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Evaluation of Mobile IPV6 Protocols In Handover And Under Dos Attacks

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Abstract- IPv6 mobility management is one of the most challenging research topics for enabling mobility service in the forthcoming mobile wireless ecosystems. The Internet Engineering Task Force has been working for developing efficient IPv6 mobility management protocols. As a result, Mobile IPv6 and its extensions such as Fast Mobile IPv6 and Hierarchical Mobile IPv6 have been developed as host-based mobility management protocols. While the host-based mobility management protocols were being enhanced, the network-based mobility management protocols such as Proxy Mobile IPv6 (PMIPv6) and Fast Proxy Mobile IPv6 (FPMIPv6) have been standardized. This system analyses the performance of IPV6 protocols based on handoff parameters such as packet loss, handover latency, handover blocking probability and enhances protocols performance under Denial of service attack that too most commonly in black hole attack scenario.

Keywords- PV6, BU, CN, COA, Handoff/Handover, HMIPv6, IPv6, LMA, MN, MAP, NS2, PMIPv6

I. INTRODUCTION

With increasing popularity of mobile devices such as PDA's, internet ready cell phones, PC Tablets, etc. There is a need to provide access to the Internet that may be always in motion or wireless access to the Internet. Mobile devices can be connected to the Internet by using wireless network interfaces. However, a mobile device may change its network attachment each time it moves to a new link.

Mobility management protocols are at the heart of the mobile wireless ecosystems. Mobile wireless ecosystems facilitate more rapid growth of digital ecosystems for our human lives. Mobile social networking, mobile collaboration computing, and mobile shopping shall become a reality with a well-deployed mobility management architecture. Various mobility management protocols for enabling mobility services are introduced. In general, mobility support in the network layer is developed by the Internet Engineering Task Force (IETF). Mobile IP (base MIP, MIPv6) are the standards proposed to handle mobility of Internet hosts for mobile data communication. Several drawbacks exist when using MIP in a mobile computing environment, the most important issues of MIP identified to date are high handover latency, and high packet loss rate. Recently, a number of enhancements for MIPv6 are proposed. Fast Handovers for Mobile IPv6 (FMIPv6), aims to reduce the handover latency by configuring new IP addresses before entering the new subnet. Hierarchical MIPv6 mobility management (HMIPv6) introduces a hierarchy of mobile agents to reduce the registration latency and the possibility of an outdated care-of address. FMIPv6 and HMIPv6 can also be used together to improve the performance Even with these enhancements, Mobile IP still cannot completely solve the high latency problem, and the resulting packet loss rate is still high. As the percentage of real-time traffic over wireless networks keeps growing, the deficiencies of the network layer based Mobile IP in terms of high latency and packet loss becomes more obvious. Since the Mobile IPv6 (MIPv6) specification was found, extensions including Fast Mobile IPv6 (FMIPv6) and Hierarchical Mobile IPv6 (HMIPv6) for enhancing the performance of MIPv6 have been developed. During the time when the extensions to MIPv6 is developed, comparative performance analysis for IPv6 mobility management protocols is used as an inputs for developing improvements . An evaluation study for MIPv6, FMIPv6, HMIPv6, and a combination of FMIPv6 and HMIPv6 has been carried out by many people to identify each mobility management protocol's characteristics and performance indicators. While host-based mobility management protocols are increasing in demand in wireless mobile communication infrastructures, communication service providers and standards development organizations have recognized that such conventional solutions for mobility service are not suitable in particular, for telecommunication service, a

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mobile node (MN) is required to have mobility functionalities at its network protocol stack inside, and thus, modifications or upgrades of the MN are forced. It evidently increases the operation expense and complexity for the MN. The host-based mobility management protocols also cause a lack of control for operators because the MN manages its own mobility support. Accordingly, a new approach to support mobility service has been required and pushed by the 3gpp people to the IETF.

