Networking Devices

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Common Network Connectivity Devices

Network Interface Controller (NIC)

- A hardware that connects computers to a network
- Every NIC has a unique MAC address

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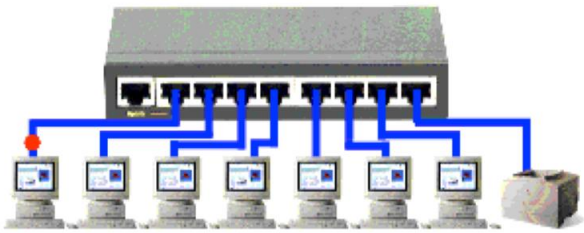
Common Network Connectivity Devices

Hub

- Broadcasts data to every computer connected to it
- Suitable for small LANs
- Not secure because all traffic can be captured
- No routing capability
- Creates a collision domain
- Half-duplex



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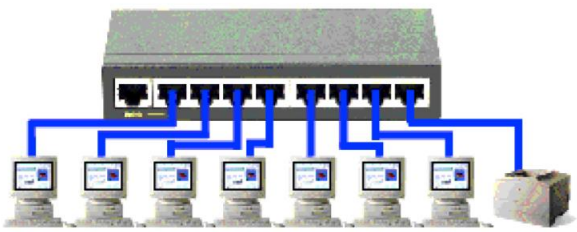
5

Common Network Connectivity Devices

Switch

- Connects multiple hosts together *(like Hub)*
- Works on Data Link Layer (Layer 2) *(unlike Hub)*
- Can inspect received traffic and forwards only to recipient(s) *(unlike Hub)*
- Each port on a Switch is a separate collision
- Full-duplex *(unlike Hub)*



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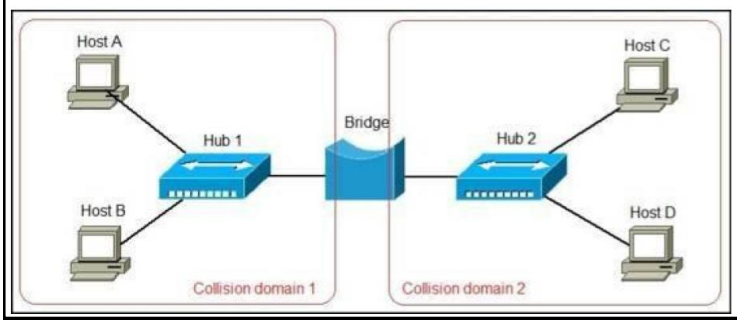
6

Common Network Connectivity Devices

Bridge

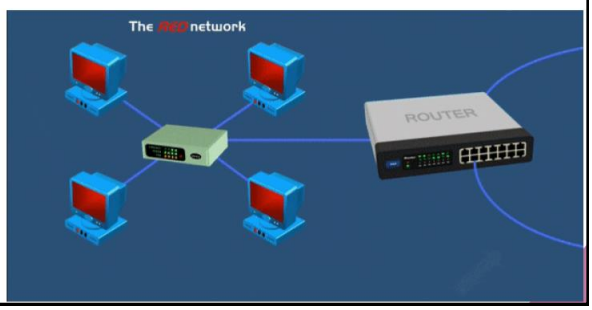
- Divides a network into segments
- Works at Data Link Layer (Layer 2)
- Forwards or filters the Ethernet frames



Common Network Connectivity Devices

Router

- Connects multiple segments together
- Uses IP addresses to make decisions about the best way to get the data to its destination
- Works on Network Layer (Layer 3)
- Combination of hardware and software



Common Network Connectivity Devices

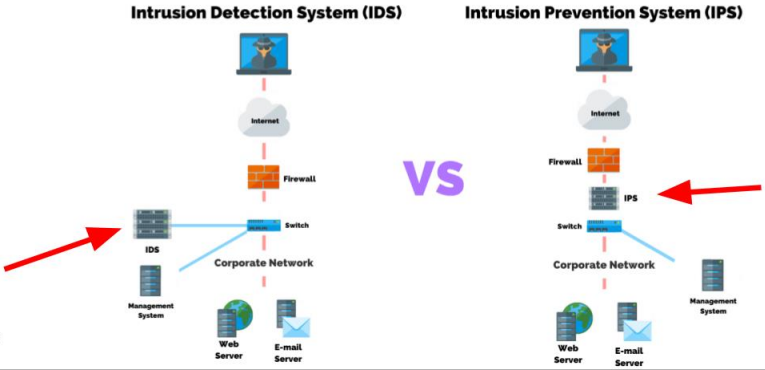
Firewall

- Prevents unauthorized access to or from a private network
- Protects a network's data and resources from outside access and threats
- Usually placed at the end point of a network
- Either a hardware (black box) or a software

