IPv4 depletion, transition to IPv6

Japanese Practice for Transition to IPv6

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Advantages of transition to IPv6 (Internet Protocol Version 6)

Connection of an astronomical number of devices
- IPv4: 4.3 billion units
  The number of a bucketful of sand
- IPv6: 340 undecillion (10^{36}) units
  Grains of sand on the entire earth

Almost empty
Astronomical figure

Improvement of security
- IPv4: Addition of encryption function
- IPv6: Standard application
  Presence of encryption is known upon receipt
  Presence of encryption is unknown without looking inside

Others
- Securing of QoS
- Simplification of various settings

Noting these IPv6 advantages, Japan started to implement various initiatives for the transition to IPv6 from an early stage.

“Promotion of transition to an Internet network equipped with IPv6” (From “e-Japan Priority Policy Program 2003”)

*Decision by the IT Strategy Headquarters headed by the Prime Minister*
Since 2000, verification tests of IPv6 have been conducted with the cooperation of the national government, local government and private enterprises.

(1) IPv6 application testing

- Regional information services for residents
- Home medical care services for the elderly
- Building facility management such as air conditioning, elevators, etc.
- Services for regional crime prevention measures
- Disaster countermeasures system such as observation, consultation, information supply, etc.
Efforts to push forward the promotion of IPv6

(2) Start of commercial services

- Start provision of IPv6 compatible products
  (Network equipment, TV telephones, network cameras, etc.)
- Start provision of IPv6 compatible commercial ISP services
  - IPv6 Internet connection services for general consumers
  - Services for internal networks in corporations

(3) Promotion of IPv6 compatibility in the government network

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“Aiming at realizing the most convenient and efficient e-government in the world, while keeping pace with renewals of information and communication equipment in each government agency, IPv6 will in principle become available by March 2009.”
(Decision by the IT Strategy Headquarters (January 2006)
The estimated number of Internet users in Japan as of the end of December 2006 is 87.54 million. In particular, the number of broadband users is estimated at 56.87 million. The growth rate over the previous year is 24.1%. A broadband connection uses 10 times more IP addresses per subscription than a dial-up connection. Also, the number of IP phone users grew substantially to 14.33 million (as of Mar 2007). There are even cases where an address for exclusive IP phone use is assigned.

Recent development in transition to broadband in Japan

<table>
<thead>
<tr>
<th>Year</th>
<th>Estimated Number of Users (in 1,000)</th>
<th>Growth Rate</th>
</tr>
</thead>
<tbody>
<tr>
<td>12.02</td>
<td>69,420</td>
<td>26.9%</td>
</tr>
<tr>
<td>12.03</td>
<td>77,300</td>
<td>34.3%</td>
</tr>
<tr>
<td>12.04</td>
<td>79,480</td>
<td>51.8%</td>
</tr>
<tr>
<td>12.05</td>
<td>85,290</td>
<td>53.7%</td>
</tr>
<tr>
<td>12.06</td>
<td>87,540</td>
<td>65.0%</td>
</tr>
</tbody>
</table>

24.1% increase over the previous FY.
Replenishment of addresses for use in Japan will become unavailable around early 2011 to mid-2013.

**Impact on the uses of the inventory depletion of IP addresses**
- Existing Internet users can continue to use the services.
- Meanwhile, it will become difficult for new users to receive new services.
  → Response to the increased use of addresses is needed.
Discussion in Japan for the promotion of transition to IPv6

- Establishment of an Internet study group on the smooth transition to IPv6
  – <Time to start the study> Aug 2007 ~
  <Participants> Telecommunications operators, vendors, researchers, etc.

Objective of the study group
While potential depletion of IPv4 addresses is being discussed, this study group’s objective will be to discuss countermeasures to such a situation mainly from a technological viewpoint.

Procedures for discussion in the Study Group

1. Current use status of IPv4 addresses and organization of problems in case the addresses become deficient
2. What options are there to cope with a shortage of IPv4 addresses should it happen; and sorting out of advantages and disadvantages of each of the options
3. Current use status of IPv4 addresses and problems when there is a shortage of addresses
4. Specific action plans in order to implement countermeasures

Indication of a direction is planned for March 2008