

## Lecture 17

# Internetworking

**CT4005NI - Computer Hardware and Software  
Architectures**

# Is it possible to communicate with someone living abroad?

# The answer is YES!

# Networks Affect Our Lives

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- Networks Connect Us
- World without boundaries
- Global communities
- Human Network



# What do you use to communicate with a friend living abroad?

# 1. Laptop/ Mobile/ Computer



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# Network Components

Networking Today

# Network Components

## End Device

- Every computer on a network is called a **host or end device**.
- Data originates with an end device
- Flows through the network
- Arrives at an end device



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# Network Components

## Servers

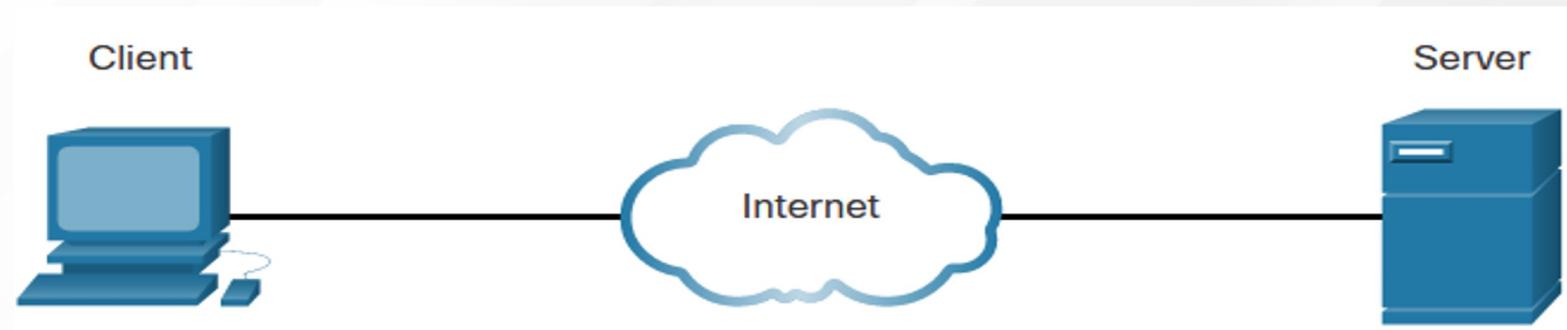
- Computers that provide information to end devices

Server Type	Description
Email	Email server runs email server software. Clients use client software to access email.
Web	Web server runs web server software. Clients use browser software to access web pages.
File	File server stores corporate and user files. The client devices access these files.

# Network Components

## Clients

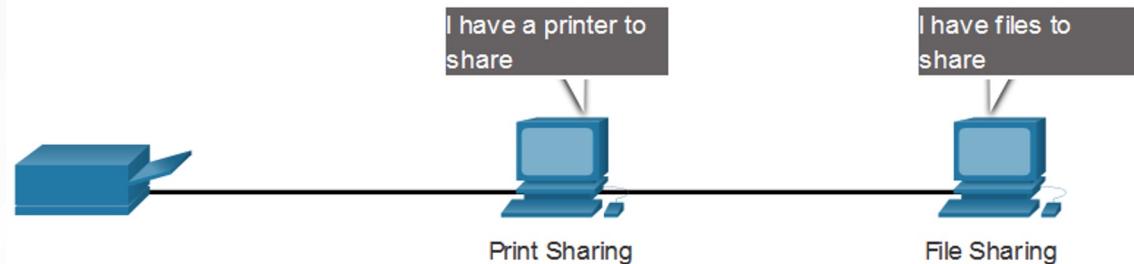
- Send requests to the servers to retrieve information



# Network Components

## Peer-to-Peer

- A device can be a client and a server in a Peer-to-Peer Network.
- Only recommended for very small networks.



