Migration Internet Protocol Version 4 Address to Internet Protocol Version 6 Address

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Abstract

First IP Addressing is Logical Addressing. Internet Protocol is commonly known as Internet Protocol. It works on Network Layer. There are two types of version of addressing scheme are available. Internet Protocol Version 4 is of 32 bit addressing system. Internet Protocol addresses is normally expressed in decimal format as a "Dotted Decimal Number". This addressing is limited Internet Protocol Addresses are provided by Internet Service Provider. The technology growth requires a lot of Internet Protocol Addresses. However, Internet Protocol Version 6 is of 128 bit addressing system. This address is expressed in Hexadecimal Format. Therefore, there is a need for migration of this operation. The migration happens using the devices such as JUNIPER routers and switches.

Keywords: Internet Protocol, Dotted Decimal Number, Juniper.

Introduction

First Internet Protocol (IP) Addressing is Logical Addressing. IP is ordinarily known as IP. It takes a shot at Network Layer. Internet Protocol Version 4 (IPV4) and Internet Protocol Version 6 (IPV6) are the two sorts of the variant of the tending to plans are accessible. IPV4 is conveying 32 bit tending to. IP addresses are ordinarily communicated in decimal arrangement as a "Dotted Decimal Number". IPV6 is conveying 128 bit tending to. IPV6 addresses are communicated in Hexadecimal Format.

Changing over IPV4 Addressing To IPV6 Addressing

IPV4 Addressing is constrained IP Addresses are given by Internet Service Provider (ISP). With innovation development, we need a great deal of IP Addresses. Subsequently, we can change the Address for IPV4 to IPV6. From that changing over, we can do bigger Address Space, never come up short on IP Address, disentangled Routing, decreased (Network Address Translation) NAT, any Broadcasts, the better nature of administration, consistently deals with IPsec parcels and gadget wandering portable IP.

System Study

Existing Network

In this system, we utilized one system arrangement. The system gadgets are, for example, two switches, one firewall, four switches, two servers, two PCs, one passageway, 90 PCs, and cell phones. The IPV4 address is going to access beneath the system.

Proposed Network

IPV6 gives a stage to new Internet usefulness that will be required in the short term, and give adaptability to assist development and extension. This IPV6 conveys new header group, huge location space, proficient and various leveled tending to and directing foundation, stateless and state-full location design, worked in security, better help for Quality of Service (QoS), another convention for neighboring hub connection and extensibility.

Project Definition and Description

IP Addresses

IP Addressing is Logical Addressing. Web convention is regularly known as IP. It deals with Network Layer (3).

IPV4 Addressing

IPV4 is conveying 32 bit tending to. IP addresses are typically communicated in decimal organization as a "dabbed decimal number" like the one above. Be that as it may, PCs convey in twofold. Take a gander at the IP address in parallel: 216.27.61.137-->11011000. 00011011.001111101.10001001

The four numbers in an IP address are called octets since they each have eight positions when seen twofold structure. Octets are part into two areas: Net and Host.

IPV6 Addressing

IPV6 is conveying 128 bit tending to. Addresses are recorded utilizing hexadecimal:

0 1 2 3 4 5 6 7 8 9 a b c d e f

It is assembled in 8 squares of 4 digits and isolated by colons

➤ 2001:0db8:3042:0002:5a55:caff:fef6:bdbf

Addresses can be abbreviated for the accompanying reasons. That are Leading zeroes can be evacuated; Multiple successions of "0000" can be expelled and Replacing them with a twofold colon "::"

- ➢ 2001:0db8:0000:0000:5a55:0302:fef6:0012
- ➢ 2001:db8:0:0:5a55:302:fef6:12
- ➢ 2001:db8::5a55:302:fef6:12

Requirements of IPV6

In view of the accompanying reasons, the IPv4 won't have the option to support the development of the Internet. That are more individuals online consistently; different gadgets per individual; the web of things. The world needs another option. In this manner, we can change the Address for IPV4 to IPV6.

Project Phases

Appraisal of Network Devices

Prior to the movement, the system gadgets will be surveyed by the system manager. The gadgets are trailed by, for example, PCs, Modem, Firewalls, Routers, Switches, Laptops, Smart Phones, Access focuses, and Tablets are accessible in the system.

