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Performance Comparison and Analysis of AODV, OLSR and TORA Using Jelly Fish Attack under MANET

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Abstract

Mobile Ad-hoc Networks are highly vulnerable to the various types of attack because in MANET there is no presence of centralized authority, Communication occurs hop by hop through intermediate nodes. Jelly Fish attack is one of the DOS (Denial of service) attacks, which tries to increase the End to End delay. In this paper we will compare the performance of AODV, OLSR and TORA Under Jelly Fish attack and Normal scenario with different no of Node scenarios.

Keywords: JF attack, AODV, OLSR, DOS, TORA.

I. Introduction

MANET is Mobile Ad-hoc network in which nodes can communicate with each other without any pre defined infrastructure. MANET has different type of protocols; Reactive (On demand), Proactive (Table driven) and hybrid (Combination of best of both). The routing protocols suitable for the fixed infrastructure network were not suitable for MANET because each node in the MANET may change their positions randomly. MANET can be configured to allow the communication devices to form a dynamic and temporary network. A malicious attacker can easily access this kind of network because of lack of the strong defense mechanism and high mobility of the nodes. In this paper we have investigated the impact of the JF Delay Variance attack on the performance of network. We have used three protocols i.e. **1) OLSR** (Proactive) is table driven protocol. It usually store and updates its routes so that when a route is needed, it present the route immediately without any initial delay. In OLSR, some candidate nodes are known as multipoint relay (MPRs) are selected and responsible to forward the broadcast packet during the flooding process. OLSR performs the hop by hop routing where each node uses its most recent routing information to route packets **2) AODV** (Reactive) Ad-hoc On-demand Distance Vector Routing Protocol is a reactive protocols, when a source wants to initiate transmission with another node as destination in the network, AODV uses control message to find the to the destination in the network. A route request message (RREQ) is forward to the neighbor nodes and they forward it to their neighbor nodes. Whenever a route is discovered they generate the route reply message (RREP) and send to the source. **3) TORA** is a highly adaptive loop free distributed routing algorithm based n the concept of link reversal. It is a source initiated andprovide multiple route for any desired source/destination pair. The protocol perfors three basic functions of Route creation, route maintenance, and Route erasure. Section (ii) includes the Literature review about the previous work done by various authors. Section (iii) includes the exact problem definition. Section (iv) includes the detail of parameters. In section (v) we will explain the JF attack in brief. Section (vi) includes the methodology used to justify our work. Section (vii) Results will be discussed. Section (viii) includes conclusion.

II. Literature Survey

[1] In this paper Ekta Barkhodia, Parulpreet Singh and Gurleen kaur Walia have taken the 40 node scenario with AODV protocol and described that as the nodes increases the average end to end delay increases but throughput increases as the no. of attacker nodes increases. In the presence of 3rd attacker node is the highest. [2] Ashok desai has presented a review paper on detection and prevention technique of gray hole attack. He has discussed about the various papers about the Gray Hole attack. [4] Jasjeet Singh and Er. Sukhjit Singh has evaluated the MANET protocols i.e TORA, OLSR and GRP with variable bit rate multimedia traffic including audio and video codec. They have used throughput, delay and load Parameters for comparison w.r.t 35, 50, 70 nodes comparison

