Simulation Project 1

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1 Introduction

The purpose of this project is to model and simulate the behaviour of an optical network consisting of optical packet switching (OPS) using a set of M/M/L/k queues. A basic network topology will be examined. The network will consist of four OPS nodes and eight access nodes (ANs). Each OPS node is connected to two other OPS nodes in a grid topology and also to two ANs. Each OPS node has 16 bi-directional ports that can be used as channel links or re-circulation ports. This project will simulate wavelength channel lengths between one and four. Tests will also be conducted on different probabilities of packets being generated at each AN.

2 Implementation

The application that was developed for this simulation was written in Java 1.5. Three variables needs to be determined before each simulation can be done. These are the amount of time steps the simulation should run, the probability that a packet is generated, and the length of the wavelength channel.

The network was setup to look like Fig. 1. In every time step the fol-

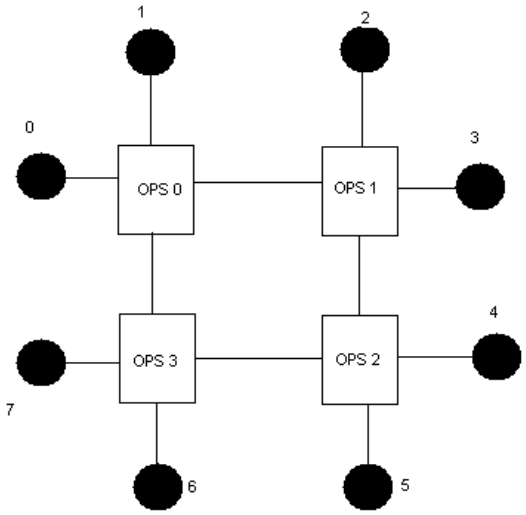

Figure 1: Network Topology

lowing steps are followed. First all the OPS nodes are checked to see if they have any packets that must be moved to other OPS nodes. These packets are then delivered to their targets. The ANs are then checked if they generated any packets that must be sent to the OPS nodes. If a packet was

created it is sent to the OPS node the AN connects to.

3 Simulations

The following results were obtained from different simulations of the input parameters.

Time	Packets	Recieved	Dropped	Drop Rate	Wave	Prob
500	428	427	0	0.0%	1	0.1
500	1190	722	448	38.29%	1	0.3
500	2012	578	1397	70.73%	1	0.5
500	2857	454	2362	83.87%	1	0.7
500	4008	431	3532	89.12%	1	1.0
500	424	315	79	20.05%	2	0.1
500	1210	590	589	49.95%	2	0.3
500	2044	745	1268	62.99%	2	0.5
500	2828	824	1972	70.52%	2	0.7
500	4008	829	3147	79.149%	2	1.0
500	392	276	102	26.98%	3	0.1
500	1195	587	593	50.25%	3	0.3
500	1981	738	1227	62.44%	3	0.5
500	2816	815	1985	70.89%	3	0.7
500	4008	845	3147	78.83%	3	1.0
500	437	313	122	28.04%	4	0.1
500	1219	548	631	51.93%	4	0.3
500	2000	732	1264	63.32%	4	0.5
500	2840	811	2025	71.4%	4	0.7
500	4008	854	3150	78.67%	4	1.0

4 Conclusion

The amount of packets that are lost over time are not satisfactory. In these circumstances it will be wise to decide what the load on the network you are designing this setup for is. If the network is to expect low packet activity a OPS with a wavelength channel of one is the best choice. In circumstances where high packet activity is to be expected an OPS with wavelength channel four would be the best.