ISSN(Online): 2320-9801
ISSN (Print): 2320-9798

International Journal of Innovative Research in Computer and Communication Engineering

(An ISO 3297: 2007 Certified Organization)

Website: www.ijircce.com

Vol. 4, Issue 12, December 2016

Throughput Maximization using Spatial Reusability in Multi-Hop Wireless Networks

Snehal C Pise[1], Prof D . P. Salapurkar[2]

M. E Student, Department of Computer Engineering, SCOE, Pune , MH, India [1]

Assistant Professor, Department of Computer Engineering, SCOE, Pune , MH, India [2]

ABSTRACT: The problem of routing in multi-hop wireless networks, to achieve high end-to-end throughput, it is difficult to find the optimal path from the source node to the destination node. Although a large number of routing protocols have been implemented to find the path with minimum transmission time for sending a single packet, such transmission time reduces protocols cannot be guaranteed to achieve high end-to-end throughput. Spatial reusability aware routing in multi hop wireless network is featured by considering spatial reusability of the wireless communication media. Spatial reusability-aware single-path routes and any path routing protocols, and compare them with existing single-path routing and any path routing protocols, respectively. Our evaluation results show that our protocols significantly improve the end-to-end throughput compared with existing protocols.

KEYWORDS: Routing, wireless network, Hop to Hop to communication.

I. INTRODUCTION

Large number of works wireless routing matrices is done in traditional wireless sensor network.
In wireless communication network it is important to carefully find the high utility route in multi-hop wireless networks, a large number of routing protocols have been proposed for multi hop wireless networks. However, a fundamental problem with existing wireless routing protocols is that minimizing the overall number of transmissions to deliver a single packet from a source node to a destination node does not necessarily maximize the end-to-end throughput. We investigate two kinds of routing protocols, including single-path routing and any path routing. The task of a single-path routing protocol is to select a cost minimizing path, along which the packets are delivered from the source node to the destination node. In spatial reusability of wireless signals fade during propagation, two links are free of interference if they are far away enough, and thus can transmit at the same time on the same channel. To the best of our knowledge, most of the existing routing protocols do not take spatial reusability of the wireless communication. We consider spatial reusability of wireless sensor network routing using spatial reusability of by single path routing and any path routing media into account.Routing protocols are generally implemented based on transmission cost minimizing routing metrics, they cannot guarantee maximum end-to-end throughput when spatial reusability need to be considered. They need centralized control to realize MAC-layer scheduling, and to eliminate transmission contention. The algorithms proposed in this work do not require any scheduling, and the SASR algorithms can be implemented in a distributed manner.Our approach can be extended to adapt to multiple transmission rates, as long as the conflict graph of links can be calculated.Proposed system motivate to simply select the (any) path that minimizes the overall transmission counts or transmission time for delivering a packet.

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Vol. 4, Issue 12, December 2016

II. LITERATURE SURVEY

PAPER NAME, AUTHOR AND JOURNAL NAME	ALGORITHM/ METHODS/ TECHNIQUES	ADVANTAGES/ DISADVANTAGES	REFERRED POINT
“A Multi-Radio Unification Protocol for IEEE 802.11Wireless Networks”, AtulAdya, ParamvirBahl, JitendraPadhye, Alec Wolman, Lidong Zhou Microsoft Research, Proc. 1st Int. Conf. Broadband Netw.,2004, pp. 344–354.	1)Striping algorithm 2)Round Robin Algorithm	**Adv:** Multiple radios is to assign a flow to a particular channel based on the load across all channels and to maintain this assignment for the duration of the flow. **Dis:** If a wireless node chooses a channel that is orthogonal to the channel chosen by its neighbors, then these neighboring nodes are not able to communicate with each other.	1)Mesh Topology 2) MAC protocols
“Highly dynamic destination sequenced distance-vector routing (DSDV) for mobile computers,” C. E. Perkins and P. Bhagwat, Proc. 4th Annu. ACM/IEEE Int. Conf. Mobile Comput. Netw., 1998, pp. 85–97.	1) shortest-path algorithm 2) Distributed Bellman-Ford (DBF) algorithm 3) dist ante-vector routing algorithm	The problems arising with large populations of mobile hosts, which can cause route updates to be received in an order delaying the best metrics until after poorer metric routes are received, we have separated the route tables into two distinct structures.	1)Ad-hoc networks 2)Mac layer
“A performance comparison of multi-hop wireless ad hoc network routing protocols,” J. Broch, D. A. Maltz, D. B. Johnson, Y.-C. Hu, and J. G. Jetcheva, In Proc. 4th Annu. ACM/IEEE Int. Conf. Mobile Comput. Netw., 1998, pp. 85–97.	1)Temporally Ordered Routing Algorithm	**Adv:**The key advantage of DSDV over traditional distance vector protocols is that it guarantees loop-freedom. **Dis:** These missing pieces greatly simplify the problem faced by the routing protocol, as propagation delay, capture effects, MAC-layer collisions, and the effects of congestion due to large packet sizes are unaccounted for. Furthermore, broadcast and unicast packets were delivered with the same probability, and, as noted in this is not a	1)Wireless network 2)Ad-hoc network 3)OSI Model

