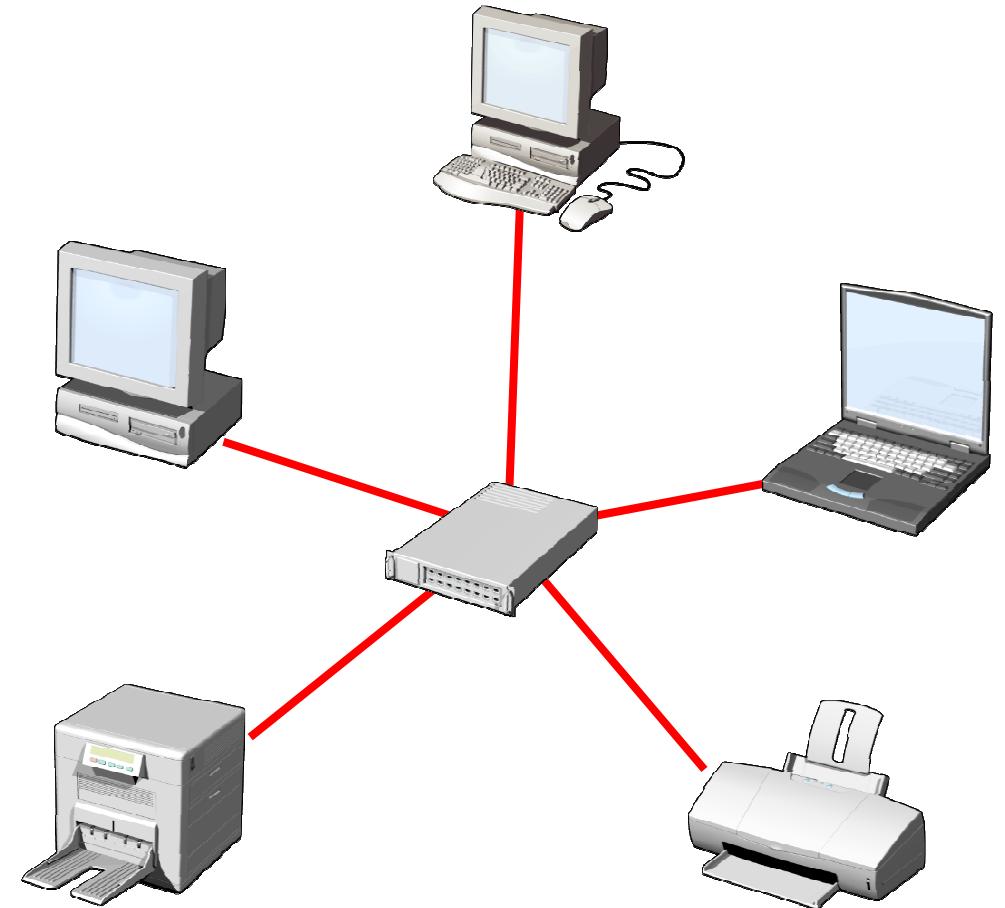
A LAN is the most common form of computer network



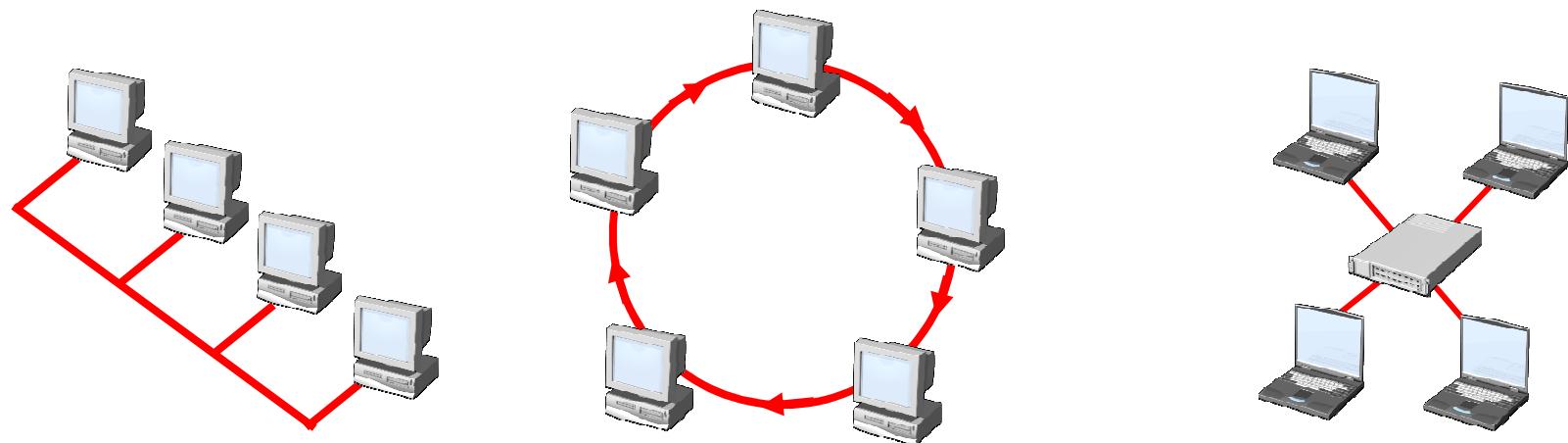
Physical Components of a LAN

Components of a LAN:

- Network adapter
- Wiring
- Hub/Switch
- Termination point
- Wiring cabinet



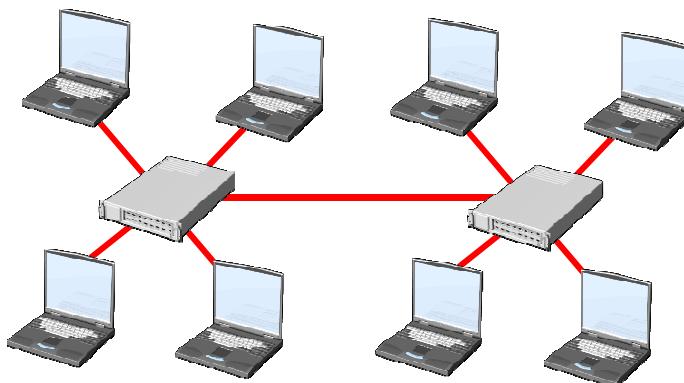
LAN Physical Topologies



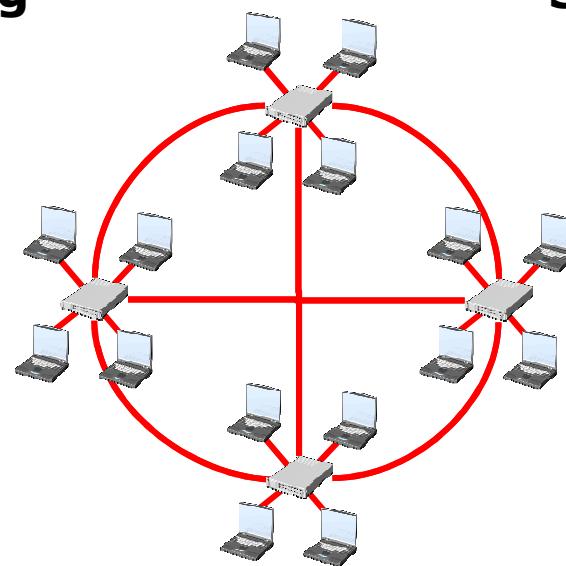
Bus

Ring

Star



Hybrid



Mesh

LAN Logical Topologies

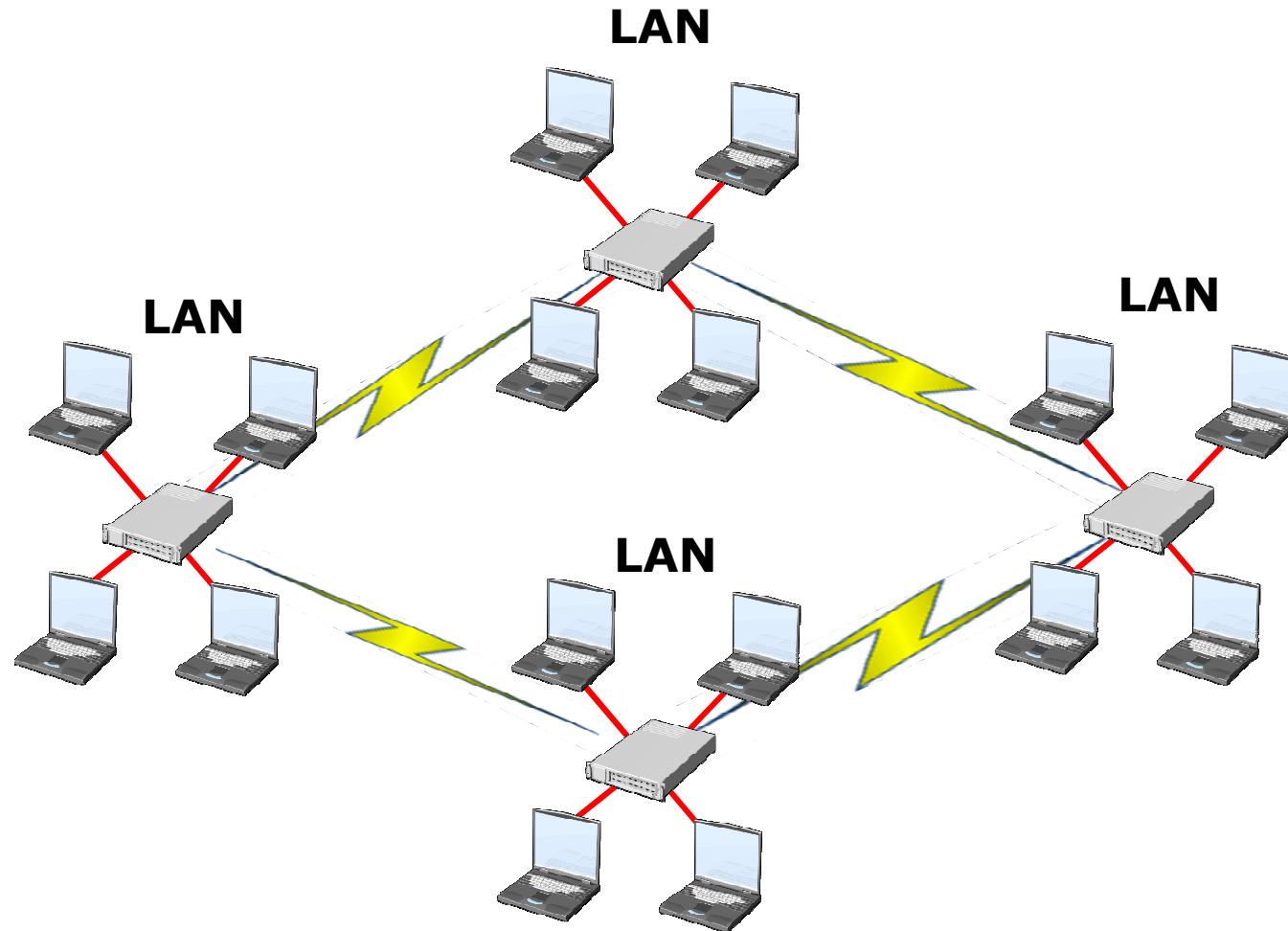
Topologies:

- Bus Logical (Ethernet)
- Ring Logical (FDDI and token ring)

Lesson 3: Wide Area Networking

- What Is a WAN?
- Physical WAN Components
- What Are the WAN Standards?
- What Are the T-Carrier and E-Carrier Standards?
- Optical Carrier Standards
- What Is ISDN?
- Connecting to the Internet with WAN Components

What Is a WAN?



Physical WAN Components

Physical WAN components:

- Bridge
- Router
- Leased line
- Backbone

What Are the WAN Standards?

WAN standards:

- T-Carrier
- E-Carrier
- Optical Carrier (OC-X)
- ISDN

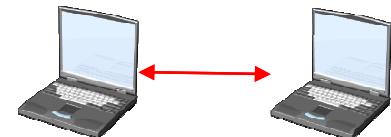
Lesson 4: Wireless Networking

- Wireless Networking Components
- Wireless Standards and Protocols
- What Is 802.11?
- Securing Wireless Networks

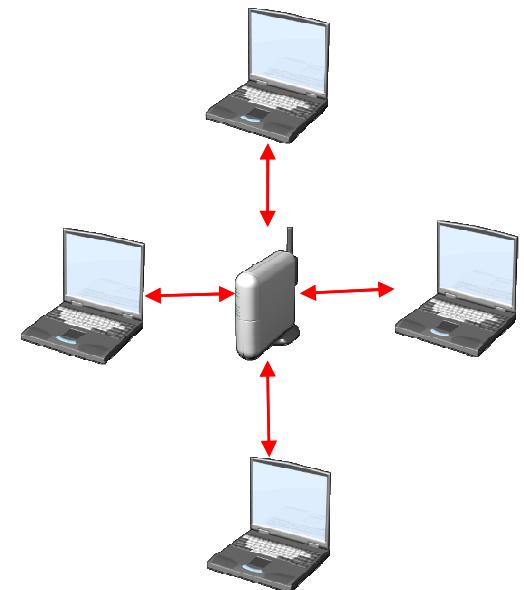
Wireless Networking Components

- Wireless network adapter
- Access point
- Ad Hoc network
- Infrastructure network
- SSID (Service Set ID)

Ad hoc Network



Infrastructure Network



Wireless Standards and Protocols

Wireless standards and protocols:

- 802.11 - Wireless LAN
- 802.16 - Wireless WAN

What Is 802.11?

