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A comparative study of IP Networking auto-configuration of dual stack and mobile IPv6 co-existence techniques

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ABSTRACT

Today challenging task in IPv6 to configure themselves independently and extend address space between IPv4 to IPv6 using different techniques. Several terms and techniques are necessary to understand Dual-Stack Mobile IP to auto-configuration in IP Networking. The IP mechanism for auto-configuration of addresses depends on the Dynamic Host Configuration Protocol (DHCP) server determination of whether addresses should be obtained using the configuration mechanism procedure. Mobile IP is technology allows mobile device users to move from one network to another IP address. And Dual –Stack mechanism supported both IPv4 and IPv6 traffic and routes with independently work hosts and routers, and to control the mobility between mobile and DHCPv6 server, signal traffic of hosts and routers, so this paper main aim to a comparative study on the auto-configuration in Dual Stack and Mobile IPv6 using co-existence techniques.

Keywords— *IP Autoconfiguration, Mobile IPv6, Dual–stack, Stateful and stateless, DHCP*

1. INTRODUCTION

Mobile IP is an open platform, defined by the Internet Engineering Task Force (IETC) RFC 2002 that allows users to keep the same IP address, stay connected, and maintain ongoing application while roaming between IP networks. Mobile IPv4 configures by manually and IP networks today work for autoconfiguration, to solve the problems of address space between IPv4 to IPv6. IP addresses automatically configure in IPv6 and unique extend address space over IPv4 to IPv6 to improved mobility and quality of services. Autoconfiguration to improve and come with new features mobility of device, extensibility and automatically configures IP networking. Mobile IPv6 network is self-organizing autoconfigures network, in which nodes are free to work randomly and can communicate within the Dynamic Host Configuration Protocol (DHCP) server. IP autoconfiguration networks do not rely on the pre-existing DHCP and moreover no centralized server exits in them. Mobile IPv6 Mobile node and Home agent can communicate directly foreign agent through signal Network Address Translation and tunnelling mechanism to extend address space of IPv4 and IPv6. In other side autoconfiguration, a new protocol automatically configures Dual Stack Mobile IPv6 without the need of DHCP server and pass out addressing, services information in the same way that DHCP is used in IPv4. However, in order to facilities multi IP networking communication between the nodes, the intermediate nodes will act routers and relay packets generated by the other nodes. The address-configuration for each node in infrastructure networks is provided by a centralized server such as a Dynamic Host Configuration Protocol (DHCP) server, but in Mobile IPv6, no such centralized server exists, so, the challenging issues in Mobile IPv6 to autoconfiguration and highly difficult to replace existing Mobile IPv4 address with in Mobile IPv6 rather a coexistence may be possible.

2. LITERATURE SURVEY

Priya Bali [1], *"A Detail Comprehensive Review on IPv4-to-IPv6 Transition and Co-Existence Strategies",* Internet Protocol version 4 (IPv4) addresses have been reported to be nearing exhaustion and the next generation Internet Protocol version 6 (IPv6) is gradually being deployed on the Internet. IPv6 provides a much larger address space, better address design and greater security, among other benefits. IPv6 deployment requires thorough and careful preparation to minimize network disruption and ensure that the benefits of IPv6 are obtained. Due to the drawbacks of IPv4, now these days IPv6 is extremely popular in organizations, companies and Internet Service Providers (ISP). For preventing the change from IPv4 to IPv6, three mechanisms will be used for a smooth transition from IPv4 to IPv6 with less effect on the network. These mechanisms are Tunnel, Dual-Stack and Translation. This paper discusses IPV4 and IPV6 and use manual transition strategies and automatic of IPV6 and also compare their performances to show how these transition strategies affects network behavior.

S. Thomson Cisco, T. Narten, T. Jinmei [2], *"IPv6 Stateless Address Autoconfiguration*", this document specifies the steps a host takes in deciding how to autoconfigures its interfaces in IP version 6. The autoconfiguration process includes generating a link-local address, generating global addresses via stateless address autoconfiguration, and the Duplicate Address Detection procedure to verify the uniqueness of the addresses on a link.

