# RELIABLE DATA DELIVERY IN LOW-POWER AND LOSSY NETWORKS USING TRUST BASED LINK SELECTION

**Ms. Archana Chemate, Prof. S. P. Pingat**

*Abstract*— **Wireless sensor network (WSN) makes important role in day to day applications. AWSN has critical applications like remote natural observing & goal tracking. The Internet Engineering Task Force (IETF) immediately perceived the need to structure a new Working Group to standardize an Ipv6-based directing answer for IP strong article networks, which prompted the arrangement of another Working Group called ROLL (Routing over Low power and Lossy ) networks. Then we proposed another technique to expand the dependability of network. For this we searched out bad links where packets are lost. Such links will be extracting from network & will find all substitute paths. At the same time collection will be select for given estimation of the links. Thus we create reliable communication of network.**

*Index Terms*— **Wireless Sensor Networks (WSN); Routing Over Low power and Lossy (ROLL); Internet Engineering Task Force (IETF); Ipv6; Reliable communication**

## I. INTRODUCTION

Wireless sensor network (WSN) is the network for the physical situation with the digital world. WSNs were made with the formation and advances of cheap, low power, multifunctional sensor nodes. WSNs are consumed as a part of diverse modern, military, home monitoring and ecological monitoring applications and give several benefits. The IETF received the new working group to standardized an Ipv6-based routing answer for IP smart object networks, which planning to another planning group called ROLL (Routing Over Low Power & Lossy) network. The ROLL working group conducted enquiry of the routing applications like urban network including brilliant lattice, current mechanization, and home and building computerization. The main goal of WG was to outline a routing protocol for LLNs, supporting a mixed bag of link layers, qualities of bandwidth, Lossy & low power. So the routing protocol is used to evaluation on the link layer, which could be wireless like IEEE 802.15.4, IEEE 802.15.4g, (low power) Wi-Fi or power line communication (PLC) exploiting IEEE 802.15.4, for example, IEEE P1901.2.

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**Link Estimation**

RPL usage combines a library of link monitoring procedure. Our library incorporates a detached monitoring plan that cleverly misuses data packets sent by neighbors as test packets. Sometimes, parcel catching may prompt incorrect link-quality evaluations in light of the fact that:

1. It is by and large intertwined for asset compelled gadgets to process all overhead traffic;
2. Most MAC protocols for LLNs don't support retransmission arrangement.
3. Packet losses happen on the overhead link from the monitoring node & neighborhood bundle.

Solve the packet loss rates by numbering the quantity of first time retransmission. To address the data driven link monitoring library can help dynamic examining over estimation windows.

The RPL controller misuses library to help a hybrid link monitoring system that chooses one of the estimation plans (detached, catching, & dynamic) based on the node status & attributes.RPL node can be one of the below three states:

1) Not joined if the RPL neighbor table is invalid;
2) Joining if the node is assembly link measurements however it is not related to a DODAG;
3) Joined if the node is associated to a DODAG.

Administration of Neighbor Tables

In a dense network a node may have few neighbors and several low quality links. Administration approaches are necessary to choose whether to measurement to recent nodes. A measure issues for the especially verifiable data to improve substitution choices. In this manner, to each time a node is reinserted, it needs to be reexamined. This could be a safe method in very dynamic networks.

Reliability-Aware Topology Construction

For routing security, the hysteresis instruments are used as portrayed. The normal number of physical retransmission, which is measured through the ETX metric does not so much states to a right measure of the routing consistency for monitoring applications. Packet loss rates measured at the MAC layer can be altogether not quite the same as the ones saw at the IP level or application layer.

Depending on the loss designs. Data transporting reliability can be improved by routing data traffic "around"



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links that are IP level packet losses. This is done by the RPL neighbor table that encounters an IP level packet loss rate more significant than a threshold, called as max loss. To maintain a strategic distance from this, a node starts the pruning process just when the RPL neighbor table contains no fewer than two neighbors with great link qualities.

## II. RELATED WORK

The IETF has arranged the general low-power and Lossy networks by following attributes:

1) LLNs are the networks, which have several wireless inserted gadgets, which are having controlled battery, memory, and handling power.
2) LLNs make consumption of distinctive low-power innovations for message, power line communication. These are influenced by the network.
3) In LLNs, the prevalent traffic examples are more successive, i.e. Multipoint-to point; while the unicast and point-to-multipoint are less frequent.

