Survey of Data Transmission over Mobile Ad Hoc Network using Multi-Path QoS Routing Protocol

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***Abstract*—large amount of Data Transmission has gained tremendous importance now a days due to the way the information is being transferred. For example like transmission of unstructured data, transaction data, machine-to-machine data, sensor data etc. Thus it is appropriate to create a wireless sensor network for transmission of data depending on the situation. In such consequencedependable transmission of data over mobile Ad-Hoc networks plays an important role. Efficient routing protocol is also very important for transmission of data to overcome the limitations like packet loss, data congestion, low bandwidth and traffic. Hence a Multi-path QoS routing protocol (MPQR) is been proposed in this paper where the existing protocol establishes a single path for data transmission but MPQR protocol emphases on distribution of tickets across the network and also further it can be divided into sub-tickets to get an efficient multi-path. The major advantage is its premier performance in bandwidth limited environment when compared to the existing protocols.**

Keywords:- Mobile Ad hoc networks, Data transmission, Multi-path QoS Routing Protocol

I. INTRODUCTION

Routing protocols for Ad hoc describe the way in which packets are being transferred from source to destination in an Ad hoc network. Well defined routing protocol are very much necessary while transferring information from one node to another in a network. In Mobile Ad hoc networks (MANET) a known route cannot be followed since no predefined topology exists but instead the configuration keeps on changing in such a way that the nodes need to broadcast their presence and also record the presence of its neighbors to form an efficient route for sending packets.

In the below subsection literature review for the need of proposed protocol is been carried out.

In dynamically changing environment of MANET's the protocols discover the route from source to destination, maintains the route while using it to transfer packets from one node to another and also delivers packets to the intended destination, but however while searching the route these protocols are concerned with finding out the shortest route for sending packets from source to destination but quality of service (QoS) requirements such as delay and bandwidth constraints are not addressed very recurrently.

The proposed Mult5i-path QoS routing protocol is very much flexible

- It provides a higher success rate in finding out an efficient QoS route for transmission of packets than the protocols which tries to find out a single path when the bandwidth of the network is very limited.
- It performs in the same way as of other protocols in both routing overhead and success rate when the bandwidth of the network is sufficient.

II. RELATED WORK

- Proactive routing protocol: This protocol is also known as Table-driven routing protocol. This protocol records all the available nodes and shares the same information to the entire network.

Disadvantages

– Always accurate data is required
– During failure reply is very slow
– Slow response during reconfiguration.

Few Proactive routing protocols

–DSDV (Destination Sequenced Distance Vector)
– OLSR (Optimized Link state Routing Protocol)
– Babel

- Reactive Routing Protocol: This protocol is also known as On-demand routing protocol. In this protocol whenever a route is to be determined for sending information from one node to another its sends route requests packets to the entire network.

Limitations:

– Causes congestion when the number of route packets increases
– Latency while finding the correct route

Few reactive routing protocols

– AODV (Ad hoc On-demand Distance Vector)
– Flow state in Dynamic source routing.
– Dynamic Source Routing
– Power-Aware DSR-based

- Hybrid routing protocol: This protocol is the combination of both proactive and reactive routing protocol. This protocols begins with few proactively identified routes and then torrents the entire network with route request packets.

Curbs:
- Active nodes dependency is very much needed
- Traffic demand is proportional to traffic demand complexity.

Few Hybrid routing protocols
- Zone routing protocol
- Hierarchical routing protocol

This protocol depends on the pecking order of nodes. It initially follows proactive routing and later reactive routing depending on the request from active nodes.

Restrictions:
- Traffic demand reaction depends on interlocking parameters.
- Address dependency

Few Hierarchical routing protocols
- Cluster Based Routing Protocol
- Fisheye State Routing protocol

III. QoS ROUTING PROTOCOL

MANET'S is different from other traditional networks because of its dynamically changing environment. MANET'S has no base station support and needs Multi-hop communication, mobile hosts in MANET'S are free to move around and can communicate with other hosts at any point of time. When the host has its communication partner within the same radio coverage then it can communicate directly in one hop manner otherwise several relay hosts are needed to transfer the message from source to destination in multi hop manner.

Many Real time applications (like video and audio transmission) need QoS (quality of support) services. Bandwidth and delay are two constraints of QoS. QoS is supported by ticket based protocol. At every nodethis protocol maintains end – to – end state information and this information is periodically updated by Distance-vector-like protocol.