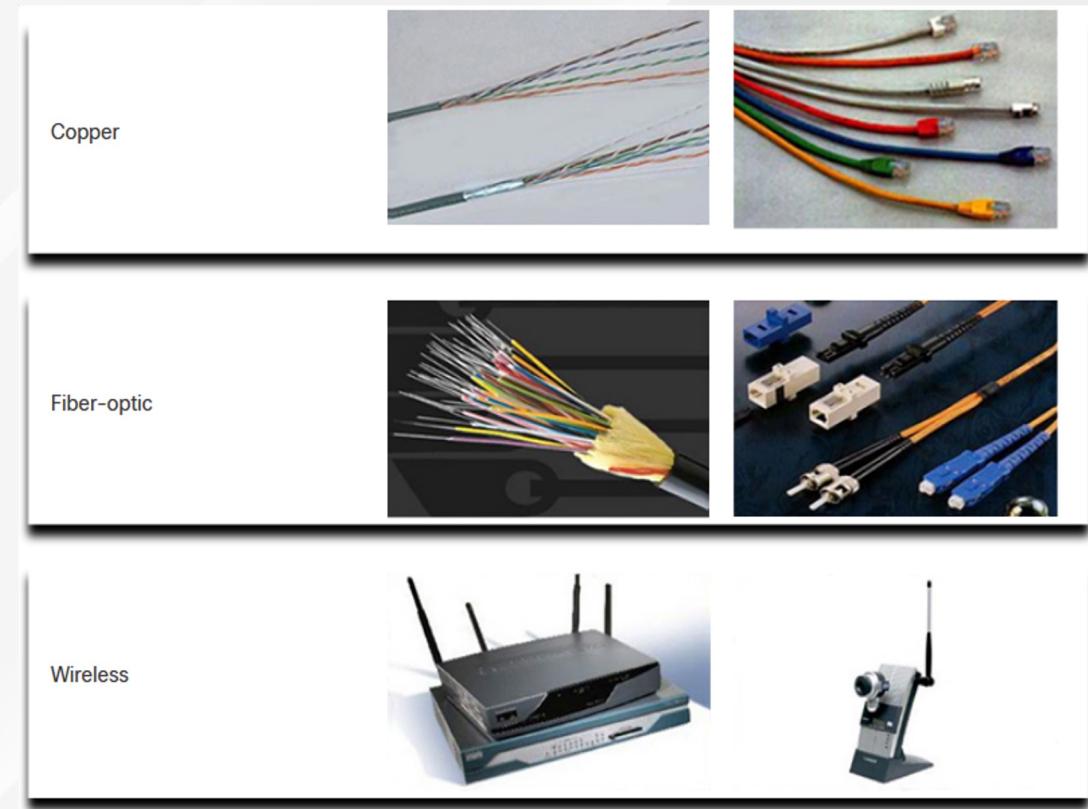
Advantages	Disadvantages
Easy to set up	No centralized administration
Less complex	Not as secure
Lower cost	Not scalable
Used for simple tasks: transferring files and sharing printers	Slower performance

# Network Components

## Network Media

- Allows a message to travel from source to destination.

Media Types	Description
<b>Metal wires within cables</b>	Uses electrical impulses
<b>Glass or plastic fibers within cables (fiber-optic cable)</b>	Uses pulses of light.
<b>Wireless transmission</b>	Uses modulation of specific frequencies of electromagnetic waves.



# Network Components

## Intermediary Network Devices

- Interconnects end devices



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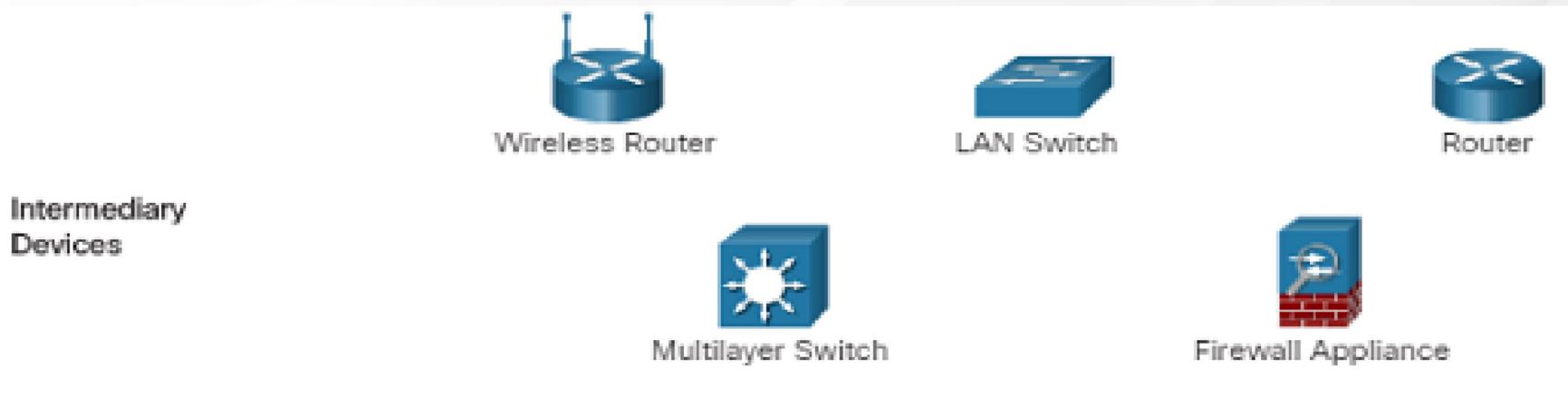


