

ECE6604 SUMMARY REVIEW

1. Introduction
 - a. Frequency reuse and the cellular concept
 - b. Path loss
 - c. Co-channel interference
 - d. Link budget
 - e. Interference margin, shadow margin, handoff gain.
 - f. Coverage and capacity
2. Flat fading
 - a. Propagation mechanism
 - b. Rayleigh fading
 - c. Rician fading
 - d. Received envelope autocorrelation
 - e. Received envelope Doppler power spectrum
 - f. Isotropic and non-isotropic scattering
 - g. Envelope correlation at a base station
 - h. Level crossing rates and fade durations
 - i. Fading simulators
 - i. Filtered white noise
 - ii. Sum-of-sinusoids – deterministic and statistical
3. Wideband channel models
 - a. Propagation mechanism
 - b. Transmission functions
 - c. Statistical correlation functions
 - d. Wide sense stationary uncorrelated scattering (WSSUS) channels.
 - e. COST207 models
 - f. Power delay profiles
 - g. Baud-spaced channel models
4. Shadowing and Co-channel interference
 - a. Sums of log-normal random variables
 - b. Fenton-Wilkinson approximation
 - c. Outage
5. Path Loss Models
 - a. Okumura-Hata model
 - b. COST231-Hata model
 - c. COST231-Walfish-Ikegami LoS and NLoS model
6. Single-carrier Modulation Techniques
 - a. Linear modulation – QAM, PSK, QPSK, $\pi/4$ -QDPSK
 - b. Pulse shaping – root raised cosine and raised cosine.
 - c. Continuous phase modulation, CPFSK, MSK, GMSK
 - d. Orthogonal multipulse
7. Power Spectrum of Digitally Modulated Signals
 - a. Continuous and discrete spectra
 - b. Effects of data correlation

8. Orthogonal Frequency Division Multiplexing
 - a. FFT implementation
 - b. Cyclic guard intervals and ISI
 - c. Power spectrum
9. Digital modulation on flat fading channels
 - a. coherent detector
 - i. correlation detector
 - ii. matched filter detector
 - iii. error probability
10. Diversity techniques
 - a. Maximal ratio combining
 - b. Selection combining
 - c. Alamouti's transmit diversity scheme
 - d. Optimum combining
11. OFDM Impairments
 - a. AWGN
 - b. Timing offset
 - c. Doppler
 - d. Frequency offset
 - e. Inter-symbol interference
 - i. Residual ISI cancellation
 - f. Sample clock offset
 - g. Peak-to-average power ratio (PAPR)
 - i. Clipping
 - ii. Decision-aided reconstruction
 - h. MIMO OFDM
 - i. synchronization