Dr. Jitendranath Mungara, Prof. Shoba M S, Satish Raj [3], proposed *Survey on IPv4 and IPv6 Using Dual Stack Tunneling and Translation* the introduction of IPv6 has opened up several questions with reference to its adaption and transition from IPv4 to IPv6 and is one of the crucial issues being frequently discussed in the networking community today. IPv6 provides many seamless features that make it far better protocol as compared to its predecessor IPv4. It is a well-known fact that IPv4 is a standard at present and is currently been deployed in almost all the Internet architecture, hence the transition process from IPv4 to IPv6 is very challenging. In order to avoid the transition, or in an actual sense to delay it, many techniques have been introduced such as Dual stack, Tunneling and NAT. The objectives of this survey paper are twofold. Firstly, to highlight the issues related to the transition from IPv4 to IPv6. Secondly, to find the transition mechanism that can be provided seamlessly to end users where they will be able to use all the services of IPv4.The purpose is to tackle the issues and challenges that are likely to be faced during the transition from IPv4 to IPv6. Cisco Packet Tracer is used for simulation and Dual Stack has been chosen as the transition mechanism for the test bed. Dual Stack allows both protocols to run simultaneously and the results show that it also provides the seamless transition from IPv4 to IPv6.

Dr. Chaman Singh, Dr. K.L. Bansal [4], *"Dual Stack Implementation of Mobile IPv6 Software Architecture",* IPv6 is introduced mainly to resolve the address space issues and also provides several advanced features. IPv6 is estimated to replace IPv4 in a very near future. Dual Stack Mobile IPv6 (DSMIPv6) is an extension of Mobile IPv6 to support mobility of devices irrespective of IPv4 and IPv6 network. This paper provides an architectural overview of the existing DSMIPv6 implementation and software architecture to understand the significant modifications which have been made on DSMIPv6 basic implementation to achieve the requirements. The scope of the paper is to implement the Dual-stack Mobile IPv6 (DSMIPv6) protocol as per the IETF (Internet Engineering Task force) draft. The entities which have been implemented are 'DSMIPv6 Home Agent' and 'DSMIPv6 Mobile Node'. The paper covers the overview of NEPL (Network Mobility platform for Linux) and DSMIPv6 implementation and briefly describes the features supported by DSMIPv6 architecture. It also focuses on our Solution Approach and explains the high-level view of modules used in DSMIPv6 using a block diagram schematic.

3. CO-EXISTENCE TECHNIQUES

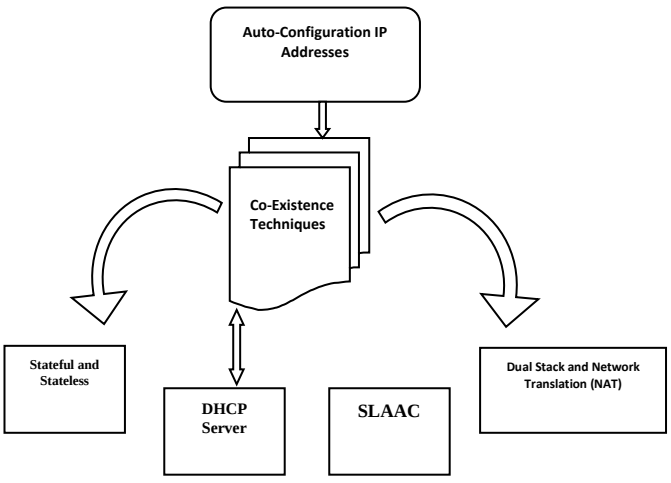


Fig. 1: Co-existence techniques

Table 1: Below shows the various IP Addresses Auto-configuration Co-existence Techniques

Co-Existence Types	Address Autoconfiguration	Prefix Derived from	Address Configuration
Manual	N/A	Manual	Manual IPv4
Stateful	Yes	DHCP	Auto DHCP
Stateless	Yes	Router Advertisement (RA)	Auto DHCP
SLAAC	N/A	Router Advertisement (RA)	Manual

Co-existence techniques table no 1 to show the IP Addresses flow obtained by any of the following auto-configuration methods:

(a) Manually: IP Address assigned by the host.
(b) Stateful: IP Auto configures assigned at the DHCP server
(c) Stateless: IP Auto configures assigned RA
(d) Stateless Address Auto-Configuration: IP Address assigned by host and RA

4. IP AUTO-CONFIGURATION

Mobile Internet Protocol version 6.0 (MIPv6) addresses need to attempt automatically configure in IP networking with new technology Auto-configuration, this parameter assigned by static and dynamic configuration obtained and might even change are any time. Automatically configured hosts dynamically participate in assigning and maintaining their configuration parameters, which have only local significance. IP configuration is especially for servers Dynamic Host Configuration Protocol and DNS Extensions have considered two main techniques configure and automatic operation. Both are exclusive requires a transition from automatic (local) to dynamic (global) configuration. MIPv6 hosts attempts to obtain IP configuration via Dynamic Host Configuration Protocol (DHCP) and its request to address responds assigned automatic configuration.

