

UNIVERSITY OF WALES TRINITY SAINT DAVID

INTERNET PROTOCOL

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Introduction	1
Instinct of the networks	2
As a comparison:	2
Address resolution protocol (ARP)	3
Private and public address	4
Security model	5
Conclusion	6
Bibliography	6
School of Computerscience and Engineering	6
School of Applied Computing	7
School of Automotive Engineering	8
School of Engineering	8

PART 1

Introduction

IPv6, which means Internet protocol version 6, the communications protocol that provides an identification and location system for computers on networks and routes traffic across the Internet, is the most recent version of the Internet Protocol (IP), has a length of 128 bits which is 16 bytes. The architecture of this TCP is based on 64 bits for the network number and 64 bits for the host number according to the IPv6 subnet prefix has a more complex compared to IPv4. The number of addresses in IPv6 is 10 to 28, higher than the IPv4 standard. The form of the address text is as follows: xxxx:xxxx:xxxx:xxxx:xxxx:xxxx:xxxx:xxxx. Where X equals a hexadecimal number representing 4 bits. As hexadecimal hem is like so 1-9, A=10, B=11, C=12, D=13, E=14, F=15. Zeros from the beginning can be omitted (::) these two double

points and can be used in the form of a text to designate any number of 0 bits, for example : ::eeee:15.145.76.52 < This is an IPv6 address that is mapped to IPv4.

Instinct of the networks

IPv4 was created in 1980, published in 1981 in the Internet engineer task force (IETF), which created a standard organization and in 1983 the ARPANET company introduced the first production version. It has a length of 32 bits, is it has 4 bytes, the address is composed of a host and a portion of the network. The form of IPv4 is xxx.xxx.xxx.xxx and must be between 0 and 255 zeros from the beginning can be omitted.

As a comparison:

- The placement of an IPv6 address is the assignment of the early stages. IETF (Internet Engineering Task Force) and IAB (Internet Architecture Board) have strongly recommended that each organization, entity or home should have a subfield prefix of a length of /48. The address space is often large enough to give every person in the world their own sub-length prefix /48. Instead, IPv4 is allocated by network classes. Less allocations have been made that use routing between classless domains. These allocations have not been balanced between institutions and nations.
- Pursuit life in IPv6 that has 2 preferred life spans and one valid one, with your preferred lifetime always being lower or equal to the valid one.

After the favorite lifetime may expire, and the address can not be used as the source IP address for new connections unless a similar preferred address is available.

After the expiration date, the allocated address can no longer be used or recognized as a valid destination IP address for the input packets, not used as a source IP

address. Some IPv6 addresses have, by definition, a lifetime of preference and infinite validity, ex : Local Link.

Instead, lifetime in IPv4 is generally not an applicable concept but with only one exception to the addresses assigned using DHCP.

- If the address mask in IPv4 is used to indicate the network in the host portion, in IPv6 is not used anymore.
- Prefix address in IPv6 is used to indicate the prefix of a subnet of an address.

It is written as a suffix /kkk that has up to 3 decimal digits, 0 is less or equal to kkk less or equal to 128 and has a printable company. A more specific example is ef80::452:1c3d/10, where the first 10 bits contain the subnet prefix. Instead, in IPv4 they are used to indicate the network in the host portion. It is sometimes written as a suffix /kk as an address presentation.

Address resolution protocol (ARP)

In IPv6 it integrates these IP functions as part of algorithms for self-configuring a stateless and discovering neighbors using ICMPv6 (Internet control message protocol version 6) and there is no such thing as ARP6. Instead, in IPv4, an address resolution protocol is used to find a physical address such as mac address or a link associated with an IPv4 address. LAN connections in IPv6 can be used for any Ethernet adapters, and are supported by such virtual Ethernet between logic parts.

Instead, IPv4 uses an IP interface to reach the physical network. Exist many types of example token ring and Ethernet. Sometimes it refers to the physical link or line interface. Integration of node information in IPv6 is a simple and convenient networking tool that works as ping, with the exception of content: an IPv6 node can query another IPv6 node for the destination DNS name, IPv6 unicast address, or IPv4 address. Currently unsupported. In contrast, there is no IPv4. Ping in IPv6 is supported for both the 5250 as well as the iSeries Navigator. Instead, in the IPv4 Basic TCP/IP Tool for Accessibility Testing. It is available using the iSeries Navigator and the 5250 Navigator.

