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Enhancing Bandwidth in Route Recovery – An Approach Based on Forward and Reverse Path Routing with Hop-Count

Ms.Apoorva P [1], Kumar Sharath.B.C [2], Manu Bhargav.M.R[3]

[1,2,3]*Department of Computer Science, Amrita Vishwa Vidyapeetham*
Mysuru Campus, Karnataka, India

***Abstract*— The wireless communication is cost effective nowadays, because fewer physical devices are used. The disadvantages of wireless link impact adhoc are Lower data rate, security, and medium access control is common problems in the wireless communications. One such problem with the wireless communication is primary path break down between source and destination, so once the failure occurs there should be some mechanism to handle this issue. It can be handled by discovering alternate path. Hop-count can be used as the path cost of networks. A path with minimal hop-count is preferred because it conserves network resource as well as the most convenient indicator of path delay.**

***Keywords*— Wireless Communication, Forward and Reverse path, Route Recovery, Node, Bandwidth, Hop Count.**

I. Introduction

Each device in a wireless communication moves on its own, and will therefore changes its path frequently. The primary task in building a wireless communication is equipping each node to continuously maintain the routing data required to properly route traffic. They may contain one or multiple and different transceivers between nodes. This gives opportunity for highly dynamic, autonomous topology. These autonomous nodes can communicate with each other if and only if they are in transmission range of each other.

II. Existing system

- The source node forwards the data packets to the destination node based on RREQ packets. These packets are flooded to the entire network.
- In case of route failure the recovery node will be selected from the neighboring nodes of node detecting failure by performing route discovery.
- In the mean time the neighboring node will send Stop Transmission till route recovery packet are send to source node through reverse path to control congestion.
- Once alternate path is selected a start transmission packet is sent to source to start transmission again and updates its cache by storing new route for transmission.

III. Proposed Methodology

We propose a routing protocol which will recover the route which provides multipath discovery and controlled traffic based on hop count. When the source wants to forward packets to the destination with **hop count** it broadcast the route request packets (RREQ) to whole network based on the given threshold. The RREQ propagation from source to destination establishes multiple reverse paths both at intermediate nodes and destination. The destination node upon receiving all RREQ packets attaches the route code consisting of route bandwidth and feedback Route Reply (RREP) packets. After receiving reply packets, the source node selects the primary route on the basis of route with higher bandwidth.

A. *Route Discovery with hop count:*

Step 1: Whenever packets need to be forwarded by the source node to the destination node the RREQ packets are flooded to entire network i.e. to the every node of the network. Since RREQ is flooded to the whole network based on hops, a node may get multiple copies of the RREQ. These duplicate copies can be used to generate alternate reverse path using the bandwidth. These are saved in Forward and reverse path tables in the form of tags.

Step 2: The reverse paths are formed only using the duplicate copies saved in forward and reverse path (saved in the form of tags).

Step 3: If the path information to the destination is present in the route cache ie in forward and reverse path (tags) of intermediate node, it has no permission to send Route Reply (RREP) back to the source , permission is given only to the destination node.

Step 4: The destination node on receiving all RREQ packets send a route code and sent it as RREP packet. On receiving the RREP packets the source selects the primary route on the basis higher bandwidth.

Step 5: If the primary route failure occurs the recovery node is selected from the neighboring nodes on the basis of next higher bandwidth.

Step 6: In case of failure of path alternative path is selected based on heart beat packets ie based on next higher bandwidth.

Step 7: The node around which is first to send the route reply packet from the destination to the node detecting failure is selected as recovery node.

B. *Route Discovery using Hop count(Via UDP)*

Whenever data packets are needed to be forwarded by the source node to the destination, ie the route request packets are sent to all the nodes in the network(flooding mechanism). This is done using hop count ie each and every node is given hops. It is used when destination is unknown or when the bandwidth is more. This is based on the given threshold. This in turn will disconnect when the hop exceeds the threshold. The destination upon receiving many RREQ packets from different paths, attaches route code and sent it as RREP packet. On receiving of RREP packets the source selects the primary route on the basis higher bandwidth.

