

IPv6 Addressing

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Introduction:

The areas of IPv4 addressing currently in the depleting stage in the Internet Assigned Number Authority (Dawadi, Joshi and Khanal 2015). This has also drained in the Regional Internet Registries where more and more customers are added to the internet connection on a daily basis. Thus, it is very much important to introduce some new type of addressing technique so that the current issue with the IPv4 can be solved. Here, it has been assessed that IPv6 type of addressing can solve this issue but currently it is not ready for the industry (Moghadam and Imani 2018). And also, a common type of correspond among the two contrary conventions is completed yet.

Thus, in this paper a brief research has been done on the IPv6 addressing techniques. A brief discussion will be done regarding the addressing the techniques used in the IPv6 type of internet protocol. A comparison between the IPv6 type of addressing and IPv4 type of addressing mode will be done so that the improvements on the IPv6 over the IPv4 can be clearly understood.

Research Aim:

The main aim of this research is performing a study over the currently introduced the IPv6 addressing modes. Here, it will be understood that why the IPv6 addressing techniques is very much important here and why it is going to replace the old type of IPv4 addressing techniques.

Research Methodology:

For conducting this research, a vast academic literature survey will be done here. Mainly the secondary type of data will be collected from the books and journals and the

gathered data will be analysed further so that a deep research can be conducted over the IPv6 types of addressing techniques.

Literature Review:

According to Goyal and Arora (2017), one of the crucial benefits of implementing IPv6 over the IPv4 is that the IPv6 is having a large size of address space which can contain the information of routing the packets that will be required for the next generation of internet services. The main advantage of the IPv6 addressing is that it supports 128-bit type of addressing space and due to this it is capable of supporting 2^{128} or 3.4×10^{38} unique IP addresses. Comparing the current internet users this is having a quite large type of addressing scheme which will effectively fulfil the demands of the current internet usage. The IPv6 is holding the capability of providing unique type of addressing to each of the devices which are being used for accessing the internet. Thus, the current addressing mode of IPv6 is capable of fulfilling the demand of the total internet users in the world over the IPv4 type addressing.

As per the authors Zarif, Najafi and Imani (2018), proper routing is also very much important so that a proper internet service can be achieved. Here, the IPv6 type of routing can provide an efficient type of routing process by reduction of the routing table size. In this way the whole routing process will become more hierarchical and efficient. The IPv6 type of addressing assists the ISPs so that they can aggregate prefix of the networks of their customers into a specific type of prefix. This specific type of prefix can be introduced at IPv6 internet. Also, the IPv6 networks fragmentation is managed by the source device instead of the router and for that protocol is used so that maximum transmission unit of the path can be discovered.

The authors Carpenter et al. (2015), has elaborated that the IPv6 type of addressing is very much capable of supporting the new types of services. The authors have been assessed that the IPv6 type of addressing technique is capable of eliminating the network address translation and by the elimination of this a true end to end connectivity is restored at the point of IP layer. In this way important and valuable type of services are enabled. It is quite easy to maintain the peer to peer networks due to the IPv6 type of addressing. Also, the IPv6 type of addressing makes the quality of the service and VoIP more robust in nature which is one of the biggest advantages of the IPv6 over the old type of IPv4.

The authors K Luye et al. (2016), has assessed the IPv6 and has found that the network configuration of the IPv6 type of addressing is very much easy. The authors have addressed the main reason behind this is the built-in address auto configuration within the IPv6. In this aspect the router sends the prefixes of a local type of link in the advertisements of its router. So, the hosts can generate their own IP of them and for that they need to append the link layer address converted into the Extended Universal Identifier 64-bit format, to the 64 bits of the prefix of the local link.

According to the authors Dhanapal and Vijayakumar (2018), one of the prior advantages of the IPv6 type of addressing is the directed type of data flow. The IPv6 type of addressing supports the multicasting rather than the broadcasting. Here, the multicast is capable of allowing the bandwidth intensive packet flow to be sent to various multiple destinations in simultaneous way. In this the IPv6 actually saves the bandwidth of the network. The hosts who are no longer interested in these cases do not need to process the packets which are for the broadcast. Also, another advantage in the IPv6 type of addressing is

that it is consisting a named flow label and a field which can help to identify the packets that belongs to the same type of flow.

