

NET3900: Quiz 1

This Quiz is based on Modules 1 and 2. Answer the questions on this sheet. Always show your calculations or provide explanation for your answers. The marks value for each question follows the question number.

Q1/2: A wireless network has 2 BSS. The BSS1 configuration is as follows. The 5 GHz band radio is configured with 3 VAPs and the 2.4 GHz band radio is configured with 4 VAPs. Three wireless stations are connected to the 5 GHz radio and 2 wireless stations are connected to the 2.4 GHz band. The BSS2 configuration is as follows. Both radio bands are configured with 4 VAPs each. One wireless station is connected to each VAP. How many BSSIDs are included in this network?

BSS1: 3 VAPs + 4 VAPs = 7 BSSIDs

BSS2: 4 VAPs + 4 VAPs = 8 BSSIDs

TOTAL BSSIDs = 15

Q2/2: A subcarrier is modulated using QAM-256 (i.e. 256 point constellation).

a) How many bits per symbol are encoded?

b) How many amplitude modulation levels are used for the In-phase signal?

a) Since $2^8=256$, therefore, 8 bits are encoded.

b) The in-phase encodes 4 bits which corresponds to 16 levels.

Q3/2: An OFDM Wi-Fi signal has 48 subcarriers. Each subcarrier is QAM modulated using 4 bits per symbol, a FEC encoding rate of $\frac{3}{4}$ and 1 spatial stream. What is the total number of data bits per symbol carried by this signal?

Data Bits Per Symbol = NBRS

$$= 48 * 4 * \frac{3}{4} * 1$$

$$= 144$$

Q4/2: Briefly explain delay spread and its relationship to the Guard Interval?

Delay spread is the difference between time for the signal to reach its destination via a direct path and via the worst case reflected path.

Guard Interval is set to be larger than the Delay Spread to allow reflections to dissipate and prevent Intersymbol Interference.

Q5/2: A data stream has been FEC encoded with a rate of $\frac{3}{4}$. How many redundancy bits are added for every 15 data bits?

F= FEC Coding Rate, D = #Data bits = 15, R=# Redundancy bits, Total bits = D + R

$$F = D / D+R$$

therefore

$$\frac{3}{4} = 15 / (15+R)$$

$$15+R = 15 * 4 / 3$$

$$15+R = 20$$

$$R=5$$