

LAN Devices and UPS in Computer Systems

 **Assignment** - Computer Hardware & Networking

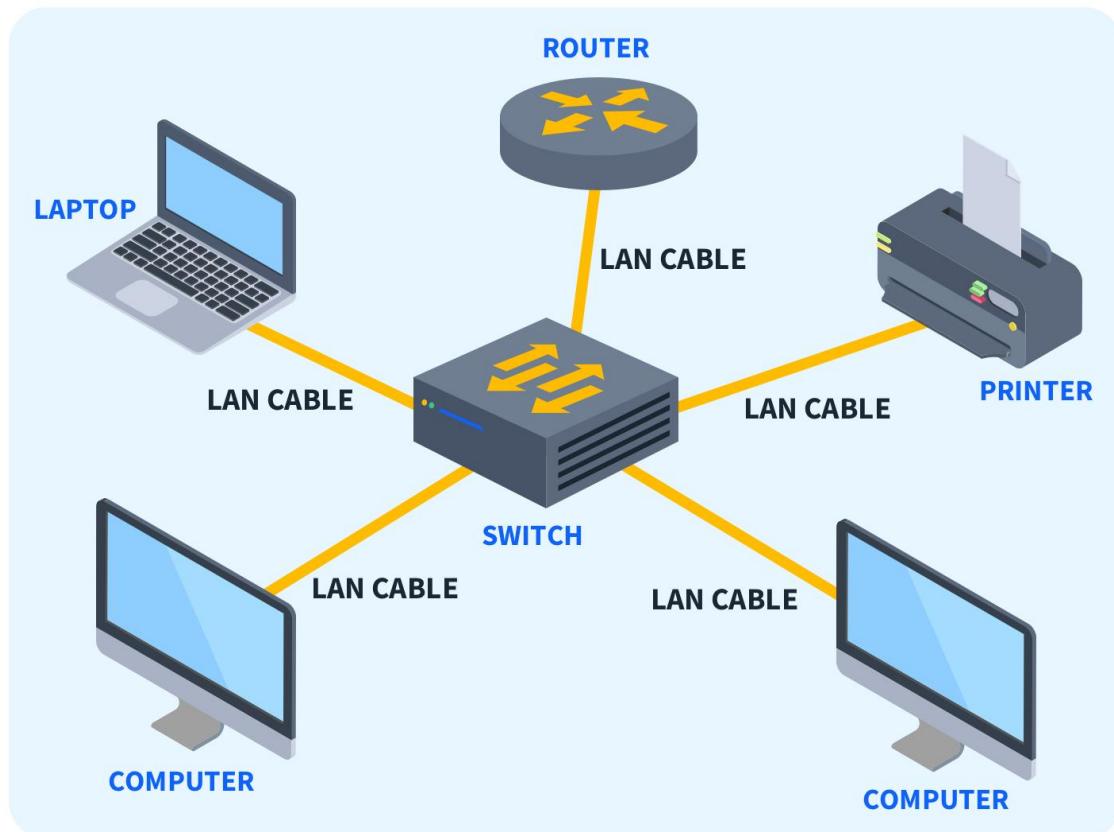
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◊ What is LAN (Local Area Network)?

A Local Area Network (LAN) is a private computer network that covers a small geographical area such as a home, office, school, or campus. LANs are designed to allow devices to communicate with each other and share resources efficiently. They usually use Ethernet cables or Wi-Fi to connect computers, printers, and other devices.

Key Features of LAN:

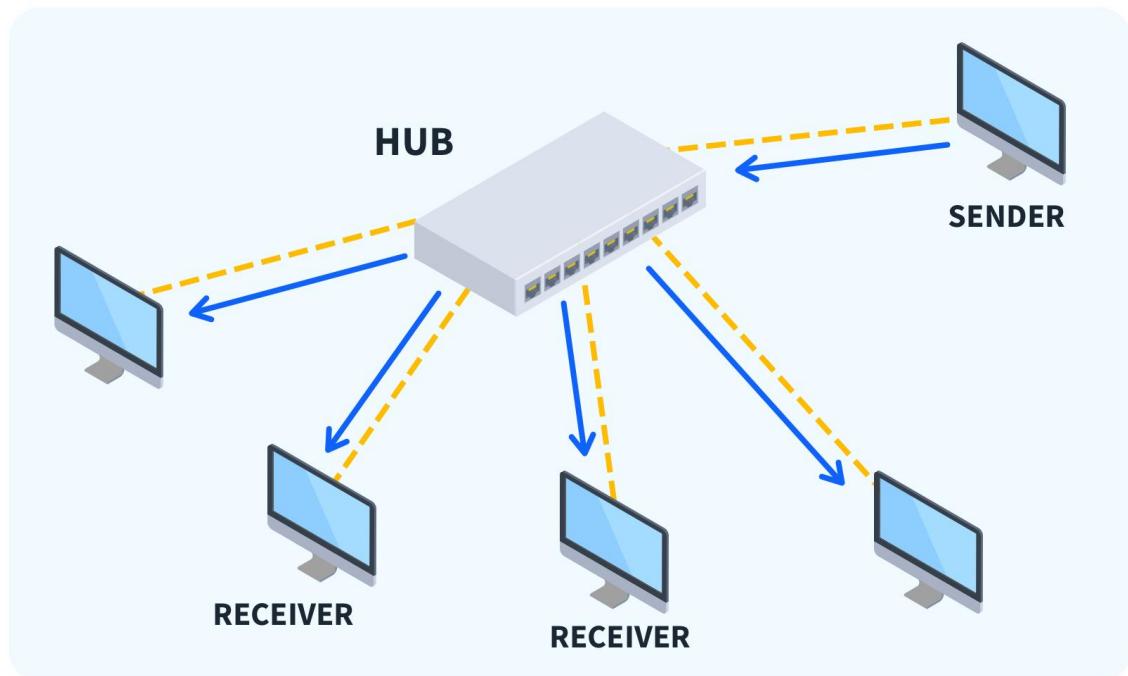
1. Covers a limited area like a building or campus.
2. Provides high-speed data transfer (up to gigabits per second).
3. Allows resource sharing such as printers, files, and applications.
4. Provides better security within the network.
5. Low installation and maintenance cost compared to wide area networks.
6. Supports multiple devices and users simultaneously.
7. Offers reliable and stable connectivity.
8. LAN devices like hubs, switches, routers, bridges, and repeaters make communication smooth.



◊ LAN Devices

▀ Hub

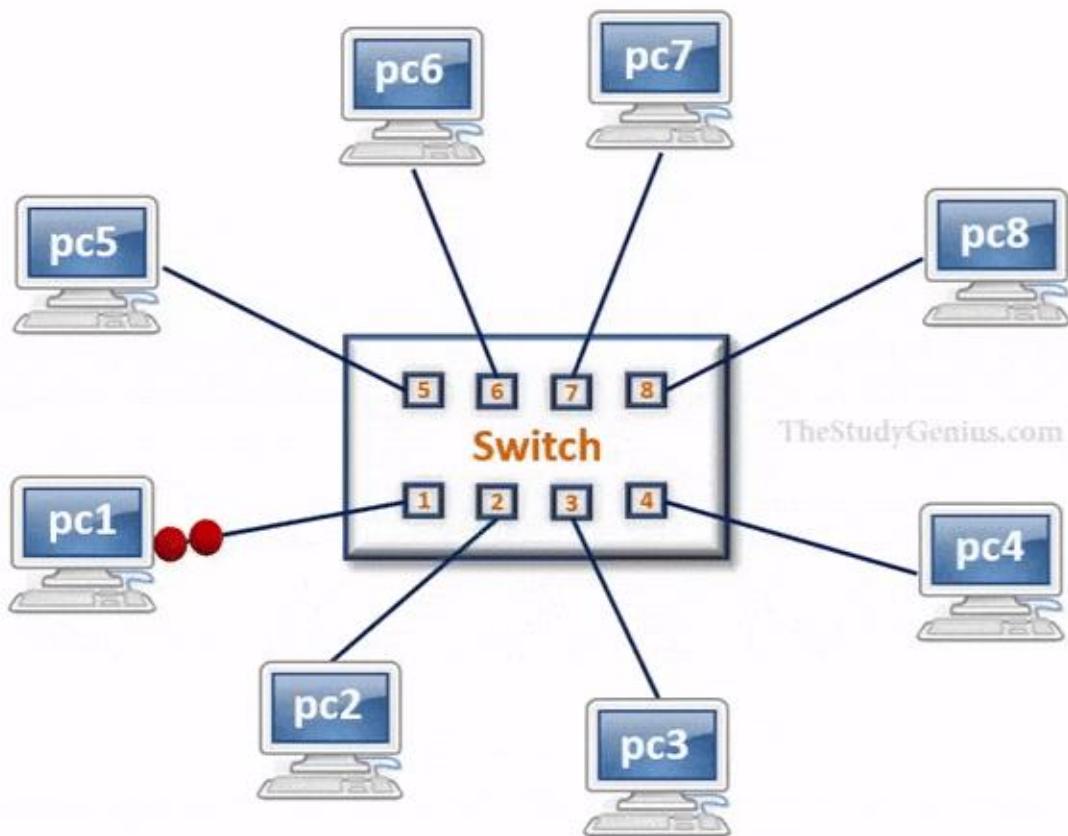
1. Works at the Physical Layer of the OSI model.
2. Broadcasts data to all connected computers without filtering.
3. Very simple to install and configure.
4. Low cost device, suitable for small temporary networks.
5. Causes unnecessary traffic since data is sent to all devices.
6. Suitable for connecting a few computers in small offices or labs.
7. Does not provide security as every device receives the same data.
8. Mostly replaced by switches in modern LANs.