shows highest load in OLSR . Both GRP and TORA have the stable load. [5] Harmanpreet Kaur and Er. Jaswinder Singh has compared three protocols OLSR, GRP and TORA on the basis of delay, load, media access delay and throughput in their research. They have concluded that OLSR performs best in terms of throughput, GRP performs best in terms of delay and routing overhead, TORA is worst choice when we consider all four parameters. [6] Ekta Nehra and Er. Jasvir Singh in this paper routing protocols AODV, TODV, OLSR and ABR are compared using the various parameters i.e delay, Network load and throughput. They have concluded that OLSR performs best in terms of network load and throughput, AODV performs worst in case of Load and throughput, Performance of ABR is good for load and throughput and TODV,s performance is consistent for all three parameters. [7] Naveen Bilandi and Harsh K Verma has compared the three type of protocols in MANET. In this paper comparison has done by considering the AODV (Reactive), OLSR (Proactive) and GRP (Hybrid). In this comparison 75 nodes are taken and simulation time is fixed for 1800 seconds. [11] In this paper Mohammad Wazid, Vipin Kumar and R H Gourad has analyzed the performance of AODV, TORA, DSR routing protocol. For efficient network performance DSR is best protocol and TORA will perform best in case of throughput. [9] In this paper authors Diya Naresh Vadhwani, Deepak kulhare and Megha Singh analyzed the behavior of DSR protocol with http traffic. They have used the 100, 70 and 50 nodes for the various parameters.

III. Problem Definition

In our research work we have done a comparative performance analysis of the three protocols OLSR, AODV and TORA under Jelly Fish attack using Voice traffic under the parameters discussed in section IV. We will also analyze which protocol is best under Jelly Fish Attack.

IV. Parameters

Commonly Used Simulation Parameters

Simulator Used	OPNET 14.0
Area	10 X 10 (Fix)
Mobility Model	Random
Topology	Random
Traffic	Voice
Simulation Time	10 minute
Address Mode	IPv4
Ad-hoc Routing	AODV, OLSR, TORA
Protocol	
AODV Parameters	Default
OLSR Parameters	Default
TORA Parameters	Default
TCP Parameters	Default
Forwarding rate	4,00,000 Packets/Sec for Honest Node
	5000 Packets/Sec for JF Nodes
Network Size	40 Nodes for Scenario 1,2,3,456
	40 Nodes for Scenario 7,8,9,10,11,12
Jelly Fish Attacker Nodes	Zero for normal flow
	15 Nodes for 40 Node JF Scenarios
	25 Nodes for 60 Node JF Scenarios

Performance Metrices: -

1. Load
2. Throughput
3. End to End delay
4. Data Dropped (Buffer Overflow)

V. Jelly Fish Basics

JF Attack: - JF attack is the Denial of Service type attack also known as the Passive attack because the Malicious nodes fully obey the protocol rules. JF attack produces the delay before the transmission and reception of data packets in the network. JF attacks can be categorized as follows.

1. JF Reorder attack
2. JF Periodic Dropping attack
3. JF Delay variance attack

1. **JF Reorder attack**: - in this attack the order of packets changed at the receiving end.
2. **JF Periodic dropping attack**: - Periodic dropping is possible at relay nodes. A node drops some packets periodically.
3. **JF delay variance attack**: - malicious nodes delay the packets without changing the order of the packets.

VI. Methodology

Network simulations are implementedusing OPNET modeler. OPNET modeler is commercial simulation environment for network modeling and simulation. It allows users to design and study the communication

devices, protocols and applicationswith flexibility and scalability. It simulates the network graphically and give the structure of actual network and netwok components. The users can design the network model visually.the model uses object oriented approach. The nodes and protocols are modeled as the classes with inheritance and specialization. The OPNET modeler architecture consists of three modeling domains: the process, the node and the network. Within the process modeling domain the developer implements the behavior of various processes, such as the e-mail client, TCP manager and IP interfaces. The development language is c. OPNET is high level event based network level simulation tool in which simulation operates at the packet level. OPNET contains a huge library of accurate models of commercially available fixed network hardware and protocols. As we have discussed the parameters in the section (IV). to justify our work we simulate the mobile Ad-hoc network for three protocols AODV, OLSR, TORA under normal flow and JF attack for two different node scenarios i.e. 40 node and 60 node.

VII. Results

a. Delay: - In both cases (normal Scenario and JF scenario) Delay is Minimum for the OLSR and abruptly increases in the TORA and AODV. Delay is maximum in the AODV with increase in no of nodes. In 60 node scenarios Delay is slightly more in TORA at the end of Simulation.

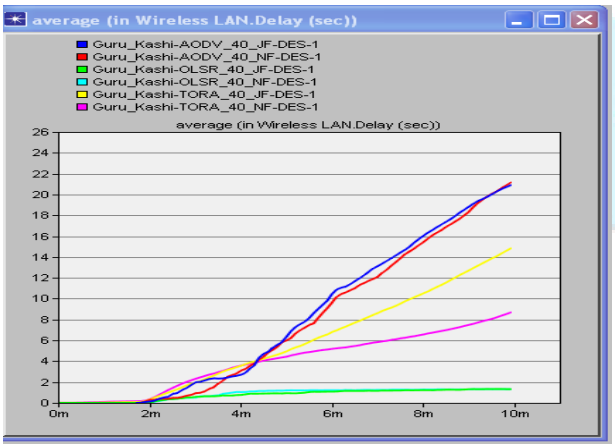

Fig: a (i)

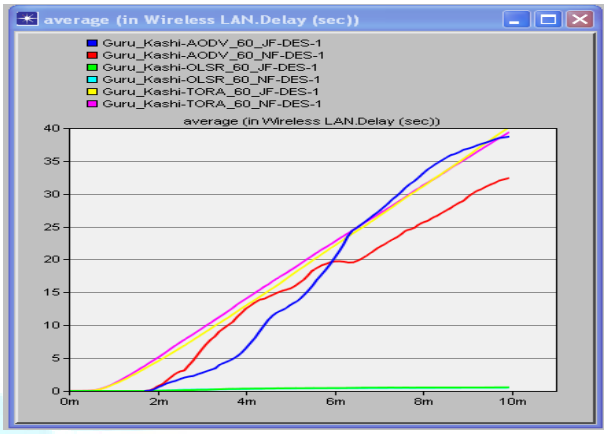

Fig: a (ii)

b. Throughput: - In both scenarios (normal and JF scenario)AODV has the Maximum throughput with the increasing no. of nodes as compare to the TORA and OLSR. But as compare to the normal scenario in JF scenario throughput lags little bit for OLSR and TORA but not in AODV.

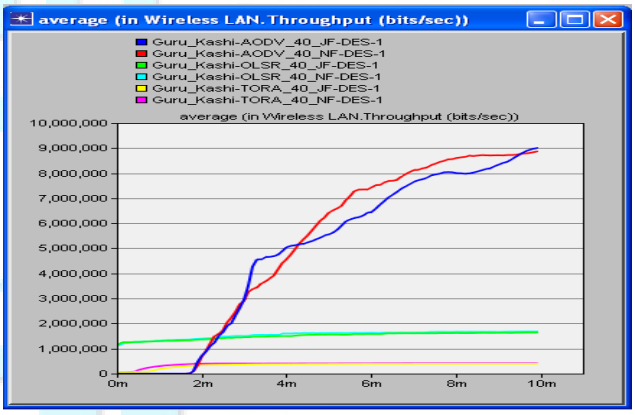

Fig: b (i)

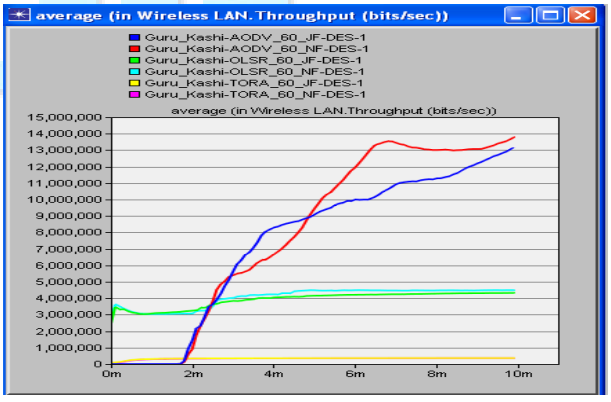

Fig: b(ii)

c. **Data Dropped (Buffer overflow): -** TORA has minimum Data Dropped and AODV has highest data dropped (Buffer overflow) because the MAC could not receive any acknowledgement for retransmission of those packets.

