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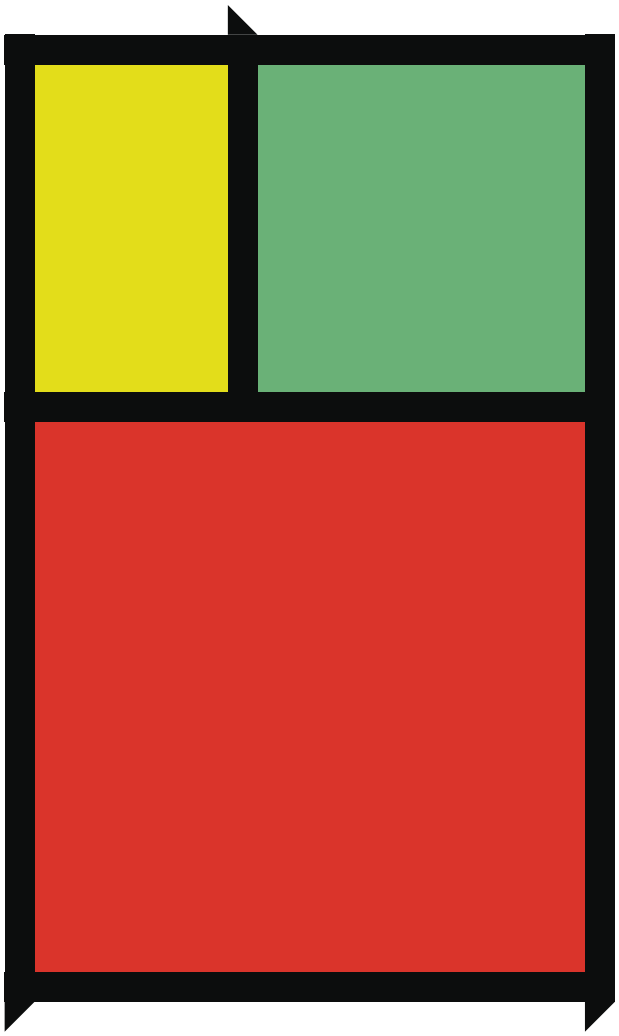

IPv6

The Next Generation Internet Protocol

interpeak
NETWORK SECURITY

The Next Generation Internet

Around year 1992, the Internet Engineering Task Force (IETF) became aware of shortage of IPv4 addresses in the world, and technical obstacles in deploying new protocols due to limitation imposed by IPv4. IPng (IP next generation) effort was started to solve these issues. After large amount of discussions, around year 1995, IPv6 (IP version 6) was picked as the final IPng proposal.

Larger IP Address Space

IPv4 uses only 32 bits for IP address space, which allows only 4 billion nodes to be identified on the Internet. 4 billion may look like a large number, however, it is less than the human population on the earth. IPv6 allows 128 bits for IP address space, allowing three hundred forty undecillion nodes to be uniquely identified on the Internet. Larger address space allows true end to end communication, without NAT or other short term workaround against IPv4 address shortage.

Deploy New Technologies

After IPv4 was specified 20 years ago, we have seen a plethora of technical improvements in networking. IPv6 covers a number of those improvements in its base specification, allowing users to assume these features available everywhere, anytime.

Autoconfiguration

With IPv4, DHCP has been available, but only as an option. The novice user can go into trouble when visiting an offsite without DHCP server. With IPv6, the stateless host autoconfiguration mechanism is mandatory.

Security

With IPv4, IPSec is optional and you need to ask the peer if it supports IPSec or not. With IPv6, IPSec support is mandatory. By mandating IPSec, you can secure your IP communication whenever talking to IPv6 devices.

Multicast

Multicast is mandatory in IPv6, which was optional in IPv4. IPv6 base specifications also extensively use multicast.

Ad-Hoc Networking

Scoped addresses allow better support for ad-hoc or "zeroconf" networking configuration. IPv6 supports anycast addresses, which can also contribute to service discoveries.

Flexible Protocol Extensions

IPv6 allows a more flexible protocol extension than IPv4 does. This is without imposing any overhead to intermediate routers. It is achieved by splitting headers into two flavours: the headers intermediate routers need to examine, and the headers the end nodes will examine. This also eases hardware acceleration for IPv6 routers.

No Routing Table Growth

IPv4 backbone routing table size has been a big headache to ISPs and backbone operators. The IPv6 addressing specification restricts the number of backbone routing entries by advocating route aggregation.

Simplified Header Structures

IPv6 has simpler packet header structures than IPv4. It will allow future vendors to implement hardware acceleration for IPv6 routers easier.

Smooth Transition From IPv4

Many IPv4 considerations were made during the IPv6 development. Also, there is a large number of transition mechanisms available. This will allow smooth migration from IPv4 to IPv6.

Same Design Principles as IPv4

IPv4 was very successful design, as proven by the ultra large-scale deployment in the world. IPv6 is the new version of IP, and it follows many of designs that made IPv4 very successful.

IPv6 Standards

The following standards define the Internet Protocol version 6—IPv6. Thanks to Robert Hinden <hinden@iprg.nokia.com> for assembling this list.

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Interpeak Network Security

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