Routing Improvements in Wireless Mesh Networks by using ARS Technique  

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Abstract— In a multihop Wireless Mesh Network (WMNs) there is frequent link failure caused by various reasons as channel interference, Qos failure and spectrum failure. Because of these link failures the throughput of wireless mesh network severely decreases which is expensive and manual management is required. In this paper, we presented the reliable and optimal routing among the nodes to increases the performance of the through put in the networks. We tend to introduce an autonomous network reconfiguration system (ARS) technique scheme, during the monitoring period phase to monitor the quality of its outgoing links, and the basic operation involved in many link recovery algorithms. After this link monitoring, the failure links are detected using the failure detector. Due to this link failure the packet dropping occurs. The planning is here fully based on energy. And Energy is calculated for the neighboring nodes from the link failure occurred node. The most important task carried out in this period is the changes must be made to link. Here the link recovery is based on the highest energy which is at the path in nearby distance. We demonstrate that number of router nodes has to cover the maximum coverage ratio and this is increases through put, packet delivery ratio and delay.  

Keywords: Wireless mesh networks (WMNs), autonomous network reconfiguration system (ARS), multi-radio, network-planning, self-re-configuration.  

I. INTRODUCTION  

The various wireless networks evolve into the next generation to provide better services, a key technology, wireless mesh networks (WMNs) has emerged recently. In WMNs, nodes are comprised of mesh routers and mesh clients. Each node operates not only as a host but also as a router, forwarding packets on behalf of other nodes that may not be within direct wireless transmission range of their destinations. A WMN is dynamically self-organized and self-configured, with the nodes in the network automatically establishing and maintaining mesh connectivity among themselves (creating, in effect, an ad hoc network). This feature brings many advantages to WMNs such as easy network maintenance, robustness, and reliable service coverage. The mesh networks (WMNs) are being developed actively and deployed widely for a variety of applications, such as public safety, environment monitoring, and city-wide wireless Internet services.  

II. RELATED WORK  

Generally link failures are one of major issue in the networking area. So, that wireless information communication is the most promising and complicated field. As wireless mesh networks are concerned this provides larger coverage’s and high data rate information transfer. Even though they provide lot of benefits to the users and several high range applications they still suffer from the occurrences of the link failure.  

A considerable amount of work has been done to solve the problems in WMNs and to build a healthy wireless network. Network reconfiguration needs a planning algorithm that keeps necessary network changes that is to recover from link failures as local as possible, as opposed to changing the entire network settings. And also the network change made autonomously when failure occurs. These link failures will occur due to some interference, different obstacles etc. By this link failure the information transfer can be lost so the quality of communication cannot be achieved and also the performance of this wireless mesh networks can low. So in order to recover from the link failures autonomous reconfiguration system is commonly used.  

In environmental monitoring some links of WMNs may experience significant channel interference from other co-existing wireless networks. Some parts of networks might not be able to meet increasing bandwidth demands from new mobile users and data cannot reach to the destination within time due to link failures.  

III. PROPOSED SYSTEM  

We have a network with mesh nodes, IEEE 802.11-based wireless links and one control gateway. Each mesh node has a number of nodes and channel assignments are initially made by using global channel/link assignment algorithms. The gateway is used to connect the internet and also connected to the other mesh routers. The network also supports the Qos. Each mesh node in WMN periodically sends its outgoing link information to the control gateway through management message.  

Fig.1: ARS architecture  

In Fig.1 shows architecture of the ARS. ARS is used for collect and sends the packets related to ARS similar to the group formation information for this module in which it includes algorithm and related protocols of ARS [4]. Link status information provides the information related to links in wireless mesh networks and it is interact with failure

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detector. Failure detector detects the link failure then link failure information is send to the leader node and its group members. Which is periodically interacts with link status information and maintain information about updated link state table. It is designed for formation of local groups within mesh networks. The every group organizer includes a group header and group members, in the group members as one node is elected as a group header. The planner gateway includes plan generator, Qos filter and does localized changes to generate new plan. Through ARS obtains or updates states of a system routing table. And each node contains routing tables that includes source address, destination address and next hop address.

