Fault Tolerant Routing and Scheduling Scheme for Multi Hop Wireless Networks

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Abstract— The multiple link failure recovery algorithm is introduced in this project, to provide the forwarding continuity even with multiple link failures. The transient failures are common in IP networks and it also have some proposals based on local rerouting. To ensure forwarding continuity, introducing the multiple link failure recovery algorithm, even with multiple link failures. For forwarding the informations, each packet carries a blacklist, which is a min set of failed links encountered along its path, and the next hop is chosen by excluding the blacklisted links. This project describes how it can be applied to ensure forwarding to all reachable destinations in case of any two or more link or node failures. Simulation results show that achieves the loop-free routes from source to the destination. TIRSN attains better performances with twofold the amount of data delivery for traffic.

Index Terms— Integrated routing, Scheduling, MAC, IEEE 802.11.

1. Introduction

In the 1970’s and the 1980’s, computer networks were considered an infrastructure of fixed form. In the latest years, the proliferation of mobile computing devices, such as laptops, personal digital assistance (PDA’s), or mobile phones, has led to a revolutionary change in the computer world. To communicate all those devices, a wired network is not feasible, since it has no mobility. Thereby, a new technology, wireless networks, is needed. Wireless networks use electromagnetic radio waves for exchanging data. However, in the last years, a demand of mobility by users is increasing; hence, special kind of networks is needed: wireless mobile ad-hoc networks.

WIRELESS LOCAL AREA NETWORKS (WLANs) based on the IEEE standard 802.11 have become extremely popular. More than ever, people use WLANs for wireless Internet access, Voice-over-IP, file sharing, and other applications. As a reaction to this success, there is an increasing interest in enhancing the WLAN standard. The 802.11 working group has thus defined several new functionalities on both the physical and data link layers. Besides standardization of higher rate transmission schemes [4] and better security functions, one of the most recent activities aims at extending the single-hop paradigm of current 802.11 technologies to a multi hop paradigm.

The multi-hop wireless networks, communication between two end nodes is carried out through a number of intermediate nodes whose function is to relay information from one point to another. An ad hoc wireless network is a collection of wireless nodes that self-configure to form a network without the aid of any established infrastructure. Some or possibly all of these nodes are mobile. These networks are extremely compelling for applications where a communications infrastructure is too expensive to deploy, cannot be deployed quickly, or is simply not feasible. There are numerous potential applications for ad hoc wireless networks, ranging from multi hop wireless broadband Internet access, to sensor networks.

2. Related Work

In medium access control layer, introducing end-to-end reservation protocol for Quality Of Service (QOS) [4]. It reserves the time slots for QOS application while retaining the Distributed Coordination Function (DCF). It consists of five functional blocks. It reserves time resources between source and destination. The RTR message sent to the destination. The main drawback of this system is it does not retransmit the lost packets. The main contribution of this paper is a joint optimization problem [5]. Multicast routing problem at the network layer and power control problem at the physical layer. The technique used in this system is a dual decomposition which perform routing and resource allocation. The main drawback of this system is interference management. As the problem of supplying physical and medium access layer resource to minimizes the cost function for end-to-end communication demands [6]. The communication infrastructure provides the quality for end user services. The main drawback is a limited bandwidth.

Exchanging of information between different layers to support real-time video streaming [7]. The joint source and channel coding technique proposed to support the new H.264 video coding standard. The main drawback of this system is too expensive communication infrastructure. It uses novel algorithm in AODV. It provides loop-free
routes even while repairing broken links [8] because it does not require global periodic routing advertisements. It requires each mobile node to maintain a complete list of routes. The network layer aim is to develop a framework that accurately models the network architecture [9]. The main drawback is lack of modularity and robustness. It may leads to poor performance for entire system.

The packet radio network (PRNET) was totally asynchronous and based on completely distributed architecture [10]. It addresses the battlefield and disaster recovery communication requirements. It handles the datagram traffic but did not offer efficient multimedia support. This is cost effective process.

3. Channel Reservation

The reservation is based on ID. The reserved packets are maintained in queue. If no packet to transmit or queue is empty, this guarantees that the bandwidth is reserved. This reserved time slot can be used by another node. In which end-to-end reservation is achieved every node can access the channel in time ordered sequence. To achieve this, a node x have to compute the interval. To find the free slot for node “x”, this node “x” is not currently owned or reserved to any other packet. Once a free slot is identified, a node with identifier Id transmits a Reservation Request packet to its neighbors and waits for N seconds to collect the replies and get the Reservation Granted, packet granting the reservation.

4. Channel Access

This scheduling is based on priority. The main advantages of channel scheduling is, if a slot is not allocated to any one packet, even though that packet can access the channel because this packet came soon when compare to the one slot allocated to the packet. The scheduling is used to access the channel. This algorithm determines which node should transmit in a time slot.

4.1 Scheduling Algorithm:

Every slot t with identifier (t mod N), node u with identifier first checks if it is the owner of the slot. If so, then checks if the owner is present in two hop neighborhoods. If it is not then u can access the channel. If the owner is present in two hop neighborhood, then have to calculate the hash function for node u and one hop neighbor node v. The node u hash function value must be greater than the v hash function value. If so, u can access the channel. Else u listen the channel.

5. Link Metric Based Routing

For a node to detect a broken link, the transmission of real time packets must be acknowledged. In this, such acknowledgments (ACKs) are achieved implicitly: if a node sends a real-time packet to the next node of the path, this transmission is acknowledged in such a way that the node overhears the next node’s transmission of this packet onward (Fig. 1). The ACK causes a small signaling overhead but has the advantage of informing nodes in the neighborhood of the destination node about the reservation, hence contributing to the protection of the reservation against interference. In both cases, if a node can no longer reach its subsequent node in the path, i.e., it does not receive ACKs, it assumes a broken link.

![Fig 1: Data transmission and ACK](image)

The reservation path might break during the real-time transmission. Clearly, such path breaks must be repaired for the real-time transmission to continue.
Fig 2: Architecture

Here the architecture shows the reservation is based on their ID. Each node ID is identified while forwarding the packets because those packets have their node ID. The node is placed in front end, then go to the back end and call PHY, LLC and channel and reserve the time slot. This slot reservation has follows two method to reserve the channel as successfully. After reserving the channel has to access that channel. This scheduling is based on priority. The main advantages of channel scheduling is, if a slot is not allocated to any one packet, even though that packet can access the channel because this packet came soon when compare to the one slot allocated to the packet. The routing based on destination meshes and enclaves. The link metric based packet forwarding scheme is used to avoid if any link failure occur in their routing.

6. Blacklist Based Forwarding

Each packet “p” carries the blacklist. The blist field of “p” is initialized $\emptyset$. The next hop with smallest path cost is forwarded without the links in the packet’s blacklist. If no such next hop is found, at least one adjacent link of node “i” must be in degraded state.

7. PERFORMANCE ANALYSIS

To achieve the multiple link failure method, we are proposing the link metric based routing scheme with the effective traffic aware incorporative routing and scheduling scheme. This method achieves the loop-free routes from source to the destination. It attains better performances with twofold the amount of data delivery for traffic.

8. Conclusion
REFERENCES


