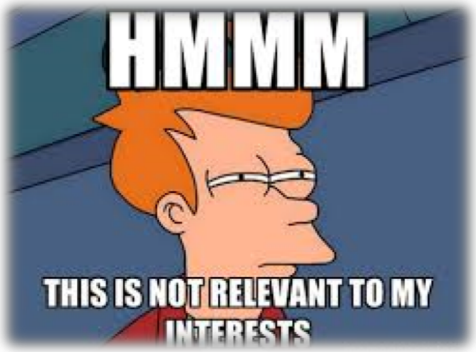
Migrating to IPv6 : Experiences from Asia-Pacific

IPv6 migration : *The Why? questions of stakeholders*



Business continuity (esp. 4G, IoT)

IPv6 in IPv4 only network (Security risks)

Economic decision – Invest in IPv6 Vs Prolong IPv4

IPv6 is growing rapidly

Resources and best practices available

Policy and regulatory support

Convincing decision makers in stakeholders – A major challenge

Who are these stakeholders?

-Ministry, Regulatory authority, e-Government agencies, Telecom service providers, Content developers and providers, Standardization agencies, IP address allocation agencies, Development agencies, Academia and Training Providers, Telecom research organizations, Data centre providers, Internet exchange providers, Equipment importers, Type approval agencies, Enterprises with own networks, End Users ……..

Country experiences

Lao PDR

Cambodia

Mongolia

Bhutan

Annual (regional / sub-regional) training on IPv6 deployment and IPv6 Infrastructure Security 2011 onwards

Specialized technical advice and training to countries and interested telecom operators

Recommendations on IPv6 deployment

COMMUNICATIONS REGULATORY COMMISSION OF MONGOLIA

INFORMATION TECHNOLOGY, POST AND TELECOMMUNICATIONS AUTHORITY

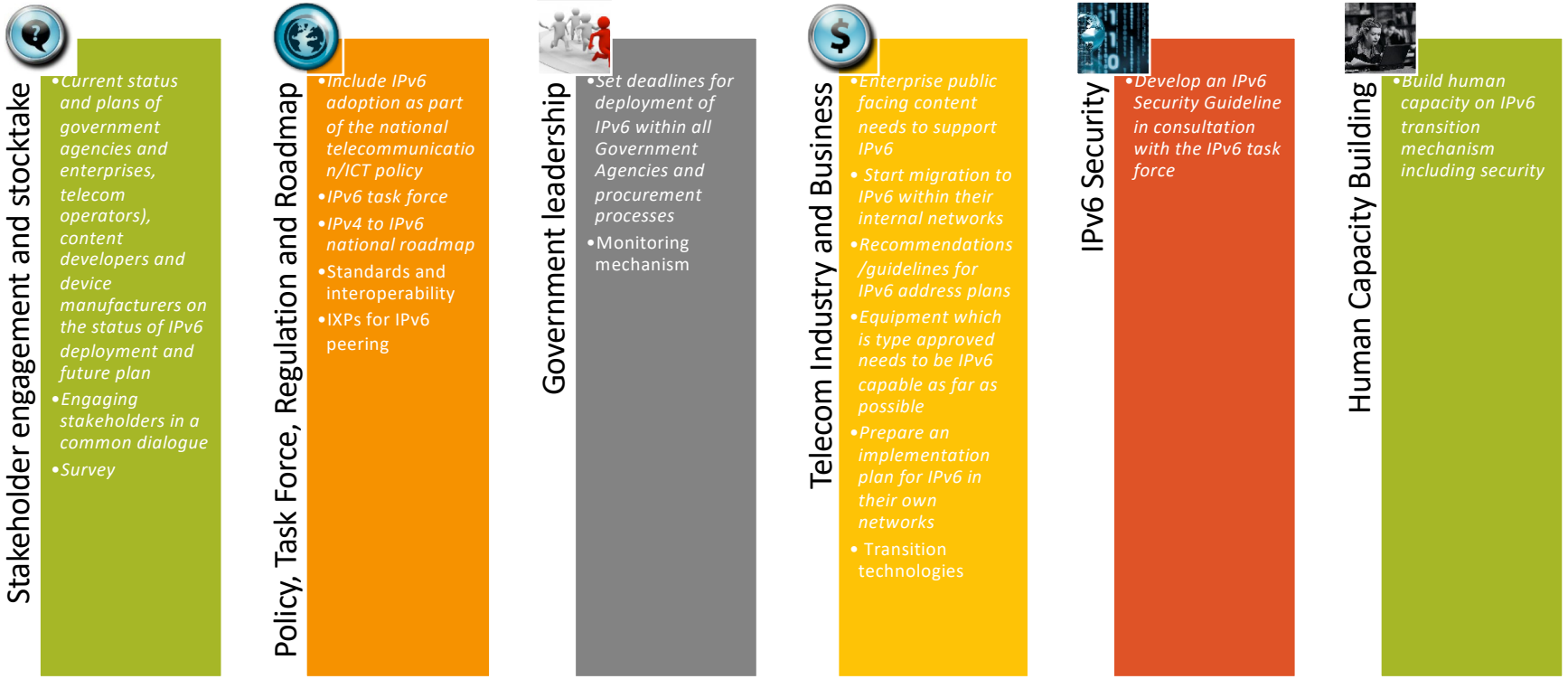
Australian Government
Department of Communications and the Arts

