Commanding Thought

Anatomy of an IPv6 Unicast Address

IPv6 is the next generation Internet protocol. In simplest terms, Internet protocol is the set of techniques used to transmit data over the Internet. IPv6 was designed to replace the current version, IPv4, and will bring superior reliability, flexibility and security to the Internet. IPv6 will have a dramatic impact on military operations, corporate security, mobility, supply chain management and other key business functions worldwide.

Given the proliferation of wireless and mobile devices, each attached to a unique IP address, the current IPv4 system's inventory of IP addresses – some four billion unique addresses – is quickly being exhausted. IPv6, on the other hand, supports 340 trillion trillion trillion unique addresses. IPv4 was designed in the 1970's with no way of anticipating the demands of today's Internet. IPv6, designed in the past 10 years, corrects many of IPv4's shortcomings in areas such as security, privacy, convergence, and more.

IPv6 incorporates several other improvements. IPv6 enables routers to treat packets – the many small packages which send data over the Internet – differently to meet the needs of specific applications. For example, a voice data packet produced by a VOIP phone will have priority over a data packet, such as email or file downloads. This means that VOIP call quality will be comparable to, if not better than analog phones. IPv6 also offers an improved security protocol by assigning each user an IP address that is entirely their own, there is less need to constantly verify identification.

The main focus for IPv6 over the next year is education and transition planning – designing strategies and procedures for large corporations and government entities to convert to this new technology infrastructure.

IP By The Numbers:

- Number of IP Addresses in IPv4: 4,294,967,296
- Population of Earth (2006): 6,547,251,903
- Number of IP Addresses in IPv6: 340,282,366,920,938,463,463,374,607,431,768,211,456

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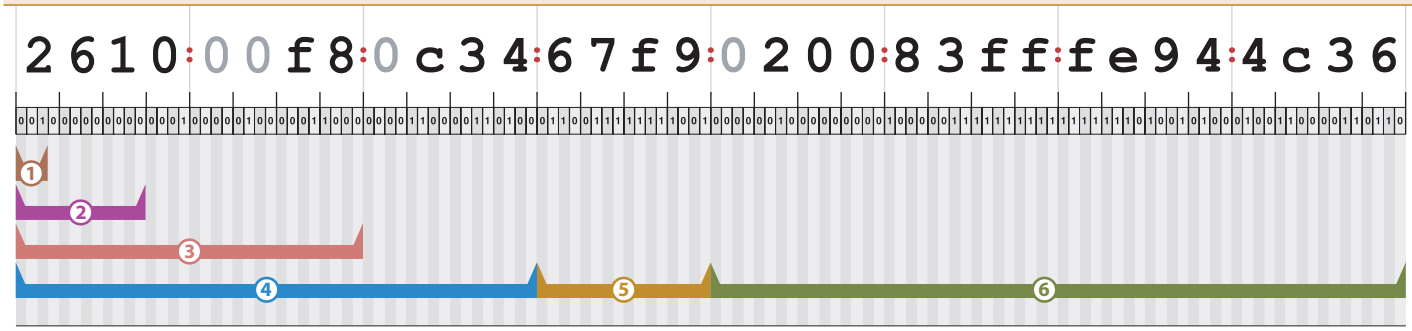
Based on an original concept by Maria Morris, Indiana University



1 2000::/3
The current IPv6 address space for unicast allocations is 1/8 of the total address space.

2 IANA Allocation to Registries (Varies)
IANA makes assignments to regional registries. New allocations are /12 bits, previous assignment have varied.
For example: "2a01:0000::/16" was assigned by IANA to RIPE NCC (the European and Middle East registry) in December 2005.

3 "ISP Allocations"
Regional registries make assignments to local ISPs. A typical assignment is /32 bits, but more space may be assigned.
For example: RIPE NCC assigned "2a01:c000::/19 to France Telecom in December 2005.

4 "End-Site Allocations"
ISPs make assignments to their customers. The amount of address space varies, but a /48 bit allocation is common.
Organizations can get larger assignments, based on need (Command Information has a /32 allocation), smaller organizations may get less space (for small companies a /56 is common).

5 "Subnet Assignments"
Organizations make assignment to individual subnets, where the most common size is /64.
With 16 bits subnetting bits available, an organization can deploy as many as 65,536 subnets.

6 "Interface ID"
Interfaces must have a unique identifier on the subnet – often created by embedding the underlying 48-bit (L2) MAC address.
Theoretically then, a single subnet could support 2^64 active hosts – clearly far beyond the practical limit.

About Command Information

Command Information is the largest IPv6 solutions provider in America, offering strategic and tactical solutions for Fortune 1000 companies and government organizations seeking to move to the fast-emerging new version of Internet protocol. Command provides application development, information assurance (security), network architecture and operations, transformational technologies, and business consulting services. Its newly opened technology center features an interactive training center and "state of 2008" IPv6-enabled research and development lab.
For more information visit www.CommandInformation.com.