RPL is a gradient-based routing that makes a Destination Oriented (DO) DAG recognized at a data power or sink node. The gradient is called rank, and it is in extensive way a representation of the node to diverse nodes concerning the DODAG root. A routing Target Function (OF) describes how RPL nodes figure their rank abilities and select their guardians. A couple of demands are recognized in RPL. The essential problem in RPL is the approach that is used to gather link insights. On account of the Trickle calculation, DIO messages are not discontinuous. the exchange between the little data structures that are used for keeping up neighborhood data at diverse layers of the protocol stack, which may provoke RPL using clashing or out of date link data. Packet catching may provoke wrong link-quality gauges in light of the way that:

1) It is generally fixed for resource-obliged gadgets to process all overhead traffic;
2) Most MAC protocols for LLNs don't support retransmission succession numbers, yet they use a one-bit flag to perceive starting transmissions and retransmissions.
3) Packet incidents happen on the overhead link and not on the link from the monitoring node and its neighbor that has sent the overhead packet.

A thick network a hub may have several extraordinary neighbors and many individuals' low-quality links to diverse nodes, neighborhood administration approaches are principal to pick whether to keep up bits of knowledge to newly discovered nodes. Lundgren et al. coin the expression "gray zones" to indicate to links that convey routing protocol data yet not data traffic. They propose link handshaking and counting course telecast to channel out gray zone links. Johnson depicts how to preemptively issue DSR course demands, based on link SNR values. Yarvis et al. watch that hop-count performs ineffectively as a routing metric for a sensor network. Awerbuch et al. [2] present a metric to help discover high through put paths when diverse links can run at distinctive bit-rates.

## III. PROPOSED SYSTEM

Problem Definition-

To find the packet loss link in the low power and lossy network in the presence of IETF routing.

B. System Overview-

Network creation

In network creation module we are creating the low power and lossy network in that we are detecting packet loss rate in the network & related bad links for the packet loss.

Neighbors discovery and link selection

In this model we are searching the neighbor of each model then we selecting shortest link for communication as there are many path available from source to destination. And here communication is done only from shorted link.

Packet loss detection

In this model we are detecting the packet loss rate of link & also the throughput. As the packet loss rate is high for the link and throughput is low then remove link from the network.

Trust based link selection

In this model we got the packet loss in the model as bad link is detected & it is removed from the network, and then select the new link based on maximum trust for further communication.

C. System Architecture-

We proposed a method to increase the reliability of the network. For that we are finding bad links where packets are lost. Such link will be removed from the network and will find all the alternate paths. That blink will be selected on the basis of trust values of the links.


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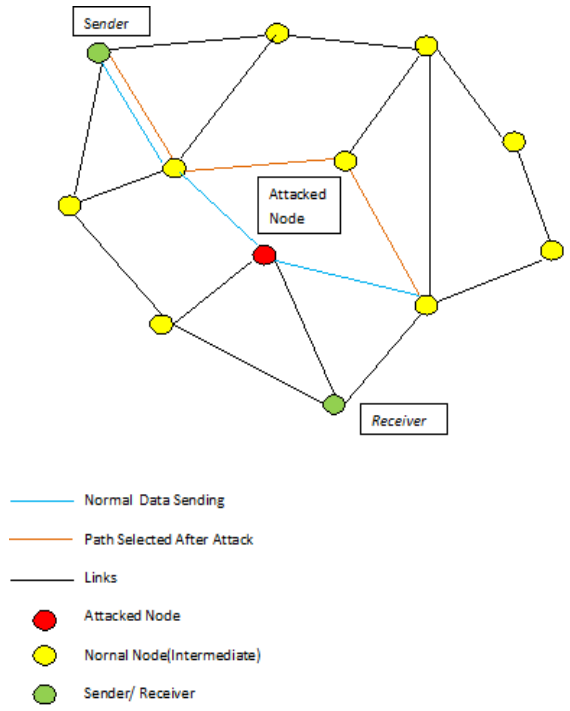


Fig.1: System Architecture

Input: Network Graph and Packets

Output: Packet loss Detected and Throughput enhancement

## IV. Experimental Setup

The system is built using Java framework (version JDK 8) on Windows platform. The NetBeans (version 8) is used as a development tool. The system doesn't require any specific hardware to run; any standard machine is capable of running the application. The additional non functional requirement is the network should be connected while transmitting the packets.

## V. RESULT & DISCUSSION

The following figure shows the average packet lost & no of packets sends with IETF routing with lossy network. Our method gives low packet loss rate & maximizing the throughput to the network.

Packet Loss rate =((No of Packet transmitted successfully)) /((Total N oof Packets))

In results we show the expected results from the proposed system. The limitations of the existing system are the routing protocol has high packet loss rate. Our proposed system evaluates the minimum packet loss rate than the IETF routing.

