"OPTIMIZING THE DATA TRANSMISSION BETWEEN MULTIPLE NODES DURING LINK FAILURE IN WIRELESS NETWORK"

Santosh S.Chinchali [1], Vasudha V.Ayyannavar[2]

[1]*Department of Computer Science and engineering, Basaveshwar College Of Engineering,Bagalkot / Visvesvaraya Technological University,Belagum*

[2]*Department of Computer Science and engineering, Basaveshwar College Of Engineering,Bagalkot / Visvesvaraya Technological University,Belagum*

Abstract

The nodes in wireless network are mobile resulting in dynamic topology with high rate of link breakage and network partitions leading to interruptions in the ongoing communication in contrast to wired network. In the networks the link failure may be occurred due to a loss of energy in nodes, congestion, and power loss in nodes. Routing techniques help in path establishment for transmission. The existing routing protocols suffer from overhead causing energy loss which may be further aggravated by link failures. Different techniques can be used to prevent one path failure and this system uses multipath routing to overcome this issue. In this technique the system uses network coding protection for both single and multiple link failures. The system states that in connection each node receives a multiple copies of same data, first copy from the primary path and second copy from secondary path. In order to improve the performance, data is to be transmitted through the secondary path is compressed using Huffman coding in order to save the energy consumption. And encoding mechanism is used for providing security for the data transmitted between source to destination. This will ensure the recovery of data in failure of working path.

----------***----------

1. INTRODUCTION

Wireless network works in the situations where certain number of nodes comes together within the transmission range of each other and they can be able to communicate. Wireless network topology frequently changes and nodes will be having limited power. Because of this the routing is challenging issue in wireless network.

Most of the energy related study has been done at routing layer to reduce energy consumption in transmission. And few have explored the idea to reduce the energy consumption due to routing overheads, which requires the cross layer design approach. In the transmission of data if link failure occurs, the source node of that link has to wait for timeout interval. And also has to inform all the nodes using the same path by sending (Route Error) RERR packets, to find another route. So the transmission interrupts for a significant amount of time. In performing these activities amount of energy is consumed. So this survey gives an insight by studying the various routing techniques that the energy consumption is due to Routing overheads and link failures.

Transmission of data in the network during congestion will not ensure the end to end delivery. When huge number of users send the data to the destination by using same link, if the link fails due to congestion, then it is not possible to provide end to end delivery in short time. So by using an optimization technique for data transmission between the nodes will provide the guaranteed delivery to the destination during link failure.

The system should adopt the concept of backup paths and should transmit data through two paths such that the destination receives multiple copies of data. If the transmission line is withdrawn or corrupted, then the data received from the other path is used. This increases the packet delivery ratio and latency as number of retransmissions is substantially minimized.

Despite the innumerable applications of wireless networks, these networks have several limitations such as limited energy supply, limited computing power, and limited bandwidth of the wireless links connecting nodes. One of the main design goals of wireless network is to prolong the lifetime of the network and prevent connectivity degradation by employing aggressive energy management techniques. The design of routing protocols in wireless network is influenced by many challenging issues.

One of the challenging design issues in routing is energy consumption without losing accuracy. Nodes can use their limited amount of energy in computations and transmitting information in a wireless environment. So energy-conserving forms of communication and computation are essential. In a multihop wireless network, each node plays dual role as data sender and data router. The malfunctioning of some nodes due to power failure leads topological changes and might require rerouting, reorganization of the network and retransmitting the packets.

1.1 Motivation

Retransmission during link failure will be reduced by compression technique, in wireless network the route failures. The data can be recovered faster than any other existing technique. With the help of this technique the bandwidth utilized through the multiple or mirrored transmission is reduced. The technique will help to provide protection against multiple failures.

1.2 Problem Definition

Current system will get the NACK (Negative Acknowledgment) during link failure and retransmission will be done until the data has to be delivered to the end (destination) node. So this will be the time consuming and energy consumption task.

