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Continuing Education Course #094
Ultra-wide Band (UWB) Radio Technology

1. What frequency range comprises the radio frequency spectrum?
 - a. 10 Hz to Gamma Rays
 - b. 9 kHz to 275 GHz.
 - c. AM and FM bands
 - d. DC to blue light
2. How are radio signals traditionally separated one from another?
 - a. By their operating frequency
 - b. Geographically
 - c. Along State line
 - d. Based on broadcast content
3. What is traditionally the ideal bandwidth of a signal?
 - a. Zero frequency like a sine wave
 - b. Plus/minus 60 Hz
 - c. As wide as possible according to Shannon
 - d. Smallest BW needed by the modulation information
4. How is best spectrum capacity traditionally achieved?
 - a. Each user operates with maximum power
 - b. Each user occupies the smallest bandwidth
 - c. Antennas are located on high towers
5. In traditional a radio system unintentional emissions are a factor in limiting the spectral capacity.
 - a. True
 - b. False
6. The bandwidth of a traditional radio signal is controlled by what?
 - a. The size of the radio dial
 - b. The emitted power
 - c. Bandwidth is not controlled
 - d. The bandwidth of the modulating signal.
7. Calculate the fraction bandwidth in % of a pulse containing 5 cycles of a sine wave.
 - a. 5 Hz
 - b. 100%
 - c. 40%
 - d. 20%
8. How is the best capacity achieved with impulsive signals?

- a. When impulses are long in time
 - b. When they are allocated their own frequencies
 - c. When each user occupies the smallest time slice
9. What is the objective of optimizing a communications receiver?
- a. Maximize the output E_b/N_0
 - b. Minimize power consumption
 - c. Drive to the lowest cost
 - d. Tune for peak signal
10. What dominates the signal to noise performance of a 'matched filter' receiver?
- a. Good antenna match
 - b. A notch filter
 - c. Filter response
 - d. A low noise audio filter
11. What dominates the signal to noise performance of a 'matched template' receiver?
- a. A long information bit pattern
 - b. A very narrow RF filter
 - c. A linear audio filter
 - d. Template signal shape
12. What cost and benefit does wide-band FM have over AM in commercial broadcasting?
- a. Bandwidth is exchanged for noise immunity
 - b. FM has a larger audience share
 - c. FM can be digitized
 - d. AM can be represented by $I(t)$ and $Q(t)$
13. Shannon's finding on the relationship between power density, noise and information capacity meant that:
- a. More power improves signal to noise ratio
 - b. Noise power density is smaller in narrower filters
 - c. The bigger the bandwidth the stronger the signal
 - d. The wider the bandwidth, the more sharing can occur and the more total information can be conveyed
14. Spectrum usage in the USA is administered by whom?
- a. FCC alone
 - b. The Federal Radio Commission
 - c. FCC and NTIA
 - d. United Nation Radio Commission
15. What is a the minimum bandwidth of a UWB transmitter above 3.1 GHz for FCC regulatory purposes?
- a. $BW \geq 0.20$
 - b. Bandwidth ≥ 500 MHz
16. UWB pulses cannot be polarity modulated.
- a. True
 - b. False

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