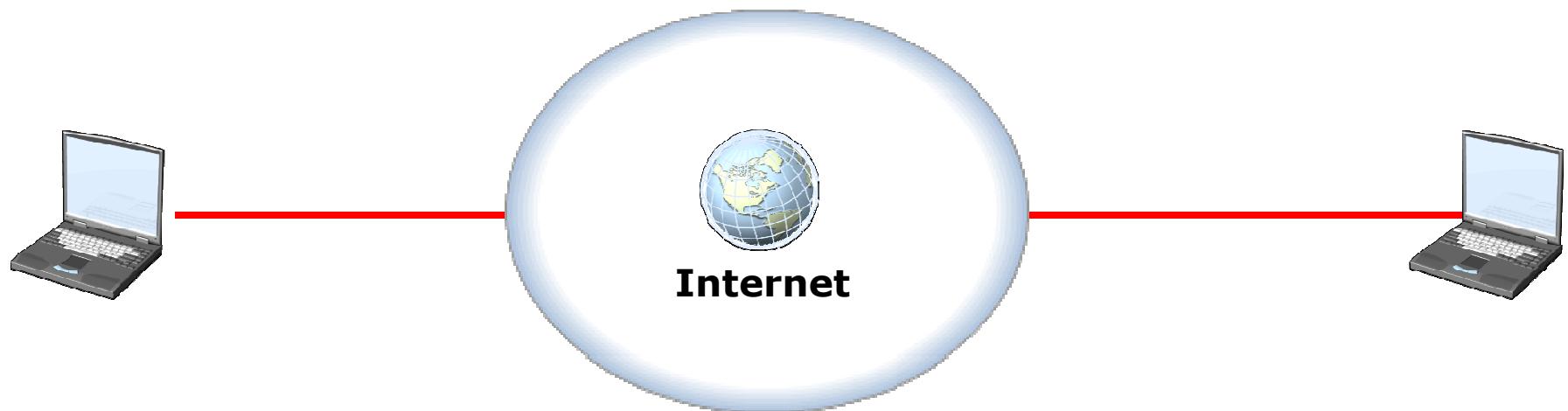
Wireless LAN standards:

- Common versions:
 - 802.11a
 - 802.11b
 - 802.11g
 - 802.11n

Lesson 5: Connecting to the Internet

- What Is the Internet?
- Intranets and Extranets
- What Is a Firewall?
- What Is a Perimeter Network?
- Proxy and Reverse Proxy Servers

What Is the Internet?



Intranets and Extranets

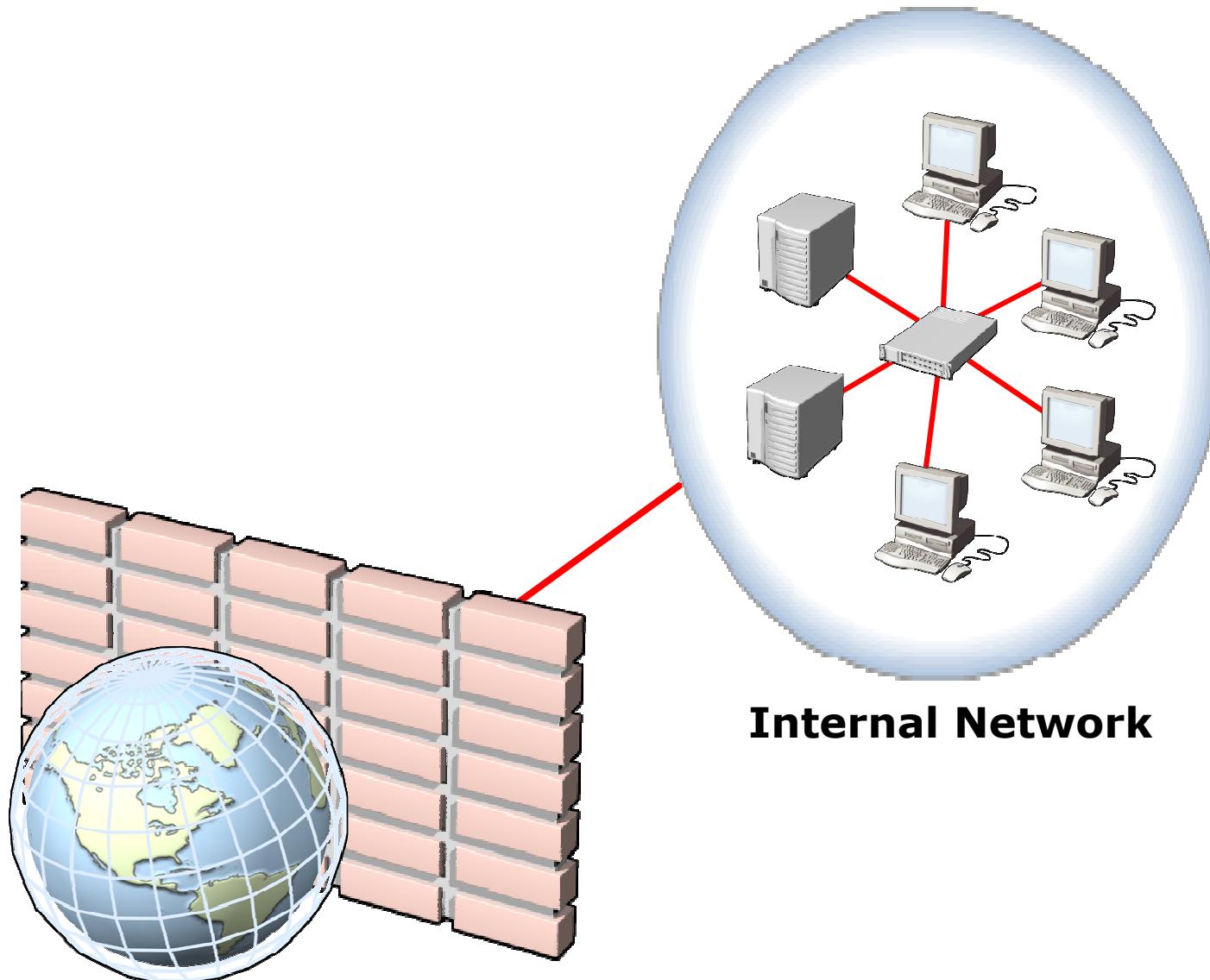
Intranets are:

- A group of services hosted on a network
- A private structure
- Internet-like service provision

Extranet are:

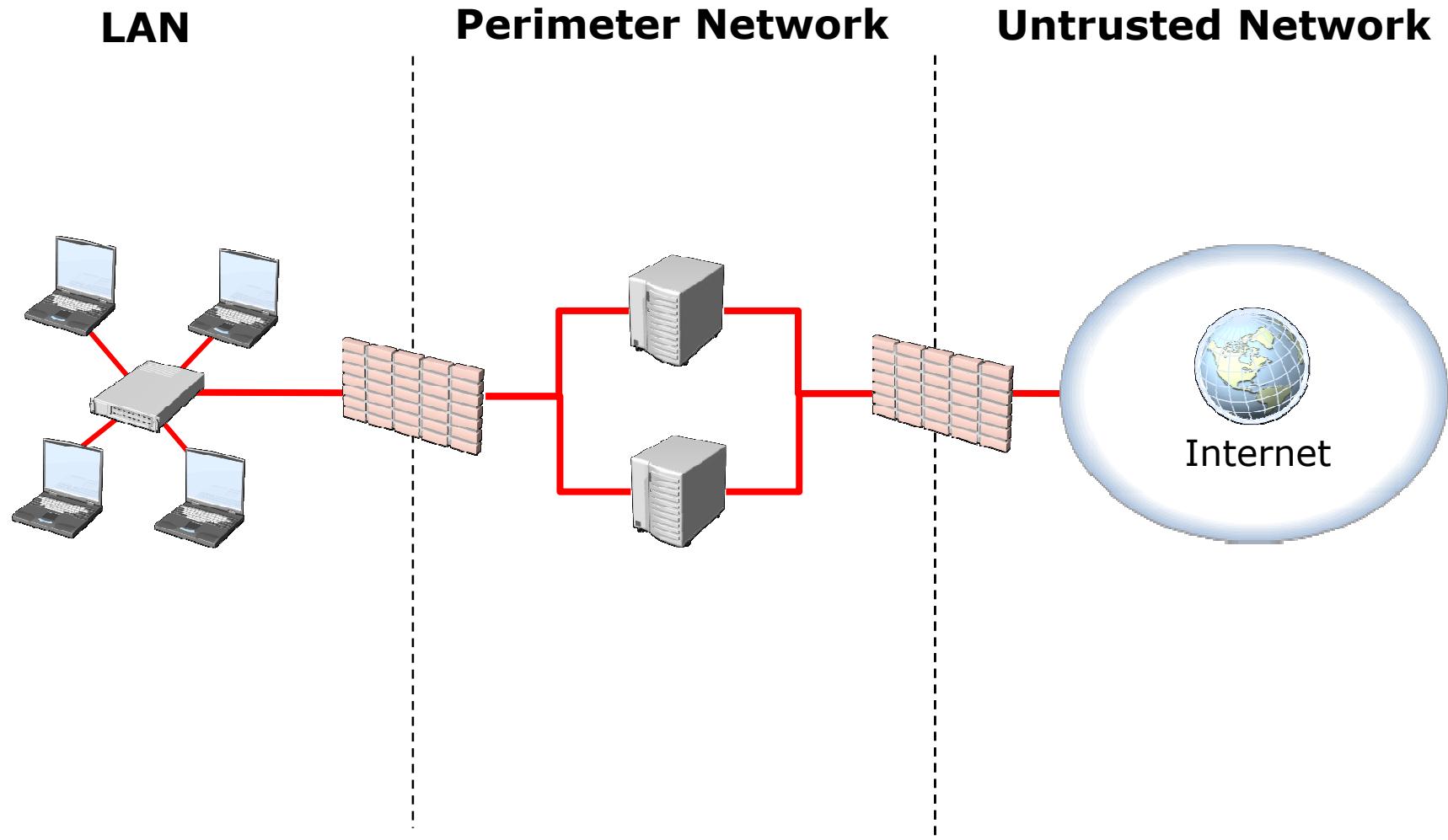
- Similar services to intranet
- Exposed to networks outside of the intranet
- Services that require extra security measures

What Is a Firewall?



