International Journal of Research in Advent Technology, Vol.6, No.7, July 2018
E-ISSN: 2321-9637
Available online at www.ijrat.org

Analysis of Adaptive Alternate Minimum Hop Rank Based Routing Method for Transmission of maximum data rate in Large WDM Fiber Optical Networks

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Abstract: Day to day innovations are take place in the new era of Technology. Now a day every one using internet technology for their innovations so gathering the information and it will apply to their innovative methods. The gathering of data is important how fast it is and how much time it is required. Now here the concept of wdm fiber optical takes place to accessing fast web. In this paper mainly discuss about how much and how fast of transmission of data rate is successfully send through the different large networks using different RWA algorithms in WDM Optical networks. Here performance analysis also observed for various networks based on new routing method.

Keywords: WDM, RWA, bitrates.

1.INTRODUCTION: in Wavelength Division Multiplexingis transmitting many light beams of different wavelengths simultaneously through an optical fiber.a wdm optical network consists of wavelength routing nodes interconnected by point-to point optical fiber links in different topologies, Here OBS is implemented using Wavelength Division Multiplexing (WDM), a data transmission technology that transmits data in an optical fibre by establishing several channels, each channel corresponding to a specific light wavelength. Optical Burst Switching has several distinctive features: first, the packets are aggregated in the ingress (entry) node, for a very short period of time. This allows that packets that have the same constraints, e.g., the same destination address and maybe, the same quality of service requirements are sent together as a burst of data (therefore the term burst in the concept name). When the burst arrives at the egress (exit) node, it is disassembled and its constituent packets routed to their destination

2. PROPOSED ALGORITHM: =

2.1 ADAPTIVE ALTERNATE LEAST HOP RANKING ROUTING

We consider an OBS network which is modeled as a graph. G(V, E), where $V=\{v_1, v_2, \ldots, v_n\}$ is the set of nodes and $E=\{e_1, e_2, \ldots, e_n\}$ is set of edges . If link e connects an input port of v_i and output port of v_j . We consider adaptive-based routing, let burst transmission request for a set of pair of nodes are defined as $Z=\{(S_i, D_j, \rho_{ij})\}$, S_i denote the source node, D_j denotes the destination node, ρ_{ij} denote the Requested burst traffic intensity between node pair (S_i, D_j). Let obtain set of all paths between pair of nodes by using adaptive alternate least hop ranking routing algorithm to select an efficient path for every node pair by estimating lest number of hops in between pair of nodes. In order to retrieve an efficient path among pair of nodes first we determine following steps.

Step1: Estimate the burst loss in OBS network by considering traffic load ρ_e on over link e
Is represented as

$$\rho_e = \sum_{p \in \rho_e} \rho_p; \exists (S_i, D_j)$$

Step 2: Calculate the Burst Loss probability (BLP) in the network link e can be calculated as

$$B_e(\rho_e, W) = \frac{(\rho_e)^w / W}{}$$

W represents number of wavelength allocated

Step 3: Find the shortest path in pair of source and destination pair (S_i, D_j) and estimate minimum hop distance is $H^s = \{h_1, h_2, \ldots, h_n\}$

Step 4: Organize routing table by sorting in nondecreasing order by considering shortest distance from source to destination and represents table with distance $D_s^j = \{d_1^j, d_2^j, \ldots, d_n^j\}$

Step 5: Select least hop distance $D_s^j = \{d_1^j, d_2^j, \ldots, d_n^j\}$ and sort the paths ρ_e

3. DIFFERENT NETWORKS ANALYSIS

3.1. 5 NODE NETWORK

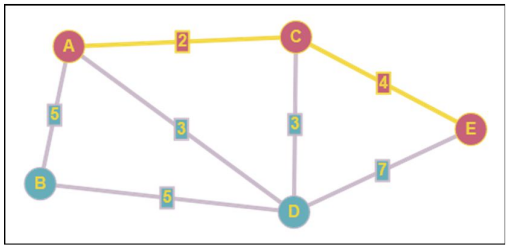


Fig 1: 5 Node network

$$\begin{pmatrix} 0, 5, 2, 3, 6 \\ 5, 0, 7, 5, 11 \\ 2, 7, 0, 3, 4 \\ 3, 5, 3, 0, 7 \\ 6, 11, 4, 7, 0 \end{pmatrix}$$