Proposed system overcomes the issues of existing system such that energy and time consumption will be reduced by sending the Data to the destination using disjoint path. Such a way that in first path sending uncompressed data .Where as in second path we are sending compressed data. So no need to retransmit the data so energy and time consumed will be less compare to retransmission. And System can compare the energy utilization between normal data and compressed data.

1.3 Proposed Model

In the event of compression and decompression even smaller data are to be padded with fixed length. So this will cause overhead in the transmission, hence it will cause inefficient transmission. Hence in order to solve the problems multipath based solution for multiple node (multi - hop) link stability. The technique can be adopted to both wireless and wired network where on demand routing scheme like DSDV and AODV are employed. The protocol is simulated in MATLAB. The technique is described as bellow.

This technique will compare the entropy of the received compressed data that is transmitted through one link and original data at the receiver as a measure of information change. And this technique is simulated with large number of session of multiple paths and node is labelled in arbitrary order, so that intruder is not able to get the path.

2. ALGORITHM

1) Source will send the Repeat request packet to all the neighboring nodes in the network. Each neighboring node forwards the same to its neighbors until the hop traverse will be less than six. This will reduce the further Route Request packet congestion.
2) Receiver responds to source with shortest delay. And this Delay is manipulated from Timestamp from source to destination transmission. Based on repeat request strategies. destination puts the packets in the queue, checks for node disjoins and forwards the route reply packet
3) Receiving node keep the packets in the queue .and check for the disjoint path to forward the route reply packet.
4) After receiving both primary and secondary routes, the source node starts the transmission. The source first saves the packets in the queue and then compresses the packets using Huffman coding.
5) While transmitting nodes are randomized so to make the header unpredictable.
6) The header is transmitted through the first path and the compressed data is send through the secondary path. Total packets to be decompressed with the current header are put in the header itself.
7) Destination node uncompressed the packets using the header.

3. METHODOLOGY

1) Node disjoint multipaths are used transmit data from source to destination
2) Encode the data with Huffman coding, transmit the uncompressed data through path1 and compressed data through path2.
3) Data is divided into multiple packets and each packet is assigned with a sequence number.
4) The destination checks the sequence numbers.
5) If sequence number in the packets coming from a path is missing then the node discards all previously acquired packets through that path.
6) Compressed data is uncompressed at the destination.
7) Comparing the energy utilization between compressed and actual data.

3.1 Compression of Data

This technique is used for ensuring lossless data compression. variable-length code table for encoding a source symbol (such as a character in a file) where the variable-length code table has been derived in a particular way based on the estimated probability of occurrence for each possible value of the source symbol.

3.2 Construction of a Tree

1)Specifying number leaves based on number values.
2)Based on probability leaf nodes are to specify as the head of the queue.
3) If there are two nodes in the queue: Then select two nodes with least weights. Then create new node by adding weights of these two nodes. Then place this node rear end of the queue.
4) All other nodes are the root node; the tree has now been generated.

4. RESULTS AND DISCUSSON

The graph shows the parallel transmission of the packets containing compressed and secured data and compression header with 20 nodes. Both the transmission can be performed parallel for increasing the speed of the technique and for improving the security.

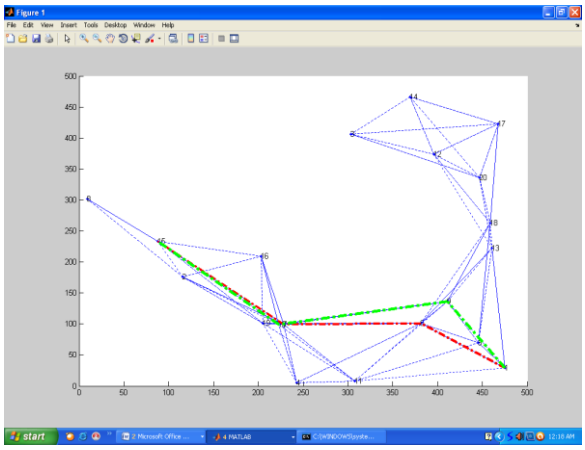

Fig 1: Parallel Transmission of the header and compressed data packets over 2 paths with 20 nodes

The performance of both shortest path based and spanning tree based routing approaches are simulated. But it is clearly deputed that network coding over multiple shortest path as in proposed system yields better result due to end to end homomorphic symmetric transmission.

