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SURVEY ARTICLE

The Survey of Techniques for Link Recovery & Admission Control in Wireless Mesh Network

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Abstract— A Wireless Mesh Network is one of the most advanced wireless network used for cost effective communication. Wireless Mesh Network is used to cover very large physical region. During their operational period, the Wireless Mesh Network may get affected from frequent link failure which degrades the performance of network largely. Admission Control plays crucial role in improving the performance of WMN. The paper presents the study of various techniques used for recovery of wireless mesh network. The paper also gives the basic idea about the admission control in Wireless Mesh Network.

Keywords— Wireless Mesh Networks (WMN); IEEE 802.16; Multipath Routing Protocol; False alert

I. INTRODUCTION

Wireless mesh networks (WMNs) is widely used for providing Internet access over large distance. WMN is a collection of Mesh Router (MRs), Mesh Client (MCs). In WMN Mesh Client (MCs) ask for the services from Mesh routers. Mesh Routers (MRs) are responsible for serving clients connected to it. Some of the Mesh Router are called as mesh gateways (MGs). They act as the gateway between the WMN and Internet. Multiple frequency bands are used by WMN to accommodate Internet backbone traffic. Due to limited number of channels available, it is difficult to obtain multiple channels for the WMN. The Cognitive radio (CR) technology has been developed as a new solution to overcome the difficulty for limited channels. The Cognitive radio technology allows wireless networks to use the channel which is licensed to primary users (PUs) but it is not used at a particular time and a specific location. [1-2]

II. RELATED WORK

A. Techniques used for Link recovery in WMN

In Wireless Mesh Network, link recovery has great importance. The performance of Wireless Mesh Network drops down largely if there is link failure. Some of the various techniques used for link recovery in Wireless Mesh Network can be listed as follows [3]:

1) *Initial Resource Allocation Method* : In this type of method, the initial planning for resources of the network is performed. Some theoretical guidelines are used for allocation of network resources. This technique had drawback of “Global reconfiguration Changes” . For small changes done for link recovery, this technique performs reconfiguration of the entire network. Authors Bhati, Li & Alcherry presented the new method namely “Joint Channel Assignment Method”. Mathematical concepts are used guidelines for handling the channel assignment and routing problem [4] .

2) *Greedy Channel assignment Method* : The main drawback of “Initial Resource Allocation Method” i.e. reconfiguration which occurs globally is handled in Greedy Channel Method. . This method focuses on the setting of only faulty link . This method has drawback of “ripple effect”. In the ripple effect one local change causes triggering of change to some other kind of network settings [5].

3) *Autonomous Reconfiguration System(ARS)* : Kim and Shin [6] presented new method for reconfiguration of WMN. This technique improves the performance of wireless mesh network , as compared to other types of link recovery techniques. The method generates set of various types of reconfiguration plans by considering the range of channel & radios of network. The feasible plan is selected out of the set of this reconfiguration plan. The main problem of ARS is that it does not consider cost during selection of reconfiguration plan.

4) *Enhanced Reconfiguration System(ERS)* : Enhanced Reconfiguration System (ERS) [7] was designed to provide the cost aware reconfiguration system for Wireless Mesh Network. ERS makes use of primitive link changes such channel, radio and route switch operations to recover WMNs from link failures. ERS produces a set of reconfiguration plans and selects the best plan which provides the required service at minimal cost. Accordingly the system reconfigures network settings among all mesh routers based on this best reconfiguration plan is selected for network. This maximizes the network performance.

Remainder of the paper contain following sections Section II describe the related work regarding link recovery in WMN. Section III describes the admission control protocol in WMN. Section IV conclude the paper.

III. ADMISSION CONTROL PROTOCOL IN WMN

In WMNs, admission control is used to control traffic loads .This help the wireless mesh backbone from being overloaded. Existing admission control protocols could be categorized as either stateful or stateless approaches, based on network state information. Both the approaches have their limitations; the stateful models suffer from the scalability issue, while the stateless ones have the false admission problem [8].

There are three types of admission control approaches:

- (1) In **the stateful approach**, all nodes have to create and maintain state information for each flow passing through them in order to provide the admission decision. Most of the stateful admission controls uses a fixed reservation scheme, which means that the reserved bandwidth for a particular session is maintained statically during all the session lifetime. This may cause inefficient bandwidth usage and some additional problems like unfair bandwidth exploitation during congestion situations. Additionally the amount of state information increases proportionally with the number of flows. This causes storage overhead on mesh nodes, which is the well-known scalability problem of stateful approaches.
- (2) In **the stateless admission control approach**, the nodes distinguish traffic according to the class they belong to, without maintaining any state information. The scalability is a major advantage of this approach, because no session state information is maintained or stored at intermediate nodes. Even though the stateless models guarantee good QoS provision, they may have the problem of false admission.
- (3) **Hybrid admission control model** based on a temporal resource reservation and three traffic regulation schemes in view of taking the advantages of both stateful and stateless approaches. The admission model allows the share of reserved bandwidth between multiple flows when it is possible. In stateful models , the bandwidth resource are entirely reserved for one flow and no extra traffic is allowed to use the reserved resource. Hybrid admission control model takes the benefit of stateless approaches by using feedback information provided by intermediate nodes. The feedback information has the parameter like adaptation rate . It should be considered by the source nodes to regulate their traffic according to the network conditions. Hybrid admission control model uses bandwidth

information rather than using the delay information. In hybrid admission control model, a congested node may specify the time required for session re-establishment, besides of the new rate at which the session should transmit its data packet.

IV. CONCLUSION

This paper introduces the detailed survey of existing techniques used for recovery process of wireless mesh network. Previously the Initial resource Allocation techniques are used for recovery of WMN. The drawbacks of this method leads to the new improved methods for recovery of WMN. Then other recovery methods like Greedy Channel Assignment Method , Autonomous Reconfiguration System(ARS) are discussed in paper. Currently the Enhanced Reconfiguration System(ERS) is widely used for reconfiguration of Wireless Mesh Network. In paper other important parameter like admission Control in WMN is discussed. Admission Control plays a very important part in link recovery of Wireless Mesh Network.

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