BATCH : BATCH 85

LESSON : **Network -1**

DATE : 18.06.2022

SUBJECT : **Networking Introduction**

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ZOOM GİRİŞLERİNİZİ LÜTFEN **LMS** SİSTEMİ ÜZERİNDEN YAPINIZ

NETWORK Day 1

- **Bugünkü dersin pre-class materyalini incelediniz mi?**
- **LMS’deki Zoom linki çalışmasa bile oraya giriş yapmanız yoklamanız açısından önemli**

Contents

- What is a Computer Network
- Uses of Network
- Features of Network
- History of Internet
- Types of Network
- Important Terms

İçerik

- Bilgisayar Ağı Nedir?
- Ağların kullanımı
- Ağlarla ilgili önemli hususlar
- İnternetin Tarihi
- Ağların Çeşitleri
- Önemli Terimler

What is a Network?

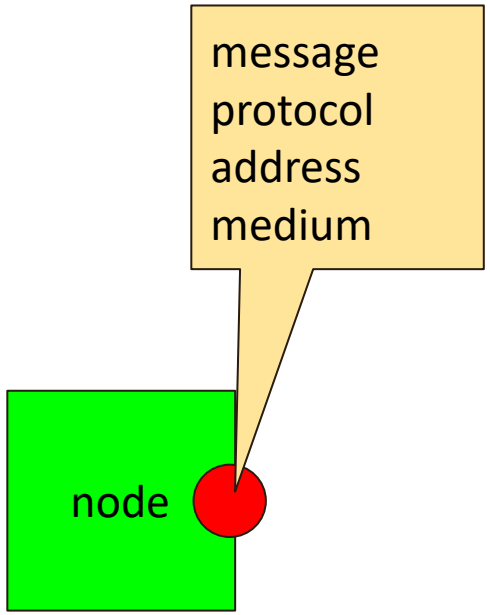
A computer network is a group of computers that use a set of common communication protocols over digital inter-connections for the purpose of transmitting, exchanging and sharing data or resources located on or provided by the network nodes.

Network of networks is the Internet.

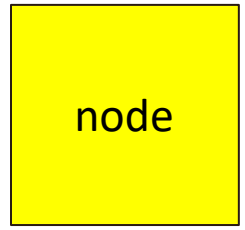
What is a Network?

Network Elements

- Nodes
- Protocol
- Medium
- Network Software



Basic Communications Model



How does a Network operate?

In a computer network, data (voice, video, text) is packed according to a set of rules named as protocol. Then these packets of data are converted to signals. These signals are sent to the other node by means of a medium such as a copper wire, a fiber optical cable or radio waves. The message goes to the address of the other node. Address can be a MAC address or IP address.

What are Networks used for ?

- Sharing programs and files
- Sharing network resources - (printer -- fax etc.)
- Establishing working groups
- Central administration (Active Directory)
- Cost reduction (Common disk space, Internet)
- Communication and E-mail
- Accessing resources / information from very remote locations

Features of Computer Networks

3 Main Criteria for a Network

- Performance
  - Transit time
  - Response time
- Reliability
  - Failures
- Security

Features of Computer Networks

- Performance
- Data Sharing
- Backup
- Security
- Reliability
- Scalability
- Software & Hardware Sharing

What is ARPANET?

The Advanced Research Projects Agency Network (ARPANET) was the first wide-area packet-switching network with distributed control and one of the first networks to implement the TCP/IP protocol suite. Both technologies became the technical foundation of the Internet. The ARPANET was established by the Advanced Research Projects Agency (ARPA) of the United States Department of Defense.

History of The Internet

•1969 ARPANET LO-GIN

•1972 E-mail

•1981 IBM PC

•1982-83 TCP/IP

•1985 Internetwork - Internet

•1990 WWW

•1993 ODTU, 50 web sites

•1994 web 1.0- static web sites- terravision

•1996 hotmail

•1998 google, napster, torrent

•1999 crypto mining, ekşisözlük

•2000 yemeksepeti

•2001 gittigidiyor, 350 m web sites

•2004 facebook, web 2.0, mobile devices, dynamic web pages, forums, blogs etc.

Who manages the Internet?

IANA.org

ICANN

RFCs

Types of Networks

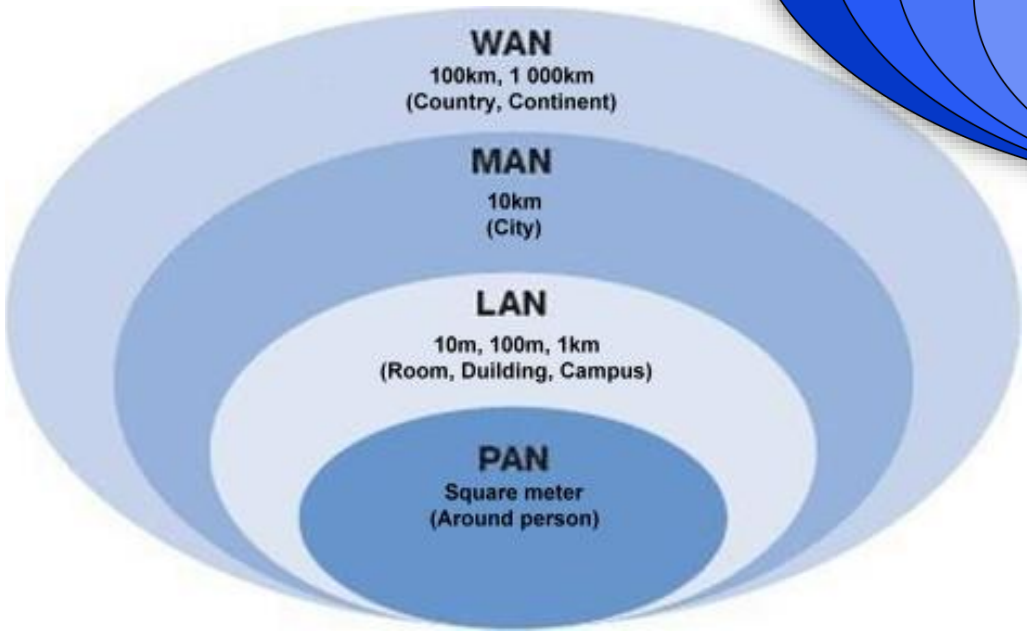
Geographical	Network Architecture	Topological	Transferring Mediums

