Wireless Communication HW7

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Contents

1 Problem 1

- OFDM pros:

Direct support to MIMO, Counter Multipath interference

- OFDM cons:

Vulnerable to narrow band distortion if no synchronization

2 Problem 2

$$L_{db} = 69.55 + 26.16 \log f_c - 13.82 \log h_t - A(h_r) + (44.9 - 6.55 \log h_t) logd$$

$$A(h_r) = (1.1 \log f_c - 0.7)h_r - (1.56 \log f_c - 0.8)$$

$$A(h_r) = (1.1 \log 750 - 0.7)3 - (1.56 \log 750 - 0.8) = 3(1.1 * 2.875 - 0.7) - (1.56 * 2.875 - 0.8) = 3.7025$$

$$L_{db} = 69.55 + 26.16 \log 750 - 13.82 \log 76 - 3.7025 + (44.9 - 6.55 * \log 76) * 0.9542$$

$$L_{db} = 69.55 + 26.16 * 2.875 - 13.82 * 1.8808 - 3.7025 + (44.9 - 6.55 * 1.8808) * 0.9542 = 146.1534$$

3 Problem 3

$$A = \lambda h$$

$$\lambda = \text{mean rate of calls attempted per unit time}$$

$$h = \text{mean hold time per successful call}$$

$$A = \text{average number of calls arriving during average holding period}$$

$$A > N \Rightarrow \text{blocking}$$

$$A < N \Rightarrow \text{nonblocking}$$

$$N \Leftarrow \text{capacity}$$

4 Problem 4

1. Relative Signal Strength: Compare two signal strength, B $<$ A, handoff to B, A $>$ B, handoff to A
2. Relative Signal Strength with threshold: use threshold for signal, If A $<$ B and A $<$ T, switch to B, If B $<$ A and A $>$ T, switch to A
3. Relative Signal Strength with hysteresis: use relative signal strenght B - A, if B - A $>$ H, handoff to B, if B - A $<$ -H, handoff to A
4. Relative Signal strenght with hysteresis and threshold: switch if A $<$ T and B - A $>$ H, vice versa.
5. Prediction Technique: based on the excepted future value of the received signal.

I think 3 is the most reasonable, because it give restricted condition to prevent problem like ping pong. But it also provide the connection quality because it doesn't use threashold. What's more, prediction technique needs to use heuristic algorithm or machine learning which needs more computation power and thus is not suitable.