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Handover Process Optimization in Mobile IPv6

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Abstract- The usage of mobile devices have increased enormously, users tend to change their positions frequently, during movement mobile node moves from one network to other. The process of mobile node (MN) movement from one network administrative domain to other is called handover. During this process large amount of time is wasted, the objective is to optimize the handover process by reducing the time taken during handover process. Internet Engineering Task Force introduced MobileIPv4, MobileIPv6 to support the handover process, when a MN leaves the home network (HN) and enters a foreign network (FN) it obtains a new IP address and updates its Care of Address (COA) to the HN. Handoff time is very high in MIPv6 due to its inability to differentiate micro mobility (intra network) and macro mobility (internetwork). Hierarchical MobileIPv6 (HMIPv6) introduced to address macro mobility performs Duplicate Address Detection (DAD) at two levels which consumes high handover time, packet losses are high in HMIPv6. The proposal is to reduce the time taken during handover process, the major component that consumes more time during handover is DAD, it is an important component in maintaining the address uniqueness. So DAD performed at MN end is shifted to Router end, during handover router generates IP addresses and performs DAD on generated addresses to maintain address uniqueness and stores it in blackboard storage, thus the addresses stored are unique. The unique address from the router is assigned to the MN, thus the routers processing power and storage capacity is utilized by performing DAD at router end, heavy packet losses are reduced and handover time can be reduced to a great extend.

Keywords- Care of Address (CoA), IPv6.

I. INTRODUCTION

Internet provides access to various resources. Internet can be accessed from a device at a fixed place like desktops and by wireless devices like PDAs, handheld devices that changes its position over the Internet. We are now in an era where the internet is not fixed anymore. Protocols that were specified for communication in fixed systems were not applicable to the mobile devices, so several researches were made to make Mobile Networking efficient. Result of the research, Mobile IP a protocol that provides mobility function for IP Devices. It describes the protocol that a mobile node must follow when it is in movement. Mobile IPv4 was then standardized in 1996 as RFC 2002, it could not support handover between networks and had no path optimization technique. Later IPv6 was developed due to the address constraints. The mobility protocol which regulates mobile devices running over IPv6, called Mobile IPv6 was built along with it. It was possible for the mobile devices to utilize the advantages of IPv6 through Mobile IPv6. It was standardized in 2004 as RFC 3775, supported handover and route optimization techniques.

II. BACKGROUND

A. EXISTING SYSTEM

In the current Scenario Mobile IPv6 protocol is used for Mobile Networking. According to the protocol the mobile node maintains two address namely Home Address, Care of Address (CoA).The mobile node is addressable through home address when present in home network. When mobile node moves to foreign network it uses it CoA to register to the Home Agent to complete home registration. CoA is the temporary IP address for the mobile node. The Home agent uses this address to forward the packets to the mobile node in foreign network. Before MN uses this address it performs Duplicate Address Detection (DAD) to check for the uniqueness of the address. Handoff Latency is described as time taken for a mobile node to move from its home network to foreign network, register its CoA to Home Agent and receiving the first packet from the Home Agent.

DAD is generally a simple process which involves sending a neighbour solicitation message to all node multicast address, if any node replies the MN then the address is duplicate and should not be assigned to MN, if no reply is received the address is unique and it can be assigned to MN. But it consumes more time during handoff when performed at the MN end leading to end to end connection interruption and more packet losses.

B. DRAWBACKS IN EXISTING SYSTEM

- DAD calculation at MN end consumes nearly 1sec of handoff time
- Large packet losses happens during handoff
- Connection sensitive applications like e-banking encounters end to end connection hindrance.

- Modern Day routers storage and processing capacity are not utilized properly

III. PROPOSED SYSTEM

The Modified MIPv6 protocol has the following changes and its working is discussed below. The basic idea of this Modified MIPv6 is to reduce the load at the MN end and utilize the routers storage capacity and processing power. The Modified MIPv6 also performs DAD before assigning address to a host but the DAD calculation is shifted from the MN to the Router end.

