Implementation and Analysis of Dynamic Routing Protocol OSPF and EIGRP in IPV6 Network

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***Abstract*—** With the ever increasing number of new devices being connected to the Internet, there is a need for more addresses than IPv4 can accommodate. With the next generation protocol IPv6, this paper presents how an ISP scenario this protocol is implemented in IPv6 domain. The inter-network connectivity can be troubleshoot in the lab using CISCO 2811 routers and end devices.

***Keywords*—** *Equaliser, MSE, DFT, DGT, EVR..*

I. INTRODUCTION

A test bed has the benefit that it allows creation of a scaled version of the network in an isolated and controlled environment. It offers an insight into how introducing IPv6 will affect existing network. Additionally, it allows technical and tech support personnel to apply all they have learned in the training in a safe environment without worrying about doing something adverse to the production network. A well designed test bed should contain the following:-

A. Flexibility

The lab must support different types of testing i.e. components, software versions and even hardware to help us identify how comprehensive their support for IPv6 is.

B. Isolation

The lab is intended as a learning platform only and should not be connected in any way to the production network. Do not want any unintended traffic to traverse to the production network causing potential mayhem.

C. Partnerships

Use the lab that is already available to aid agencies or departments you already have a relationship with since it gives a win-win situation for you to evaluate their services and products and at the same time provides the staff with much needed experience in supporting the said services and products.

D. Interoperability

IPv6 offers a multitude of rich features therefore it is wise to ensure different devices from different vendors work well with one another. Vendors tend to focus on being inter-operable with their own range of products that they might inadvertently miss certain functionalities with products by other vendors. It is best to verify claims of support from vendors using this test bed.

E. Network

1) Infrastructure

The design of the lab must mimic your production network as close as possible and therefore it should include at least a core or edge router, switches (that may or may not support VLAN) and a firewall. If possible, having an IDS is also advised.

2) Operating systems

As most environments are heterogeneous, it is best to make sure that different platforms are in use to communicate with one another. As of November 2008, all major Linux distributions meets requirement of the US DoD mandate IPv6 compliance. Windows Vista has a better support for IPv6 than Windows XP. The lab will allow us to consider the impact of each and every Operating Systems being used in the network.

3) Services

Should be aware of any changes (if there are any) to the services and are accustomed to using i.e. SSH, HTTP, SNMP.

II. IPv6

A. IPv6 Training

To get started with deploying IPv6 in any organization, it is best to start of with the network administrators who will be responsible for managing the organization's network. If possible it would also be beneficial to send the tech support personnel as well as they will be dealing with end users who might encounter problems with IPv6 on their workstations.

1. Benefits of IPv6 especially to the organization concerned.
2. Technical specifications of IPv6.
3. Transition mechanisms available as well as their pros and cons.
4. Routing schemes and algorithms and how do they differ from IPv4.
5. Security benefits i.e. IPSec; its uses, benefits and how to set it up.

6. Security considerations having both IPv4 and IPv6 on the network.
7. Understanding risks that may have cropped into the upper layer protocols due to bugs introduced in them during the porting.

B. *IPv6 Compliance and Certification*

It is also important to provide conformance services relating to evaluation of products and verification that a specific product and version number has complied with the IPv6 Compliance tests.

The demand for such certification has increased substantially and should be mandated in the IPv6 Roadmap that new procurement of ICT equipment must be IPv6 complied. The compliance test of products on conformance to the standards set by the IPv6 Forum.

In the proposed joint working arrangement, the respective roles and responsibilities are as follows:

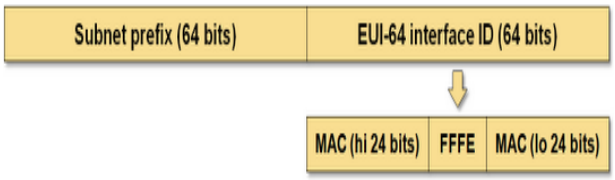
The key objective and benefits of these programs are to:

- Verify protocol implementation and validate interoperability of IPv6 products.
- Provide access to self-testing tools.
- Provide IPv6 Compliance testing laboratory to the organization

