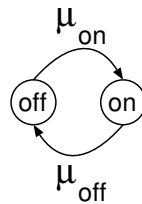


1997 Paper 9 Question 3

Computer System Modelling

The two-state Markovian on-off source is used in computer networking research as a model of bursty network traffic. The source is pictured in the figure below. When in the on state it generates fixed-sized network packets at a *constant* rate of 100 packets/second. Each set of packets generated in the on state is called a *burst*. When in the off state the source is silent. The residence time in each state is exponentially distributed. The *burstiness* of the source is defined as the ratio of its peak and mean rates.



A traffic modeller wants to write a simulation module which emulates this source, with the requirement that it transmits bursts of traffic with a mean length of 25 packets, and a burstiness of 20.

- (a) Calculate the rates μ_{off} and μ_{on} . [10 marks]
- (b) Briefly describe how to generate values which are distributed exponentially for use in the simulator. [3 marks]
- (c) State Little's Law. Outline a proof of Little's Law with the aid of a diagram. [7 marks]