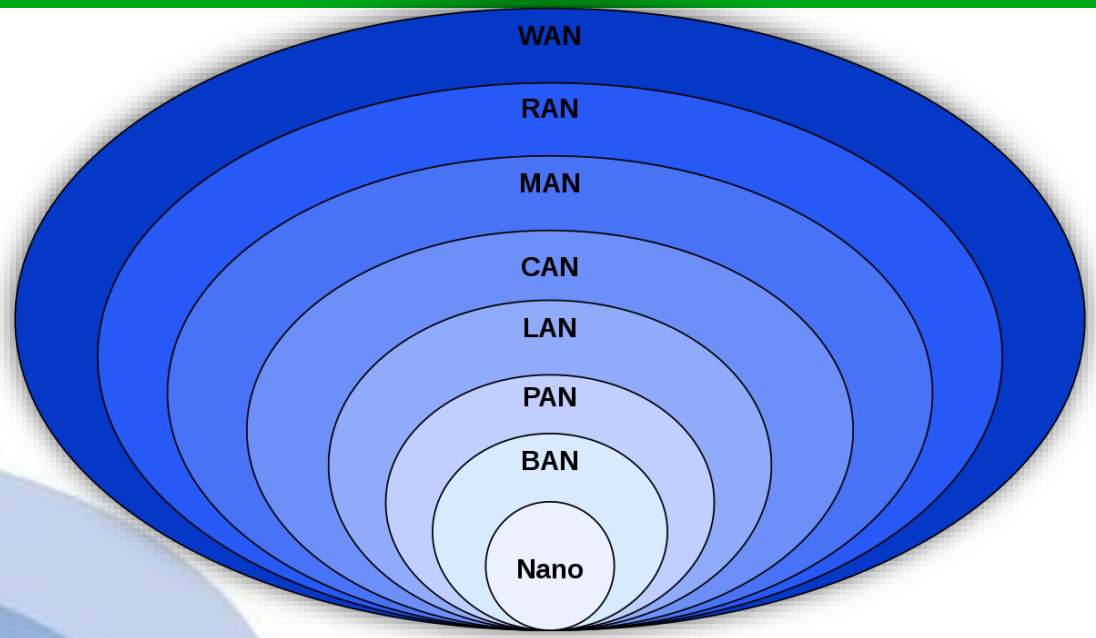
• NANO
• BAN
• PAN
• LAN
• CAN
• MAN
• WAN
	• Client –Server
	• P2P
		• Ring
		• Star
		• Mesh
		• Bus
		• Line
			• Cable
			• Wireless
			  • RF
			  • Laser
			  • Microwaves

Geographical

Geographical

- NANO
- BAN
- PAN
- LAN
- CAN
- MAN
- WAN





Geographical

Geographical

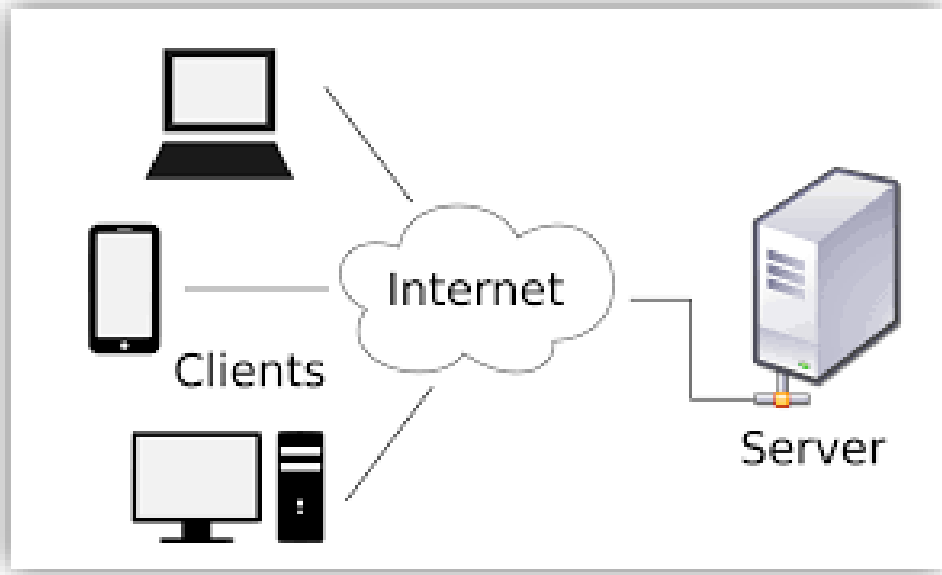
- NANO
- BAN
- PAN
- LAN
- CAN
- MAN
- WAN

TABLE II
COMPARISON BETWEEN LAN, MAN AND WAN

Network	Coverage area	Bandwidth	Links	Cost	Specialities
LAN	Typically, 1km; over a building, an institution, etc	Low	Ethernet cable	Low	• Fully-private network • Shared media network • Can support 100% resource sharing
MAN	Typically, 100km; over a city, zonal district, etc	Medium	Coaxial cable, microwave link	Medium	• Zonal public network • Switched network
WAN	Typically, over 100km to 10,000km; over a country or province	Highest	Satellite links, telephonic links	Most expen-sive	• National public network • Switched network
Internet	Beyond 10,000km; over multiple coun-tries, intercontinental (planets)	Highest	Logical connectivity using physical networks	Not so expen-sive	• Logical connection across the globe

Network Architecture

Network Architecture	Client-Server	
• Client –Server • P2P	•Resources are on a dedicated node(a server) •Security and managament is easy •Easy backup	•Network fails if server fails •Expensive hardware for server •Network traffic may get heavily loaded

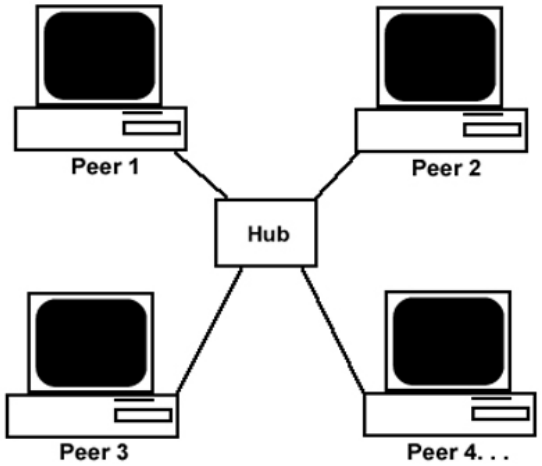


Client-Server

Examples are the WWW, Facebook, Twitter, Google search, a bank's website etc.