On requiring a QoS route the source node sends the probing packets each containing ticket and in turn each probe is responsible for finding one path, if possible. The more tight the QoS requirements, more tickets should be issued. Each probe on reaching an intermediate node will choose one outgoing path satisfying QoS requirements. If the probe enters a node that does not satisfy QoS requirement then the intermediate node will send an invalidated ticket to the destination node.to saving number of probing packets serval tickets are been carried out by each probe.

For example, Fig 1 describes a MANET where the number related with each link corresponds to bandwidth. The arrows shows the transfer of two tickets from S to D. Assuming that bandwidth of 4 is required then the probe flowing through C flows, while through B to E succeeds.

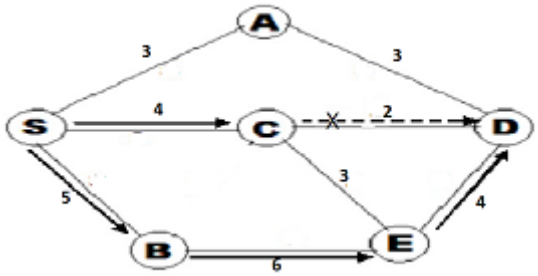

Fig 1: Searching a route with bandwidth 4 from S to D using two tickets

Multi-path ticket based protocol

When the bandwidth demand is too large this protocol solves the problem of finding the path in an efficient manner. For example in Fig 1 if a route from S to D with bandwidth 5 is required then the ticket based routing protocol will fail as no single path will satisfy the criteria. Thus this gave the motivation for investigating Multi-path QoS routing protocol where the multipath route will contain several sub-paths to the destination from source. For example Fig 2 below shows a multi-path with bandwidth 6.

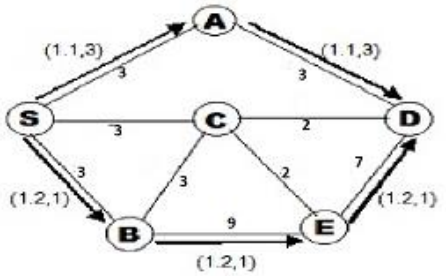

Fig 1: Searching a route with bandwidth 6 from S to D

IV. MULTI-PATH QoS ROUTING PROTOCOL

Proposed Multi-path QoS routing protocol will follow an on-demand style for allocating the bandwidth. Each host will know the available bandwidth of each of its neighbors. When source requires a route to destination with some bandwidth, it will send probe packets containing tickets. Each ticket is responsible for finding a route from source to destination with the aggregated bandwidth. When a ticket or a sub-ticket arrives at intermediate node some bandwidth of the qualified outgoing link will be reserved for the ticket and the ticket will sent out of the link. Since multiple paths are used from source to destination if a link with no sufficient bandwidth exists then the ticket will be split into sub-tickets and each ticket will be responsible for finding multi-path with certain portion of bandwidth. Then destination will receive ticket or sub-tickets. Destination node will pick a ticket or a group of sub-tickets to form a whole ticket and sends back a reply to the source node.While on the way back to the source the bandwidth reserved by the earlier probes will be confirmed. After a timed out period the reservation that is not confirmed will be released.

Ticket Format

T(S, D, a, b, BID, TID, B, b)

Parameters meaning are as below
S: Source node
D: Destination node
a: packet sender carrying ticket
b: packet receiver carrying ticket
BID: identification of bandwidth request. It is unique for each route request
TID: ticket identification and it is unique for each ticket
B: bandwidth required for each multipath from source to destination.
B: bandwidth required for each multipath from packet receiver to destination.

Inheritance relationship

On a ticket reaching a node from whichthere is no outgoing link enough bandwidth then the ticket will be further split into sub-tickets. A unique identity will be given when a ticket is initiated at the source node. When an intermediate host receives a whole-ticket or sub-ticket with identity T, it may split the ticket into sub-tickets. In that case, each sub-ticket will be given a number appended after T.Specifically, the ticket will be split into n sub-tickets. These sub-tickets will be given identities T1,T2….Tn. as below in Fig 3