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# Network Components

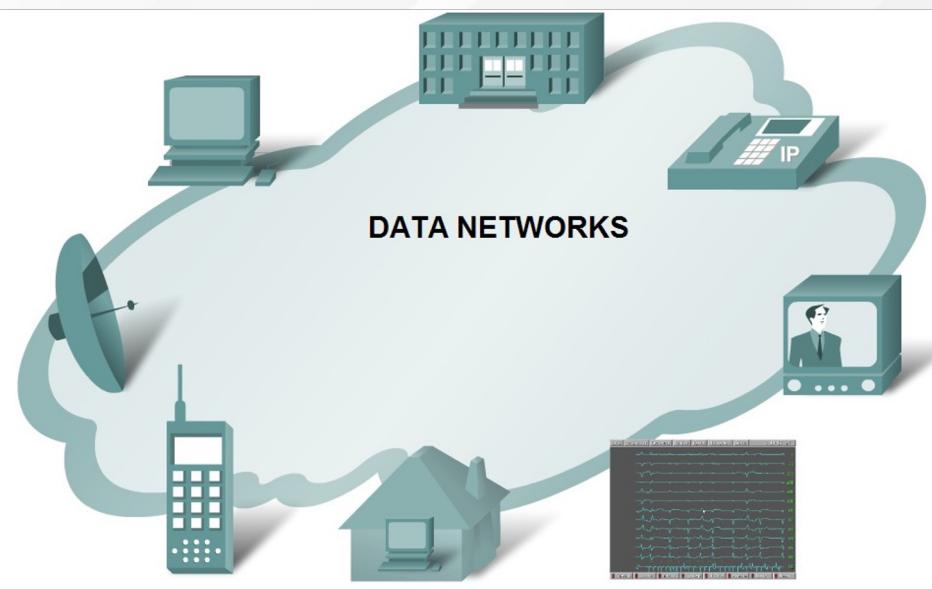
## Intermediary Network Devices (Cont.)

- Management of data as it flows through a network
  - Regenerate and retransmit data signals.
  - Maintain information about what pathways exist in the network.
  - Notify other devices of errors and communication failures.

