

Understanding Network Infrastructure

Module Overview

- Network Architecture Standards
- Local Area Networking
- Wide Area Networking
- Wireless Networking
- Connecting to the Internet
- Remote Access

Network Architecture Standards

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

Network Components and Terminology

- Data – actual information sent over the network
- Node – device that either sends or receives data
- Client – primarily receives data
- Server – primarily sends data
- Peer – performs jobs of a client and also of server
- Network adapter-device that allows a node to connect to the physical network
- Hub – device which connects multiple nodes
- Switch – same as hub with extra features
- Router – connects individual networks together
- Media – physical material used to connect devices
- Transport protocol – set of rules
- Bandwidth – throughput or speed of network ops.

Network Architecture

Most common network architecture types:

- Ethernet
- Fiber Distributed Data Interface [FDDI]
- Token ring

Most Common Ethernet Standards

Standard	Media	Bandwidth	Common Uses
10BASE-T	Twisted Copper	10Mbps	Local Networks
100BASE-TX	Twisted Copper	100Mbps	Local Networks
100BASE-FX	Fiber Optic	100Mbps	Distant Networks
1000BASE-T	Twisted Copper	1Gbps	Local Networks
1000BASE-LX	Fiber Optic	1Gbps	Distant Networks
10GBASE-T	Twisted Copper	10Gbps	Local Networks
10GBASE-LR/ER	Fiber Optic	10Gbps	Distant Networks

Network Media Access Control Methods

Network Media Access Control Method	Action
CSMA/CD	<ul style="list-style-type: none">• Checks for media availability• Sends data• Resolves collisions
CSMA/CA	<ul style="list-style-type: none">• Monitors media availability constantly• Advertises intent to send• Sends data
Token passing	<ul style="list-style-type: none">• Listens for token• Packages data with token• Confirms delivery when token returns

IEEE 802 Standards

IEEE 802 standards:

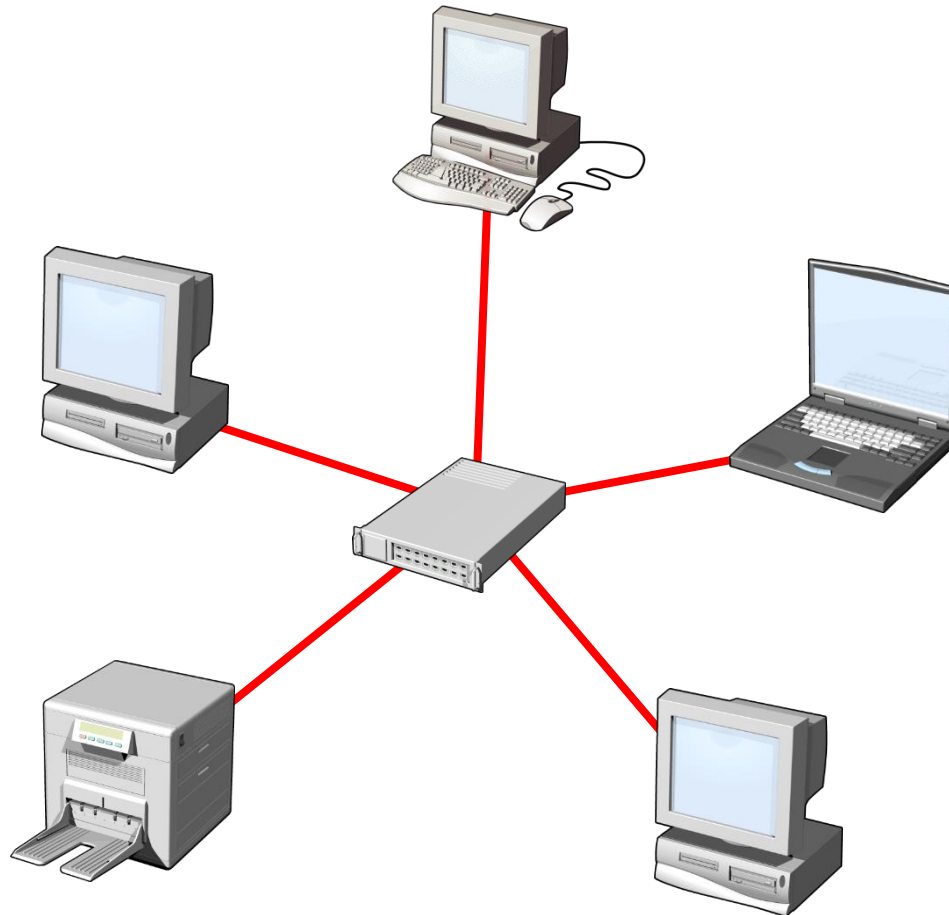
- IEEE 802.3 – Ethernet networks
- IEEE 802.5 – Token ring networks
- IEEE 802.11 – Local wireless networks
- IEEE 802.16 – Broadband wireless networks

