المملكة العربية السعودية
وزارة التعليم
جامعة نجران
الكلية التطبيقية

Basic Networking

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إعداد
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Course Title: Basic Networking
Course Code: CYBER130
Program: Cybersecurity
Department: Computer
College: Applied College
Institution: Najran University
Version: 1
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Course Learning Outcomes (CLOs),

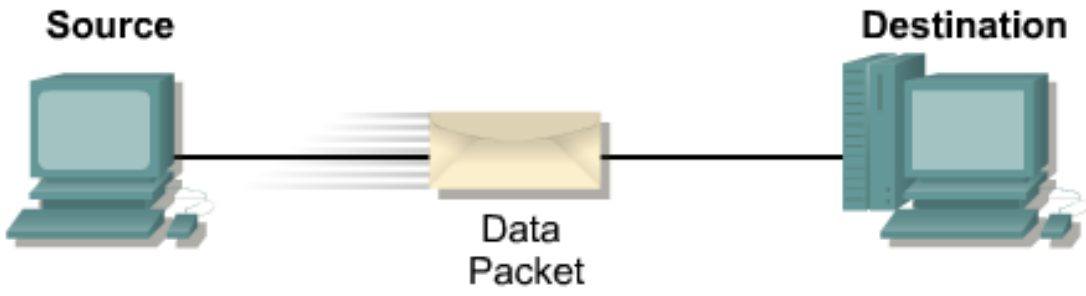
Code	Course Learning Outcomes
1	Examine the components of a computer network • common Network Devices: Routers , Switches and Firewalls • Network Models • Network Protocols , Services and Applications :ICMP, DNS, NTP, VLAN, SMTP, HTTP, VoIP, SSH, etc.
2	Apply network tools trace packet flows for a connection
3	Construct the architecture for a small network
4	Configure network operating system
5	Configure network devices, routers ,switches and firewalls
6	Configure IP addressing and IP sub netting
7	Configure network access
8	Implement network security
9	Illustrate common network threats and vulnerabilities
	Deploying Wireless Networks, WAN Links and Remote Access Methods and Business Continuity and Disaster Recovery

Course Learning Outcomes (CLOs),

No	Assessment Activities *	Assessment timing (in week no)	Percentage of Total Assessment Score
1	Case Study Project	5	5
2	Oral Presentation	6	5
3	Exam	9	20
4	Lab Activities	10	20
5	Quizzes	15	50

Introduction

- Network is a combination of Hardware and Software that sends data from one location to another
  - Hardware: physical equipment that carries signals from one point to another
  - Software: instructions that make possible the services that we expect from a network



Computer Network Components

Components of a computer network:

- Computer with NIC (Network Interface Card) (PCs, laptops, handhelds)
- routers & switches (IP router, Ethernet switch)
- Links" Transmission media" (wired, wireless)
- **protocols (IP,TCP,CSMA/CD,CSMA/CA)**
- applications (network services)
  i.e. Network Operating System (NOS)
- humans and service agents

Computer Network Components

Computer with NIC

also known as an Ethernet Card or Network Adapter

Network Interface Card

a piece of hardware that allows computers to communicate with other devices on a network/internet .

How does a NIC card work?

Operating as an interface, a NIC card can transmit signals at the physical layer and deliver data packets at the network layer.

Irrespective of location, the NIC card acts as a middleman between a computer, or server, and a data network.

When a user requests a web page, the LAN card gets data from the user device, sends it to the server via the Internet, and gets the required data back from the Internet to display for users.

How does a NIC card work?

NIC port for the cable/transceiver:

Usually, this port will connect with an Ethernet cable for the transceiver directly, which can generate and receive the electronic signals that are put on the network cable or fiber cable.

Port Type Based Classifications

According to different cables connected, three types of NIC ports can be found in the market.

- RJ-45 port is used to connect with twisted pair cables;
- AUI port is used for a thick coaxial cable;
- BNC port is used for a thin coaxial cable;

How does a NIC card work?

Transmission Speed Based Classifications
There are 10Mbp/s, 100Mbp/s, 10/100 Mbp/s adaptive card, 1000Mbp/s, 10GbE, 25G or even higher speed network cards on the market.