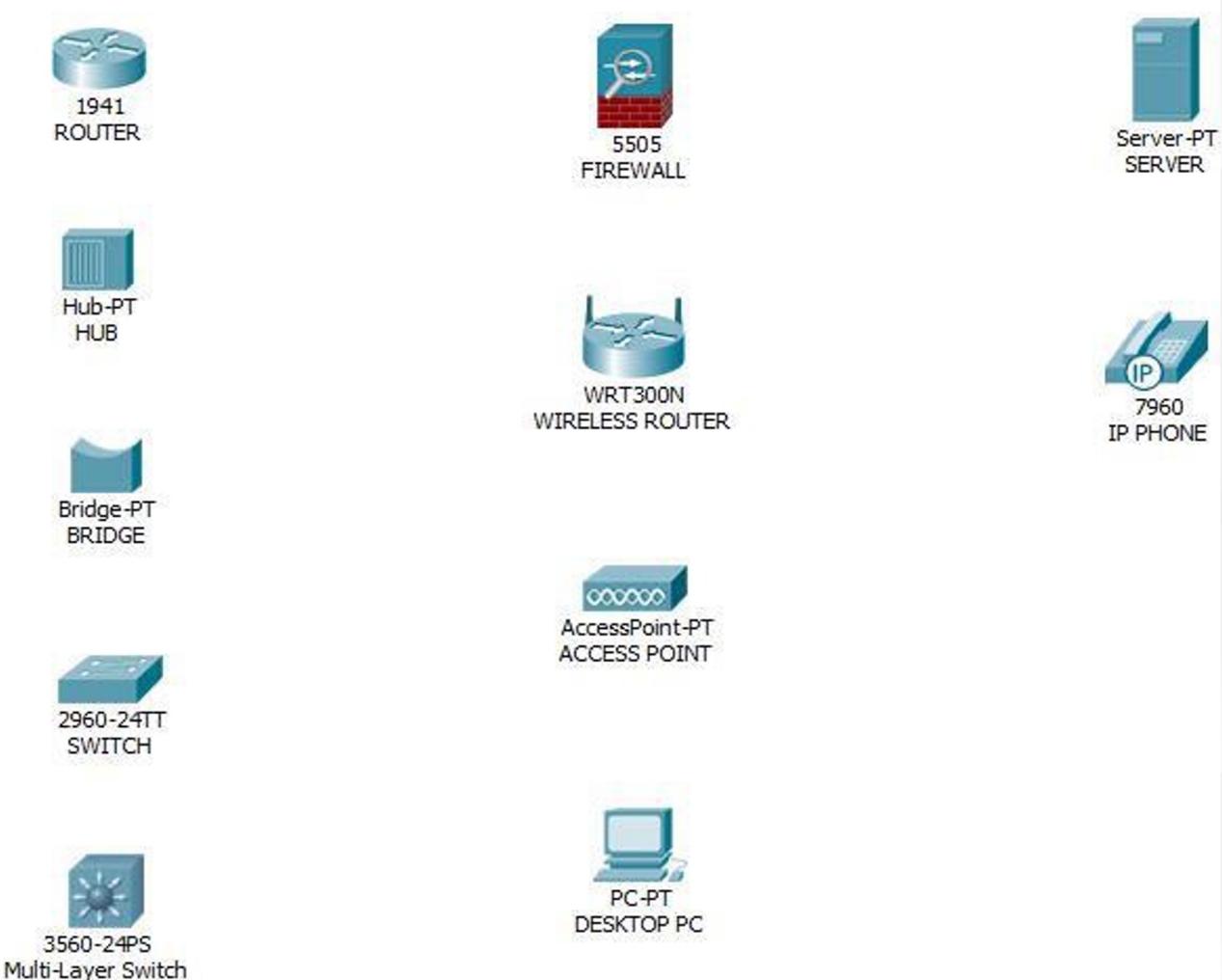


# Basic Characteristics of Communication

- Rules or agreements are established in the first step.
- Information is molded into a format which can be transmitted in a data network.
- Data may get delivered through different paths to the destination.



# Components of a Computer Network



# Internetworking Basics

- Computer networks have grown exponentially over the last 25 years.
- Video conferencing and the use of such mission critical data has increased drastically.
- How would the PC name Harry communicates with the PC name Ron?

