Adaptive Trust Based Intelligent Feedback Mechanism for Dynamic Services in MANET

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Abstract—MANET is a collection of wireless nodes that can dynamically form a network to exchange information without using any pre-existing fixed network infrastructure with or without centralized network controller. MANETs are becoming useful due to the existing wireless infrastructure is costly and not convenient now a days. MANET is becoming important part of next generation mobile services. The mobile nodes must co-operate at the routing level in order to forward packets to moderate the behavior in MANET. It is required to build the relationship between the mobile nodes in the MANET and select routes based on the trust. A dynamic feedback mechanism should be designed in which mobile nodes monitor the behavior of their neighbors and exchange information about other nodes in the MANET. We are proposing a intelligent system that address a novel approach that can cope with the network performance’s degradation problem by our Dynamic Intelligent Feedback protocol. The proposed system functions by reliable routing mechanism with the time to keep the network performance at the best level.

Keywords—Mobile Ad hoc Networks (MANETs), packet redundancy, routing protocols, Trust management, Delivery delay.

1. INTRODUCTION

Mobile ad hoc networks (MANETs) are autonomous systems of mobile hosts connected by wireless links. This kind of networks is becoming more and more important because of the large number of applications, such as personal networks of Laptops and PDA’s (Personal Digital Assistants), military applications, civil applications and emergency operations. To achieve efficient communication between nodes connected to the network various routing protocols are available. A mobile ad hoc network is a concept that has received a large attention in scientific research. A mobile ad hoc network is includes mobile routers (and associated hosts) connected by wireless links. The routers are free to move randomly and organize themselves arbitrarily; thus, the network’s wireless topology may change rapidly and
unpredictably. Such a network may operate in a stand-alone fashion, or may be connected to the larger Internet. MANETs are useful in many applications because they do not need any infrastructure support. Communications in smaller areas (building organizations, conferences, etc.) can be set up using MANETS. Communications in battlefields and disaster recovery areas are further examples of application environments. With the evolution of Multimedia Technology, Quality of Service in MANETs became an area of great interest. MANETs impose new constraints for its services. This is due the dynamic behavior and the limited resources of such networks. Mobile Ad Hoc Networks propose a dynamic model to support this paradigm. Devices setup temporary. Although lots of research has been done on supporting dynamic services in the MANET and other networks, they are not sufficient for mobile ad hoc networks and still more research and support for such networks remains an open problem.

Fig 1: Mobile AD-Hoc Network

Mobile nodes in MANET form a dynamic autonomous network. Nodes communicate with each other over the wireless medium without the intervention of centralized access points or base stations. Hence, they form a fully mobile infrastructure. Each node acts both as a router and as a host. Due to the limited transmission range of wireless network interfaces, multiple hops may be needed to exchange data between nodes in the network, which is why the literature sometimes uses the term multi-hop network for a MANET. It was also referred to as a packet radio network in the mid-1960. MANET are very user friendly because they can be rapidly deployed anywhere and anytime without the presence of fixed base stations and system administrators.

MANETs are putting a new era of more efficient wireless solution for infrastructure less network. As we know that setting up and maintaining the infrastructure setup quiet expensive and does not fulfill main requirement of mobility and connectivity due to frequent disconnection among the nodes while a ad-hoc network require a very less effort and cost efficient in setting up the network and maintaining it for along time. MANETs are more significant with some valuable features providing for a network which can be up for more time and have less often failed links. It can set up in less time and provide a easy approach to communicate to other network and share the data to anyone through internet.

