Analysis of Security Attacks Regarding MANET Routing Protocols

Abstract

A mobile ad hoc network is a kind of wireless ad-hoc network due to its feature such as self configuration and self maintenance attainment popularity day by day but MANET often travail form security attack because of its different characteristic such as dynamic topology, lack of central administration, open network architecture, and lack of clear line defense. Example of Such a security attacks are the black hole and wormhole attacks that readdress the packet to unknown node which is not exit in the network. [2, 6]

The scope of this thesis is to analysis and compares both black hole and wormhole attack in Ad-Hoc on Demand Distance Vector (AODV) and Optimized Link State Routing (OLSR) which are reactive and proactive protocols to identify which of these routing protocols are more assailable to attacks and which one of theses attacks are more serous in MANET and what are the defense mechanism against them. The measurements were taken in the light of throughput, end-to-end delay and network load. Simulation is done in Optimized Network Engineering Tool (OPNET) or as its new name Reverbed modeler 17.5. [11]

Keywords: MANET, Routing Protocols, Black Hole, Wormhole, Security Mechanisms

Research Goals

The objectives of this thesis are as bellow:

This thesis focus on consequences and analysis of black hole and wormhole attack in MANET

- Analyzing the consequences of black hole and wormhole attack in the light of Network load, throughput and end-to-end delay in MANET.
- Simulating the black hole attack and wormhole attack using active and proactive routing protocol
- Comparing the results of both Proactive and Reactive protocols to analyze which of these two types of protocols are more vulnerable to Black Hole attack and wormhole attack.
- Comparing the result of routing protocol under the black hole and wormhole attack to analysis which of these attacks are more Wrackful in MANET
- Suggest a pervious defining mechanism for avoiding black hole and wormhole attack

1.4 Research question

To achieve our objective in thesis we should address and answer to these questions:

Q1: what are the consequences of wormhole and black hole attack on MANET routing protocol?

In this question we measure the performance of MANET in normal mode and under the attacks and it well be clarify that how Mach the attack can make unstable the network and researchers can have research on isolation of such attacks on MANET .

Q2: which one of these attacks is more serious on MANET routing protocol and what are the defense mechanism against them?

In this question we compare the result of MANET routing protocol under the black hole attack and worm hole attack than well be identified that which of these attack are more Wrackful in MANET and we well review and analyze different defense mechanism against these attacks and suggest the best one .

Q3: Which one of these routing protocols are more assailable to attacks on MANET the reactive or proactive?

In this question after comparing the result of both routing protocol under the black hole and wormhole attack well be clarify that which type of these routing protocols are more assailable to attacks and than researchers can have research on the assailable routing protocol to make it more secure against such type of attacks.

Research Methodology

Research Methodology is like a tool that examine particular area and define that how the development work can be fulfilled in form of research activity which the data is collected analyzed and based on analyzed the conclusions are drown. There are many type of research such as empirical and conceptual, quantitative and qualitative, descriptive and analytical, basic and applied and some more other types.

Our research method is quantitative because Experimental and simulation studies are generally quantitative research and the result are presented in table and graph via numbers in our case we use OPNET tool to carry out our simulation which the outcome result well collect, analyze and based on analyze the conclusions are drown. The whole thesis's research design divides into four stages.

I. Problem identification and selection

At first it is important to select and define a problem area, after studied different area in MANET especially many types of attack and their consequences on MANET we attention on how to increases MANET routing protocol performance, we select black hole and wormhole attack and their consequences on MANET as our research area .

II. Literature Study

After problem identification we should know more about MANET and the security issues regarding MANET in the literature study we were studied different routing protocol, many simulation tools, security attacks specially black hole and wormhole attack and their consequences on MANET; we divided problem in many keyword to search for materials.

III. Building Simulation

For analysis the problem we simulated the problem we created many scenarios under the black hole and wormhole attack, the OPNET or reverbed modeler 17.5 tool is selected for executed simulation OPNET is a simulation tools that provide technologies, protocols, communication devices for academic research, estimation and improvement. It is efficient, robust and highly relies.

IV. **Result Analysis and conclusion**

The most important part in this stage we compare the performance of network under the attacks and with no attacks we also compare the system result under the black hole attack with wormhole attack all the result archive from the simulation analysis based on result analysis the conclusions are drown.

The measurements were taken in the light of throughput, end-to-end delay and network load