II.HANDOVER IN MOBILE COMMUNICATION

Mobility is the most important feature of wireless cellular communication systems. Usually, continuous service is achieved by supporting handoff (or handover) from one cell to another. When mobile moves from one cell to another Handoff/Handover occurs. Handoff is the process of changing the channel (frequency, time slot, spreading code, or combination of them) associated with the current connection while a call is in progress. The process of transferring a mobile user from one channel or base station to another. The conversation needs to be handed over to the new BS before the link between the old BS and the MS becomes unusable. Otherwise, the call is lost. Handoffs must be performed quickly, infrequently and successfully and it should be imperceptible to users. A handover (HO) is the process during which a mobile node (MN) creates a new connection and disassociates from its old one. The decision for a new association may be initiated due to movement, if we are moving away from the old connection point and we are approaching a new one; low signal quality, because of interference or other impairments in the wireless path quality of service decision, trying to effect a balanced load among neighboring or overlapping cells better service, if we recognize a network with services that we require or policy and cost decision, where the network or the user decide that it is more appropriate, or advantageous to relate to a different location. Handovers can be characterized as Horizontal if they are performed between connection points using the same access technology, or Vertical if they are performed between access points of different technologies, a case which will be more common in future heterogeneous networks. Poorly designed handoff schemes tend to generate very heavy signaling traffic and, thereby, a dramatic decrease in quality of service (QoS). (a handoff is assumed to occur only at the cell boundary.) The reason why handoffs are critical in cellular communication systems is that neighbouring cells are always using a disjoint subset of frequency bands, so negotiations must take place between the mobile station (MS), the current serving base station (BS), and the next potential BS. Handover involves link switching, which may not be exactly coordinated with fast handover signaling. Furthermore, the arrival pattern of packets is dependent on many factors, including application characteristics and network queuing behaviors .Other related issues, such as decision making and priority strategies during overloading, might influence the overall performance.

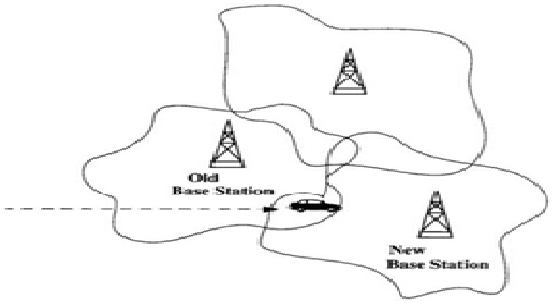

Fig 1.HANDOVER

III.FUNCTIONS OF THE PROTOCOLS ANALYSIS

Mobility management consists of location and handoff management. Location management tracks the location of mobile nodes. Handoff management consists in moving from an access point to another, in order to keep the connection alive. Handoff's can be horizontal or vertical. A horizontal handoff is a handoff between homogeneous networks, while a vertical handoff is a handoff between heterogeneous networks. The challenge with handoffs is to keep the signaling and power overhead at a minimum, to avoid traffic disruption (e.g., packet loss and latency), and to use network resources efficiently.

Global mobility management solutions apply to the movement between different domains/ providers, or different access technologies infrastructures which are not interoperable (such as the movement from a 3G network to a WLAN network). In global mobility solutions the mobile node is responsible for movement detection and updating its location with the network.

A. MIPV6

MIPv6 is a global mobility management protocol the mobile node can reach the entity in its home network (independently of the access network domain/provider) the protocol will be able to perform mobility management at a global scale. Mobile IPv6 is the next generation

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protocol and in the near future, routers are going to become more faster and new technologies are going to reduce the Internet delay (delay incurred in transmitting packets from one network to another). Mobility support in IPv6 is particularly important, as mobile computers are likely to account for a majority or at least a substantial fraction of the population of the Internet during the lifetime of IPv6.The Mobile IPv6 protocol is just as suitable for mobility across homogeneous media as for mobility across heterogeneous media. For example, Mobile IPv6 facilitates node movement from one Ethernet segment to another as well as it facilitates node movement from an Ethernet segment to a wireless LAN cell, with the mobile node's IP address remaining unchanged in spite of such movement.

