الاتصالات المتكاملة
INTEGRATED TELECOM

IPv6

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Move to IPv6

Scalability
More than 2 billion addresses per square millimeter of the Earth's surface.

Confidentiality & Integrity
Faster than IPv4 and End-to-end connectivity with real authentication (NAT free)

Simplified Network Configuration:
Address auto-configuration (address assignment) is built in to IPv6.

IoT
Internet of things (Smart Building, Smart City) IPv6 is fully Internet compliant.

Performance
IPsec makes IPv6 more secure than IPv4, Address scanning is impossible in IPv6.

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IPv6

Introduction:

IPv6 or IP version 6 is the next generation Internet protocol which will eventually replace the current protocol IPv4 and to deal with the long-anticipated problem of IPv4 address exhaustion. IPv6 is the latest revision of the Internet Protocol (IP) and the first version of the protocol to be widely deployed.

IPv6 features overview

IPv6 offers the following significant features:

- Larger Address Space
- Simplified Header
- End-to-end Connectivity
- Auto-configuration
- Faster Forwarding/Routing

Comparison & Benefit between IPv4 vs IPv6

Why use IPv6? What are the differences between IPv4 and IPv6? Why is IPv6 better than IPv4? Here is a comparison of IPv4 and IPv4 in six important areas showing the benefits of using IPv6.
There are also problems ahead for organizations that don't move to IPv6. For more about the positives of IPv6 and the negatives of not using it

Why IPv6?	IPv4	IPv6
IPv6 has massive address abundance	4.29 x 109 = 4.3 billion addresses - far less than even a single IP address per person on the planet.	3.4 x 1038 = 340 trillion trillion trillion addresses - about 670 quadrillion addresses per square millimeter of the Earth's surface.
IPv6 networks are easier and cheaper to manage	Networks must be configured manually or with DHCP. IPv4 has had many overlays to handle Internet growth, which demand increasing maintenance efforts.	IPv6 networks provide autoconfiguration capabilities. They are simpler, flatter and more manageable, especially for large installations.
IPv6 restores end-to-end transparency	Widespread use of NAT devices means that a single NAT address can mask thousands of non-routable addresses, making end-to-end integrity unachievable.	Direct addressing is possible due to vast address space - the need for network address translation devices is effectively eliminated.
IPv6 has improved security features	Security is dependent on applications - IPv4 was not designed with security in mind.	IPSEC is built into the IPv6 protocol, usable with a suitable key infrastructure.
IPv6 has improved mobility capabilities	Relatively constrained network topologies restrict mobility and interoperability capabilities in the IPv4 Internet.	IPv6 provides interoperability and mobility capabilities which are already widely embedded in network devices.
IPv6 encourages innovation	IPv4 was designed as a transport and communications medium, and increasingly any work on IPv4 is to find ways around the constraints.	Given the numbers of addresses, scalability and flexibility of IPv6, its potential for triggering innovation and assisting collaboration is unbounded.

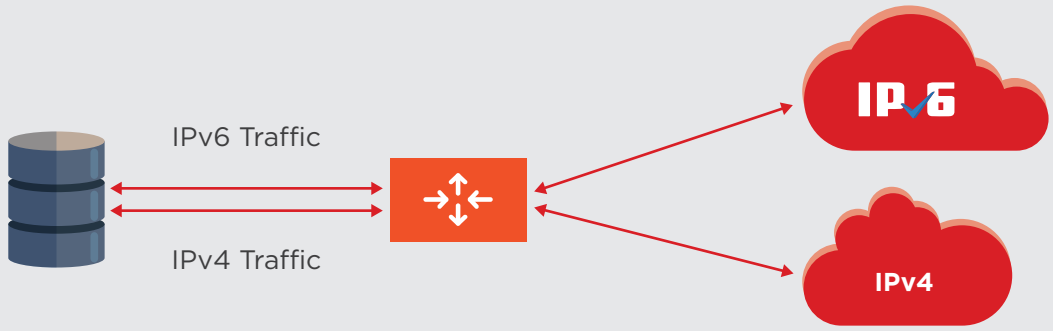
Transition from IPv4 to IPv6 address

When we want to send a request from an IPv4 address to an IPv6 address but it isn't possible because IPv4 and IPv6 transition is not compatible. For solution to this problem, we use some technologies. These technologies are explained as following below.

