Computer

Networks

Assigment - 1

S. Latisha

195524071

BTECH AI. ds.

1.

a) Wireless interference challenges.

1. Limited 2.4 GHz channels : Only 3 non-overlapping channels cause congestion.

2. Adjacent-Channel interference (ACI) : Poor channel planning causes signal bleed.

3. Device density : 50+ clients per AP overwhelm MAC layer protocols.

4. Non-wifi Noise: Bluetooth, Stadium electronics (cameras, Scoreboa -rds).

5. Physical Blockages : Concrete, metal seats and human bodies (water) absorb signals.

6. Legacy devices: Slow 802.11 b/g/n clients hog airtime.

b) Recommended wireless standards.

1. Wifi 6 (802.11ax) : Mandatory for OFDMA and BSS coloring.

2. OFDMA : Shares channels among multiple users simultaneously.

3. BSS coloring : Reduces co-channel interference by 30%+.

4. Wi-Fi 6E : Adds 6GHz band (59 new channels, zero legacy interference).

5. TWT (Target Wake Time) : Saves battery, reduces background traffic.

6. WPA3 Encryption : Required for 6GHz band Security.

c) Antenna Placement strategies.

1. Sector Antennas : Directional ($60° - 90°$) for seating areas ; minimize overlap.

2. Under-Seat APs : Mount within 15m of users ; avoid use -of- Sight blockage.

3. Perimeter Focus : Place APs along aisles /walls , not center -field.

4. Elevated Edge Placement : use catwalks for overhead signal penetration.

5. Avoid Metal obstacles : Sleer clear of beams , ducts ,or scoreboards.

d) Load Balancing Methods.

1. Client Load Balancing : Distribute users across APs based on real -time capacity.

2. Airtime Fairness : Limit Bandwidth -heavy clients (eg., 4k streamers).

3. controller - Based Balancing : centralized algorithms for AP /user distribution.

4. Cloud Scalability : Auto -provision APs during peak events (eg halftim)

5. Local Caching : Host replays / stats on edge servers -to offload internet traffic.