B. HMIPV6

HMIPv6 is a local mobility management Protocol extension to MIPv6 and FMIPv6. HMIPv6 still requires the mobile node to perform some of the movement detection and location updating. However, the signaling is significantly reduced since the entity in the point of access will perform location updating with other entities on behalf of the mobile node. It is a well-known observation that MNs moving quickly as well as far away from their respective home domain or correspondent nodes produce significant BU signaling traffic and will suffer from handoff latency and packet losses when no extension to the baseline Mobile IP protocol is used. This aims to reduce the signaling load due to user mobility. The mobility management inside the local domain is handled by a Mobility Anchor Point (MAP). Mobility between separate MAP domains is handled by MIPv6. The MAP basically acts as a local Home Agent. When a mobile node enters into a new MAP domain it registers with it obtaining a regional care-of address (RCoA). The RCoA is the address that the mobile node will use to inform its Home Agent and correspondent nodes about its current location. Then, the packets will be sent to and intercepted by the MAP, acting as a proxy, and routed inside the domain to the on-link care-of address (LCoA). When a mobile node then performs a handoff between two access points within the same MAP domain only the MAP has to be informed. However that this does not imply any change to the periodic BUs a MN has to sent to HA, CNs and now additionally to the MAP.HMIPv6 presents the following advantages: it includes a mechanism to reduce the signaling load in case of handoffs within the same domain and may improve handoff performance reducing handoff latencyand packet losses since intra-domain handoffs are performed locally.

C. PMIPV6

Proxy Mobile IPv6 (PMIPv6) is a network-based mobility management protocol that supports network mobility, regardless of whether or not a Mobile Node (MN) supports mobility protocol . This particular feature enables resource optimization in their networks and reduces energy consumption of an MN and handover signaling cost. A Mobile Access Gateway (MAG) and a Local Mobility Anchor (LMA) are in charge of the mobility of an MN in the PMIPv6 domain. However, basic PMIPv6 does not support Route Optimization (RO). If so, all packets are always transmitted via an LMA, and this increases the load of an LMA and increases packet transmission delay. Many schemes are proposed to support the RO to resolve this problem in PMIPv6. When the RO occurs in PMIPv6, the MN communicates with the Correspondent Node (CN) via the RO path between MAGs. Here, we define the RO path as a new path, and the basic PMIPv6 path as an old path. When the new path is established, the out-of-sequence problem occurs due to the difference the transmission time between the old path and the new path. This problem causes packet loss in User Datagram Protocol (UDP) and packet retransmission request messages in Transmission Control Protocol (TCP). The mobile agent located in the network will perform the mobility signaling instead of MN, and will keep track of movement of MN. It is noted that the PMIPv6 is used mainly for binding update of locations of MNs.

IV. SYSTEM ANALYSIS OF THE PROCESS

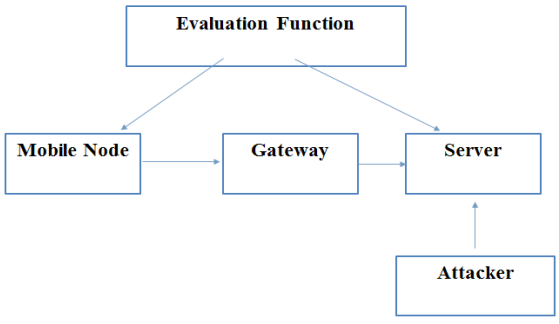

Fig 2.BLOCK DIAGRAM OF THE SYSTEM

a.*Mobile Node:*Mobile device with an IPv6 home address is used and is Capable of connecting to the Internet from a variety of different points of entry.

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*b. Gateway (Base Station):*Itcan be a computer running the appropriate software to connect and translate data between networks with different protocols and it contains devices such as protocol translators, impedance matching devices, rate converters, fault or Signal isolators, to provide system interoperability.Thecomputer with which mobile node communicates using its home address

*c.Server:*Thesystem (software and suitable computer hardware) that responds to a requestsand it is used by a computer network to provide a network service.

