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MOBILE IP AND MANET INTEGRATION: COCEPTUAL STUDY OF GATEWAY SELECTION BASED ON MOBILITY EFFECT AND ITS PROPERTIES

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ABSTRACT
Mobile Ad hoc network (MANET) is collection of mobile node that can communicate in limited range without any infrastructure. Every ad hoc network act as router, to search of destination address that is not connected directly. Limited range of the MANET create a problem for node to communicate globally and the nodes which are move out from the range of group. The feature of MANET is utilized properly when nodes are able to connect with infrastructure network using Mobile IP. Infrastructure and Infrastructure less network worked on different mechanism using different protocol. Common intermediate feature is required for communication between both network. Gateway is use to support the Hybrid mechanism for two different network. Gateway selection is very crucial part in the Mobile IP. We basically focus on the gateway selection and the parameters that affect the gateway selection. On the study it is found that these are some factors that may affect the overall performance. In the proposal work a novel gateway selection algorithm has to be designed which will be comprises Location Based Selection and Link Quality Estimation.

KEY WORDS: Mobile Ad hoc network, MANET, Mobility effect,

1. Introduction

MANET network are limited in small area and required feature to connect with Internet. Combined approach of communication may beneficial for MANET (Agrawal et al. 2003). Internet is widely used feature for communication which requires high cost for building a large number of bases and total throughput is limited by the number of cells in the area. This facility is not available everywhere, some time we require this feature in the area of emergency operation, betel field, with temporary bases which can provide by Mobile Ad hoc network. Combined approach of communication may beneficial for MANET Mobile IP can help in communication between different domains mobile host without any obstacle although an autonomous, stand-alone mobile ad hoc network is useful in many cases, a mobile ad hoc network connected to the Internet is much more desirable. To achieve this network interconnection, *gateways* that understand the protocols of both the mobile ad hoc network stack and the TCP/IP suite are needed. All communication between a mobile ad hoc network and the Internet must pass through the gateways

2. Infrastructure less Wireless Network (Ad hoc Network)

A wireless ad hoc network is a collection of wireless nodes that can dynamically self-organize into an arbitrary and temporary topology to form a network without necessarily using any pre-existing infrastructure. These characteristics make ad hoc networks well suited for military activities, emergency operations, and disaster recoveries. MANET employs its mobile nodes as a part of the networking system. Each node in MANET can act as an intermediate node, i.e. as a relay to forward packets of data and do routing functionality (Agrawal et al 2003).

2.1 Routing Protocols in MANET

Proactive (Table-Driven) Routing Protocols The benefit of these protocols is that a source node does not need route-discovery actions to find a route to a destination node. On the other factor that the problem of these protocols is maintaining a dependable and up-to-date routing table requires substantial messaging overhead, which consumes bandwidth and power, and decreases throughput, especially in the case of a large number of high node mobility. This

type of protocols, nodes keep one or more routing tables about nodes in the network. These routing protocols update the routing table information either periodically or in response to change in the network topology.

Reactive (On-Demand) Routing Protocols

In this type of protocols is an initialization of a route discovery mechanism by the source node to the destination node to find the route when the source node has data packets to send. When a route is found, the route maintenance is initiated to maintain this route until it is no longer required or the destination is not reachable. The advantage of these protocols is that overhead messaging is reduced. One of the drawbacks of these protocols is the delay in discovering a new route. The different types of reactive routing protocols are: Dynamic Source Routing (DSR)(Johnson et al, 2002) Ad-hoc On-Demand Distance Vector routing (AODV) (Perkins et al, 2002) and Temporally Ordered Routing Algorithm (TORA).

Hybrid Protocols

Hybrid protocols are the combinations of reactive and proactive protocols and it takes advantages of both the protocols and as a result, routes are found quickly in the routing zone. ZRP, GRP etc.

3. Mobile IP

In general, on the Internet, IP packets are transported from their source to their destination by allowing routers to forward data packets from incoming network interfaces to outbound network interfaces according to information obtained via routing protocols. The routing information is stored in routing tables. Typically the routing tables maintain the next-hop (outbound interface) information for each destination IP network.