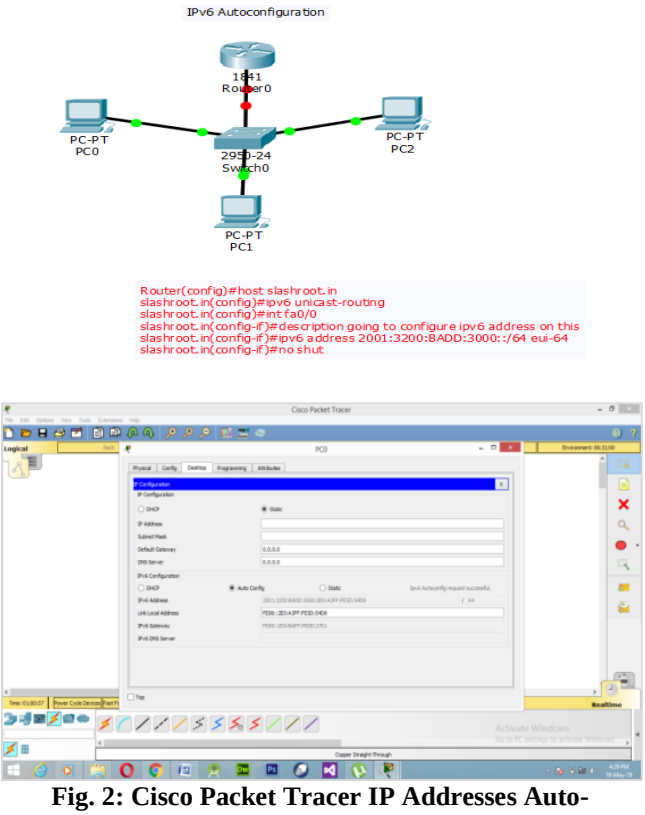


Fig. 2: Cisco Packet Tracer IP Addresses Auto-configuration

5. MOBILE INTERNET PROTOCOL VERSION 6.0 (MIPV6)

Mobile IPv6 and Dual- Stack Mobile IPv6 protocols require the signaling message between the mobile node and home agent to be secured. However, security for the user plane/traffic is optional and is a choice left to the mobile node. Mobile IPv6 signaling which enables the users plane traffic to be secured on a need or on-demand basis. The mobile node or the home agent can request at any time security for the user plane traffic. Security for user plane traffic can be triggered as a result of policy or, mobility or, at the user's choice. Mobile IPv6 and Dual-Stack Mobile IPv6 provide the option to secure the user plane data between Mobile Node (MN) and the Home Agent (HA). Mobile IPv6 protocol takes care of binding addresses between Home Agent (HA) and Mobile Node (MN). The user plane traffic between the MN and HA is secured via an IPSec Security Association (SA). MIPv6 and DSMIPv6 security of the user plane traffic is optional. When MN is attached the binding address of Mobile IPv6. It also ensures that the Mobile Node (MN) is always reachable through Home Agent (HA). In IPSec, each Mobile Node is always identified by its home address. Mobile IPv6 uses IPSec (IP Security) to protect signaling between the home agent and the mobile node. RFC6275 and RFC5555 provide the secure data between the Mobile Node (MN) and Home Agent (HA) Security of Mobile IPv6 and Dual-Stacks Mobile IPv6 need of NAT (Network Address Traversal) and detection on dual stack implementation of mobile IPv6. NAT traversal securing fully functionality of IP Sec and IKEv2 (Internet Key Exchange version 2) It also implements how IPSec integrate with NAT. The research is to IP Networking auto-configuration also implements Network Address Translation (NAT) and integrate IP Security to protecting signals between Mobile IPv6 and Dual-Stacks Mobile IPv6 on demand NAT (Network Address Translation).

