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Performance Evaluation of IPV6 Compression Technique

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Abstract: ***This paper aims to reduce the size of data which is the biggest challenge for any networks to bring it to the high efficiency in performance, especially with the development of the telecommunications and Internet networks. The main goal of this paper is Comparing the three rules to pressure IP address and choose the best in terms of reducing the number of bits and thus improve the performance and efficiency of the network.***

Keywords: IPV6, OPNET ,Compression , anycast, Delay

1. Introduction

The continuous growth of the global Internet requires that its overall architecture evolves to accommodate the new technologies that support the growing numbers of users, applications, appliances, and services. Internet Protocol Version 6 (IPv6) provides solutions to the problems of the growth of internet, especially to the lack of addresses, also it makes Simplified routing, and the main characteristics of this protocol had to be the following:

- Larger addressing space, structured addresses and no addresses classes.
- Automatic configuration.
- Simplified routing.
- Better structuring options for the networks.
- Improved security features.
- Support for real-time and multimedia services.

1.1 IPV6 Addresses Classes

IPv6 addresses are classified by the primary addressing and routing methodologies common in networking into three categories:-.

1) Unicast Addresses
A Unicast address acts as an identifier for a single interface. An IPv6 packet sent to a Unicast address is delivered to the interface identified by that address.

2) Multicast Addresses
A Multicast addresses acts as an identifier for a group/set of interfaces that may belong to the different nodes. An IPv6 packet delivered to a Multicast address is delivered to the multiple interfaces.

3) Any Cast Addresses
Any cast addresses act as identifiers for a set of interfaces that may belong to the different nodes. An IPv6 packet destined for an Anycast address is delivered to one of the interfaces identified by the address.

2. Methodology

IPv6 uses a 128-bit address consist of eight hexadecimal/parts and each hexadecimal/part consist of 4 digits and of 16bits, like this:
2001:1265:0000:0000:0AE4:0000:005B:06B0

This is normally difficult to remember, using compression techniques you can represent IPv6 in more understandable and simple way.

I will explain and illustrate how to perform each of the three ways to pressure the address, and what is the number of bits that have been decreased for each of the three methods, by using excel analysis and then which is better to improve the performance and efficiency of the network. These compression rules and methods are as follow:

(I)IPv6 Zero Compression:
In zero compression we can represent group of zeros by one double-colon (::) but we can perform this only once in their IPv6 address, that means if we have two group of zeros in their IPv6 address we can use the double-colon only once. Review the example for better understanding.

(II)Leading Zero Compression:
In leading zero compression you can eliminate the starting zero(s) from any hexadecimal. If you have all zero in hexadecimal you can represent this hexadecimal with one zero.

(III)Both Zero and Leading Zero Compression:
You can use the both zero and leading zero compression together by following these compression techniques

3. Results and Discussions

Figure 1 shows us the size of the address before and after the compression and the number of bits that has been diminished using the excel program.

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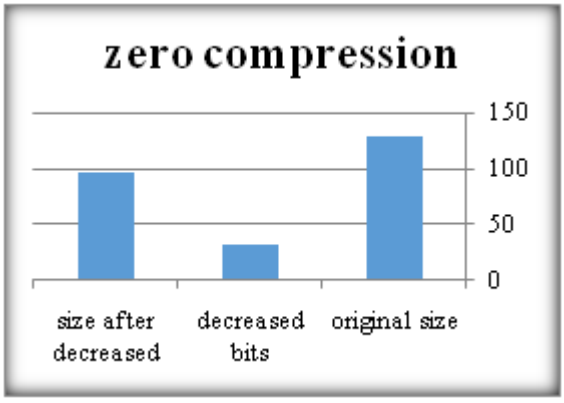

Figure 1: The size of the address before and after the compression

Table 1: Shows the data that used in figure1

Name of rule	*Original Size*	*Decreased Bits*	*Size after Decreased*
Zero compression	128	32	96

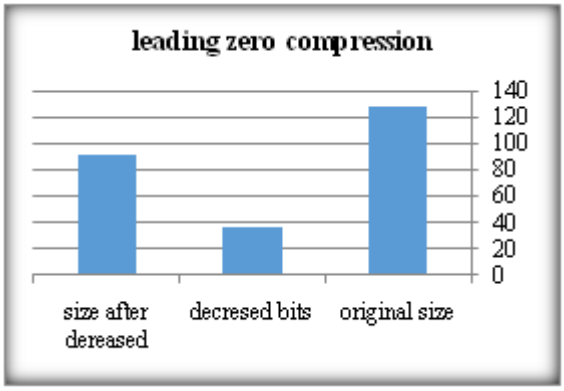

Figure 2: IPv6 address with leading zero compression

Table 2: IPv6 address with leading zero compression

Name of rule	*Original Size*	*Decreased Bits*	*Size After Decreased*
Leading Zero compression	128	36	92

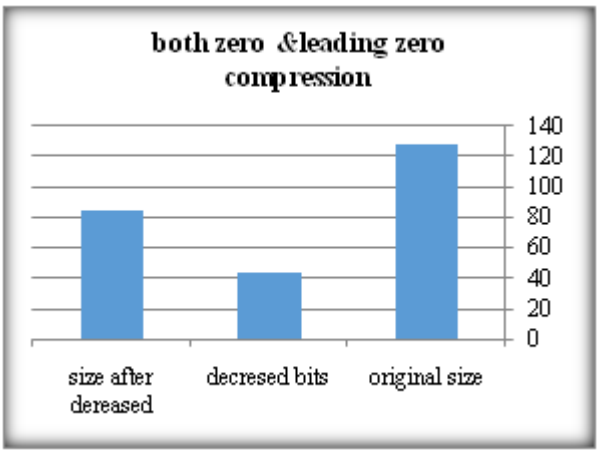

Figure 3:IPV6 add Both Zero and Leading Zero Compression

The following table shows the data that used in figure 3

Table 3: IPV6 add Both Zero And Leading Zero Compression

Name Of Rule	*Original Size*	*Decreased Bits*	*Size after Decreased*
Both Zero & leading zero compression	128	44	84

Using the first method has been reducing the number of 32 bits or more, and using the second method has been reducing the number of 36eight or more bits, and finally using a third method was to lose a 44 or more bits. As show in fig (4):

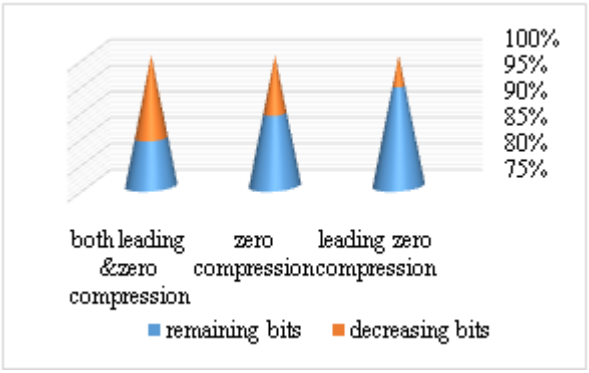

Figure 4: The overall compression technique

4. Conclusion

To reduce the number of bits in the IPV6 addresses we use three rules, in this paper we compared between this three rules and we've got a very good result, all of the three rules realized the goal of decreasing the number of bits, but the last rule (both zero and leading zero compression) have a largest decreased bits , that is means the third method is the best rules in decreasing number of bits and improvement in the performance of the network and increase speed the flow of data and get the highest output data per second.

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