

IPv6 – Frequently Asked Questions

Key areas covered in the IPv6 FAQ document

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What is IPv6

1. What is IPv6?

IPv6 (Internet Protocol Version 6) is the latest version of the network layer Internet Protocol. IPv6 is designed to be the successor of IPv4, which is the protocol predominantly in use today. IPv6 has quite a few improvements and additional features.

2. What are the various features of IPv6? How is IPv6 different from IPv4?

IPv6 salient features and differences from IPv4 are:

- Larger Address Space – 128 bit address in IPv6 as compared to 32 bit IPv4 address
- Autoconfiguration – Plug n Play possible with IPv6
- Link-local addressing – Possible with IPv6
- Mobility – Mobile IPv6 for mobile networks / terminals
- Security – IPSec is mandatory
- Simple Header – IPv6 header is simple with many fields removed.

3. Is IPv6 the replacement for IPv4?

IPv6 will eventually replace IPv4. The IPv6 protocol can co-exist with IPv4. A variety of transition methods are available to enable this phased and eventual migration.

The IPv4 address pool has been exhausted at the global pool – IANA level in February 2011, the IPv4 address pool in the Asia Pacific is expected to be exhausted very soon. As this happens, IPv6 adoption is expected to spread across all the organizations. IPv4 and IPv6 are expected to co-exist for the next few years, before IPv6 eventually replaces IPv4.

4. Is IPv6 backward compatible with IPv4?

IPv6 is not backward compatible with IPv4, there are a few IPv6 transition methods, which help in adopting IPv6.

Dual Stack – In this the network stack supports both IPv4 and IPv6.

Tunneling – In this the IPv6 packets are encapsulated within IPv4 packets using protocol number 41.

Translation – Protocol translation between IPv4 and IPv6 are performed.

Where Do I learn IPv6

5. I want to learn IPv6, where do I start?

For further reading visit –

- [IPv6 Forum](#) – A world-wide consortium of worldwide leading Internet vendors, Industry Subject Matter Experts, Research & Education Networks.
- [IPv6 Task Force](#) – Created the IPv6 standards
- IETF working groups –
 - o [IPv6](#)
 - o [IPv6 Operations](#)
- [IPv6 Ready Logo Compliance Certification](#)
- [IPv6 Blog](#) – Companies experience with IPv6 integration activities
- [The IPv6 Portal](#) – IPv6 Information and news; IPv6 Task Force Search Engine

How do I deploy IPv6

6. What are the various activities involved in the IPv4 to IPv6 transition?

The IPv6 transition is a phased activity wherein, the typical activities comprise of:

- **IPv6 readiness assessment**

In this phase the IPv6 readiness of the hardware and the software inventory of an organization is assessed

- **IPv6 transition planning**

In this phase, based on the business priorities and IPv6 readiness of the hardware and software, the various IPv6 transition methods are chosen for the IPv6 transition design.

Based on the business priorities the IPv6 adoption can be accomplished across phases with hardware and software being upgraded in phases accordingly.

- **IPv6 adoption implementation**

In this phase, the IPv6 is implemented across systems as per the design in the previous phase.

- **IPv6 post deployment support**

In this phase, the systems wherein IPv6 has been deployed is stabilized and various issues in the system stabilized accordingly.

7. I need IPv6 addresses, where should I go?

You can get in touch with APNIC or your service provider for your IPv6 address needs.

8. I have mentioned in my RFP that the hardware and software should support IPv6, is this sufficient?

Just mentioning the term the hardware and software should support IPv6 is not sufficient towards ensuring that the products are IPv6 compliant. It should be ensured that the products are IPv6 ready logo certified, you can find the list of IPv6 ready logo certified products at: <https://www.ipv6ready.org/db/index.php/public/>

9. Where can I find the list of IPv6 compatible hardware and software?

IPv6 forum provides IPv6 ready logo certification for various products that support IPv6. The list of products that IPv6 ready logo certified are listed at - <https://www.ipv6ready.org/db/index.php/public/>

