A Review on Evaluation of Routing Protocols using Wireless Mobile Ad-hoc Networks

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Abstract - Mobile Ad hoc Network is a collection of wireless mobile nodes dynamically forming a temporary network without the aid of any established infrastructure or centralized administration. Many routing protocols are proposed in Mobile Ad-hoc Network. There is a necessity to investigate the performance of MANETs under a number of different protocols with various mobility models. In this paper we are considering the performance evaluation of different routing protocols (AODV, DSR, DSDV, ZRP) in the presence of different network loads and differing mobility models. In this paper we were doing the study of Reactive, Proactive and Hybrid protocols with various mobility models. This paper focuses on the evaluation of performance with respect to various parameters such as packet delivery ratio, average end to end delay, jitter and throughput. In this our finding show that the Influence of Mobility Models on the Performance of Routing Protocols in Wireless Mobile Ad-hoc Networks using NS-2 simulator.

Keywords: MANET, routing protocols, mobility model, NS-2.

I. INTRODUCTION (SIZE 10 &BOLD)

This paper focuses on the analysis of different routing protocol under different mobility models. A MANET is characterized by a self configuring infrastructure less architecture, which can handle the communications in a highly dynamic network topology. In MANETs nodes are free to move randomly and join or leave the network when at their will. Since the medium of the communication is wireless, only limited bandwidth is available.

In MANETs, mobile nodes (MNs) operate as routers and end-system connecting points in order to forward packets while moving about, change location frequently and also organize them into a temporary 'ad-hoc' network. Because of this, MANETs can offer a larger degree of freedom at a considerably lower cost than other networking solutions. The main objective of this paper is that, we have created a solid attempt to study the performance of DSR, AODV, DSDV routing protocols over different types of mobility model such as RWM, RPGM, GMV, CMM with respect to various parameters such as packet delivery, average end to end delay, jitter and throughput. In this paper our finding show that the influence of mobility models on the performance of routing protocols in wireless mobile ad-hoc network using NS-2simulator.

Keeping mobility feature of the nodes it is essential to decide a suitable routing protocol based on the network environment [1]. Here nodes are mobile and are moving with random direction and random speed so to get a route between a source and destination node is an important issue. The prediction of path duration for a selected path is not easy, as it depends on several parameters such as the position and number of relay nodes, their velocity, direction of movement etc. Whenever a route becomes invalid, a mobile node has to find a new route to the
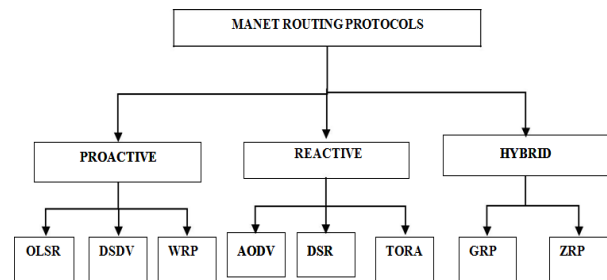

Fig: Types of MANET routing protocols

II. LITERATURE REVIEW

Abdul Hadi Abd Rahman and Zuriati Ahmad Zukarnain analysed on three protocols AODV, DSDV and I-DSDV were simulated using NS-2 package and were compared in terms of packet delivery ratio, end to end delay and routing overhead in different environment; varying number of nodes, speed and pause time. Simulation results show that I-DSDV compared with DSDV, it reduces the number of dropped data packets with little increased overhead at higher rates of node mobility but still can't compete with AODV in higher node speed and number of node[1].

They compared for 20, 30, and 75 nodes only. They

considered performance evaluation of routing protocol and they shows that TORA and DSR shows the better result as compared to AODV and DSDV routing protocol.

Adam Macintosh, Ming FeiSiyau and Mohammed Ghavami suggested examining through simulation the fundamental factors, mobility models and transmission power which have a major impacts on the performance of position based routing protocols[2][3]. He analyses the effect of the transmission power of on the performance of protocols under two different mobility models. Using NS-2 simulation tool, results show the evaluation and performance of the proposed protocol under a unified simulation environment for different scenarios[4].

Santosh Kumar, S.C.Sharma, Bhupendra Suman evaluated the impact of mobility models with different scalability of networks on MANET routing protocols. This paper evaluates the impact of three mobility models i.e. File Mobility model (FM), RWPM model and RPGM model on proactive routing protocols only. FM model and RWPM are in the same group of routing protocols. The performance of any routing protocol depends on the duration of interconnection among the nodes in the networks. This interconnections results an average connected path for whole network [5].

In recent studies , Samir M. Said, Ibrahiem M. M. El Emary and Shatha Kadim have compared AODV and DSDV with only RWPM model under different parameters. They concluded that the AODV gives less fluctuation results and better performance as compared with DSDV, with respect to some identified parameters like routing overhead, throughput, end-to-end delay. In this, performance evaluation of both proactive wireless routing protocol destination sequenced distance vector (DSDV) and reactive protocols ad-hoc on demand distance vector (AODV) with continuous bit rate (CBR) traffic is executed using NS-2 simulator[7][8]. The research work mainly focuses on the protocols behaviour on different mobility. The performance differentials are analyzed with varying network load and mobility. Random waypoint model is used to create mobility model for this research work. Two types of simulation work on mobility are done under same simulation environment, which make it more closely to evaluate the performance of routing protocols. In total five performance metrics are measured to conclude this paper. It demonstrates that even though both protocols share distance vector characteristics, the individuality of protocol's mechanism draw considerable performance differentials with mobility.[6][9]

Vivek Thapar, Bindiya Jain, Varsha Sahni investigated simulation based study of ad-hoc routing protocols in wireless sensor networks. In this paper they have compared the performance of two routing protocol AODV and DSR by using random waypoint mobility model and changing the node density with varying number of source node. DSR and AODV both protocol use On-Demand route discovery concept but internal mechanism which they use to find the route is significantly different for both protocol. They have analyzed the performance of protocols for varying network load and mobility. Simulation with random waypoint mobility model has been carried out by using qualnet 5.0.2 Simulator. The metrics used for performance evaluation are packet Delivery fraction, Average end-to-end Delay, Average jitter.[7].