*d. Evaluation function:*The evaluation function is typically designed to prioritize speed over accuracy and other characteristics that the function looks only at the current position and therefore static.

e. Attacker: Attack is an any attempt to destroy, expose, alter, disable, steal or gain unauthorized access to or make unauthorized use of an asset in any network this is done by an attacker.

V. WORK FLOW MODEL OF THE SYSTEM

1. A network model is to be created and Mobile node, corresponding node, Gateways, attacker, server are to be added.

2. An Evaluation function is to be initiated in backend.

3. Authentication process is to started.

4. Once authentication is completed service request and communication is needed to be initiated.

5. Then due to mobility handoff function to be called.

6. The QOS parameters such as latency throughput, packet loss needed to be measured for all 3 protocols.

7. An analysis plot is to be produced as a result.

VI. OUTPUT GRAPHICAL ANALYSIS AND RESULT ANALYSIS

NS (Network Simulator) is the Open Source discrete event simulator targeted at networking research. NS provides substantial support for simulation of TCP, Routing and Multicast Protocols over wired and wireless (Local and Satellite) networks. NS began as a variant of Real Network Simulation in 1989 and has Evolved Substantially over past years. Here NS2.32 version is used and worked under VMware Work station in CentOS.

Hence through our project from these graphs the value's analyzed from various protocols are as follows

1) PACKET LOSS ANALYSIS

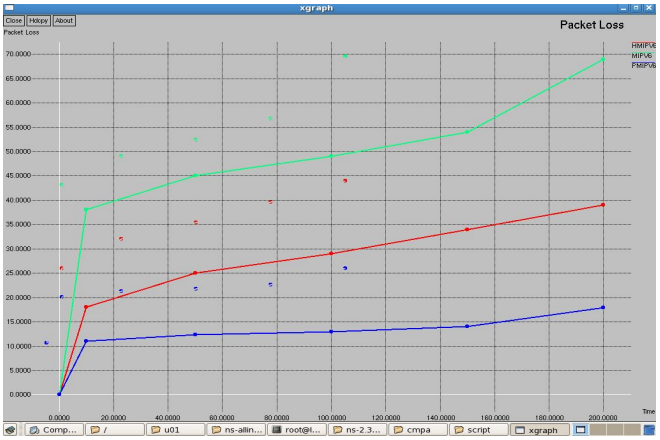

Fig 3.PACKET LOSS

Packet loss occurs when one or more packets of data travelling across a computer network fail to reach their destination. Packet loss is the discarding of packets in a network when a router or other network device is overloaded and cannot accept additional packets at a given moment. The losses are usually due to congestion on the network and buffer overflows on the end-systems. A buffer is a portion of a computer's memory that is set aside as a temporary holding place for data that is being sent to or received from an external device. The sum of all lost packets destined for an MN during the MN's handover. Compared to MIPV6 packet loss is lesser in HMIPV6 and compared to HMIPV6 Packet loss is less in PMIPV6as there is less interference in HMIPV6.From this simulation we infer that PMIPV6 shows better performance when compared to MIPV6 and HMIPV6 during packet loss. Because it enables and uses resource optimization in their networks and reduces energy consumption of an MN and handover signaling cost. It uses Mobile Access Gateway (MAG) and Local Mobility Anchor (LMA) components.