10Mbp/s, 100Mbp/s, and 10/100MB/s adaptive NIC cards are suitable for small LAN, home uses or day-to-day offices; 1000Mbp/s NIC cards provide a higher bandwidth in the Gigabit network.

10Gb, 25Gb, or high speed NIC cards are used by large enterprises or data centers.

Introduction to Networks

- Computers on a network can act as a client or a server.
- A client is a computer that requests for resources.
- A server is a computer that controls and provides access to resources.

Need for Networks

- Enhance communication.
- Share resources.
- Facilitate centralized management.

Classification of Networks

- Classification by network geography.
- Classification by component roles.

Classification by Network Geography

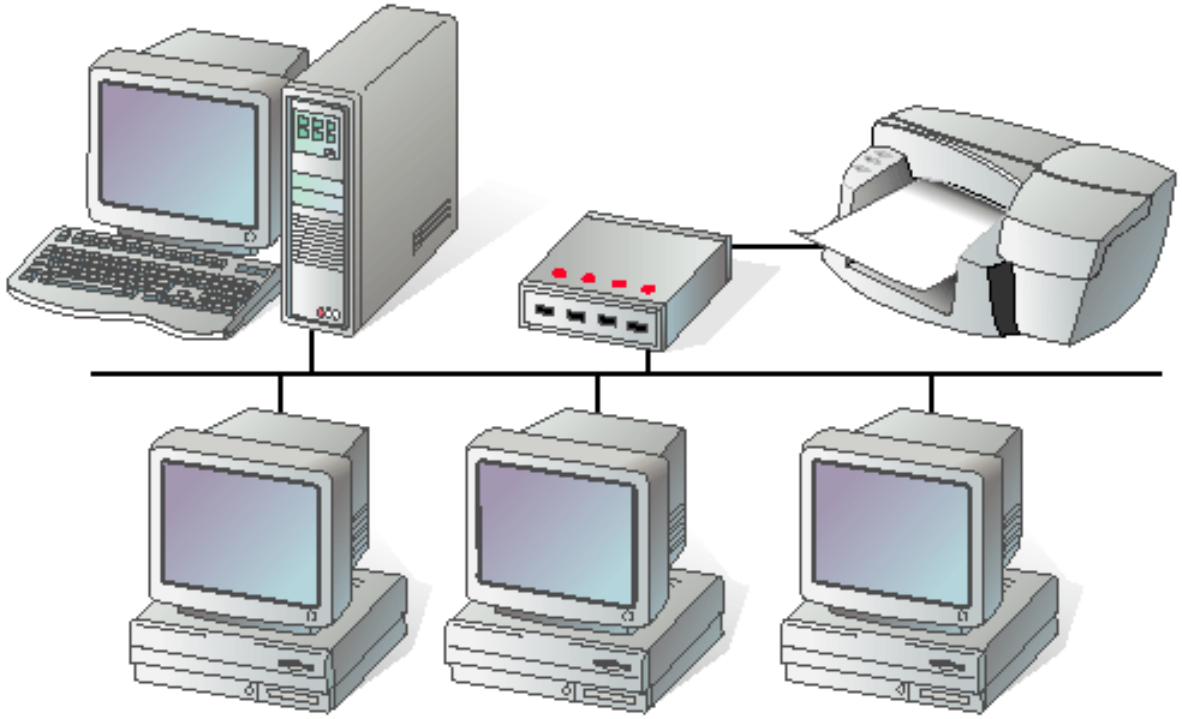
- Networks are frequently classified according to the geographical boundaries spanned by the network itself.
- LAN, WAN, and MAN are the basic types of classification, of which LAN and WAN are frequently used.

Classification by Network Geography

Local area network (LAN):

- A LAN covers a relatively small area such as a classroom, school, or a single building.
- LANs are inexpensive to install and also provide higher speeds.