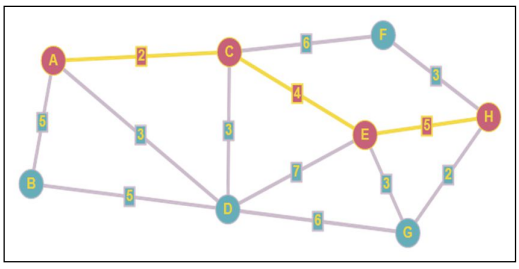
Fig 2: 5 node traffic matrix

In Fig 1: According to aamhr algorithm if 'C' node is burst then path is treated as routing ranking according to different wavelength algorithms

Step 1:direct path is A->C->E ,Cost =6,hops=2

Step 2: According to AAMHR path is A->D->E,Cost is =10,hops=2

3.2. 8-NODE NETWORK



Fig(3):8-node degree

8-node degree traffic matrix

$$\begin{pmatrix} 0, 5, 2, 3, 6, 8, 9, 11 \\ 5, 0, 7, 5, 11, 13, 11, 13 \\ 2, 7, 0, 3, 4, 6, 7, 9 \\ 3, 5, 3, 0, 7, 9, 6, 8 \\ 6, 11, 4, 7, 0, 8, 3, 5 \\ 8, 13, 6, 9, 8, 0, 5, 3 \\ 9, 11, 7, 6, 3, 5, 0, 2 \\ 11, 13, 9, 8, 5, 3, 2, 0 \end{pmatrix}$$

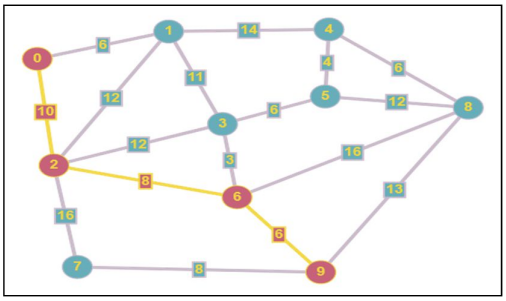
Fig(4):8-node traffic matrix

In Fig 3: According to aamhr algorithm if 'E' node is burst then path is treated as routing ranking according to different wavelength algorithms

Step 1: direct path is A->C->E->H, Cost =24, hops=3

Step 2: According to AAMHR path is A->C->F->H,Cost is =34, hops=2

3.3 10 node network



Fig(5):10-node network

10 node network traffic matrix

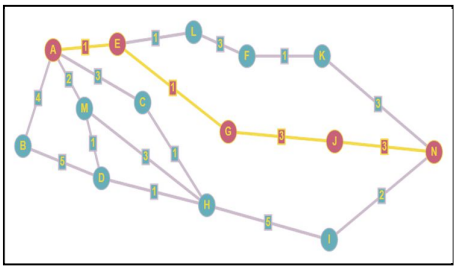
$$\begin{pmatrix} 0, 6, 10, 17, 20, 23, 18, 26, 26, 24 \\ 6, 0, 12, 11, 14, 17, 14, 28, 20, 20 \\ 10, 12, 0, 11, 21, 17, 8, 16, 24, 14 \\ 17, 11, 11, 0, 10, 6, 3, 17, 16, 9 \\ 20, 14, 21, 10, 0, 4, 13, 27, 6, 19 \\ 23, 17, 17, 6, 4, 0, 9, 23, 10, 15 \\ 18, 14, 8, 3, 13, 9, 0, 14, 16, 6 \\ 26, 28, 16, 17, 27, 23, 14, 0, 21, 8 \\ 26, 20, 24, 16, 6, 10, 16, 21, 0, 13 \\ 24, 20, 14, 9, 19, 15, 6, 8, 13, 0 \end{pmatrix}$$

Fig(6) 10 node traffic matrix

In Fig 5: According to aamhr algorithm if '6' node is burst then path is treated as routing ranking according to different wavelength algorithms

Step 1:direct path is 0->2->6->9,Cost =24, hops=3
Step 2: According to AAMHR path is 0->2->7->9, Cost is =34, hops=3