Private and public address

Private and public address in IPv6 has an analogue concept, but with important differences. The addresses are public or temporary, previously called anonymous. See RFC 3041. Unlike IPv4 private addresses, temporary addresses can be routed globally. The motivation is also different; IPv6 temporary addresses are designed to protect a customer's identity when initializing communication (a private connection). Temporary addresses have a limited lifetime and do not contain an interface identifier that is a MAC address. Generally, they can not be distinguished from public addresses.

In contrast, in IPv4 they are public and has the exception of three address ranges that are designated as private by IETF RFC 1918: 10.*.* (10/8), 172.16.0.0 through 172.31.255.255 (172.16/12), and 192.168.*.* (192.168/16). Private address requests are typically used in organizations. Private addresses can not be routed to the Internet. Package service in IPv6 no changes are made to this table instead in IPv4 on the iSeries server, a configuration table that associates a service name with a port and protocol; for example, service name-FTP, port 21, TCP and UDP.

A large number of well-known services are mentioned in the service table. Many applications use this table to determine which port to use. Api sockets in IPv6 improve sockets so applications can now use IPv6 using a new address family: AF_INET6.

Improvements are intended so that existing IPv4 applications are completely unaffected by IPv6 and API changes. Apps that want to support IPv4 and compliant IPv6 traffic are easily accommodated using IPv6 mapped IPv4 addresses like ::ffff:abcd, where abcd the IPv4 address of customer. Change in IPv4 as APIs are the method by which applications use TCP/IP.

Security model

The unspecified address in IPv6 is defined as `:: / 128` (128 bits 0). It is used as an IP source in several neighboring discovery packages and various other contexts, such as sockets. Programming with sockets uses `::/128` as in `6addr_any`. And in IPv4 is apparent, undefined. Socket programming uses `0.0.0.0` as `INADDR_ANY`. Network Address Translation or abbreviated NAT does not support IPv6. Generally, IPv6 does not require NAT. The IPv6 extended IP address eliminates the problem of addressing and allows easy re-counting. Instead, in IPv4 TCP/IP based basic firewall features configured using the iSeries Navigator.

Maximum Transmission Unit or abbreviated MTU in IPv6 has a lower limit for MTU of 1280 bytes. Therefore, IPv6 will not fragment the packets below this limit. To send IPv6 over a link with less than 1280 MTU, the level link must break transparently and defragment IPv6 packages. And instead in IPv4 the maximum drive of a link is the maximum number of bytes that it supports a certain type of connection, such as by modem or Ethernet.

A loopback in IPv6 has the same concept as IPv4. The only loopback address is `0000:0000:0000:0000:0000:0000:0000:0001` or `::1` (abridged version). The virtual physical interface is called `* LOOPBACK`. Instead, in IPv4 An interface with address `127.*.*` (Typically `127.0.0.1`), which can only be used by a node to send packets to itself. The physical interface (line description) is called `*LOOPBACK`.

LAN cable in IPv6 can be used for any Ethernet adapter, and it is also supported over virtual Ethernet between logical partitions. Instead, IPv4 is used by an IP interface to reach the physical network. There are many types, for example token ring and Ethernet. Sometimes it refers to the physical interface, link, or line. Interface in IPv6 is the same concept as IPv4.

It can be turned on and off independently of others and independently if TCP/IP uses the iSeries Navigator. And in IPv4 The conceptual entity and logic used by TCP/IP to send and receive packets and always closely associated with an IPv4 address if it is not named with an IPv4 address. Sometimes it refers to a logical interface. It can be turned on and off independently of others and independently if TCP/IP uses the `STRTCPIFC` and `ENDTCPIFC` commands or uses the iSeries Navigator.

Conclusion

Finally, we can say that following the differences between IPv4 and IPv6, we can say that the performance of the two is almost equal. This does not mean that IPv6 does not have its own problems, but at least in terms of network performance, you can safely migrate without performance deficiencies, but transitioning is necessary.

