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Crosstalk Free Modified Omega Network in Two Stage Interconnection Network

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***Abstract*- Crosstalk is the major problem with optical interconne-ction network. It is a parallel processing system. The optical multistage interconnection network is an important part of parallel processing system. The major problem with OMIN is crosstalk. It degrades the performance of the network but also disturb the path of the communication signal. It is also costly, when wire is broken rare to joint.**

The paper presents a new interconnection network which is known as crosstalk free modified omega network stage-2.The proposed routing algorithm minimize the crosstalk problem and gives optical free interconnection network in only two passes. It is the modified form of omega network which is known as crosstalk modified omega network stage-2

Keywords
Omega network, Multistage Interconnections network, Optical multistage interconnection network Crosstalk, Time domain approach, crosstalk modified omega network.

INTRODUCTION

Omega network is a network configuration after used in parallel computing network architecture .It is an indirect topology that relies on the perfect shuffle interconnection network. 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 NxN 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. The main problem with optical multistage interconnection network is optical loss, path dependent loss and crosstalk. The crosstalk is the coupling of two signals within switching element. In this research work we have proposed a new Omega network which is known as cornstalk modified Omega network stage-2. It reduces crosstalk from any source to any destination. The Algorithm which we have proposed is based on the time domain approach and provides the network in only in two passes and in two Stages. The size of all SEs is n×n in first stages, n×k in second stages, k×n in third stages. Here the value of n is 2 and the value of k is 4 i.e. number of SEs in last stage. Now in first stages every SE has 2 input and 2 output links and the upper output links of all SEs are connected with upper input links. The crosstalk may be either electrical or optical. The electrical crosstalk is link conflict and optical crosstalk is switch conflict. In the case of link conflict two or more signal passes through the same SE in the same time interval. In case of switch crosstalk, two or more messages interact with each other in the same switching element in the same time. The crosstalk means both link and switch conflict. In this paper we compare the optical multistage interconnection network (OMIN) and destination based modified Omega network (DBMON).

OMEGA NETWORK

An 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 a free network. In omega network N processing Element contains N/2 switches. An Omega network log2nStages shuffle exchange interconnection network. Here multistage Omega network N=8

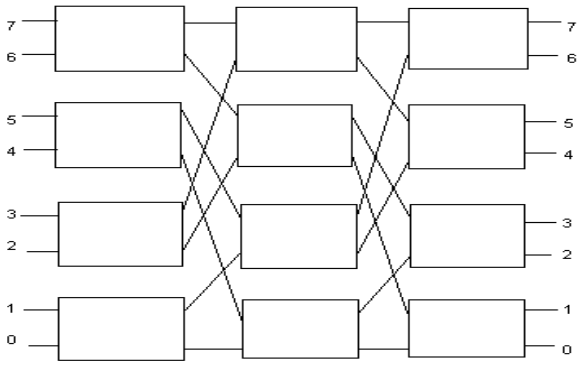

Figure 1. An 8 x 8 omega network topology

The omega network is another example of a banyan multistage interconnection network that can be used as a switch fabric. The omega differs from the delta network in the pattern of interconnections between the stages. The omega MIN uses the "perfect shuffle".

CROSSTALK-FREE MODIFIED OMEGA NETWORK STAGE-2

The structure of the network is based on the optical omega network and the destination based Modified omega network is related with pattern of CFMON .The source of

the optical signal is fixed while the destination of the signal is not fixed. The destination of the signal is dynamic in nature. the output of the links of the SEs of the first stage and input links of the SEs of the middle stage out of the third stage of the CFMON.The upper input links of input signal represented by red and the lower signal is represented by green color. In case of crosstalk free we pass the signal in two passes. In first pass we pass the signal which follow the upper signal .In second pass the signal which follow the lower signal.

