Computer Network Devices

Munesh Singh

Indian Institute of Information Technology, Design and Manufacturing Kancheepuram,
Chennai, Tamil Nadu 600127

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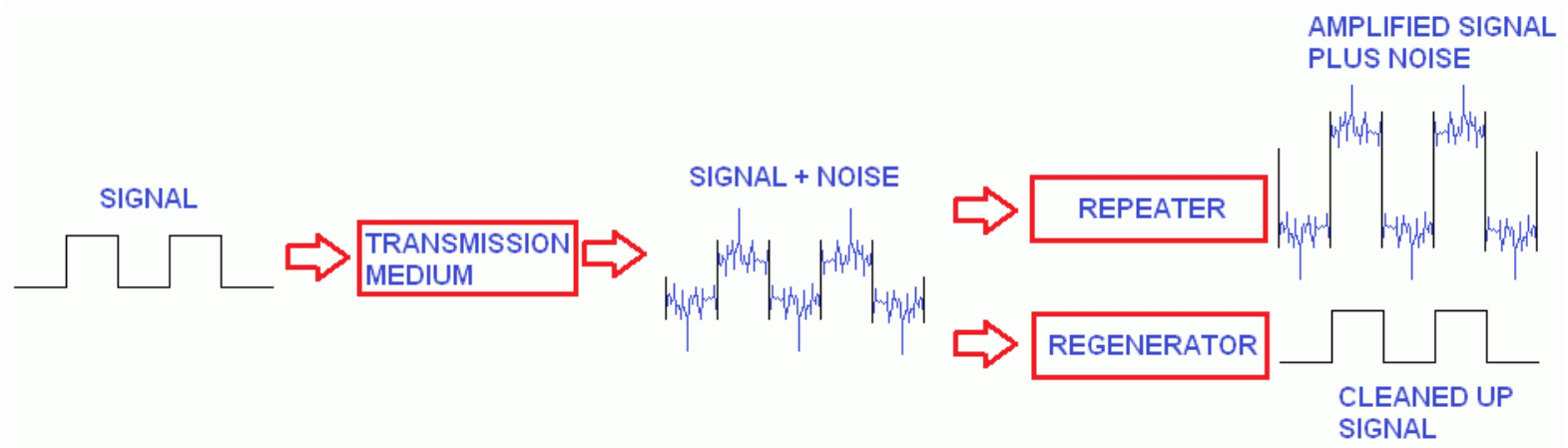
Network Device Repeater

- A network device used to regenerate or replicate a signal.
- Repeaters are used in transmission systems to regenerate analog or digital signals distorted by transmission loss.
- Repeater Device (Physical Layer Device):
  - **2 Port device**
  - **Forwarding**
  - **No filtering**
  - **Collision Domain**



Network Device HuB

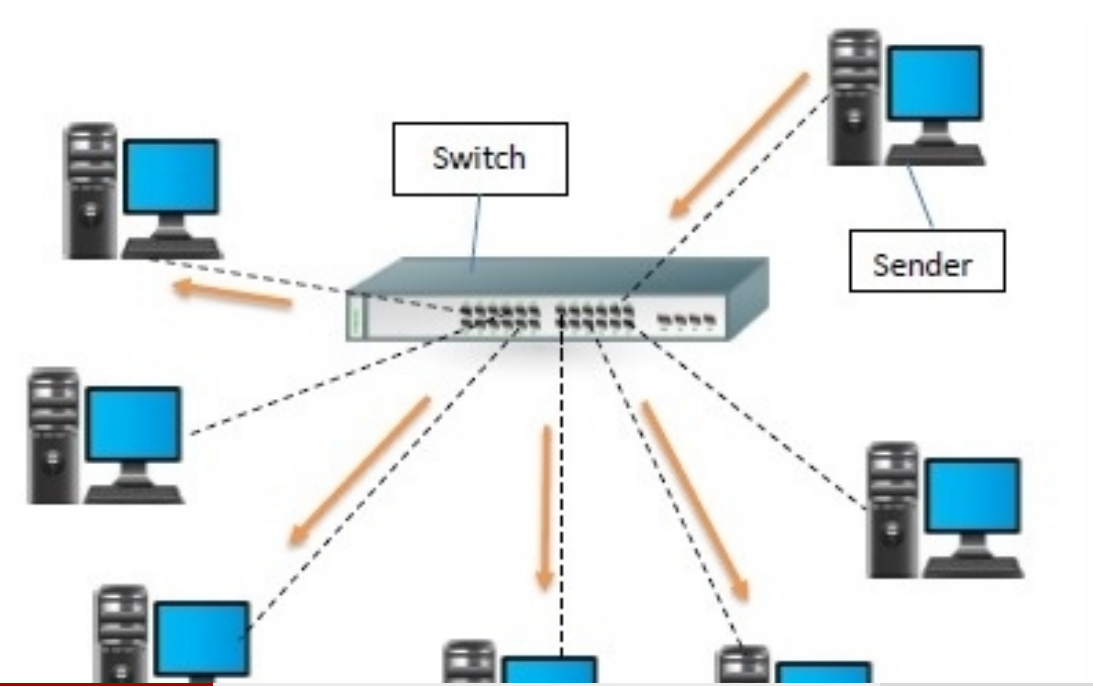
- Hubs were the common network infrastructure devices used for LAN connectivity.
- Hubs are designed to work with Twisted pair cabling and normally use RJ45 jack to connect the devices.
- Hubs usually come in different shapes and different numbers of ports
- Hubs features (Physical Layer Device):
  - **Multi port Repeaters (4/12)**
  - **Forwarding**
  - **No Filtering**
  - **Collision Domain**
  - **Transmission mode is half duplex.**

