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"REVIEW ON""METRICS FOR PERFORMANCE EVALUATION OF ROUTING ALGORITHM"

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ABSTRACT: *Now a days uses of wireless sensor network has been increased but it has some limitations such as low battery power and memory, narrow channel, poor link quality and high packet loss rate. How to avoid noise and provide an efficient reliable data transmission is a challenge we are facing. Also wireless sensor networks could not balance the network load and also cannot achieve maximum the wireless link bandwidth. Also the challenge we are facing is how to precisely measure performance of routing algorithm when studying routing algorithm of network-on-chip (NoC). In this paper have to study the wireless sensor network and also presenting the routing matrices.*

Keywords: data transmission, network-on-chip, packet loss rate, wireless sensor network

1. INTRODUCTION

A wireless sensor network (WSN) is a wireless network consisting of spatially distributed autonomous devices using sensors to monitor physical or environmental conditions. A WSN system incorporates a gateway that provides wireless connectivity back to the wired world and distributed nodes. The wireless protocol you select depends on your application requirements. A number of security issues exist in WSN and need to be analyzed in detail in order to design appropriate security mechanisms and overcome security problems that arise in the sensor environment. However, designing new security protocols and mechanisms is constrained by the capabilities of the sensor nodes.

2. LITERATURE SURVEY

R. Draves et. al. [3] presents a new metric for routing in multi-radio, multihop wireless networks. We focus on wireless networks with stationary nodes, such as community wireless networks. Aim of author is metric to choose a high-throughput path between a source and a destination. Our metric assigns weights to individual links based on the Expected Transmission Time (ETT) of a packet over the link. The ETT is a function of the loss rate and the bandwidth of the link. The individual link weights are combined into a path metric called Weighted Cumulative ETT (WCETT) that explicitly accounts for the interference among links that use the same channel. The WCETT metric is incorporated into a routing protocol that we call Multi-Radio Link-Quality Source Routing.

A. Agarwal et. al. [4] suggests a routing protocol wherein the route selection is done on the bask of an intelligent residual lifetime assessment of the candidate routes. Schemes for performance enhancement with TCP and non-TCP traffic in Ad-hoc networks am proposed. The protocol is backed by simulations in N that show excellent adaptation to increasing network mobility. Author also introduced new route cache management and power aware data transmission schemes.

S. Singh et. al. [6] developed Geographic Random Forwarding (GeRaF) for Adhoc and sensor networks. It considers a novel forwarding technique based on geographical location of sensor nodes and random selection of relying nodes via contention among receivers. A unique collision avoidance scheme is proposed and analyzed with respect to latency and energy performance. It is found that these parameters are better for smaller node density. But selection of realistic channels is required for accurate results.

D. Kim et. al. [7] provides a greedy localized routing for maximizing probability of packet delivery in wireless adhoc networks with a realistic physical layer. The localized routing minimizes energy and communication cost required to build and manage the global topological information. This protocol concentrates on hop-by-hop fixed packet delivery, but it is unable to handle variable length packets with end-to-end routing.

Y. Yang et. al. [8] developed a reliable reactive routing enhancement (R3E) to increase reliability and energy efficiency in packet delivery process links in unreliable links. This protocol is designed with biased back-backup scheme for route discovery that can find better paths with large co-operative forwarding opportunities. This path facilitates the packets to transmit towards the destination without requirement of location information, but comparatively it requires more energy cost towards co-operative forwarding.

3. ROUTING METRICS

The existing routing metrics are classified into six categories based on their operation. Topology based, Hop count, Signal strength based, Active probing based, Mobility aware and Energy aware metrics. [4]

3.1. Topology Based

In this technique the topological information of the network will be considered i,e. the number of neighbors of each node, number of hops and/or paths towards a particular destination. The metrics always consider connectivity information which is available locally by the routing protocol, without requiring additional passive or active measurements. The topology-based metrics do not take into account several variables that have an impact on both the network and application performance, such as the transmit rates of the links are popular due to their simplicity.[11]

3.2 Hop count

In this metric, every link counts as one equal unit independent of the quality or other characteristics of the link and very simple technique. The ease of implementation has made hop count the most widely used metric in wired networks and it is the default metric in many wireless sensor networks routing protocols, such as OLSR [8], DSR [9], DSDV [10] and AODV [11]. Fewer hops on the data path produce smaller delay, whether these involve network links or buffers or computational power. The implicit assumption is the existence of error-free links. On the contrary, links in wireless sensor networks cannot be assumed error-free.