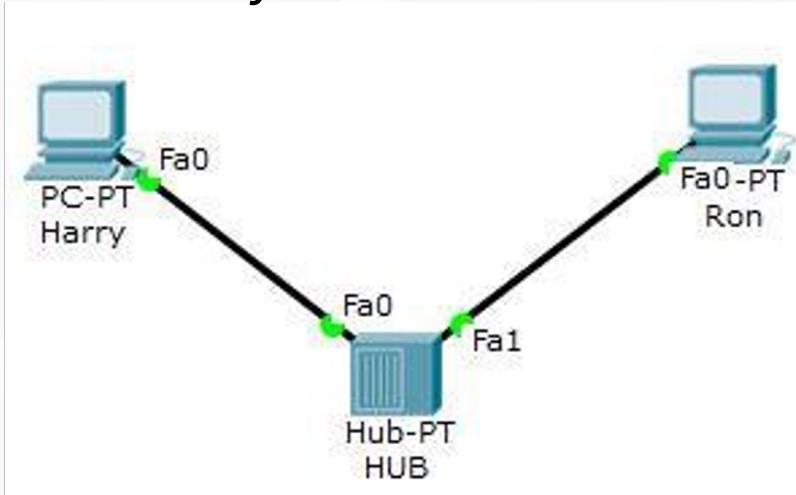


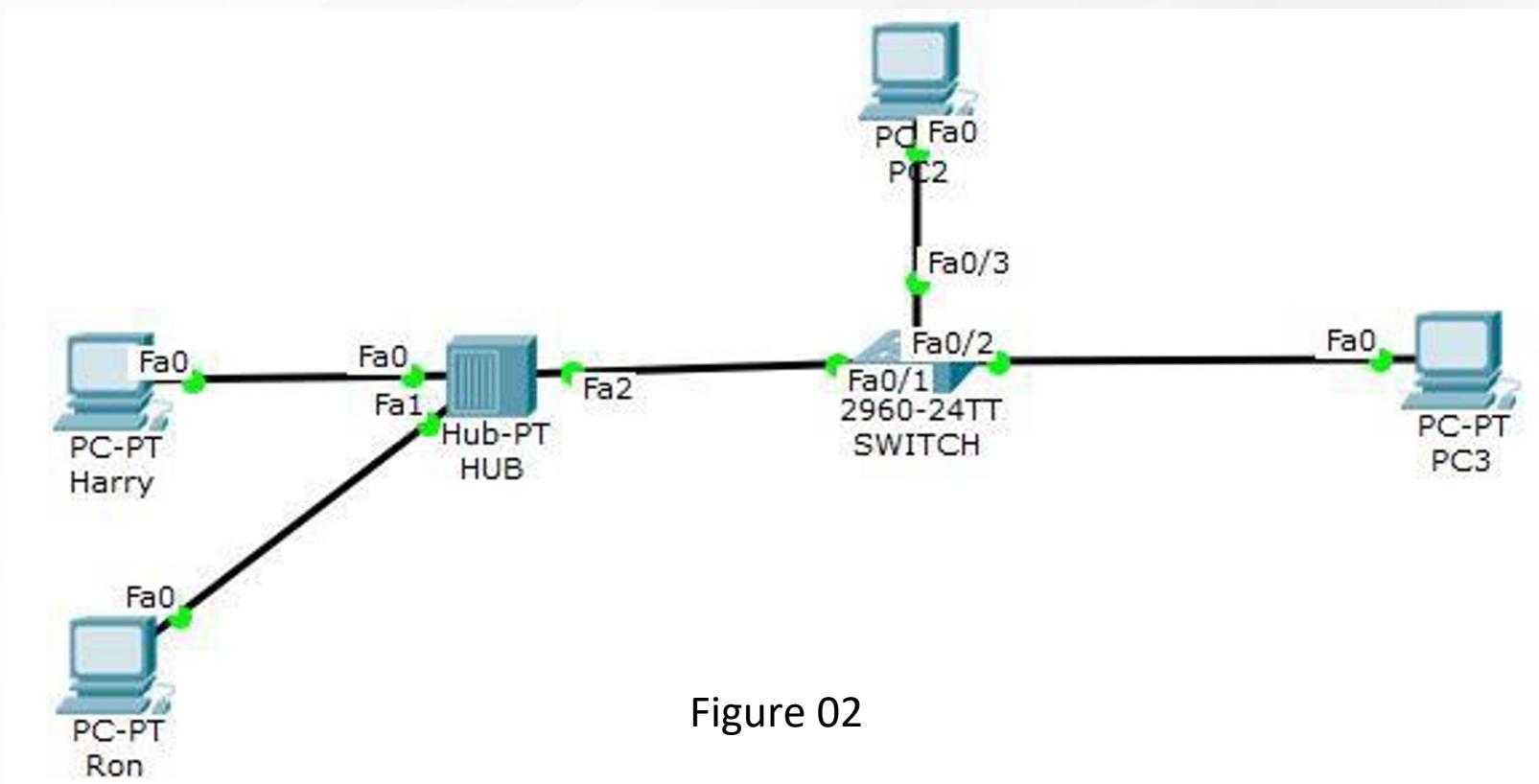
Figure 01

# Internetworking Basics

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- With traffic growth, a LAN's traffic congestion has reached epic proportions.
- Thus we use Network Segmentation.
- Using devices such as routers, switches and bridges.
- List of things which causes a LAN traffic congestion:
  - Too many hosts in a broadcast and collision domain.
  - Broadcast storms.
  - Low bandwidth.
  - Adding Hubs for connectivity.

# Internetworking Basics



# Internetworking Basics

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- In figure 02, the main hub from figure 01 is replaced by a Switch.
- Hubs do not segment a network, they just connect network segments together.
- Switches are not used to create internetworks, thus they do not break broadcast domains by default.
- Switches are used to add functionality to a LAN.
- By default, a switch breaks up collision domains.
- Switches “switch” frames from one port to another port.