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		realistic assumption.	
“Trading structure for randomness in wireless opportunistic routing,” S. Chachulski, M. Jennings, S. Katti, and D. Katabi, in Proc. SIGCOMM Conf. Appl., Technol., Archit. Protocols Comput. Commun., 2007, pp. 169–180.	1) Computing the number of transmissions each node makes to deliver a packet from source to destination, zi’s 2) Dijkstra’s shortest path algorithm	**Adv:** Field tests on a 20-node wireless testbedshow that MORE provides both unicast and multicast traffic with significantly higher throughput than both traditional routing and prior work on opportunistic routing. **Dis:**Can’tforwording maximum packet this system.	1)Network Coding 2)Wireless Networks
“Routing in multi-radio, multihop wireless mesh networks,” R. Draves, J. Padhye, and B. Zill, in Proc. 10th Annu. Int. Conf. Mobile Comput. Netw., 2004, pp. 114–128.	1) shortestpath algorithm	**Adv:** First, higher layersoftware runs unmodified over the ad-hoc network. Second, the ad-hoc routing runs over heterogeneous link layers. Third, while we have currently implemented only the LQSR protocol in the MCL framework, the design, in principle, can support any ad-hoc routing protocol.	1)Mesh network 2) Expected Transmission Time (ETT) 3) Weighted Cumulative ETT

III .SASR AND SAAR ALGORITHM

In An ad hoc network wireless sensor nodes dynamically forming a network without the use of any existing network infrastructure administration. Which limit transmission range of wireless network devices, multiple networks "hops" may be needed for one node to exchange data with another across the network. So existing work proposed, a variety of new routing protocols targeted specifically at this environment have been developed, but little performance information on each protocol and no realistic performance comparison between them is available.In existing system there are some drawback.If a wireless node chooses a channel that is orthogonal to the channel chosen by its neighbors, then these neighboring nodes are not ableto communicate with each other [1].Broadcast and unicast packets were delivered with the same probability, and, as noted in this is not a realistic assumption [3].Can’t forwarding maximum packet this system.[4]’.Energy consumption was bigger challenge to wireless sensor network.In multi hop communication secure data transmission with less cost is ignored.Existing infrastructure is expensive or inconvenient to use, wireless mobile users may still be able to communicate through the formation of an ad hoc network. Although a large number of routing protocols have been implemented to find the path with minimum transmission time for sending a single packet, such transmission time reduces protocols cannot be guaranteed to achieve high end-to-end throughput.
In spatial reusability aware routing Scheme novel approach is defined with the spectrum spatial reusability in single path routing and any path routing. Propose algorithm for participating node selection, cost calculation, and forwarding list determination, increasing throughput.Spatial reusability-aware single-path routes and any path routing protocols consider the both condition to achieve high end to end throughput and to find the path with least transmission time. There are two types of spatial reusability routing protocols. Spatial aware single path routing Protocol (SASR) and Spatial aware any path routing (SAAR) Protocol .SASR Protocol is divided into two type.