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Protocols	**X axis**(packet loss)	**Y axis**(time)
MIPv6	origin	68,000
HMIPv6	origin	*34,000*
PMIPv6	origin	17,000

Protocols	**X-axis**(frame error rate)	**Y-axis**(handover blocking probability)
MIPv6	600,000	170,0000
HMIPv6	600,000	130,0000
PMIPv6	600,000	70,0000

2) HANDOVER BLOCKING PROBABLITY ANALYSIS

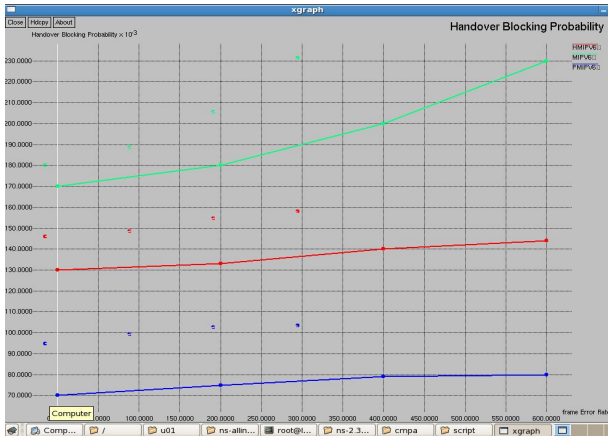

Fig 4.HANDOVER BLOCKING PROBABILITY

Handover blocking probability is the probability when an MN cannot complete its handover when the network residence time is less than the handover latency where it plays important role in the performance of wireless networks this is used to analyze the handover management failure of each mobility management protocol. The handover blocking probabilities of predictive FMIPv6 and PMIPv6 are lower than the others as well, but the handover blocking probability of MIPv6 is higher than the others. MIPv6 calls forth poor performance in terms of the handover blocking probability. The handover for an MN can fail for several reasons such as unacceptably high handover latency, signal-to-noise deterioration, and unavailable wireless channel resource. For instance, if the residence time that the MN stays in the network is less than the handover completion time, the handover for the MN is failed due to the loss of the link information or the wireless channel.

3) HANDOVER LATENCY ANALYSIS

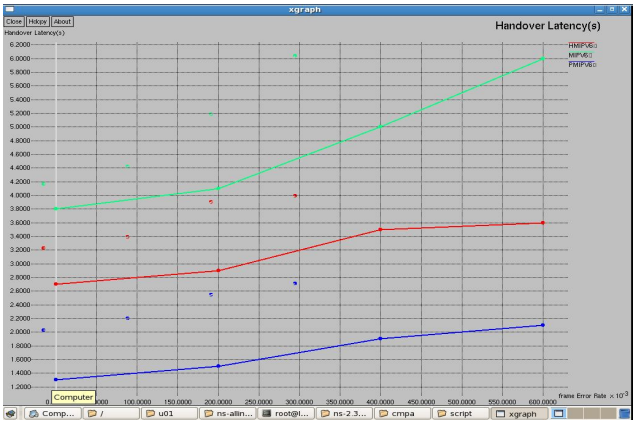

Fig 5.HANDOVER LATENCY

Handover latency is the time interval during which an MN cannot send or receive any packets while it performs its handover between different access networks. A mobile node is unable to receive IP packets on its new association point until the handover process finishes. The period between the transmission (or reception) of its last IP packet through the old connection and the first packet through the new connection is the handover latency. The handover latency is affected by several components such as Link layer establishment delay (DL2), Movement Detection (DRD), Duplicate Address Detection (DDAD),BU/Registration Delay (DREG). Handoff latencies affect the service quality of real-time applications of mobile users. With Mobile IP (MIP), the handoff latency highly depends on the distance, i.e. delay, between Home Agent (HA) and Foreign Agent (FA). Hierarchical MIP (HMIP) minimizes handoff latencies but depends on additional network elements introduced on the path between HA and FA. This proves high and in MIPv6 as identified as before even though with

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enhancements and PMIPv6 shows the best using in MAG and LMA.

Protocols	**X-axis** (frame error rate)	**Y-axis** (handover Latency)
MIPv6	3.8000	170,0000
HMIPv6	2.7000	130,0000
PMIPv6	1.3000	70,0000

These values are determined from the origin with the scale using 10,000 units with respect to the x and y axis and is measured in time.

The analysis of other parameter in a DOS attack scenario especially in Black hole Attack and wormhole attack is analyzed in future.

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