Hubs are networking devices used to connect multiple computers or network devices within a local area network (LAN). There are two main types of hubs: active hubs and passive hubs.

### Active Hub:

1. \*\*Amplification:\*\*

- \*\*Function:\*\* An active hub, also known as a "repeater hub," actively amplifies and regenerates the incoming signal.

- \*\*Purpose:\*\* This helps to extend the distance over which the network can operate.

2. \*\*Power Requirement:\*\*

- \*\*Power Source:\*\* Requires an external power source, typically through an AC adapter.

- \*\*Usage:\*\* Commonly used in larger networks or when longer cable runs are necessary.

3. \*\*Regeneration:\*\*

- \*\*Signal Regeneration:\*\* Regenerates and strengthens the signal before sending it to connected devices.

4. \*\*Number of Ports:\*\*

- \*\*Port Limitations:\*\* Active hubs are available with a limited number of ports (typically fewer than 10).

5. \*\*Cost:\*\*

- \*\*Higher Cost:\*\* Active hubs are generally more expensive due to their amplification and signal regeneration capabilities.

### Passive Hub:

1. \*\*Amplification:\*\*

- \*\*Function:\*\* A passive hub, also known as a "dumb hub" or "concentrator," does not amplify or regenerate signals.

- \*\*Purpose:\*\* It simply passes the signal along to all connected devices without any modification.

2. \*\*Power Requirement:\*\*

- \*\*No Power Source:\*\* Does not require an external power source. It operates solely on the power received from connected devices.

3. \*\*Regeneration:\*\*

- \*\*No Signal Regeneration:\*\* Does not regenerate or strengthen the signal.

4. \*\*Number of Ports:\*\*

- \*\*Port Availability:\*\* Passive hubs are available with a higher number of ports compared to active hubs.

5. \*\*Cost:\*\*

- \*\*Lower Cost:\*\* Passive hubs are generally less expensive than active hubs due to their simpler design and lack of signal regeneration capabilities.

### Comparison:

- \*\*Distance Limitation:\*\*

- \*\*Active Hub:\*\* Can extend the distance between connected devices due to signal regeneration.

- \*\*Passive Hub:\*\* Limited in terms of distance, and signal quality may degrade with longer cable runs.

- \*\*Power Dependency:\*\*

- \*\*Active Hub:\*\* Requires external power.

- \*\*Passive Hub:\*\* Operates without external power, drawing power from connected devices.

- \*\*Signal Quality:\*\*

- \*\*Active Hub:\*\* Maintains signal quality over longer distances.

- \*\*Passive Hub:\*\* Signal quality may degrade with increased cable length.

- \*\*Cost Consideration:\*\*

- \*\*Active Hub:\*\* Higher cost.

- \*\*Passive Hub:\*\* Lower cost.

In modern networking, hubs have largely been replaced by switches, which offer more advanced features and better performance. Switches operate at the data link layer (Layer 2) of the OSI model and can intelligently forward data only to the device that needs it, reducing network congestion.