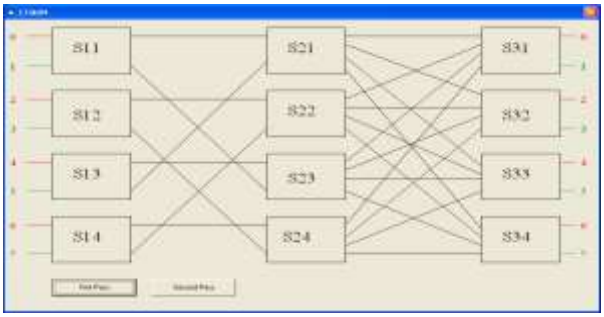

Fig 2. 8×8 CFMON

PROPOSED CFMON STAGE-2(CROSSTALK FREE MODIFIED OMEGA NETWORK STAGE-2)

The proposed optical interconnection network is able to reduce crosstalk problem in only two Passes and therefore it is known as a crosstalk modified Omega network stage-2(CFMON Stage-2).In the above figure at the source side we all the source address and the destination side we have all the destination address. Stages are shown by Stage1, Stage2 and Stage3.In this network each SE is represented by Sij. Here I represent the stage and J represents the SE.e.g. S11 shows, it is first SE which exists in first stage, S33 shows, it is third SE which exits in third stage. In this network, every SE which exits in first stage. is connected with two source address and these address are shown by red and green color. Routing Procedure of n×n CFMON stage-2 Routing of communication signal or data is easy in CFMON stage-2 .In first stage, the address which are in red colour will follow the upper sided route and address which are in green colour will follow the lower sided route

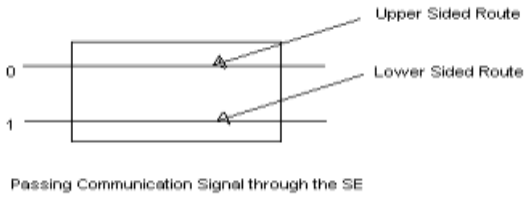

Fig 3.

In second stage, the data move according to the given table.

Source address	Destination address
0 →	3
1 →	2
2 →	1
3 →	0
4 →	4
5 →	5
6 →	6
7 →	7

Table: 1

This table is scalable for the large network e. g the network size is 16×16 .In this case the SE of middle stage will have n=2 input and k=8 output links. We can also obtain the routing table for the large network e. g 32×32, 64×64 etc. To get this table for the large network, only we have to consider the value of k because n is constant in every case.

Source Address	Colour	Destination	Colour	Route
0	Red	3	Red	US
1	Green	2	Green	LS
2	Red	1	Red	US
3	Green	0	Green	LS
4	Red	4	Red	US
5	Green	5	Green	LS
6	Red	6	Red	US
7	Green	7	Green	LS

Table: 2

Here US stands for upper sided route, LS stands for the lower sided route .In the same way, we can obtain table for the large network.

The Source and Destination Based Algorithm

The process for source and destination addresses. Firstly select the source and destination addresses.

In next step coloring of source and destination addresses as in the table. In next step store the source address which are of same color in variable SR and SG .SR stands for "source red address ". SG stands for store green source address". Transmit these addresses in first pass and second pass respectively and get the crosstalk free optical Network.This algorithm is based on time domain division approach.

ALGORITHM FOR SDBA

1. Begin
2. Obtain the source and its respective destination addresses.
3. Show the destination addresses in red and green color as mentioned in the table.
4. Show the first source addresses in red color and second source addresses in green color and repeat this
   process unto last source address.
5. Store the red source addresses in a variable SR.
6. Store the green source address in a variable SG.
7. Transmit the source addresses which are stored in variable SG In first pass.
8. Transmit the source addresses which are stored in variable SR In second pass.
9. For each SR and SG destination will be varying from 0 to 7.
10. End.

Example: Let the source and destination addresses as follows

S	D1	D2	D3	D4	D5	D6	D7	D8
0	6	5	7	4	0	2	0	1
1	7	4	4	5	6	0	1	3
2	5	5	6	3	7	5	2	4
3	3	6	7	4	3	2	3	0
4	2	7	2	1	1	3	4	6
5	4	2	1	0	5	6	5	2
6	1	0	0	2	3	1	6	7
7	0	1	3	6	7	4	7	5

Now applying the proposed SDBA algorithm on example we have obtained the following result.

Now applying the proposed SDBA algorithm on example we have obtained the following result.