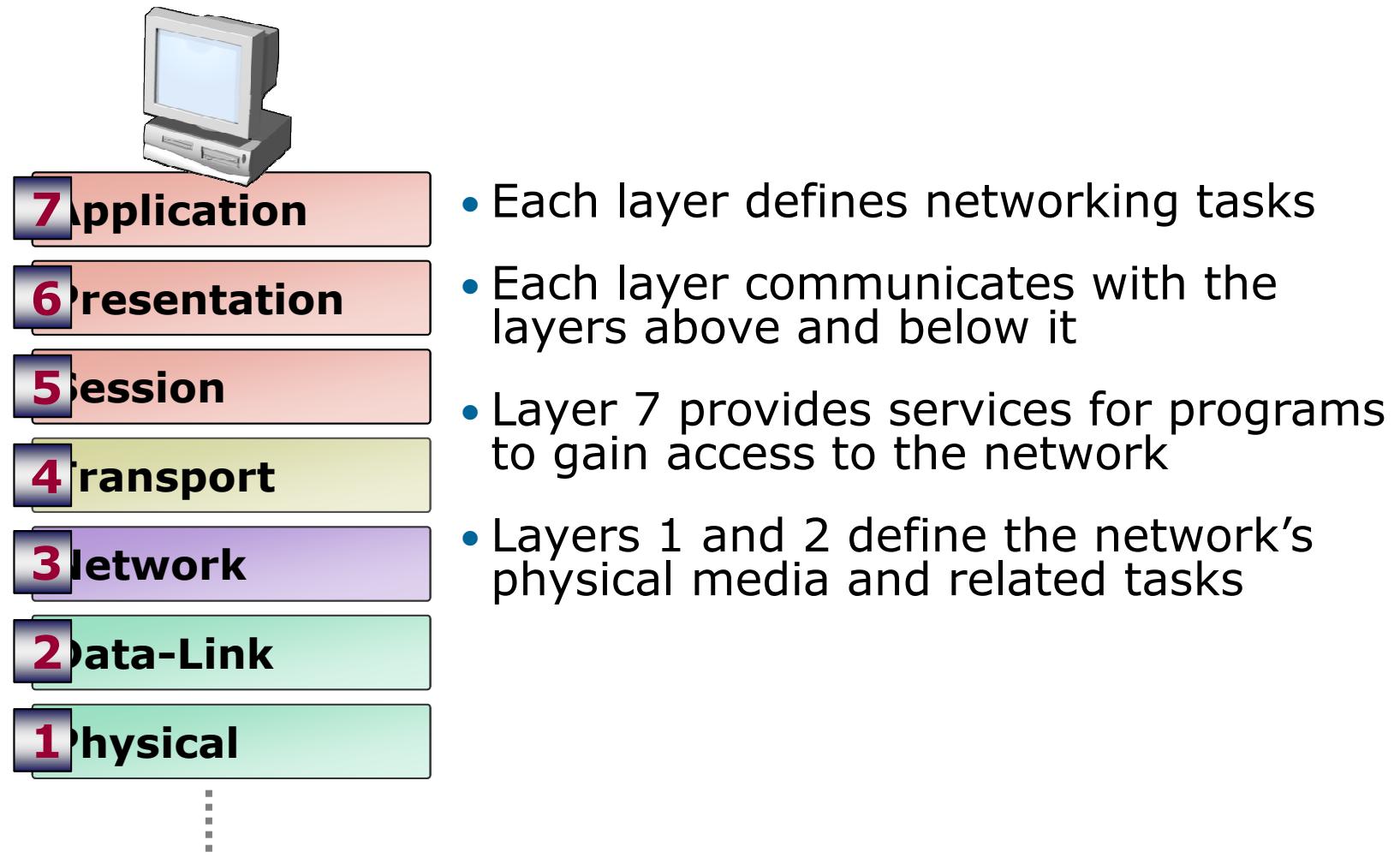
Internal Network

What Is a Perimeter Network?



The OSI Model

The OSI model defines the generic tasks that are performed for network communication



Lesson 8: Understanding Adapters, Hubs, and Switches

- What Is a Network Adapter?
- Transmission Speeds
- What Is a Hub?
- Characteristics of a Switch
- What Is a VLAN?

What Is a Network Adapter?

A network adapter:

- Converts instructions from the network protocol stack into electrical signals
- Merges these signals onto the wire
- Converts electrical signals received on the wire into meaningful instructions for the network protocol stack

Preamble	Start frame delimiter	Dest. MAC address	Source MAC address	Data	Pad	Frame check sequence
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The network adapter encapsulates the instructions it receives from the protocol stack into a logical sequence known as a frame

Transmission Speeds

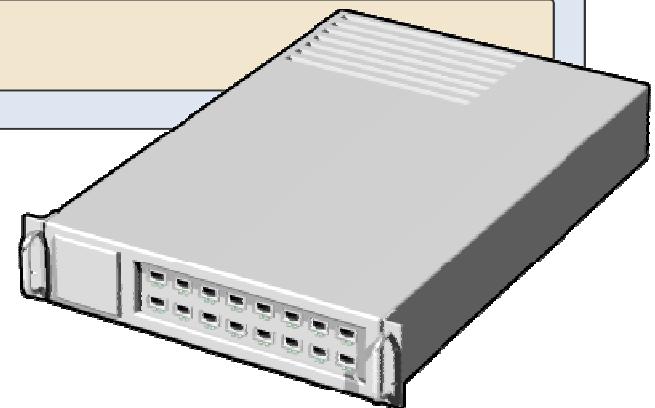
The term bandwidth is often used to describe the transmission speed of a network

- Early Ethernet operated at 3 Megabits per second
- Today's Ethernet is typically 1 Gigabits per second
- Contention reduces throughput

What Is a Hub?

A hub:

- Enables star wiring to provide a central wiring point**
- Supports multiple ports**
- Provides for a degree of fault isolation**
- Extends your network**



Characteristics of a Switch

A switch provides the same basic functionality as a hub

A switch:

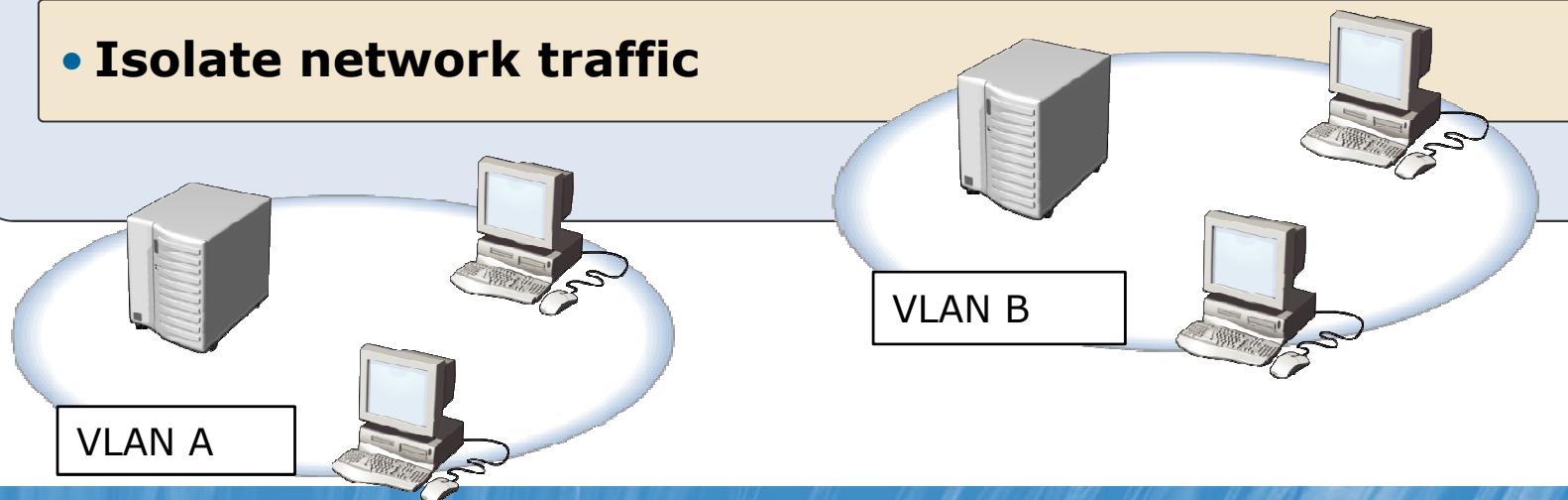
- Provides wiring concentrator functionality like a hub**
- Enables network traffic management**
- Performs firewall functions**
- Makes routing decisions based upon traffic priority**

Type	Description
Layer 2	MAC-level bridging
Layer 3	Routing functionality added
Layer 4	Firewall and QOS support available

What Is a VLAN?

A VLAN enables you to:

- Manage network traffic
- Group physically dispersed nodes into logical LANs
- Increase the number of nodes without needing to rewire the network
- Reconfigure the network without needing to move nodes
- Isolate network traffic



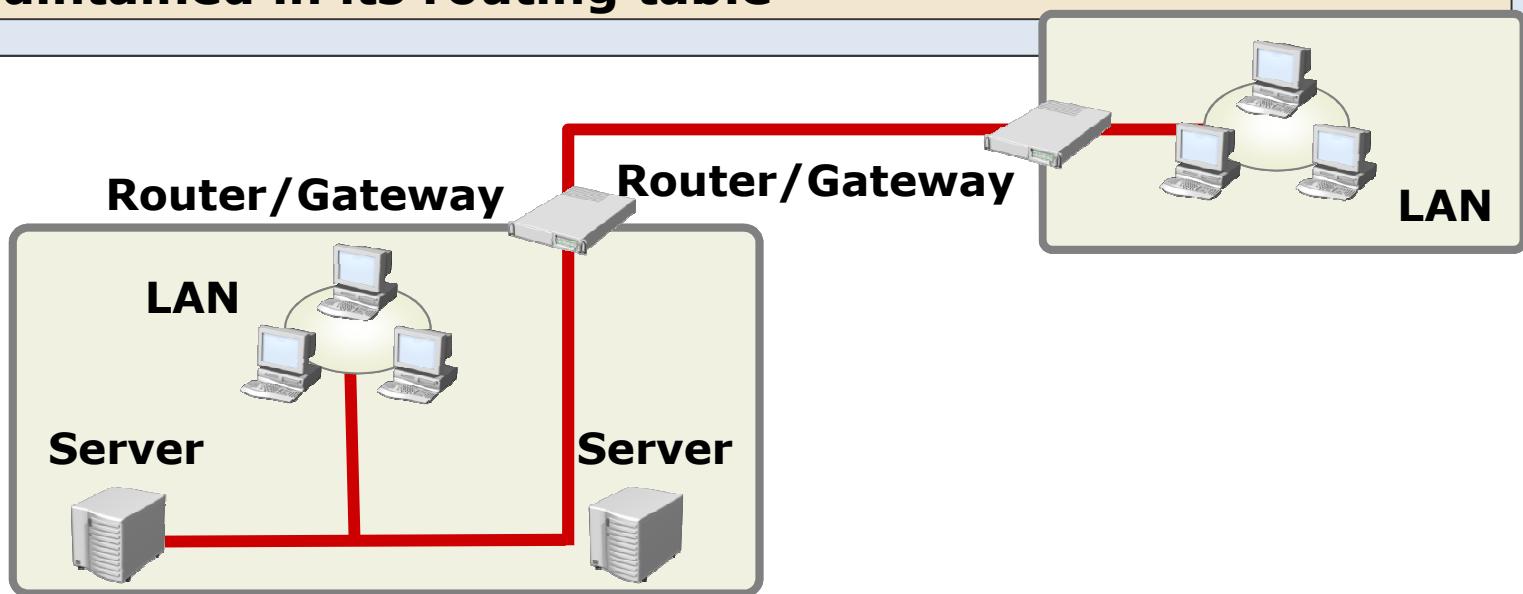
Lesson 9: Understanding Routing

- What Is a Router?
- How a Router Determines a Destination
- Common Routing Protocols
- Discussion: Selecting a Suitable Routing Protocol

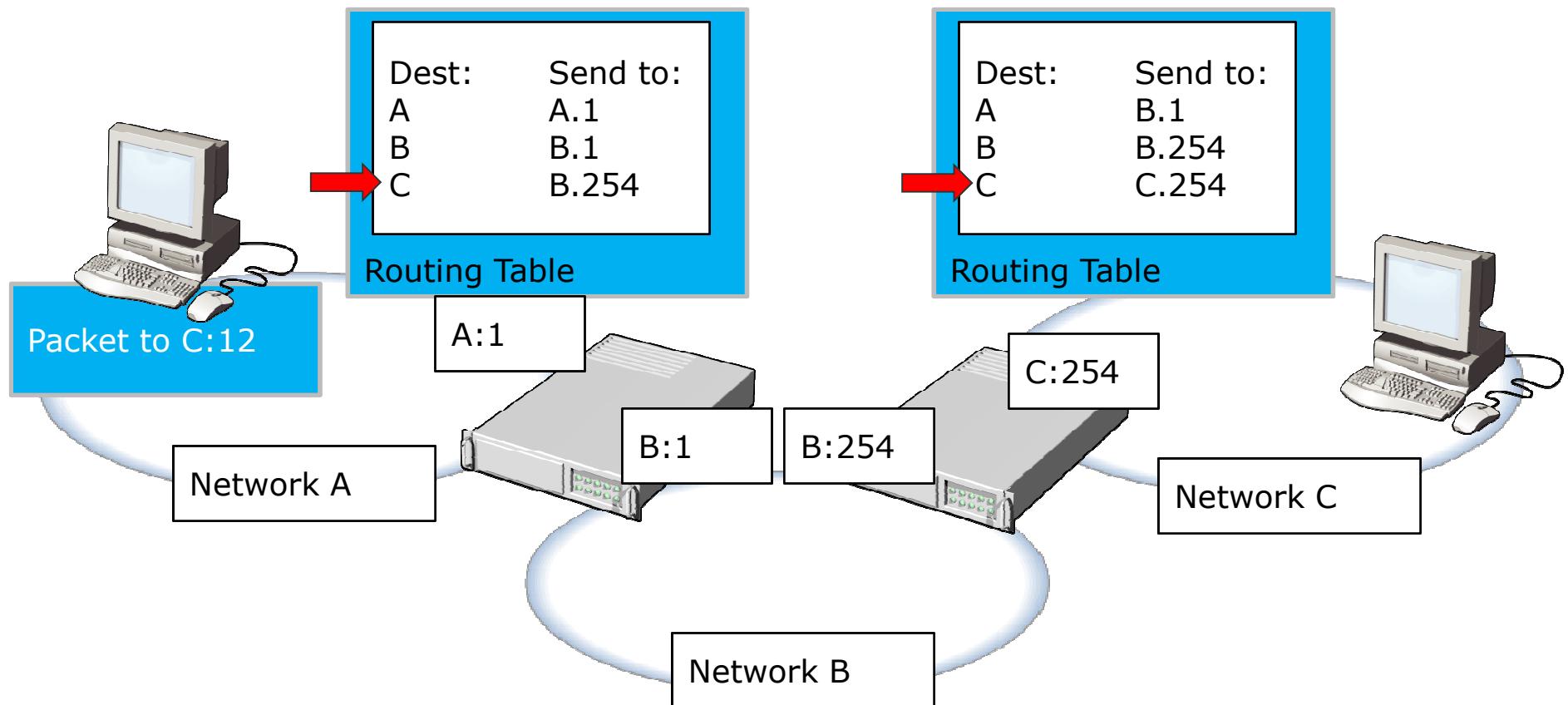
What Is a Router?