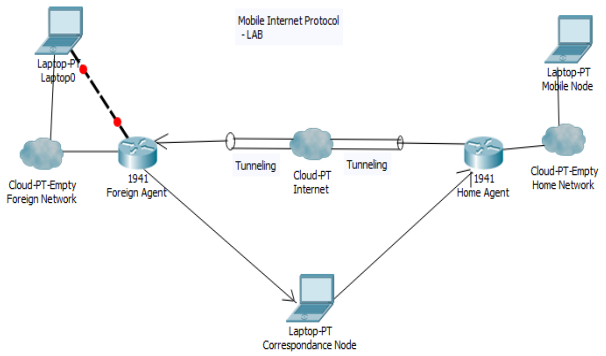
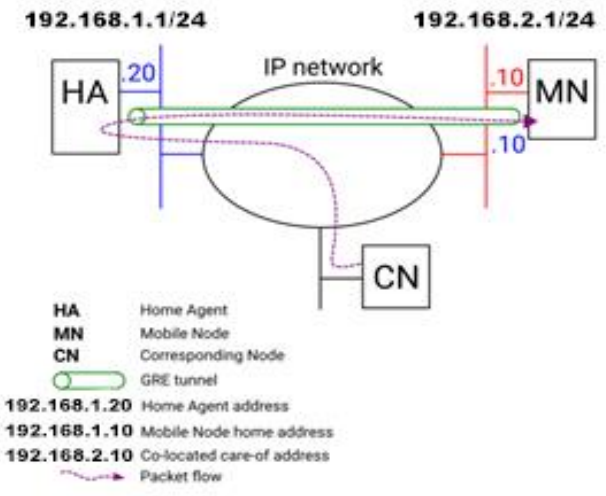


Fig. 3: Mobile IP work architecture



6. DUAL STACK MECHANISM

Dual Stack network working with two different nodes which are both IPv4 and IPv6 inter-connected with the router, as the router is typically the first node on a given network to receive traffic from outside of the network. Dual Stack mechanism IPv4 and IPv6 one network shift in another network to provide more address space and serve growing global connectivity. Dual stack network capable of processing IPv4 and IPv6 traffic simultaneously, When a node within a dual stack network receives traffic, it is a mechanism to prefer Ipv6 over Ipv4 traffic. Dual stack networking is one of several solutions for migrating from IPv4 to IPv6, but it is also one of the most expensive. In Dual Stack mechanism need to work with routers, IPv4 and IPv6, DNS, tunneling, Virtual Private Network (VPN) Data link etc. which are developed Dual stack architecture. Today day wise day dual stack need to want to deploy IPv6 on their internet network infrastructure. Dual stack devices are able to run IPv4 and IPv6 in parallel. Dual stack mechanism over all part of the transition from IPv4 and IPv6, transition mechanism is Dual Stack, Tunneling, and Header Transition to define architecture.

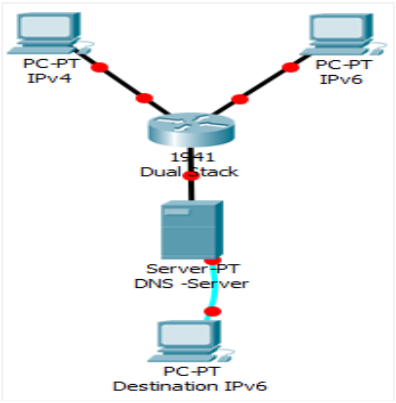


Fig. 4: Dual Stack mechanisms

7. STATEFUL AND STATELESS CONFIGURATION

Stateless autoconfiguration feature needs to Dynamic Host Configuration Protocol for configures various devices such as LAN, wireless, printers etc. attached with IPv6 network to connect the internet using the stateless autoconfiguration without requiring any intermediate of IP supporter. SLAAC for automatic configuration of hosts in an IPv6 network for use ICMPv6 Neighbor Discovery Protocol (NDP) also. IP addresses generate without using DHCP in stateless configuration to need to generate Link-Local address and various hosts and routers to send Router Solicitation (RS) and respond by Router Advertisement (RA). SLAAC supporting EUI-64 address format to autoconfiguration in IPv6 addressing and IPv6 host need unique auto-configured in the global level.