# Internetworking Basics

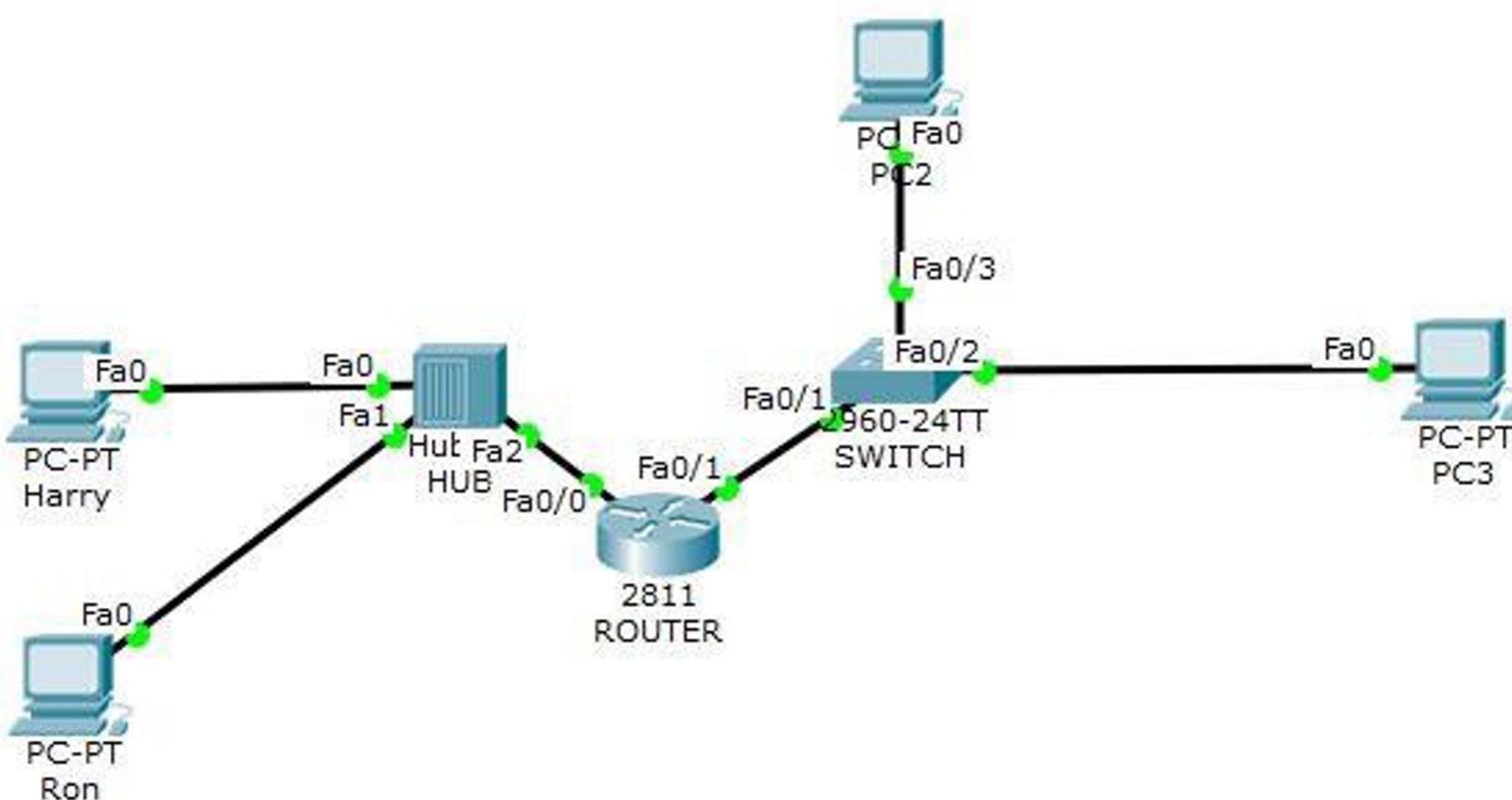


Figure 03

# Internetworking Basics

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- Routers are used to create Internetworks as they route packets of data from one network to the another.
- Routers by default break up a broadcast domain.
- Figure 03 represents an internetwork, as the router is used to connect two different computer networks together.
- Routers are also used to provide connections to the WAN services (through the use of serial interfaces).
- Breaking up a broadcast domain is important.

