A Review on Energy Comparison for AODV, ZRP and AODVDR Routing Protocols

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Abstract- In current project the work will be undertaken to compare various protocols . These protocols lies under different categories like reactive ,proactive and hybrid protocols. Under current work our aim is to identify various parameters for different protocols. So that analysis can be drawn regarding the best protocol for implementation in real scenario. These protocols provides different scenarios for different situations. Our study is based on given scenario. So that best protocol can be identified for that scenario.

Keywords - AODV,ZRP,AODVDR

1. Introduction

In recent years, the fields of wireless communication and networking become more popular. Now a day's lots of research are going in this field. In particular, Ad hoc networks (MANETs) have become quite popular due to its fundamental characteristics like fast and cost effective deployment, self-manageable, infrastructure-less etc. Ad hoc network are applicable. in many application particularly where the establishment of fixed base station or access point is very difficult or impossible. Traditional wireless network work on the concept of central control also called the base station. On the contrary MANET has a special feature is that it not required the central administration control or base station. MANET has some unique properties that make it more effective than traditional wireless network such as: low cost stationing, self-control and superintend, fast lineup etc. In such type of network each node has administrative power it means node can send the date, receive the date and route the data on the basis of some decision. Wireless network is classified as cellular and Ad hoc Network.

This thesis work compare the performance of *ReRout* protocols i.e. AODV, AODVDR and hybrid routing protocol i.e. ZRP. The AODVDR routing protocol is a nothing but a version of AODV in which only the destination node can send the route reply packet. In general, AODV routing protocol worked in two mode one in which intermediate node which having fresh enough route to destination can send the route reply message and second in which only the intended destination node can send the route reply message. The performance of AODV in these two modes is differ with different network scenarios such as different number of network connections, different pause time and different number of malicious nodes. Especially this thesis work highlights the effect of the presence of different node connections on the performance of the routing protocol. Since ZRP is the hybrid routing protocol uses the advantage of proactive and reactive routing protocol, it always gives the better performance than original AODV routing protocol but AODVDR gives better or almost same performance than ZRP in the presence of some range of maximum number of node connections.

1.1 Mobile Ad Hoc Network

MANET is the collections of wireless mobile devices that are capable for working as host as well as router and these devices can move anywhere at any time in the physical environment. The important features of MANETs are that, self-organizing and self- maintenance properties are in-built in these. The mobile ad hoc networks are quick and easily deployed network as compared to other type of wireless networks. In MANET when two nodes comes in the radio range of each other can communicate directly. Otherwise these communicated through intermediate nodes which are calls the intermediate router (boundary router). In ad hoc network each mobile node has all the features of router and these features are used by the mobile nodes at the time of route establishment and delivery of the packets

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1.2 Classification of Ad Hoc Routing Protocols

Mobile ad hoc network is a one class of wireless network consists of wireless mobile nodes which can communicate without any fixed base station. MANET is a multi-hop wireless network. Due to its fundamental characteristic like infrastructure-less, dynamic topology, self-manageable etc., we cannot uses those routing protocols in MANE which are used in the traditional wired networks. Ad hoc routing protocols are classified a follows shown in Figure 2
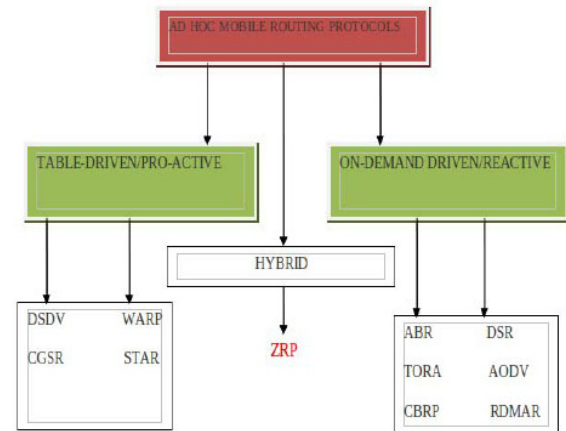
Proactive Routing Protocol(ProRout)

