ALIX Route optimization Mechanism in MANET’s For AODV

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Abstract:
As the routing is the basic cause of networking, so the concept of networking is interdependent with methodology of routing. In reactive routing protocols one the AODV plays the active role in obtaining the routes when needed. In related to the Ad-hoc networks like MANET’s, it is considered as the very most prioritized protocol.

In this paper a slight advantageous attachment to the AODV routing protocol makes luxurious in connecting nodes. The new protocol was Aodv+Shrinking formed as ALIX (Aodv Link Extension). It evaluates the shortcuts in the route and avoids the two major problems encountering previously. 1 sub optimal 2 connection breaks. ALIX ensures these two problems will be overcome by initiating the continuous route optimization over the cases of node mobility, as well as it defines the path lengths are topologically efficient. ALIX uses one more control packet to avoid unnecessary hop’s travelling.

Keywords: Ad-hoc, AODV, ALIX

I. LITERATURE SURVEY
Most traditional mobile ad hoc network routing protocols were designed focusing on the efficiency and performance of the network [1]. Ad hoc networks are wireless networks with no fixed infrastructure in which nodes depend on each other to keep the network connected. Topology based routing protocols use the information about links for packet forwarding. Position based routing protocols use node’s geographical position to make routing decisions, resulting in improved performance under extremely dynamic network condition lives [2].

So route optimization is necessary to save the wireless bandwidth. One direction that deserves further investigation is to perform route optimization only when the new route is shorter as well as more stable (which may be determined from, say, signal strength)[3].

[4] conclude that if the active route timeout is less or exactly 1 second then it provide maximum throughput. When the value of active route timeout increases from 1 second to few seconds then the throughput get changes accordingly. Hence in AODV route identification and maintenance is the most important things. In these two parts route maintenance had a major part.

II. INTRODUCTION
Issues of routing in wireless networking have been well studied and many routing protocols have been proposed in accordance with different network structures, mobility scenarios and types of applications. While developing a routing algorithm for MANETs, one of the most challenging peculiarities which developers must consider is the behavior of the proposed algorithm in the presence of node movement. Mobility has a potential to result in dynamic changes to network topology, making the task of routing algorithms more difficult. Two major challenges introduced by mobility, are the occurrence of disconnection and sub-optimality in connection routes. More precisely, if the network topology is dynamically changing due to node movement, at least one of the following two events eventually occurs: (i) the connection breaks because one of its constituent links becomes disconnected, or (ii) the route becomes sub-optimal in terms of path length (i.e. number of hops) due to changes in the network topology.

Reactive routing protocols generally take care of the former event by initiating local recovery or restarting the route discovery process. The latter event is not often considered, and accordingly is the focus of this paper. An example in which route sub-optimality occurs (over time) is depicted in Figure 1. In reactive routing protocols, connection routes between source-destination pairs are constructed on-demand at the very outset, when their necessity becomes known due to a request by the source node. At the very beginning of a connection, the number of hops that the route takes tends to be very close to the number of hops on a min-hop path.
III BACKGROUND
Ad-hoc On-demand Distance Vector Routing (AODV) is one such widely used lightweight routing protocol. The route discovery in AODV is as follows the entire path is accumulated in the route request (RREQ) and subsequently sent back in the route reply (RREP), as it travels back to the initiator. These RREQ and RREP are the control packets. Then route was discovered from intended source to destination.

The main function of a routing algorithm is to find an initial path between a source and a destination, and then to maintain data forwarding between the two nodes. Although there have been many reactive routing protocols proposed in the literature, for concreteness, we will cast our proposal as an extension to AODV in this paper. In AODV, when a node (source) requires a connection to another node (destination), a global route discovery operation is initiated by the source, resulting in a flooding of ROUTE REQUEST messages in the network.

AODV Characteristics
- Will find routes only as needed.
- Use of Sequence numbers to track accuracy of information.
- Only keeps track of next hop for a route instead of the entire route.
- Use of periodic HELLO messages to track Neighbors.

AODV Routing
1. Source S wants to send data to the destination D. Then S broadcasts the RREQ packets over the network
2. This broadcasting done hop by hop, when the destination D receives the RREQ, it creates a RREP message and uncast it to the source node.
3. Then the source S sends the data packets to the destination D.
4. This route maintained until it gone through catastrophic failure or route breakage due to node movement.

