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Direct Sequence Based Comparative Simulation Evaluation of AODV and OLSR Protocol for 11 Mbps Data Rate Using OPNET

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ABSTRACT

In this paper analysis of the performance of AODV and OLSR routing protocols is done with the use of OPNET simulation tool, we created a 18 mobile nodes networks on data rate 11 Mbps and transmission power 0.005 watts with buffer size 256000 bits the time of simulation was 1500 sec. Routing protocols are compared in terms of FTP Download Response Time (sec), HTTP Page Response Time (sec), WLAN Delay (sec) WLAN Retransmission Attempts (packets) in scenario for the simulation analysis and performances. According to the resulted performance OLSRSPL performed best in cases we considered. The simulation result of the research has practical reference value for further study.

Keywords : AODV, OLSR, MANET, QOS, OPNET

I. INTRODUCTION

As wireless communication technology is increasing, people are expecting to be able to use their network terminals anywhere and anytime. Examples of such terminals are PDAs and laptops. Wireless connectivity to the network gives users the freedom of movement they desire. These networks consist of mobile nodes and networks which themselves creates the under laying architecture for communication. Because of this, no pre-existing routers are needed. In ad hoc networks, as mentioned above, the nodes are responsible for routing and forwarding of packets themselves.

If the wireless nodes are within range of each other, no routing is necessary. But, on the other hand, if the nodes have moved out of range from each other, and therefore are not able to communicate directly, intermediate nodes are needed to make up the network in which the packets are to be transmitted and the success of communication depends on cooperation of other nodes. Traditional routing protocols are not designed for rapid changing environments such as ad hoc networks. Therefore, customized routing protocols are needed. Examples of such protocols are AODV and OLSR.

Due to the dynamic nature the network topology keep changes randomly. [1]The Optimized Link State Routing (OLSR) is a table-driven, proactive routing protocol which is an optimization of pure link state protocols in that it reduces the size of control packet as well as the number of control packets transmission required.[2] OLSR is well suited to large and dense mobile networks.

Routing protocol is the major issue of performance of MANET. Hence, routing protocol required is to be effective and accurate so as to handle mobility of nodes and to give best utilization to technology. In this paper performance of AODV and OLSR protocols are evaluated by using FTP and HTTP application type of IEEE 802.11a/b/g WLAN Standard Direct Sequence.

II. RELATED WORK

Sandeep Kaur [1] Mobile Ad hoc network is concept of communication that mobiles nodes want to communicate using dynamic topology. The important characteristics of having dynamic topology is node can change position quite frequently. Nodes consists laptops and personal digital assistants and are often very limited in resources like CPU capacity, storage capacity, battery lifetime and bandwidth. The routing protocol should minimize the control traffic and calculate route only when they receive request. In this paper they present simulation analysis of the AODV Protocol consider two networks one having smaller nodes and other having larger nodes.

Jonish [2] analyzed the performance of OLSR and TORA routing protocols using OPNET Simulation tool he created a network containing 50 mobile nodes with data rate 1 Mbps and 2 Mbps with transmission power 0.005 watts and buffer size 256000 bits each node moves randomly in the network and simulation time was 1500 sec. TORA and OLSR routing protocols were compared in terms of Traffic Received, Traffic Sent, Network Load, Retransmission Attempts and Throughput. According to the resulted performance OLSR performed better then TORA in both 1 Mbps and 2 Mbps.

Anjali [3] analyzed the performance of AODV, OLSR and GRP routing protocols is evaluated for FTP based application traffic on IEEE 802.11 WLAN Standard and 48 Mbps data rate. The network performance is evaluated by using OPNET simulator based on various quantitative metrics- Network Load, Throughput, Retransmission Attempts and Media Access Delay by varying physical characteristics and number of nodes. A comparative performance analysis of these protocols have been carried out in this paper and in the last conclusion will be presented which demonstrate that performance of routing protocols differs by varying the network and selection of accurate routing protocol according to the network ultimately influences the efficiency of the network in a magnificent way.