As we all know *ProRout* is the more power full routing technique that was used in conventional network (Ethernet). After some time this technique was successfully implemented for wireless ad hoc networks (MANET). In this technique each device maintains the information about their neighbor's node in the table. Due to this, it is also called the table driven routing protocol. The information inside the table is updated on the periodic basis. In this technique each node exchanges the topology information with its neighbors. These periodic information exchanges consume lot of network resources like network band width, battery life of communicating devices. The proactive routing gives better performance in the case of stable (zero mobility) network as compared to mobile network. Most widely used table driven routing protocols are: DSDV, WRP, OLSR and STAR

Reactive Routing Protocol(ReRout):
Another approach that is used for route the packet form the source to destination is a *ReRout* also called on demand routing protocol. As its name on demand, it preserves and establishments the path when node actually sends the data instead of regularly maintain and update the information table about the all neighbor nodes. The major advantage of reactive routing over proactive routing is that it saves the network bandwidth and battery life of nodes. The disadvantage of this technique is that it is slower than table than table driven routing technique. Most widely used table driven routing protocols are: DSR, AODV, TORA, CBRP, RDMAR and ABR. Figure

Hybrid Routing Protocol(HyRout): HyRout accede the advantage of both table driven and on demand driven routing protocols. The most powerful advantage of table driven routing is high speed and on demand driven is less overhead. HyRout inbuilt these features. HybRout protocols may exhibit table driven or on demand driven routing depending on the circumstance, hence allow flexibility based on the wireless network. Most widely used table driven routing protocols are: ZRP and ZHLS

2. Literature Survey

[1] Anupam Kumar Sharma(2016) et al: MANET is a collection of computational devices that creates random topology for communication. The beauty of MANET is that it not required any central controller or base station. The devices used in MANET may be fixed or mobile. MANET is only a network in which devices worked as a host as well as router. The routing protocol used in mobile ad hoc network is broadly classified in three category-proactive, reactive and hybrid routing protocol. In this thesis work performance of AODV, AODVDR and ZRP is compared in the presence of different number of connection, different pause time and different number of communicating devices. In this work, network simulator tool NS2.35 is used for simulation. Simulation result shows the AODVDR is perform better than AODV and ZRP routing protocol.

[2] M.L.Ravi Chandra(2016) et al: A Mobile Ad Hoc networks is a dynamic environment which due to frequently mobile wireless nodes experiences communication failures due to network partitioning, and nodes failures exhibiting different faulty actions temporary or long lasting arising out of glitches related to hardware or software. As the mobile nodes are mostly resource constrained, in case of faulty nodes packets forwarding could be lead to further complications. Hence

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in designing a robust mobile ad hoc network fault tolerance plays a major role. Due to the presence of faulty nodes, the performance of routing degrades and the reason for the faulty nodes has to be identified to address routing by exploring network redundancies

[3] Rajeev Paulus(2013) et al: A Mobile Ad-Hoc Network (MANET) is a collection of wireless mobile nodes that communicates with each other without using any existing infrastructure, access point or centralized controller. In MANET, as nodes moves in and out of the network, the topology of the network changes frequently and thus, routing becomes a challenging task. A variety of routing protocols with varying network conditions are analyzed to find an optimized path from a source to destination. In this article a performance comparison of four popular mobile ad-hoc network routing protocols i.e. Ad hoc On-demand Distance Vector (AODV), Dynamic Source Routing (DSR), Optimization Link State Routing (OLSR) and Zone Routing Protocol (ZRP) is presented with variable pause time. A network simulator QualNet 6.1. from scalable networks is used to evaluate the performance of these protocols. The performance analysis is based on different network metrics such as Average End to End delay (s), Average Jitter(s), Throughput and Packet delivery ratio.

[4] Tarunpreet Bhatia(2015) et al: The primary concern for the deployment of MANET is to promote flexibility, mobility and portability. This mobility causes dynamic change in topology and poses challenges for designing routing algorithms. In the past few years, many ad hoc network protocols have been developed and research is still going on. It becomes quite difficult to say which protocols may perform well under different network scenarios such as varying network size, mobility of nodes and network load etc. This paper analyzes the performance of proactive protocols like DSDV, OSLR, reactive protocols like AODV, DSR and hybrid protocol such as ZRP. The analysis guides us to the evaluation of various performance metrics such as throughput, packet delivery fraction, normalized routing load and average end to end delay under different scenarios such as varying network size, speed of the node and pause time. The focus of this paper is to have quantitative analysis to guide which protocol to choose for specified network and goal.