Classification by Network Geography



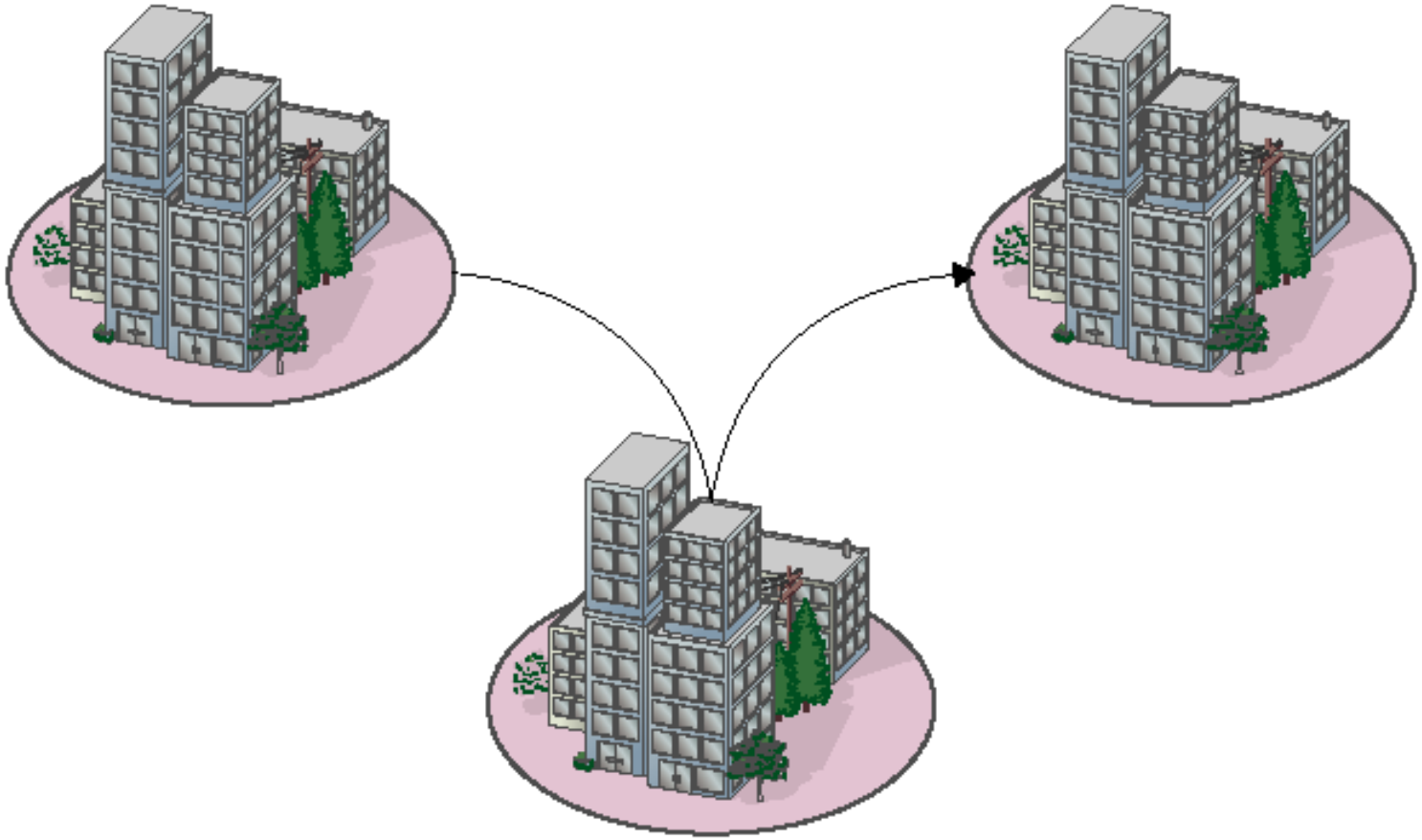
Local area network

Classification by Network Geography

Metropolitan area network (MAN):

- A MAN spans the distance of a typical metropolitan city.
- The cost of installation and operation is higher.
- MANs use high-speed connections such as fiber optics to achieve higher speeds.

