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Wi-Fi Training Program 2025

Module 5

Question 6:

What are the major innovations introduced in Wi-Fi 7 (802.11be)?

Solution:

Wi-Fi 7 (802.11be), also known as Extremely High Throughput (EHT), brings several major innovations that significantly enhance wireless speed, reliability, and responsiveness. It builds on Wi-Fi 6/6E but introduces advanced features tailored for next-generation applications like ultra-HD streaming, cloud gaming, AR/VR, and industrial automation.

Major Innovations in Wi-Fi 7:

1. 320 MHz Channel Bandwidth

- Doubles the channel width compared to Wi-Fi 6 (which supports up to 160 MHz).

- Available only in the 6 GHz band, it enables higher data rates and improved throughput.

2. 4096-QAM (4K-QAM)

- Increases the modulation from 1024-QAM (in Wi-Fi 6) to 4096-QAM.

- Allows more data to be packed into each transmission, resulting in up to 20-25% higher throughput under ideal conditions.

3. Multi-Link Operation (MLO)

- Devices can simultaneously connect to multiple bands or channels (for example, 5 GHz and 6 GHz at once).

- Improves speed, reduces latency, and enhances reliability through load balancing and link aggregation.

4. Improved OFDMA and MU-MIMO

- Wi-Fi 7 improves scheduling and coordination of OFDMA and multi-user MIMO for better support of many concurrent users.

- Increases network efficiency and fairness, especially in congested environments.

5. Preamble Puncturing

- Allows the use of a partial channel when part of the spectrum is blocked or occupied by interference.

- Maximizes spectrum usage even in noisy environments.

6. Deterministic Low Latency

- Designed to support real-time applications like gaming, AR/VR, and industrial IoT.

- Offers more predictable latency and jitter control for time-sensitive data.

7. Enhanced QoS with Time-Sensitive Networking (TSN)

- Brings wired-level quality of service to wireless networks.

- Ensures reliable and synchronized data delivery, useful for automation and media streaming.