# Internetworking Basics

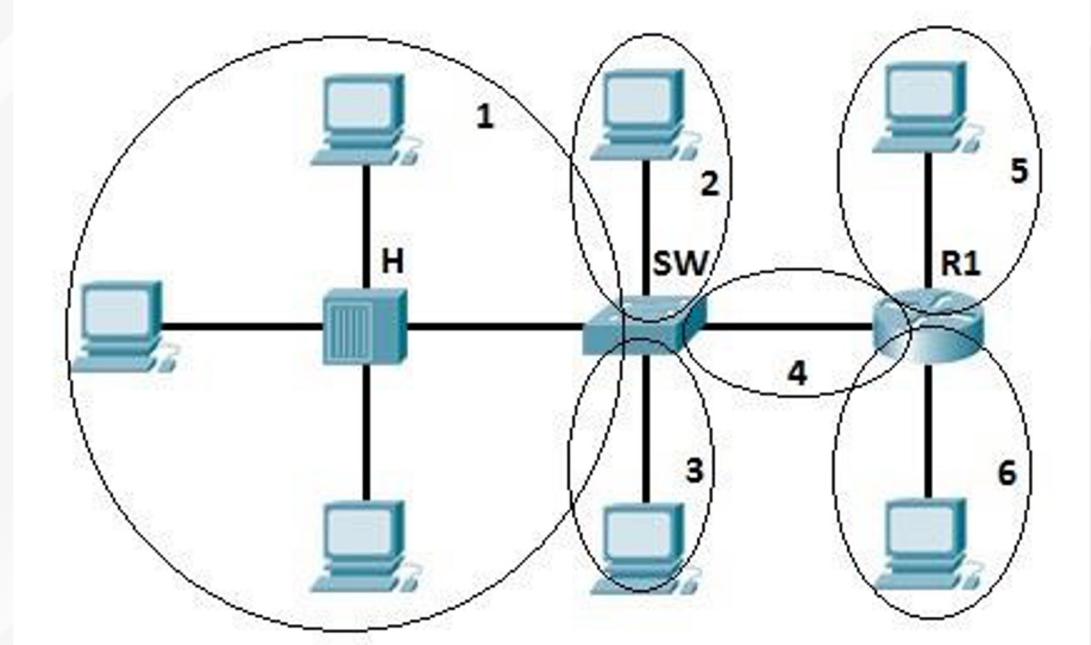
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- Four router functions in a computer network can be listed as:
  - Packet switching.
  - Packet filtering.
  - Internetwork communication.
  - Path selection.
- Advantages of using a router in a computer network:
  - They do not forward broadcasts by default.
  - They can filter the network based on Layer 3 information.

# Collision and broadcast domains

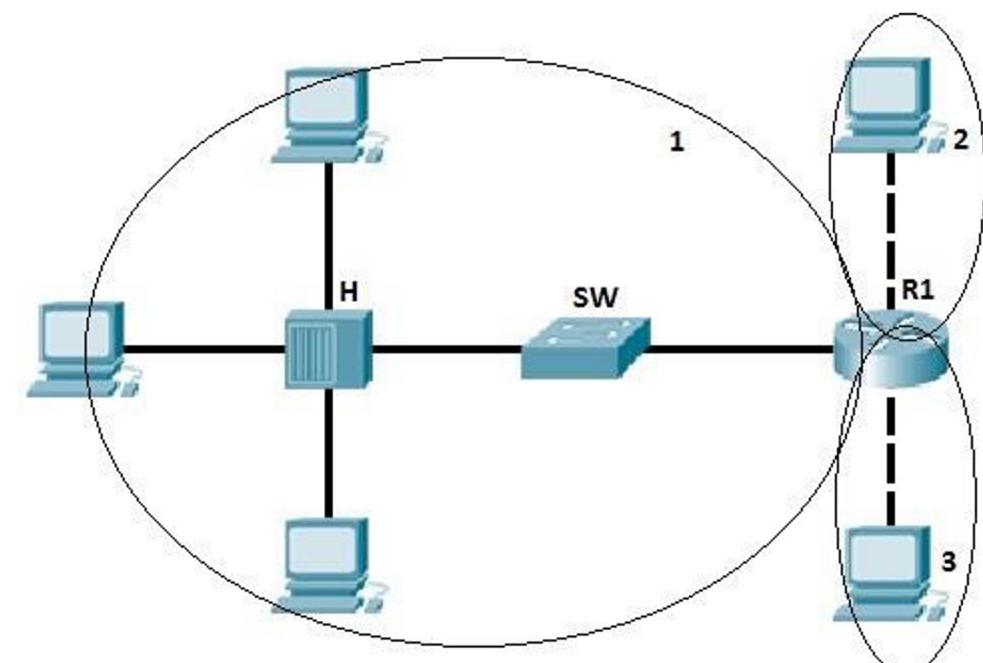
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- Collision domain represents a part of a network where packet collision can occur.
- A collision occurs when two devices send a packet at the same time on a shared network segment.



