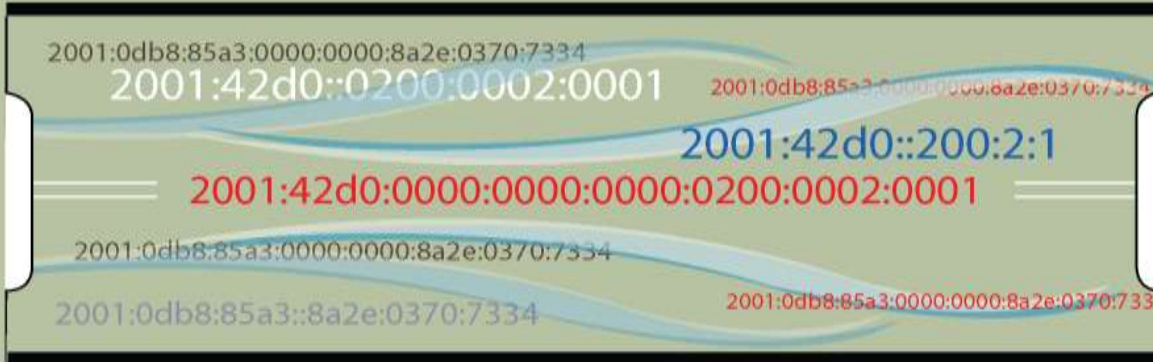


## WHAT IS IPv6?

IPv6 is the acronym for "Internet Protocol version 6". IPv6 is the Internet's "next generation" numbering system. Currently, the broadly used and known version of the Internet Protocol is Internet Protocol version 4 (IPv4). The Internet was designed for each device attached to the network to have its own unique identifier (IP address) so computers can communicate with one another. The threat of the shortage of IPv4 unique identifiers was demonstrated in the early 1980s and in response, the IETF (Internet Engineering Task Force) developed the basic specifications of IPv6 during the 1990's to substitute IPv4.



## WHY DO WE NEED IPv6?

Internet Protocol version 4 (IPv4), on which the Internet has been running for more than 20 years is now reaching its design limits mainly through the exhaustion of available addresses. More addresses are required to cater for the billions of new devices, of new users, and for "always-on" access technologies. Once IPv4 address space reaches exhaustion, organisations will not be able to obtain large blocks of IPv4 addresses to connect their equipment to the Internet, and may only be able to obtain large blocks from the IPv6 address space. It is then clear that the future development of the Internet and its economy is largely based on a numbering scheme that can provide as many IP identifiers (addresses) as the devices that will need to be online.

5. **Mobility:** IPv6 includes more efficient and stronger mobility mechanisms which allow roaming between different networks without losing an established IP address.
6. **Addressing and routing:** IPv6 addressing scheme is designed for more efficient addressing and routing hierarchy.
7. **Extensibility:** IPv6 has been designed to be extensible and offers optimized support for new options and extensions of the protocol.

## HOW DOES IPv6 SOLVE SOME OF THE PROBLEMS?

1. **Scalability:** IPv6 has 128 bits addresses versus 32 bits in IPv4 addresses. So there are a lot more numbers available.
2. **Security:** IPv6 includes inbuilt security, such as, information encryption and the authentication of the source of this information.
3. **Real time applications:** To better serve real time traffic, IPv6 includes flow labels in its specifications. By means of this mechanism, routers can recognize the end-to-end flow to which transmitted packets belong to and take quick decisions.
4. **Auto-configuration:** IPv6 includes in its standard, a "plug and play" mechanism to facilitate users to automatically connect their equipment to the network.

## HOW DOES IT IMPACT HOME USERS?

There is no cost for an end-user to upgrade to IPv6 for PCs and similar devices as most operating systems released after 2001 have IPv6 support.

There are three basic scenarios for having your computer IPv6 enabled:

1. You do nothing. Your computer automatically transitions to IPv6, because your operating system enables it by default.
2. You turn on IPv6 support in the operating system. Your computer then completes the transition automatically if your network or provider offers the service.
3. You ensure IPv6 is enabled in your operating system and then you or your ISP manually set up the rest of your network.

## HOW DOES IPv6 IMPACT ISPS/ENTERPRISE NETWORKS?

During the transition period to IPv6, ISPs will be required to move from a service exclusively based on IPv4 to one that will support both IPv4 and IPv6 concurrently.

This implies the introduction of a new technology in an already existing environment without interrupting or degrading existing services. Proper planning is the key for the success of such implementation.

Three fundamental aspects should be taken into consideration:

- Interconnection with other IPv6 providers
- Deploying IPv6 within the provider's network
- Providing IPv6 services to customers

ISPs and organisations that are planning to implement IPv6 in their networks should ensure that their network equipment is IPv6 capable and that they have IPv6 connectivity to other providers.

Upgrading an ISP or enterprise network to support IPv6 does not represent a huge cost, if it is adequately planned to ensure provisioning, management, monitoring, auditing, billing and security all work with IPv6.

## HOW DOES IPv6 IMPACT GOVERNMENTS?

Government organizations are not only policy makers, they are also technology leaders and e-service providers for their citizens and community. As policy makers, government should also provide incentives and appropriate policies that can facilitate a smooth transition to IPv6.

As e-service providers, the role of governments will be significantly impacted by IPv6 as they will be required to provide e-services to users on both IPv4 and IPv6 networks and must also be able to access information that runs on both IPv4 and IPv6 websites. By ensuring their own infrastructure and e-provisioning systems are IPv6 compliant, governments can lead in the uptake of IPv6.

As technology leaders, governments should take some responsibility for the uptake of IPv6 within their community and work with related parties at local, national and regional levels to help increase awareness about the exhaustion of IPv4 and the importance of transitioning to IPv6.

## ADOPTION AND CO-EXISTENCE

Today, all major operating systems, and many core applications, support IPv6. IPv6 has been designed with the principle of being able to co-exist with IPv4 networks and allowing all the existing services and applications to keep working alongside without disruption. It is difficult to state exactly how long both protocols will continue to be used, and when IPv4 will cease to be utilised, as this depends on many factors, both technical and commercial. We could say that it is the market and competition that will set this schedule.

The transition period from IPv4 to IPv6 has to be transparent from the point of view of the users, who will gradually begin to perceive improvements in existing applications and the appearance of new applications that would not be possible with IPv4.

A region like ours has a lot to gain from early adoption of IPv6, because it is where the growth margin is important and where the appropriation of technologies around mobility is picking up rapidly. We will need among others, these IP addresses to connect the millions of new devices that will have access to the Internet in the coming years. Acting now is our way of ensuring smooth development of the Internet.

## IPv6 INFORMATION

To request IPv6 address space:  
[hostmaster@afrinic.net](mailto:hostmaster@afrinic.net)

Mailing list:  
[afripv6-discuss@afrinic.net](mailto:afripv6-discuss@afrinic.net)

IPv6 info page:  
<http://www.afrinic.net/IPv6/index.htm>

Virtual Lab Information:  
<http://www.afrinic.net/projects/cvl.htm>