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# Common Network Connectivity Devices



### **Common Network Connectivity Devices**



### **Network Interface Controller (NIC)**

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



## 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





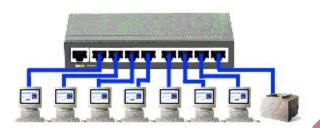
# **Common Network Connectivity Devices**



#### **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)





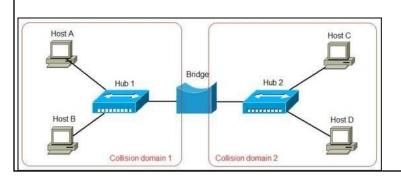


## **Common Network Connectivity Devices**



### **Bridge**

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





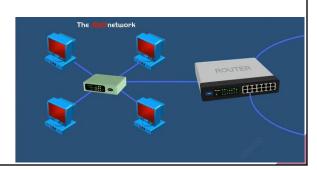
# Common Network Connectivity Devices



### 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



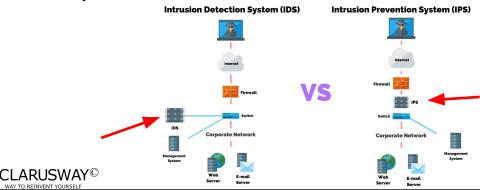
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## **Common Network Connectivity Devices**



### IDS/IPS

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



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# Other Specialized Devices

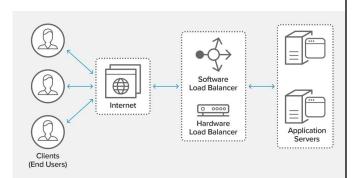


# Other Specialized Devices



#### **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







### **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 13.35.253.82
- 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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# Other Specialized Devices

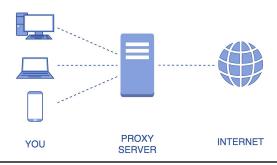


### **Domain Name Service (DNS) Server**

- .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:
  .ip (Japan) .ca (Canada) .uk (Great Britain)

### **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



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### Other Specialized Devices



### **Encryption Devices**

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







### **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.





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### 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

#### **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
  - o Ensure end-to-end delivery of data



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