III. ROUTING SECURITY AND SERVICE

Due to the fact that the nodes in a wireless ad hoc network communicate on a shared medium, security becomes an important issue. There are different ways of compromising wireless networks, including: Denial of service: An attacker makes services unavailable by keeping the service provider busy Resource consumption: Battery power of critical nodes is depleted because of unnecessary processing done by an attacker, or the attacker causes buffer overflow which can lead to important data packets being dropped. Host impersonation: As the name suggests, a compromised node may impersonate a host, and thereby cause wrong route entry tables. Providing quality of service (QoS) in a wireless ad hoc network is a difficult task to overcome. Nodes in such a network act both as clients and service providers, making, contrary to most networks, the boundary between network and host is less clear. Hence, to achieve QoS, a better coordination between the nodes is required. Different applications have different QoS parameter requirements. Whereas multimedia applications require high bandwidth and low delay, availability is the primary requirement for search-and-rescue operation applications. QoS parameters should be considered for route decisions. Throughput, packet loss rate, and reliability are examples of such parameters.

IV. SIMLATION SETUP

We used software known as OPNET Modeler to work, which is a tool provided by the OPNET Technologies in order to undertake the comparative simulation evaluation; the version named OPNET Modeler 14.5 has been adopted for study [7]. OPNET is one of the most extensively used commercial simulators based on Microsoft Windows platform, which incorporates most of the MANET routing parameters compared to other commercial simulators. It simulates the network graphically and gives the graphical structure of actual networks and network components.

TABLE I: SIMULATION PARAMETERS

Simulation Parameter	**Value**
Simulator	OPNET Modular 14.5
Area	1500*1500
Network Size	18 Nodes
Data Rate	11 Mbps
Mobility Model	Random waypoint
Traffic Type	FTP, HTTP
Simulation Time	1500 sec
Address Mode	IPV4
Standard	IEEE 802.11 Direct Sequence
Routing Protocol	AODV , OLSR

TABLE II: AODV PARAMETERS

Attribute	**AODV Value**	**AODVSPL Value**
Hello Interval(sec)	Uniform(1,1.1)	Uniform(0,1.1)

Allowed Hello Loss	2	1
Net Diameter	35	50
Node Traversal Time(sec)	0.04	0.02
Route Error Rate Limit (pkts/sec)	10	20
Timeout Buffer	12	50
TTL Increment	2	2
TTL Threshold	7	7
Local Add TTL	2	2
Packet Queue Size (Packets)	Infinity	Infinity
Local Repair	Enabled	Enabled
Addressing Mode	IPV4	IPV4

TABLE III: OLSR PARAMETERS

Attribute	**OLSR Value**	**OLSRSPL Value**
Willingness	Default	High
Hello Interval(sec)	2.0	1.0
TC Interval(sec)	5.0	10.0
Neighbor Hold Time(Sec)	6.0	10.0
Topology Hold Time(Sec)	15.0	20.0
Duplicate Message Hold Time(Sec)	30.0	40.0
Addressing Mode	IPV4	IPV4

Fig. 1 shows the simulation environment of scenario containing 18 WLAN mobile nodes, one fixed WLAN Server, Application definition, Profile definition and Mobility config. We configured the nodes in the scenario to work with 11 Mbps data rate.

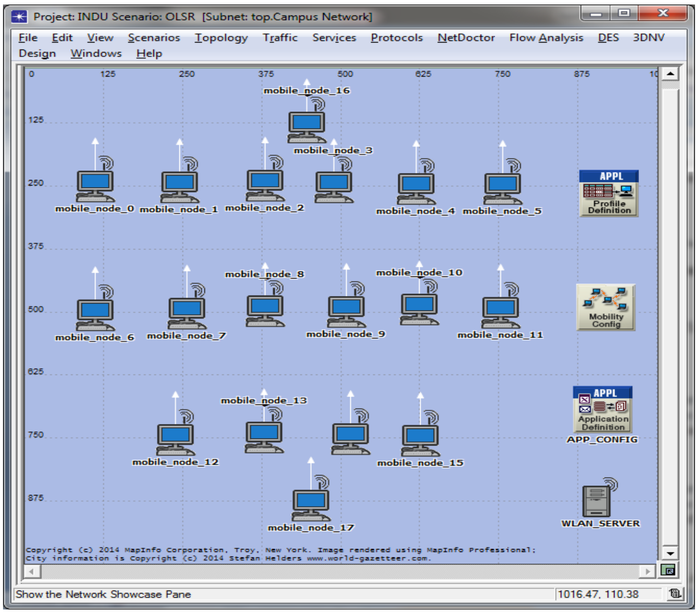

Figure 1. Network Model for 18 Nodes scenario

V. PERFORMANCE MERICS

A. FTP Download Response Time (sec)

Time elapsed between sending a request and receiving the response packet. Measured from the time a client application sends a request to the server to the time it receives a response packet. Every response packet sent from a server to an FTP application is included in this statistic.

