Study and Analysis of Routing Protocols RIP and DSR Using Qualnet V5

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Abstract:

In the recent years, the Ad-Hoc networks have been the focus of many researches especially in the routing protocols which include Proactive and Reactive routing. The strategy of forwarding the data packets from the source to the destination is the ultimate goal of routing protocols. Hence, the difference between these protocols is based on searching, maintenance and recovering the route path. The potential problem in Ad-Hoc networks is how to determine the optimum routing protocol that satisfies the needs of the application regarding to some criteria. This work will present the evaluation of proactive routing protocol Routing Information Protocol (RIP) and reactive routing protocol Dynamic Source Routing (DSR) based on the QualNet simulation. Moreover, the performance of these routing protocols will be measured based on the throughput, delay, average jitter and energy consumption metrics. The present paper shows that the routing information protocols (RIP) have better evaluation performance compared to DSR in the scenario.

INTRODUCTION:

The recent advancements in wireless technology have led to the development of a new wireless system which is Called Ad-hoc Networks. Ad-hoc hoc Network enables wireless devices to directly communicate with each other. In Ad-Hoc network, each node plays a dual role at the same time and functions as a host in the sense. Then, it obtains some information concerning the surrounding network and deals with algorithm which functions to control the process of sending and receiving data packages. The combination of both functions is known as a routing protocol [1-5].

Ad-Hoc networks have gained lots of attention in researches especially in the routing protocols either as Proactive or Reactive routing. Therefore, the strategy of forwarding the data packets from the source to the destination is the ultimate aim of routing protocols [3].

Hence, the difference between these protocols is based on searching, maintenance and recovering the route path. The decision for choosing the best routing protocol must take into account some issues like mobility of nodes, type of data, cost of path, application type, number of nodes, type of traffic and Quality of Services (QoS) [7].

OPNET

- OPNET [9] stands for Optimized Engineering Tools.
- OPNET Technologies, Inc. was a software business that provided performance management for computer networks and applications performance management.
- The company was founded in 1986 and went public in 2000. In October 2012, OPNET was acquired by Riverbed Technology.
- OPNET simulator is a tool to simulate the behavior and performance of any type of network. The main difference with other simulators lies in its power and versatility. This simulator makes possible working with OSI model, from layer 7 to the modification of the most essential physical parameters.

LITURATURE SURVEY:

Simplified XOR Based Approach for Reducing Broadcast Redundancy with Fast Network Coverage in Wireless Ad-Hoc Networks [6]

The problem of message broadcasting from the base station (BS) to sensor nodes (SNs) in solar energy harvesting wireless sensor networks (EHWSN) [10] is considered in this paper. The aim is to ensure fast and reliable broadcasting without interfering with upstream communications (from SNs to BS), whilst taking into account energy harvesting constraints. An adaptive approach is proposed where the BS first selects the broadcast time slots, given a wake-up schedule for the SNs (the time slots where the SN are active and in receiving mode). Hence, the SNs adapt their schedules. This is then iterated seeking optimal selection of the broadcast time slots, so as to minimize broadcast overhead (transmitted messages) and latency. Our approach enables fast broadcast and eliminates the need for adding protocol overhead (redundancy), compared to the existing solutions. Hidden Markov Model (HMM) and Baum-Welch learning algorithm are used for this purpose. Numerical results confirm that our scheme performs the broadcast operation in less time, and by reducing the broadcast overhead, as compared to state-of-the-art approaches.

Evaluation of Ad Hoc on Demand Distance Vector Routing Protocol in HetMAN Architecture

With the introduction of the smart grid, Advanced Metering Infrastructure (AMI) has become a main component in the present power system. The effective implementation of AMI depends widely on its communication infrastructure and protocols providing trustworthy two-way communications. In this paper we study two routing protocols philosophies for low power and lossy networks (LLNs) [9] and their application for a smart metering scenario. This study purposes a detailed evaluation of two routing protocols proposed by IETF, the proactive candidate namely RPL (IPv6 Routing Protocol for Low-Power and Lossy Networks) and the reactive candidate named LOADng (LLN On-demand Ad-hoc Distance vector routing protocol - next generation) recently proposed as an internet Draf , still in

its design phase and is part of the ITU-T G.9903 recommendation. In the course of this study, we also implemented an extension version of LOADng, named LOADng-CTP specified by an IETF draft extended with a collection tree for efficient data acquisition in LLNs. We performed checks on control overhead; End to End Delay and Packet delivery ratio for the two protocols related to multipoint-to-point (MP2P), and point-to-multi point (P2MP) traffic flow in a realistic smart metering architecture.

Highly dynamic destination sequenced distance-vector routing (DSDV) for mobile computers

Mobile ad hoc network (Manet) is a kind of ad hoc network, Multihop with no fixed centralized node. Every node in Manet acts as host and router at the same time. Since nodes are highly dynamic, routing in such a network is challenging task. This article presents a routing strategy for Manet called Spatial Destination Sequenced Distance Vector (S-DSDV) [11] which is an improved version of destination sequence distance vector (DSDV) routing protocol. The proposed S-DSDV composed of 3 phases i.e. identification of activity area, identification of representative node and route discovery process. Finally S-DSDV reduces the overhead, end to end delay and increases network life time by sending and receiving more number of packet across the network and provides the better throughput when compare to DSDV routing protocol.