3.4 14-NODES DEGREE



Fig(7):14 node degree

14 node degree traffic matrix

3, 7, 0, 2, 4, 8, 5, 1, 6, 8, 9, 5, 3, 8
3, 5, 2, 0, 4, 8, 5, 1, 6, 8, 9, 5, 1, 8
1, 5, 4, 4, 0, 4, 1, 5, 9, 4, 5, 1, 3, 7
5, 9, 8, 8, 4, 0, 5, 9, 6, 7, 1, 3, 7, 4
2, 6, 5, 5, 1, 5, 0, 6, 8, 3, 6, 2, 4, 6
4, 6, 1, 1, 5, 9, 6, 0, 5, 9, 10, 6, 2, 7
9, 11, 6, 6, 9, 6, 8, 5, 0, 5, 5, 9, 7, 2
5, 9, 8, 8, 4, 7, 3, 9, 5, 0, 6, 5, 7, 3
6, 10, 9, 9, 5, 1, 6, 10, 5, 6, 0, 4, 8, 3
2, 6, 5, 5, 1, 3, 2, 6, 9, 5, 4, 0, 4, 7
2, 6, 3, 1, 3, 7, 4, 2, 7, 7, 8, 4, 0, 9
8, 12, 8, 8, 7, 4, 6, 7, 2, 3, 3, 7, 9

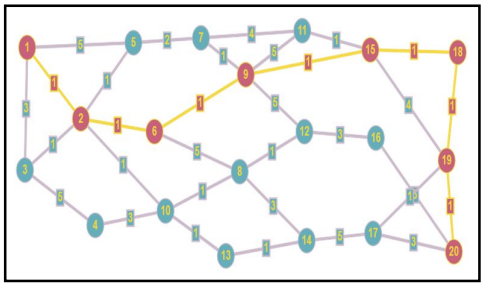
Fig(8):14 node degree traffic matrix

In Fig 7: According to aamhr algorithm if 'G' node is burst then path is treated as routing ranking according to different wavelength algorithms

Step 1: Direct path is A->N, Cost =8,hops=4

Step 2: According to AAMHR path is A->C->H->I->N,Cost is =11, hops=4

3.5 20 NODE DEGREE



Fig(9): 20 node degree

20 node traffic matrix

3, 2, 3, 6, 3, 1, 1, 4, 0, 3, 2, 5, 4, 5, 1, 7,4,2,3,4
2, 1, 2, 3, 2, 2, 4, 1, 3, 0, 5, 2, 1,2, 4, 5, 7,5,6,7
5, 4, 5, 8, 5, 3, 3, 6, 2, 5, 0, 7, 6,7, 1, 7, 4,2,3,4
4, 3, 4, 5, 4, 4, 6, 1, 5, 2, 7, 0, 3, 4, 6, 3,8,7,7,6
3, 2, 3, 4, 3, 3, 5, 2, 4, 1, 6, 3, 0, 1, 5, 6, 6, 6,7,
4, 3, 4, 5, 4, 4, 6, 3, 5, 2, 7, 4, 1, 0, 6, 7, 5, 7,6,
4, 3, 4, 7, 4, 2, 2, 5, 1, 4, 1, 6, 5, 6, 0, 6, 3,12,3
7, 6, 7, 8, 7, 7, 8, 4, 7, 5, 7, 3, 6,7, 6,0, 5, 5,4,3
7, 6, 7, 10, 7, 5, 5, 8, 4,7, 4, 8, 6,5, 3,5, 0,2,1,2
5, 4, 5, 8, 5, 3, 3, 6, 2, 5, 2, 7, 6, 7, 1,5, 2,0,1,2
6, 5, 6, 9, 6, 4, 4, 7, 3, 6, 3, 7,7, 6, 2, 4, 1,1 0,1
7, 6, 7, 10, 7, 5, 5, 7, 4,7, 4, 6, 8, 7, 3,3,2,2,1,0