Fist pass:

Source Address	Destination Address
2	6
3	2
6	0
7	4

Second pass:

Source Address	Destination Address
0	7
1	3
4	1
5	5

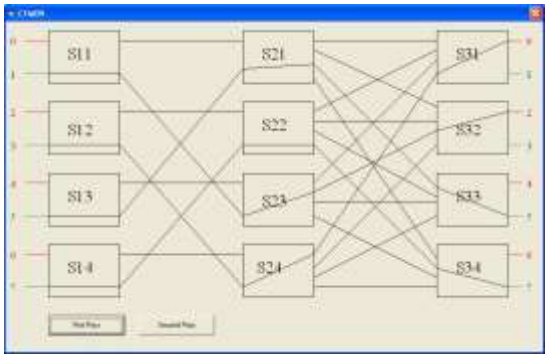

Fig: 4

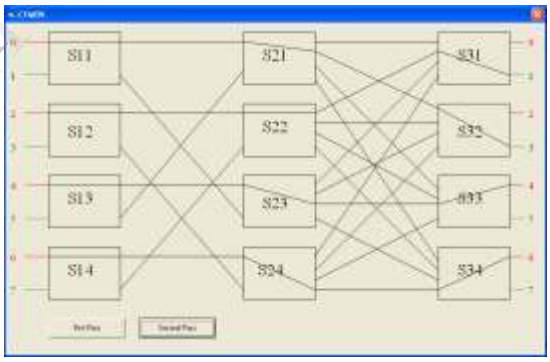

Fig: 5

COMPARISON

The CFMON can do the message transmission in two passes even than It fails in few cases. It also requires more than two passes for every network size to make the network crosstalk free. Where as SDBA only require two passes in each and every case.

CONCLUSION

Crosstalk is the challenging problem in omega networks. It degrades the performance of the network .The signal of the communication do not reach their proper destination due to crosstalk. The proposed multistage interconnection network and its algorithm is used to reduce the optical cross-talk problem .The main advantages of this algorithm is to reduce the crosstalk and cost effective

REFERENCES:-

1. Laxmi N. Bhuyan, Qing Yang, Dharma P. Agrawal, "Performance of Multiprocessor Interconnection Networks," IEEE Computer 22(2):25-37, February 1989.
2. M. Brenner, D. Tutsch, G. Hommel, "Measuring Transient Performance of a Multistage Interconnection Network Using Ethernet Networking Equipment," Proceedings of the International Conference on Communications in Computing 2002 (CIC'02). Las Vegas, USA, 2002, pp. 211-216.
3. S. Cheemalavagu, M. Malek, "Analysis and Simulation of Banyan Interconnection Networks with 2x2, 4x4 and 8x8Switching Elements," IEEE Real-Time Systems Symposium 1982: 83-89.
4. D. M. Dias and J. R. Jump, "Analysis and simulation of Buffered delta networks," IEEE Trans. Comput., vol. C 30, pp. 273- 282, Apr. 1981.
5. L.R. Goke and G.J. Lipovski, "Banyan networks for Partitioning multiprocessing systems," Proceedings of the First International Symposium on Computer Architecture, pp. 21-28, 1973.
6. Clyde P. Kruskal, Marc Snir, "The Performance of Multistage Interconnection Networks for Multiprocessors," IEEE Transactions on Computers 32(12): 1091-1098, December 1983.
7. Manoj Kumar, J. Robert Jump, "Performance of Unbuffered Shuffle-Exchange Networks," IEEE Transactions on Computers 35(6): 573-578, June 1986.
8. K. Padmanabhan and A.N. Netravali, "Dilated networks for Photonic switching," IEEE Trans. Communications, vol. 35, no. 12, pp. 1357-1365, Dec. 1987.
9. J.H. Patel, "Performance of processor-memory interconnections for multiprocessors," IEEE Transactions on Computers, Vol. C-30, pp. 771-780, October 1981.
10. C. Qiao, "A Universal Analytic Model for Photonic Banyan Networks," IEEE Trans. on Communications, Vol. 46, No. 10,pp. 1381-1389, 1998.
11. Y. Yang and J. Wang, "A More Accurate Analytical Model on Blocking Probability of Multicast Networks," IEEE Trans. Common.vol. 48, no. 11, pp. 1930-1935, 2000.

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