A. Architectural Overview
Fig.2 and 3 illustrates proposed system architecture and overall dataflow of the proposed system respectively and in architecture first we have to formation of the network, the numbers of WMN nodes are defined and these nodes are created with different position in the network then initialize with the different parameters such as network parameter id, node label and number of channels. Next the nodes are started movements from one position to another position after by using autonomous network reconfiguration system technique, the topology is adjusted or adaptation.

B. ARS Algorithm
Autonomous network reconfiguration system planning algorithm, the algorithm used in ARS technique is reconfiguration planning algorithm. Why we need this algorithm is to improve and maintain the performance of ARS and WMN in case of dynamic link failures in the network. To with stand failures by enabling Mr-WMNs and to autonomously reconfigure channels and radio assignments.

1) ARS in every node monitors the quality of its outgoing wireless links at every time and reports the results to a gateway node.
2) Once it detects a link failure, ARS in the detector node triggers the formation of a group among routers and one of the group members is elected as a leader, the leader node for coordinating the reconfiguration.
3) The leader node sends planning request message to a gateway. Then, the gateway synchronizes the planning requests and generates a reconfiguration plan for the request.
4) Gateway sends a reconfiguration plan to the leader node and the group members.
5) All nodes in the group execute the corresponding configuration changes.

C. Monitoring Period
The Monitoring is an important phenomenon when we consider the link failure. Generally monitoring is and the basic operation involved in many link recovery algorithms. Monitoring period is used to monitor the links from which the information is started to the end of that period in the network that we considered.

D. Failure Detection
After this link monitoring, the failure links are detected using the failure detector. Due to this link failure the packet dropping occurs. This packet loss occurred not only for link failure even they occur if the traffic exhibits some congestion.

E. Planning Period
The planning is here fully based on energy. And energy is calculated for the neighboring nodes from the link failure occurred node. Then the node with highest energy is elected as a leader. It will send the request to the failure occurred node and then that node will generate the reconfiguration plan, send to the leader node. Finally the link failures are recovered and transmission continues through the leader node to the destination.

F. Reconfiguration Period
By using reconfiguration plan send to the leader node the changes to node are made. So the changes that are made to the links. The most important task carried out in this period is the changes must be made to link. Here the link recovery is based on the highest energy which is at the path in nearby distance.

The performance parameters that can be obtained through the NS2 Trace Analyzer are as follows:

1) Throughput:-
Throughput is the rate at which a network sends and receives data. Throughput is rated in terms bits per second (bit/s). Throughput, Tp = Ps/Pt, where Ps = packets received, Pt is the amount of forwarded over certain time interval

2) Delay:-
Delay refers to the time taken for a packet to be transmitted across a network from source to destination. Delay, D = Td – Ts, where Td = packet received time at destination Ts = packet time at source.

3) Packet loss ratio:-
The number of sent packets by source node minus with number of received packets gives the packet loss ratio. Packet loss ratio, Pl = Ps–Pr, where Ps= packet send by source, Pr=packet received at destination
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IV. SIMULATION AND RESULTS

The simulation is performed on Linux Ubuntu 10.04. The experiments are implemented and run in the network simulator ns-2 version 2.35. The performance metrics chosen improvements the routing are Throughput, control overhead, packet loss ratio and delay.

Fig. 4 shows the data transmission between the source and destination. In the diagram red circle is indicates mesh routers, black and brown circle is indicates mesh clients and pink circle is indicates neighboring nodes the data packets to reach a destination.

V. CONCLUSION

Hence, we provided a reliable and optimal routing against the unreliable wireless links by introducing an autonomous network reconfiguration system scheme. In the monitoring period phase to monitor the outgoing wireless links, and also detection the failure links. Next phase is planning period to planning is here fully based on energy. And energy is calculated for the neighboring nodes from the link failure occurred node and then generate the new configuration plan. Simulation results showed that, as number of router node is cover maximum coverage ratio and improves the throughput, end-to-end delay and packet loss ratio.

REFERENCES