Local Area Networking

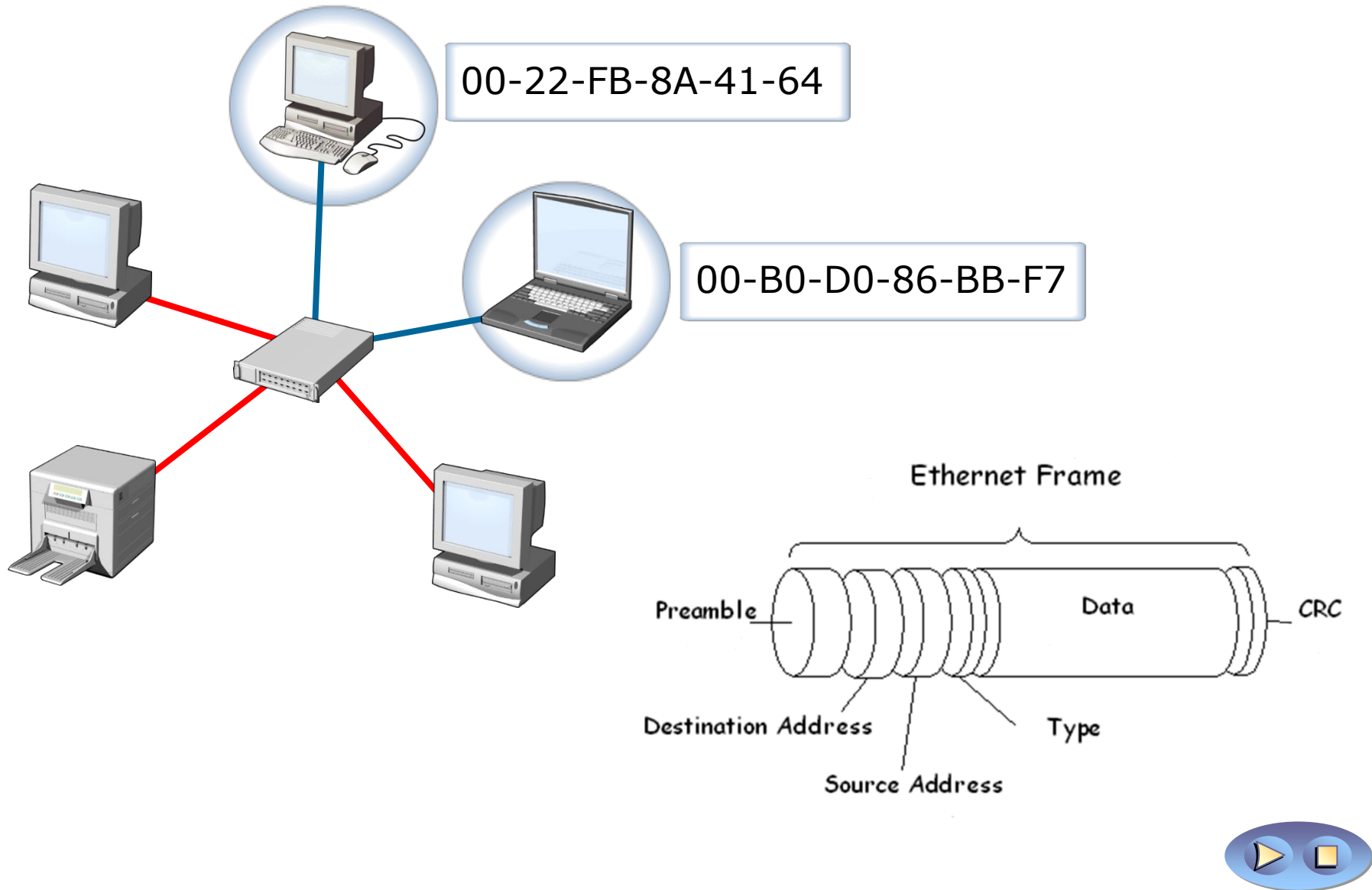
- What Is a LAN?
- How Nodes on a LAN Communicate
- Physical Components of a LAN
- LAN Physical Topologies
- LAN Logical Topologies