Network Architecture

Network Architecture	P2P (Peer to Peer/ Point to Point)	
• Client –Server • P2P	•All nodes are equal •Easy to set-up •No administrator required •Less expensive hardware	•Less secure •Difficult to backup data



P2P Network

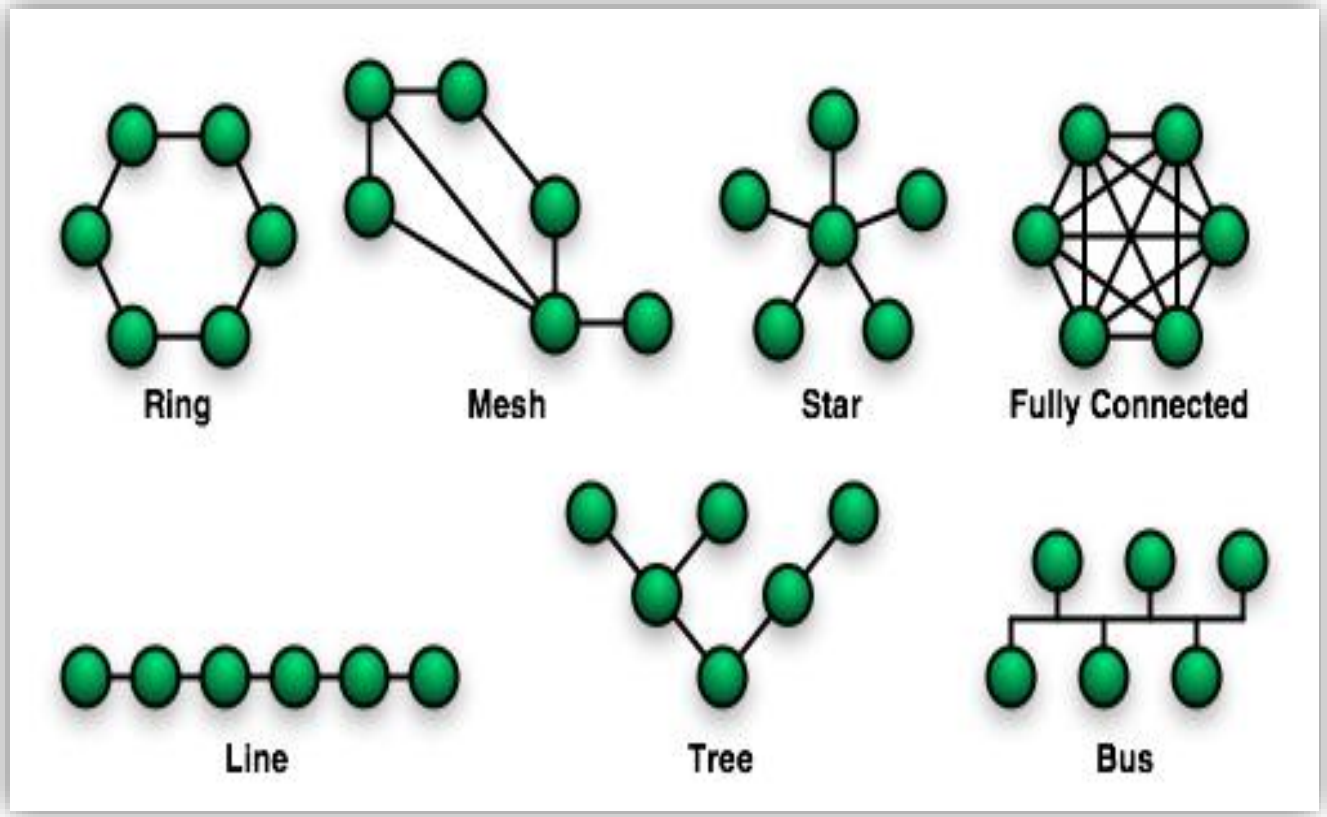
P2P

Examples are torrent networks used for file sharing such as BitTorrent.

Topological

Topological

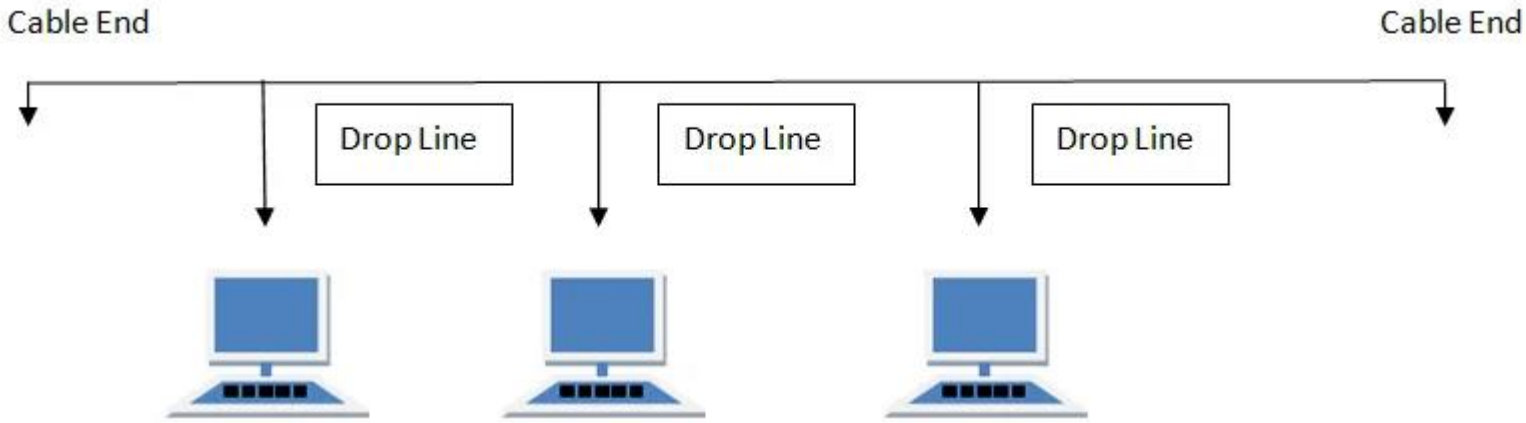
- Ring
- Star
- Mesh
- Bus (Line)
- Tree



