

The background features a dark blue field with a grid of thin, light blue lines. On the right side, these lines curve and swirl, creating a sense of depth and movement, resembling a tunnel or a dynamic data flow.

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Network Strategy

Outline

- Network device
- Hub operation
- Switch/Bridge operation
- Router operation
- Difference between Switch & Bridge
- Collision domain
- Broadcast domain

Network devices

- End-user Device: End-user devices include computers, printers, scanners, and other devices that provide services directly to the user.
- Hub, Switch & Bridge are network devices, they connect nodes to form a network
- Router, on the other hand, is an internetwork device, Router connect different networks together and forms an internetwork.

Hub

- Layer 1 device, because it does not understand any address
- Also called dummy or non-intelligent device.
- Can not filter data, because hub does not understand MAC or IP
- Hub environment is also call as :
 - Half duplex domain
 - Ethernet network
 - Shared bandwidth environment
 - 802.3 [an IEEE standard for ethernet network]
 - or collision domain

Hub

- In hub environment, only a single device is allowed to transmit data at the same time. If another device tries to transmit data, a collision occurs which discards both messages. Then a jam message is generated to inform all devices about the collision, and after a specific time frame, each device then transmits the data in its own turn.
- When a hub receives a message, it floods the message because the hub cannot read the destination MAC/IP. Flooding a message is sending a message out of all ports except the port it is received on.

Switch & Bridge

- Is a layer2 device (data link layer device), because they filter data based on destination MAC address and MAC is a layer 2 address.
- The S/B environment is also called the full duplex or dedicated bandwidth environment where all devices can transmit data at the same time and each device has a dedicated bandwidth to the switch.
- Understands MAC address but not IP
- Switches keep a table of MAC addresses called MAC Table.
 - #show mac-address table

Switch & Bridge

- When a switch receives a message, the switch read the destination MAC address then:
 - A. if the destination MAC is not available in the MAC Address Table, the message is flooded.
 - B. if the destination MAC is available in the MAC Address Table, the message sent only to that specific Device.
- Switch is a new technology and mostly used today
- Each port of a switch is a single collision domain.

Switch & Bridge

- All ports of a switch are in a single broadcast domain.
- Broadcast domain is a network segment in which if a single device send a broadcast message, all other devices are forced to receive the message.
- Switches can be:
 - Static Switch Manageable
 - Dynamic Switch Not Manageable

Switch vs Bridge

Switch

New technology

Mostly used today

More Ports

Hardware Based

(Uses ASIC Chip)

Bridge

Old Technology

Not used today

Less Ports

Software Based

Router

- Router is a layer 3 or Network Layer device because Router filters data based on the destination IP address.
- Routers understand both IP and MAC addresses
- Routers connect networks to form internetwork
- When a router receives a packet, it reads the destination IP addresses and forwards the packet to that specific Network.
- If the destination IP is not available in the Routing table of the Router, then the message is discarded.
- Routing table keeps information about all networks.

Router

- Each port of a router is a separate network or separate broadcast domain.
- Each interface of a router takes an IP address from a separate network class.
- Unlike Hub, Switch & Bridge, the routers block a broadcast message by default. If the router does not block broadcast, a single broadcast must reach to all internet connected devices and the traffic may cause the entire internet down.

