International Research Journal of Natural and Applied Sciences
Vol. 4, Issue 2, February 2017 **Impact Factor- 5.46**
ISSN: (2349-4077)

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ANALYSIS OF PERFORMANCE PARAMETERS OF NEW IRREGULAR AUGMENTED SHUFFLE NETWORK AND COMPARISON WITH IRREGULAR ASEN-2

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ABSTRACT

This paper proposes a newly designed Fault-Tolerant Dynamic Irregular MIN named as New Irregular Augmented Shuffle Exchange Network (NIASN) and compares the multiple paths from different sources to destinations of the proposed MIN with existing ASEN-2.The various performance parameters have been evaluated.

Keywords : Structure of Interconnection Netork NIASN, Performance Measures, Bandwidth, Cost and Bandwidth per unit cost,ASEN -2

Structural Characteristics of NIASN

The proposed MIN is an altered IASN Sadawarti et al. (2007) with less number of SEs in the intermediate stages and with changed connection patterns. The Network of size N*N has N sources and N destinations. The proposed MIN consists of k-1 stages ($k=\log_2 N$).The network Comprises of two identical groups [4]of switching elements (SEs), named as G^0 and G^1.There are N/2 sources and N/2 destinations in each group. Both the groups are connected to the N inputs and N outputs. The inputs are connected through N multiplexers of 4:1 size, and the outputs are connected through the same number of demultiplexers of 1:2 size. The multiplexers and demultiplexers have been numbered as 0, 1, ----, N/2. In this network the switches are of size 2*2 in all the stages except the first stage where the switches are of size 3*3. The NIASN network of size N*N has (2*k) no. of switches of size 3*3 and [(2*k) +3] number of switches of size 2*2.Each source is connected to one switching element in each group with the help of multiplexers. The multiplexers and demultiplexers have been given the numbers as 0, 1, ---, N/2-1. The switches in the first stage have been assigned the numbers from 0, 1, ---, N/2-1, connected to each other through links called as auxiliary links. The auxiliary links are used when the SE in the next stage is busy or faulty. This makes the network more Fault-Tolerant and reliable. The switches in the middle stage have been given the number as N/2,--,N/2+2.Like wise the switches in the last stage are identified with the numbers from N/2+3,----,N/2+10.