Ad hoc On-demand Distance Vector

Mobile Ad hoc Network (MANET) [6] consists of several nodes which are configurable. It consists of multiple number of wireless nodes. The nodes are mobile nodes. It consists of many mobile nodes. The topology may get changed due to higher mobility. The security is another aspect which is very low. Routing protocols are used for transferring the data packets. Due to high vulnerability in security, many attacks such as black hole attacks may occur at the time of routing in routing protocols. AODV [8] is one of the routing protocols which is also affected by such attacks. In this paper several existing methods available to mitigate the attacks in AODV protocol are analyzed.

EXISTING SYSTEM:

- Wireless sensor networks are network systems consisting of hundreds, even thousands of sensor nodes connected to each other through a wireless environment.

- Sensor nodes have complex functions, such as the detection, collection, calculation and routing of surrounding data with predefined criteria by placing them randomly or according to a certain strategy into diverse areas.

- Wireless communication standard was used, which is more advantageous than other wireless communication standards with respect to parameters like battery usage and low power consumption, providing high performance with short range sensors .. Additionally, the RIVERBED (OPNET) Academic Edition 17.5 simulator, capable of generating correct results and analysis to identify the actual behavior of the real system, was used.

- With this simulator program, the performances of star, tree, and mesh topologies supported by the Zig Bee standard were compared based on end-to-end delay, throughput, mac load and traffic received parameters.

- Then, the performance analyses were conducted on different PANs (Personal Area Network) using single and dual Zig Bee coordinators. Finally, network fixed and mobile node behavior was compared with respect to the quality parameters of the end-to-end delay and traffic received by the destination.

- RIP is defined as a routing protocol which is as dynamic as OPSF, but it is widely used in both local and wide area networks, and it is categorized as an interior gateway protocol (IGP) which makes a use of the distance -vector routing algorithm.

- This initial definition of RIP was proposed by. Since then, RIP has been extended and updated to RIP Version 2[6].

DISADVANTAGE:

- The maximum average end to end delay gains simulation with 130 numbers of nodes from DSR and the minimum average end-to-end delay gains from simulation 170 number of nodes from DSR.

- The average end to end delay values the increase and the decrease accordingly to the number of nodes for RIP. The maximum average end to-end delay gains simulation with 90 numbers of nodes from RIP and the minimum average end-to-end delay gains from simulation 170 number of nodes from RIP.

PROPOSED SYSTEM:

- Ad-Hoc networks have gained lots of attention in researches especially in the routing protocols either as Proactive or Reactive routing.

- Therefore, the strategy of forwarding the data packets from the source to the destination is the ultimate aim of routing protocols. Hence, the difference between these protocols is based on searching, maintenance and recovering the route path.

- Quality of Service is provided to the End user using OPNET for getting correct result analysis to identify the actual behavior of the real systems.

- This is achieved through two topologies (star and ring) and two protocols (DSR and RIP protocol).

- Create network

- Nodes are connected using topologies (star and ring).

- Now packets are sent from source to destination within a given time period

- Now packets are sent from source to destination within a given time period.

- Packet variation in sending (packet transformation) are shown through distribution graphs

- Here, the analysis of these 2 protocols is done through QOS to check the best suitable one.

ADVANTAGE

- The possibility of establishing a route when necessary makes the sender to be able to choose and control routes by reducing the load of data and including routing which is free from loop containing unidirectional links in networks which are all the main advantages of DSR. However, DSR has some disadvantages. First, it may lead to significant overheads because the source route has to be included with each packet.

Module Description:

Ad-Hoc network

The objectives of this Qual Net Version 5 simulation are to evaluate the study of proactive (RIP) routing protocol and reactive (DSR) routing protocol in Ad-Hoc networks in scenario. It has 5 experiences with different number of nodes. The evaluation metrics used are throughput, end to end delay, average jitter and energy consumption. The possibility of establishing a route when necessary makes the sender to be able to choose and control routes by reducing the load of data and including routing which is free from loop containing unidirectional links in networks which are all the main advantages of DSR. However, DSR has some disadvantages.
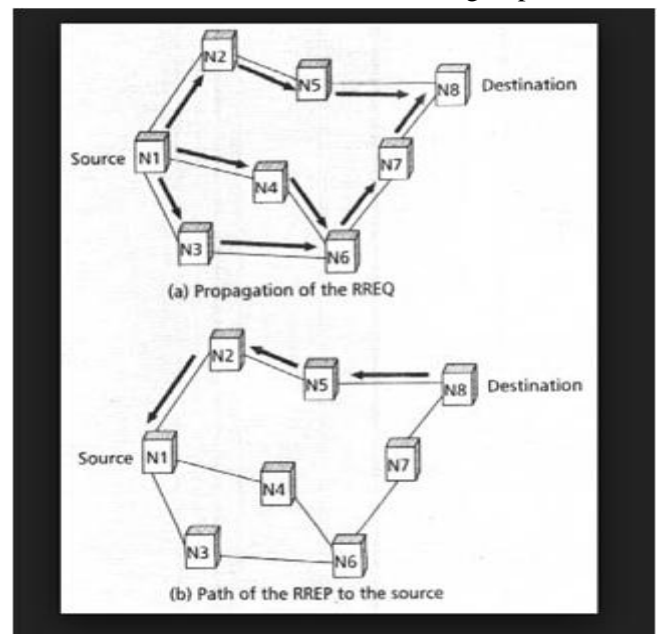
Routing Protocols

