Appendix A

In VOQ, HOL blocking is completely eliminated by using N queues, one for each output, at every input port, so total input queues are N^2. The status of all N^2 queues is represented in the form of a matrix with matrix entity a_{ij} denoting the occupancy of a queue at input i for output j. (0-1 bit indicating empty-nonempty)

The scheduling algorithm tries to select one non-zero element in each row, such that no more than one of them are from the same column. Scheduling algorithm obtains

a lower bound throughput = $1 - \frac{(1-p)-(1-p)^{n+1}}{np}$, (with prob($a_{ij}$=1)= p)

an upper bound throughput = $1-(1-p)^n$

Both lower and upper bounds go to 1 as the switch size n goes to infinity.

Bernoulli arrival process

A sequence of independent Bernoulli trials and at each trial

P (Success) = P (X=1) =p
P (Failure) = P (X=0) =1-p

Under Bernoulli arrival process, cell arrival probability in each time slot is identical and independent of any other slot. If each cell is equally likely to be destined for any output, the traffic becomes uniformly distributed among the switch as traffic model A and C. If each cell is, normally distributed over some output with variance, then it is known as non uniform distribution among the switch as traffic model B and D.

Markov bursty traffic model

In the bursty traffic model (C and D) each input switches between ON and OFF periods. Figure A1 considers as ON-OFF source model in which an arrival process to input port alternates between ON and OFF periods. During ON periods, traffic source sending cells in every time slots. During OFF period traffic source does not send any cell.

The Duration of ON period called a burst is decided by a random variable X Є {1, 2, ---}, .which is assumed to be geometrically distributed with a mean of β cells (i.e mean burst length)

The Duration of OFF period is decided by a random variable Y Є {0, 1, 2, ---}, .which is assumed to be geometrically distributed with a mean of α cells.

q = probability of starting ON period in each time slot.

P= probability of terminating burst i.e OFF period in each time slot. [105],[106]

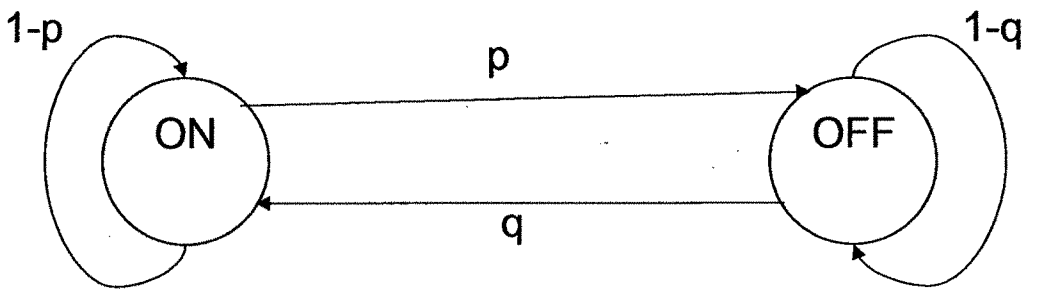

Figure A1 Markov ON-OFF Model

For different traffic model, performance analysis of all the scheduling algorithms is done.