Main Functions of a Router

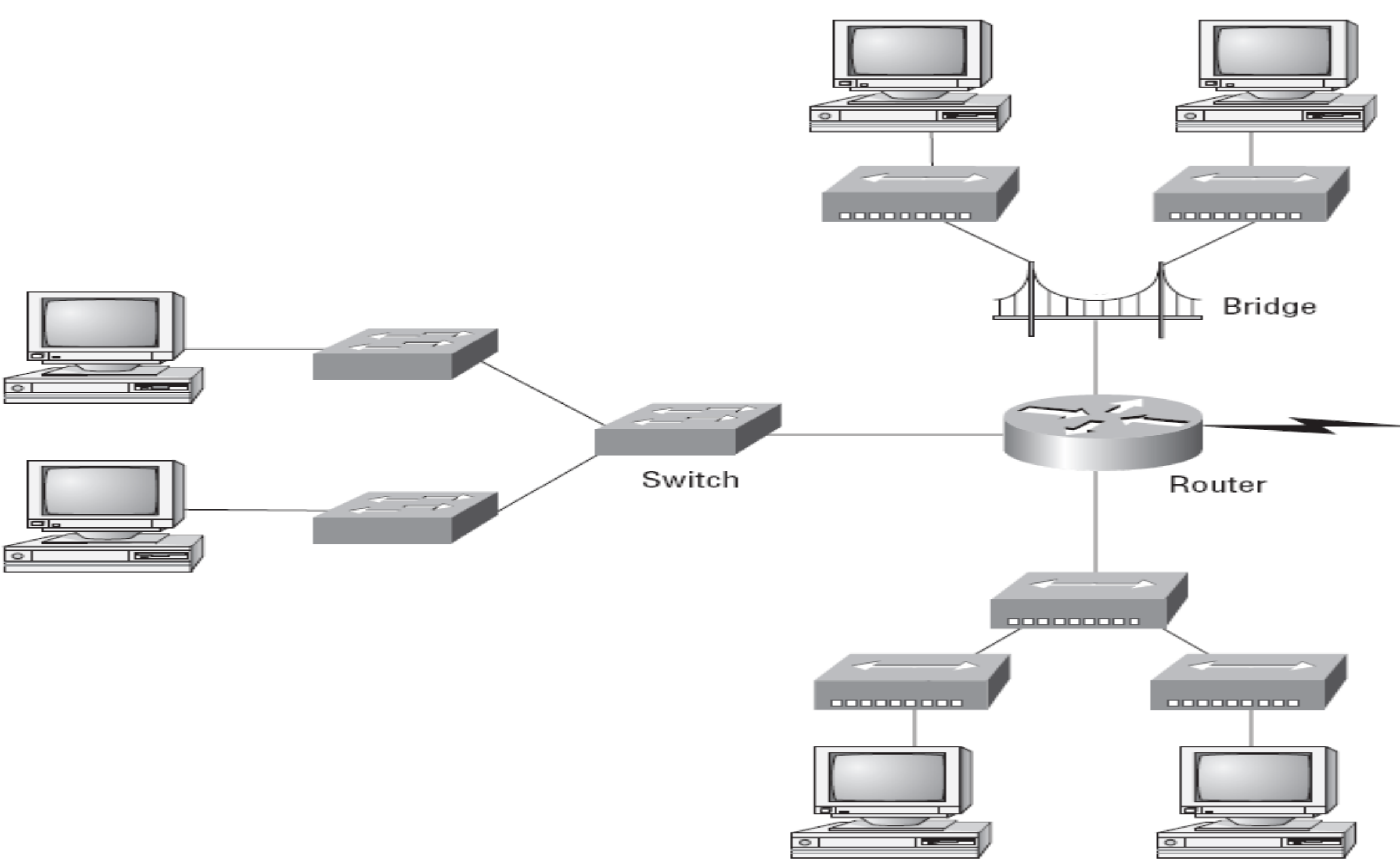
- Packet switching
- Packet filtering
- Best path selection
- Internetwork communication
- Blocks broadcast by default

Collision Domain

- A collision domain is a network segment in which only one device is allowed to transmit the data.
- While determining the number of collision domains in a topology, we must count the number of Switch/Bridge ports used.

Broadcast Domain

- Broadcast domain is a network segment in which if a single device send a broadcast message, all other devices are forced to receive the message.
- While determining the number of broadcast domains (Networks) in a topology, we must count the number of router ports used.



References

- Chapter 01 & 02 of Cisco CCNA book: CCNA Routing and Switching Study Guide - Lammle, Todd

THANK YOU