**7. Describe the power saving scheme in MAC layer and explore on the types of Power saving mechanisms**

The power-saving scheme in the MAC layer is designed to allow devices to remain connected while consuming minimal power. This is done by reducing the time a device spends actively listening for data and allowing it to enter low-power states. In wireless networks like Wi-Fi, this scheme typically works by using beacon frames and power-saving polling techniques, enabling devices to sleep and wake up only when necessary.

**Sleep Mode**

The client device informs the Access Point (AP) that it’s entering sleep mode. This minimizes energy consumption by turning off the radio when not actively needed.

**Traffic Indication Map (TIM)**

The AP includes a TIM in beacon frames to indicate which clients have buffered data. This ensures that clients wake up only when they have data waiting, reducing idle listening.

**Power Save Poll (PS-Poll)**

The client sends a PS-Poll frame to request buffered data from the AP when it wakes up. This allows the client to retrieve data without continuously listening for it, saving power.

**Automatic Power Save Delivery (APSD)**

The AP buffers data and delivers it to the client only when it is awake. This reduces the need for constant polling and helps save power by sending data during specific wake-up periods.

**Ad-Hoc Power Saving**

In ad-hoc networks, power saving is simpler, with devices waking up at scheduled intervals or based on communication needs, which helps prevent devices from staying active unnecessarily.

**Dynamic Power Management (DPM)**

Devices adjust their power consumption based on traffic load. During low-traffic periods, devices enter lower power states, and during high-traffic periods, they consume more power.

**Adaptive Power Saving**

Devices adapt their power-saving strategies depending on battery level or power supply conditions. When the battery is low, devices enter deeper sleep states to save power.

**Scheduled Sleep (Duty Cycling)**

Devices sleep during pre-scheduled times or when network activity is low. This time-based scheduling helps reduce unnecessary power usage by ensuring devices are awake only when there’s likely network activity.