Bus - Line

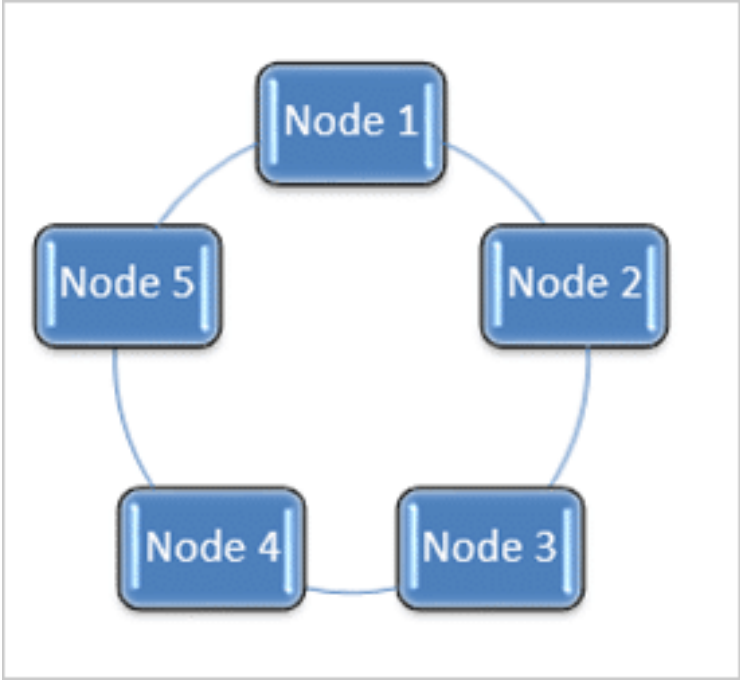
Bus

- ✓ Minimal cost to install
- ❖ If the backbone fails whole network fails
- ❖ Security is low
- ❖ Low performance in heavy traffic
- ❖ Used in schools, laboratories, offices, not very common now



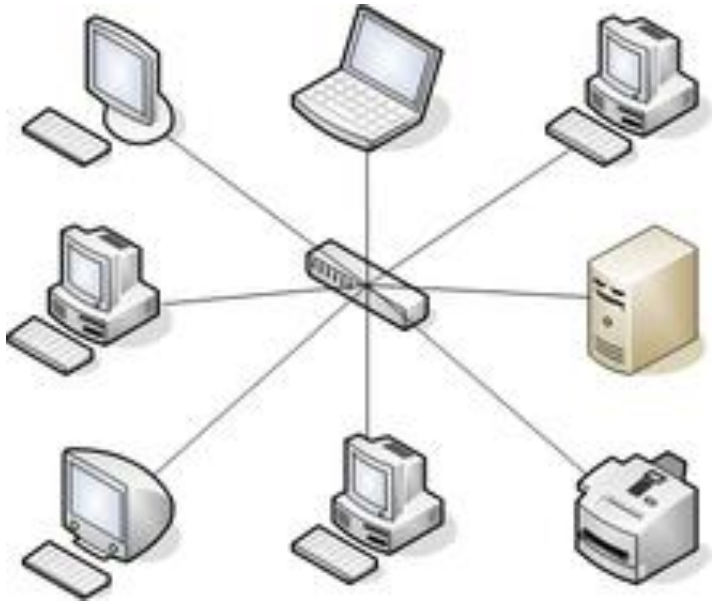
Ring

Ring
✓ Equal access to the resources ✓ No need server control ✓ Low risk of collision ❖ If one node down whole network down ❖ Used in offices, schools, not common now



Star

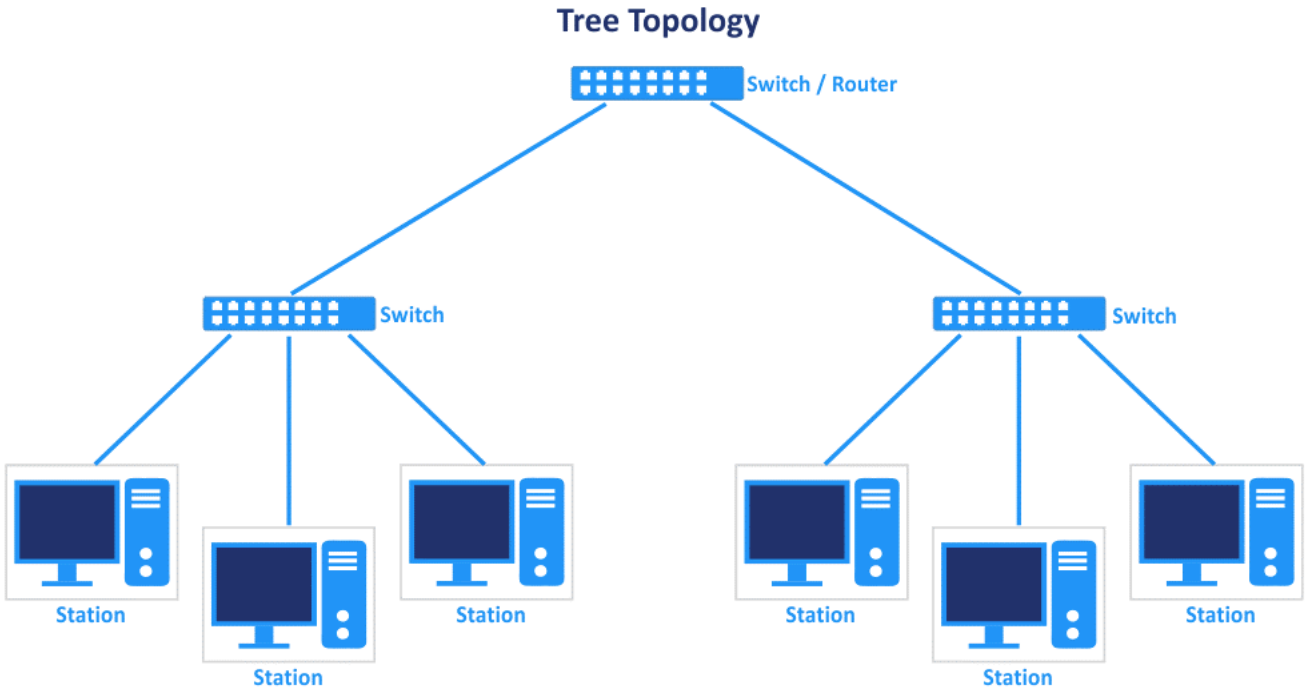
Star
✓ Easy to connect new nodes or devices ✓ Centralized management ✓ Failure of one node or link doesn't affect the rest of **network**. ❖ If one node or connection breaks, the rest of the **network** remains unaffected ❖ The most used topology in offices, homes etc