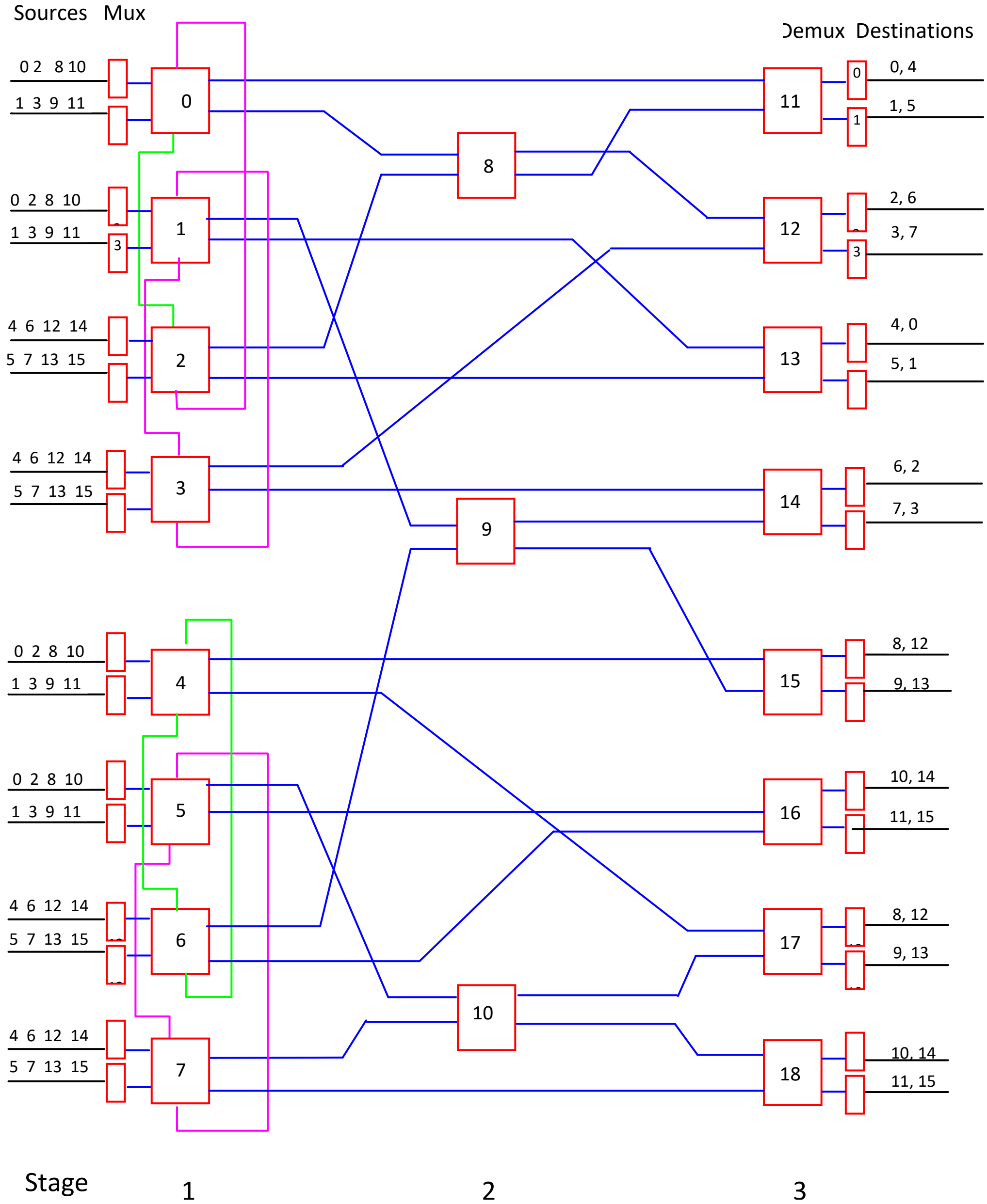

Fig 1Design of NIASN of size 16 * 16

Bandwidth Analysis

Active requests reached Gupta Rohit et al. (2006) from the source to destination have been analyzed for the existing MIN ASEN-2. Table 1 compares the values of the parameters [2] for 100% request generation, for 16 * 16 size of the compared networks.

Table 1 Comparative Bandwidth analysis of NIASN and ASEN-2

P_{req_gen}		0.1	0.3	0.5	0.7	0.9	1.0
BANDWIDTH	NIASN	2.8651	6.9918	9.6568	11.3971	12.5478	12.9704
	ASEN-2	0.994	1.8122	2.5681	3.876	4.7642	5.1591

The values listed in Table 1 prove that the MIN NIASN has an improved Bandwidth as compared to other network considered for comparison. It has also been observed that proposed network has more Bandwidth per unit cost[1][3] as compared to ASEN-2.

Cost Analysis

The cost of similar type of existing network ASEN-2 has been calculated by considering the hardware complexities[6] in the networks. Table 2 lists and compares the cost in units of the proposed network with ASEN-2.

Table 2 Comparison of Cost in Units of varying size networks

Cost in units Size in $\log_2(N)$	NIASN	ASEN-2
4	212	240
6	1004	1176

8	4748	4920
10	22028	24896

Conclusion

The proposed MIN NIASN has better bandwidth and is less costly at the same time as compared to ASEN-2. The NIASN has better Bandwidth per unit cost.

References

1. M Morris Mano,*Computer System Architecture*,Pearson Education PvtLtd,Third edition,2005.
2. Fan C. C. and Bruck J., September 2000, "Tolerating Multiple Faults in Multistage Interconnection Networks with Minimum Extra Stages", IEEE Transactions on computers, **49** (9), pp. 998-2004.
3. Feng T. Y. and Wu C. L., October 1981, "Fault-Diagnosis for a Class of Multistage Interconnection Networks", IEEE Transactions on Computers, **C-30**, pp. 743-758.
4. Garofalakis John, StergiouEleftherios, May 2008, "An Analytical Performance Model for Multistage Interconnection Networks with Blocking", the 6th Annual Communication Networks and Services Research Conference (CSNR), pp. 373-381.
5. Wei S. and Lee G., June 1988, "Extra Group Network: A Cost-Effective Fault-Tolerant Multistage Interconnection Network", Proceedings 15th Annual Symposium on Parallel Architecture, pp. 108-115.
6. DALLY William James, TOWLES Brian Patrick ,*Principles and practices of interconnection networks* ,Stanford University, Palo Alto, CA,2004.