Common Network Connectivity Devices

IDS/IPS

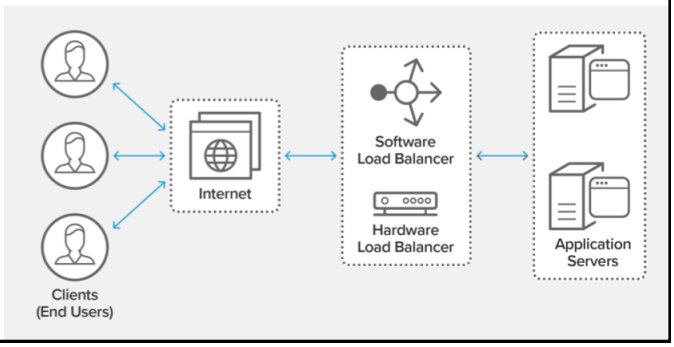
- Intrusion Detection System (IDS) monitors traffic and report malicious activities
- Intrusion Prevention System (IPS) stops threats in real-time as they occur



Other Specialized Devices

Load Balancer

- Distributes client requests or network load efficiently across multiple servers
- Ensures high availability and reliability by sending requests only to servers that are online
- Provides the flexibility to add or subtract servers as demand dictates



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Other Specialized Devices

Domain Name Service (DNS) Server

- Finds the IP addresses of hostnames
- Computers use IP addresses, humans use names
- Easier to remember www.clarusway.com than 52.84.116.109
- There are thousands of DNS servers
- Managed and controlled by *The Internet Assigned Numbers Authority (IANA)*
- IANA is operated by *the Internet Corporation for Assigned Names and Numbers (ICANN)*

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13

Other Specialized Devices

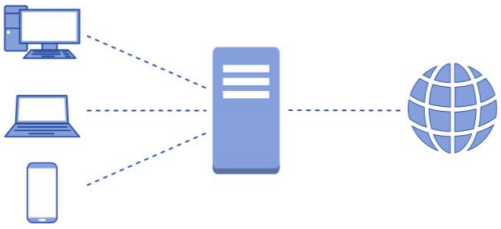
Domain Name Service (DNS) Server

- **.com** A commercial organization
- **.edu** An educational establishment, such as a university
- **.gov** A branch of the U.S. government
- **.int** An international organization, such as NATO or the United Nations
- **.mil** A branch of the U.S. military
- **.net** A network organization
- **.org** A nonprofit organization
- Some DNS names end with country name like:
  .jp (Japan) **.ca** (Canada) **.uk** (Great Britain)

Other Specialized Devices

Proxy Server

- Acts as a gateway between you and the internet
- Acts as a firewall and web filter
- Provides shared network connections
- Caches data to speed up common requests
- Provides privacy



Other Specialized Devices

Encryption Devices

- Allows you to create secure connections over insecure channels
- Sometimes called *encryption gateway*

Other Specialized Devices

Packet Shaping (Traffic Shaping)

- Traffic shaping *(or packet shaping)* is a congestion management method that regulates network data transfer by delaying the flow of less important or less desired packets.
- Used to optimize network performance by prioritizing certain traffic flows and ensuring the traffic rate doesn't exceed the bandwidth limit.

Other Specialized Devices

Packet Shaping (Traffic Shaping)

Common uses of traffic shaping include:

- Time-sensitive data may be given priority over traffic that can be delayed briefly
- In a corporate environment, business-related traffic may be given priority over other traffic
- A large ISP may shape traffic based on customer priority
- An ISP may limit maximum bandwidth consumption for certain applications to reduce costs and create the capacity to take on additional subscribers

Other Specialized Devices

VPN Concentrator

- Provides secure creation of VPN connections
- A type of router device
- It can:
  - Establish and configure tunnels
  - Authenticate users
  - Assign tunnel/IP addresses to users
  - Encrypt and decrypt data
  - Ensure end-to-end delivery of data