1. SASR-MIN 2. SAAR-FF

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SASR-MIN- It is approximation algorithm for finding the path delivery time minimizing Collection of non-interfering sets.
SASR-FF- It is for achieving good performance in most of the cases.
SAAR Algorithm which restricts the packets to be forwarded through a predetermined path from the source to the destination. Any path routing enables any intermediate nodewho overhears the packet to participate in Packet forwarding.

For transmitting message at every node, there will be chances of information hacking. So we can provide our Contribution in security format. We can use encryption decryption at every node. For that we use AES algorithm Forcryptography.

Advantages of SASR and SAAR

1. Reduced energy consumption in WSN.
2. Secure node to node communication.
3. Reduce packet drop attack with trust based active source routing.

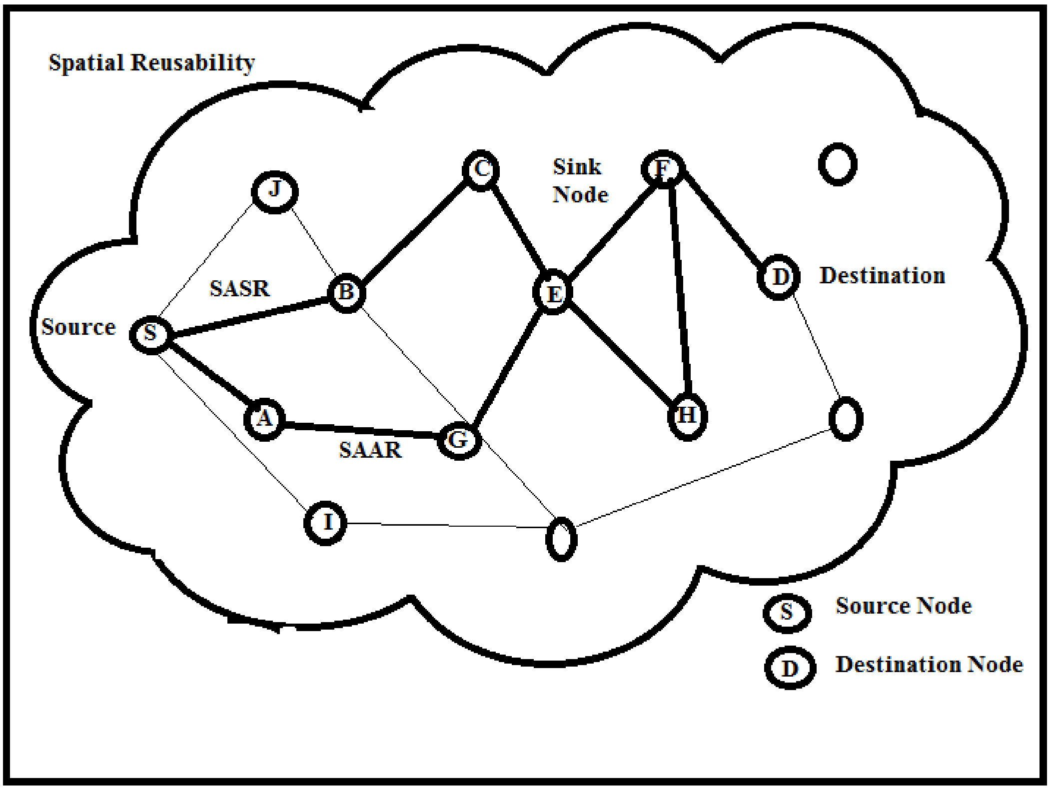

Fig .1 SASR AND SAAR ALGORITHM

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1. SASR-Min Algorithm:
This algorithm used for finding minimal path.
C=Path delivery time
Q=Covered link
M^*= Maximal non-interfering sets
I=non-interfering sets
P=Path
1. C←0
Initially cost mean delivery time is zero.
2. Q← ϕ
Covered Set initially empty
3. whileQ≠P
In this Step loop for Q is not equal to select path then it executed. Enter in loop .
4. for each I∊M^*do
In above step for loop executed up to Iis an element of set M^*.
5. I←I \ Q
In that Store link in I when set that contains all those link of I that are not in Q.
6.if I ≠ ϕ&&c(I) / |I|< Threshold then
In that if I is not equals to Empty and also we check value of cost of I up to threshold i.e. particular link.
7. ∝←c(I) / |I|
Store the value of cost in ∝.
8. Temp ←I
And also non-interfering link are stored in Temp Variable.
In that continuously execute the loop up covered all links are possible.
9. End //End if loop
10. End //End for each loop
11. C← C+ c(Temp)
Store total cost in C.
12. I←I∪ {Temp}
Store the non-interfering link in I .
13. Q ← Q ∪ {Temp}
Stored covered link in Q
14. End // End while loop

2. SASR-FF Algorithm
This algorithm used for minimal cost of path selection from set of paths.
P=Path
C=cost of path
I= non-interfering sets
1. Sort the links in P by cost in non-increasing order L
2. Initially we give one variable
K ←0
3. Cost of path initially zero and I is empty
C ←0; I← ∅

4. Execute the for loop for all links are sorted in L and (i, j) are the values are particular node