B. HTTP Page Response Time (sec)

Time elapsed between sending a request and receiving the response page. Measured from the time a client application sends a request to the server to the time it receives a response page.

C. WLAN Delay (sec)

It is the time taken by a packet from the movement it is transmitted on the network by source node to reach the destination node.

D. WLAN Retransmission Attempts (packets)

It is the total number of retransmission attempts by all WLAN MACs in the network until either packet is successfully transmitted or it is discarded as a result of reaching short or long retry limit.

VI. SIMULATION RESULTS AND ANALYSIS

Figure 2. Execution Window

Figure (2 - 6) below shows FTP Download Response Time(sec), HTTP Page Response Time (sec), WLAN Delay (sec) WLAN Retransmission Attempts (packets) in 18 mobile nodes scenario for IEEE 802.11 standard 11 MBPS data rate with OLSR and AODV. The color scheme is showing the protocols behavior in different graphs which gives the average values. From these average values we will conclude the behavior of all these routing protocols.

A. FTP Download Response Time (sec)

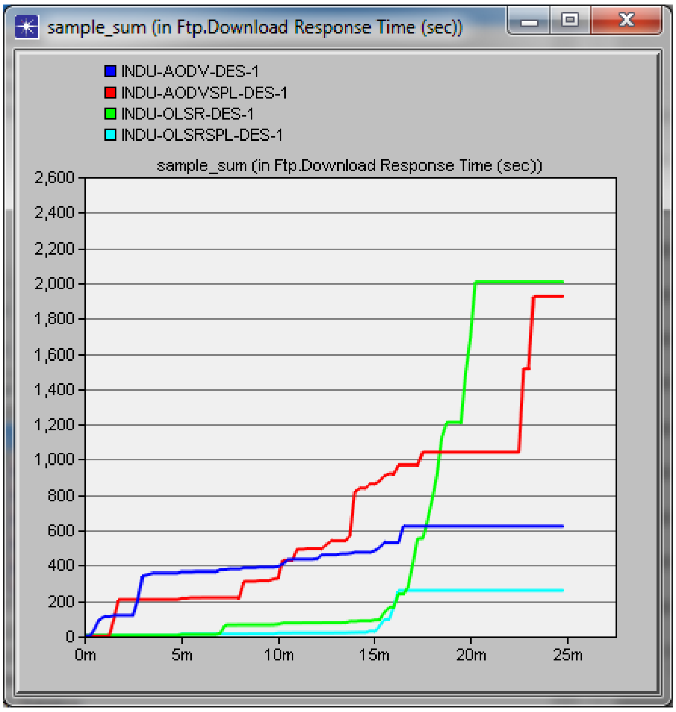

Figure 3. Sample Sum for *FTP Download Response Time (sec)* for AODV and OLSR 11 Mbps

According to simulation, as we can see in Fig. 3, FTP Download Response time OLSRSPL performed best.

B. HTTP Page Response Time (sec)

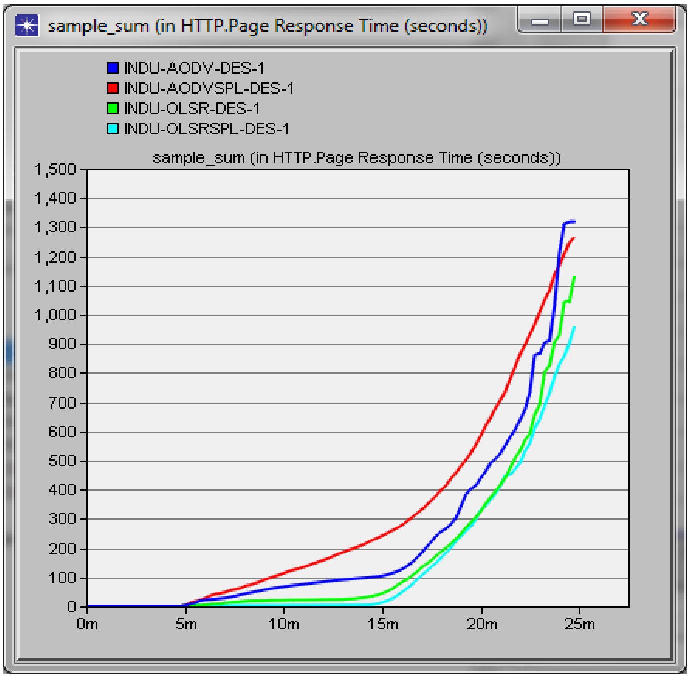

Figure 4. Sample Sum for *HTTP Page Response Time (sec)* for AODV and OLSR in 11 Mbps

According to simulation, as we can see in Fig. 4, *HTTP Page Response Time (sec)* OLSRSPL performed best.