ROUTING INFORMATION PROTOCOL

- RIP is a routing protocol which exchange network information between routers dynamically.
- Each rip maintain a routing table which is a list of all the destination it knows how to reach, along with the distance to that destination.
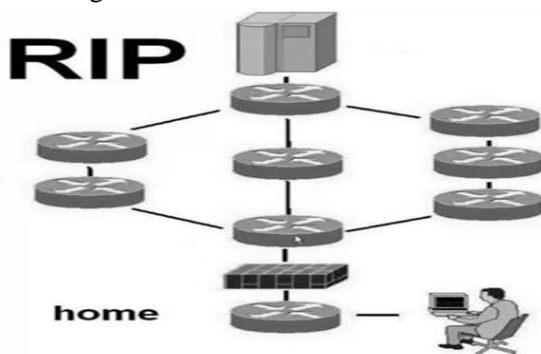
DYNAMIC SOURSE ROUTING

- DSR is efficient routing protocol.
- It is a loop free routing protocol
- The protocol is composed of the two mechanisms of route discovery and route maintenance.
- The network is completely self-organizing and self-configuring, requiring no existing network infrastructure or administration.
- The protocol allows multiple routes to any destination and allows each sender to select and control the routes used in routing in packets.

(a) Propagation of the RREQ

(b) Path of the RREP to the source

Evaluation metrics can be used in evaluating quantitatively MANET routing protocols. Such quantitative measurement is useful as a prerequisite for assessing or evaluating the performance of network or even to compare the performance using different routing protocols. This evaluation study employs the following performance metrics This refers to the interval taking place between the data packet generation time and the time of the arrival of the last bit at the destination. That is, the average amount of time taken by a packet to move from source to destination. The process includes all possible delays which happen due to buffering during route discovery latency, queuing at the interface queue, retransmission delays at the MAC [8] and propagation and transfer times.

Proactive

This packet header includes a number of intermediate nodes for routing. Each node functions to maintain the route cache which cashes the source route being learned. It is stated that "Route Discovery and Route Maintenance" are the two main components of DSR in which together function to determine and maintain routes to random destinations. The purpose of designing such protocol is to make restrictions to the large consumption of bandwidth caused by control packets in ad hoc wireless networks. This process is done by deleting the messages of the periodic updates required and which usually appears in the table-driven approach.

Average Jitter

The maximum average end to end delay gains simulation with 130 numbers of nodes from DSR [13] and the minimum average end-to-end delay gains from simulation 170 number of nodes from DSR. The average end to end delay values the increase and the decrease accordingly to the number of nodes for RIP. The maximum average endto- end delay gains simulation with 90 numbers of nodes from RIP and the minimum average end-to-end delay gains from simulation 170 number of nodes from RIP. From the graph, it is very clear that RIP out performs DSR for scenario of varying pause time, varying simulation time, varying speed and varying number of nodes. In case of DSR delay time increases very sharply with increasing number of nodes.
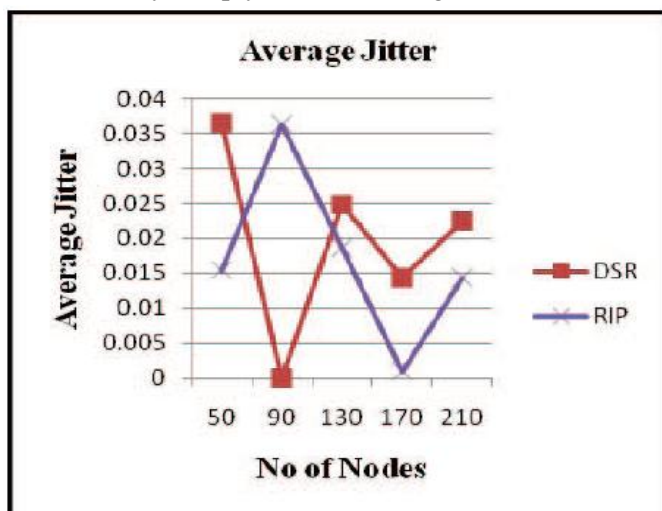

Figure: Average Jitter between RIP and DSR

CONCLUSION

In this paper, analysis and investigations were carried out on acquired simulation results of two routing protocols RIP and DSR using QualNet V5. RIP is selected as representative of proactive routing protocol while DSR are the representative of reactive routing protocols. DSR is designed up to two hundred nodes. It shows effective number of nodes between RIP and DSR. Routing Information Protocol preformed better than DSR for all evaluation matrixes.

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