**4. What is the significance of OFDM in WLAN? How does it improve performance?**

OFDM (Orthogonal Frequency Division Multiplexing) is a modulation technique used in wireless LANs. It splits a wide frequency channel into many smaller subcarriers and transmits data across them simultaneously. This makes communication more efficient and reliable, especially in environments with interference.

**Significance of OFDM in WLAN**

* Used in many Wi-Fi standards like 802.11a/g/n/ac/ax/be.
* Allows efficient use of the available bandwidth.
* Handles multipath interference effectively.
* Supports higher data rates with parallel data transmission.
* Enables the use of advanced technologies like MIMO and OFDMA.

**Improves Performance**

* Makes better use of spectrum by tightly spacing subcarriers without interference.
* Reduces the impact of signal reflections, which are common indoors.
* Allows higher-order modulation (like 256-QAM, 1024-QAM) for faster speeds.
* Maintains stable performance even in crowded or noisy environments.
* Provides a strong foundation for modern Wi-Fi features and higher throughput.