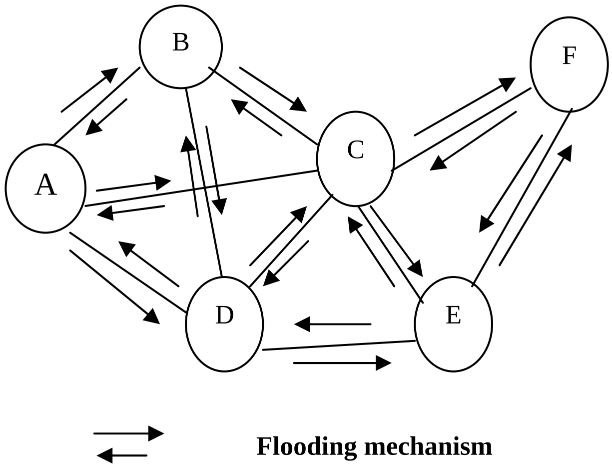

Fig 1: Flooding with Hop count

C. *Forward and Reverse paths Computation*

When RREQ is sent to all the nodes in the network, a single node may receive same RREQ from different nodes. These multiple copies are stored and used to form alternate reverse path. The reverse paths are formed only using those copies that preserve loop freedom (never form a route at a downstream node via upstream node) and disjointness (ensure the last hops and the next hops before destination are unique) among the resulting set paths to the source to destination S source

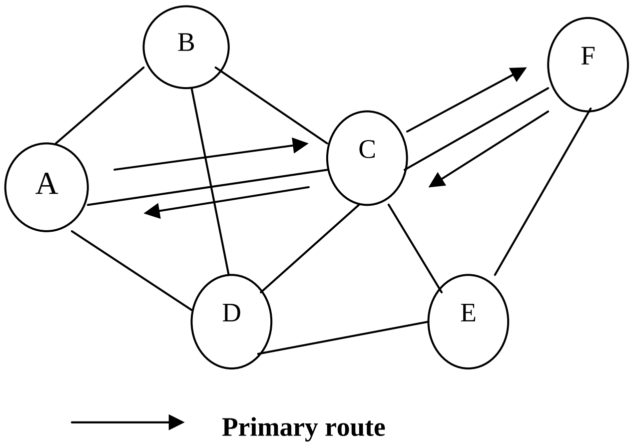

Fig 2: Setting forward and reverse path

D. *Data Transmission (Via TCP)*

The data transmission module is based on the most popular TCP protocol for its reliability. This module features packet-based data transmission where reliable in-order delivery of packets is required.

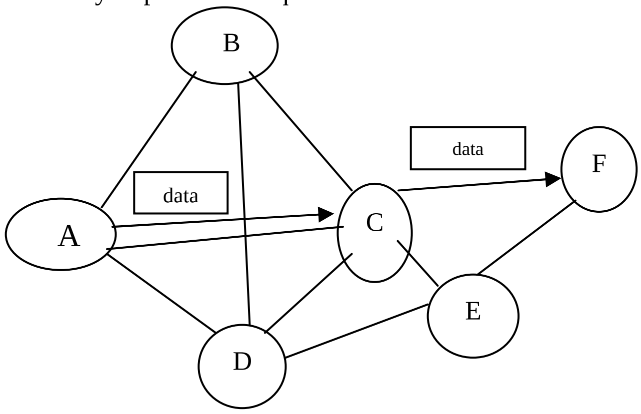

Fig 3: Data packet transmission

E. *Route Recovery (Via TCP)*

In case of route failure in primary route the recovery node is selected from the neighboring nodes of node detecting failure by performing route discovery from node detecting failure. Now the node detecting failure starts route discovery and the neighboring node which is sent first to the route reply packet from the destination to the node detecting failure is selected as recovery node