C. WLAN Delay (Sec)

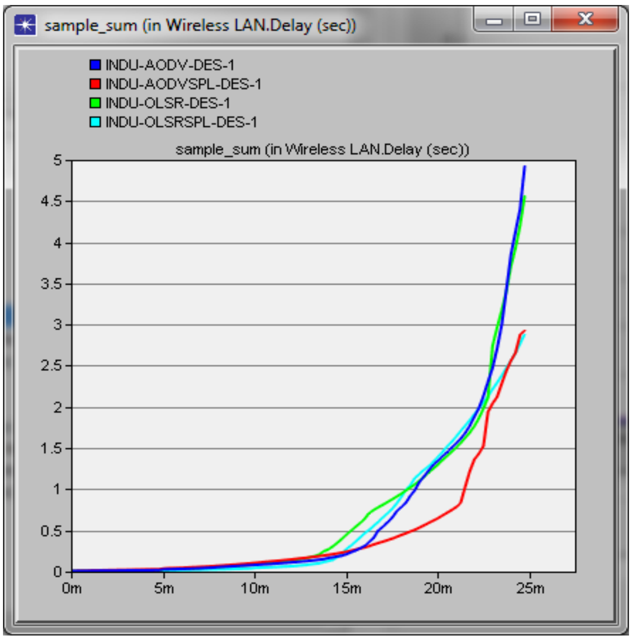

Figure 5. Sample Sum for Wireless LAN Delay for AODV and OLSR in 11 Mbps

According to simulation, as we can see in Fig. 5, *WLAN Delay (Sec)* OLSRSPL performed best.

D. WLAN Retransmission Attempts (packets)

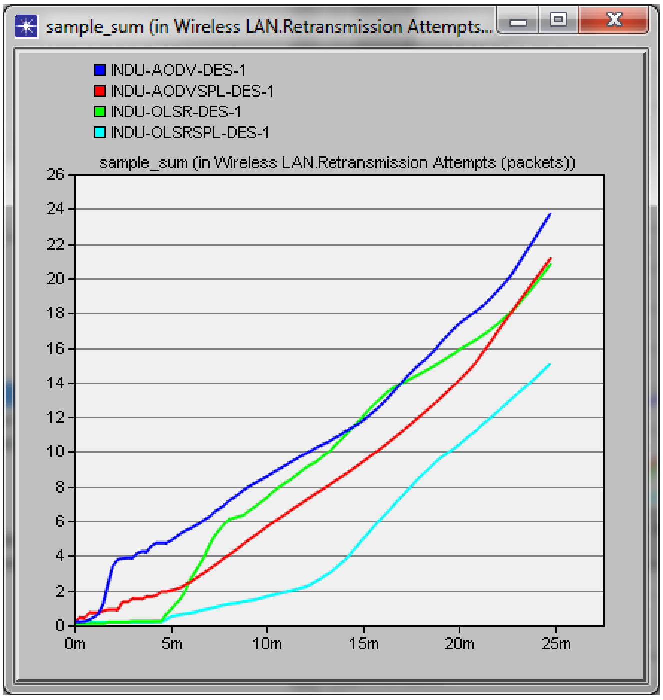

Figure 6. Sample Sum for WLAN Retransmission Attempts (packets) in 11 Mbps for AODV and OLSR

According to simulation, as we can see in Fig. 5, that AODV for 11 Mbps have highest retransmission attempts than all so it performed better of all.

VII. CONCLUSION

In this paper performance of AODV and OLSR are evaluated for metrics like FTP Download Response Time (sec), HTTP Page Response Time (sec), WLAN Delay (sec) WLAN Retransmission Attempts (packets) by using 18 nodes scenario with IEEE 802.11 Direct Sequence WLAN Standard in 11 Mbps data rate. From the above discussion we find out that below tabled results.

TABLE IV
RESULTING VALUES

S. NO.	**Performance Metrics**	**AODV**	**AODVSPL**	**OLSR**	**OLSRSPL**
1	Download Response Time	-	-	-	Best
2	Page Response Time	-	-	-	Best
3	WLAN Delay	-	-	-	Best
4	Retransmission Attempts	Best	-	-	-

The simulation result of the research has practical reference value for further study.

VIII. REFERNCES

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