As per the authors Dhanapal and Nithyanandam (2018), one of the main reasons for considering the IPv6 over the IPv4 type of addressing mode is the more efficient type of packet processing. The simplified packet header which is present in the IPv6 makes the processing of the packets much more efficient. While the IPv6 is compared with IPv4 the IPv6 does not consists of any type of IP-level checksum. Due to this fact checksum does not need to be calculated at every time at every router hop. In this aspect becoming free from the IP-level checksum was quite possible as most of the link layer technology is already having checksum and the capabilities of error control. Also, most of the transport layer which handled the end to end connectivity is consisting a checksum which enabled the process of the error detection.

As per the authors Jevremovic et al. (2016), the data integrity, authentication and confidentiality of the data is provided by the IPSec and this IPSec is already included within the IPv6 type of addressing process. While it is compared with the IPv4 it does not have any type of IPSec included within it. Due to this fact the IPv4 becomes potential of carrying the malware and as there are potential chances that the IPv4 are carrying the malware, IPv4 ICMP packets are blocked in many of the times by the corporate type of firewalls. In this aspect the ICMPv6 which is the Internet Control Message Protocol for IPv6 is permitted through these firewalls in most of the time as the IPv6 packets are already having the IPSec integrated within it. In this way the IPv6 becomes more secured in nature while it is compared with the IPv4 type of addressing process.

Results and Discussion:

From the discussion is being made in the literature section it has been assessed that IPv6 type of addressing is quite superior when it compared with the old type of IPv4 type of addressing. Basically, a vast comparison has been made among these two types of addressing techniques in this paper and it has been assessed that IPv6 is superior than the IPv4 is all of the cases. From the comparison it has been identified that the main reason due to which the IPv6 is currently replacing the old IPv4 is the large address space offered by IPv6. In the current context the address spaces are not enough which are provided by the IPv6 so that all the users can connect to the internet at the same time. With having a quite large address space the IPv6 becomes the appropriate replacement of IPv4.

Conclusion:

From the above discussion it can be concluded that IPv6 addressing is far more superior when it is compared with the IPv4 type of addressing process. It has been assessed that IPv6 is having various advantages over the IPv4 type of addressing on different kind of contexts. Though there are various advantages of the IPv6 the main advantage of IPv6 over IPv4 is the large address space offered by the IPV6. In this way theIPv6 become capable of fulfilling the demands of the current internet users. Thus, IPv6 is the perfect replacement of the IPv4. In this research first a brief introduction has been provided on the IPv4 and IPv4 in the aspect of networking. In the following section the main aim behind the research and methodology used for the research has been demonstrated. Secondary data research methodology has been chosen here and from those data a vast litterateur has been presented here. From the results it has been assessed IPv6 is much better compared with the Ipv4 type of addressing.

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PART 2

IP addressing scheme

The School of Applied Computing will have 711 devices to connect.

The School of Engineering will have 406 devices to connect.

The School of Automotive Engineering will have 283 devices to connect.

Test Centre will have 22 devices and the Open Access Lab 250 devices.

Because there is a big number of devices and a future grow I chose a private Class B address- 175.40.0.0

The scheme will have three IP addresses (VLSM) for the buildings and two networks between them.

School Name	Number of PCs	Network Address	Broadcast Address	First Usable	Last Usable	Subnet
School of Applied Computing	711	175.40.0.0/22	175.40.3.255	175.40.0.1	175.40.3.254	255.255.252.0
School of Engineering	406	175.40.6.0/21	175.40.7.255	175.40.0.1	175.40.7.254	255.255.248.0
School of Automotive Engineering	283	175.40.12.0/20	175.40.15.255	175.40.0.1	175.40.15.254	255.255.240.0
Test Centre	22	175.40.18.0/24	175.40.18.255	175.40.18.1	175.40.18.254	255.255.255.0
Open Access Lab	250	175.40.20.0/26	175.40.20.63	175.40.20.1	175.40.20.62	255.255.255.192

IPv6 Addressing scheme for the six servers

Name Server	IPv6
DNS	fc00::1
Email	fc00::2
Registry	fc00::3
Print Server	fc00::4
File Server	fc00::5
Finance	fc00::6
Mp	2002::