

Diversity

Exercise 1: Which of these might lead to a reduction in system efficiency by requiring more time or bandwidth? Which of these would require additional or more complex antennas?

Exercise 2: What spacing is required for 10λ separation at 900 MHz?

Exercise 3: What frequencies would see complete cancellation due to multipath if there are two equal-gain paths with a delay difference of τ ? If the path length differences are 300 m? 3 m?

Exercise 4: Would time diversity be more or less effective as the receiver's speed increased? What would happen if the receiver was stopped (such as a traffic light)?

Exercise 5: Assuming maximal-ratio combining, what would be the resulting SNR if the branch SNRs were +10 dB and +20 dB? If they were both +10 dB?

Exercise 6: Assuming independent Rayleigh fading, the same SNRs as in the previous exercise and that the signal is considered “faded” if the SNR is below 0 dB, what fraction of time would be signal be faded with and without two-branch selection diversity?

Exercise 7: What type of diversity would you expect to be implemented in an (inexpensive) WLAN card? In a cellular base station?