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Increased Throughput In MANETS With The Heterogeneous Environment

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Abstract: Mobile ad hoc network (MANET), flexible and self-autonomous wireless network architecture, is very promising to find many important applications in the daily information exchange, disaster relief, military troop communication, etc. In MANETS for long life and reliability the throughput capacity must be increased. This work deals the per node throughput capacity of a MANET, where the transmission power of each node can be controlled to adapt to a specified transmission range and a generalized two-hop relay with limited packet redundancy f is used for packet routing. Based on the concept of automatic feedback control and the Markov chain model, an Inter-MANET Routing protocol called InterMR that can handle the heterogeneity and dynamics of MANETs is used. First it defines an Inter-MANET address scheme based on a variety of node attributes .Next the contribution is to provide a seamless routing mechanism across heterogeneous MANETs without modifying the internal routing mechanisms in each MANET, by packet-level simulation, that the performance of InterMR will be improved by adaptive gateway assignment functionalities. From the routing values the throughput parameters is obtained. Increasing the transmission power of the nodes with this routing mechanism improves the capacity, and even at high packet rate increased throughput can be achieved.

Keywords: Throughput, InterManet Routing, Mobility model, Heterogeneous Network

I Introduction

Mobile ad hoc network (MANET), flexible and self-autonomous wireless network architecture, is very promising to find many important applications in the daily information exchange, disaster relief, military troop communication, etc. By now, the lack of a general Shannon limit like network capacity theory is still a challenging roadblock stunting the development and commercialization of Manets[1],[2].It is helps to understand the fundamental network throughput limit and thus serves as an instruction guideline for the network design, performance Optimization. The i.i.d. mobility model, it is possible to achieve a per node throughput by employing a two-hop relay scheme [6]. The per node throughput can also be achieved under other mobility models, like the random walk model ,the two-dimensional Brownian motions model and the restricted mobility model [8] . Now it is explored that the exact capacity for the MANETs based on a specific two-hop relay routing algorithm with limited packet redundancy, i.e., a limited number of copies can be dispatchedfor each packet, and further extended capacity analysis to the scenario where each transmitter is allowed to conduct multiple rounds of probing for identifying a possible receiver [10] .Closed-form models has also been developed for achievable throughput analysis in a directional antenna-based MANET.In addition, at the technical level, drastically differentrouting protocols with different routing philosophies haveextensively deployed in MANETs. For example, one MANETmay run a reactive routing protocol whereas another MANET runs a proactive or geo-routing protocol. A viable inter-MANET routing solution must be able to bridge the gapbetween such diverse protocols and support interoperabilityamong MANETs without requiring internal routing protocolsto be changed.The [7] paper was the first attempt to identify the challengesof inter-MANET routing and to provide a high level design ofan inter-MANET routing framework.

II. RELATED WORK

Numerous techniques has been defined to increase the throughput in MANETs. Various mobility models and routing schemes are used to increase throughput in heterogeneous environment .Recently, Liu et al.[18] explored the exact capacity for the MANETs based on aspecific two-hop relay routing algorithm with limited packetredundancy, i.e., a limited number of copies can be dispatchedfor each packet, and further extended capacity analysis to thescenario where each transmitter is allowed to conduct multiplerounds of probing for identifying a possible receiver [19].It is noticed that the capacity results in [18]–[19] holdonly when the packet redundancy is smaller than a specificvalue (i.e., falls within a restricted range); while in [14], [16],the capacity was derived without considering the importantinterference, medium contention and traffic contention issues. Since it is generally believed thatthe local transmission mode could result in the maximum pernode throughput capacity, these work generally adopt the localtransmission mode in their analysis, where either each nodehas a small transmission range [12],[13], [15], or it can only transmit to some other node(s) inthe same cell [7], [8], [14]. Therefore, the throughput capacityunder a general setting of node transmission range remainsunknown by now. Numerous routing protocols have been developed in thewireless networking community to target various scenarios, andmuch research effort has been paid to study the taxonomy of adhoc routing protocols and to survey the representative protocols in different categories For example, Boukerche et al.providesthe comprehensive summary of the routingprotocols for MANETs. Unfortunately, most of the existingprotocols are limited to homogenous networks and performineffectively in power heterogeneous networks.There are some routing protocols for heterogeneousMANETs. Multiclass (MC) [12] is a position-aided routingprotocol for power heterogeneous MANETs. The idea of MC isto divide the entire routing area into cells and to select a highpowernode in each cell as the backbone node (B-node). Then,a new medium access control (MAC) protocol called hybridMAC (HMAC) is designed to cooperate with the routing layer.Based on the cell structure and HMAC, MC achieves betterperformance. However, a fixed cell makes MC to work wellonly in a network with high density of high-power nodes. In[13], a cross-layer approach is presented that simultaneouslyextends the MAC and network layers to minimize the problemscaused by link asymmetry and exploits the advantagesof heterogeneous MANETs. Hierarchical optimized link staterouting (HOLSR) [14] is a routing protocol proposed to improvethe scalability of OLSR for large-scale heterogeneousnetworks. In HOLSR, mobile nodes are organized into clustersaccording to the capacity of a node. However, if the node is athigher hierarchy, then it needs to maintain more information. In[10], a cross-layer-designed device–energy–load aware relaying(DELAR) framework that achieves energy conservation frommultiple facets, including power-aware routing, transmissionscheduling, and power control, is proposed. DELAR mainlyfocuses on addressing the issue of energy conservation inheterogeneous MANETs.Dressler et al.propose a distributed hash table (DHT) based inter-MANETrouting in ad hoc networks by surrendering the control of underlyingrouting protocols of MANETs [11]. In the literature, there have been several proposals to enablecommunication among heterogeneous routing protocols for different purpose. For example, SHARP [20] uses bothproactive and reactive routing protocols to adapt differenttraffic patterns and improve performance. The basic idea ofSHARP is to createproactive routing zones around the nodeswith lots of data traffic, and use reactive routing in otherareas. Although the hybrid routing protocols enable communicationbetween proactive and reactive routing protocols, theyrequire nodes to be controlled by the same administrativepolicies and do not support autonomous operations by multipleMANETs. Thus they do not provide a systematic solutionto interoperability among multiple MANETs with differentrouting protocols. Our proposal consider both the throughput and routing for heterogeneous environment

III. SYSTEM ASSUMPTIONS AND DEFINITIONS

We define a MANET asa logical grouping of mobile nodes, where all the nodes in the same MANET employ the same wireless PHY/MAC androuting protocols and are governed by a single administrativeentity. We assume that only the nodes in the same MANETcan directly communicate with each other without the supportof Inter MR; direct communication between nodes in different MANETs may not be allowed due to policy constraints not just because of differencein network technologies The mobility model is designed to describe the movement pattern of mobile users, and how their location, velocity and acceleration change over time.

A. RANDOM WAYPOINT MODEL

The Random Waypoint Model was used, it became a 'benchmark' mobility model to evaluate the MANET routing protocols, because of its simplicity and wide availability.As the simulation starts, each mobile node randomly selects one location in the simulation field as the destination. It then travels towards this destination with constant velocity chosen uniformly and randomly from [0,V], where the parameter V is the maximum allowable velocity for every mobile node[6]. The velocity and direction of a node are chosen independently of other nodes. Upon reaching the destination, the node stops for a duration defined by the 'pause time' parameter . If T=0, this leads to continuous mobility. After this duration, it again chooses another random destination in the simulation field and moves towards it. The whole process is repeated again and again until the simulation ends

B. INTRA-MANET TOPOLOGY CHANGE DETECTION:

One of the key characteristics of a MANET is dynamicnetwork topology, and thus we need to handle this issue when designing an inter-MANET routing protocol. There are two types of topology changes. First, nodes belonging to a singleMANET can become partitioned into multiple sub-MANETsdue to node mobility. Such a topology change must be detectedby gateways in each sub-MANET. If the underlying routingprotocol of the MANET is proactive, the partition will bedetected automatically by the underlying routing protocol. To support change detection within asingle MANET, we define a sub-protocol called i-InterMR,by which gateways maintain soft state of MANET topologyvia periodic beacons. Failure to receive a beacon indicatesa partition. It should be noted that this probing only detectspartitions involving active gateways.

C. INTER-MANET TOPOLOGY CHANGE DETECTION:

The second type of the topology change is the MANET-level topology change. For instance, the neighboring MANETs of MANET A may change from MANET B, C, D to D, E due to node movement. As MANETs dynamically move, gateways in each MANET are required to detect new neighboring MANETs and start exchanging routing information with them and retire old inter-MANET routing entries. To handle this, we designanother sub-protocol called e-InterMR which is used to maintainand discover inter-MANET topology changes via inter-MANET beacons and propagation of inter-MANET routinginformation (e.g., routing entries of destinations in otherMANETs). For this we require gateways to maintain directconnectivity with adjacent gateways of other MANETs. Wenote that the beacon periods of both i-InterMR and e-InterMRcan be adaptively determined based on the dynamicity oftopology changes.