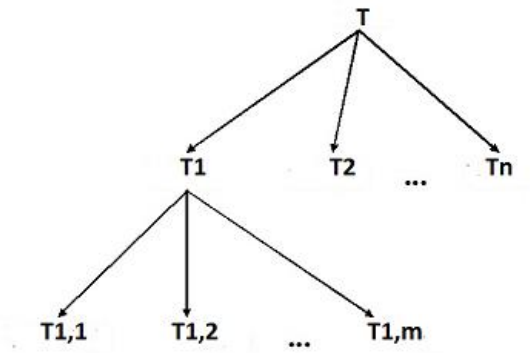

Fig 3: Representation of ticket after splitting

V. SYSTEM ARCHITECTURE

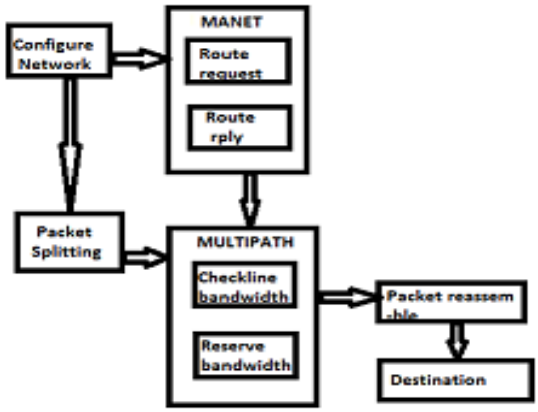

Fig 4: System Architecture

Configuration: The network is created with the help of number of nodes, area, and range.

Node: This tells that node has been added to the network by the user.

Packet Splitting: This indicates splitting of the packets based on the network configuration and thus creation of MANET network done.

MultipathRouting: Routing is completed with the help of check link bandwidth and reserve bandwidth. Packets are formed at the destination.

VI. S TRUCTURE AND DATA FLOW RELATIONSHIPS

A context-level or level 0 data flow diagram shows the interaction between the system and external agents which act as data sources and data sinks. On the context diagram (also known as the Level 0 DFD) the system's interactions with the outside world are modeled purely in terms of data flows across the system boundary. The context diagram shows the entire system as a single process, and gives no clues as to its internal organization

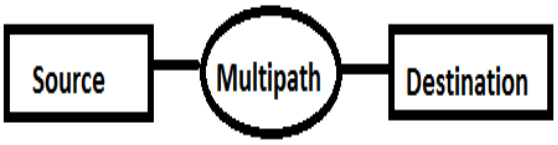

Fig 5: Data Flow Diagram 0

The Level 1 DFD shows how the system is divided into sub-systems (processes), each of which deals with one or more of the data flows to or from an external agent, and which together provide all of the functionality of the system as a whole. It also identifies internal data stores that must be present in order for the system to do its job, and shows the flow of data between the various parts of the system

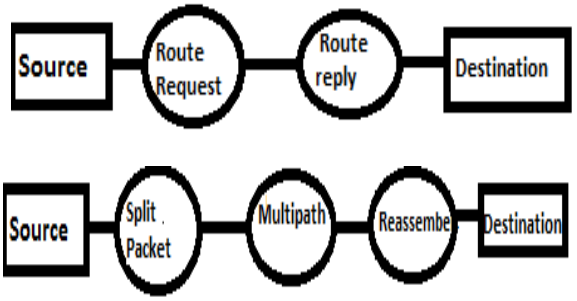

Fig 6: Data Flow Diagram 1

The Level 2 DFD shows how the sub system is divided into sub processes, each of which deals with one or more of the data flows to or from an external agent, and which together provide all of the functionality of the system as a whole. It also identifies internal data stores that must be present in order for the system to do its job, and shows the flow of data between the various parts of the system.

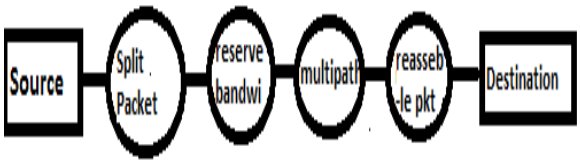

Fig 7: Data Flow Diagram 2

VII. CONCLUSION

In this paper, a multi-path QoS routing protocol (MPQR)is proposed to find a route with a bandwidth constraint forreal time data packet transmission in a MANET. Asopposed to the proactive routing protocol, this protocol isbased on an on-demand manner to search for a QoS route,so no global link state information has to be collected inadvance. Proposed protocol flexibly adapts to the status of thenetwork by spending route-searching overhead only when thebandwidth is limited and a satisfactory QoS route is difficultto find.

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