Volume : 3 | Issue : 8 | Aug 2014 • ISSN No 2277 - 8179

Research Paper

Data Management and Quality of Service (QOS) Routing Protocol in Manet

Computer Science

KEYWORDS : Mobile ad hoc networks, quality-of-service, admission control, data level, data management

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ABSTRACT

Providing quality of service (QOS) in a mobile ad hoc network is a not easy task due to its peculiar characteristics. This paper proposes at presenting a data management and quality of service (QOS) routing protocol which identifies data level to be sent, based on the data size the route selected. If huge level of data wants to sent then the routing protocol consider the multiple node-disjoint paths are examined for fulfilling QOS in terms of end-to-end delay and window-based size of channel view is performed. If small size of data want to sent the routing protocol consider end to end delay only. In this paper examine the data level and end-to-end delay along the paths taking into account the IEEE 802.11 argument delays and exceptional capacity. Data Management and QOS routing method is proposed. To study the presentation of routing system has approved out replication. The results show that the planned protocol performs superior in terms of QOS satisfaction ratio and the throughput as compared to an presented protocol.

INTRODUCTION

Ad-hoc networks are autonomous, nature-prepared, wireless, and mobile networks. They do not need setting up any set communications such as access points, as the nodes categorize themselves automatically to move data packets and handle dynamic topology due to mobility. This typically provides an ad-hoc mode, allowing mobiles to converse directly. As the communication series is restricted by policy, a scattered routing protocol is required to allow long distance communications. However, this usual has not been targeted specially for multi-hop ad hoc process, and it is therefore not absolutely suited to this type of networks. At the present time, several applications generate multimedia data flows or rely on the proper and efficient transmission of sensitive control traffic. These applications may advantage from a quality of service (QOS) support in the network. That is why this domain has been widely studied and more and more QOS solutions are proposed for ad hoc networks.

Throughout this paper, we will focus on one of the fundamental resources: throughput and delay. Estimating the outstanding bandwidth at a given time and in a given part of the network is difficult because, in a wireless network, the average is shared between close nodes. In this paper, we present a new method to evaluate the available bandwidth and end to end delay in ad hoc networks based on the IEEE 802.11 MAC layer. This scheme uses the nodes carrier sense capability combined to other techniques such as collision prediction to perform this estimation.

RELATED WORKS

Devising a routing protocol for an ad hoc network with a provision of quality of service (QOS) is a challenging task due to their inherent characteristics. A lot of work is directed towards identification of multiple paths from the point of view of fault tolerance and load sharing [2]. Recently, the research is directed towards the use of multiple paths for the purpose of QOS provisioning in case of mobile ad hoc networks [3] [4]. In an ad hoc including figures and tables. network, multiple paths between a given source and a destination may help in the provision of QOS in the following situations [5].

In this paper, we present a routing protocol that is aware of the QOS and may utilize multiple paths for traffic distribution. In our protocol, the source tries to classify multiple node-disjoint paths that are able to satisfy QOS requirements in terms of data volume, capacity estimation end-to-end delays for the real-time traffic and at the same time achieve high throughput while sending packets. The paths identified are selected for sending packets in such a manner so that contention delays along the paths and re-sequencing delays at the destination are alleviated.

Over View of IEEE 802.11

In a mobile ad hoc network, IEEE 802.11 is used as the Medium Access Control (MAC) protocol. IEEE 802.11 comes in different flavours, IEEE 802.11 with Distributed Coordination Function (DCF), is of particular interest in case of an ad hoc network because the mobile devices using DCF can be configured in ad hoc (or infrastructure less) mode. In IEEE 802.11, there is another coordination function called the Point Coordination Function (PCF), however, it works in infrastructure mode only, and therefore, it is not suitable for ad-hoc networks. Note that IEEE 802.11 DCF is based on Carrier Sense Multiple Access (CSMA) with Collision Avoidance (CA).

In a CSMA/CA based network, if a node i wish to transmit, it senses whether the channel is busy or idle. If it finds the channel busy, it waits until the channel becomes idle. If the node finds the channel idle for a certain amount of time called the Distributed Inter-frame Space (DIFS), it transmits the frame. The receiver node receives the frame and if it received the frame successfully, it waits for a time duration called Short Inter-frame Space (SIFS), and sends an Acknowledgment (ACK) to the sender. After the maximum number of retries either the frame is sent successfully or it is removed. To decrease the possibility of impact, there is an optional mechanism to reserve the channel using very small frames called Request-To-Send (RTS) and Clear-To-Send (CTS) [6].

End - To -End Delay Analysis

In our protocol, the source tries to estimate the average end-to-end delay based on per-hop delays. As mentioned earlier, IEEE 802.11 which is based on CSMA/CA is generally used as a MAC protocol in ad hoc networks. Hence, the contention delay at each node plays an important role and contributes to the major part of end-to-end delay. In this paper, we focus on contention delays along a path and try to minimize it. The actual procedure of how to minimize the contention delay shall be described later in this paper. The per-hop delays at each node, say node i, can be divided into three components which are as follows:

- Ts: Successful transmission time.

- Tc: Time consumed during collision.
- Tbf : Average back-off time at node i.

The total delay at node i is the summation of these delays and can be written as follows.