The IP address of a packet normally specifies the IP client's point of attachment to the network. Correct delivery of IP packets to a client's point of network attachment depends on the network identifier portion contained in the client's IP address. Unfortunately, the IP address has to change at a new point of attachment. Altering the routing of the IP packets intended for a mobile client to a new point of attachment requires a new client IP address associated with that new point of network attachment. On the other hand, to maintain existing transport protocol layer connections as the mobile client moves, the mobile client's IP address must remain the same. In order to solve this problem, Mobile IP introduces two new functional entities within IP networks. Those are the Foreign Agent, FA and the Home Agent, HA (Perkins C.E., 1996).

These two new entities together with enhancements in the mobile node (the client) are the basic building blocks for a Mobile IP enabled network. The last entity for providing a full reference for a basic Mobile IP enabled network is the Correspondent Node, CN. The Correspondent Node is another IP entity e.g. an Internet Server with which the mobile node communicates (Deering, S. 1989). In the basic Mobile IP scenarios the Corresponding Node does not need to have any Mobile IP knowledge at all. This is an important distinction. To require that new devices that are introduced on the Internet to have new functionality is one thing – to require that all Internet servers and fixed clients should be upgraded is completely different. A Mobile IP enabled network requires the mobile nodes to be upgraded, it also requires new functions in the visiting and home networks; however it does not require upgrading of core Internet services. The basic entities constituting a MIP aware network are: The Mobile Node comprising the Terminal Equipment and the Mobile Termination· The Foreign Agent· The Home Agent. The Corresponding Node (Hamidian et al 2003 and Broch et al 1999).

4. Mobile IP and MANET Integration Using Gateway

The network consisting of multiple MANET, each of which has a point of attachment to the backbone Internet. The host connecting a MANET to the Internet is called the Gateway. Gateway is use to define the ranges of MANET. Each Gateway has two network interface cards one wireless and one wire line (El-Moshrify et al 2007)

We basically focus on the gateway selection and the parameters that affect the gateway selection. On the study it is found that these are some factors that may affect the overall performance. In the proposal work a novel gateway selection algorithm has to be designed which will be comprises of this factors
1-Location Based Selection
2-Link Quality Estimation

4.1 Location based selection-

The proposed scheme works as follows:

- Source node computes the arbitrary midpoint between an gateway node and the sink node by using location information.
- Source node establishes a shortest path from itself to the sink node through the reference axis by using a mobile agent with the help of location information; the mobile agent collects the connectivity information and other parameters of all the nodes on the way and provides the information to the sink node.
- Source node finds the arbitrary location of the special (middle) intermediate nodes (above/below reference axis) by using the midpoint location information gin step 1.
- Mobile agent clones from the source node and the clones carry the event type and discover the path passing through special intermediate nodes; the path above/below reference axis looks like an arc. While migrating from one sensor node to another along the traversed path, each mobile agent gathers the node information (such as node id, location information, residual energy, available bandwidth, and neighbors' connectivity) and delivers to the sink node.
- The sink node constructs a partial topology, connecting gateway and sink node by using the connectivity information delivered by the mobile agents. Using the partial topology information, sink node finds the multipath and path weight factor by using link efficiency, energy ratio, and hop distance.
- The sink node selects the number of paths among the available paths based upon the criticalness of an event.
- if the event is non-critical, then single path with highest path weight factor is selected, else multiple paths are selected for the reliable communication.

4.2 Link quality estimation based selection-

In this work, we propose a new link quality prediction metric associated with location based protocols to improve the selection of next hop, that consider both the link quality assessment based on the transmission success rate and the link quality assessment based on the prediction of the future locations of nodes. In order to measure the quality of a link, we want to obtain the expected transmission count (ETX) defined as the expected number of transmissions to successfully deliver one data packet to a receiver on the given link. We also thought to consider various link quality parameters to add and estimate the quality of links for proper gateway link establishment. The better the link quality the more chances of gateway selection.

5. Conclusion

In this paper I have studied the integration mechanism of Mobile IP with MANET for better performance and benefit of MANETA and proposed gateway selection method . Proposed novel gateway selection algorithm which is based on location based selection and link quality estimation based selection provide batter result compare to other method.

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