Tree

Tree

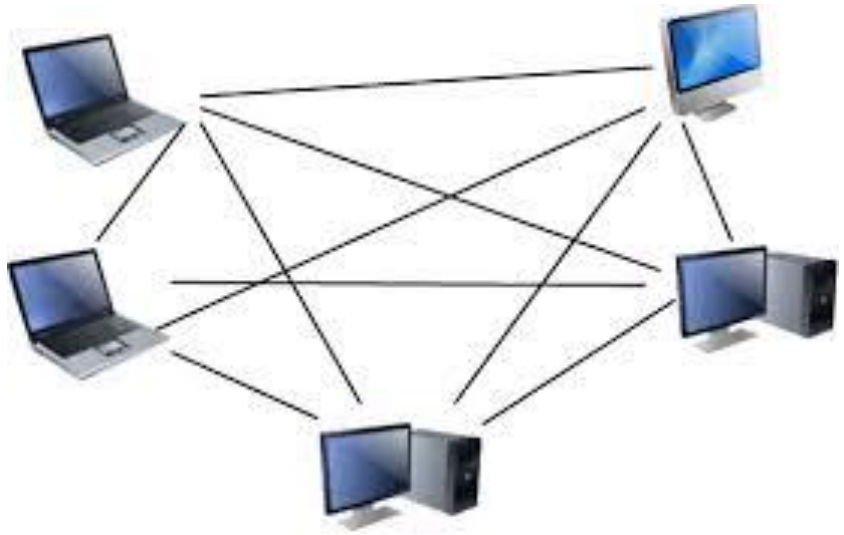
- ✓ Easy to expand
- ❖ Difficulty in error detection
- ❖ Failing in one node affects the big propotion of the network
- ❖ Used in hospitals, campuses



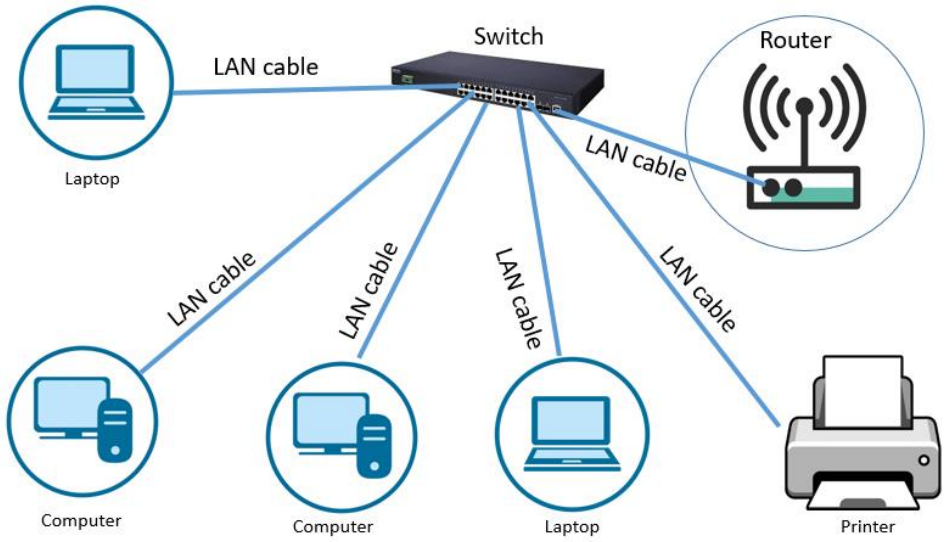
Mesh

Mesh

- ✓ Up time is high, reliable
- ❖ High cost in installation
- ❖ Configuration is difficult
- ❖ Increased Power Consumption for Each Node
- ❖ One of the most used, in military, traffic lights and city services, The Internet is a mesh network



LOCAL AREA NETWORK (LAN)



Local Area Network

A **L**ocal **A**rea **N**etwork (LAN) is a group of computer and devices which are connected.