I. ROUTING PROTOCOLS AND MOBILITY MODELS

A. Manet Routing Protocol

There are three types of Routing Protocols in Mobile Ad Hoc Networks: Reactive Routing Protocols, Proactive Routing Protocols and Hybrid Routing Protocols.

a) Reactive Routing Protocols

Reactive protocols also known as On-demand routing protocols which takes the passive approach or lazy to routing which is different with proactive routing protocols. Router are identified and maintained for nodes that require sending data to destination this is done by routing discovery mechanism to find the path to the destination. The reactive protocols discovered when needed. In this source nodes initiate route discover broadcasting route request into the network [3][10]. The discovered route maintained in the routing table however valid and kept and the old one are deleted after active route timeout. AODV, DSR are the example of reactive routing protocols.

b) Proactive Routing Protocols

Proactive protocols are table-driven protocols when each nodes maintain a route to old destination in its routing table. Proactive protocols also determine the route for various nodes in the network in advance, so that the route is already present whenever needed. Route overhead are larger in such schemes in compare to reactive protocols. DSDV, WRP, OLSR are some of example of proactive protocols.

c) Hybrid Routing Protocols

Hybrid protocols depending on how the source finds a route to the destination, It uses combination of both Reactive and Proactive Routing protocols. For ex: GRP, ZRP.

B. Mobility Models

A mobility model which represents movement behaviour of considered application scenarios should incorporate and is an important feature that may change

characteristics of mobile nodes. It describes how speed, acceleration and direction of the node changes over time.

a) RPGM (Reference Point Group mobility Model)

RPGM is a mobility model with spatial dependency to simulate group behavior, where each node belongs to a group where every node follows a logical center (group leader) that determines the group's motio behavior. Different nodes use their own mobility model and are added to the reference point, which drives them in the direction of the group. During simulation, each node has a speed and direction that is derived by randomly deviating from that of the group leader.

b) GMM (Gauss Markov Mobility Model)

In GMM model, the speed and direction of any node at any time t depends on its position and speed at the previous time step (t _ 1). Initially, for each node position, speed and direction are chosen uniformly distributed. The movement of each node is varied after a time interval Δt elapses. The new speed and direction values are chosen based on a first-order autoregressive process ahead.

c) RWMM (Random Walk Mobility Model)

In this mobility model, a mobile node moves from its current position to a new position by randomly choosing a direction and speed. The new speed and direction are both chosen from pre-defined ranges, [min-speed, max-speed] and [0, 2*pi] resp. It is a memory-less mobility pattern because the current speed and direction of a mobile node is independent of its past speed and direction.

d) CMM (Column Mobility Model)

A set of mobile nodes will move forward uniformly in part.Direction forms a line. This mobility model is mainly useful for scanning and searching purposes [11][12].

II. PROBLEM DEFINITION

In wireless networks, TCP suffers from poor performance because of packet losses and transmission errors due to the wireless channel. A comprehensive overview of the main limitations of TCP over MANETs is provided, and the performance of different TCP techniques is evaluated by simulation. During the simulation time there are a series of mobility events, in which two adjacent nodes switch positions, by moving in opposite directions at a constant speed of 2 m. Two nodes are disconnected if their distance becomes approximately larger than 130 m. During these events, the connections among the nodes break and the network topology needs to be reconstructed once all the nodes are connected again.

The basic idea is to find and maintain a route only when it is used for communication. In AODV, the network is silent until a connection is needed. At that point the network node that needs a connection broadcasts a request for a link. Other AODV nodes ahead this message, and record the node that they heard it from, creating a blast of provisional routes back to the needy node. DSR is a simple and a capable routing protocol designed especially for use in multi-hop wireless Ad Hoc networks of mobile nodes. The sender knows the complete hop by hop route to the destination.

III. PROPOSED SYSTEM

In this project, The influences of mobility models on routing protocols investigated in detail. In this context, the performance metrics including delivery ratio, jitter, average end-to-end delay and throughput will compare separately to have a detailed picture of how each protocol behaves under each mobility model. To make an attempt to find the best routing protocols with the help of mobility models using NS-2 simulation tool. In previous paper many routing protocols were investigated, they find the DSR protocol performs well with the RPGM model but it performs fairly with MGM model. The RPGM model gives the lowest end to end delay in all routing protocols[10][13]. The main objective of this paper is to find better routing protocol and also show their influences with different parameters.

IV. CONCLUSION

In this paper we have investigated the performance of different routing protocols with different mobility model under various performance metrics. In MANETs, many routing protocols were studied and analyzed. From that the AODV routing protocol gives the better performance for the different parameters as compare to other routing protocols.

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