▀ Switch

1. Operates at the Data Link Layer of OSI model.
2. Sends data only to the intended recipient using MAC addresses.

3. Reduces network traffic compared to hubs.
4. Increases performance and efficiency of LAN.
5. Provides better security as data is delivered to the correct device only.
6. Commonly used in modern LAN setups in offices and organizations.
7. Supports multiple simultaneous transmissions without collision.
8. Can be used to build large and complex LANs.



Router

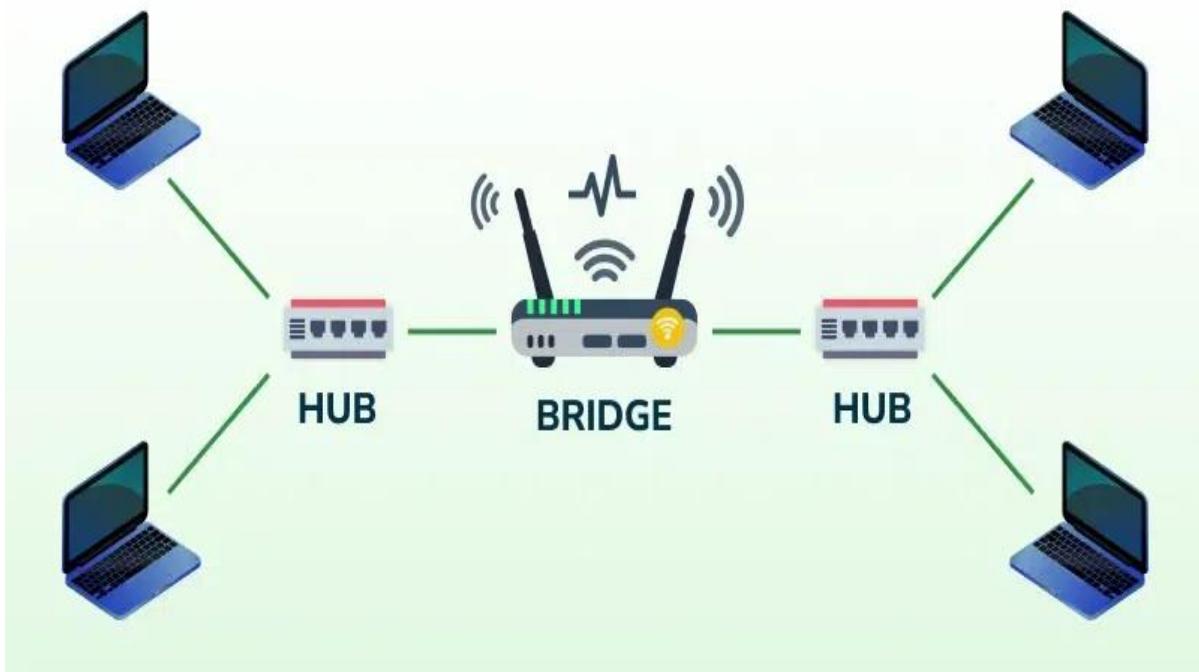
1. Works at the Network Layer of OSI model.
2. Connects different networks such as LAN to Internet.
3. Assigns IP addresses dynamically using DHCP.