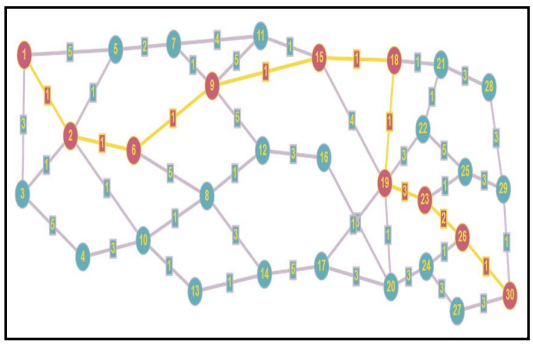
Fig(10): 20 node traffic matrix

In Fig 9: According to aamhr algorithm if 'C' node is burst then path is treated as routing ranking according to different wavelength algorithms

Step 1:direct path is 1->20,Cost =7,hops=6

Step 2: According to AAMHR path is 1-2-10-14-17-20Cost is =12,hops=5

3.6: 30 node degree



Fig(11):30 node degree

30 node traffic matrix

6, 5, 6, 9, 6, 4, 4, 7, 3, 6, 3, 7, 7, 6, 2, 4, 1, 1, 0, 1, 2, 3, 3, 4, 4, 5, 7, 5, 7, 6

7, 6, 7, 10, 7, 5, 5, 7, 4, 7, 4, 6, 8, 7, 3, 3, 2, 2, 1, 0, 3, 4, 4, 3, 5, 4, 6, 6, 6, 5

6, 5, 6, 9, 6, 4, 4, 7, 3, 6, 3, 8, 7, 8, 2, 6, 3, 1, 2, 3, 0, 1, 5, 6, 6, 7, 9, 3, 6, 7

7, 6, 7, 10, 7, 5, 5, 8, 4, 7, 4, 9, 8, 9, 3, 7, 4, 2, 3, 4, 1, 0, 6, 7, 5, 8, 10, 4, 7, 8

9, 8, 9, 12, 9, 7, 7, 10, 6, 9, 6, 10, 10, 9, 5, 7, 4, 4, 3, 4, 5, 6, 0, 3, 1, 2, 6, 7, 4, 3

10, 9, 10, 13, 10, 8, 8, 10, 7, 10, 7, 9, 11, 10, 6, 6, 5, 5, 4, 3, 6, 7, 3, 0, 4, 1, 3, 6, 3, 2

10, 9, 10, 13, 10, 8, 8, 11, 7, 10, 7, 11, 11, 10, 6, 8, 5, 5, 4, 5, 6, 5, 1, 4, 0, 3, 7, 6, 3, 4

11, 10, 11, 14, 11, 9, 9, 11, 8, 11, 8, 10, 12, 11, 7, 7, 6, 6, 5, 4, 7, 8, 2, 1, 3, 0, 4, 5, 2, 1

13, 12, 13, 16, 13, 11, 11, 13, 10, 13, 10, 12, 14, 13, 9, 9, 8, 8, 7, 6, 9, 10, 6, 3, 7, 4, 0, 7, 4, 3

9, 8, 9, 12, 9, 7, 7, 10, 6, 9, 6, 11, 10, 11, 5, 9, 6, 4, 5, 6, 3, 4, 7, 6, 6, 5, 7, 0, 3, 4

12, 11, 12, 15, 12, 10, 10, 13, 9, 12, 9, 12, 13, 13, 8, 9, 8, 7, 7, 6, 6, 7, 4, 3, 3, 2, 4, 3, 0, 1

12, 11, 12, 15, 12, 10, 10, 12, 9, 12, 9, 11, 13, 12, 8, 8, 7, 7, 6, 5, 7, 8, 3, 2, 4, 1, 3, 4, 1, 0

Fig(12):30 node degree distance matrix

4.SIMULATION:

In thiswe are assume some nodes like 14,40,100,200 large networks using NS2 we draw x-graphs for different parameters mentioned below

4.1 BLOCKING RATIO

AAMHR		FIXED ALTERNATE	
0	0	0	0
14	3.40	14	5.28
40	6.07	40	10.39
100	8.82	100	11.25
200	11.32	200	17.92

Fig(13):30 blocking ratio result

According to above result proposed algorithm compare to existed algorithm with two different wavelength algorithms AAMHR is showing best result with respect to most used wavelength algorithm