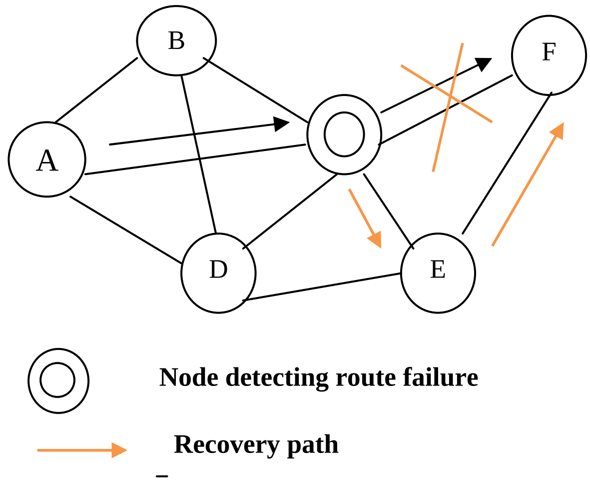

Fig 4: Alternate route recovery

F. *Heartbeat Transmission (Via TCP)*

In case of route failure in primary route the node detecting failure need not send Stop Transmission packet to source node but all nodes in the network will receive heart beat packet to each other to say that node is active. So when there is a route failure the node doesn't have to stop source but rather on basis of heart beat packets received it will send through that node .Therefore by this the source and destination doesn't have to wait and their won't be any time delay.

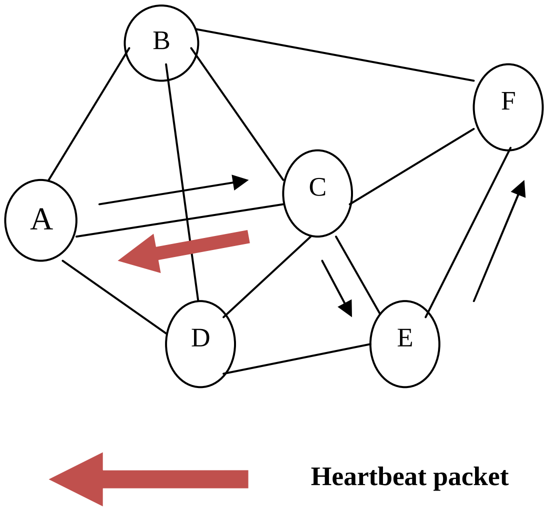

Fig 6: Data transmission with Heartbeat packet

IV. PERFORMANCE MEASURE:

In this paper the computation of forward and reverse path route provide the high performance. The reasons are:

- **Data packet delivery ratio:** Total number of delivered data packets divided by total number of data packets transmitted by all nodes. This performance will give us an idea of how well the protocol is performing in terms of packet delivery at different speeds using different traffic models.

- **Throughput or bandwidth (messages/second):** Total number of delivered data packets divided by the total duration of simulation time. We analyze the throughput of the protocol in terms of number of messages delivered per one second.

- **Average End-to-End delay (seconds):** The average time it takes a data packet to reach the destination. This is calculated by subtracting “time at which first packet was transmitted by source” from “time at which first data packet arrived to destination”. This includes all possible delays caused by buffering during route discovery latency, queuing at the interface queue, retransmission delays, propagation and transfer times.

- **Reduced traffic flow:** whenever source needs to forward a data packet, it floods the data packet to the next router. Usage of hop counter will reduce the flow in the traffic. This performance will give us an advantage of reduced load in the network.

V. CONCLUSION AND FUTURE WORK

In this paper we proposed a routing protocol which provides multiple path discoveries based on forward and reverse path, efficient utilization of bandwidth and controlled traffic load at the time of failure. The proposed protocol is efficient in overcoming the problem of stale routes in multipath routing protocols. Also proposed protocol shows significant improvement in packet delivery ratio, reduced end to end delay and usage of hop count will reduce the traffic flow. In future researchers can develop hybrid multipath routing protocols that will provide feature of fault tolerance at the time of failure of node, failure of link and breakage of route and also balance load at the time of large volume traffic and finally increase quality of service aspects of multi path routing protocols.

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