2. RELATED WORKS

Mobile Ad-hoc Network (MANET) is a self configuring communications network of mobile devices connected by wireless medium. Ad hoc is a Latin word and means "for this purpose". MANET devices are free to mobile independently in any way. This leads to frequent changes in links to other devices. The main challenges in MANET are to track the information about movement and data transfer among the nodes. This information helps in deciding the correct route and formation of source to destination routing path. MANET networks may manage by themselves or may be linked to the internet. MANET finds applications in military, business and establishing a new communication instantly after a tragedy occurs like an earth quake. [1] For the connectivity among through wireless medium, MANET is very popular. The routing protocols in MANET are divided into three ways, namely pro-active, reactive and hybrid routing protocols. The nodes present in the
Due to the frequent changes in network topology and the lack of the network resources both in the wireless medium and in the mobile nodes, mobile ad hoc networking becomes a challenging task. As a result, routing in such networks experiences link failure more often than infrastructure-based network. Hence, a routing protocol that supports ad hoc networks requires considering the reasons for link failure to improve its performance. [2] Link failure results from node mobility and lack of the network resources. Therefore it is essential to analyze the characteristics to identify the quality of links. Furthermore, the routing protocols must be adaptive to cope with the time-varying low-capacity resources. [6] For instance, it is possible that a route that was earlier found to meet certain requirements no longer does so due to the dynamic nature of the topology. In such a case, it is important that the network intelligently adapts the session to its new and changed conditions. Quality of service means providing a set of service requirements to the flows while routing them through the network. For mobile ad hoc wireless networks, with time-varying low-capacity resources, the notion of being able to meet specific application requirements such as delay is not plausible. [10] Hence, the definition may not be valid for mobile ad hoc networks since even the Internet today, with high-speed high-quality fixed communication links, is unable to deliver guaranteed end-to-end services. The presence of mobility implies that links make and break often and in an undetermined fashion. This dynamic nature makes routing and consequently support in these networks fundamentally different from fixed networks. Further, since the quality of the network in terms of available resources reside in the wireless medium and in the mobile nodes: e.g. buffer and battery state varies with time. It has to be mentioned that a QoS Model does not define specific protocols or implementations. Instead, it defines the methodology and architecture by which certain type of services can be provided in the network.[10] Integrated services and Differentiated services are the two basic architectures proposed. Integrated Services architecture allows sources to communicate their requirements to routers and destinations on the data path by means of a signaling protocol such as RSVP.

With rapid development of wireless technology, the Mobile Ad Hoc Network (MANET) has emerged as a new kind of wireless network. MANET is a collection of wireless mobile nodes (e.g. laptops) that dynamically function as a network without the use of any existing infrastructure and centralized administration. It is an autonomous system where each node operates not only as an end system but also as a router to forward packets for other nodes. Since the nodes in MANET move around, the wireless links break and re-establish frequently. Furthermore, most of mobile nodes are resource limited in computing capability and battery power and therefore traditional computing content routing protocols are not suitable for MANET. Several ad hoc routing protocols have been proposed for each node acting as router and maintaining routing information. There are many other
applications of MANET. For examples, MANET can be used to provide emergency services when the network is impaired due to the damaging of existing infrastructure. Computer scientists have predicted a world of ubiquitous computing in which computers will be all around us, constantly performing mundane tasks to make our lives a little easier. These ubiquitous computers connect in mobile ad hoc mode and change the environment or react to the change of the environment where they are suited. MANET is also found useful in the so-called sensor dust network to coordinate the activities and reports of a large collection of tiny sensor devices which could offer detailed information about terrain or environmental dangerous conditions. These two modes concern whether or not nodes in an ad hoc network should keep track of routes to all possible destinations, or instead keep track of only those destinations of immediate interest. Proactive protocols store route information even before it is needed. This kind of protocols has advantage that communications with arbitrary destination experience minimal delay. However it also suffers from the disadvantage that additional control traffic is needed to continually update stale route information. This could significantly increase routing overhead especially for the MANET where the links are often broken. Reactive protocols, on the contrary, acquire routing information only when it is actually needed. However, the latency of the communication increases tremendously especially when a node communicates to another at the first time. [1][3]