10. What are the typical challenges faced during IPv6 transition?

The typical IPv6 migration challenges faced are :

- Lack of IPv6 skilled resources
- Planning of the IPv6 adoption costs and budgets
- Lack of IPv6 ready products
- Performance impact on the network based on the IPv6 adoption design

The investment in IPv6 results in significant returns. The following are a few benefits therein:

- IPv6 facilitates end to end connectivity
- Reduced costs because of non-maintenance of NAT
- Reduced costs due to better management solutions
- Improved security
- And so forth

11. Is there any performance impact because of IPv6 adoption?

Based on the network architecture and the IPv6 transition methods used, there could be impact on the performance of the network and the applications, because of two parallel network stacks running on the same system, like in the case of using dual stack techniques.

In case native IPv6 networks and applications are deployed, there will be no impact on the IPv6 performance.

12. Can I use translators for IPv6 adoption?

Yes, IPv6 translators can be used, but the translation of stateful protocols need to be considered, when using the transition mechanism.

A few of the stateful protocols are: VoIP, FTP, HTTP and so forth

Because of the involvement of stateful protocols, use of IPv6 translators is not the preferred way of IPv6 adoption.

13. What is the typical time period taken for IPv6 adoption?

The time period for IPv6 adoption ranges from 2 years to 5 years, depending on the size of the organization. The activities therein comprising of:

- IPv6 readiness assessment
- IPv6 transition planning
- IPv6 adoption implementation
- IPv6 post deployment support

14. Can I wait and start IPv6 adoption later, do I need to do it now?

You need to start the IPv6 adoption activities at the earliest, as the IPv4 address pool is now exhausted at Global level – IANA level and is expected to be exhausted very soon across Asia, at the APNIC level.

15. My service provider is not providing IPv6 services, what do I do?

Govt of India has issued a mandate that all major service providers should start offering IPv6 services by December 2011, all the service providers have agreed to comply to the same, and IPv6 services are expected to be made available by them either earlier or by December 2011.

16. Is content available on IPv6?

Department of Telecom, Govt of India is following up with the various content providers to ensure that content is available on IPv6, and the goal is that the same also happens by December 2011.

India IPv6 Task force

17. What is India IPv6 Task force?

The transition from IPv4 to IPv6 will affect many organizations. At the same time it is not possible for any one organization to bring about this change. It has to be a coordinated national effort among different stakeholders. During the various workshops conducted by DoT/TEC throughout the country, it has emerged to create a task force for deployment of IPv6 in India. This is the method adopted by many countries around the world for facilitating the deployment of IPv6 in their countries. The Task Force will bring together all the different stakeholders to a common platform where they can together discuss the issues, develop and implement the strategies for making the transition to IPv6 possible.

The India IPv6 task force comprises of the following committees and working groups.

Committees:

Oversight committee
Steering committee

Working groups

- Training and awareness working group
- IPv6 network implementation working group
- Standards and specifications working group
- India6 network working group
- Experimental IPv6 working group
- IPv6 implementation in government working group
- Pilot project working group
- Applications support working group

- Knowledge resource development working group
- Security working group

For more details please refer to -
National IPv6 Deployment Roadmap.

18. What are the key IPv6 adoption policy guidelines issues by Govt of India?

The following are the key policy guidelines issued by Govt of India

- All major Service providers (having at least 10,000 internet customers or STM-1 bandwidth) will target to handle IPv6 traffic and offer IPv6 services by December-2011.
- All central and State government ministries and departments, including its PSUs, shall start using IPv6 services by March-2012.

IPv6 across government organizations

19. Why is IPv6 adoption important for India?

India has a rapidly growing Internet market, and an IP address is essential for Internet connectivity. IPv4 addresses are getting exhausted at a fast rate, and it has already depleted at the global pool. The number of IPv4 addresses allocated to India is very small, thus acquiring new IPv4 addresses will become extremely difficult or impossible.

This makes IPv6 adoption all the more important for us. It is therefore essential to quickly adopt IPv6, which has a very large address space of about 3.4×10^{38} , to ensure that connectivity to the Internet is maintained, and also to make use of the benefits that IPv6 offers.

20. What are the initiatives taken by the Govt of India to promote IPv6 adoption?

The task of leading the country towards IPv6 was initially given to Telecommunication Engineering Centre (TEC), a standardization body under the Department of Telecommunications (DoT) in 2009. TEC has prepared the “National IPv6 Deployment Roadmap”, which examines the different issues related to the deployment of IPv6 in India & now a multilevel a multimember IPv6 Task Force, comprising of various Working Groups, with representatives from various stakeholders – both private and government has been setup in DoT to promote and carry out deployment activities in

India. NT cell in DoT is responsible for deployment and implementation of IPv6 in the country.

21. Who are involved in the IPv6 transition process?

Various stakeholders are involved in the IPv6 transition process –

Internet organizations – This includes ICANN, RIRs, and IETF who manage common IPv6 resources and services (allocate IPv6 addresses, operate domain name system (DNS) servers, etc), and continue to develop needed standards and specifications.

ISPs – ISP's need to offer IPv6 connectivity and IPv6 based services to their customers.

Infrastructure vendors – Vendors who manufacture network equipment, operating systems, network application software need to integrate IPv6 capability into their products.

Content and service providers – These include providers who offer services for hosting websites, instant messaging, e-mail, file sharing, VoIP etc. who need to be reachable via IPv6.

Business and consumer application vendors – Manufacturers of business software, smart cards, peer-to-peer software, transport systems, sensor networks etc. need to ensure that their solutions are IPv6 compatible and also in the long run need to develop products and offer services that take advantage of IPv6 features.

End-users – This includes consumers, companies, academia, and public administrations, which need to purchase IPv6 capable products and services and to enable IPv6 on their own networks or home Internet access.

22. How is DoT facilitating Government organizations to adopt IPv6?

A large amount of public services presently in Govt of India is facilitated using e-governance. It is therefore crucial that the entire e-governance infrastructure is IPv6 compliant, to ensure that the system is robust, reliable and scalable.

All central and states government nodal officers have been requested to co-ordinate with the Central Nodal Agency officer in DoT for facilitating the deployment of IPv6. The team will support IPv6 transition planning and implementation, including representatives from various lines of business, infrastructure, application development, security, enterprise architecture, capital planning, budgeting and procurement.

23. What is the recommended approach for IPv6 adoption for Government organizations?

- All ministries and Departments of the Central and State Governments must perform an inventory assessment or audit of their network infrastructure. The

outcome of this audit is to list out what equipment is ready for IPv6 and what is not.

- Procurement requirements must be modified to mandate purchase of IPv6 ready equipments. The Department of Telecommunications has already issued instructions to all Central and State governments in this regard.
- Various government departments can prepare their transition plan to IPv6 with the help of their service providers.
- Create an IPv6 transition team in each ministry/departments in close coordination with DoT / TEC
- Set up pilot networks in non-core segments in each Department / Ministry to gain the experience of deploying IPv6. These pilot networks can be connected to each other for doing interoperability testing. Once the experience is gained, the pilot networks can be scaled up to cover all the segments of the Department / Ministry.
- Transition can start by introducing the first application using IPv6 for the government web sites.

24. What is the timeline for migration to IPv6 for Government organizations?

It is expected that government organizations will start using IPv6 by March 2012.

IPv6 across Service Providers

25. What are the business benefits by being an early adopter of IPv6?

The IPv4 address pool has been exhausted at the global pool – IANA level in February 2011, the IPv4 address pool in the Asia Pacific is expected to be exhausted very soon. As this happens, IPv6 adoption is expected to spread across all the organizations. IPv4 and IPv6 are expected to co-exist for the next few years, before IPv6 eventually replaces IPv4. Given that IPv6 adoption is essential, and IPv6 will eventually replace IPv4 it's useful to be an early adopter.

For service providers, being an early adopter ensures that your existing customers have better reach through IPv6 and also facilitates providing IPv6 services to numerous new customers.

For content service providers and application service providers, being an early adopter of IPv6 facilitates business innovation, and allows you to introduce new applications and capabilities based on IPv6.

Transition Planning

26. What is the underlying motive of IPv6 transition and how is it beneficial?

Transition is -

- A strategic business need.
- New business capabilities potentials arise due to the transition
- The right step towards future opening avenues for application and services innovation.
- An initiative that is phased and must be considered as part of future infrastructure planning and implementation

27. How do I include IPv6 as part of the future network planning activities?

- Identify business justification and strategic long term benefits with IPv6 adoption.
- Future architecture planning to reflect IPv6 capabilities in applicable areas such as devices, applications, tools..
- Good transition plan and framework for successful IPv6 transitioning.
- Innovate new applications and services to focus and take advantage of IPv6 provided benefits

28. How do I plan IPv6 transition?

Define – A transition framework and project plan for transition evaluation and transition progress measurement as part of transition planning with well defined milestones.

Plan IPv6 Transition Activities – IPv6 Readiness Assessment, IPv6 Device Inventories, IPv6 Address Planning and Procurement, IPv6 Transition Design and Deployment, IPv6 Implementation and Testing, IPv6 Awareness Training

Use – The transition framework and project plan for evaluation at each milestone the following –

- IPv6 Device Inventories status
- IPv6 Transition Progress Report and Activity Phase Completion
- The Success of IPv6 Transition Strategy and Methods for the Activity

29. Where do I get IPv6 prefixes from?

You can get in touch with your Regional Internet Registry (APNIC) for all IPv6 addressing needs.

For more details please visit the [APNIC](#) website.

30. What is the World IPv6 Day and its relevance?

This is a trial period where a number of major web sites will provide their content on both IPv4 and IPv6. This activity is being initiated by the ISOC, and is scheduled to be on 8th June 2011. The goal of this event is to motivate various organizations such as -- Internet service providers, hardware makers, operating system vendors and web companies -- to IPv6 enable their services as IPv4 address space runs out.

More information can be found on the [World IPv6 Day](#) page.

31. What are the typical challenges faced during IPv6 transition?

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32. What are the recommended guidelines for service providers for IPv6 transition?

- Policy Development, Decision making by Management
 - Analyze the impact of exhaustion on the organization
 - Perform the business decision for the preparation policy
 - Whether to ignore the exhaustion issue?
 - How and when to solve the problem by using IPv6?
- Business Planning, Review, Service Planning
 - Policy detailing and the business plan development – This should include service planning, basic network design, consideration of operating procedures and systems etc.
- Design, Technology, verification – The design and technology of the equipment being purchased has to be confirmed and verified for IPv6 functionality
- Equipment selection, procurement, system building – Actual selection, procurement and installation of the IPv6 equipments
- Preparation of O&M system – Preparing the Operation and Maintenance systems Workforce Training – Training the workforce well in advance to install, operate and maintain the systems.
- Launch basic services – Launching of services for customers

33. What are the recommended guidelines for application service providers / content service providers for IPv6 transition?

- Policy drafting, Management decisions making
- Technology verification, system building
 - Platform verification, selection and building
 - Server, OS, middleware
 - Service infrastructure design, verification and building
 - DNS, Load balancer, firewall etc.
- Application, content
 - Verify applications and contents under exhaustion situations (i.e. when IPv4 is no longer available and only IPv6 is available)
- O&M system
 - Verify the correct behavior of the system log, database, OS under the exhaustion situation
- Workforce training
- Launching the basic services

34. What is the mandate for service providers to provide IPv6 services in India?

Govt of India has issued a mandate that all major service providers should start offering IPv6 services by December 2011, all the service providers have agreed to comply to the same, and IPv6 services are expected to be made available by them either earlier or by December 2011.

Note: Any further query may be sent at ddgnt-dot@nic.in or dirnt-dot@nic.in, reply will be emailed to the concerned as well as will be uploaded in FAQ.