What Is a LAN?

A LAN is the most common form of computer network



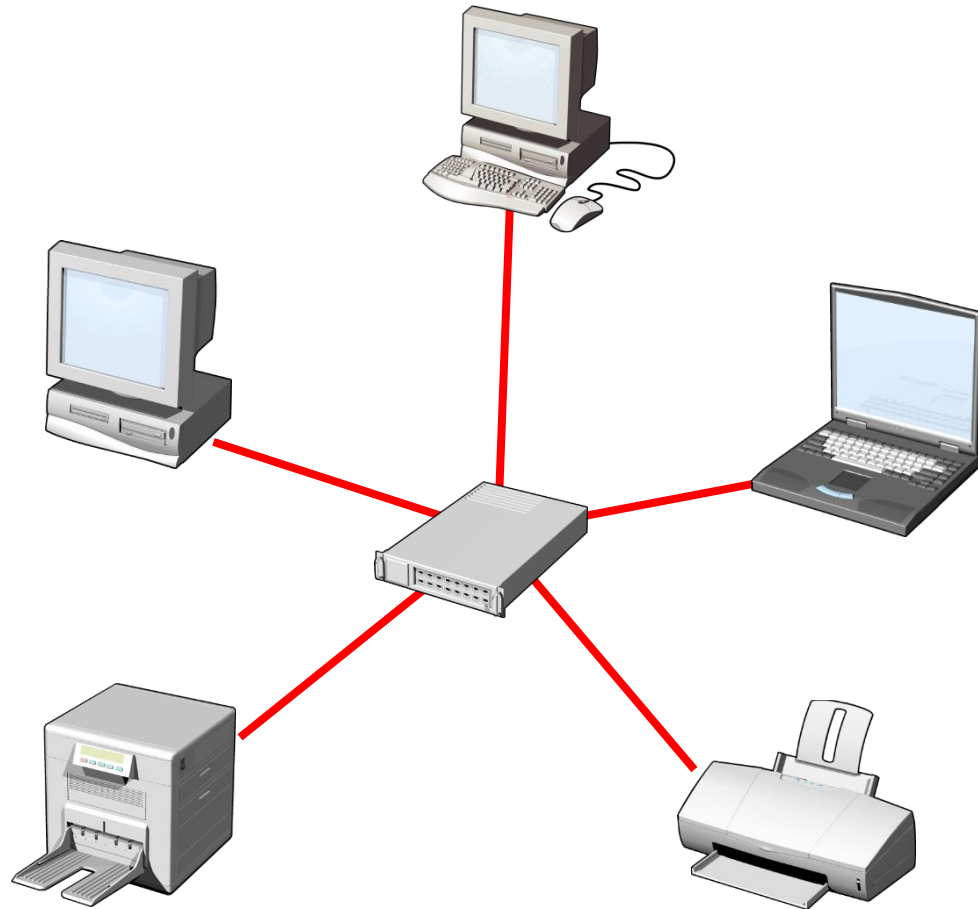
How Nodes on a LAN Communicate



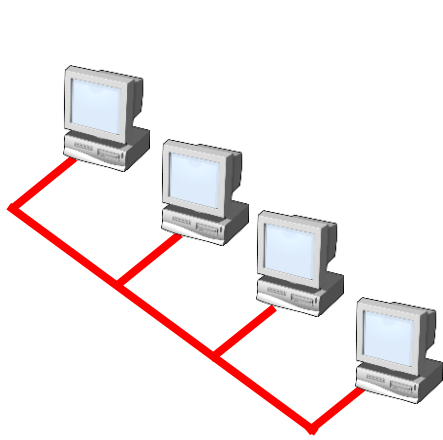
Physical Components of a LAN

Components of a LAN:

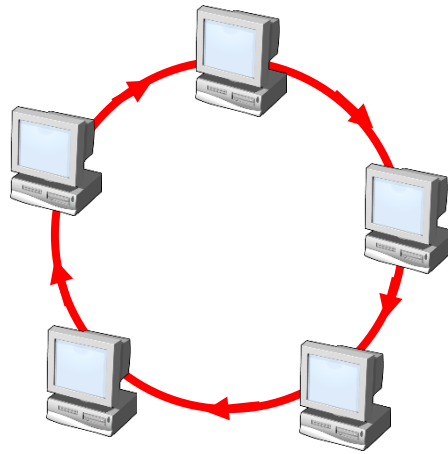
- Network adapter
- Wiring
- Hub/Switch
- Termination point
- Wiring cabinet



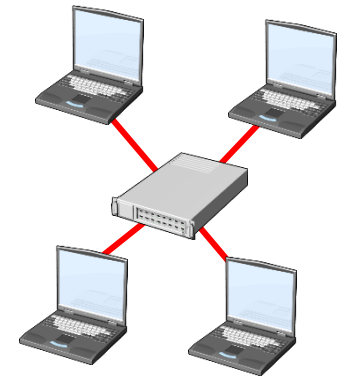
LAN Physical Topologies



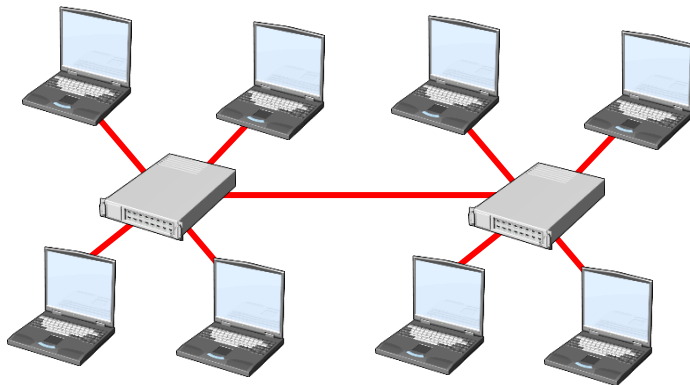
Bus



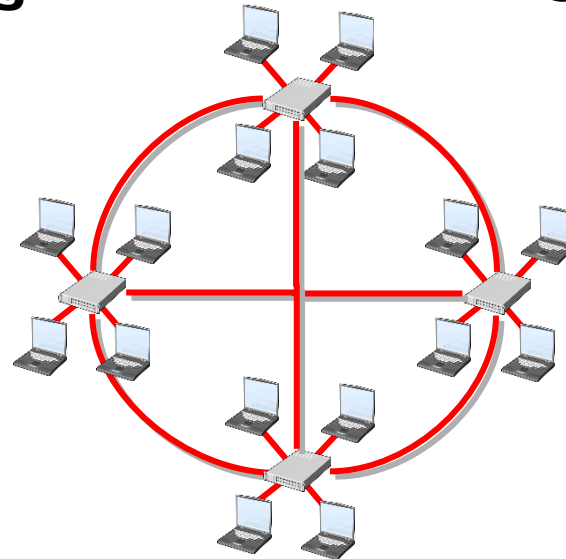
Ring



Star