4.1.1 x-graph for blocking ratio

Fig(14) x-graph for blocking ratio

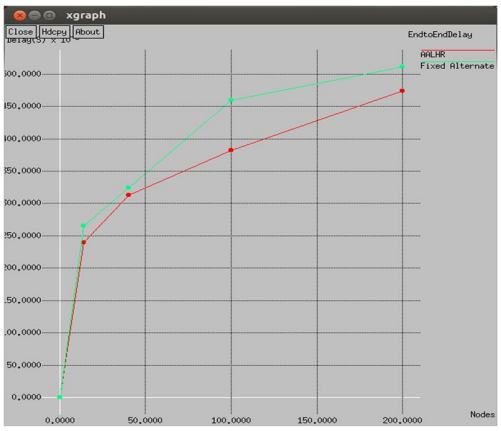
4.2 END TO END DELAY

AAMHR		FIXED ALTERNATE	
0	0	0	0
14	0.239367	14	0.265267
40	0.312449	40	0.324611
100	0.381799	100	0.459630
200	0.473485	200	0.511190

Fig(15): Result for end to end delay

According to above result proposed algorithm compare to existed algorithm with two different wavelength algorithms AALHR is showing best result with respect to most used wavelength algorithm end to end delay is increase compare to existing algorithm

4.2.1 x-graph for end-to-end delay



Fig(16): x-graph for end-to-end delay

4.3 PACKET DELVERY RATIO

AAMHR		FIXED ALTERNATE	
0	0	0	0
14	97.59	14	94.73
40	93.95	40	90.82
100	91.18	100	88.77
200	88.68	200	82.09

Fig(17): Result for packet delivery ratio

According to above result proposed algorithm compare to existed algorithm with two different wavelength algorithms AAMHR is showing best result with respect to most used wavelength algorithm, packet delivery ratio is gradually better compare to existing one.

4.3.1 x-graph for packet delivery ratio

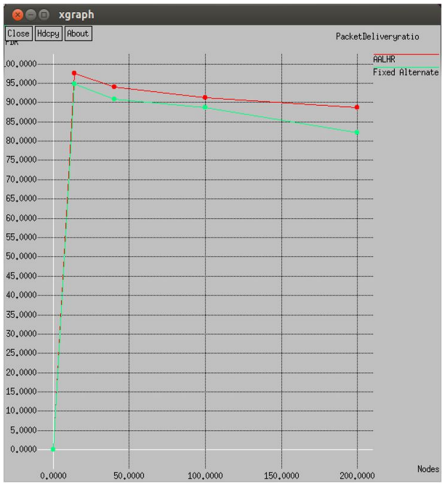


Fig (18): x-graph for packet delivery ratio

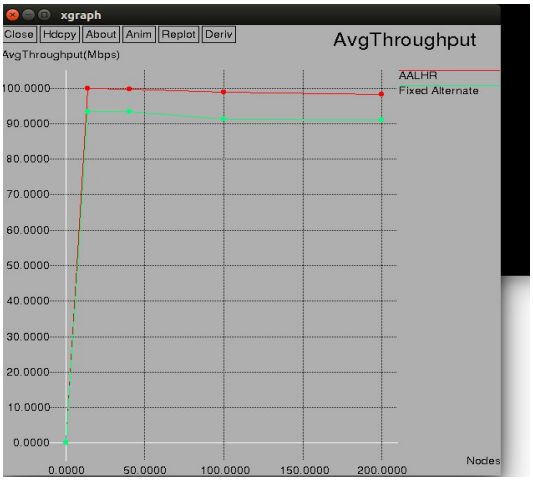
4.4 THROUGHPUT

AAMHR		FIXED ALTERNATE	
0	0	0	0
14	51.26	14	47.46
40	44.76	40	39.96
100	39.91	100	35.32
200	32.32	200	30.98

Fig(19): result for throughput

According to above result proposed algorithm compare to existed algorithm with two different wavelength algorithms AAMHR is showing best result with respect to most used wavelength algorithm here throughput is high

4.4.1 x-graph for throughput



Fig(20) :x-graph result for throughput

5.CONCLUSION AND FUTURE SCOPE:

In this paper we briefly discussing about different parameters like blocking ratio,packet delivery ratio,maximum throughput is analysed for the different nodes like14, 40,100,200 using ns2 simulation.It showing better result compare to existing algorithm.in future we are observing large networks like 500, 1000, 2000 etc nodes observed for the above said algorithm with same parameters.

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