Network Device Bridge

- A bridge can join segments or workgroup LANs.
- A bridge can also divide a network to isolate traffic or problems.
- Types of Bridges: Static (manual bridge table) and Dynamics or transparent (automatic bridge table)
- Bridge Features (Physical and Data Link Layer):
  - **Connecting two LANs**
  - **Forwarding (based on MAC address)**
  - **Filtering (check the MAC address)**
  - **Collision Domain**
  - **Bridge Data unit protocol** (spanning tree formation to avoid packet loop)
  - **Store and Forward**

Network Device Switch

- A switch is a multiport bridge with a buffer and a design that can boost its efficiency(a large number of ports imply less traffic) and performance.
- It is supports unicast, multicast and broadcast.
- Collisions do not occur since the communication is full duplex
- They are active devices, equipped with network software.
- The number of ports is higher 24/48

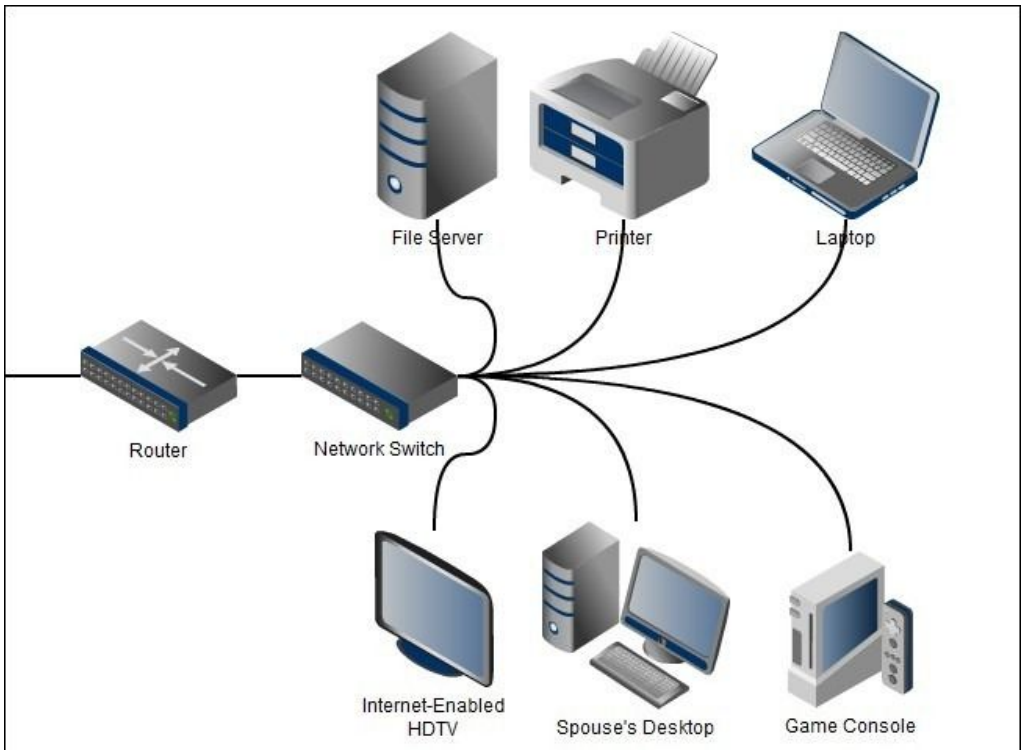


Network Device Router

- Features of Routers: (Physical, Data Link, and Network layer)
  - It connects different networks together and sends data packets from one network to another.
  - A router can be used both in LANs and WANs
  - It transfers data in the form of IP packets.