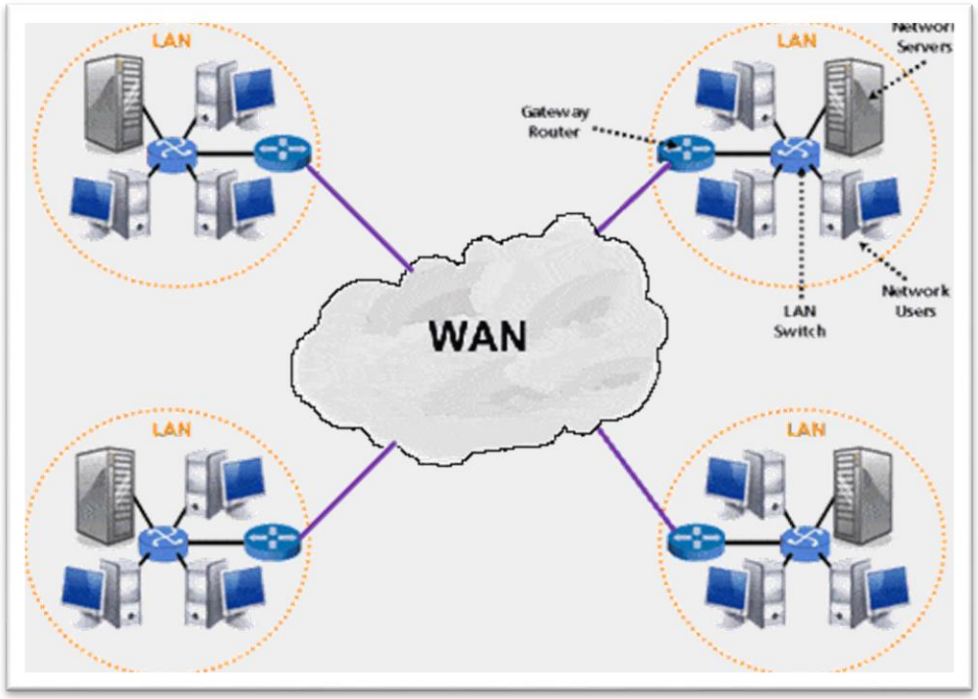
- It is a private network, so an outside regulatory body never controls it.
- LAN operates at a relatively higher speed compared to other WAN systems.
- There are various kinds of media access control methods like token ring and ethernet.

WIRELESS LAN

Major Topologies for LAN

- Bus Topology
- Ring Topology
- Star Topology
- Mesh Topology

WIDE AREA NETWORK (WAN)



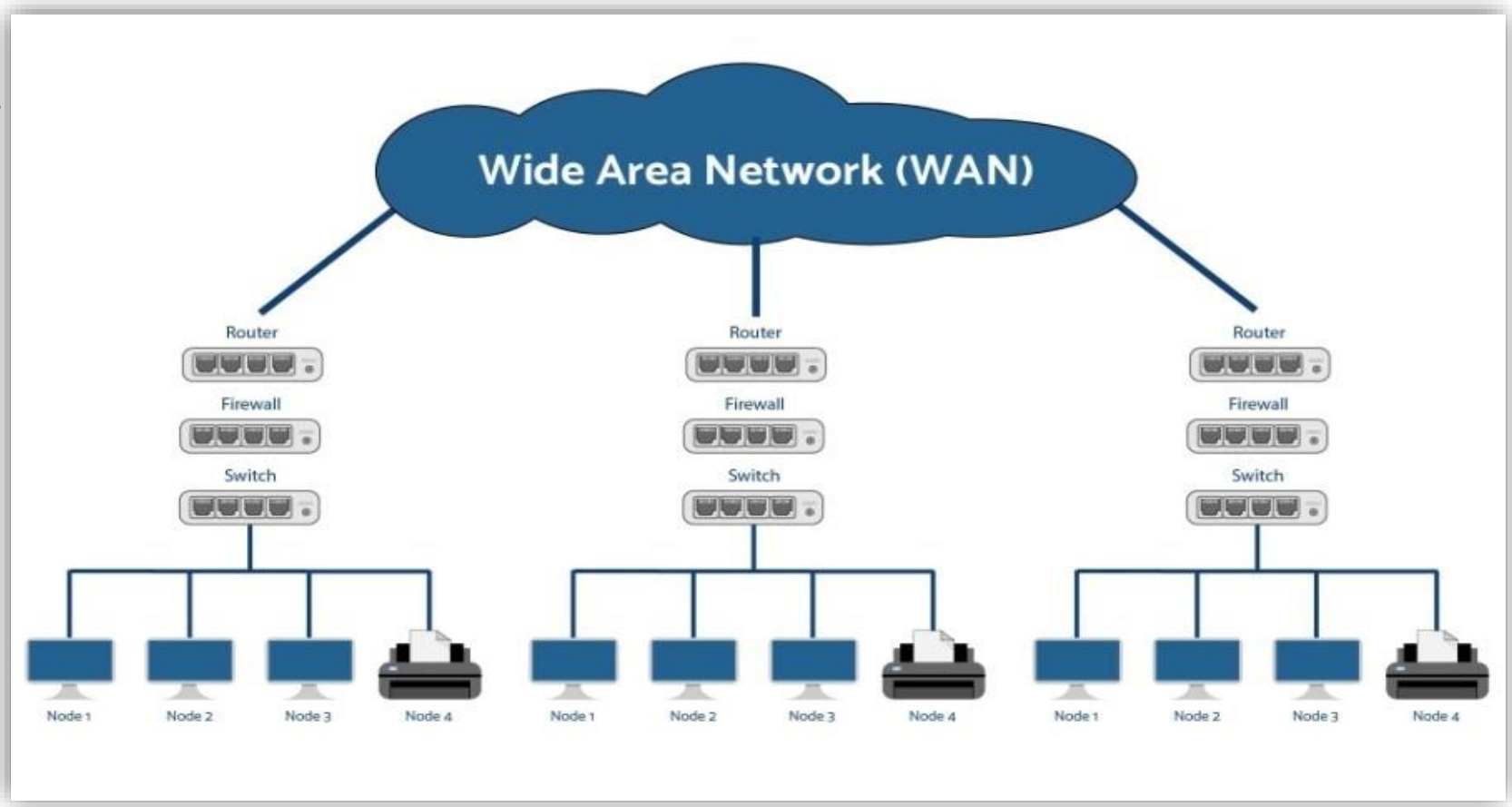
A wide area network (WAN) is a telecommunications network that extends over a large geographic area for the primary purpose of computer networking.

- Wide area networks are often established with leased telecommunication circuits.
- The Internet may be considered a WAN.