IPV4 and IPV6

The IPV4 tending to conspire is separated into Five Classes. These are trailed by, for example, Class A, Class B, Class C, Class D, and Class E. The Class A contains one Net id and the other three Host Instruction Detections (IDs) and the range is 0 to 127. In this range, 0 and 127 are called held locations. Class B contains two Net ids and the other two Host IDs and the range is 128 to 191. Class C contains three Net IDs and other one Host id and the range is 192 to 223. Class D contains Four Net ids and no Host id and the range is 224 to 239. Class E is the range is 240 to 255. There are two sorts of systems are accessible. These are trailed by, for example, Private Network and Public Network. The private IP Address Range in Class A is 10.0.0.0 to 10.255.255.255 and the IP Address scope of 169.254.0.0 to 169.254.255.255 are held for Automatic Private IP Addressing. These IP's not to be utilized on the Internet. In the Class B Private IP Address is 172.16.0.0 to 172.31.255.255 and the Class c private IP Address is 192.168.0.0 to 192.168.255.255. The Internet Assigned Numbers Authority (IANA) controls the responsibility for IP's. Unicast, Multicast, and Anycast Addresses are the three sorts of addresses are accessible in the IPV6. The Unicast delivers are parcel conveyed to one interface. The Multicast delivers are parcel conveyed to different interfaces and the Anycast delivers are bundle conveyed to the closest of numerous interfaces (as far as directing separations). Connection Local, Site – Local and Global are the extents of the Unicast and Anycast in IPV6. The Link-Local extension is the nearby connection (hubs on the equivalent subnet). The Site-Local extension is the Organization (private website tending to) and the worldwide degree is Global (IPV6 Internet addresses).

Lab Setup – Testing for all applications and OS

As a matter of first importance, look at for all the applications and OS are underpins for the IPV6 or not. The system gadgets are, for example, a switch, switch, servers, and PCs.

IPV6 Addressing Plan

The IPV6 128 bit address is separated along 16- bit limits. Every 16-piece square is then changed over to a 4 digit hexadecimal number, isolated by colons. The subsequent portrayal is called colon-hexadecimal. The IPV6 address is utilized by this task. Fda8:6c3: ce53:a890::1/64

I. Omit leading zeros

Determine IPV6 addresses by precluding driving zeros. For instance, IPV6 address 1050:0000:0000:0000:0005:0600:300c:326b might be composed as 1050:0:0:0:5:600:300c: 326b.

ii. Double Colon

Indicate IPV6 addresses by utilizing twofold colons (::) instead of a progression of zeros. For instance, IPV6 address ff06:0:0:0:0:0:0:c3 might be composed as ff06::c3.

Domain Name Service (DNS) & Dynamic Host Configuration Protocol (DHCP) Server Setup

The DNS deciphers Internet space and hostnames to IP addresses. DNS consequently changes over the names. The DHCP server is utilized to consequently allotting for the IP address in the PCs.

Application-Web Server

Internet Information Server 7 (IIS 7) is Microsoft's most recent rendition of its IIS. Its measured design gives a stage to the turn of events and sending of dynamic Web applications and sites. IIS 7 was intended for security, speed, and convenience.

Turn off IPV4

At long last, all the procedures will be finished at that point Turn OFF the IPV4.

Network Analysis

Requirements Specification

S. No	Network Devices	Model Numbers	JUNOS Version Details
1.	Routers	Juniper J2320	Junos 10.4
2.	Firewall	Juniper SRX 210	Junos 12.1
3.	Switches	Juniper EX 220	Junos 10.1
4.	Access Point	Linksys	Predefined by Vendor
5.	Servers	HP DL 380, Dell Power Edge 3550	Windows 2008 Server
6.	Laptops	HP / Dell Laptops	Windows 7 / 8
7.	PCs	HP / Dell / Assembled System	Windows XP / 7
8.	Mobile Phones	Smart Phones & tablets	Android

Network Implementation

IPV4

IPV4 is conveying 32 bit tending to. IP addresses are regularly communicated in decimal arrangement as a "Dabbed Decimal Number". Every IP address incorporates a system ID and a host ID. The system ID (otherwise called a system address) distinguishes the frameworks that are situated on the equivalent physical system limited by IP switches. All frameworks on the equivalent physical system must have a similar system ID. The system ID must be one of a kind to the system. The host ID (otherwise called a host address) distinguishes a workstation, server, switch, or other Transmission Control Protocol / Internet Protocol (TCP/IP)has inside a system. The host address must be special to the system ID. IP address range can be ordered into 2 levels.

Address Class First Octet in Decimal

Address Class	First Octet in Decimal
Class A	1 – 126
Class B	128 – 191
Class C	192 – 223
Class D	224 – 239
Class E	240 – 254

Class A-This class is for enormous systems, for example, a significant worldwide organization may have. IP addresses with the main octet from 1 to 126 are a piece of this class. The other three octets are utilized to recognize each host.