IPv6 Roadmap Development

Key challenges

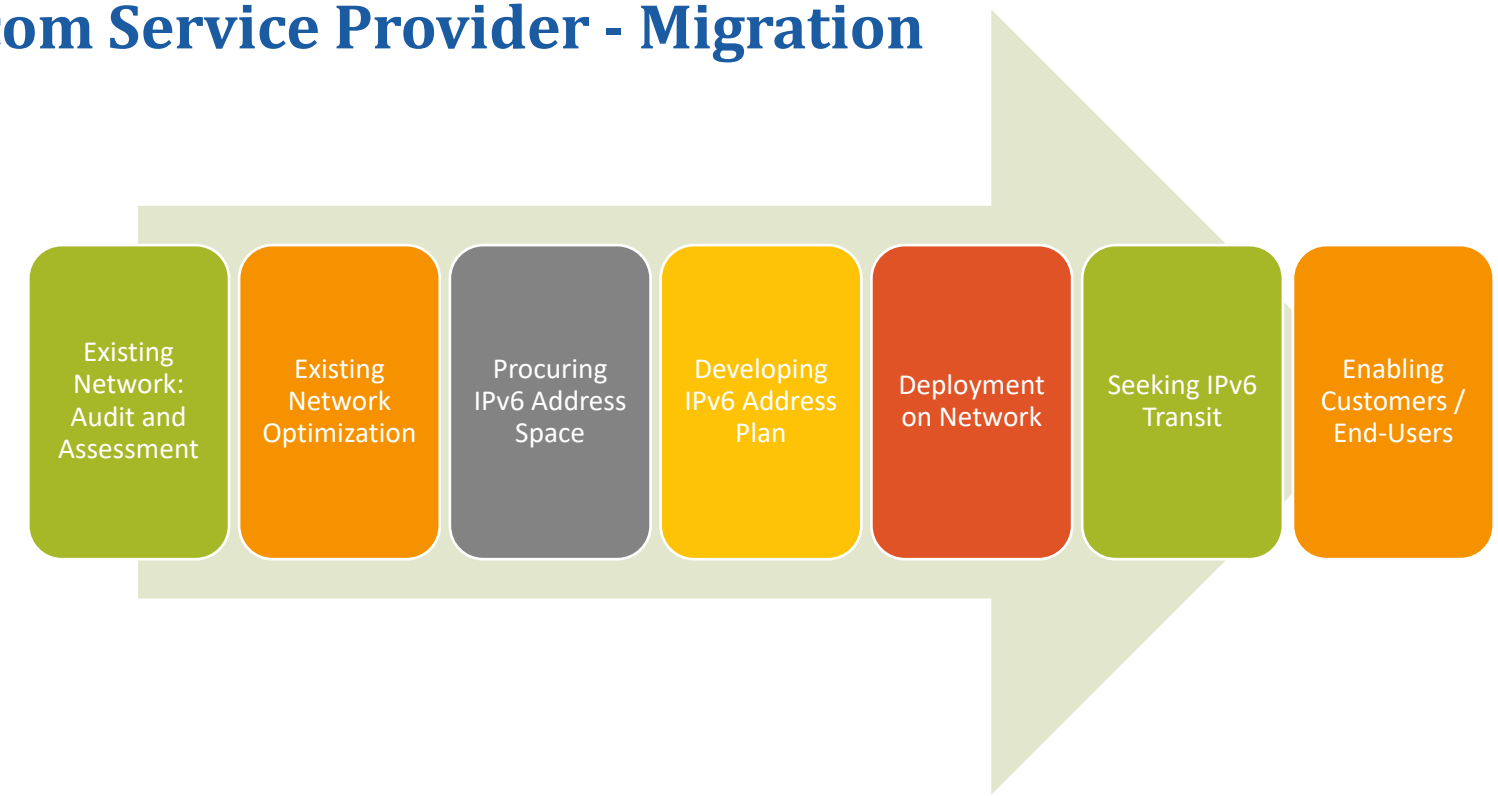
1. Policy, legislation, regulation and standardization issues
2. Institution, stakeholder engagement and coordination issues
3. Technology (hardware and software), infrastructure, and interoperability aspects
4. Security issues
5. Knowledge, awareness and skills issues
6. Procurement and financial issues

IPv6 migration - Experiences



Source: Roadmap assistances by APNIC and ITU

Telecom Service Provider - Migration



Source: Dr. Philip Smith, Roadmaps assistances by APNIC and ITU

Recommendation Categories

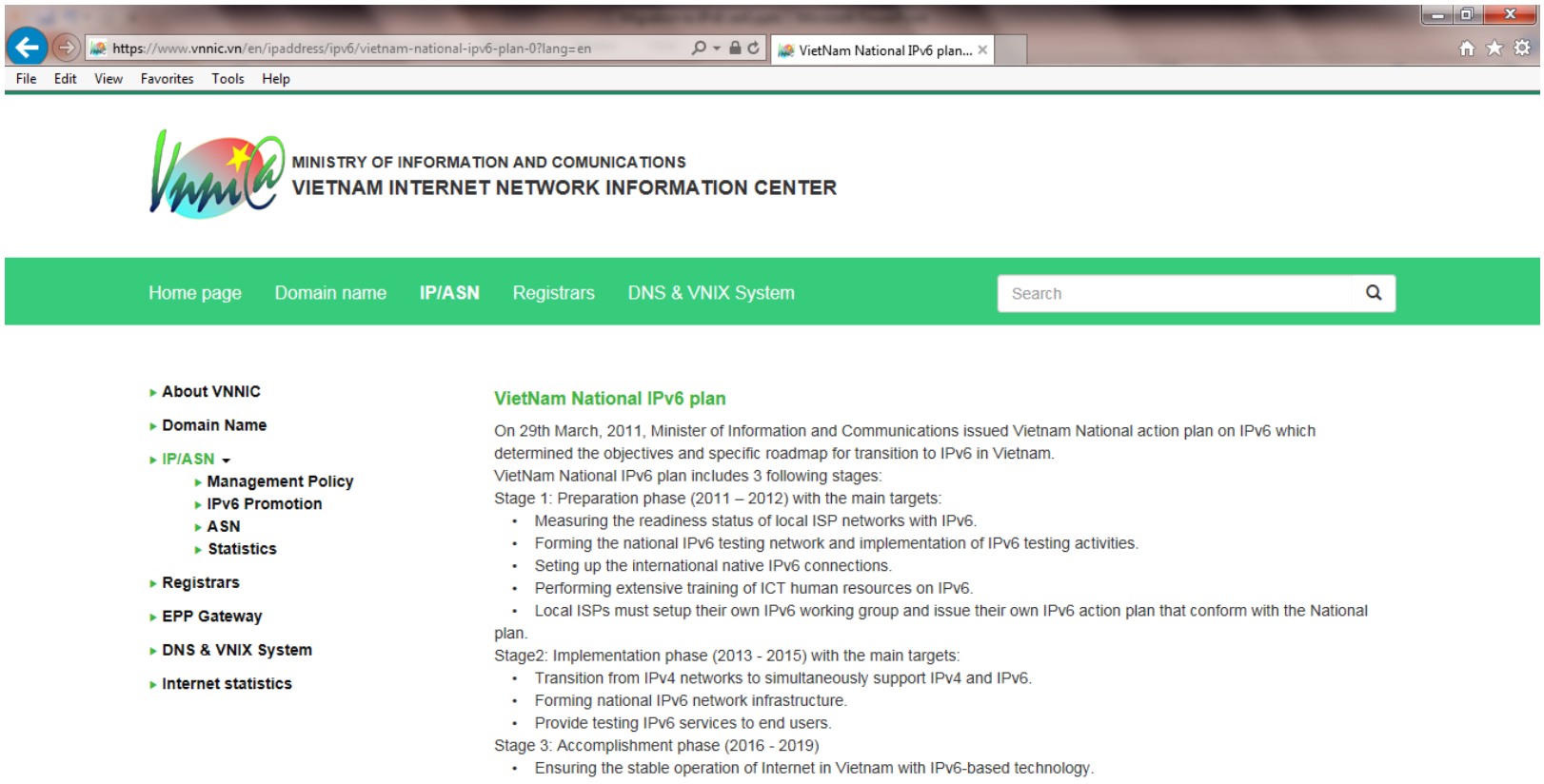
1. Recommendations applicable to all stakeholders
2. Recommendations relating to IPv6 deployment in government agencies
3. Recommendations relating to content and applications
4. Recommendations relating to Telecom service providers, CPE vendors, Data Centres and Enterprises
5. Recommendations relating to IPv6 security
6. Recommendations relating to customer awareness
7. Recommendations relating to institutional and individual capacity building