1. Dual Stack Routers
2. Tunneling
3. NAT Protocol Translation

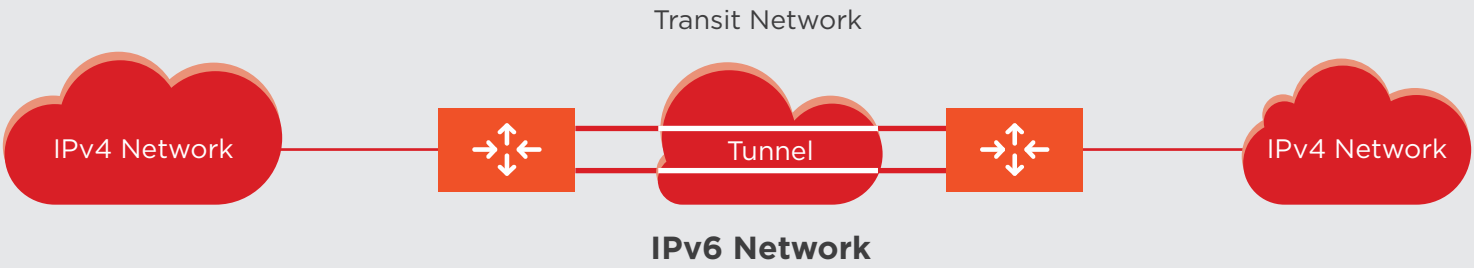
Dual Stack Routers

A router can be installed with both IPv4 and IPv6 addresses configured on its interfaces pointing to the network of relevant IP scheme.



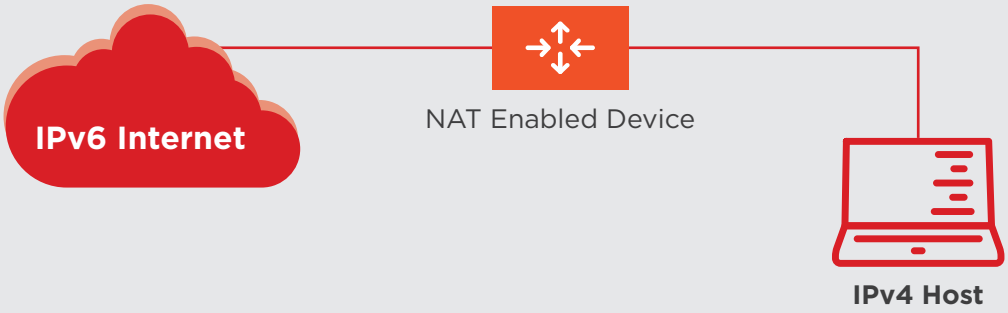
Tunneling

In a scenario where, different IP versions exist on intermediate path or transit networks, tunneling provides a better solution where user's data can pass through a non-supported IP version.



NAT Protocol Translation

This is another important method of transition to IPv6 by means of a NAT-PT (Network Address Translation – Protocol Translation) enabled device. With the help of a NAT-PT device, actual can take place happens between IPv4 and IPv6 packets and vice versa. See the diagram below:



IPv6 Technology Scope.

IP Service	IPv4 Solution	IPv6 Solution
Addressing Range	32-Bit, Network Address Translation	128-Bit, Multiple Scopes
Auto-Configuration	DHCP	Serverless, Reconfiguration, DHCP
Security	IPSec	IPSec Mandated, Work End to End
Mobility	Mobile IP	Mobile IP with Direct Routing
Quality of Service	Differentiated Service, Integrated Services	Differentiated Service, Integrated Services
IP Multicast	IGMP/PIM/Multicast BGP	MLD/PIM/Multicast BGP, Scope Identifier

FAQs.

1. What is IPv6?
IPv6 is a new version of the Internet Protocol that will eventually replace IPv4, the version that is most widely used on the Internet today.

2. Is IPv6 secure?
IPv6 has the same inherent security as IPv4.

3. What are the advantages of IPv6?
These include:
- Better multicast capabilities
- A more flexible, extensible header architecture
- The potential for more granular Class of Service (CoS)
- The potential for better network mobility

4. What does "Dual Stack" mean?
This means that IPv4 and IPv6 run simultaneously at the network level. Dual Stack service ensures that legacy devices, applications and content that support IPv4-only will continue to function while IPv6 deployment continues.

5. Will my device support IPv6?
Because IPv6 has been around for quite some time, your computer and mobile devices probably already support IPv6.

6. When can I get IPv6?
IPv6 is available today with an IPv6 capable modem in the majority of Spectrum's footprint.

7. What does an IPv6 address look like?
An IPv6 address is much longer than an IPv4 address. An IPv4 address is a 32-bit address composed of 4 octets.
Example of an IPv4 address: 24.128.21.12
Example of an IPv6 address: 24da:db8:ac10: fe01:2aa: ff: fe00:56ab