WIDE AREA NETWORK (WAN)

Major Topologies for WAN

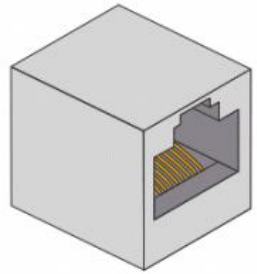
- Mesh Topology
- P2P
- All types can be seen

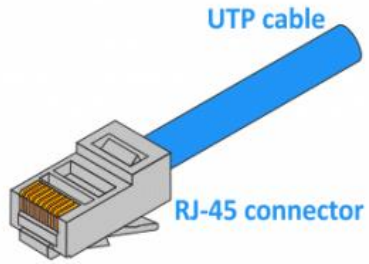


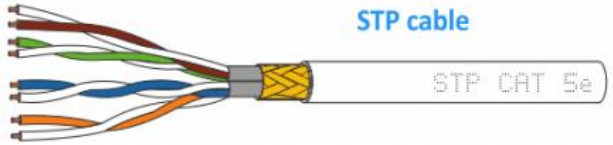
Types of Networks

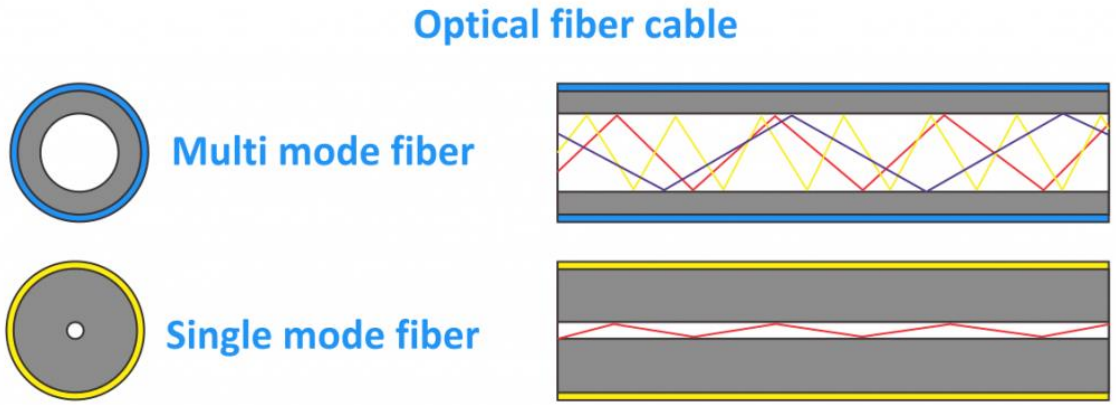
Transferring Mediums

- Cable
- Wireless
  - RF
  - Laser/Infrared
  - Microwaves









Types of Networks

Transferring Mediums

- Cable
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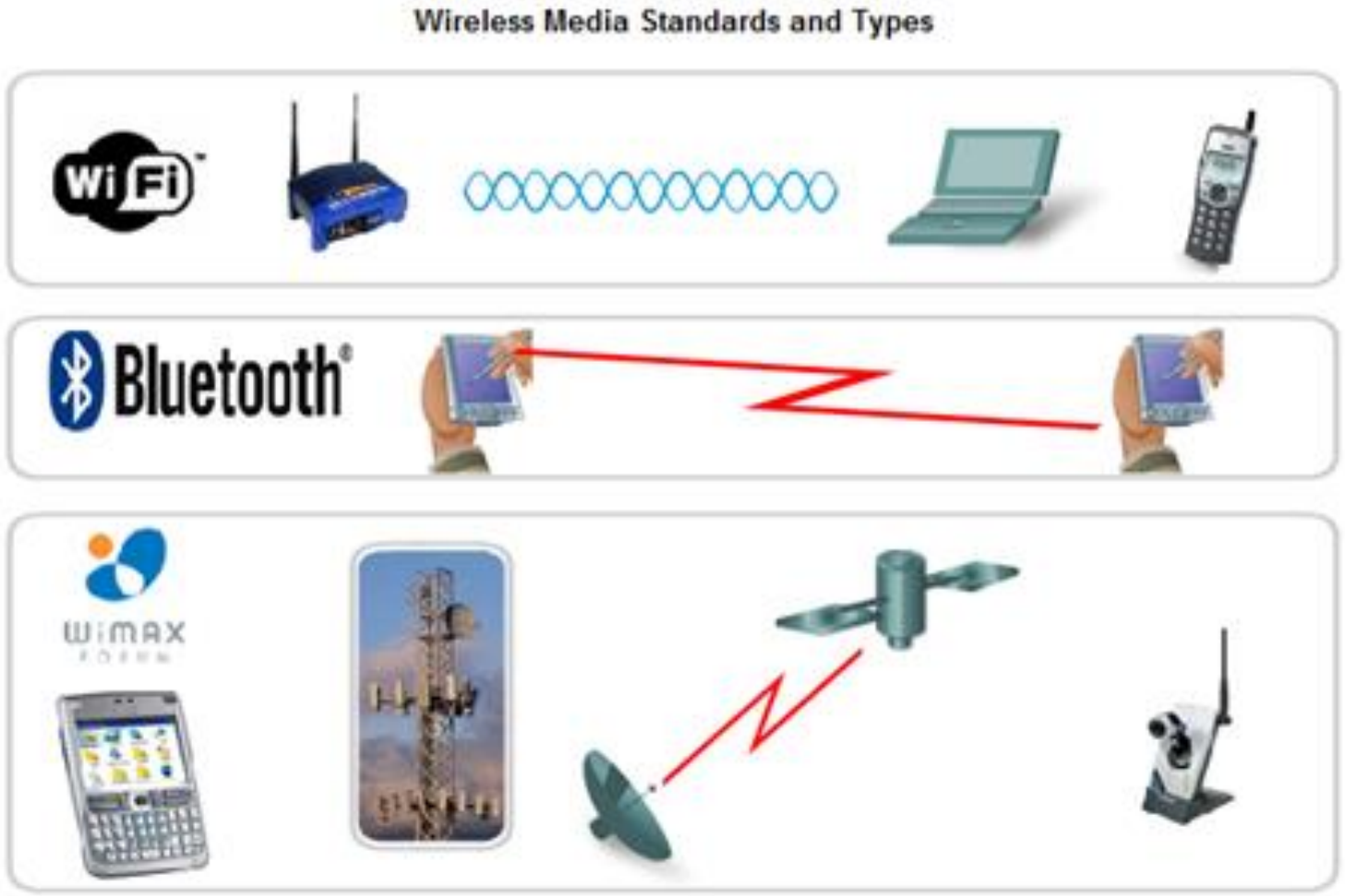


TERMS and DEFINITIONS

node

A connection point or end point for the transmission of the data

Hub, switch

These two nodes connect computers or other network devices. Hub broadcasts data to every computer, switch broadcasts to specific ones. Switch is smart.

