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IPV6 TUNNELING USING PEER-TO-PEER VPN

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***Abstract*—The global expansion and usage of internet and exchanging communication between devices around the world has been established within seconds. As per statistics the IPV4 address has been exhausted and therefore there is a shortage of IPV4 address, to connect to internet and establishing a communication between the end devices. As the population increases, the end devices such as smart phones, PC and laptops has increased. Though the Internet service providers are serving us by giving both IPV4 and IPV6 address but IPV6 has more features than IPV4 and also by default IPV4 has been used in almost every places. In order to overcome this, we are going to establish a remote connection to end devices using global IPV6 address by using IPV6 in IPV4 tunneling using UDP protocol. Here we will be using a peer-peer node tunneling is used which uses SIT tunneling is configured in the cloud server to ensure that the IPV6 address is routable and connection is established. Also, an openwrt router is used to deliver the global IPV6 address over IPV4 to the end devices with reduced latency and reliability.**

Keywords— IP tunneling, UDP, IPV6, Openwrt, peer-peer

I. INTRODUCTION

In today's world the term internet has been surfing around the world for more than decades and humans are evolving with new technologies by having the basic configuring called internet knowing that they can exchange communication and ideas around the world within ease. The term IP (Internet Protocol) serves as a set of regulations to assign an IP address which is unique to every device which is connected to internet. There are two version of this IP address IPV4 and IPV6 in this, by default the Internet service providers are providing us IPV4 address which is becoming exhausted by increasing population in the world and as per statistics the available IP address around us is only 4.3 billion and also it differs from region to region [1]. Also, the adoption of IPV6 address and also as per statistics from google the adoption rate of IPV6 address has been increased in 43.12% [2]. The Internet Services are also providing unique IPV4 and IPV6 address for each and every device but still around us by default all the software and hardware are utilizing IPV4 address and in order to switch form IPV4 to IPV6 address upgrade of physical hardware such as servers as to be upgraded. In order to utilize the IPV6 address effectively from the IPV4 address and to access the internet around the world we will be setting up a tunnel to reach the cloud server using SIT tunneling. In this IPV6 address is encapsulated in IPV4 address and the communication and sending the packets from ISP to cloud server is established using IPV4 address. In cloud server, here we will be using oracle by default public IPV4 address is used to connect to internet and no IPV6 address will be assigned in cloud server. Here the IPV6 address will be decapsulated and a peer-to-peer node will be installed in the cloud server. The global Ipv6 address from the ISP provider reaches the endpoint of IPv6 traffic is received and packets have been decapsulated from the IPv4.Ensuring the IPV6 address is globally routable an open source openwrt router is installed as a firmware in routers or any kind of linux machines. Above that the peer-to-peer node will be installed, a prefix has been assigned to the peer-to-peer node and the IPV6 address is assigned to end devices and it can connect to the internet using the IPV6 address which is globally routable and without the usage of any kind of third-party software we can globally connect to internet.

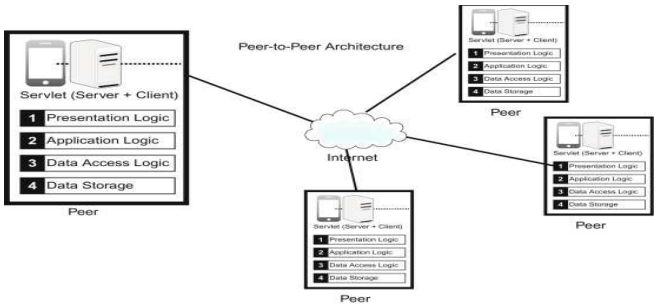

Fig 1. Architecture of peer-peer connection

II. LITERATURE REVIEW

There are various protocols has been used to in establishing internet access using IPV6 address which was discussed earlier. In Custura A et.al, discusses about a wide-scale measurement campaign, showing that many autonomous systems in both access networks and the core of the Internet do permit the traversal of packets. packets that include an extension header can also impact the function of load balancing network devices, and present evidence of equipment mis-configuration, noting that a different path to the same destination can result in a different traversal result[3]. In Ashraf Z et.al, ISPs are trying to move from existing IPv4 physical networks to virtualized next-generation IPv6 networks gradually. The transition from physical IPv4 to software-based IPv6 is very slow due to the usage of IPv4 addresses by billions of devices around the globe. IPv4 and IPv6 protocols are different in format and behaviour. Therefore, direct communication between IPv4 and IPv6 is not possible. Both protocols will co-exist for a long-time during transition despite the incompatibility issues ad summarize the challenges during the transition process, recommended appropriate solutions, and an in-depth analysis of their mitigations during moving towards the next-generation virtual IPv6 network[4]. In Subratie K, Bounded