3. RESEARCH ISSUES & CHALLENGES:
Mobile Ad-hoc Network is created by the nodes which are moving and changing locations every time. These nodes need some resource requirement for transferring information such as user related data, location information network information and most important continue movement. The resource required for all this activity is provides by the small availability of resources such as for battery, mainly attached with the devices. Since nodes have variable resource repository so they are force to fetch the requirement from available storage. It leads to develop innovative ideas that make MANET a resource aware network so that it can provide more reliable and fast network for a longer period. Network services in Mobile ad hoc network do not only dependent on available resources but also the mobility pattern and rate of mobile nodes. This is because mobility may result in link failure which in turn may result in a broken path. Furthermore, mobile ad hoc networks potentially have less resource than fixed networks. Therefore, more efforts are required to capture the better services between nodes. MANET’s offered services always face problem with resources having more time variation and low capacity. It is hard to provide dynamic services. So it is required to make services adaptable to time variation and low capacity of resources. As a result, the service quality that an application requires depends on the quality of the network. This network quality should cooperate with the available resources in the wireless medium and in the mobile nodes in the network as well. Stability of resources is also very important factor while providing services. It is also required to build the relationship among the nodes. Selection of best routes should be decided on the basis of a trust among the mobile nodes. Forwarding data among nodes without any verification of destination will create many problems. Some problems are unauthorized access of services from unwanted malicious nodes. To identify of these problems a better mechanism is required to provide a best path and selection of best route through the existing or new routing protocols. There is various mechanisms available to provide better dynamic services in MANET but still there are lot of scope available in
improvement of the dynamic services propagation in MANET.

The Mobile Ad-hoc Network recent development in improving communication among nodes give birth to the reliable and secure networking where user enjoy the more efficient services at anytime and without worrying of their movement. These services include traditional services such as internet browsing and media streaming. However, these scenarios sometimes need support of fixed infrastructures. Unpredictable coverage of radio waves in the air medium leads to the short and unpredictable coverage of radio waves. It is desired that establishment of MANET should be carefully designed and deployed. The design and deployment of MANET is a major hindrance in providing a platform for dynamic application. Dynamic application provides a platform for users to discover and possibly share resources, independently on their location.

4. SYSTEM MODEL:

In our research work, we have developed an intelligent system that is capable of the selection of the routing protocol to address a novel approach that can cope with the network performance’s degradation problem. For the proposed system, we have developed an intelligent protocol that uses an intelligence feedback mechanism according to the networking perspective. Our networking protocol uses a dynamic feedback method. This mechanism will helpful in analyzing the node’s behavior in MANET. As we know that MANET is formed through the collection of mobile nodes that are moving here and there. This mobility is main challenge in developing

and improvement in ad-hoc networking.

Sometimes when a node selects a path to transfer the data to destination nodes and it is being experienced that sudden broken path. It leads to dropping of data and we experienced a degraded MANET performance. To overcome this situation, a mechanism is required to avoid such condition or if it occurs then there should be some facility for providing alternate route. Some research suggests that when a link is broken then the node should buffer the data and wait for a alternative route formation to the destination node. A better approach is available that formed the link on the basis of trust among the nodes. Our research works follow the routes formation strategy in which routes are selected on the basis of trust relationship between the mobile nodes in the MANET. The parameters selected to describe the networking perspective are the network size and average mobility. Our proposed system functions by reliable routing mechanism with the time to keep the network performance at the best level. The parameters selected to describe the network context were the network size, packet loss, average delay, link failure and average mobility. The proposed system then functions by varying the routing mechanism with the time to keep the network performance at the best level. The selected protocol has been shown to produce a combination of higher throughput, lower delay, fewer retransmissions attempts, less data drop, and lower load. Hence it is helpful to
provide optimized dynamic services in MANET.

5. CONCLUSION

Mobile ad hoc networking is a challenging domain due to the lack of infrastructures and resources which frequently changes in network topology. This makes it more difficult to provide services in MANET. Our proposed intelligent system will address the selection of the efficient route formation that will improve the performance in order to provide more effective dynamic services among the mobile nodes of MANET. It also provides reliable routing mechanism which will be helpful in finding the best path before the services start to negotiate. The proposed system will vary the routing mechanism with the time to keep the network performance at the best level produce higher throughput; lower delay, fewer retransmissions attempts, less data drop, and lower load in MANET.

This research focus on providing a dynamic feedback mechanism algorithm that can dynamically adjust the route formation and avoid the formation of less reliable route. More reliable route formation is helpful in providing reliable-services in MANET. Our approach also decreases the effects of the packet loss rate among the nodes. It also help to discover best route with minimum cost to maximize the Packet Delivery Ratio and minimize routing overhead and the average end-to-end delay.

REFERENCES:


