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International
Journal
Of Modern Engineering Research (IJMER)

Review of crosstalk free Network

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ABSTRACT: *Multistage interconnection networks (MIN) are among the most efficient switching architectures for the number of switching Element (SE). Optical crosstalk in optical multistage interconnection network on the omega network topology Switches are arranged in multiple stages. These switches also referred to as switching element (SEs) have two input and two output ports, interconnected to the neighboring stages in a shuffle exchange connected pattern message routing in such a network is determined by the interstate connection pattern.*

Optical Multistage interconnection networks (OMIN) are advanced version of MINs. The main Problem with OMIN is crosstalk. The main purpose of this paper is to Present crosstalk free modified omega network, which is based on time domain approach. This paper presents the source and destination based Algorithm (SDBA) .SDBA does the scheduling for source and their respective destination addresses for the message routing. SDBA is compared with the crosstalk modified omega network (CFMON).CFMON also Minimizes the crosstalk. This paper is the modified form of the omega network.

Keywords: *Omega network, Multistage Interconnections network, Optical Multistage interconnection network, Crosstalk, Time domain approach, Crosstalk Modified omega network.*

I. Introduction

The multistage interconnection Network is an essential network for the Parallel computing applications .It contains N inputs to N outputs and is known as an N×N MIN. The parameter N is called the size of the network. In this paper we study the performance of optical multistage Interconnection network.

Omega network is a network configuration after used in parallel computing architecture .It is an indirect topology that relies on the Perfect Shuffle interconnection algorithm. The omega network is a highly blocking through one path can always be made from input to any output in free network**.** It connects N inputs to N outputs and is known as an N*N MIN. Here N is the size of the network. In Omega network contains N/2 switches. An omega network is a log2N stage shuffle –exchange Interconnection network .Here multistage Omega network N=8 Multistage Interconnections network establishes a reliable communication between source and destination. But now a days electro optic technologies have built optical communication a reliable and fast network that fulfill the Increasing demands of users.

II. Analysis for the Network

Most of the interconnection network analysis related to identical processor And a uniform reference model. We shall analyze the performance of the n- stage Banyan network discussed.

1. Fixed size packets are generated by the modules at each source address
2. Arrival of packets at the network inputs are independent and identical.
3. A connection between two switches can carry the packet in each cycle.
4. If two packets arriving at two distinct network inputs require the use of common link between two stages, one of the packets is discarded.
5. The switches and links have no internal buffers to temporarily store an incoming packet that cannot be forwarded in the current.
6. There is no blocking at the output links of the network. This means that the output links have at least the same speed as the internal links.

Moreover, if the network is uniform, then for each stage in the network, the patterns of packet arrivals at the inputs of that stage have the same distribution. While Banyan networks are very attractive in their simplicity, other considerations such as performance or reliability sometimes dictate the use of more complicated

networks. We consider packet-switching networks built of 2 × 2 unbuffered switches with the topology of an *n*-stage square Banyan network. When several packets at the same switch require the same output, a randomly chosen packet is forwarded and the remaining packets are deleted. An 8 × 8 Banyan network is shown in Figure 1