C. *Auto Configuration*

Stateless auto configuration is performed in a number of steps. After initializing the physical interface, the IPV6 hosts:

- Creates its link-local address (LLA) using the FE80::/10 prefix and its MAC address encoded in EUI-64 format as shown in fig below:

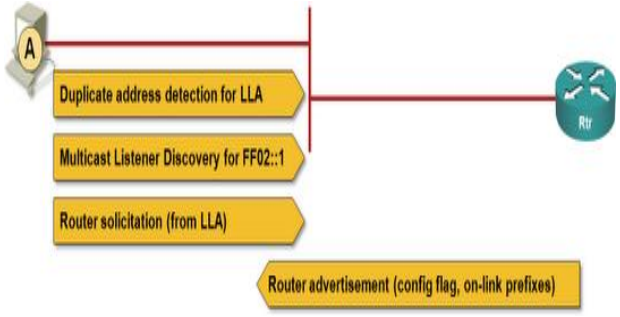


- Checks whether its LLA is unique using duplicate address detection procedure.
- Joins the all hosts multi-caste group FF02::1 Multicaste Listener Discovery protocol(MLD) If it hasn't joined the group during the LLA duplicate address detection step.

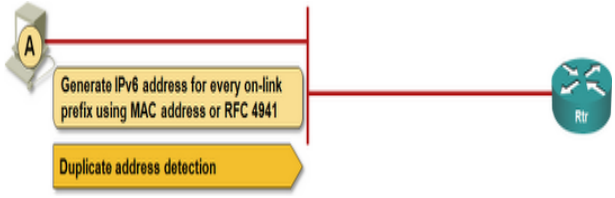
IPv6 hosts must use MLD to join IPv6 multicast groups to ensure MLD-snooping L2 switches propagate L2 multicasts to all interested hosts.

- Sends *router solicitation* message (part of the *neighbour discovery – ND* – protocol) to all-routers multicast group (FF02::2).
- Receives *router advertisement* messages from all directly-connected routers. The router(s) with

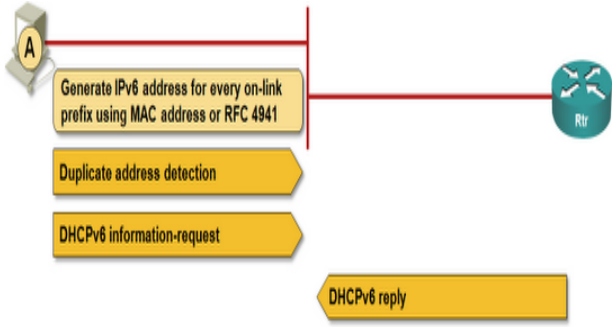
The highest RA preference are used as the default gateways(default route:solved)



- Collects all valid prefixes advertised by adjacent routers and create a global IPv6 address within each advertised /64 IPv6 prefix, using either EUI-64 format or pseudo-random host ID as specified by RFC 4941.
- Perform duplicate address detection for every generated global IPV6 address (interface IPV6 address:solved).

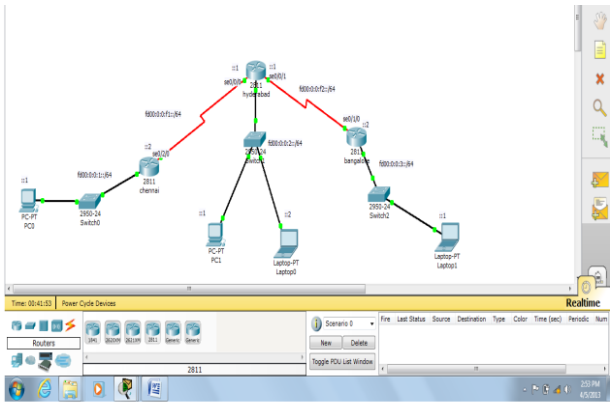


The router advertisement received during the autoconfiguration process might contain the *managed address configuration* flag (in which case the host uses DHCPv6 instead of stateless autoconfiguration) or *other configuration* flag that triggers an extra step: the IPv6 host sends a DHCPv6 *information request* query to receive additional configuration information like DNS server IPv6 address, domain search list, or SIP server IPv6 address (DNS server: solved). The list of all registered DHCPv6 optiond is available on IANA's website.

