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A PATH FOR HORIZING YOUR INNOVATIVE WORK

EVOLUTION OF MANET AND CLUSTERING

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Abstract: Now a days there is extreme requirement of clear and proper way communication. But there is always problem in communication while user is mobile. In MANET end users have to switch from one network to another because of their movable characteristic which consumes energy that affects clear communication. For that a good network topology is required which will optimize the energy consumption. In mobile ad hoc network hierarchical approach and distributed approach are more practical as compared to the flat architecture. Energy efficiency in mobile ad hoc network is very important

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INTRODUCTION

MANET stands for Mobile Ad hoc Network. It is a robust infrastructureless wireless network. A MANET can be formed either by mobile nodes or by both fixed and mobile nodes. Nodes randomly associate with each other forming arbitrary topologies[10]. They act as both routers and hosts. The ability of mobile routers to self-configure makes this technology suitable for provisioning communication to, for instance, disaster-hit areas where there is no communication infrastructure, conferences, or in emergency search and rescue operations where a network connection is urgently required. The need for mobility in wireless networks necessitated the formation of the MANET working group within The Internet Engineering Task Force (IETF) for developing consistent IP routing protocols for both static and dynamic topologies [10].

Networking

To cope with the self-organizing, dynamic, volatile, peer-to-peer communication environment in a MANET, most of the main functionalities of the Networking protocols (i.e., network and transport protocols in the Internet architecture) need to be re-designed. In this section we provide an outline of the main research issues in these areas, and survey the existing literature. The aim of the networking protocols is to use the one-hop transmission services provided by the enabling technologies to construct end-to-end (reliable) delivery services, from a sender to one (or more) receiver(s)[2]. To establish an end-to-end communication, the sender needs to locate the receiver inside the network. The purpose of a location service is to dynamically map the logical address of the (receiver) device to its current location in the network. Current solutions generally adopted to manage mobile terminals in infrastructure networks are generally inadequate, and new approaches have to be found. Once, a user is located, routing and forwarding algorithms must be provided to route the information through the MANET. Finally, the low reliability of communications (due to wireless communications, users mobility, etc.), and the possibility of network congestion require a redesign of Transport Layer mechanisms The paper is organized as follows in section2 we explain MANET evolution .In section 3 we explain clustering. In section 4 Discuss conclusion.

II . MANET evolution

Historically, mobile ad hoc networks have primarily been used for tactical network related applications to improve battlefield communications /survivability. The dynamic nature of military operations means that military cannot rely on access to a fixed pre-placed communication infrastructure in battlefield. Pure wireless communication also has limitation in

that radio signals are subject to interference and radio frequency higher than 100 MHz rarely propagate beyond line of sight (LOS) [4]. Mobile ad hoc network creates a suitable framework to address these issues by providing a multi-hop wireless network without pre-placed infrastructure and connectivity beyond LOS. Early ad hoc networking applications can be traced back to the DARPA Packet Radio Network(PRNet) project in 1972 [4], which was primarily inspired by the efficiency of the packet switching technology, such as bandwidth sharing and store and forward routing, and its possible application in mobile wireless environment. PRNet features a distributed architecture consisting of network of broadcast radios with minimal central control; a combination of Aloha and CSMA channel access protocols are used to support the dynamic sharing of the broadcast radio channel. In addition, by using multi-hop store-and-forward routing techniques, the radio coverage limitation is removed, which effectively enables multi-user communication within a very large geographic area. Survivable Radio Networks (SURAN) were developed by DARPA in 1983 to address main issues in PRNet, in the areas of network scalability, security, processing capability and energy management. The main objectives were to develop network algorithms to support a network that can scale to tens of thousands of nodes and withstand security attacks, as well as use small, low-cost, low-power radios that could support sophisticated packet radio protocols [4]. This effort results in the design of Low-cost Packet Radio (LPR) technology in 1987 [2], which features a digitally controlled DS spread-spectrum radio with an integrated Intel 8086 microprocessor-based packet switch. In addition, a family of advanced network management protocols was developed, and hierarchical network topology based on dynamic clustering is used to support network scalability. Other improvements in radio adaptability, security, and increased capacity are achieved through management of spreading keys [1]. Towards late 1980s and early 1990s, the growth of the Internet infrastructure and the microcomputer revolution made the initial packet radio network ideas more applicable and feasible [4]. To leverage the global information infrastructure into the mobile wireless environment, DoD initiated DARPA Global Mobile (GloMo) Information Systems program in 1994 [3], which aimed to support Ethernet-type multimedia connectivity anytime, anywhere among wireless devices. Several networking designs were explored; for example Wireless Internet Gateways (WINGs) at UCSC deploys a flat peer-to-peer network architecture, while Multimedia Mobile Wireless Network (MMWN) project from GTE Internetworking uses a hierarchical network architecture that is based on clustering techniques. Tactical Internet (TI) implemented by US Army at 1997 is by far the largest-scale implementation of mobile wireless multi-hop packet radio network [4]. Direct-sequence spread-spectrum, time division multiple access radio is used with data rates in the tens of kilobits per second ranges, while modified commercial Internet protocols are used for networking among nodes. It reinforces the perception that commercial wire line protocols were

