International Journal of Multidisciplinary Engineering in Current Research
Volume 7, Issue 7, July 2022, http://ijmec.com/

Utilizing Support for IPv6 Efficient Routing Protocol on A campus Networks Systems: A review

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Abstract
IPv6 is becoming more required as the number of people and objects connected to networks continues to expand on a daily basis while IPv4 is being phased out. Other features in this edition make it well worth the time, money, and effort it takes to upgrade. We're getting closer to running out of IP addresses thanks to technologies like Classless Inter-Domain Routing (CIDR) and Network Address Translation (NAT), but we'll still run out in a few years. IPv6 efficient IPv6 dynamic routing protocol in the A campus network systems at the University of Baghdad is the focus of this evaluation. OSPF is deployed on three geographically isolated campuses using IPv6 in a simulated network in this assessment, utilizing the Graphical Network Simulator (GNS3). A network sniffer is used to delve deep into select packets and analyze OSPF performance on campus. Shark on wires
Keywords : Routing Protocol SRP support is included in Internet Protocol version 6, Graphical Network Simulator version 3..

INTRODUCTION

The Internet Address (IA) of every IP device currently under control must be manually authorized. Automatic device checks in IPv6 alleviate this administrative effort. For all intents and purposes, IPv6 provides end-to-end security for financial transactions as well as scalability, availability, and QoS for VoIP and IP-based television (IPTV). IPv6 will have a more flexible structure compared to IPv4, a new feature. When comparing IPv4 with IPv6, there are a few structural differences in the headers of both protocols, the most notable one being the addition of an extension to the IPv6 header. IPv6's built-in IPsec is more secure than IPv4's NAT, although IPv4's NAT complicates security. [1] In comparison to IPv4, IPv6 is a higher-level protocol for network layer enhancement. There is a lot of business activity in Europe, Asia, and the United States, as well as elsewhere. The US Department of Defense wants to complete the IPv6 transition for all internal communication. As a result of the IPv6 development from October 1st, 2003 to October 1st, 2008, new products needed to support IPv6. All universities were urged to migrate to IPv6 by the United States in 2005 [2].

The OSI Framework Model

The International Standards Organization (ISO) developed the OSI model in 1978 to separate the communication process into smaller, standardized steps or layers (as shown in figure 2.1), where each layer is in charge of a specific set of actions and functions and communicates with the same layer at the other peer side by sending and receiving messages [4]. [3]

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Figure .1OSI Model [11]

The layers are arranged from bottom to top, with the first three levels most significant from a network perspective, and the upper four layers most critical from a user perspective [5].

The Data Link Layer

The MAC address is used.

• Works as a converter between layer 1 and the higher layers, converting bits to packets and packet top bits. As an electrical signal, the data is sent to layer 2.

• The packages are divided into smaller pieces and then framed.

• It checks for errors. The data connection layer's devices include switches and bridges [6].

The network layer IPv4 logical addresses are generated from the MAC or physical addresses.

It is possible to use IPv4 or IPv6 addresses as an addressing tool.

• Is the level of customer satisfaction high enough to warrant a higher price? The routing table is used to choose the best route.

Network layer devices include routers and layer 3 switches

[6].IPv4 and IPv6 are compared in this section.

IPv4	IPv6
Multicast address space at 224.0.0.0/4	Multicast address space at FF00::/8
Has broadcast address for all devices	No such concept in IPv6 (uses multicast groups)
Uses 0.0.0.0 as unspecified address	Uses :: as unspecified address
Uses 127.0.0.1 as loopback address	Uses ::1 as loopback address
Supports globally unique "public" addresses	Supports globally unique addresses
Uses 10.0.0.0/8, 172.16.0.0/16 and 192.168.0.0/16 as "private" addresses	Uses FD00::/8 as unique local addresses

Table.1Comparison between IPv4 and IPv6

Auto-configuration of IPv6 addresses

Although IPv6 has a DHCP version, a feature called IPv6 Auto-Configuration replaces many of the DHCP capabilities by allowing the host on the segment to automatically have an IPv6 address and to know the default gateway. Just like DHCP, IPv6 Auto-Configuration uses Link-Local and the ICMPv6 protocol, and may be set to send periodic messages or not. IPv6 unicast routing with the command no IPv6 and suppress enable the Auto-Configuration capability, which is otherwise disabled by default [7].

reviews of the literature Simulated network performance study in the present, transitional time has been enhanced by [8] author utilizing OPNET, an open-source network simulation tool.

Finally, there are IPv6-enabled networks. His primary areas of interest are:

1. IPv6 has significant distinctions, benefits, and suggested superiority over IPv4.

IPv6 – IPv4 routing and IPv6 gains measured and compared in a simulated test-bed environment, with a focus on the transaction mechanism (OPNET)

Ege University's current IPv6 operational status is also discussed in this context. There are other

procedures that may be taken to ease the transition and improve the performance of IPv6 networks that are included in this thesis's area of study. [9]

VIDEO CONFERENCE SOFTWARE DEVELOPMENT IS NOW ABLE TO USE IPv6.

Knowledge of IPv6 services is expected to grow as a result of the "Videoconferencing over IPv6 Software" research platform's presence.