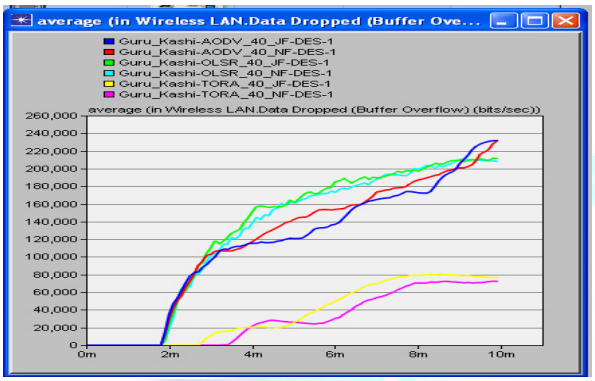

Fig: c (i)

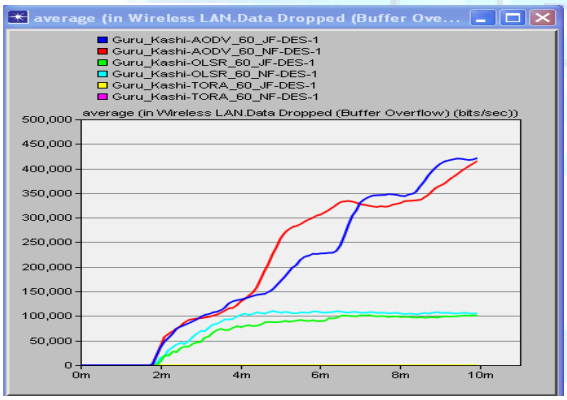

Fig: c (ii)

d. **Load: -** Load represents total load submitted to wireless LAN layer by all higher layers. Highest load is captured by AODV and TORA has captured lowest load.

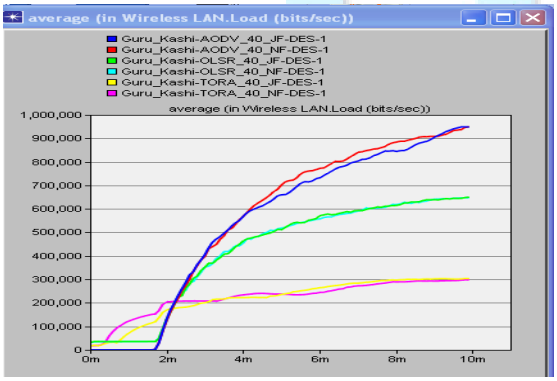

Fig: d (i)

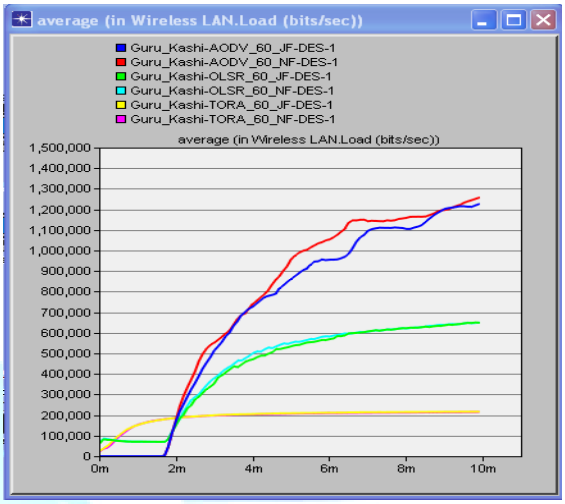

Fig: d (ii)

VIII. Conclusion

AODV is best protocol to use when we need highest throughput, TORA performs worst. But when we need reliable delivery of packets we will choose TORA because Data dropped is less in TORA. OLSR is best protocol when we need less delay in network.

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