Bibliography

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PART 2

School of Computerscience and Engineering

Building Name	Subnets	Network address	First Usable Host	Last Usable Host	Broadcast Address	Subnet Mask
School of Applied Computing	2048	172.16.0.0	172.16.0.1	172.16.7.254	172.16.7.255	255.255.248.0
School of Automotive Engineering	1024	172.16.8.0	172.16.8.1	172.16.11.154	172.16.11.255	255.255.252.0
School of Engineering	1024	172.16.12.0	172.16.12.1	172.16.15.254	172.16.15.255	255.255.252.0
NET 1	4	172.16.16.0	172.16.16.1	172.16.16.2	172.16.16.3	255.255.255.252
NET 2	4	172.16.16.4	172.16.16.5	172.16.16.6	172.16.16.7	255.255.255.252

School of Applied Computing

	Subnets	Network address	First Usable Host	Last Usable Host	Broadcast Address	Subnet Mask
272	512	172.16.0.0/23	172.16.0.1	172.16.1.254	172.16.1.255	255.255.254.0
Lab 308-140	512	172.16.2.0/23	172.16.2.1	172.16.3.254	172.16.3.255	255.255.254.0
Lab 301-60	256	172.16.4.0/24	172.16.4.1	172.16.4.254	172.16.4.255	255.255.255.0
Lab 309-50	128	172.16.5.0/25	172.16.5.1	172.16.5.126	172.16.5.127	255.255.255.128
Lab 304-45	128	172.16.5.128/25	172.16.5.129	172.16.5.254	172.16.5.255	255.255.255.128
Lab 306-40	64	172.16.6.0/26	172.16.6.1	172.16.6.62	172.16.6.63	255.255.255.192

Lab 303-36	64	172.16.6.64/26	172.16.6.65	172.16.6.126	172.16.6.127	255.255.255.192
Lab 302-30	64	172.16.6.128/26	172.16.6.129	172.16.6.190	172.16.6.192	255.255.255.192
Staff 20	32	172.16.6.192/27	172.16.6.193	172.16.6.222	172.16.6.223	255.255.255.224
Lab 310-18	32	172.16.6.224/27	172.16.6.225	172.16.6.254	172.16.6.255	255.255.255.224

School of Automotive Engineering

	Subnet	Network address	First Usable Host	Last Usable Host	Broadcast Address	Subnet Mask
Lab 301-50	128	172.16.8.0/25	172.16.8.1	172.16.8.126	172.16.8.127	255.255.255.128
Lab 206-48	128	172.16.8.128/25	172.16.8.129	172.16.8.254	172.16.8.255	255.255.255.128
Lab 101-40	128	172.16.9.0/25	172.16.9.1	172.16.9.126	172.16.9.127	255.255.255.128
Lab 205-40	128	172.16.9.128/25	172.16.9.129	172.16.9.254	172.16.9.255	255.255.255.128
Lab 103-35	64	172.16.10.0/26	172.16.10.1	172.16.10.62	172.16.10.63	255.255.255.192
Lab 102-25	32	172.16.10.64/27	172.16.10.65	172.16.10.94	172.16.10.95	255.255.255.224
Staff-25	32	172.16.10.96/27	172.16.10.97	172.16.10.126	172.16.10.127	255.255.255.224
CAD Lab-20	32	172.16.10.128/27	172.16.10.129	172.16.10.158	172.16.10.159	255.255.255.224

School of Engineering

	Subnets	Network address	First Usable Host	Last Usable Host	Broadcast Address	Subnet Mask
Lab 202-80	128	172.16.12.0/25	172.16.12.1	172.16.12.26	172.16.12.127	255.255.255.128
Lab 409-80	128	172.16.12.128/25	172.16.12.129	172.16.12.254	172.16.12.255	255.255.255.128
Lab 203-65	128	172.16.13.0/25	172.16.13.1	172.16.13.26	172.16.13.127	255.255.255.128
Lab 404-45	64	172.16.13.128/26	172.16.13.129	172.16.13.190	172.16.13.191	255.255.255.192
Lab 410-45	64	172.16.13.192/26	172.16.13.193	172.16.13.254	172.16.13.255	255.255.255.192
Lab 408-28	32	172.16.14.0/27	172.16.14.1	172.16.14.30	172.16.14.31	255.255.255.224
Lab 205-25	32	172.16.14.32/27	172.16.14.33	172.16.14.62	172.16.14.63	255.255.255.224
Lab 201-20	32	172.16.14.64/27	172.16.14.65	172.16.14.94	172.16.14.95	255.255.255.224
Staff-18	32	172.16.14.96/27	172.16.14.97	172.16.14.126	172.16.14.127	255.255.255.224