  - Routers have a routing table in it that is refreshed periodically according to the changes in the network.
  - Routers provide protection against broadcast storms
  - Routing table:
    - Static Routing Table
    - Dynamic Routing Table
  - Types of routers:
    - Wireless routers
    - Broadband routers (connect to the Internet through telephone)
    - Core Routers (route data packets within a given network)
    - Edge Routers (Border Gateway Protocol (BGP) for connectivity)
    - Brouters (Brouters are specialized routers, work like a bridges as well)

Network Device Router cont...

- Routing Features:
  - Forwarding (based on source IP and Destination IP)
  - Filtering (It can block or allows the packets on its interface)
  - Routing (Shortest distance routing algorithm)
  - Flooding (Update the network change for routing table)
  - Collision domain (store and forward)
  - Router get an IP address from its connecting networks (class of IP)



Network Device Modem

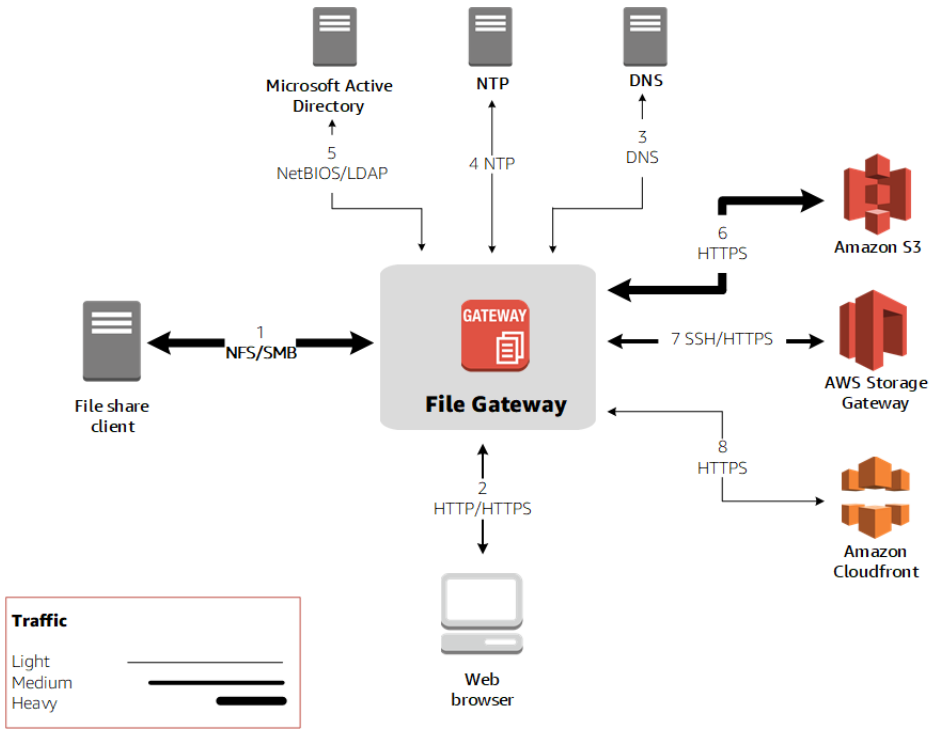
- Modem serves as a bridge between your local network and the Internet
- Modem is shorthand for modulator-demodulator
- Modem plugs into whatever type of infrastructure you have:
  - **cable**,**telephone**,**satellite** ,**fiber**