Net	Host or Node
10	10.10.1

Loopback-The IP address 127.0.0.1 is utilized as the loopback address. This implies it is utilized by the host PC to communicate something specific back to itself. It is usually utilized for investigating and system testing.

Class B-Class B is utilized for medium-sized systems. A genuine model is a huge school grounds. IP addresses with the main octet from 128 to 191 are a piece of this class. Class B addresses additionally incorporates the second octet as a component of the Net identifier. The other two octets are utilized to distinguish each host.

Net	Host or Node
190.24	50.1

Class C-Class C addresses are normally utilized for little to medium size organizations. IP addresses with the principal octet from 192 to 223 are a piece of this class. Class C addresses additionally incorporate the second and third octets as a component of the Net identifier. The last octet is utilized to distinguish each host.

Net	Host or Node
192.168.1	1

Class D-Used for multicasts.

Multicast-In multicast, a hub sends a bundle routed to an uncommon gathering address. Gadgets that are keen on this gathering register to get parcels routed to the gathering. A model may be a Cisco switch conveying an update to the entirety of the other Cisco switches.

Class E-Class E is utilized for test purposes as it were.

Private IP

The Internet Assigned Numbers Authority (IANA) has held the accompanying three squares of the IP address space for private virtual worlds (neighborhood systems):

10.0.0.0	-	10.255.255.255
172.16.0.0	-	172.31.255.255
192.168.0.0	-	192.168.255.255

Likewise, IP addresses in the scope of 169.254.0.0-169.254.255.255 are saved for Automatic Private IP Addressing. These IP's not be utilized on the Internet.

Public IP

Open IP Addresses (otherwise called Static IP Addresses) are IP delivers that are obvious to the general population. Since these IP addresses are open, they permit others to think about and get to your PC, similar to a Web server. At times, you don't need individuals to get to your PC or you need to confine certain people from getting to your PC or server.

IPV6

The IPV6 128- bit address is isolated along 16- bit limits. Every 16-piece square is then changed over to a 4-digit hexadecimal number, isolated by colons. The subsequent portrayal is called colon-hexadecimal. This is rather than the 32- bit IPV4 address spoke to in dabbed decimal arrangement, partitioned along 8- bit limits, and afterward changed over to its decimal comparable, isolated by periods.

Juniper

Juniper Networks, Inc. is an American producer of systems administration gear established in 1996 by PradeepSindhu. It is headquartered in Sunnyvale, California, USA. The organization structures and sells elite Internet Protocol arrange items and administrations. Juniper's primary items incorporate T arrangement, M arrangement, E arrangement, MX arrangement, and J arrangement groups of switches, EX-arrangement Ethernet switches, and SRX arrangement security items. Junos, Juniper's own system working framework, runs on most Juniper items. JUNOS, then again, was developed as a secluded working framework. This is a part based open-source Free BSD working framework, and procedures that run as modules on head of the bit are isolated in elite, ensured, memory space.

Source Codes

IPV4 DHCP Server Configuration in Juniper Router

➢ Specify the least IP address of the pool extend (for instance, 192.168.1.33).
user@host# set framework administrations DHCP pool 192.168.1.0/24 location go low 192.168.1.33
➢ Specify the most elevated IP address of the pool go (for instance, 192.168.1.64).
user@host# set framework administrations DHCP pool 192.168.1.0/24 location go high 192.168.1.64
➢ Specify the space to be indicated for DHCP customers (for instance, example.net).
user@host# set framework administrations DHCP pool 192.168.1.0/24 space name example.net
➢ Specify the DNS server that customers use (for instance, 192.168.1.1).
user@host# set framework administrations DHCP pool 192.168.1.0/24 name-server 192.168.1.1

> Specify the IP address of the switch appointed to customers for the DHCP pool (for instance, 192.168.1.1).
> user@host# set framework administrations DHCP pool 192.168.1.0/24 switch 192.168.1.1

> Specify the quantity of seconds a customer can hold a rent if a customer doesn't demand a particular rent length (for instance, 3600).
> user@host# set framework administrations DHCP pool 192.168.1.0/24 default-rent time 3600

> Specify DHCP as a permitted inbound help for every interface that is related with DHCP. In the accompanying model, DHCP revelation messages are normal on the fe-0/0/5.0 and fe-0/0/6.0 interfaces, so DHCP is designed as an inbound help for fe-0/0/5.0 and fe-0/0/6.0.
> user@host# set security zones security-zone untrusted interfaces fe-0/0/5.0 host-inbound-traffic framework administrations DHCP
> user@host# set security zones security-zone untrusted interfaces fe-0/0/6.0 host-inbound-traffic framework administrations DHCP