Singapore: IPv6 Adoption Guide Report - II

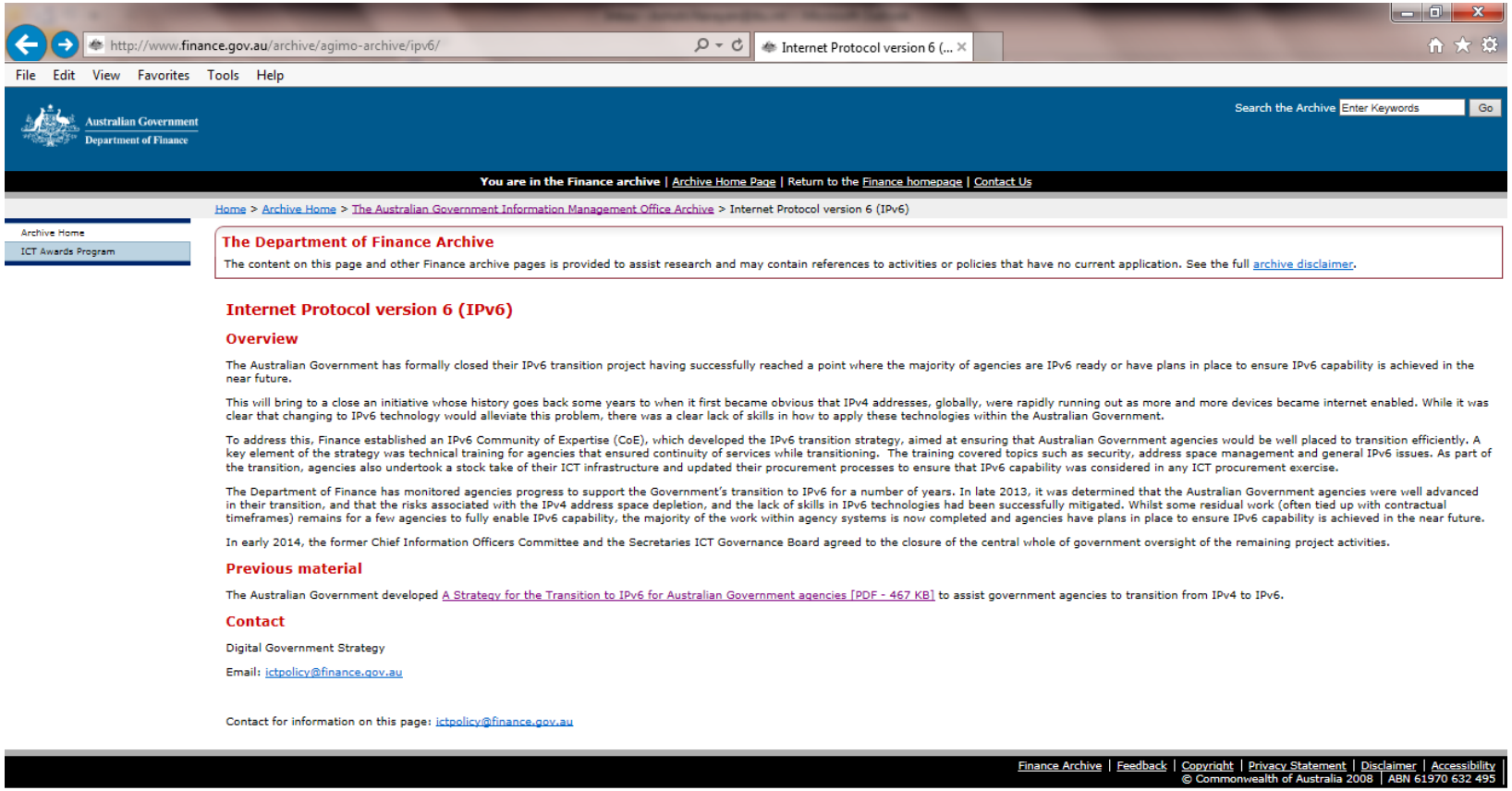
Focus areas identified in the report

- *Planning*
- *Network*
- *Applications*
- *Skills*
- *Services / products*

Governments promoting IPv6 deployment (examples)



Governments promoting IPv6 deployment (examples)



http://www.finance.gov.au/archive/agimo-archive/ipv6/ — Internet Protocol version 6 (...

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Internet Protocol version 6 (IPv6)

Overview

The Australian Government has formally closed their IPv6 transition project having successfully reached a point where the majority of agencies are IPv6 ready or have plans in place to ensure IPv6 capability is achieved in the near future.

This will bring to a close an initiative whose history goes back some years to when it first became obvious that IPv4 addresses, globally, were rapidly running out as more and more devices became internet enabled. While it was clear that changing to IPv6 technology would alleviate this problem, there was a clear lack of skills in how to apply these technologies within the Australian Government.

To address this, Finance established an IPv6 Community of Expertise (CoE), which developed the IPv6 transition strategy, aimed at ensuring that Australian Government agencies would be well placed to transition efficiently. A key element of the strategy was technical training for agencies that ensured continuity of services while transitioning. The training covered topics such as security, address space management and general IPv6 issues. As part of the transition, agencies also undertook a stock take of their ICT infrastructure and updated their procurement processes to ensure that IPv6 capability was considered in any ICT procurement exercise.

The Department of Finance has monitored agencies progress to support the Government's transition to IPv6 for a number of years. In late 2013, it was determined that the Australian Government agencies were well advanced in their transition, and that the risks associated with the IPv4 address space depletion, and the lack of skills in IPv6 technologies had been successfully mitigated. Whilst some residual work (often tied up with contractual timeframes) remains for a few agencies to fully enable IPv6 capability, the majority of the work within agency systems is now completed and agencies have plans in place to ensure IPv6 capability is achieved in the near future.

In early 2014, the former Chief Information Officers Committee and the Secretaries ICT Governance Board agreed to the closure of the central whole of government oversight of the remaining project activities.

Previous material

The Australian Government developed A Strategy for the Transition to IPv6 for Australian Government agencies [PDF - 467 KB] to assist government agencies to transition from IPv4 to IPv6.

Contact

Digital Government Strategy

Email: ictpolicy@finance.gov.au

Contact for information on this page: ictpolicy@finance.gov.au

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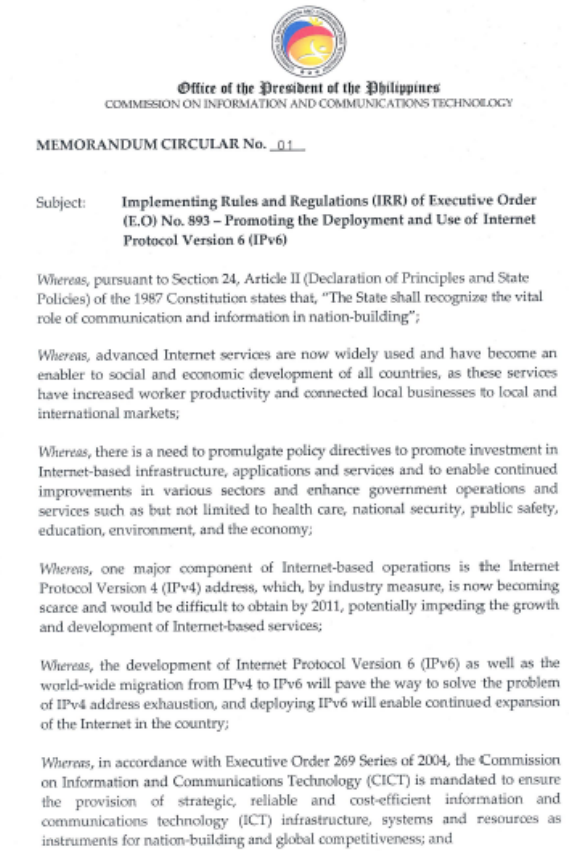
Governments promoting IPv6 deployment (examples)



Office of the President of the Philippines
COMMISSION ON INFORMATION AND COMMUNICATIONS TECHNOLOGY

MEMORANDUM CIRCULAR No. 01

Subject: **Implementing Rules and Regulations (IRR) of Executive Order (E.O) No. 893 – Promoting the Deployment and Use of Internet Protocol Version 6 (IPv6)**

Whereas, pursuant to Section 24, Article II (Declaration of Principles and State Policies) of the 1987 Constitution states that, "The State shall recognize the vital role of communication and information in nation-building";

Whereas, advanced Internet services are now widely used and have become an enabler to social and economic development of all countries, as these services have increased worker productivity and connected local businesses to local and international markets;

Whereas, there is a need to promulgate policy directives to promote investment in Internet-based infrastructure, applications and services and to enable continued improvements in various sectors and enhance government operations and services such as but not limited to health care, national security, public safety, education, environment, and the economy;

Whereas, one major component of Internet-based operations is the Internet Protocol Version 4 (IPv4) address, which, by industry measure, is now becoming scarce and would be difficult to obtain by 2011, potentially impeding the growth and development of Internet-based services;

Whereas, the development of Internet Protocol Version 6 (IPv6) as well as the world-wide migration from IPv4 to IPv6 will pave the way to solve the problem of IPv4 address exhaustion, and deploying IPv6 will enable continued expansion of the Internet in the country;

Whereas, in accordance with Executive Order 269 Series of 2004, the Commission on Information and Communications Technology (CICT) is mandated to ensure the provision of strategic, reliable and cost-efficient information and communications technology (ICT) infrastructure, systems and resources as instruments for nation-building and global competitiveness; and

Promotion of IPv6

IPv6 deployment and use

Interagency Task Force

Funding

Singapore: IPv6 Transition Programme

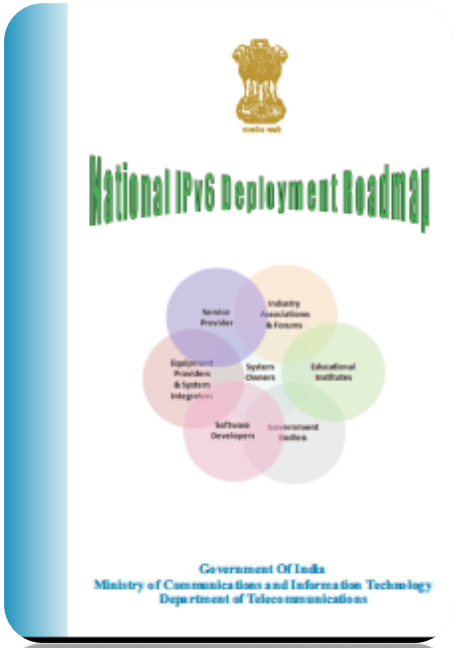
The IPv6 Transition Programme is a national effort spearheaded by IDA in its role as the national planner for Infocomm development, to address the issue of IPv4 (Internet Protocol version 4) exhaustion and to facilitate the smooth transition of the Singapore Infocomm ecosystem to IPv6 (Internet Protocol version 6).

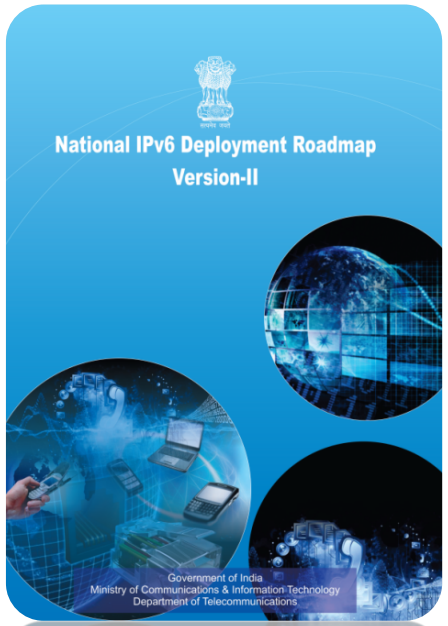
Developed by the Singapore IPv6 Task Force, it involves a two-pronged approach to drive IPv6 adoption in the nation as well as encourage the efficient use of the remaining pool of IPv4 addresses to minimise the risks of depletion

Developing reference specifications and transition guides	Engaging stakeholders	Developing IPv6 capabilities	Establishing an IPv6 Marketplace	Setting up IPv6 industry exemplars	Others

Source: http://www.ida.gov.sg/Technology/20110414104645.aspx

IPv6 Roadmap (example - India)





India: NTP 2012 and IPv6

Preamble

NTP-2012 recognises futuristic roles of Internet Protocol Version 6 (IPv6) and its applications in different sectors of Indian economy.

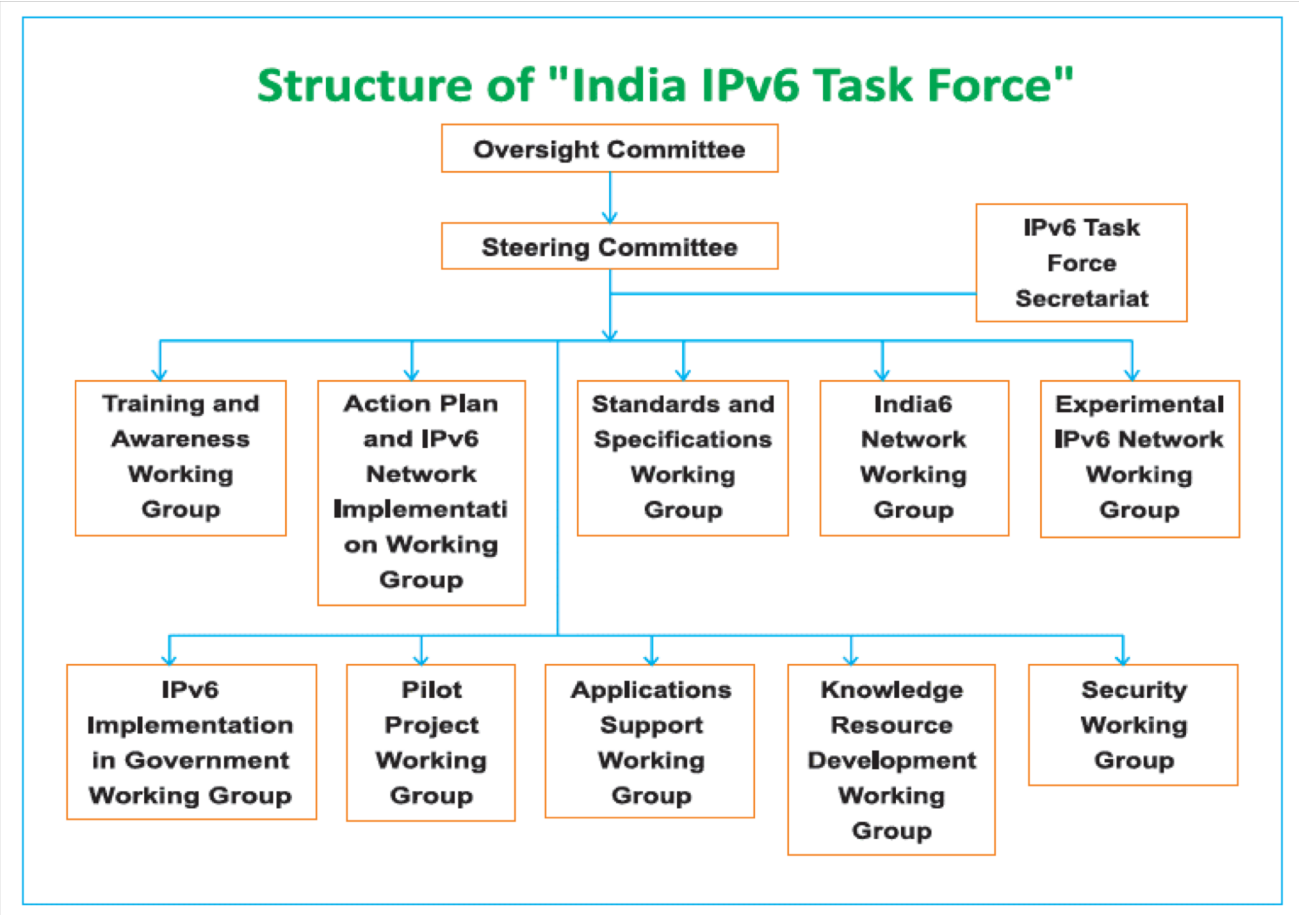
Objectives

Achieve substantial transition to new Internet Protocol (IPv6) in the country in a phased and time bound manner by 2020 and encourage an ecosystem for provision of a significantly large bouquet of services on IP platform.

Telecom Enterprise Data Services, IPv6 Compliant Networks and Future Technologies

To recognize the importance of the new Internet Protocol IPv6 to start offering new IP based services on the new protocol and to encourage new and innovative IPv6 based applications in different sectors of the economy by enabling participatory approach of all stake holders.

To establish a dedicated centre of innovation to engage in R & D, specialized training, development of various applications in the field of IPv6. This will also be responsible for support to various policies and standards development processes in close coordination with different international bodies.


Structure of "India IPv6 Task Force"
Oversight Committee
Steering Committee
IPv6 Task Force Secretariat
Training and Awareness Working Group
Action Plan and IPv6 Network Implementation Working Group
Standards and Specifications Working Group
India6 Network Working Group
Experimental IPv6 Network Working Group
IPv6 Implementation in Government Working Group
Pilot Project Working Group
Applications Support Working Group
Knowledge Resource Development Working Group
Security Working Group

Governments promoting IPv6 deployment (example India)

Government Organisations:

- The Government organisations should prepare a detailed transition plan for complete transition to IPv6 (dual stack) by December 2017 based on the network complexity & equipment/ technological life cycles. The plan should be prepared latest by December 2013 and accordingly the required budgetary provisions should be made in their demand for grant.
- For this purpose, it is recommended that a dedicated transition unit in each organisation should be formed immediately to facilitate entire transition.
- All new IP based services (like cloud computing, data centres etc.) to be provisioned for / by the Government organisations should be on dual stack supporting IPv6 traffic with immediate effect.
- The public interface of all Government projects for delivery of citizen centric services should be dual stack supporting IPv6 traffic latest by 01-01-2015. The readiness of Government projects in turn will act as a catalyst for private sector transition from IPv4 to IPv6.

Governments promoting IPv6 deployment (example India)

Government Organisations:

- The Government organisations should procure equipments which are also IPv6 Ready (Dual Stack) and go for deployment of IPv6 ready (Dual Stack) networks with end to end IPv6 supported applications. The equipment should be either TEC certified or IPv6 Ready Logo certified.
- The Government organisations should go for IPv6 based innovative applications in their respective areas like smart metering, smart grid, smart building, smart city etc.
- The Government organisations should develop adequate skilled IPv6 trained human resources within the organisation through periodic trainings over a period of one to three years to have a seamless transition with minimum disruption.
- The IPv6 should be included in the curriculum of technical courses being offered by various institutes / colleges across the country.

Governments promoting IPv6 deployment (example India)

Service Providers:

Enterprise Customers

- All new enterprise customer connections (both wireless and wireline) provided by Service Providers on or after 01-01-2014 shall be capable of carrying IPv6 traffic either on dual stack or on native IPv6.
- Regarding the existing enterprise customers which are not IPv6 ready, the Service Providers shall educate and encourage their customers to switch over to IPv6.

Retail Customers (Wireline)

- All new retail wireline customer connections provided by Service Providers on or after 01-01-2017 shall be capable of carrying IPv6 traffic either on dual stack or on native IPv6.
- The Service Providers shall endeavor to progressively replace/ upgrade the Service Providers owned CPEs which are not IPv6 ready as per the following timelines:
- Replacement/ upgradation of 25% of CPEs by December 2014.
- Replacement/ upgradation of 50% of CPEs by December 2015.
- Replacement/ upgradation of 75% of CPEs by December 2016.
- Replacement/ upgradation of 100% of CPEs by December 2017.

Regarding the customer owned CPEs which are not IPv6 ready, the Service Providers shall educate and encourage their customers to replace/ upgrade such CPEs to IPv6 ready ones.

Governments promoting IPv6 deployment (example India)

Retail Customers (Wireless)

- All new LTE customer connections provided by Service Providers with effect from 01-01-2017 shall be capable of carrying IPv6 traffic either on dual stack or on native IPv6.
- All new GSM/ CDMA customer connections provided by Service Providers on or after 01-01-2017 shall be capable of carrying IPv6 traffic either on dual stack or on native IPv6

Content & Application Providers:

- All contents (e.g. websites) and applications providers should endeavour to adopt IPv6 (dual stack) by 01-01-2017.'

- The complete financial ecosystem including payment gateways, financial institutions, banks, insurance companies etc. should endeavour to adopt IPv6 (dual stack) by 01-01-2017.'

- The entire '.in' domain should endeavour to adopt IPv6 (dual stack) by 01-01-2017.'

Governments promoting IPv6 deployment (example India)

Equipment Manufacturers:

- All mobile phone handsets/ data card dongles/ tablets and similar devices used for internet access supporting GSM/CDMA version 2.5G and above sold in India on or after 30-06-2014 shall be capable of carrying IPv6 traffic either on dual stack (IPv4v6) or on native IPv6.
- All wireline broadband CPEs sold in India on or after 01-01-2014 shall be capable of carrying IPv6 traffic either on dual stack or on native IPv6.

Cloud Computing / Data Centres:

- All public cloud computing service / data centres providers should endeavour to adopt IPv6 (dual stack) latest by 01-01-2017.

Thailand

Strategic Thrusts

The National IPv6 Thailand Master Plan (Action Plan Phase 2 (2016-2018)

On December 1, 2015 the Thai Cabinet approved the three-year National IPv6 Action Plan Phase 2 (2016-2019). There are four strategic thrusts under the Action Plan:

1. IPv6 Infrastructure
2. Human Development
3. Services and Supports
4. Public Awareness

Where are we in Mongolia?

Recommendation 1

Establish an IPv6 task force for Mongolia including policy maker, regulator, telecom operators, ISPs, e-government agencies, software associations & manufacturers, and data centre operators. The work of the task force will include making recommendations for IPv6 transition for the following industry sectors:

- *Telecom operators (e.g. fixed, mobile, transit, ISPs)*
- *Broadband & Enterprise customers*
- *Government Departments responsible for IT*
- *Local content / Data Centres*
- *NDC Exchange Point (MIX)*
- *Others as deemed appropriate*

The example of work areas include constitution of the decision making group, promotion, skill building and awareness raising, technical (including standards and technical guidelines) and network implementation, content and applications, IPv6 Security, research and innovation.

Recommendation 2

Develop an IPv4 to IPv6 national roadmap in consultation with the task force. The working group comprising of ITPTA and CRC can continue to facilitate the Government support requirements for deployment of IPv6.

Where are we in Mongolia?

Recommendation 3

The Government should take the lead and set deadlines for deployment of IPv6 within all Government Agencies and procurement processes. Develop a detailed action plan for implementation of IPv6 in Government departments including creation of an IPv6 transition team (focal point) in each Government department, allocation of required budget, upgrading of equipment, skills and security amongst others.

Recommendation 4

Internet Exchange Points need to provide their members support to enable them to peer using IPv6.

Recommendation 5

It is important to set up a monitoring mechanism for IPv6 implementation based on the national roadmap.

Recommendation 6

Enterprise public facing content needs to support IPv6 while enterprises should be encouraged to start migration to IPv6 within their internal networks.

Recommendation 7

Recommendations/guidelines for IPv6 address plans following industry best practices should be developed to assist organisations with their IPv6 deployment

Where are we in Mongolia?

Recommendation 8

Equipment which is type approved in Mongolia needs to be IPv6 capable as far as possible

Recommendation 9

Industry and business, including telecom service providers and enterprises, need to prepare an implementation plan for IPv6 in their own networks

Recommendation 10

Develop an IPv6 Security Guideline in consultation with the IPv6 task force

Recommendation 11

Build human capacity on IPv6 transition mechanism including security

Thank You