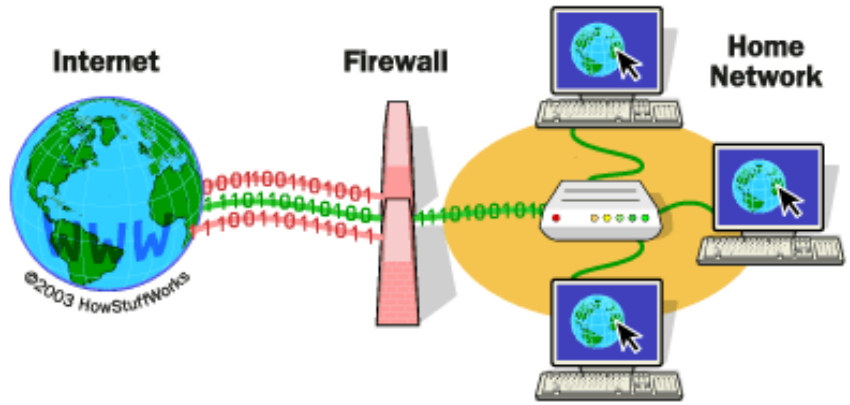
-and gives you a standard Ethernet cable output that you can plug into any router (or a single computer) and get an Internet connection

Network Device Gateway

- Gateways make communication possible between different architectures and environments.
- A gateway links two systems that do not use the same:
  - **Communication protocols**
  - **Data formatting structures**
  - **Languages**
  - **Architecture**
- Types of Gateways:
  - **Network Gateway**
  - **Cloud Storage Gateway** (API of SOAP or REST)
  - **Internet-To-Orbit Gateway (I2O)** (It connects devices on the Internet to satellites)
  - **IoT Gateway** (IoT gateways assimilates sensor data from IoT)
  - **VoiP Trunk Gateway** (It facilitates data transmission between plain old telephone service)

Gateway & Firewall



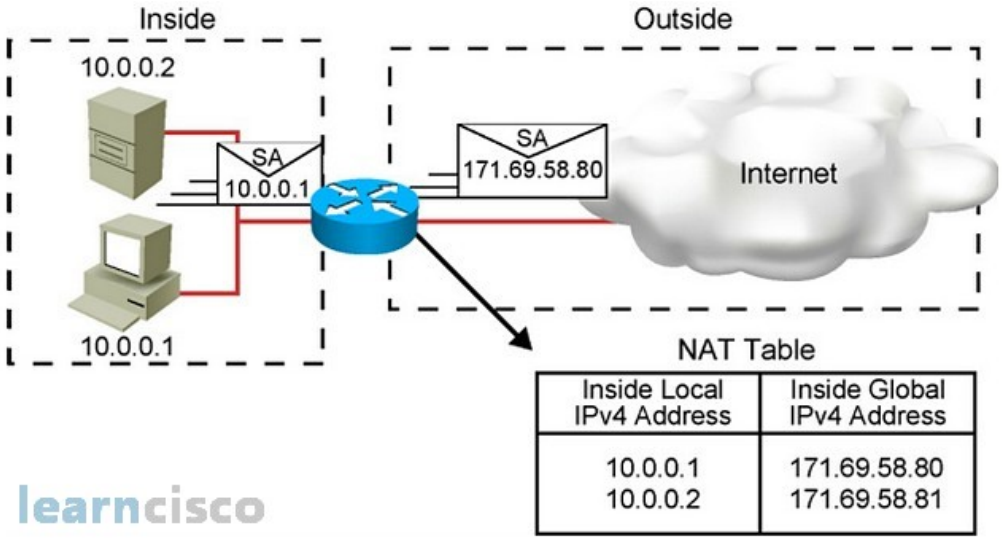


Firewall and IDS

- Firewall is a single device used to enforce security policies within a network or between networks by controlling traffic flows.
  - Packet filtering (examine whole packet)
  - Proxy service (redirect to proxy server rather than webserver)
  - Stateful inspection (examine key part of the packet)
- Firewall Security
  - Remote login
  - Application backdoors
  - SMTP session hijacking
  - Operating system bugs
  - Denial of service
  - E-mail bombs
  - Macros
  - Viruses, Spam
  - Source routing
  - Redirect bombs

Other Network Devices

- **NIC:Network Interface Card**
- **Connectors** Network cards have three main types of connectors
  - **BNC connectors** (10Base-2)
  - **DB9 (RJ45 JACK)**
  - **DB15 Connector**
  - **RJ45 connector**
- Network address translation (NAT)
- Port Address Translation (PAT) (MAP Private IPs to Single Public IP)



Thank You