IV. ROUTE OPTIMIZATION
We propose a route optimization mechanism we call ALIX. This mechanism becomes active after a route between a source-destination pair has been constructed by the routing protocol. The objective of Alix mechanism is to shorten unnecessarily long paths by eliminating inessential hops. Such an operation has many potential advantages, including (i) it reduces the end-to-end delay incurred by packets by decreasing the number of hops on the path, (ii) it increases spatial reuse and network capacity, and provides energy savings by removing unnecessary transmissions, and in fact (iii) it makes the connection more resilient to breakages due to node mobility. The ALIX mechanism in figure 3 is initiated periodically by the source node of each connection, as long as the connection is active and has data being sent on it. Rather than considering the period to be a fixed time interval, we view it as stochastically determined by the data rate. Concretely, the source node initiates the alix mechanism for a connection with some fixed probability \( p \) every time a data packet is to be sent. The natural question that arises is what value of \( p \) should be used? This is one of the questions we will consider in the subsequent sections, where we will consider \( p = 1/4, 1/8, 1/16, 1/32 \). In general we will denote the Alix mechanism with \( p = 1/\alpha \) as Alix-\( \alpha \).
Suppose that source node S has established a connection to destination node D, and the route between them is constructed by the AODV routing protocol. Whenever node S has a data packet to send, with probability \( p \) it generates special packet of type Alix. An alix-0 packet contains the following fields:

- The IP address of the previous node in the connection. Since S is the first node in the connection, there is no previous hop, and so in this case, the alix-0 packet generated by S has a special sentinel value in this field.
- The IP address of the sender (i.e. node S in this case).
- The IP address of the final destination (i.e. node T).
- The time to live (TTL) value (which is set to 1 by S).

Intermediate node Participation: When an intermediate node receives an Alix-0 packet from the previous hop, it produces two Alix packets, one with flag 0 and one with flag 1. The packets include the IP addresses of the previous node, the current node, and the final destination. The packet with flag-0 message is sent to the next hop along the path towards the destination. The packet with flag-1 on the other hand, is sent to the upstream node two hops away (i.e. node A) with TTL of 1.

Eliminating unwanted hops: Two subsequent links on the route are replaced by just a single one if the all necessary conditions are satisfied.

- When a node receives Alix-1 packet from another node, then it can be concluded that there may be a short cut available between this node and the sender of Alix message. Before doing any update in the routing table, the quality of the prospective new link is checked by looking at the received signal strength at the receiver side.
- If the received signal strength is greater than predefined threshold level P, then the node updates its routing table in such a way that the next hop for the corresponding final destination is replaced with the address of the originator of the Alix packet.

We have explicated the proposed mechanism in terms of data flowing along a single connection, in order to make the exposition simpler. In practice, however, there can be many data flows (i.e. many connections) between different source and destination pairs, simultaneously. Such a situation does not alter the operation of proposed mechanism.

V. EXPERIMENTAL RESULTS

The proposed Alix route mechanism is implemented as an extension to the standard implementation of AODV in ns-2.33. NS (version 2) is an object-oriented, discrete event driven network simulator developed at UC Berkeley written in C++ and OTcl (Tcl script language with Object oriented extensions).

Topology of the network: Networks of 25 nodes were deployed uniformly at random in a 1500 m x 300 m rectangular field. In this model, the nodes are randomly situated at the beginning of the simulation within the deployment area. Intermediate values of pause time correspond to intermediate levels of mobility. The pause time is used to adjust level of mobility. When pause time is set to 0, the nodes move continuously without stopping, which provides a maximally mobile setting. On the other hand, when pause time is set to 1 the duration of the entire simulation, the nodes remain fixed. Traffic sources are constant bit rate (CBR) with 512 bytes packet size, and data rate of 4 packets/s.
VI. CONCLUSION

We propose and evaluate an extension to AODV which makes use of continuous route optimization through an Alix route mechanism. The experimental results show that the proposed route optimization mechanism works well inspite of node mobility. The proposed algorithm can work harmoniously with any reactive routing protocols.

As a future work, we are planning to improve the proposed scheme in terms of both control traffic incurred and resulting gain in path optimality. Indeed, the proposed scheme detects the shortcuts, if any, only between the nodes which are located 2-hop away to each other. Therefore, as a next step, we would like to develop a route optimization scheme which is able to detect shortcuts between any pair of nodes on a connection. Finally, such a route optimization scheme can lead researchers to develop efficient local recovery protocols without worrying about the path optimality, which has been addressed as a problem in local recovery operations.

VII. REFERENCES


