|  |  |
| --- | --- |
| Hub | Switch |
| Hubs are simple networking devices with an input Ethernet port that connects to a [router](https://www.coursera.org/articles/router) and multiple output ports for devices to connect | A network switch is a hardware connection device that is smarter than a hub |
| A Hub works on the basis of broadcasting. | Switch works on the basis of MAC address. |
| Low – sends data to all | High – sends only to intended device |
| Works on Physical Layer (Layer 1) | Works on Data Link Layer (Layer2) |
| Cost is Cheaper | Cost is More expensive |

|  |  |
| --- | --- |
| Switch | Router |
| Connects devices within a LAN | Connects multiple networks (e.g., LAN to Internet) |
| Uses MAC addresses | Uses IP addresses |
| Used in LAN (Local Area Network) | Used in WAN and Internet connections |
| Faster for internal communication | Slightly slower due to routing overhead |
| Works on Data Link Layer (Layer 2) | Works on Network Layer (Layer 3**)** |

|  |  |
| --- | --- |
| Router | Gateway |
| A device that routes data between different networks | A device that connects different network architectures or protocols |
| Forwards data based on IP addresses | Translates and converts protocols between networks |
| Less complex | More complex (handles format and protocol differences) |
| Chooses best IP route for packets | Converts and routes data across incompatible systems |
| Works mainly at Network Layer (Layer 3) | Works at all layers, especially Layer 5 to Layer 7 |

# **Router**

A Router is a device that connects multiple networks together and routes data packets based on IP addresses.

Works at **Network Layer (Layer 3)**.

Uses **IP addresses** to forward data.

Connects LAN to **WAN or Internet**.

Can perform **NAT** (Network Address Translation).

Supports **routing protocols** like RIP, OSPF, BGP.

Ex: Your home Wi-Fi router connects your mobile and PC (LAN) to the Internet (WAN).

# **Gateway**

A Gateway is a network device that acts as a translator between networks using different protocols or architectures.

Works across **all layers (mainly 5 to 7)** of OSI Model.

Converts **protocols, data formats, or languages**.

Used when networks differ in **type, structure, or application**.

Slower but essential for communication between **incompatible systems**.

Ex: A **VoIP gateway** connects a telephone network to the Internet.

# **Switch**

A Switch is a network device that connects devices within a Local Area Network (LAN) and forwards data based on MAC addresses.

Works at **Data Link Layer (Layer 2)**.

Uses **MAC addresses** to forward frames.

Creates **separate collision domains** per port.

Improves network efficiency over hubs.

Does **not change IP or MAC addresses**.

Ex: Connecting computers, printers, and servers in an office.

Think of it like an **intelligent power strip** for network connections.