Hybrid



Mesh

LAN Logical Topologies

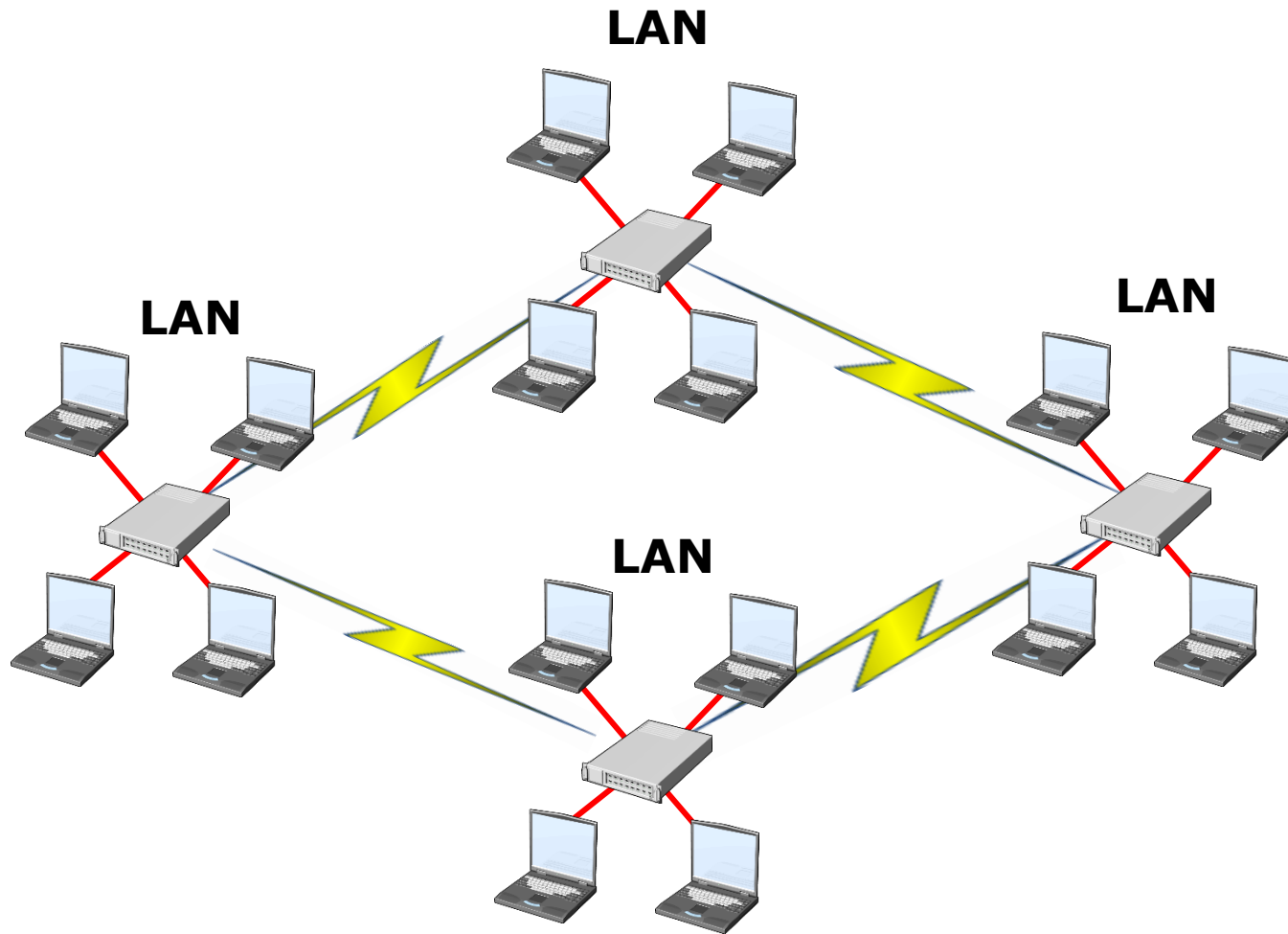
Topologies:

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

Wide Area Networking

- What Is a WAN?
- Physical WAN Components
- What Are the WAN 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

What Is ISDN?