3.3. Signal Strength Based Metrics

Signal strength metric has been used as link quality metrics in several routing protocols for wireless sensor networks. The signal strength can be viewed as a good indicator for measuring link quality since a packet can be transferred successfully when the signal strength is more than the threshold value.

3.4. Active Probing Based Metrics

To overcome the drawbacks of topology based metrics various authors have proposed active probing metrics to carry out active measurements and use probe packets to directly estimate those probabilities. Probing. Technique had various challenges such as packet sizes of probes in the network should be equal to the data so that what probes measure is as close to the target as possible and probe packets should not give any priority in the network. The probing based metrics have proved promising in the context of wireless sensor networks. They measure directly the quantity of interest, rather than inferring it from indirect measurements, and do not rely on analytical assumptions. Per-hop Round Trip Time (RTT) The per-hop Round-Trip Time (RTT) metric is based on the bidirectional delay on a link [12]. In order to measure the RTT, a probe packet is sent periodically to each neighboring node with time stamp. Then each neighbor node returns the probe immediately. This probe response enables the sending node to calculate the RTT value. The path RTT metric is the summation of all links RTT in the route. The RTT metric is dependent on the network traffic. Since it comprises queuing, channel contention, as well as 802.11 MAC retransmission delays. Per-hop packet pair delay (PktPair) This delay technique is designed to overcome the problem of distortion of RTT measurements due to queuing delays and it consists periodic transmission of two probe packets with different sizes back-to-back from each node. The neighbor node calculates the inter-probe arrival delay and reports it back to the sender. This metric is less susceptible to self-interference than the RTT metric, but it is not completely immune, as probe packets in multi-hop scenario contend for the wireless channel with data packets. Both the RTT and PktPair metrics measure delay directly, hence they are load-dependent and prone to the self-interference phenomenon. Moreover, the measurement overhead they introduce is O(n2), where n is the number of nodes.

3.5 Mobility aware

It emphasize on more stable path rather than shortest path all the time and it reduces the probability of link breakage the rate of broadcasting of messages. This metric will also minimize the overhead of broadcasting messages. It has the adaptivness in topological changes.[14] This can be very efficient at the time of sending the large data where continuous connection among the source and destination is more preferable.

3.6 Energy aware

At the network layer, power efficient routing protocols are designed to select the best path such that the total energy consumed is minimized or the system lifetime is maximized. EAR makes use of different paths and tends to balance the load by optimizing the residual energy.

4. COMPARATIVE STUDY

Author/Title	Proposed Work	Drawback observed
C.J. Glass and L.M. Ni „„„The Turn Model for Adaptive Routing" [1]	proposes energy aware routing that uses sub optimal paths to achieve significant gains	Not always result in an efficient routing path.
C.E. Perkins and E.M. Royer . Ad hoc on-demand distance vector routing. In Proceedings [2]	called Expected Packet Advancement (EPA) per unit energy consumption	networks requires more analysis with respect to mobility constraints
M. Gerharz, C. de Waal, M. Frank, and P. Martini, ". Link stability in mobile wireless ad hoc networks"[5]	also improves time complexity and QoS metrics	Exhibits lower performance for delay sensitive applications.
Y. Yang, J. Wang, and R. Kravets ", Designing routing metrics for mesh networks	biased back-backup scheme for route discovery	It requires more energy cost towards co-operative forwarding.

5. CONCLUSION

From the above literature study it is clearly observed There are some critical problems in the new research field of normal sensor network as well as underwater acoustic sensor networks. The problems involve system lifetime and system throughput. In this paper have to study the wireless sensor network and also presenting the routing matrices.

6. REFERENCES

[1] Christopher J. Glass And Lionel M. NI, "The Turn Model for Adaptive Routing", ACM 00(J4-541 1/94/0900-0874, Journal of the Association for Computing Machinary, Vol. 41, NO. 5, September 1994.