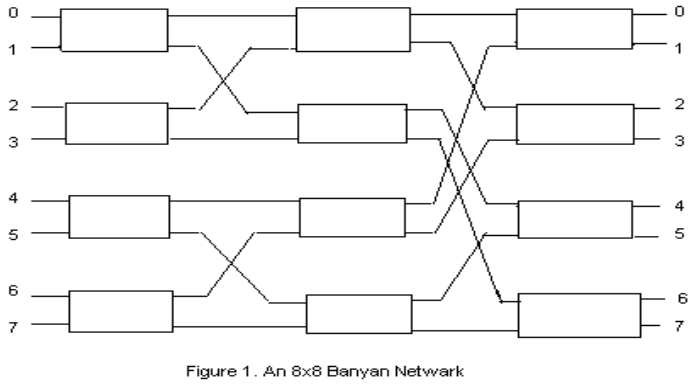


Figure 1. An 8x8 Banyan Netwark

Figure 1. An 8 x 8 Banyan network topology

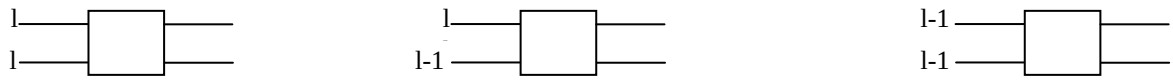
Since we are dealing with OMINs, at any instant of time we can only send one message through any switch to avoid the effect of crosstalk. But here in this paper for an $N \times N$ network we are allowing limited crosstalk's up to $C = (log2N - 1)$ (where *'C'* is a parameter dependent on Technology). The number of stages for such a network is given by $n=log2^N$ Hence for the Banyan network shown in fig we can allow crosstalk In switches at two stages out of three stages in the network .Hence in this paper we can have switches where 0, 1 or2 messages Can be allowed at the same time .In other words a switch can be active 2-active, 1-active or 0-acive .Both 0-Acive and 1-active switches do not. Allow crosstalk where as the 2-active switch produces optical conflicts. And hence could potentially contribute to crosstalk. We are most interested in analyzing the performance of a banyan network allowing limited cross-Talk. For instance, one of the best ways for analyzing the performance Is to calculate the bandwidth (BW) of the NxN Banyan network operating Under a load l .load is defined as the probability, that an input is active. Thus, the expected number of active input s at load for an NxN banyan network is Nl. We will derive some equations to find the BW of such a Banyan network built with 2 x 2 unbuffered switches. Let $P(j)$ be the probability that a request exists at an input link Of a switch in stage j, and let $P(j + l)$ be the probability that an output link of this switch is used for routing a request. The analysis involves the iterative computation of $P(j + l)$ in terms of $P(j)$, starting with $P(1)$.For an n-stage network, the probability of acceptance, PA is given by $P(n)$. The crucial step in the analysis of each network is the recurrence relation to specify $P(j + l)$ in terms of $P(j)$. The recurrence relation depends on the network topology and the routing algorithm. Since we are dealing with a Banyan network with 2-active, 1-active or 0-active switches, we have the following equations.

For each stage ($1 \le j \le n$), we define

$P2(j)$ = probability that a given switch is 2-active,

$P1(j)$ = probability that a given switch is 1-active,

$P0(j)$ = probability that a given switch is 0-active.



Various combination of load at stage 1

III. Optical Omega Network (Oon)

The OON has a shuffle exchange connection pattern. In this pattern the address is shifted one bit to the left circularly in each connection. This network connects the input to output nodes using n stages, where $n=log2^N$ with each stage containing 2^{n-1}SEs. When any source sends the communication signal to a destination then it has to pass through the OON. Each communication signal has a definite path from the given source to the given destination. Crosstalk occurs when two or more signals follow the same path in the same time period. In Fig. 1 the dotted black arrows show the switch conflict and the solid black arrows show the link con-flict problem in OON.

The remainder of this paper is organized as follows. In the second section, related work and the theoretical about previously proposed algorithm is presented.

IV. Related Work

Using any one of the following three techniques we can minimize the crosstalk: the Space Domain Approach, the Wavelength Domain Approach, and the Time Domain Approach (TDA).The Time Domain Approach reduces the crosstalk problem by allowing only one source and its corresponding destination address to be active at a time within a SE in the network. The Window Method, the Improved Window Method, and many other TDA based approaches have come into limelight in recent years.

The aim of ASA is to select a particular source address that does not create conflict in the network in the first pass, and the remaining source address can be transmitted in the second pass. This algorithm is applicable for the 8 x 8 Optical Multistage Interconnection Networks. Initially, in this algorithm, the SA and DA are obtained sequentially. Next, the combination matrix of the source and corresponding destination address is obtained. Furthermore, transformation and row selection operations are applied on the combination matrix. In this way, two pairs of rows can be obtained. In the next step, addition and subtraction operations will be performed between the corresponding bits in each pair. Finally, some SAs and their DAs are selected for a current pass and again the ASA is applied to the rest of the addresses.

The routing process of RSA is little bit different from ASA. This algorithm emphasizes two operations (i.e., column selection and the construction of a conflict matrix table that is based on these columns).The rest of the operations of RSA is same as in ASA. Furthermore, providing crosstalk free routes in minimum passes is an exigent problem. For this problem, CFMON and its routing algorithm were proposed in. After going through, we found that the routing algorithm of CFMON does not provide the crosstalk-free routes in two passes in some exceptional cases. Hence, we have compared our research work with CFMON.

V. Conclusion

In this research work, we have analyzed the performance of an OMIN for crosstalk**.** The crosstalk is a challenging promlem.Regarding this concern, we have proposed a new algorithm which is known as source destination based algorithm(SDBA).SDBA makes the cost effective and efficient for message transmission. In this result show minimum crosstalk and less time consume than the other CFMON. In the future research can be per-formed to analyze the performance of an OMIN with limited crosstalk under the bursty traffic, uneven and self- similar traffic conditions.

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