Classification by Network Geography



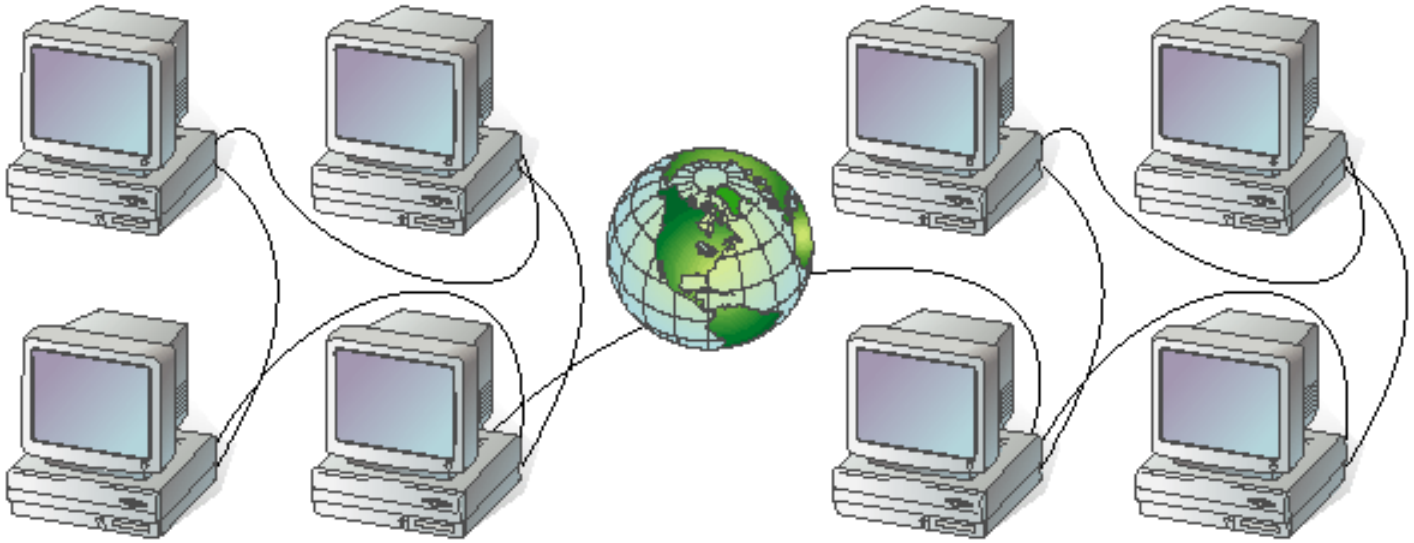
Metropolitan area network

Classification by Network Geography

Wide area network (WAN):

- WANs span a larger area than a single city.
- These use long distance telecommunication networks for connection, thereby increasing the cost.
- The Internet is a good example of a WAN.

Classification by Network Geography



Wide area network

Classification by Component Roles

- Networks can also be classified according to the roles that the networked computers play in the network's operation.
- Peer-to-peer, server-based, and client-based are the types of roles into which networks are classified.

Classification by Component Roles

Peer-to-peer:

- In a peer-to-peer network, all computers are considered equal.
- Each computer controls its own information and is capable of functioning as either a client or a server depending upon the requirement.
- Peer-to-peer networks are inexpensive and easy to install.
- They are popular as home networks and for use in small companies.

Classification by Component Roles

Peer-to-peer (continued):