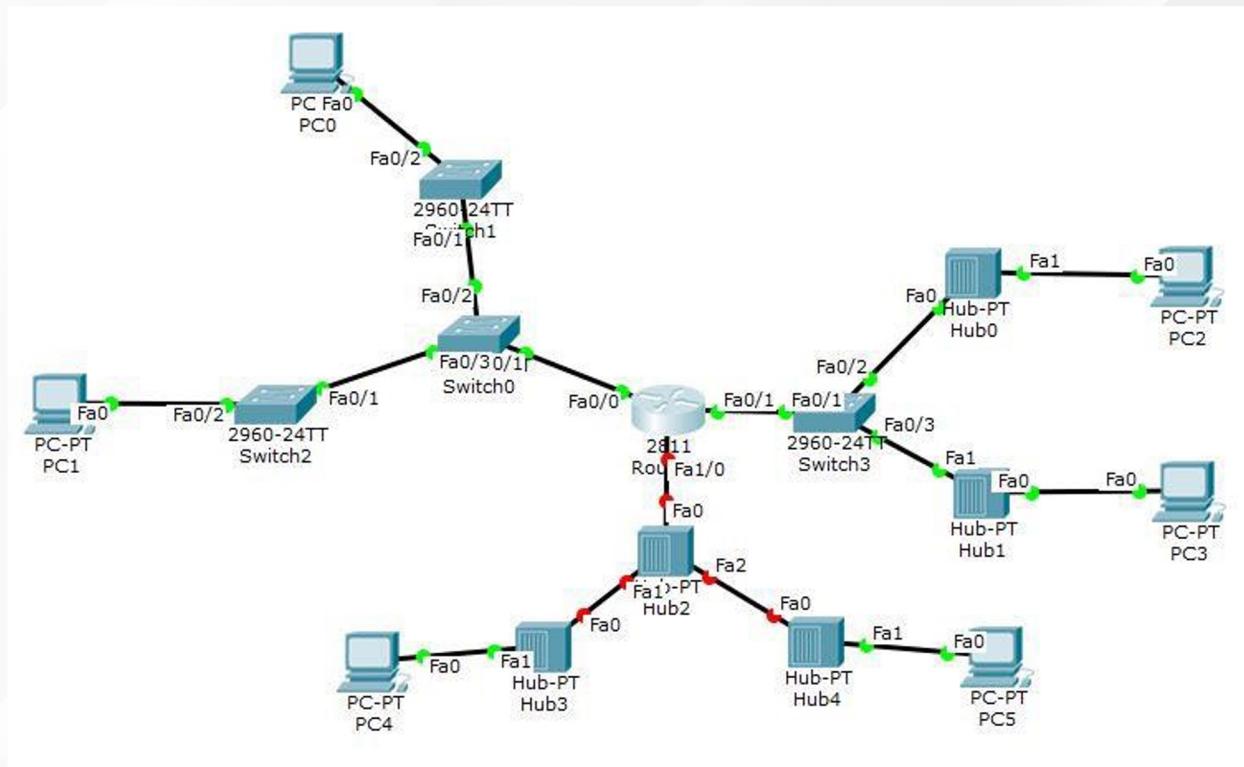
# Collision and broadcast domains

- A broadcast domain is a domain in which a broadcast is forwarded.
- A broadcast domain contains all the devices that can reach other at data link layer by using broadcast.



# Collision and broadcast domains

How many collision domains and broadcast domains are there in the following topology?



# End of Lecture 17