Foreach(I, j) ∊L do
5. fused← FALSE;
In this step fused is false then go to for loop
6. forl ← 1 to k do
In this step variable l is equals to one up to k
7. reusable←TRUE;

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If route will be reusable then it assign to TRUE
8. foreach $(i',j') \in I_l$ do
9. If $[(i, j), (i',j')] \in E$ then
10.reusable←FALSE;
If route is not reusable then assign to FALSE i.e. if node not sending more packet for different route .
11. break**;**
12.end// end if loop
13.end// end foreach loop
14.if reusable then
If reusable is TRUE
Then find max cost of path add to non-interfering set
15.$I_l \leftarrow I_l \cup \{(i, j)\}$; $c_l \leftarrow \max\{(i',j')\}$;
16. fused← TRUE;
17.end
18.end
19. if not fusedthen
20. k← k+1
21. $I \leftarrow I \cup \{\{(i, j)\}\}$; $c_k \leftarrow t_{ij}$
22.end
23. end
24. forl ← 1 to k do
25. $C \leftarrow C + c_l$
26.end
27. returnC and I

3.Algorithm- SAAR
Input- A network graph G= (N, E), a source node Src, a destination node Dst.
Output- A set of participating nodes Q, and the corresponding profile of cost C and forwarder lists F.
1.foreachi∈ Ndo
2.$C_i \leftarrow +\infty$ **;** $F_i \leftarrow \emptyset$**;** $\Omega(i, i) \leftarrow 1$
3.end // end foreach loop
4.$C_{Dst} \leftarrow 0$; q←Dst; $Q \leftarrow \{Dst\}$; $I \leftarrow \{\{Dst\}\}$;
5. whileq≠ Dstdo
6.foreach **(**i, q) ∈ E ∧i∉ Qdo
7.$F_i \leftarrow F_i \cup \{q\}$**;**$\Omega_i \leftarrow \Omega$
8.foreachj ∈ Q do
9.$\Omega_i(i,j) \leftarrow 0$
10.foreachk $\in F_i \wedge C_k < C_j$do
11.$\Omega_i(i,j) \leftarrow \Omega_i(i,j) + \omega_{ik} x\, \Omega_i(k,j)$;
12.end//end foreach loop
13.end//end foreach loop
14.$(C_i, I_i) \leftarrow$ CalculateCost (i, I,Ω_i, F);
15.end//end foreach loop
16. q←argmin(C_i); $Q \leftarrow Q \cup$**{**q**};** i∈N\Q
17.$\Omega \leftarrow \Omega_q$**;**I← I_q;
18. end //end while loop
19. return Q, C, and F;

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VI.CONCLUSION

Spatial reusability aware routing can efficiently improve the source to destination communication with high end throughput in multi-hop wireless networks, by carefully considering spatial reusability of the wireless communication media. This is done by the protocols, SASR and SAAR, for spatial reusability-aware single-path routing and any path routing, respectively. To contribute more for better energy efficiency system implement opportunistic routing to reduce energy consumption.

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