ISSN (Online) 2394-2320

International Journal of Engineering Research in Computer Science and Engineering (IJERCSE)
Vol 5, Issue 3, March 2018

Congestion control mechanism using Traffic Aware Dynamic Routing (TADR) algorithm

[1] S.Pavithra, [2] R.Bavani, [3] J.Uma Sawmiya, [4] Dr.K.Vimaladevi
[1][2][3] B.E. IV Year Department of Computer Science and engineering, Velammal Engineering College,Chennai.
[4] Professor, Department of Computer Science and engineering, Velammal Engineering College,Chennai.

Abstract: **Traffic-Aware Dynamic Routing (TADR) algorithm is proposed to route the packets around congestion areas and scatter the excessive packets along multiple paths consisting of idle and under loaded nodes. Utilizing the concept of potential in classical physics, TADR algorithm is designed for constructing hybrid virtual potential field using depth and normalized queue length to force the packets to steer clear of obstacles.**

Keyword- Dynamic routing, Congestion, Hybrid potential field, idle nodes, under loaded nodes.

I. INTRODUCTION

The congestion problem in Wireless Sensor Networks (WSNs) is quite different from that in traditional networks. Most current congestion control algorithms try to alleviate congestion by reducing the rate at which source nodes inject packets into the networks. This traffic control scheme always decreases the throughput. Hence it has to violate the fidelity level required by applications. Therefore, we present a solution that sufficiently exerts idle or under loaded nodes to alleviate congestion and improve overall throughput in WSNs. To achieve this goal, TADR algorithm is proposed where it identifies the congestion areas and then divides the packets to be sent along multiple paths, and finally reaches the destination. This algorithm is designed through constructing hybrid potential field using depth and normalized queue length to force the packets to steer clear of obstacles.

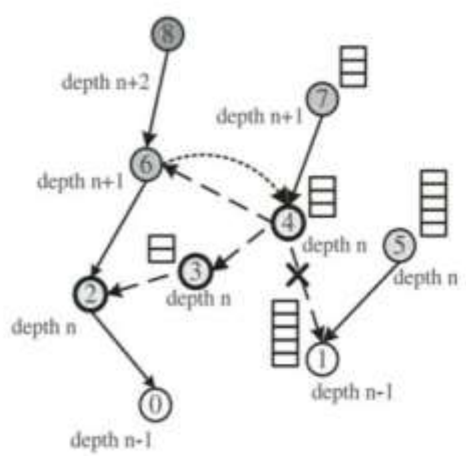


Figure 1.shows the illustration of TADR

II. HISTORY

Congestion in WSNs has negative impact on performance, namely, decreased throughput and increased per packet energy consumption. Due to the centralized traffic pattern in WSN, just bypassing the hot spots is ineffective to eliminate congestion because it will reappear near sink. For example, the data generated during crisis state are of atmost important and loss of such data can violate the purpose of deploying unattended sensor network.

In other words, congestion control in WSNs must not only be based on network capacity but also on fidelity required by applications. Most of the prior works basically try to throttle the incoming traffic into the network once congestion is detected. Although traffic control strategies are effective to alleviate congestion in traditional networks, they are restricted for the following reason: "Reducing source traffic during crisis state is undesirable since it will significantly violate fidelity requirements."

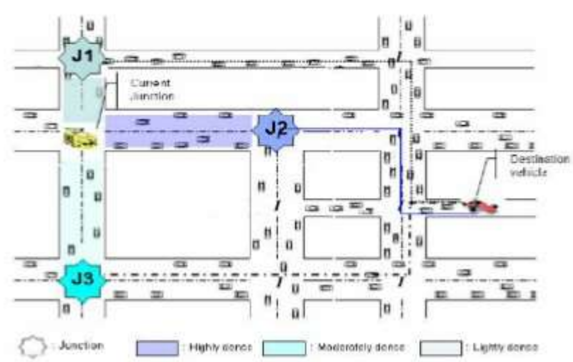


Figure 2.shows typical traffic awareness model

ISSN (Online) 2394-2320

International Journal of Engineering Research in Computer Science and Engineering (IJERCSE)
Vol 5, Issue 3, March 2018

It may be a better option to increase capacity by turning on more resources to accommodate excessive incoming traffic during crisis state. There are various congestion control schemes such as capacity planning, end-to-end or hop-by-hop traffic control connection admission control and buffering. It has been found that the selection of congestion control schemes should depend upon the characteristic of congestion.

