

Configuring Linux System for Internet Protocol based Multimedia Communication Network

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Abstract

This research paper is trying to implement an idea through which we can configure a system have an effective multimedia communication network through a Linux based router with internet protocol. Which deals with the protocol used in the past IPv4 and presently used IPv6. It states about the use IPv4 in IPv6 Networks and different combinations of IP networks, the cost effective design is the use of IPv4 server and IPv6 client. The objective of this research extends to set up a network lab and Configuring Linux system as router, also to have a study of performance and to examine the analysis of multimedia communication in various topologies using internet protocol networks. There are 4 computers used to configure the network of multimedia communication host a and host b serves as the server and client and the other 2 computers are configured to act as routers, ie., router 1 & router 2. **Method:** Connections are done by using Ethernet and optical fiber cables, by creating a virtual server with connection oriented network of TCP (Transmission Control Protocol), also measuring the performance of the internet protocol between the intermediate routers. The routers are configured as Dual Stack Protocol by the method of Tyga Tunneling process. **Findings:** Finally, this research eliminates the use of routers and switches in a computer network, Increase in Efficiency, Throughput & QOS of multimedia data transmission by using OFC also decrease in Delay & Data loss by replacing Ethernet by OFC.

Keywords: IPv4, IPv6, Mixed Protocol Network, Router, Multimedia Communication Network

1. Introduction

During the last few years the communication technology has improved with digitalization with all form of multimedia information, which attracted almost society towards the field in particular and also it compensating the need for the distributed system using the multimedia information. Multimedia communication handles while transfers the information as discrete information like text, graphics; and analogues information like audio, video for communication systems through digitalize network and also provides services and mechanisms. The network estimates the requirements of the resources involved, Compiles the end-to-end delay, timing restriction and loss characteristics, since the network is capable to handle a well define QoS. Advancements and improvements in

the multimedia communication networks allow the user to configure the system as per the requirement and behave as user-friendly, which results a wealthy transmission over the communication network. Even accommodate the traditional data traffic and communicational data. By establishing the direct connection of the input and output bus to the communication network, which can shares I/O bus and reduces the cost of connection.

The proposal proposes a more effective platform for the transmission of the multimedia information over a communication network with the help of IPv4 & IPv6. The paper deals with the protocol used in the previous IPv4 and presently used IPv6. Then it states about, how we can use IPv4 in IPv6 Networks and different combinations of IP networks. The cost effective design is the use of IPv4 server and IPv6 client. The important

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service qualities assurance provided by the internet protocol based communication networks for the multimedia information; we use many numbers of routers to connect computers in a network which will be more expensive for larger networks. Server will be the intermediate for data transfer in intra-network.

- Use of Routers and Switches in any network will be more expensive
- Use of Ethernet in Long Distance Communication will cause delay
- Replacement of IPv4 Networks to facilitate the present IPv6 network protocols and devices

To provide back ground information on the issue to be considered in the proposed research work and to emphasize the relevancy of proposed study a broad literature survey has been conducted. Few important reviews of researchers are explained in table 1

Table 1

1998	Web Protocol rendition 4 (IPv6) Basic procedure (RFC2460)
2000	The SIIT calculation utilized as a premise of the BIS makes an interpretation of form 4 header to adaptation 6.
2003	Essential plug API (RFC 2553) and DHCPv6 (RFC 3315)
2004	Portable IPv6 (RFC 3775) surge tag terms (RFC 3697) added. A proposal for tunnelling IPv6 with private IPv4 addresses through Network Address Translation (NAT0 devices has been given.
2006	deal with structural design (RFC 4291) steady, Slight correction, Node desires (RFC 4294) published
2008	Router Performance and characteristics were analysed for Cisco in addition to that produced the Latency and Throughput.
2010	The transport planes and the network control separated for the easier management in NGNs.
2011	To provide better results, Seven guidelines were followed to design the methods and deployed in Internet protocol version 6 addresses.
2013	Hierarchical routing protocols examine the various design strategies to improve the performance of the network.
2014	Trust-based Opportunistic Routing (OR) protocol is designed and proposed to increase the performance of transmission and the data reliability in wireless network.