ISDN is:

- Dial-on-demand
- Typically used as a backup connection
- Provides simultaneous text, voice and video transmission

Standard	Bandwidth
BRI	128Kbps
PRI	1.536Mbps

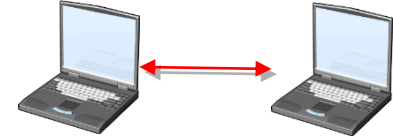
Wireless Networking

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

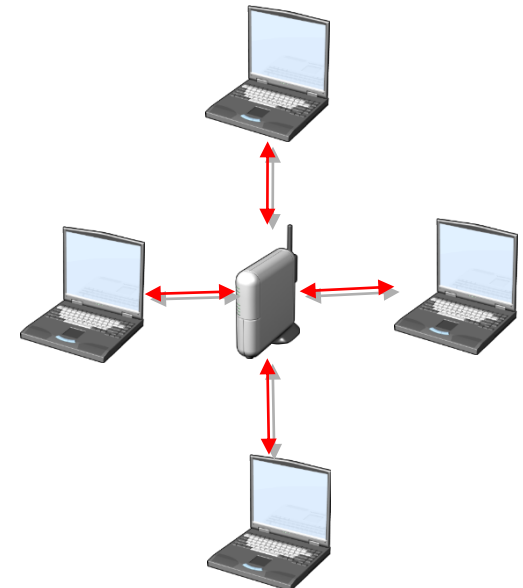
Wireless Networking Components

- Wireless network adapter
- Access point
- Ad Hoc network
- Infrastructure network
- SSID

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:

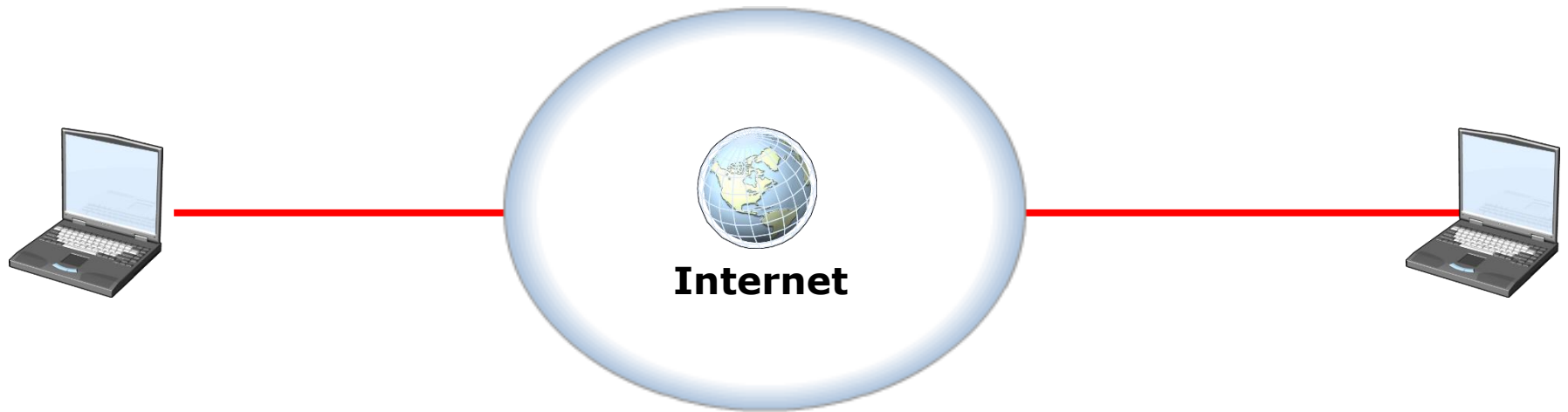
- Common versions:
 - 802.11a
 - 802.11b
 - 802.11g
 - 802.11n
 - 802.11ax

Standard	Released	Frequency	Data Rate	Indoor Range	Outdoor Range
802.11a	Sep 1999	5GHz	54 Mbps	50 feet	100 feet
802.11b	Sep 1999	2.4 GHz	11 Mbps	150 feet	300 feet
802.11g	Jun 2003	2.4 GHz	54 Mbps	150 feet	300 feet
802.11n	Oct 2009	2.4-2.5 GHz	600 Mbps	300 feet	600 feet
802.11ac/x	2019	2.4-5GHz	10Gbps	100 metres	200 metres