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Flood, a novel technique that enables virtual private Ethernet Networks that span edge and cloud resources, including those constrained by NAT and firewall middleboxes[5]. In Saraj T, Analyze the most common tunneling protocols that are available to configure in most of the network device. Our analysis in this paper is based on mathematical and deployment on a testbed setup in LAN, CAN and MAN only [6]. In Amr P, Compare the routing convergence of two tunnel types, 6to4 and Manually Configured versus the conventional IPv4 and IPv6 protocols. We analyze the network resources consumed during cold start phase[7].

III. OVERVIEW

The foundation of internet and the version of IP address assigning them according to the protocols and usage of OSI and TCP model for using and hosting a service and exchanging the information between the people around the globe is done within seconds. The transporting of IP address by TCP or UDP and the version of IP address IPV4 which is a 32 bit IP address ensuring that by using this unique address we can use any kind of connection establishment around the world. But the lack is that the IANA (Internet Assigned Number Authority) has declared that the IPV4 address are going to extent and so that people can't connect to any type of network with a unique identity. And also, there is lack of security and features in IPV4. To overcome this the IPV6 address come to existence which has enhanced feature and security when compared to IPV4 and these address are 64-bit which can connect to internet as in IPV4.But the major issue or lack is, in olden days the software and the hardware are built using the IPV4 address and the ISP are also using the servers using IPV4.If the ISP wants to switch to IPV6 they have to upgrade their hardware and software for assigning IP address and also to establish internet connection to the end devices which results in additional upfront charges. Though the ISP providers are giving us both IPV4 and IPV6 by default the services such as web, mail etc. is using IPV4 address. In previous research, there are various protocols which is used to establish a connection between a client-server still we relay on a software as a intermediate and embedding the IP address in the IP address decapsulation and establishing a connection between them and complex and there can be latency issues, The IP address should be globally routable with reduced latency.

IPV4	IPV6
Deployed in 1981	Deployed in 1998
32-bit IP address	128-bit IP address
4.3 billion addresses is available	$7.9*10^{28}$address is available
Masking of address is done and not unique IP address	Every device will be assigned with unique IP address
Represented as 192.68.22.9	Represented as 502b2:6400::6c3a: b17d: 0000:1

Fig 2 Difference between IPV4 vs IPV6

IV. PROPOSED METHODOLOGY

In this method an implementation of establishing internet using IPV6 address which is encapsulated in IPV4 address is configured in low cost and reduced complexion. The ISP provider, will be having access for both IPV4 and IPV6 address which is globally routable and to establish a connection in wireless devices, a cloud server is used which will be encapsulating the IPV6 address inside the IPV4 address, a tunnel will be created between ISP and cloud server which will be using SIT protocol which ensures to transmit the IP address to the cloud server. Since the cloud server here we will be using oracle which does not contain IPV6 address for tunneling and encapsulation we will be IPV4 address which is global public unicast IPv6 addresses behind a NAT IPv4.

