

Simulation Project

The goal of the project is simulate a heterogeneous traffic flow through an infinite capacity queue with a 100Mbps constant bit rate in order to observe the response time of each traffic class. Be careful, the rate of the source is constant bit rate but the sizes of the packets are different, resulting in different service times for different packets types.

The input flows are represented by three different source models. Each one has its own features and QoS requirements. One of them is a bursty source model. It is an “ON/OFF” which alternates activity periods (“On”) with silence ones (“Off”). The average duration of “On” periods is T_{on} , the average duration of “Off” periods is T_{off} . During “On” periods, traffic is emitted by the source at a constant peak rate D . “On” and “Off” periods are exponentially distributed. This source model is identified by the triplet (T_{on}, T_{off}, D) . With these notations, the average rate of the source $\lambda_{average}$ and its burstiness b are given by the formulae:

$$b = \frac{D}{\lambda_{average}} = \frac{T_{on} + T_{off}}{T_{on}}. \quad (1)$$

Within this project, we consider three traffic sources:

Data traffic: it is a Poisson source. An important feature of this traffic is the probability distribution of its packet length. Measures done on the Internet suggest to take: 40% of the packets have a size of 50 bytes (400 bits...), 30% 500 bytes (4000 bits) and the other 30% 1500 bytes (12Kb);

Voice traffic: the time interval between packets is constant. The packet size is constant and equal to 100 bytes (800 bits);

Video traffic: video traffic is highly bursty, it is an “ON/OFF” source. “ON” and “OFF” periods are exponentially distributed. The packet size is constant equal to 1000 bytes (8000 bits...). A same average rate may correspond to different values of T_{on} , T_{off} and peak rate D : cf. formula (1).

The rate of the server modeling the network is 100 Mb/s. The average rate of the voice source is 20Mb/s, the average rate of the video source is 30Mb/s and the average one of the data source is also 30Mb/s. The average duration of the “ON” periods of the video source is 10^{-3} s.

Study the impact of the burstiness b of the video source on the response times of each traffic class.

Present your results in a report of maximum two A4 pages, minimum font size 10pts. In this report, your results must be presented with their interpretation.

Caution: do not forget your confidence intervals.