4. Directs data packets to the correct destination.
5. Provides security features like firewalls and filtering.
6. Supports both wired and wireless devices.
7. Essential for connecting multiple LANs together.
8. Commonly used in homes, offices, and ISPs.



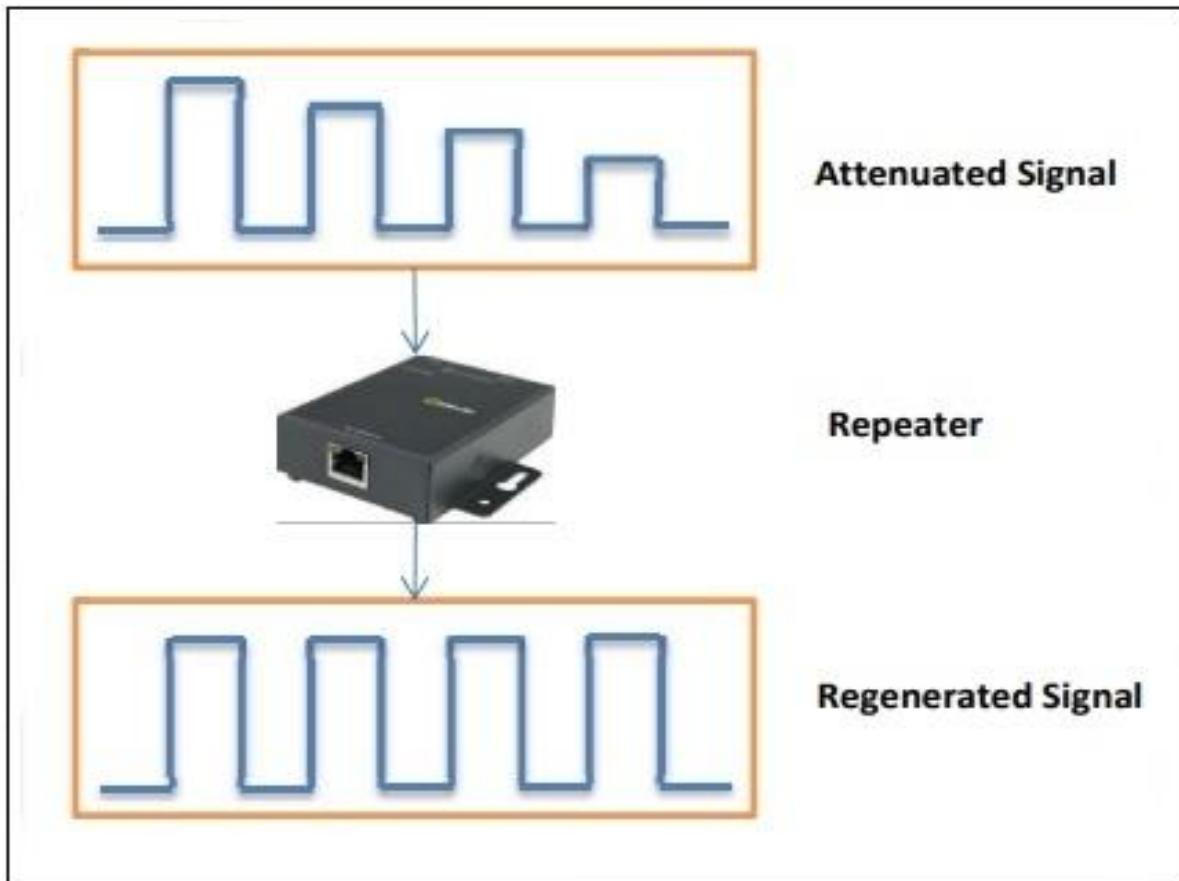
Bridge

1. Operates at the Data Link Layer of OSI model.
2. Connects two or more LAN segments together.
3. Filters data traffic and reduces unnecessary transmissions.
4. Divides a large LAN into smaller manageable parts.
5. Reduces congestion by forwarding only required data.
6. Works with MAC addresses for forwarding decisions.
7. Provides better efficiency for medium-sized networks.
8. Used in enterprises to improve performance of networks.