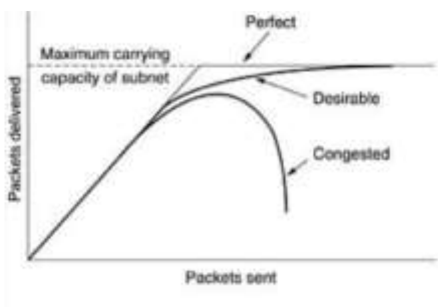
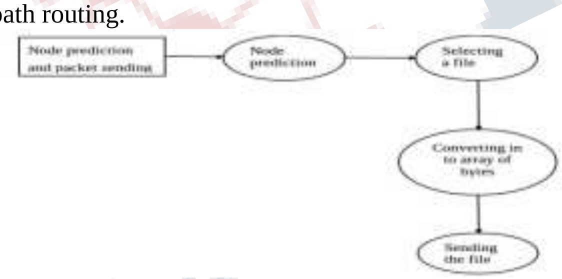


Figure 3.shows congestion control scheme

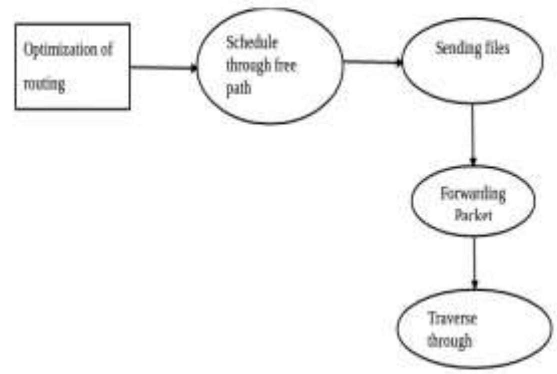
III. COMPONENTS IN TADR:

It consists of 3 modules which serve following functions:

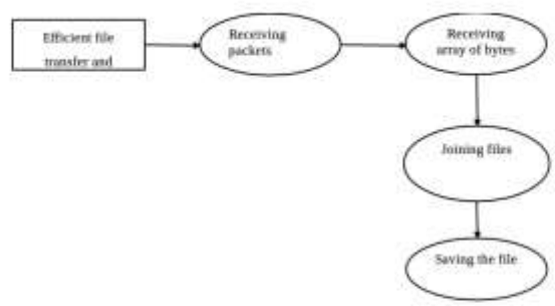
i.Path prediction and packet splitting:
Here the path for the transaction of the file is detected and the data is divided into number of packets depending on the size of data In highly loaded nodes, the surface of the "bowl" is smooth and hence this algorithm acts as shortest path routing.



ii.Scheduling and packet sending:
In this module, it schedules the order of the packets to send. An 8-bit field for depth and another 8-bit field for queue length. Assume that all the nodes in the network are homogeneous and have same buffer size, thus TADR get the normalized queue length. The reason for not sending the potential virtual machine directly is that it will cost more space to store a floating point number than two integers.



iii. Packet receiving and joining:
A typical routing loop is caused by local minimal potential, which is a hollow in our bowl model. At the beginning, the nodes around this minimal potential node may send their packets to it, so this hollow will be filled up after sometime. Once the potential of this node goes higher than that of any node around it, the node will send back packets.



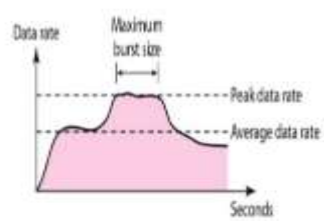


Figure 4.Traffic descriptors

ISSN (Online) 2394-2320

International Journal of Engineering Research in Computer Science and Engineering (IJERCSE)
Vol 5, Issue 3, March 2018

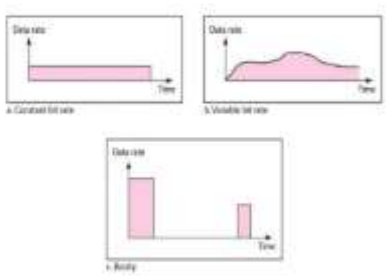


Figure 5.Three traffic profiles

IV. TADR ALGORITHM:

TADR- update message from processing:
If received an updatemessage(u_msg) from a neighbouring node(neighbour_id)
1: insertToRoutingTable(u_msg,neighbor_id)
2: for each entry in RoutingTable
3: w=id of the neighbor;
4: c=cost of radio link to w;
5: d=depth of w;
6: q=queue length of w;
7: Fd(w)=(Local_depth-d)/w;
8: Fq(w)=(Local_queuelength-q)/c;
9: Fm(w)=(1-α)Fd(w)+ α Fq(w) ;
10:end for;
Recalculate the depth:
11: Select the lowest depth from the RoutingTable as
12:SetLocalDepth(LD+1);
Choose the nexthop node:
13: Selects from the entries with QL<1//RULE1 according to max-Fm, max-Vm, min-depth, min-cost, Random in turn
TADR-Time to update:
If one those events occurred:
1:Timeout of the most updating interval
2:Depth changed
3:The variation of Queue Length exceeds Qupdate_ threshold
1:if(Timeout of the least update interval)then
2: sendupdatemsg();
3:else
4:updatemsgPending=TRUE;
5:endif;
Processing of update message:

When a node receives update message from one of its neighbors, it will refresh its routing table and reselect nexthop node according to the algorithm. TADR uses the steepest gradient method to choose its parent. Most precisely, if there are more than one neighbor that has maximum force Fm, TADR chooses the nexthop node according to the maximum potential Vm, minimum depth of neighbors and minimum cost of links. In case id TADR still cannot determine its parent, then it will choose one node randomly.