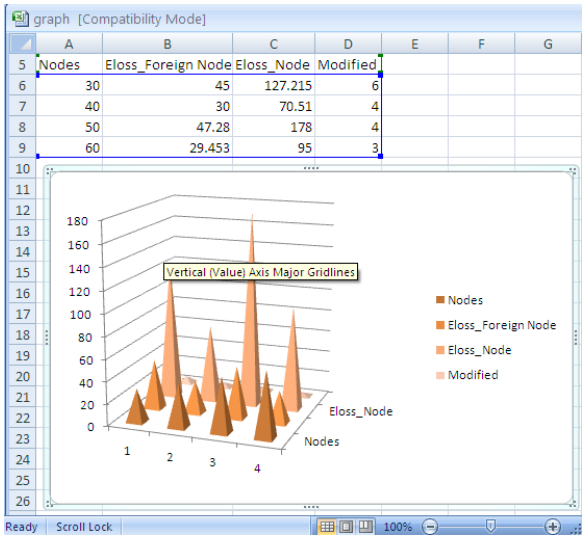

Fig 2: Above Graph shows the difference between existing and proposedSystem

5. CONCLUSIONS

Data transmission between multiple nodes in the wireless network is one where data from one node traverses or route, For example mobile ad-hoc network, wireless sensor network. Due to energy constraints of the node one of the important requirement for such network's arc to limit the data flow.

Energy and time consumption will be reduced by sending the Data to the destination using disjoint path. Such a way that in first path sending uncompressed data. where as in second path we are sending compressed data. So no need to retransmit the data so energy and time consumed will be less compare to retransmission. and it can compare the energy utilization between normal data and compressed data.

5.1 Scope for Further Research

The system can be improved by adopting split transmission where half data can transmitted through primary path as uncompressed data and the rest half can be compressed and transmitted through the secondary path.

REFERENCES

[1]. Ahmed E.Kamal, Aditya Ramamoorthy," Overlay Protection Against Link Failure Using Network Coding". This paper introduces network coding-based protection scheme against single-and multiple-link failures.IEEE/ACM transaction on networking ,vol.19.NO,4,Aug-2011.

[2]. J. Vygen, "NP-completeness of some edge- disjoint paths problems," *Discr. Appl. Math.*, vol. 46, 1995, pp. 83–90.

[3]. A. E. Kamal, "Network protection for mesh networks: Network coding-based protection using p-cycles," *IEEE/ACM Trans. Netw.*, vol. 18, no. 1, Feb. 2010, pp. 67–80.

[4]. A. E. Kamal, "Protection in optical mesh networks using network coding on p-cycles," in *Proc. IEEE GLOBECOM*, 2006, pp. 1–6.

[5]. W. He, M. Sridharan, and A. K. Somani, "Capacity optimization for surviving double-link failures in mesh-restorable optical networks," *Photon. Netw. Commun.*, vol. 9, Jan. 2005, pp. 99–111.

[6]. J. Zhang, K. Zhu, and B. Mukherjee, "Backup provisioning to remedy the effect of multiple link failures in WDM mesh networks," *IEEE J. Sel. Areas Commun.*, vol. 24, no. 8, Aug. 2006, pp. 57–67.

[7]. D. Schupke and R. Prinz, "Performance of path protection and rerouting for WDM networks subject to dual failures," in *Proc. OFC*, 2003, pp. 209–210.

[8]. W. D. Grover, *Mesh-based Survivable Networks: Options and Strategies for Optical, MPLS, SONET, and ATMNetworking*. Upper Saddle River, NJ: Prentice-Hall, 2004.

[9]. S. Li and A. Ramamurthy, "Protection against link errors and failures using network coding," *IEEE Trans. Commun.*, 2010

[10]. D. Zhou and S. Subramaniam, "Survivability in optical networks," *IEEE Netw.*, vol. 14, no. 6, Nov/Dec. 2000, pp. 16–23.