2. Web Protocol rendition 4 - IPv4

For the TCP/IP Protocol suite, Internet convention is one of the real convention works in the OSI display and has a duty of recognizing the host ahead their sensible delivers as well as to course the data above the correspondence arrange. Systems designed in the direction of recognize a device on a communication network through a specific address with the packet switching computer communication network is called IPv4. The protocol used for the LAN-Ethernet, which has packet-switching link layer networks. In the internet, it is protocol for the standard based internetworking methods and deployed the first version. It uses 32 bit address fields for the source and destination in a limited address space and has reverses a special address block for the private network. In this dynamic host configuration protocol (DHCP) establishes an address assignment process is each time when it log in to the network called as stateful auto configuration process. IPv4 does not assure the guarantee for the data delivery, proper sequence of transmission, data integrity, and avoidance if duplicate data delivery. Web convention header has the applicable data for the suitable correspondence between the source and goal as takes after:

- **Version:** Used Internet Protocol Version number.
- **IHL:** Length of web convention header.
- **DSCP:** This specifies the kind of tune-up provided.
- **ECN:** Data of the jamming shown in the router.
- **Total Length:** This includes the header and payload.
- **Identification:** During the transmission the packets were fragmented and assigned the identification number used to identify the required IP packet.
- **Flags:** Information specifies by the flag about the fragmentation or not. Flag is a 3-bit.
- **Fragment Offset:** Specifies the faithful point of the fragmentation in the unique IP pack.
- **Time to Live:** TTL value is set, which specifies the packet travel plan through the networks.
- **Protocol:** Tells the Network layer at the target host, to which Protocol this bundle has a place with, i.e. the following level Protocol. For instance convention number of ICMP is 1, TCP is 6 and UDP is 17.

- **Header Checksum:** Checksum value is added in IP header in order to avoid the error, if arises to detects.
- **Source Address:** 32-bit address of the wellspring of the parcel.
- **Target Address:** 32-bit address of the target of the parcel.
- **Alternatives:** This is discretionary field, which is utilized if the estimation of IHL is more prominent than 5. These choices may contain values for alternatives, for example, Security, Record Route, Time Stamp, and so forth.

3. Web Protocol rendition 6 - IPv6

This protocol is an advance version in internet protocol, has more advancements and improvements compared to the version 4. It has better feature and capability to

infinite numbers of addresses and helps to solve the problem identified by the lower version IPv4. Also it solves the address exhaustion problem in IPv4. It supports the revised version of the dynamic host configuration protocol (DHCP) for stateful and stateless auto configuration to assign the addresses. It helps to create unique address for the server to obtain the DHCP for the router. Also creates the plug-and-Play environment for the administration and management of the address assignments. In this administrator can re-number the network address without accessing the client, also automatic configure and reconfigure of the addresses. It does not provide any flag delay as like in IPv4 and upgrade to all communication networks with all defined transition services and mechanism by makes the internet to connect directly to TCP (Transmission Control Protocol) since transition mechanism is so flexible and specific upgrade is not required also provides new services facilities and large address-

Table 2

IPv4	IPv6
32 bit (4 bytes) is use to indicate the Sender and receiver addresses.	128 bit (16 bytes) is use to indicate the Sender and receiver addresses.
Internet Protocol Security may is used or not	The Internet Protocol Security is must
IPv4 header does not have the recognition of packet flow for the QoS handling.	IPv6 header consist a label field for the same.
Router and Sending host does the fragmentation.	Only Sending host does the fragmentation.
Checksum is included in IPv4 Header.	IPv6 Header do not contain checksum.
IPv4 Header includes the Optional data.	IPv6 Extension Header contains all optional data, not in header.
To link the IPv4 address to Link Layer Address, it uses ARP request frame to resolve address issue.	Multicast Neighbour Solicitation messages are used to resolve the address issues.
To control and manage the subnet group membership, it uses the IGMP.	To control and manage the subnet group membership, it uses the MLD.
To determine default gateway in IPv4, uses ICMP router discovery.	To decide default gateway in IPv6, uses ICMPv6 router Solicitation and Router advertisement message.
Subnet nodes were identifying the traffic by using Broadcast addresses.	Subnet nodes were identifying the traffic by using multicast addresses.
Configuring the IPv4 can be done manually or DHCP.	Automatic Configuration.
Mapping the hostname address to IPv4 address is done by Host address resource records in DNS with 4-bit (nibble) address.	Mapping the hostname address to IPv6 address is done by Host address resource records in DNS with 4 byte address.
Mapping IPv4 address to hostname address is done by Pointer resource records in IN-ADDR.ARPA DNS domain.	Mapping IPv6 address to hostname address is done by Pointer resource records in IP6.ARPA DNS domain.
Packet size of 1280 bytes required with or without discontinuity.	Packet size of 1280 bytes required without discontinuity.
It has lack of security for the information packet	It has strong security to the information packet
Subnet mask is used by IPv4 address.	IPv6 uses a prefix length.