.gained

INNOVATION IN HONEYPOT CREATION

This project's "IPv6 Security Research and Honeypot Development" is one of the most important research and "development components." During this phase of the project, the first ever "IPv6 Honeypot" has been created. This program will be used in conjunction with IPv6-GO to create a "honeypot network" that can be used to detect IPv6 threats. [10]

Internet Protocol (IP) Addressing and Physical Connections There will be a trunk interface connection between each stack of switches (each virtual switch) and the campus core, and this link will be used by the VTP to copy and modify the VLANs database from the core to all access switches. Each stack of switches (each virtual switch) will have this trunk interface connection. The core switch will be in server mode, and we'll employ two of the three VTP modes. Create, destroy, and alter VTP objects on the server, and then send these changes to all other switches. Clients that have no authorization to alter the database security-wise will only get updates and implement such upgrades to their own databases.

.database

Layer 1 physical connection testing should be followed by layer 2 connectivity testing, and lastly layer 3 functionality testing. You should start by seeing if there is a physical connection between your domain's core and every access device. You can do this by executing the command show CDP neighbours on any machine in your domain to see what other devices are connected to yours and what interfaces on those devices are showing. When checking for layer 1 connection, this command comes in helpful since we can see whether we have a neighbor.

this indicates that the interfaces are functioning properly and the connection to this neighbor is operating as it should. Worked perfectly good for me

Figure 2 Show CDP Neighbors Command on Baghdad core

Rather of having just one VLAN, we will be able to better govern and handle our network by breaking it into many VLANs. Our network may be divided into smaller, more manageable segments by using VLANs.

The following is the list of VLANs in our network for the Baghdad campus:

VLAN NAME	VLAN NO.	IPv6 ADDRESS RANGE
Wireless VLAN	2	2001:0000:0000:0002::/64
Administration VLAN	3	2001:0000:0000:0003::/64
Labs VLAN	4	2001:0000:0000:0004::/64
Management VLAN	5	2001:0000:0000:0005::/64
Simulator VLAN	6	2001:0000:0000:0006::/64

Table.2The VLAN's in Baghdad campus

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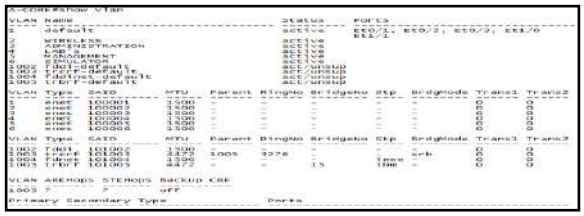
All buildings that need wireless connectivity will be covered by this VLAN, which is specifically designed for this purpose. 2001:0000:0000:0002:/64 is the IPv6 address range for this VLAN

Administrators and professors may utilize the Administration VLAN whenever it is necessary. This VLAN's IPv6 address range is 2001:0000:0000:0003::/64 laboratories Students in three different buildings will be able to connect to this VLAN in order to access the various labs. For this VLAN, the IPv6 address space is set to 2001:0000:0000:0004::/64.

```
A-CORE#show cdp neighbors
Capability Codes: R - Router, T - Trans Bridge, B - Source Route Bridge
                  S - Switch, H - Host, I - IGMP, r - Repeater, P - Phone,
                  D - Remote, C - CVTA, M - Two-port Mac Relay

Device ID       Local Intrfce     Holdtme    Capability  Platform  Port ID
A-LIB-SW        Eth 3/3           157             R S   Linux Uni Eth 0/0
A-ADM-GF        Eth 2/2           137             R S   Linux Uni Eth 0/0
A-ENG-GF        Eth 1/2           161             R S   Linux Uni Eth 0/0
A-AER-GF        Eth 3/0           137             R S   Linux Uni Eth 0/0
A-LANG-1F       Eth 2/1           138             R S   Linux Uni Eth 0/0
A-LANG-GF       Eth 2/0           138             R S   Linux Uni Eth 0/0
A-AER-1F        Eth 3/1           137             R S   Linux Uni Eth 0/0
A-AER-2F        Eth 3/2           159             R S   Linux Uni Eth 0/0
A-ROUTER        Eth 0/0           149              R    7206VXR   Fas 0/0
A-ENG-1F        Eth 1/3           137             R S   Linux Uni Eth 0/0
A-ADM-1F        Eth 2/3           159             R S   Linux Uni Eth 0/0
```

This VLAN will be used to control all of the network's equipment, including switches and routers. This VLAN's IPv6 address space will be 2001:0000:0000:0005::/64 (inclusive).



Because the flight simulator is such a delicate piece of equipment, it has its own VLAN specifically for protection. 2001:0000:0000:0006::/64 will be the IPv6 address range used for this VLAN.

The command show VLAN lets us examine the VLANs we've created on the core switch.

the following is what I mean by that:

Figure .3Show VLAN command on the core switch

CONCLUSION

Due to the ever-increasing number of people and objects connected to networks, IPv6 is becoming an increasingly obvious solution as IPv4 is being phased out. It's our recommendation to adopt the normal Cisco hierarchical structure and implement IPv6 as layer 3 addressing protocol for our university's "University of Baghdad" campus. Every gadget on campus may now have an IP address, since IPv6 has so many addresses available.

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