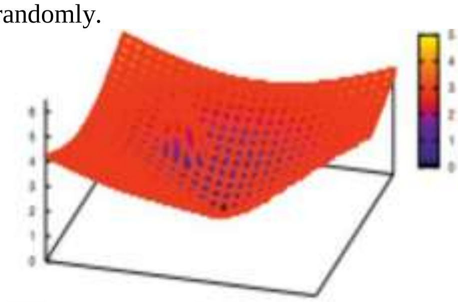


Figure 6.The smooth "bowl" of depth potential field

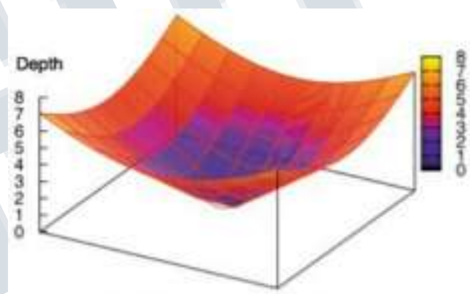


Figure 7.An example of hybrid potential field

Time to update:

TADR defines Maximum Updating Interval(MUI) and Least Updating Interval (LUI) between two successive update messages.LUI prevents from sending too many update messages and MUI maintains connectivity of the network. TADR sends update message when any one of the following events occur:

i.MUI timer expires:
If the time elapses, then the node will send new update message immediately no matter whether the depth or the queue length has changed.

ii.Depth changes:
If the depth of the node has changed, and the elapsed time also exceeds LUI then, the node will also send a new update message.

iii.Variation of queuelength exceeds certain threshold: If the queue length on a node is changed by threshold such as 0.1 and the elapsed time also exceeds LUI, then the node will send new update message.

ISSN (Online) 2394-2320

International Journal of Engineering Research in Computer Science and Engineering (IJERCSE)

Vol 5, Issue 3, March 2018

Figure 8.shows update message processing

V. ADVANTAGES:

- Faster transfer of data
- Traffic is very low.
- Very low packet loss
- Efficient use of bandwidth
- Promotes security to data.

VI. CONCLUSION

In this paper, we have presented an improvement of traffic aware dynamic source routing protocol by proposing a new metric to evaluate routes. This metric is based on nodes weight computed by combining two parameters which are the power of node and its stability. These are assumed to be the most important parameters in choosing the routes. Then using these weights, we can choose the best route that may be a long one, but that is the best route according to our proposed system. Whenever two routes have near values of weights, we can choose the one with minimum number of hops.

REFERENCES

[1] B. Hu, S. Chen, J. Chen, and Z. Hu, "A mobility-oriented scheme for virtual machine migration in cloud data center network," IEEE Access,vol. 4, pp. 8327–8337, 2016

[2] A. Munir, T He, R. Raghavendra, F. Le, and A. X. Liu, "Network scheduling ware task placement in datacenters,"inProc.12th Int.Conf. Emerg. Netw. EXperi. Technol. (CoNEXT), New York, NY, USA,2016, pp. 221 235.[Online].Available:http://doi.acm.org/10.1145/29995 72.2999588.

[3] K. Chen et al., "OSA: An optical switching architecture for data center networks with unprecedented flexibility," IEEE/ACM Trans. Netw.,vol. 22, no. 2, pp. 498–511, Apr. 2014.

[4] J. Zhang, F. Ren, and C. Lin, "Delay guaranteed live migration of virtualmachines," in Proc. IEEE INFOCOM, Apr. 2014, pp. 574–0582

[5] D. Erickson, B. Heller, N. McKeown, and M. Rosenblum, "Using network knowledge to improve workload performance in virtualized datacenters," in Proc. IEEE IC2E, Mar. 2014, pp. 185–194.

[6] D.Richert and J. Cortés, "Robust distributed linear programming,"IEEE Trans. Autom. Control, vol. 60, no. 10, pp.2567–2582,Oct. 2015.

[7] H. Wang, Y. Li, Y. Zhang, and D. Jin, "Virtual machine migrationplanning in software-defined networks," in Proc. IEEE INFOCOM,Apr. 2015, pp. 487–495.