ing space for the IP packets in the transmission on the communication network. It gives end-to end datagram transmission through numerous IP arrange by accomplishing the developed design principles for the protocol. In addition IPv6 offers implements features like renumbering, router announcements, auto configuration, multicasting, mobility, options extensibility, jumbograms, privacy and network security. In the DNS, host is mapped to IPv6 addresses by resource record as 4 byte data called as Quad A-record. The 4-bit data is divided by the name space hierarchic by 1-digit hexadecimal value of nibble value as 4-bit IPv6 address.

4. Comparison Study of Web Protocol rendition 4 with Web Protocol rendition 6.

IPv6 be formulated based on improved edition of IPv4; hence many things may be familiar in IPv6. The main differences are illustrated in the table below:

5. Translation (transition) Mechanisms and Strategies

In any organization as advancement in the technological sector, network migration from the present scenario to the advanced new scenario may be a long-term goal. In general, the translation (transition) from one configuration (IPV4) to another configuration (IPv6) may take a long time or still it may continue the same old configuration (IPV4) also. Therefore while migration from one configuration to another configuration, the equal importance to be given to the existence configuration nodes. In such organization, different nodes may configured as IPv4 only, IPv6 only, IPv6/IPv4 nodes or vice versa and will have different address issues, mapping issues, ISATAP address, Teredo address etc. to coexist with that configuration of IPv4 infrastructure and to a successful migration to IPv6 infrastructure, different architectural approaches, various methodologies, different services and mechanisms were followed.

6. Architectural Approach

The Architectural approach describes the objective of the long-term goal of the organizations network migra-

tion to the advanced scenario. This proposal contributes the development of the technological and social impacts of the multimedia computer communication network. This architectural approach describes the development of the distributed multimedia sectors with an interactive manner. This approach focuses the recent advancement of the computer communication network in the areas of modeling, coordination, platform of middleware, software development & engineering and Networking. Furthermore, this approach is most suitable for small organizations such as educational institutions, small scale industries, Training institutions, integration & tourism sectors, E-commerce. The following goals specify the main objective of the architectural approach of this proposal by breaking down in to four objectives to achieve the target as follows:

- Set up a network lab and Configuring Linux system as router
- Study of performance & analysis of multimedia data communication in Different Network Topologies
- Study of performance & analysis using IPv4 and IPv6 Protocols.
- Comparing the same with IPv4 to IPv6 Mixed Networks.

7. Methodology

In organizations, the course of action for replacing the existing IPv4 serve in the direction of the advanced IPv6 serve is expenditure efficient. Since the dual-stack approach supports the both Ipv4 and IPv6 Server-Client concept. To implement such a concept and to overcome the excess economical investment on new servers, the process of tunneling is proposed in this approach and will fulfill the requirement of migration from old version to the new version of the internet protocol network. Tunneling is a mechanism, the information of IPv6 packets were placed inside the IPv4 packet and routed through the IPv4 Router to minimize the dependencies during the transition. Tunneling supports IPv6 and IPv4.