📡 Repeater

1. Works at the Physical Layer of OSI model.
2. Regenerates and strengthens weak signals in a network.
3. Extends the coverage area of LAN connections.
4. Prevents signal loss over long cable lengths.
5. Simple, low-cost, and easy to install device.
6. Commonly used in large buildings or campus LANs.
7. Can connect distant computers in the same LAN.
8. Helps maintain reliable data communication.



◊ UPS (Uninterruptible Power Supply)

A UPS is an electrical device that provides emergency backup power when the main power source fails. It ensures that computers and networking devices continue working without interruption, avoiding data loss or system damage.

Key Benefits of UPS:

1. Provides backup power during outages.
2. Prevents sudden system shutdowns.
3. Protects against voltage fluctuations and surges.
4. Ensures safe data storage and prevents corruption.
5. Improves hardware life by supplying stable power.
6. Supports critical devices like servers and routers.
7. Different models are available for different needs.
8. Essential for both home and office computer systems.



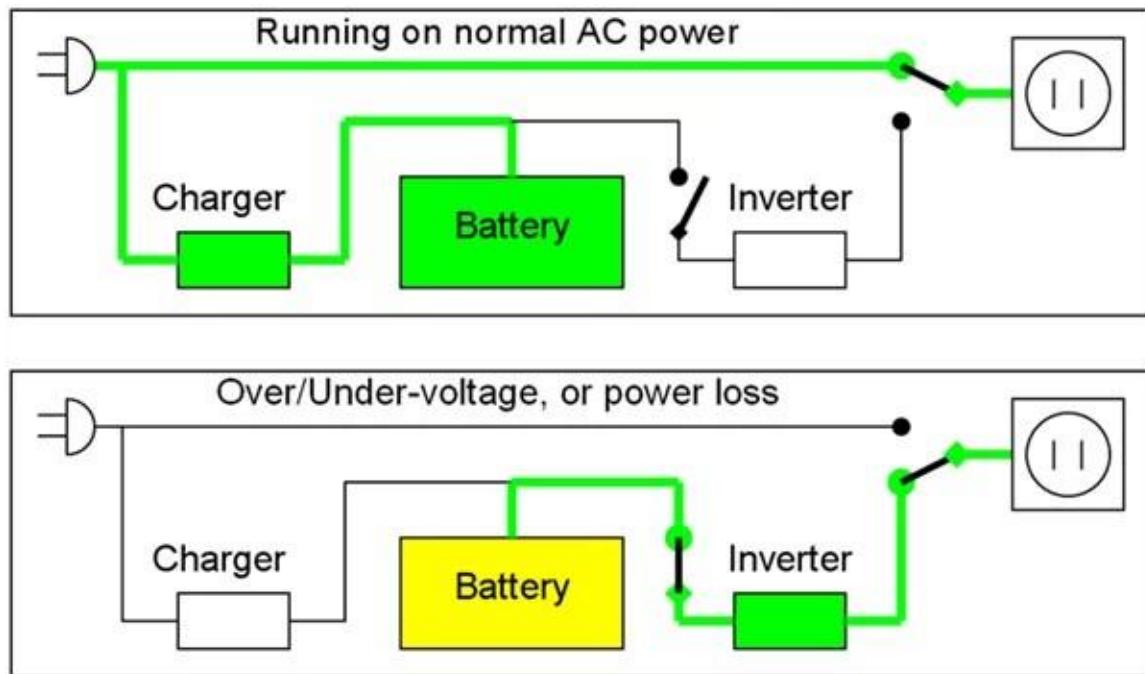
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⚡ Types of UPS