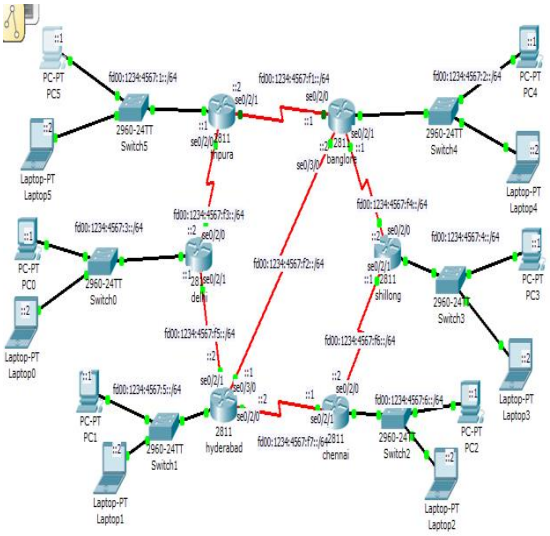


III. SIMULATION, EXPERIMENTAL RESULTS AND ANALYSIS

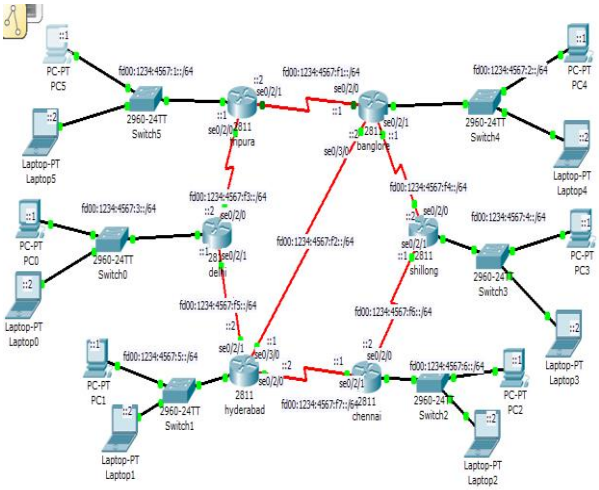
A. STATIC ROUTING



B. OSPF



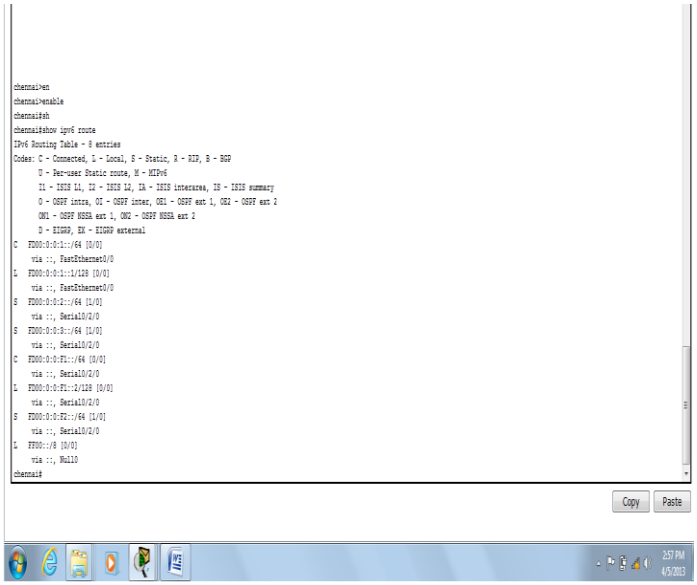
C. EIGRP



D. ANALYSIS & RESULTS

Static Routing:

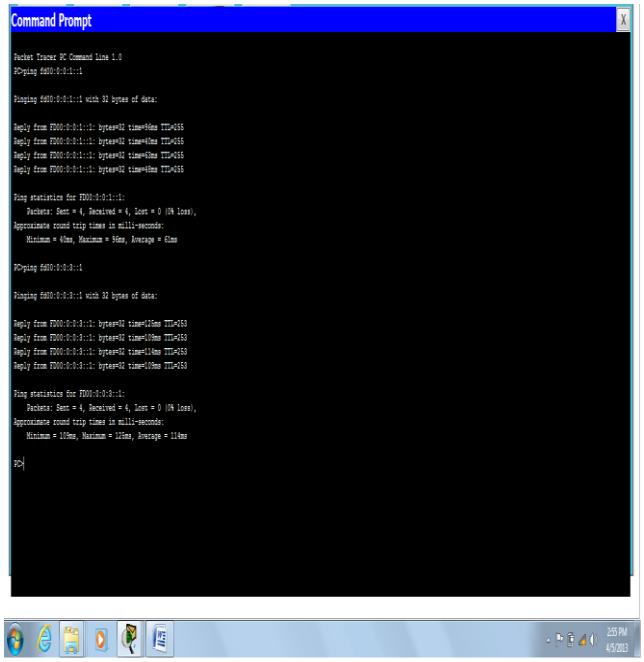
Routing table Command:router#show ipv6 route



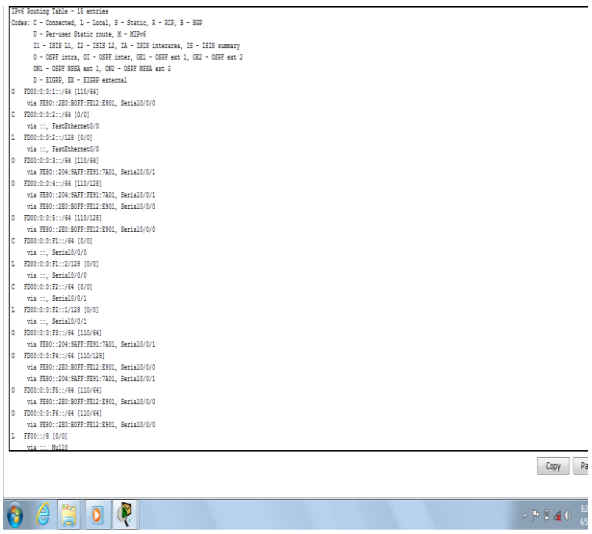
ping

Command:In router: router#ping destination address.

In pc: open desktop->command prompt->(pc>ping destination address)