not good at coping with topology changes, as well as low data rate, and high bit error rate wireless links [5].In 1999, Extending the Littoral Battle-space Advanced Concept Technology Demonstration (ELB ACTD) was another MANET deployment exploration to demonstrate the feasibility of Marine Corps war fighting concepts that require overthe-horizon (OTH) communications from ships at sea to Marines on land via an aerial relay. Approximately 20 nodes were configured for the network, Lucent_s WaveLAN and VRC-99A were used to build the access and backbone network connections. The ELB ACTD was successful in demonstrating the use of aerial relays for connecting users beyond LOS. In the middle of 1990, with the definition of standards (e.g., IEEE 802.11 [6]), commercial radio technologies have begun to appear on the market, and the wireless research community became aware of the great commercial potential and advantages of mobile ad hoc networking outside the military domain. Most of the existing ad hoc networks outside the military arena have been developed in the academic environment, but recently commercially oriented solutions started to appear .

III. Clustering

Any device with a microprocessor can in principle be an ad hoc network node. Supporting a large number of heterogeneous users is thus a requirement for future ad hoc networks. In a large network, flat routing schemes produce an excessive amount of information that can saturate the network. In addition, given the nodes heterogeneity, nodes may have highly variable amount of resources, and this naturally produces a hierarchy in their roles inside the network. Nodes with large computational and communication power, and powerful batteries are more suitable for supporting the ad hoc network functions (e.g., routing) than small embedded-systems. Cluster-based routing is an interesting solution to address nodes heterogeneity, and to limit the amount of routing information that propagates inside the network. The basic idea behind clustering is to group the network nodes into a number of overlapping clusters. This enables the aggregation of the routing information, and consequently increases the routing algorithms scalability. Specifically, clustering makes possible a hierarchical routing in which paths are recorded between clusters (instead of between nodes); this increases the routes lifetime, thus decreasing the amount of routing control overhead [7]. Clustering was introduced in 1980s to provide distributed control in mobile radio networks [8]. In its original definition, inside the cluster one node is in charge of coordinating the cluster activities (cluster head). Beyond the cluster head, inside the cluster, we have ordinary nodes that have direct access only to this one cluster head, and gateways, i.e., nodes that can hear two or more cluster heads [8]. A simple clustering distributed algorithm is based on the nodes identifier (ID). By assuming that a distinct ID is associated to each node, the node with the

lowest ID (in a neighborhood) is elected as the cluster head [9]. This guarantees that two clusterheads cannot hear each other. As all nodes in the cluster can hear the clusterhead, all inter-cluster communications occur in at most two hops, while intra-cluster communications occurs through the gateway nodes. Ordinary nodes send the packets to their clusterhead, that either distributes the packets inside the cluster, or (if the destination is outside the cluster) forwards them to a gateway node to be delivered to the other clusters. By replacing the nodes with clusters, existing routing protocols can be directly applied to the network. Only gateways and clusterheads participate in the propagation of routing control/update messages. In dense networks this significantly reduces the routing overhead, thus solving scalability problems for routing algorithms in large ad hoc networks. These strategies mainly differ in the criteria used to organize and maintain the cluster. Clusterheads act as local coordinators, and in addition to support packets routing and forwarding, they may resolve channel scheduling, perform power measurement/control, maintain time division frame synchronization, [9,10]. For example, CDMA/TDMA techniques can be applied inside ad hoc networks by assigning a different code to each cluster, and using inside each cluster a TDMA scheduler managed by the clusterhead [9]. A clusterhead concentrates the traffic of a cluster, and as a consequence it may become a cluster bottleneck. This problem can be avoided by eliminating the clusterhead role, and adopting a fully distributed clustering approach .A key point in the use of clustering techniques in a mobile environment is the maintenance of the network topology (i.e., nodes grouping, and identification of clusterheads, and gateways, if necessary) in the presence of various network events (mainly, the nodes_ mobility). The clustering strategies proposed in the literature, generally apply static criteria for the implementation of clustering algorithms without taking directly into consideration the node mobility. Node mobility is a critical point because the membership of a node to a cluster changes over time due to the node mobility. Rearrangement of clusters may introduce excessive overheads that may nullify clustering benefits. To cope with the mobility problem, in [11] the node mobility is directly included inside the; tÞ-Cluster clustering algorithm. The objective of tÞ-Cluster is to create and maintain a topology that adapts to node mobility. Specifically, tÞ-Cluster partitions the network into clusters that provide some guarantees on the path stability with respect to nodes mobility. In detail, the nodes belonging to a cluster are expected to be reachable along paths internal to the cluster, and these paths have a lower-bounded availability, i.e., they are expected to be available for a period of time t, with a probability Pa [11]. Intra-cluster routing can be implemented with proactive algorithms, while inter-cluster routing is based on a on demand protocol.

IV. CONCLUSION

In coming years, mobile computing will keep flourishing, and an eventual seamless integration of MANET with other wireless networks, and the fixed Internet infrastructure, appears inevitable. Ad hoc networking is at the center of the evolution towards the 4th generation wireless technology.

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