A router:

- Manages network traffic by only forwarding packets when required
- Supports one or more routable protocols, such as IP
- Receives explicitly addressed frames from network nodes
- Makes routing decisions based on the information maintained in its routing table



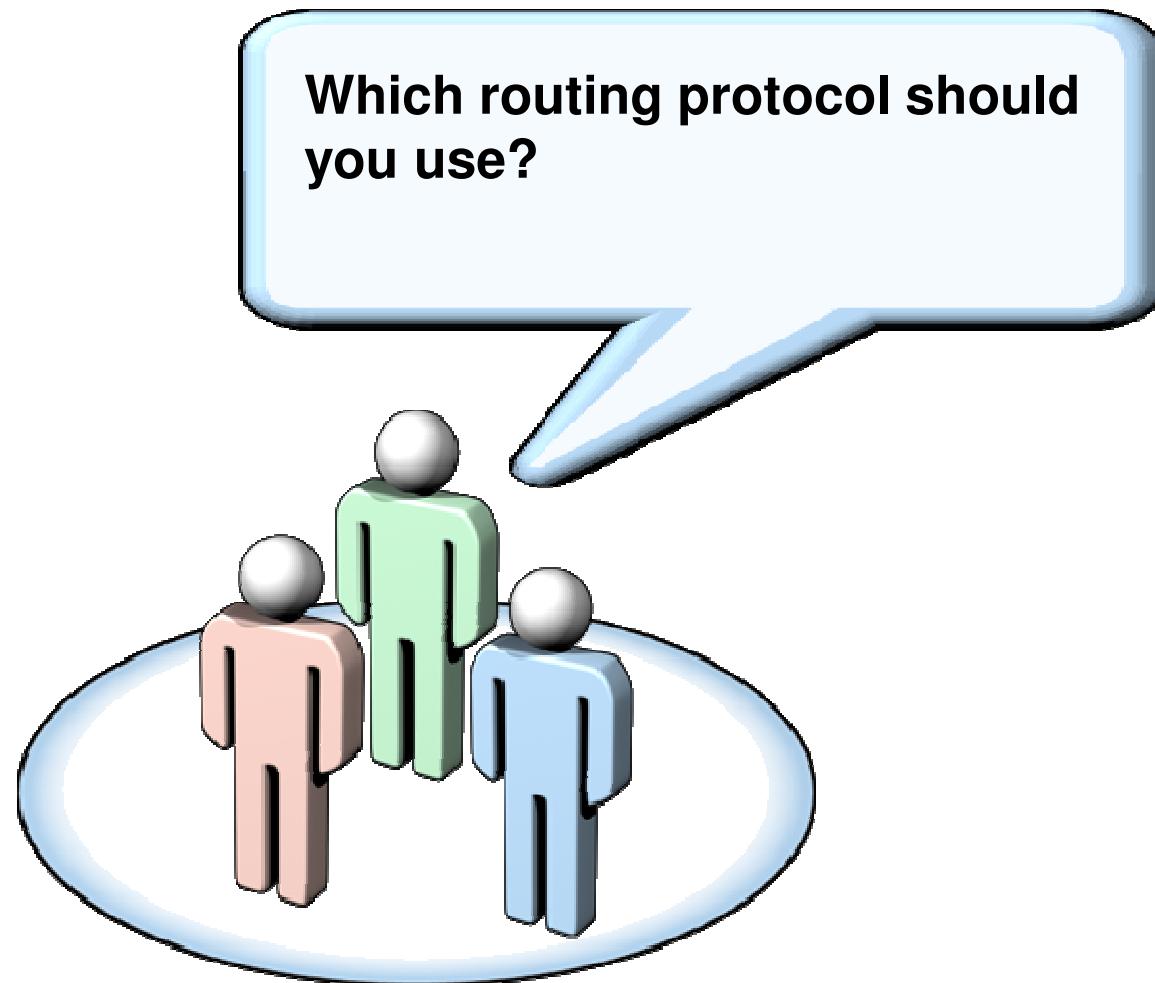
How a Router Determines a Destination



Common Routing Protocols

Protocol	Description
RIP	IGP distance-vector based algorithm Hop count > 16 unreachable
OSPF	IGP routing protocol Link-state based Scales better than RIP
BGP	EGP specifically designed to support the Internet

Discussion: Selecting a Suitable Routing Protocol



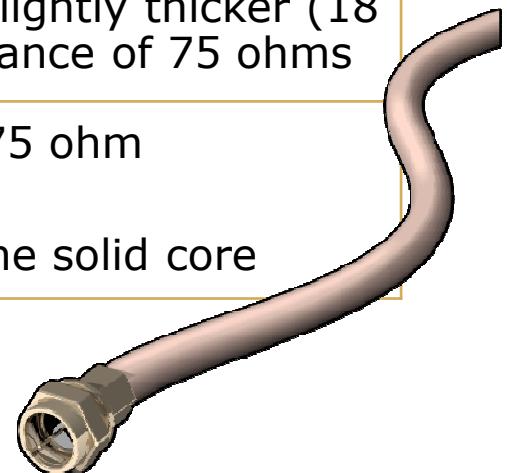
Lesson 10: Understanding Media Types

- Coaxial Cable
- Twisted-Pair Cable
- What Are the CAT Standards?
- Fiber Cable
- Discussion: Selecting a Suitable Cabling Strategy