Note: The IP address of the interface must be in a similar system as the DHCP pool. For instance, if the subnet for the DHCP pool is 192.168.1.0/24, utilize the set interfaces order to indicate the fitting IP address:

user@host# set interfaces fe-0/0/6 unit 0 family inet address 192.168.1.1/24

DHCPV4 Verification

To check the DHCPV4 administration setup, utilize the accompanying operational orders:

user@host>show dhcp server restricting point of interest

Customer IP Address: 100.20.22.14

Equipment Address: 00:00:64:34:01:02

State: BOUND (LOCAL_SERVER_STATE_BOUND)

Rent Expires: 2012-03-13 09:53:32 PDT

Rent Expires in: 82660 seconds

Rent Start: 2012-03-12 10:23:32 PDT

Last Packet Received: 2012-03-12 10:23:32 PDT

user@host>show dhcp server restricting measurements

Bundles dropped:

Total   0

Messages received:		Messages sent:	
BOOTREPLY	25	BOOTREPLY	20
DHCPDECLINE	0	DHCPOFFER	10
DHCPDISCOVER	10	DHCPACK	10
DHCPINFORM	0	DHCPNAK	0
DHCPRELEASE	4	DHCPFORCERENEW	0
DHCPREQUEST	10		

IPv6 DHCP Server Configuration in Juniper Router

➢ Specify the most minimal IP address of the pool run (for instance, 2607:f650: 102:ffee::200/128):

root#set get to address-task pool my-pool family inet6 territory r1 low 2607:f650: 102:ffee::200/128

➢ Specify the most elevated IP address of the pool go (for instance, 2607:f650: 102:ffee::299/128):

root#set get to address-task pool my-pool family inet6 territory r1 high 2607:f650: 102:ffee::299/128

➢ Specify the DNS server that the customers use (for instance, 2001:4860:4860::8888):

root#set get to address-task pool my-pool family inet6 DHCP -characteristics DNS-server 2001:4860:4860::8888

➢ Specify the IP address of the switch that is doled out to customers for the DHCP pool:

root#set get to address-task neighbor-revelation switch notice my-pool

root#set get to address-task pool my-pool family inet6 prefix 2607:f650:102:ffee::/64

➢ Specify DHCP as a permitted inbound help for every interface that is related with DHCP:

user@host# set security zones security-zone untrusted interfaces ge-0/0/0.0 host-inbound-traffic framework administrations DHCP

user@host# set security zones security-zone untrusted interfaces ge-0/0/1.0 host-inbound-traffic framework administrations DHCP

Note: The IP address of the interface must be in a similar system as that of the DHCP pool.

root#set framework administrations DHCP -nearby server dhcpv6 bunch my gathering interface ge-0/0/0.0

root#set interfaces ge-0/0/0 unit 0 family inet6 address 2607:f650:102:ffee::1/64

root#set conventions switch ad interface ge-0/0/1.0 prefix 2607:f650:102:ffee::/64

➢ Enable IPV6 stream in the security sending alternatives and afterward reboot the gadget:

root# set security sending alternatives family inet6 mode stream based

root# exit

root> demand framework reboot

DHCPV6 Verification

To confirm the DHCPV6 administration design, utilize the accompanying operational commends:

root# run show dhcpv6 server official

Prefix Session Id Expires State Interface Client DUID

2607:f650:102:ffee::200/128   2   85293   BOUND   ge-0/0/0.0   LL_TIME0x1-0x17484efa-00:23:18:10:a6:8b

root# run show dhcpv6 server insights

DHCPv6 Packets dropped:

Total 0

Messages received:	Messages sent:
DHCPV6_DECLINE 0	DHCPV6_ADVERTISE 2
DHCPV6_SOLICIT 3	DHCPV6_REPLY 2
DHCPV6_INFORMATION_REQUEST 0	DHCPV6_RECONFIGURE 0
DHCPV6_RELEASE 0	DHCPV6_RELAY_REPL 0
DHCPV6_REQUEST 2	DHCPFORCERENEW
DHCPV6_CONFIRM 1	
DHCPV6_RENEW 0	
DHCPV6_REBIND 0	
DHCPV6_RELAY_FORW 0	
DHCPV6_RELAY_REPL 0	

Conclusion

Unmistakably, the speeding up of IPV4 address weariness leaves specialist organizations no decision however to get ready for the progress to IPV6.Comprehensive relocation plan for your system can be an overwhelming assignment. Moving to IPV6 includes the overhauling of utilizations, hosts, switches, and DNS to help IPV6. Since the relocation may take years, IPV6/IPV4 hubs must have the option to coincide over IPV4 frameworks, for example, the Internet and private intranets.

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