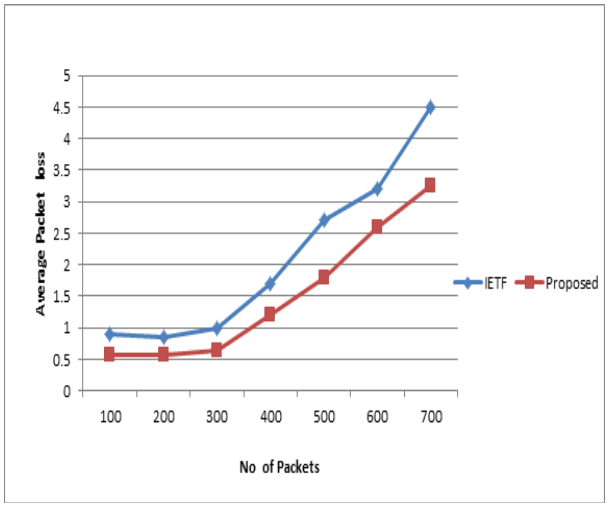


Fig.2: Average Packet Loss Graph

Packet rate is defined as the number of packet rate is transmitted successfully. Also throughput is depending on the maximum packet rate. Throughput is the most important factor for evaluating the system has more throughput system gives high performance & successful transmission of data.

## VI. Conclusion

The RPL meets high packet disaster rate. Packet incidents not on a very basic level increase way length. It simply surveys the links that are at this moments being used. This new frame work allows a RPL node too adequately to individual links. The proposed RPL execution achieves update of packet delivery rate. This study is a dare to perceiving how to upgrade course discloser in RPL network.

## Appendix

Appendixes, if needed, appear before the acknowledgment.

## Acknowledgment

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## REFERENCES

[1] Woo, T. Tong, and D. Culler, "Taming the underlying challenges of Reliable multichip routing in sensor networks," in Proc. ACM Conf. Embedded Netw. Sens. Syst. (ACM SenSyns-03), 2003, pp. 14-27.

[2] D. S. J. De Couto, D. Aguayo, J. Bicket, and R. Morris, "A high throughput Pathmetric for multi-hop wireless routing," in Proc. ACM Int. Conf. Mobile Comput. Netw. (ACM Modicum? 03), 2003, pp. 134-146.

[3] E. Ancillotti, R. Bruno, and M. Conti, "Reliable Data DeliveryWith The IETF Routing Protocol for Low-Power and Lossy Networks", IEEE Transactions on Industrial Informatics, Vol. 10, No. 3, August 2014.



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[4] E. Ancillotti, R. Bruno, and M. Conti, "The role of the RPL routing Protocol in smartgrid communications", IEEE Comm. Mag., vol. 51, no. 1, pp. 75-83, Jan. 2013.

[5] G. Anastasi, M. Conti, and M. Di Francesco, "A comprehensive analysis Of the MAC unreliability problem in IEEE 802.15.4 wireless sensor Networks," IEEE Trans. Ind. Informat. vol. 7, no. 1, pp. 52-65, Feb. 2011.

[6] G. E. Moore, "Moore's Law or How Overall Processing Power for Computers will Double Every Two Year", 1970. Accessed on 13th Dec, 2014,http://www.mooreslaw.org/

[7] G. Moritz, F. Golatowski, C. Lerche, and D. Timmermann, "Beyond 6LowPAN: Web Services in Wireless Sensor Networks," IEEE Trans. Ind. Informat. vol. 9, no.4, pp. 1551-3203, Nov. 2013.

[8] H. Zhang, A. Arora, and P. Sinha, "Link estimation and routing in sensor Network backbones: Beacon-based or data-driven" IEEE Trans. Mobile Comput. vol. 8, no.5, pp. 653?-667, May 2009.

[9] I. Demirkol, C. Ersoy, and F. Alagoz, "MAC protocols for wireless sensor Networks: A survey," IEEE Commun. Mag., vol. 44, no. 4, pp. 115-121, Apr. 2006.

[10] J. Hui and P. Thubert, "Compression Format for IPv6 Datagrams over IEEE 802.15.4-Based Networks", IETF RFC 6282, Sep. 2011.

[11] J. KO Et Al., "ContikiRPL and TinyRPL: Happy together," in Proc. Workshop Extend. Int. Low power and LossyNetw. (IP+SN-11), Chicago, IL, USA, Apr. 2011, pp. 16.

[12] K.-H. Kim and K. Shin, "On accurate and asymmetry-aware measurement Of link quality in wireless mesh networks," IEEE/ACM Trans. Netw. vol. 17, no. 4, pp. 1172-1185, Aug. 2009.



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