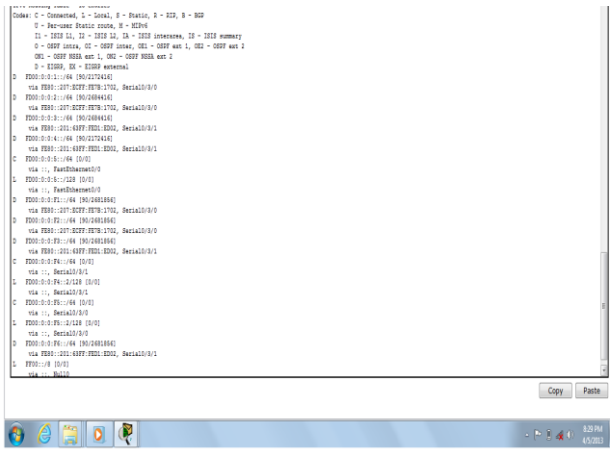


OSPF Routing table

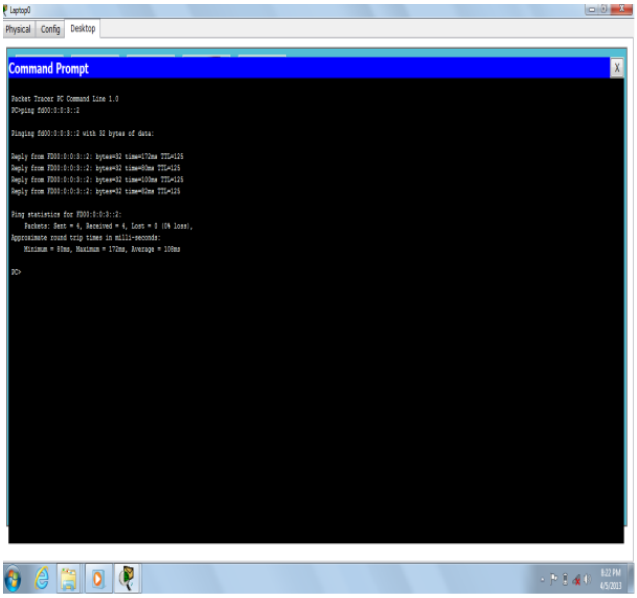


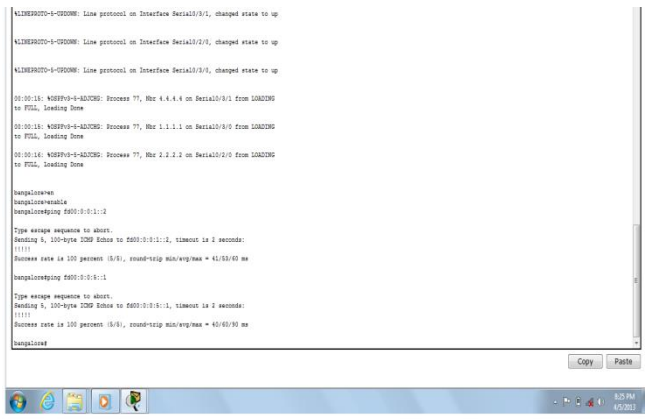
EIGRP

Routing table

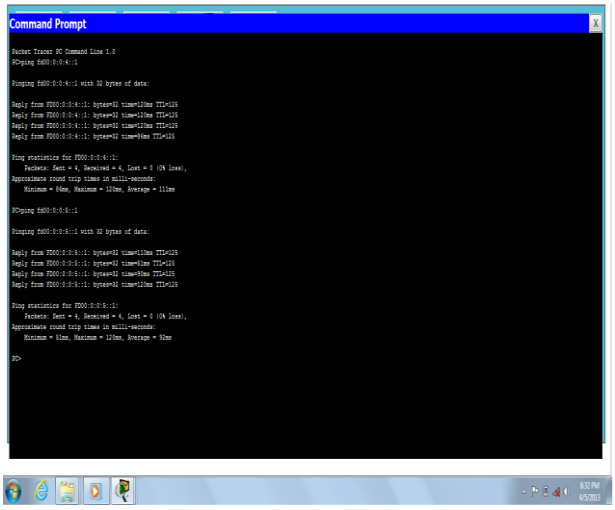


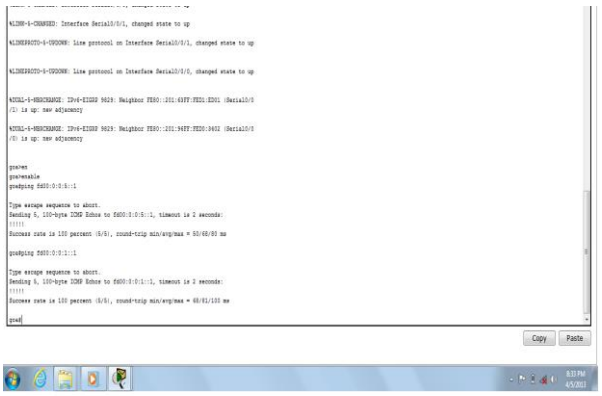
ping





ping





IV. CONCLUSION

Transform based equaliser, though has longer training time has been found to have better noise recovery property and lower MSE level especially when the additive noise in the channel is large. In channel 1 for –20 dB additive noise DGT domain adaptive equaliser settles at –20 dB at 200 iterations where as transform domain equaliser settles at about –18 dB at 100 iterations. Further studies may be carried out for reducing the convergence time of DGT domain equalisers and to develop other algorithms for better performance of DGT domain equalisers under high noise and channel EVR

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