CCE 5303 – Radio Propagation and QoS

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Tutorial 2

1. Discuss the requirements for Teletraffic theory.

2. Explain why Markov chains can be used to model the states of a telecommunications system.

3. Describe the Birth-Death process and thus indicate the possible probabilities for the next time interval if we are in state *k*.

4. The state diagram of a loss system with full accessibility, such as one having an M/M/n/n queuing system, is shown in figure 1. Given that $\lambda = 0.3$ and $\mu = 0.2$, n = 32, and $P_k = \frac{\frac{A^k}{k!}}{\sum_{i=0}^{n} \frac{A^i}{i!}}$, find the traffic offered to the system and the call congestion probability within this system.

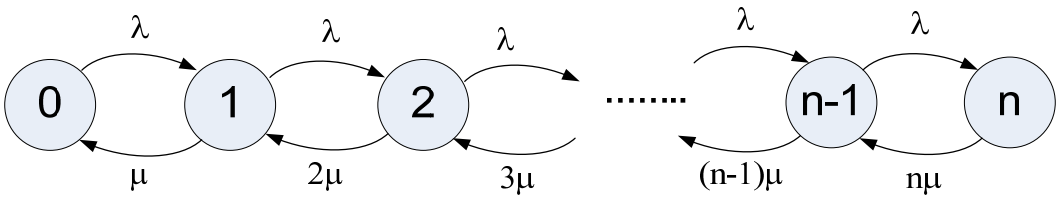

Figure 1

5. If users in a cell initiate fresh calls as a Poisson process at rate $\lambda_1 = \lambda_n = 0.3$ and the cell receives handovers at a mean intensity $\lambda_h = 0.1$, and that ongoing calls complete at a service rate of $\mu_c = 0.4$ and a user departs the cell at a rate $\mu_h = 0.1$, calculate the effective traffic to a cell.

6. Given that the blocking probability within an FDMA system is equal to $P_B = \frac{\frac{A_e^c}{c!}}{\sum_{i=0}^{c} \frac{A_e^i}{i!}}$, the number of channels in a cell is 15, and the process probabilities are as given in part (5), determine the traffic carried by the cell.

7. Define carried traffic and offered traffic in a loss system.

8. Define Grade of Service and explain blocking techniques.

9. Discuss the relation between GoS and economic costs of a telecommunications system.

10. Define Quality of Service and differentiate between quantitative and qualitative QoS.

11. Discuss end-user QoS.