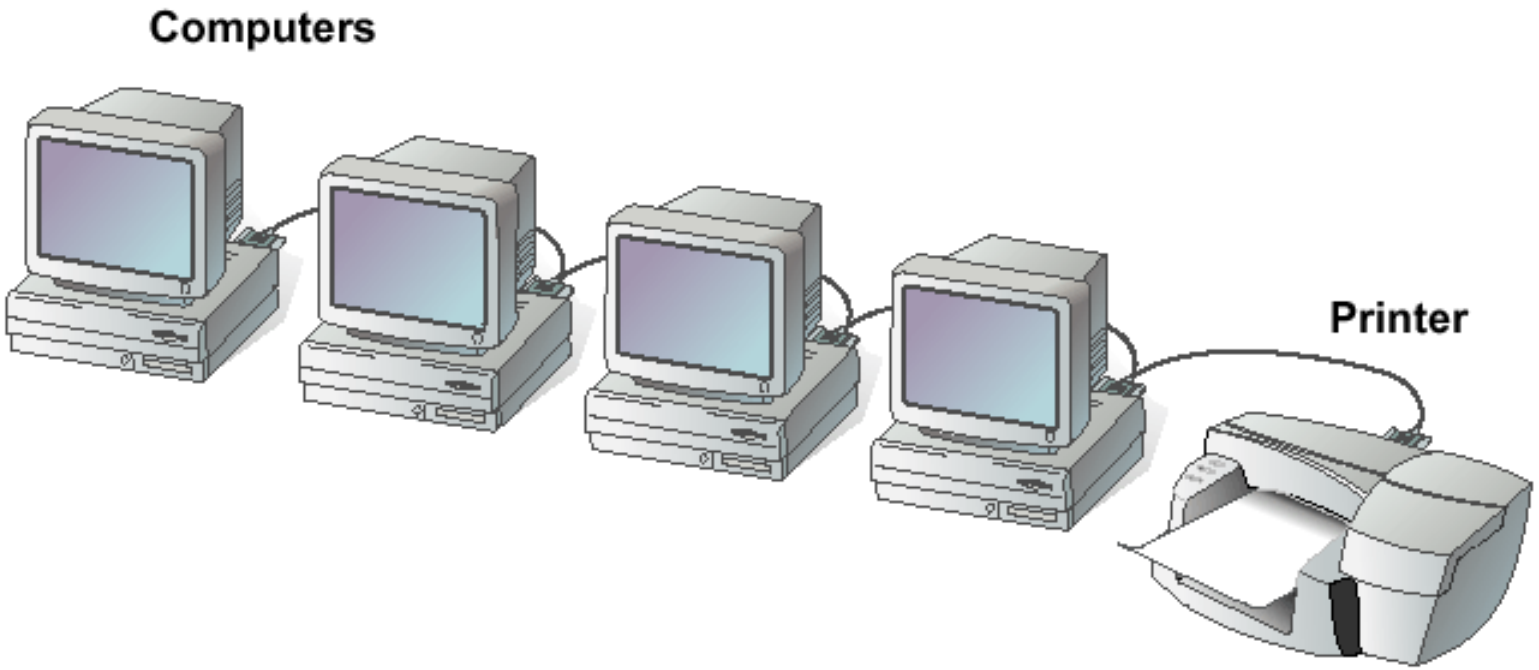
- Most operating systems come with built-in peer-to-peer networking capability.
- The maximum number of peers that can operate on a peer-to-peer network is ten.
- Each peer shares resources and allows others open access to them.

Classification by Component Roles

Peer-to-peer (continued):

- Peer-to-peer networks become difficult to manage when more security is added to resources, since the users control their security by password-protecting shares.
- Shares can be document folders, printers, peripherals, and any other resource that they control on their computers.

Classification by Component Roles



Peer-to-peer network

Classification by Component Roles

Server-based:

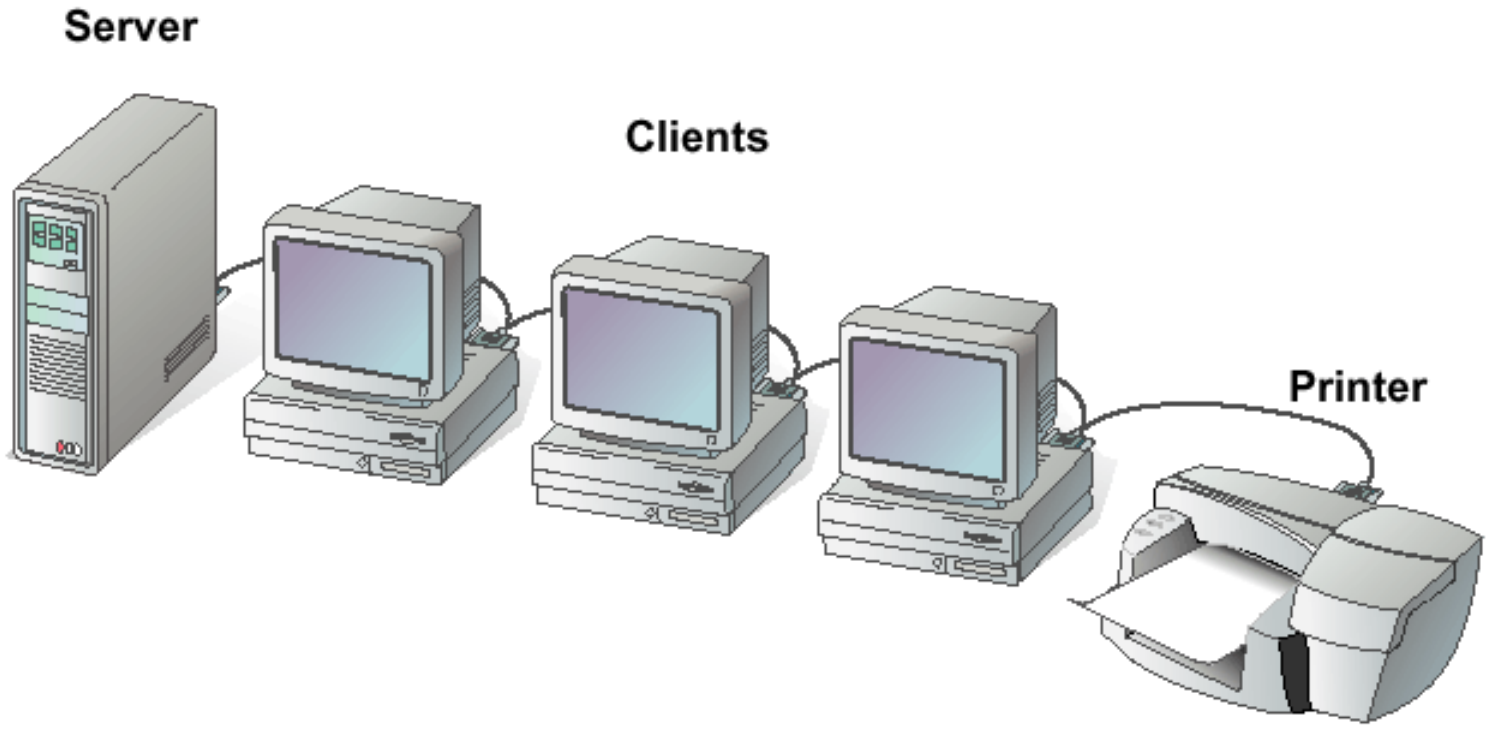
- A server-based network offers centralized control and is designed for secure operations.
- In a server-based network, a dedicated server controls the network.

Classification by Component Roles

Server-based (continued):

- A dedicated server is one that services the network by storing data, applications, resources, and also provides access to resources required by the client.
- These servers can also control the network's security from one centralized location or share it with other specially configured servers.

Classification by Component Roles



Server-based network

Multiple Choice

Which network covers a large area?

A. LAN
B. WAN
C. SAN
D. MAN

Which network covers a small area?

A. LAN
B. WAN
C. SAN
D. MAN

Cardiff University has its campus buildings spread out across the city and country.
Which network is being used?

A. LAN
B. WAN
C. SAN
D. MAN

Multiple Choice

Njran University has its campus buildings spread out across the city and country.

Which network is being used??

A. LAN
B. WAN
C. SAN
D. MAN

A network with over 500 computers connected is considered to be a ?

A. LAN
B. WAN
C. SAN
D. MAN

A computer that is connected to a network is called a _?

A. Stand alone
B. Mainframe computer
C. Personal computer
D. Workstation or network node

Multiple Choice

Advantages of the network ?

A. Expensive Hardware
B. Specialist staff required
C. Communication
D. Hacking

Disadvantages of networks ?

A. Share files
B. Viruses
C. Share Internet
D. Roaming

Wifi is an example of :

A. LAN
B. WAN
C. WLAN
D. MAN