Homework

EECS 863

In many networks the time axis is slotted, e.g. in asynchronous transfer mode (ATM) systems. Often the packet length is equal to the slot time. These systems can be modeled using discrete time Markov chains. The source alternates between an active state and an idle state. In the active state the source generates a packet in each time slot while in the idle state no packets are generated. The probability of going from the active to idle states is $P_{ai}$ while the probability of going from the idle to active state is $P_{ia}$. A Markov Chain is often used to model the packets arrival process. A single source with these characteristics called a binary source.

Assume the $P_{ai} = 0.6$ and $P_{ia} = 0.35$.

a) Consider a single binary source and draw a state transition diagram for the discrete time Markov Chain that defines the arrival process. Include all transition probabilities.

b) Find the transition probability matrix for the arrival process given in part a).

c) Find the steady-state probabilities for the arrival process given in part a).

d) Find the average number of arrivals in a time slot given in part a).

e) An aggregate traffic source for the traffic can be formed by combining multiple binary sources. Repeat parts a)-d) for the combination of two binary sources.