[5] Abhishek Dixit(2015) et al: In this paper a comparative study is done for different routing protocols in mobile ad-hoc network by using directional antenna. The directional antenna is metamaterial rectangular patch antenna. Performance of MANET can be improved using metamaterial antenna, because of directivity and compact size of metamaterial antenna. Complexity of routing is day

by day increasing between mobile users because of dynamic nature of mobile nodes and rapid change in mobile topologies in MANET. However, it is possible to reduce the network congestions by using the directional antenna. To find out which routing protocol gives better result for mobile ad-hoc networks, in the paper, the scenario of directional metamaterial antenna is simulated for comparing and analyzing of different routing protocols such as AODV, DSR and ZRP using QualNet simulator 6.1. The metrics used for performance evaluation of different routing protocols we used throughput, average unicast end to end delay, and average unicast jitter of routing protocols.

[6] Ajay Singh(2014) et al: Mobile Ad Hoc Networking (MANET) is a group of independent network mobile devices that are connected over various wireless links. It is relatively working on a constrained bandwidth. The network topologies are dynamic and may vary from time to time. Each device must act as a router for transferring any traffic among each other. This network can operate by itself or incorporate into large area network (LAN). In this paper, we have analyzed various Random based mobility models: Random Waypoint model, Random Walk model, Random Direction model and Probabilistic Random Walk model using AODV,DSDV and ZRP protocols in Network Simulator (NS 2.35). The performance comparison of MANET mobility models have been analyzed by varying number of nodes, type of traffic (CBR, TCP) and maximum speed of nodes. The comparative conclusions are drawn on the basis of various performance metrics such as: Routing Overhead (packets), Packet Delivery Fraction (%), Normalized Routing Load, Average End-to- End Delay (milliseconds) and Packet Loss (%).

[7] ZishanHaider Y. Noorani(2013) et al: Mobile Ad-hoc network (MANET) is a non-infrastructure, self-configurable and decentralized network of autonomous mobile nodes which are capable for communication over wireless links. Routing is the main part for any wireless network and same is for MANET. There are two approaches for routing in MANET one is Proactive and another is Reactive. Zone routing protocol is a hybrid protocol means that it uses Proactive approach in its inter-zone whereas Reactive approach in its intra-zone. This work revolves around enhancement in Zone routing protocol in the area of fast route reconfiguration and route acquisition delay.

3. Problem Definition

In current paper they have compared three protocols like AODV,AODVDR and ZRP. These protocols can be

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broadly classified into three categories like proactive ,reactive and hybrid. They have considered a environment like different number of connection, different pause time and different number of communication devices. Once study has been completed they have identified that the ZRP is better protocol than both AODV and AODVDR, AODV performs better than AODVDR when number of network connections are below 25% of total connection available. But when the number of connection is more than 40% of the total number of nodes then aodvdr performs better. But the performance does not being known when number of network connections are in between to 25% to 40%. Similarly ZRP the performance does not know when the connection are between 37% to 52%. In any organization we uses any protocol depending upon the network resources available and network situation.

In current research their can be design of a new protocol whose performance is better in all the situation like network availability below 25% greater than 40% and in between to 25% and 40%.   Later on we can compare the performance on different parameters to the exiting better protocol like ZRP and AODV.

4. Parameters Taken

1. End to End Delay
2. Throughput
3. Packet Delivery Ratio

4.1 End to End delivery

It is the time calculated at each hop. It is considered as Hop to Hop Delay.
End to End delay=No of hops/total time

4.2 Throughput

Throughput or network throughput is the average rate of successful message delivery over a communication channel.
Throughput=(packet sent/packet received)/(total time)

4.3 Packet Delivery Ratio
As packet Delivery ratio is the amount of packets received versus Number of packet sent.
Packet Delivery Ratio=(packet received)/(Total Number of packet sent)

5. Conclusion

AODV performs better than AODVDR when number of network connections are below 25% of total connection available. But when the number of connection is more than 40% of the total number of nodes then aodvdr performs better. But the performance does not being known when number of network connections are in between to 25% to 40%. Similarly ZRP the performance does not know when the connection are between 37% to 52%.

Future Work

Based on current study of three protocols in future there can be the enhancement in the performance of the network under different conditions.

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