[2] C.E. Perkins and E.M. Royer . Ad hoc on-demand distance vector routing. In Proceedings*",* of the 2nd IEEE Workshop on Mobile Computing Systems and Applications, pp. 90–100, New Orleans, LA, February 1999.

[3] Richard Draves, Jitendra Padhye, Brian Zill, "Routing in Multi-Radio, Multi-Hop Wireless Mesh Networks", ACM 1-58113-868-7/04/0009, MobiCom‟‟04, Sept. 26-Oct. 1, 2004.

[4] Sulobh Agorcvol, Ashish Ahujo, Jorinder Pol Singh anti Rojeev Shore, "Route-Lifetime Assessment Based Routing (RABR) Protocol for Mobile Ad-Hoc Networks", IEEE, 0-7803-6283-7/00/$10.00, 2000.

[5] M. Gerharz, C. de Waal, M. Frank, and P. Martini, "Link stability in mobile wireless ad hoc networks", Proceedings of the 27th Annual IEEE Conference on Local Computer Network, November 2002.

[6] S. Singh , M. Woo, and C. Raghavendra, *"*Power-aware routing in mobile ad hoc net-works*",* In The Fourth Annual ACM/IEEE International Conference on Mobile Computing and Networking, pp. 181–190, 1998.

[7] N Minghua Tang, Xiaola Lin, and Maurizio Palesi, "Routing Pressure: A Channel-Related and Traffic-Aware Metric of Routing Algorithm", IEEE Transactions On Parallel And Distributed Systems, VOL. 26, NO. 3 MARCH 2015.

[8] M. Gruteser, G. Schelle, A. Jain, R. Han, and Grunwald , Privacy-aware location sensor networks 2003

[9] D. Johnson and D. Maltz,. "Dynamic source routing in ad hoc wireless networks".

T. Imielinski and H. Korth, editors, Mobile Computing, Dordrecht, The Netherlands, 1996.
[10] Khalaf Mustafa Bani, Ahmed Y. Al-Dubai and Abed Mourad, “New Velocity Aware Probabilistic Route Discovery Schemes for Mobile Ad hoc Networks”, IEEE, 2012.
[11] P. Jaquet, T. Clausen, “Optimized Link State protocol for minimization of delay”, International Journal of Digital Content Technology and its application, vol. 4, pp. 101-109, 2010.
[12] Tran Anh Tai, Myung Kyun Kim , “A real-time communication protocol considering load balancing in Adhoc Network”, IEEE, 2013.
[13] Mohd. Ayash, Mohd. Mikki, Kangbin Yim, “ Improved Aodv Routing Protocol to Cope with High Overhead in High Mobililty MANETs”, Sixth Int. Conference on Innovative Mobile and Internet Services in Ubiquitous Computing, 2012.
[14] Y.Hassan, M. Abd El-Aziz, and A. Abd El-Radi, “Performance evaluation of mobility speed over MANET routing protocols”, International Journal of Network Security, Vol. 11, No.3, November 2010.
[15] A.Mohammad, M.ould-khaoua, L.Mackenzie, abdulai, “Dynamic probabilistic counter based routing in mobile adhoc network”, 2nd international conference on Adaptive Science Technology, Jan 2009.
[16] M. uddin, Abdul Rahman, A. Alarifi, Mohd. Talha, A. Shah, Mohsin Iftikhar and A. Zomaya, “Improving performance of Mobile adhoc networks using efficient Tactical on demand distance vector (TAODV) routing algorithm”, international journal of innovation and control, vol.8, June 2012.
[17] Ali Khosrozadeh,Abolfazl Akbari,Maryam Bagheri and Neda Beikmahdavi, "NEW AODV Routing Protocol With Break Avoidance", IEEE, International Symposium on Computer Science and Society, 2011.

[18] DEAR: A Device and Energy Aware Routing protocol for heterogeneous ad hoc networks $ Arun Avudainayagam, Wenjing Lou, and Yuguang Fang Department of Electrical and Computer Engineering, University of Florida, Gainesville, FL 32611, USA Received 17 October 2002; accepted 21 October 2002