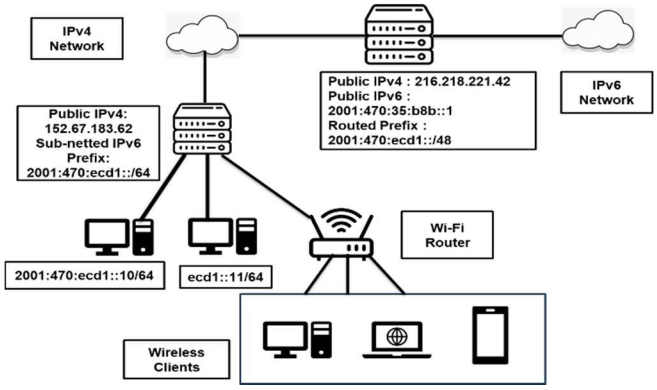

Fig 3 Architecture for assigning IPV6 address in IPV4

Once it has reached the cloud server, decapsulation of IPV6 address from the IPV4 and a peer-peer node will be installed inside the cloud server. At the endpoint we will be establishing a connection between the node and server and a prefix of IPV6 address form the oracle server is assigned and it is globally routable with reduced latency. To expand this an openwrt router is installed inside any type of routers or linux machines which ensures that the wireless client can be connected using this router. This router will act as a node and will be exchanging and transmitting the packets using peer-peer node which is installed in the oracle server. Once the openwrt router is installed inside the firmware of the router, above that the peer-peer node which is installed in the oracle server will be installed in the router. For assigning IP address to the end devices a prefix will be assigned for the peer-peer node which consist of unique IPV6 address using this open wrt router the end devices will be assigned with unique IPV6 address ensuring that it is routable can come across the IPV6 traffic and can connect to internet without the installation of any software.

V. PROPOSED ARCHITECTURE

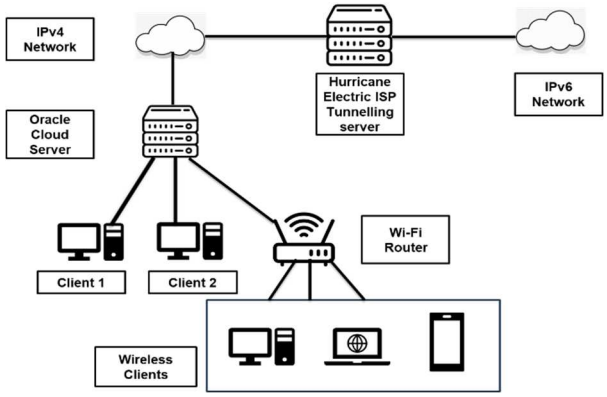

Fig 4 Architecture of IPV6 in IPV4 over UDP

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This method uses SIT tunneling protocol for transporting and encapsulating the IPV6 address inside the IPV4 address by default. After that the oracle server stores the IPV6 address from the ISP consisting of prefix and list of available IPV6 address is decapsulated and stored. A peer-peer node is installed in the oracle server ensuring that using that node IPV6 address will be utilized by each client which is connected to the oracle server. The peer-peer node will be installed at the client device so that by using IPV6 address for identification and IPV6 address for connecting the internet which is routable. To expand this we will be installing an open source openwrt router which can be installed in any type of linux machines and the peer-peer node will be installed above the openwrt router. For the end devices which is connected via the router will be having an assigned prefix IPV6 address form the oracle server the peer-peer node will be acting as intermediate and transmitting packets for the end devices and the server. After receiving these IP address each end devices which is connected in the router will be assigned with the IPV6 address with reduced latency.

VI. RESULTS

In this establishing connection between the end devices using IPV6 address from the ISP provider to the end devices by using the cloud server is done without the usage of any third-party software There is no need of public IPV4 address for the peer-peer node to connect and SIT protocol is used during encapsulation ensuring that the transmission of data packets through the SIT protocol is encrypted and the peer-peer node ensures that the packets are not transparent. The peer-peer node itself will assign IPV6 address from the oracle server ensuring that the it will work behind the routers .More than that IPV6 address adds for the extra advantage and security over IPV4 and it will not be exhausted like IPV4.

VII. CONCLUSION

In this project, an architecture for establishing internet connectivity using IPV6 address which overcomes the usage of IPV6 address behind the NAT, globally routable and a public unicast address, the implementation tunneling between the ISP server to oracle server assigning the IPV6 address to the end devices and usage of peer-peer node for assigning and delivering IPV6 prefix address to every unique device and also connect to internet from the ISP server and also the IPV6 address is encapsulated in IPV4 is added as great advantage and can act as a peer-peer node act as a self-hosting service.

VIII. REFERENCE

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