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

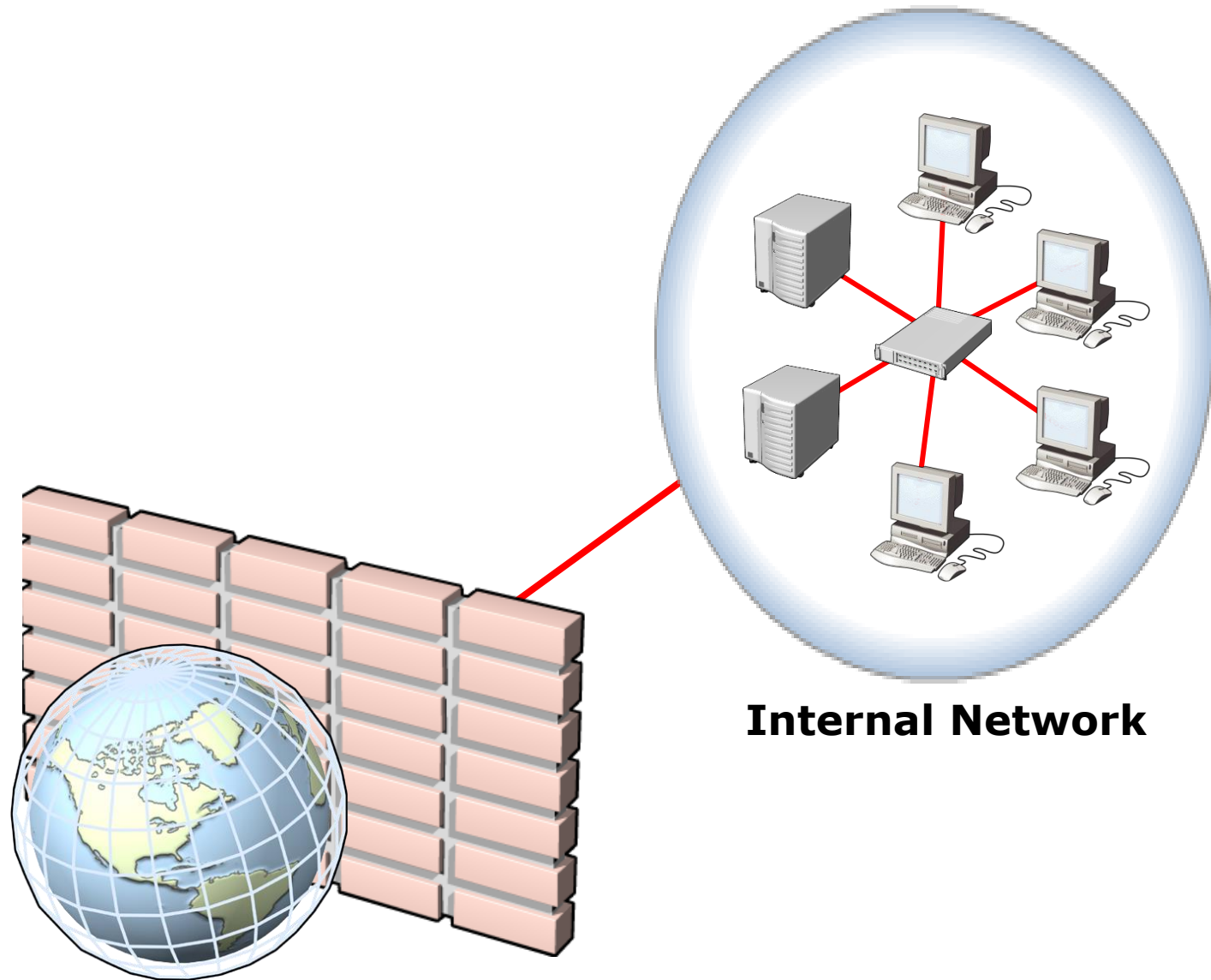
Intranets are:

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

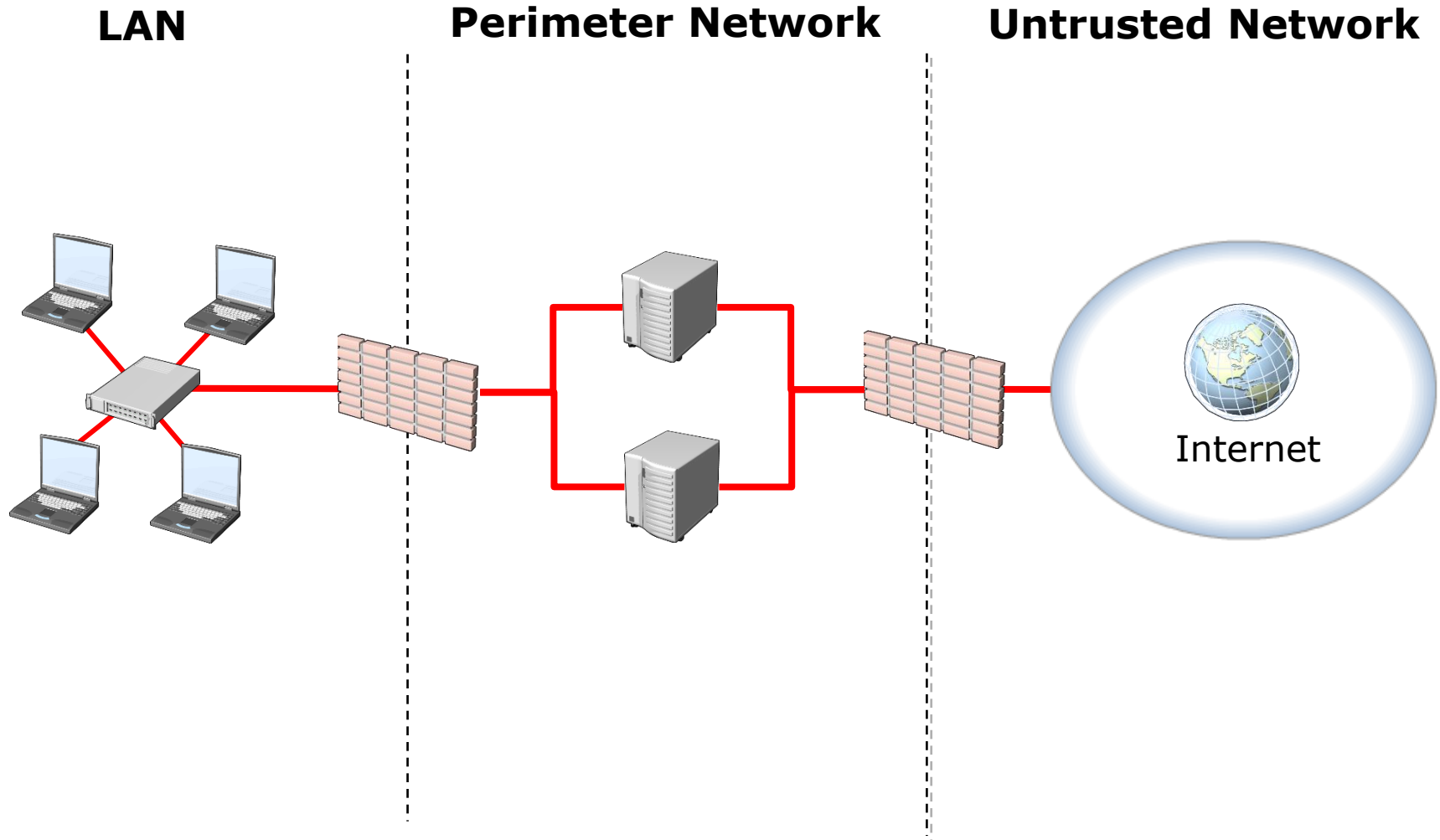
Extranet are:

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

What Is a Firewall?



What Is a Perimeter Network?



Proxy and Reverse Proxy Servers

Proxy servers:

- Filter client access to resources
- Locally cache information

Reverse proxy servers:

- Redirect incoming traffic
- Allow for load balancing