Total delay

Δ = Tc + Tbf + Ts

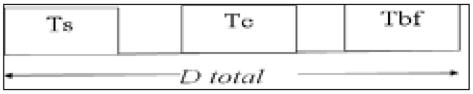

Figure 1: crumb rubber in cracker mill
Fig.1 Total Delay

Successful Transmission
Tx = RTS + SIFS + CTS + SIFS + Packet load + SIFS + ACK + DIFS

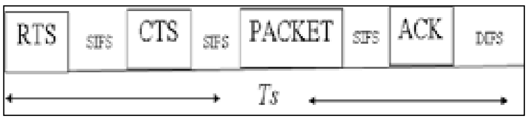

Fig.2 Successful Transmission
The Channel is busy due to collision

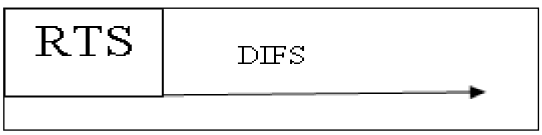

Fig.3 Channel is Busy

Ch busy = RTS + DIFS
The transparency due to transmitting the data frame
T over = TACK + DIFS + 3SIFS + TRTS + TCTS
DIFS -> Distributed Interface Space
ACK -> Acknowledgment
RTS -> Request-To-Send
SIFS -> Short Interface Space
CTS -> Clear-To-Send

DATA MANAGEMENT ROUTING PROTOCOL SYSTEM MODEL
In DATA MANAGEMENT ROUTING module provide the routing the packet based on the outstanding band width, data volume and end to end delay so, it will reduce the traffic, effective utilization of the channel& resources and increasing the through put. DATA MANAGEMENT ROUTING is a highly adaptive, scattered routing algorithm depends on the principle of link-reversal. It offers many loop-free paths from source to destination. The key design concept of DATA MANAGEMENT ROUTING is to localize control messages to a small set of nodes in the neighborhood of the topological changes. If we want to send the data from Node A to Node E means, there are two paths are available one is ACHE and AFGHE. The routing protocols choose the path based on the end to end delay and capacity estimation.

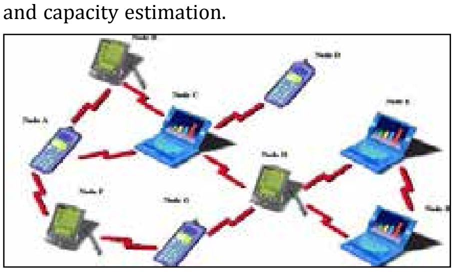

Fig.4 MANET Architecture Design

Data management Routing Algorithm

INPUT: PATH, NUMBER_OF_HOP, AVAILABLE_BANDWIDTH_IN_PATH, DATA_VOLUME

OUTPUT: MX, I
1. If(data_volume > small volume)
2. for i ←0, i ≤n, i ←i + 1 do
3. data rate[i] ← available b.w in p[i]/number of.hop[i]
4. end for
5. mx=maxvalue (data rate [0], data rate [1]…data rate[no of path])
6. for i ←0, i ≤n, i ←i + 1 do
7. If data rate[i] eq Mx then
8. return i
9. break
10. End if
11. End for
12. Else
13. for i ←0, i ≤n, i ←i + 1 do
14. hop_delay[i] ← no.of.hop[i]
15. end for
16. mx=maxvalue (hop_delay [0], hop_delay [1]… hop_delay [no of path])
17. for i ←0, i ≤n, i ←i + 1 do
18. If hop_delay [i] eq Mx then
19. return i
20. break
21. End if
22. End for

RESULTS AND DISCUSSION
To evaluate the performance of our protocol, we have developed our own simulator in C++. We generated topologies of the network where 100 nodes are distributed uniformly randomly in a region of area 1000m × 1000m. Each node is assumed to have a transmission range of 250m. The simulation time is 100 simulated seconds. The mobility model is Random Way Point (RWP). The medium access control (MAC) layer is assumed to be IEEE 802.11. The bandwidth of each link is assumed to be 2 Mbps. The traffic is constant bit rate (CBR). The packet size is 512 bytes. While evaluating the performance of the protocol.

We focused on the following parameters: (i) Average end-to-end delay: It denotes average latencies experienced by packets from the source to the destination. (ii) Throughput: It denotes the average bandwidth occupied by packets that are sent to the destination. (iii) QOS success ratio: It represents how many packets arrive at the destination before the expiry of their respective deadlines divided by the total number of packets sent by the source. We observe that as the number of packets transmitted is increased, the average end-to- end delay decreases. The reason is that with the increase in the deadlines, thereby, increasing the QOS success ratio.

CONCLUSION
In this paper, the proposed DMRP protocol will provide path selection mechanism based on the data volume, which means it effectively utilizes the node computation. The source tries to identify the data volume that has to be sent. If it's a small volume of data, our protocol reduces the work load and increases the performance by calculating only the end to end delay. But for large volume of data, the DMRP protocol identifies multiple node-disjoint paths that satisfy QOS requirements in terms of end-to-end delays and Capacity estimation at the same time of achieving high throughput while sending packets.

The source selects the paths that are expected to incur relatively low contention delays and high capacity. Hence, the data packets are sent according to the estimated capacity and the delay of each path. We extend the analysis of the throughput of a single hop network to a multi-hop network and then tried to maximize it. In this simulation, the performance of the proposed protocol and DMRP routing is compared with AOMDV, Attentive routing protocol and QARMD. We observed that DMRP routing provides better improvement over AOMDV, Attentive routing protocol and QARMD in terms of end-to-end delay, Capacity, QOS success ratio, and throughput.

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