A. CHANGES AT MN END

The MN when boots receives periodic RA from its home agent, the MN requests for solicited RA by sending a solicited packet, home agent process solicited packet and sends IP address along the solicited RA,MN on receiving solicited RA extracts the suffix and combines it with the link local prefix and forms the unique Link Local Address and auto configures is HoA. Thus the MN forms the home address through which it is addressable when present in HN, packets are forwarded to the home address of the MN. Now the MN receives periodic RA from foreign routers it compares the prefix with its Binding Update List if new prefix is found it moves to the FN, same as in HN it requests solicited RA, meanwhile MN rejects any unsolicited RA,FR sends IP address along with RA.MN extracts the suffix combines with Link Local Prefix and forms Unique Link Local Address and auto configures its CoA. Address formation has the concept that the suffix used to form an address in a network is unique then the same suffix used to form another address in the same network will also be unique, hence the CoA is formed .Thus the MN end has been made simple and made free from DAD which consumed more time in handoff latency.

B. CHANGES AT ROUTER END

Router is configured to have a blackboard storage which storages 20 to 25 address. When router receives solicited RA request from MN it generates IP address and stores it in its blackboard. Now router initiates DAD on generated address it is done based on the following concept, address uniqueness has to be tested for each individual unicast address, address uniqueness is determined by interface identifier, assuming that the subnet prefixes are assigned correctly. For address formed from same interface identifier it is sufficient to check the link local address generated from the identifier is unique on the link, if no duplicate address is detected then DAD for further addresses generated on the same interface identifier can be skipped.

1) DAD Operation: In order to check uniqueness of an address using DAD a node sends DupAddrDetectTransmit neighbor solicitation message each separated by RetransTimer milliseconds. The solicitations Target address is set to the address to be checked, IP source address is set to Unspecified address, IP destination address is set to solicited node multicast address of the target address. Within RetransTimer milliseconds if the MN receives reply from any node the address is duplicate and should not be assigned, if no reply is received then the address is unique and not used by any other mobile node, this address is permanently assigned to the MN.

Thus in Modified MIPv6 the router performs the core operation of DHCP server by generating the address when needed and maintaining the uniqueness of the generated address. The above operation does not count in the handoff latency as it happens at routers end. Moreover the major component that consumed more time during handoff is DAD performed at MN end, as it is shifted to Router's end the handoff latency is drastically reduced, nearly 950ms are reduced using this approach. So users can experience very less hindrance during handover and very less end to end connection interruption.

C. ADVANTAGES OF PROPOSED SYSTEM

- DAD at router end does not count in handoff latency, so overall handoff latency is reduced drastically.
- Routers storage and processing capacity is utilized.
- The load at MN end is reduced as DAD is removed from MN.
- Very less packet losses occur.
- Connection sensitive Applications like chat, e-banking can be done on mobile phone will less interruption in communication as the Router takes the job of DAD, mobile node is left free.

IV. EXPERIMENTAL OBSERVATIONS

TABLE I EXISTING SYSTEM VERSES PROPOSED SYSTEM

S.No.	Existing MIPv6	Modified MIPv6
1	DAD is done at MN end	DAD is done at Router end
2	DAD calculation consumes 1sec of handoff time	DAD calculation consumes 50msecs of handoff time
3	Routers storage and processing capacity is not utilized.	Routers storage and processing capacity is utilized properly.
4	The load at MN end is very high	The load at MN is very low
5	Huge packet losses occur	Very Very Low packet losses occur

TABLE II
PERFORMANCE EVALUATION OF CURRENT AND PROPOSED SYSTEM

TIME	MIPv6	MODIFIED MIPv6
1.Mobile Node boot up at	**0.85 sec**	**0.85 sec**
2.Address Configuration in HN at	**2.89 sec**	**0.89 sec**
3.Address Configuration in FN at	**7.94 sec**	**5.83 sec**
4.Time taken for DAD	**1.5 sec**	**Less than 50 m sec**

V. CONCLUSION

Thus using Modified MIPv6 Protocol test results are observed with respect to address configuration, DAD calculation time taken during handover in Modified MIPv6 and MIPv6. Using Modified MIPv6 Protocol the time for address configuration and DAD calculation is reduced, yielding less packets losses and fast handover.

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