IV EXISTING MODEL

The main contributions of the existing model are summarized as follows: First, the packet dispatching at the source and the packet receiving at the destination is modelled as Markov chains. Then apply the concept of automatic feedback control to characterize the service rate adaptation between the source and the destination. Then develop a general framework to depict the complicated packet delivery process in the challenging MANET.With the help of the theoretical framework, thendevelop the exact per node throughput .Simulation results are alsoprovided to validate the throughput capacity result Based on the new throughput result, theoptimalcapacity and its variation to

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achieve the possible maximum throughput capacity is achieved.

A. NETWORK ,COMMUNICATION AND TRAFFIC MODEL

Here a two-dimensional cell-partitioned unit torus with nindependent mobile nodes is defined. Time is slotted, and in order to exclusively exploreand thus clearly illustrate the impact of transmission range on per node throughput capacity, also assume a limited channel bandwidth such that the total number of bits that can be transmitted per time slot is fixed and normalized to one packet. Further assume that during each time slot each node has the knowledge about which cell it resides in based on its location To account for the interference among simultaneous transmissions, the Protocol adopted here. For a link i at time slot t, we use Ti (t) and Ri (t) to denote the positions of the corresponding transmitter and receiver, respectively. Based on the Protocol model, the transmission of the link i can be successful at the time slot t if for any other link j with simultaneous transmission,

$$Tj(t) - Ri(t)| \geqslant (1 + \Delta)|Ti(t) - Ri(t)$$

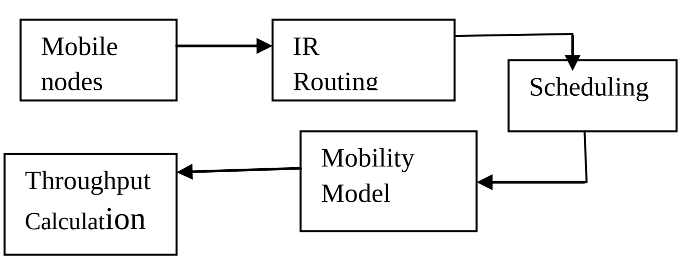
Here permutation traffic model is considered. Under such traffic model, there will be in total n distinct flows, where each node is the source of its locally generated traffic flow and at the same time the destination of a flow originated from another node. The packet arrival process at each node is independent of the mobility process and packets arrive at the beginning of a time slot. For the purpose of throughput capacity analysis, we assume that no lifetime is associated with each packet and the buffer size at each node is large enough (or infinite) such that the packet loss due to buffer overflow will never happen.

B. ROUTING AND SCHEDULING

2HR-f routing scheme is used .Here, consider a generalization of the classic two-hop routing scheme with f-cast (2HR-f) $f \in [1, n - 2]$, where each packet waiting at the source is delivered to at most fdistinct relay nodes and should be received in order at destination. Transmission group based scheduling is used, where transmission group is a subset of cells, where any two of them have a vertical and horizontal distance of some multiple of α cell and all of them could conduct transmissions simultaneously.

V. INCREASED THROUGHPUT BY IR ROUTING:

The proposed framework describes about the routing techniques and mobility patterns for the increased throughput. And also one can transmit the packets without delay.



The throughput capacity for MANETS is defined with this system. This work can be extended to develop an energy efficient heterogeneous pattern of throughput.. In this model each mobile node observes movement patterns defined in all constituent models.Heterogeneous model comprises of random way point, Gauss Markov and other models and each node in the model moves in patterns defined by all models such that nodes final position of scenario is linked to the initial position of the scenario. It aims to derive the per node throughput capacity of the 2HR-f under a more general scenario in which each packet is of limited lifetime and each node has constrained buffer space, and thresholds of packet lifetime and buffer size there. The packet delay will also be considered.The Packet delivery is monitored during transmission from source to destination. The nodes mobility pattern is achieved by Random waypoint model and more accuracy in mobility can be achieved by gauss markov model. Then we present detailed design of a practical Inter-MANET Routing protocol called InterMR to support interoperabilityacross heterogeneous MANETs.Then a novel distributed algorithm to dynamicallyelect active gateways so that we can maximize theinter-MANET connectivity when the network topologychanges due to node mobility are defined.With the help of these techniques the throughput is increased in MANETS with heterogeneous environment.

IV CONCLUSION

In this work, we define a novel inter-MANET routingprotocol to support communication across heterogeneous MANETs inorder to increase the throughput. With this routing the throughput is increased and estimated by mobility model. In particular, we identifiedseveral major challenges, namely lack of a name server,dynamic network topology change, non-existence of well defined boundaries, and heterogeneous intra-MANET routingprotocols.results we showed that our protocol provides effective inter-MANET communication among heterogeneous.MANETs, andparticularly that the dynamic gateway election scheme significantlyperforms better than the static mechanism also here it mainly focuses on heterogeneous environment.

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