We have arranged four systems which are cable of supporting both IPv4 and IPv6 addressing as shown in the figure. Out of four systems, two are configured as routers and the remaining act as server and client. There are two switches used to distinguish between the differ-

ent networks connected. The process of configuration of systems into routers will add up to the less cost network configuration as said above. Similarly, the other cost effective thing in multimedia data communication is the requirement of replacement of Pv4 server to IPv6 server. Our experiment as shown up that the IPv4 server can also be configured such that it can support IPv6 client with damaging any data. There are four computers to be used with are of Ubuntu12.04 (Linux) platform. These computers are arranged as shown in the architecture diagram. The middle two systems are externally added with an extra NIC (Network Interface Cards) or Ethernet port and are configured to act as routers. Then the remaining systems are used to act as server and client respectively. First system is made to work as server whereas the last as client. We have used the apache server to configure the system to work as server. In Ubuntu we have the option of modifying the type of connection or addressing required (IPv4 or IPv6).

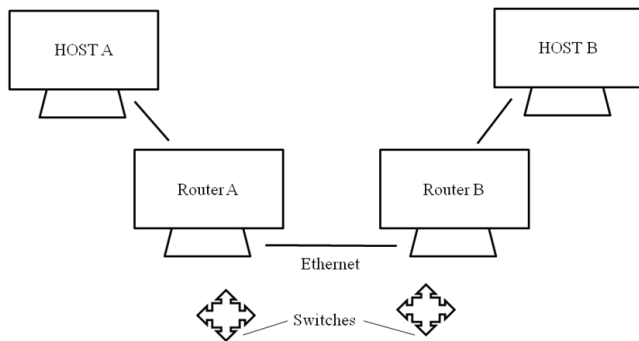


Figure 1. Architecture used.

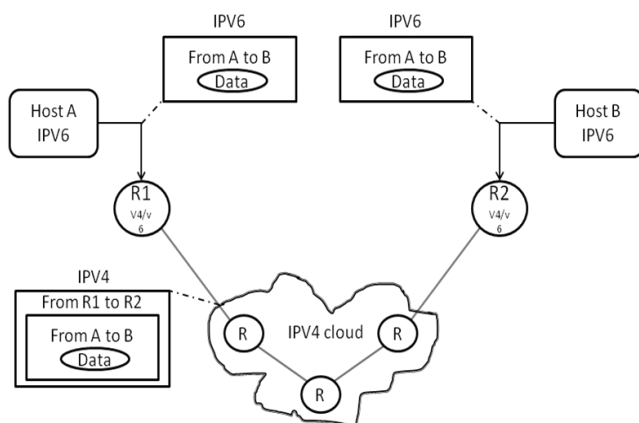


Figure 2. System Configuration for routing.

- Initially the server-client has to be configured with IPv4 for the multimedia audio, video etc communication.

- Later the server-client network must be configured to IPv6.
- Now the server is configured to be IPv6 addressing and the client is configured to be IPv4 addressing. To construct the communication between the IPv6 and IPv4 systems we have used the tunneling mechanism. Then the multimedia data is transmitted from server to client and analyzed.
- Then the server if configured to IPv4 addressing and the client are configured to IPv6 addressing and the multimedia data is transmitted over the network. We observed that there was not much difference in the communication outcome of both the combination of networks.

8. Implementation Aspects

- The client computer is configured as router
- Virtual server is created for the information communication.
- Ethernet link and Optical Fiber Cable may be used for the information transmission in network connection
- The performance of the protocols used in the approach to be analyzed with different topologies.
- TCP - Connection Oriented Network were used to configure the protocols.
- Respective protocols must be defined before the transmission of the information in the network connection.
- Dual Stack Protocols must be used to configure the intermediate routers present in the network connection for the effective transmission.

9. Conclusion

The goal of this work will extend a client-server communication without the utilizing the router, the client computer replaces the router and acts as same to communicate the client-server concept. The IPv4 and IPv6 addressing networks have a lot of difference between them. The addressing must be chosen properly for a particular network for an efficient communication. There are many techniques to utilize the IPv4 systems inside IPv6 network and IPv6 systems inside IPv4 network. The

requirements in the replacement of IPv6 server is not needed to extend the service to both the IPv4 and IPv6 clients. The result shows that there is not much difference in the data analysis for both IPv4 and IPv6 servers. The intermediate client works as router. This product will be working for network management in form of Fault, Configuration, Accounting, Performance, and Security. Finally, this client-server base concept extends Management Information Base with Linux platform and provides simple

10. References

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