NOS

Network Operating Syster

workstation

A special **computer** designed for technical or scientific applications. Intended primarily to be used by **one person at a time**, they are commonly connected **to a local area network.**

MAC address

Identification number of a device on the network

server

A **server** is a **computer** or system that provides resources, data, services, or programs to other computers

client

Any device that makes request to servers

multimode fiber

fast but short distance fiber cable

segment

Dividing network devices into groups

Packet-switching

Sending data as chunks, data broken into packets for a faster and secure communication.

IP address

A unique number that defines a computer on the network

proxy

Acts like gateway between user and Internet

Caching

Administrative control

Security

gateway

A node between 2 networks, makes them understand each other

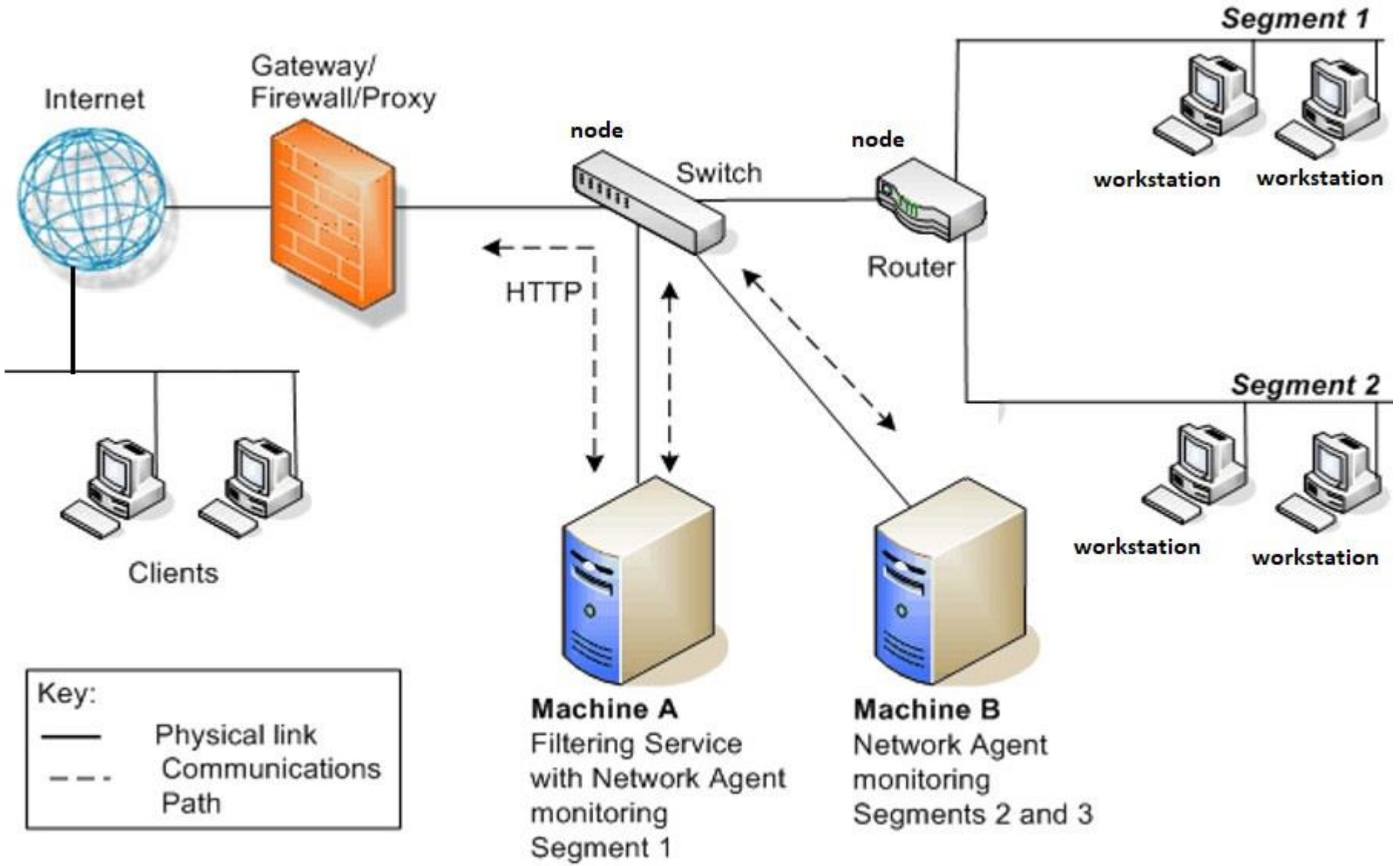
Firewall

Network security device that controls incoming and outgoing network traffic

Router

A router connects 2 or more networks. It controls network traffic by forwarding data packets to the correct address.

Diagram


Segment 1
Internet
Gateway/
Firewall/Proxy
node
Switch
node
Router
workstation
workstation
HTTP
Segment 2
workstation
workstation
Clients
Key:
Physical link
Communications
Path
Machine A
Filtering Service
with Network Agent
monitoring
Segment 1
Machine B
Network Agent
monitoring
Segments 2 and 3

Review and Prepare

İçerik

- Bilgisayar Ağı Nedir?
- Nasıl çalışır?
- Ağların kullanımı
- Ağlarla ilgili önemli hususlar
- İnternetin Tarihi
- Ağların Çeşitleri
- Önemli Terimler

Gelecek ders öncesi ders materyallerini incelemeyi

Geçmiş dersin tekrarını yapmayı

Unutmayalım

Practice With Cisco Packet Tracer