💡 Offline UPS

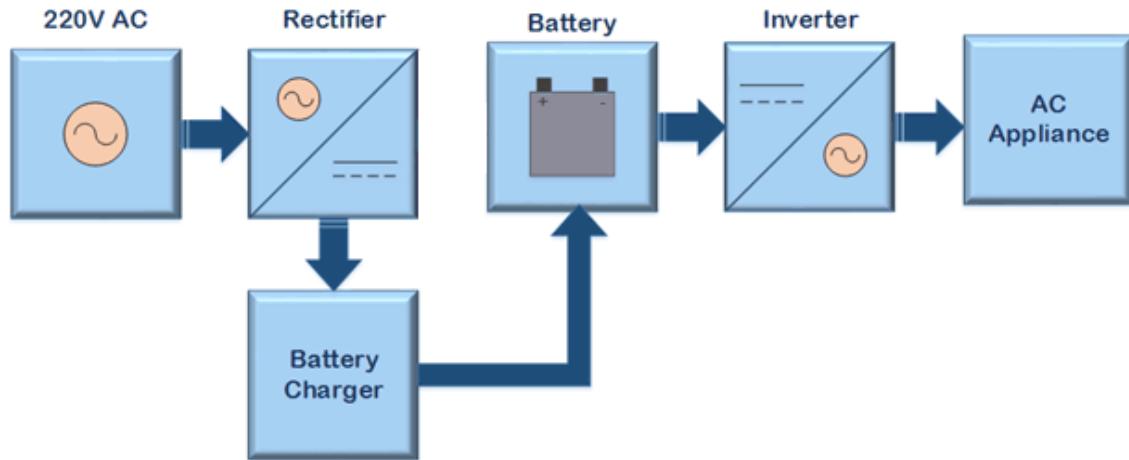
1. Works only when the main power supply fails.
2. Switches to battery backup with slight delay.
3. Simple and economical UPS type.
4. Best suited for home computers and small offices.

5. Protects against basic power failures only.
6. Easy to install and maintain.
7. Limited backup time depending on battery size.
8. Not suitable for critical systems or servers.



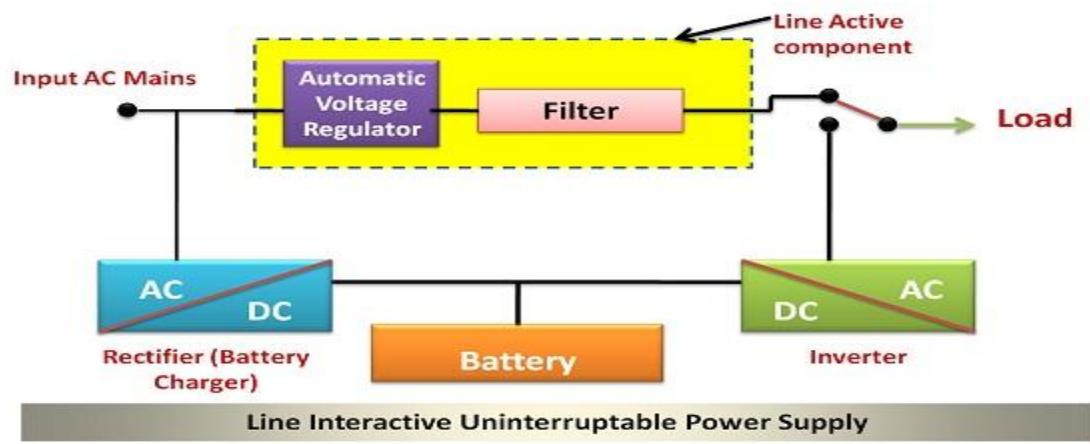
Online UPS

1. Always connected through the battery, continuously powering devices.
2. No switching delay when power fails.
3. Provides pure and stable power output.
4. Protects against all types of power issues.
5. Suitable for servers, hospitals, and data centers.
6. More expensive compared to other types.
7. Reliable and ensures uninterrupted operation.
8. Essential for mission-critical systems.



Line Interactive UPS

1. Has a voltage regulator to handle small fluctuations.
2. Better performance than offline UPS.
3. Cheaper than online UPS but more efficient than offline.
4. Good for small and medium-sized businesses.
5. Provides moderate level of power protection.
6. Longer battery life compared to offline models.
7. Switches faster than offline UPS with minimal delay.
8. Balance of cost and performance.



Intelligent UPS

1. Advanced UPS system with monitoring and control features.
2. Communicates with computers to give alerts and reports.
3. Provides real-time data about power status.
4. Offers the highest level of protection for networks.
5. Commonly used in big companies and data centers.
6. Very costly compared to traditional UPS systems.
7. Ensures maximum safety for critical operations.
8. Best for organizations with sensitive or valuable data.