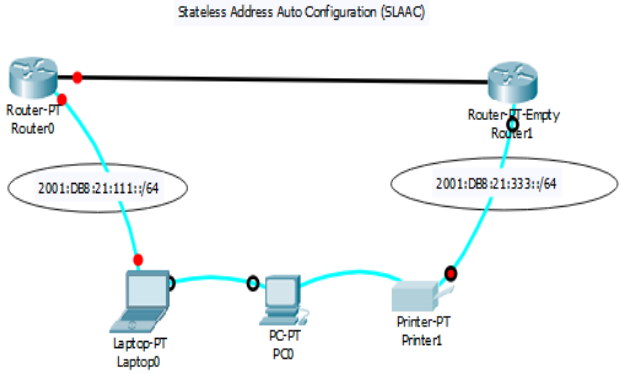


Fig. 4: Stateless allowing the hosts to configure IPv6 address

In case stateful autoconfiguration architecture parameter of server obtains hosts and addresses to configuration clients side information from server. Servers assigned an address to hosts. Stateless and Stateful autoconfiguration working in different way stateless autoconfiguration to configure addresses and stateful autoconfiguration obtain information in IPv6 network. Stateless Address Autoconfiguration needs to configure with DHCPv6 server but does not maintain a state of addresses, in stateful address configuration received address from DHCPv6 server and all address except default gateway use DHCPv6 server for all information. Stateful DHCPv6 server configures in a simple way need to use the router as a stateful DHCPv6 server and ICMPv6 Router Solicitation (RS) and Router Advertisement (RA) solicit to all DHCPv6 servers or Advertise depend in Unicast, Stateful RA message flow working Link-local-address and DHCPv6 server.

8. DYNAMIC HOSTS CONFIGURATION PROTOCOL (DHCP) AUTOCONFIGURATION

The DHCP server is one of the important and useful protocols for autoconfiguration in IP networking. This protocol working into DHCP for IPv6 starting with a comparison of stateful DHCP and stateless DHCP. It works a host sends a DHCP message, hoping to hear back from a DHCP server. The server will give the host a little initial information, and after another exchange of packets, the host is good to go with the IP address is accepted by the server. Four messages in the entire DHCP process, two sent by the client and two by the server. In between the location of the server in clients and server keeps a database of information on clients that accept the IP addresses that it offers.

9. CONCLUSION

This paper covers the different IP address Autoconfiguration techniques that were for the automatic configure IP addresses in Mobile IPv6 (MIPv6) and Dual Stack Mobile IPv6 (DSMIPv6). The total review confirms the efficient way to Auto configuration of Mobile IPv6 using Dynamic Host Configuration Protocol version 6.0 (DHCPv6) and Stateful or stateless auto configuration technology in Mobile IPv6 networking for Extend address space between Mobile IPv4 to Mobile IPv6 using techniques Dual Stack mechanism and Advance Network Address Translation. The work to bring out the most efficient method as compared to IP networking for Auto configuration techniques is on the process as it leads to large overhead and it is not appropriate for huge Mobile IP networking. For future work, Mobile –Adhoc Networks auto-configuration protocols, and using advance DHCPv6 for auto-configuration and depends on the number of configured advance techniques increase in networks size, Message or time complexity for detecting, we need to design some protocols that care of the memory constraint at IP networking.

10. REFERENCES

[1] Dr. Jitendranath Mungara, Prof Shobha M S, Satish Raj, T Sudarshan Rao, "Survey on IPv4 and IPv6 using Dual Stack, Tunneling and Translation" International Journal of Advanced Research in Computer and Communication Engineering. Vol. 7, Issue 2, Feb. 2018

[2] Khalid EL Khadiri, Najib El Kamoun, Ouidad Labouidya, and Rachid HILAL. "A novel Solution for the Transition from IPv4 to IPv5" International Journal of Computer Science, Vol.18, No.10, October 2018

[3] Adarsh Misra, Harsha Chawla, "Performance Analysis of IPv6 Dual-Protocol Stack and Tunnel Transition" International Journal of Science, Engineering and Technology Research, Vol. 5, Issue 5, May 2016

[4] Henry Chukwuemeka Paul, "A study on IPv4 and IPv6 the Importance of their Co-Existence", International Journal f Information System and Engineering, Vol. 4, No-2, Nov. 2016

[5] G. Bajko, B. Patil, T. Savolainen, "Security for Mobile IPv6 and Dual-stack Mobile IPv6, Mobile IPv6 and Dual-stack Mobile IPv6 protocols", Internet Engineering Task Force, Vol. 5, May 2012

[6] C. Perkins, David B. Johnson, "Mobility Support in IPv6, Mobile IPv6" Institute of Electrical and Electronics Engineers, Vol. 5, No.2, May. 2016

[7] Piyush Sharma. Ms Renu Single, "A Detail Comparative Review IPv4/IPv6 Dual stacks Co-existence techniques", International Journal of Innovative Research in Computer and Communication Engineering, Vol. 4, Issue 4, April 2016

[8] C.V. Ravi Kumar, Kakumanilakshmi Venkatesh, Marri Vinay Sagar and Kala Praveen Bagadi, "Performance Analysis of IPv4 to IPv6 Transition Method", Indian Journal of Science and Technology, Vol 9(20), May. 2016

[9] Olabenjo Babatunde, Omar AL-Debagy, " A Comparative Review of Internet Protocol Version 4 (IPv4) and Internet Protocol Version 6 (IPv6)", International Journal of Computer Trends and Technology, Vol. 13, No. 1, Jul. 2014

[10] Daniel Enache, Marian Alexandru, "A Study of the Technology Transition from IPv4 to IPv6 for an ISP", Air Force Academy, Vol. 1, No. 1, Jun. 2016

[11] Niranjam Ravi, Niraj Prasad Bhatta, "Implementation of IPv6/IPv4 Dual Stack Transition Mechanism", International Journal of Innovative Research in Computer and Communication Engineering, Vol. 2, Issue 11, Nov. 2014

[12] Arun Kumar Tripath, Anchal Srivastava, Harish Pal, "Security Issues in Mobile IPv6", International Journal of Computer Application, Vol. 1, Issue 5, May. 2012

[13] Prof. Dr Torsten Braun, Marc Danzeisen, "Secure Mobile IP Communication", Institute of Computer Science and Applied Mathematics Vol. 5, No. 1, May 2001

[14] S. Thomson Cisco, T. Narten, T. Jinmei, "IPv6 Stateless Address Auto configuration", International Journal of Innovative Research in Computer and Communication Engineering, Issue 8, Sept. 2007

[15] Kanij Fatema Aleya, Madhumita Santra, Supriya Maji, Asoke Nath, "Scope and Challenges in Mobile IP", International Journal of Advance Research in Computer Science and Software Engineering, Vol. 6, Issue 5 May 2016

[16] Dr. Chaman Singh, Dr. K.L. Bansal, "Dual Stack Implementation pf Mobile IPv6 Software Architecture", International Journal of Computer Application, Vol. 25, No. 9, July 2011

[17] S. Guha, K. Biswas, B. Ford, S. Sivakumar, and P. Srisuresh. "NAT Behavioral Requirements for TCP. RFC 5382", Internet Engineering Task Force, BCP 142 Oct. 2008.

[18] Mohd. Khairi Sailan, Rosilah Hassan, Ahmed Patel, "A Comparative Review of IPv4 and Ipv6 for Research Test Bed", International Conference on Electrical Engineering and Informatics, Aug. 2009

[19] Priya Bali, "A Detail Comprehensive Review on IPv4-to-IPv6 Transition and Co-Existence Strategies", International Journal of Advanced Research in Computer Engineering & Technology, Vol. 4, Issue 4, April 2015

[20] O. Troan, Ed., D. Miles, S. Matsushima, T. Okimoto, D. Wing, "IPv6 Multihoming without Network Address Translation", Internet Engineering Task Force, Issn 2070-1721, March 2014.

[21] Varsha Jain, Damodar, Shailendar Tiwari, Shailendra Singh, Sanjeev Sharma, "Impact of IPv4, Ipv6 and Dual Stack Interface over Wireless Networks", International Journal of Computer Network and Information Security", Vol. 1, April 2018

[22] Manal M. Alhassoum, Sara R. Alghunaim, "A Survey of IPv6 Deployment", International Journal of Advance Computer Science and Application, Vol. 7, No. 9, 2016

[23] Arya, Jaqualin, Nimmy, Sonali, Amrutha, Hega, Subha, "Transition Mechanisms from IPv4 to IPv6 Addresses", Journal of Web Engineering & Technology, Vol. 3, Issue 2, June 2017

[24] Roman Kuntz, Jean Lorchat, "Versatile IPv6 Mobility Deployment with Dual Stack Mobile IPv6", International Journal of Advance Computer Science and Application, Vol. 2, May 2014

[25] Koshiro Mitsuya, Ryuji Wakawa, Jun Murai, "Implementation and Evaluation of Dual Stack Mobile IPv6", International Journal of Advanced Computer Science and Application, Vol. 6, No. 2, Sept. 2014.