Coaxial Cable

Coaxial cables must be terminated

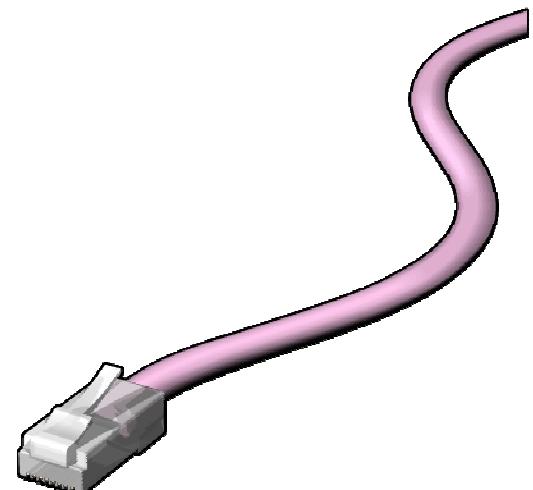
Types of Coaxial Cable	Description
RG58	<ul style="list-style-type: none">• Fairly thin and flexible• Ideal for connecting nodes to the network• Does not support long cable runs or a large number of connected devices• Has an impedance of 50 ohms and uses 20 AWG copper wire
RG59	<ul style="list-style-type: none">• As for RG58, but with a slightly thicker (18 AWG) core and an impedance of 75 ohms
RG11	<ul style="list-style-type: none">• Thick coaxial cable with 75 ohm impedance• 14 AWG cable provides the solid core



Twisted Pair Cable

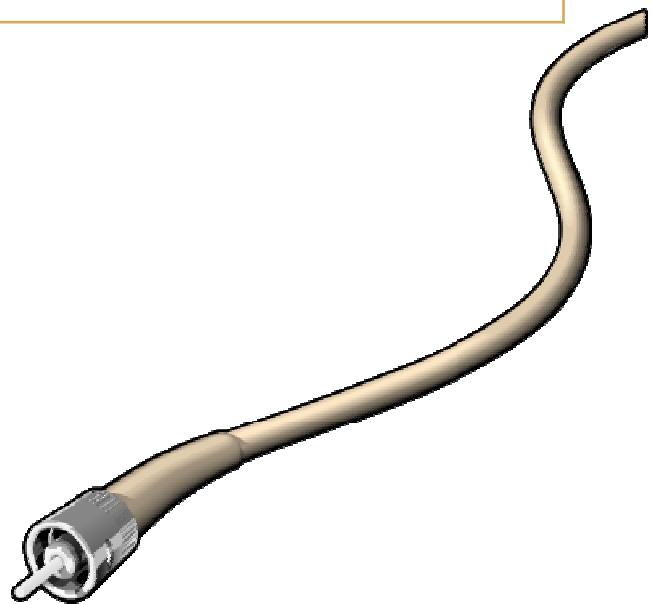
Twisted-pair characteristics:

- **Installation is comparatively inexpensive**
- **Fault finding is easier due to the star wired way in which the cable is laid**
- **The cable supports many uses, including data and telephony**

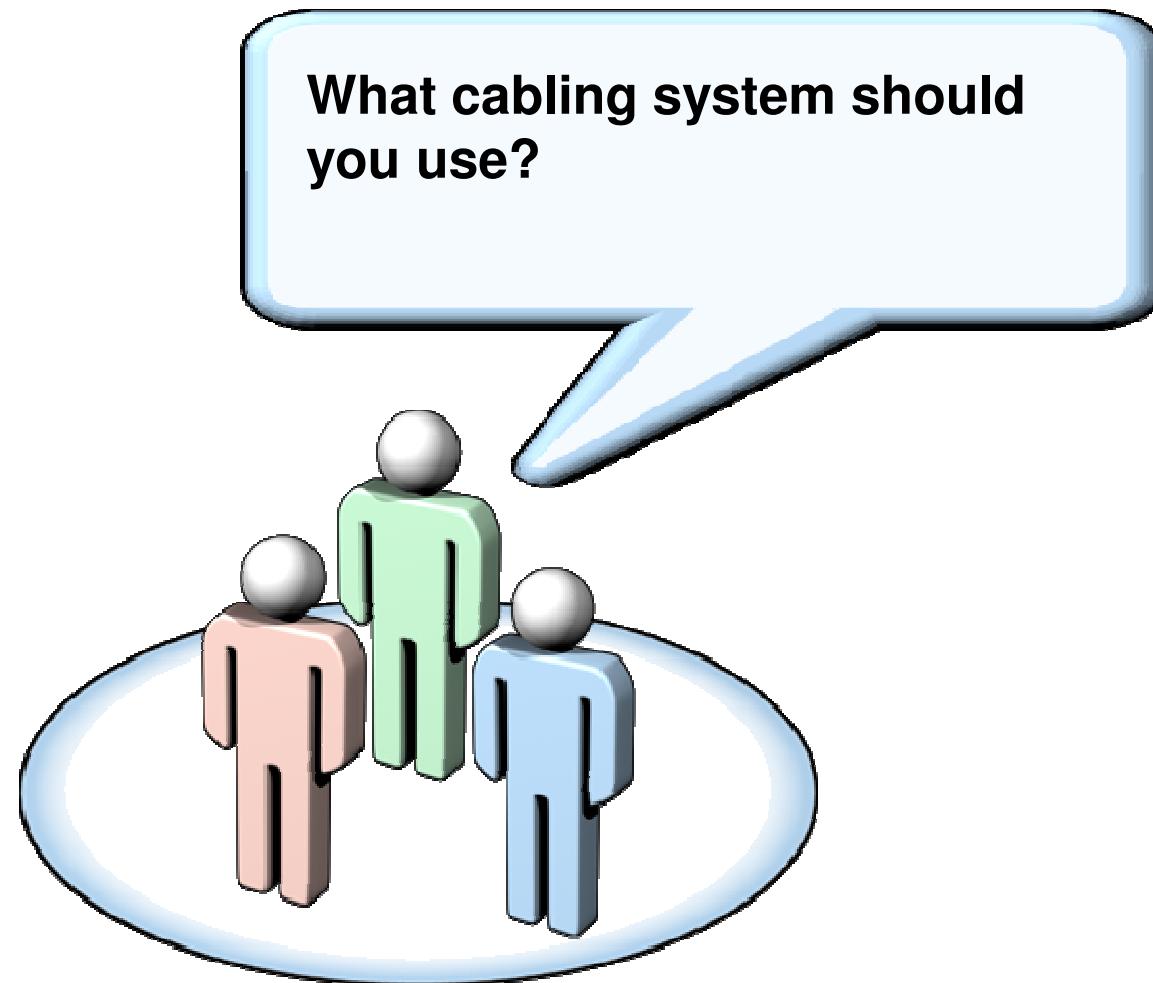


Fiber Cable

Types of fiber cable	Description
Multimode fiber	<ul style="list-style-type: none">Supports bandwidths of around 100 Mbps at distances of up to 2 kilometers and 10 Gbps over 300 meters
Single-mode fiber	<ul style="list-style-type: none">40 Gbps is possible over distances of several hundred kilometers



Discussion: Selecting a Suitable Cabling Strategy



Module Review and Takeaways

- Review Questions

