Japan's discussion for preparation toward IPv4 Address Depletion

APRICOT2008 Plenary II

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Overview and purpose of this presentation

- **To update Japan's situation of discussion and preparation for IPv4 address depletion**
  - **Some Details from**
    - JPNIC's Study Report on the IPv4 Address Space Exhaustion Issue (Phase I)
  - **And Overview of**
    - Ministry's Study Group on the smooth transition to IPv6
    - IPv6 Promotion Council's "IPv4/IPv6 co-existence WG"
    - DISTIX Project's "IPv6 Interconnection WG"

JPNIC's Study Report on the IPv4 Address Space Exhaustion Issue (Phase I)

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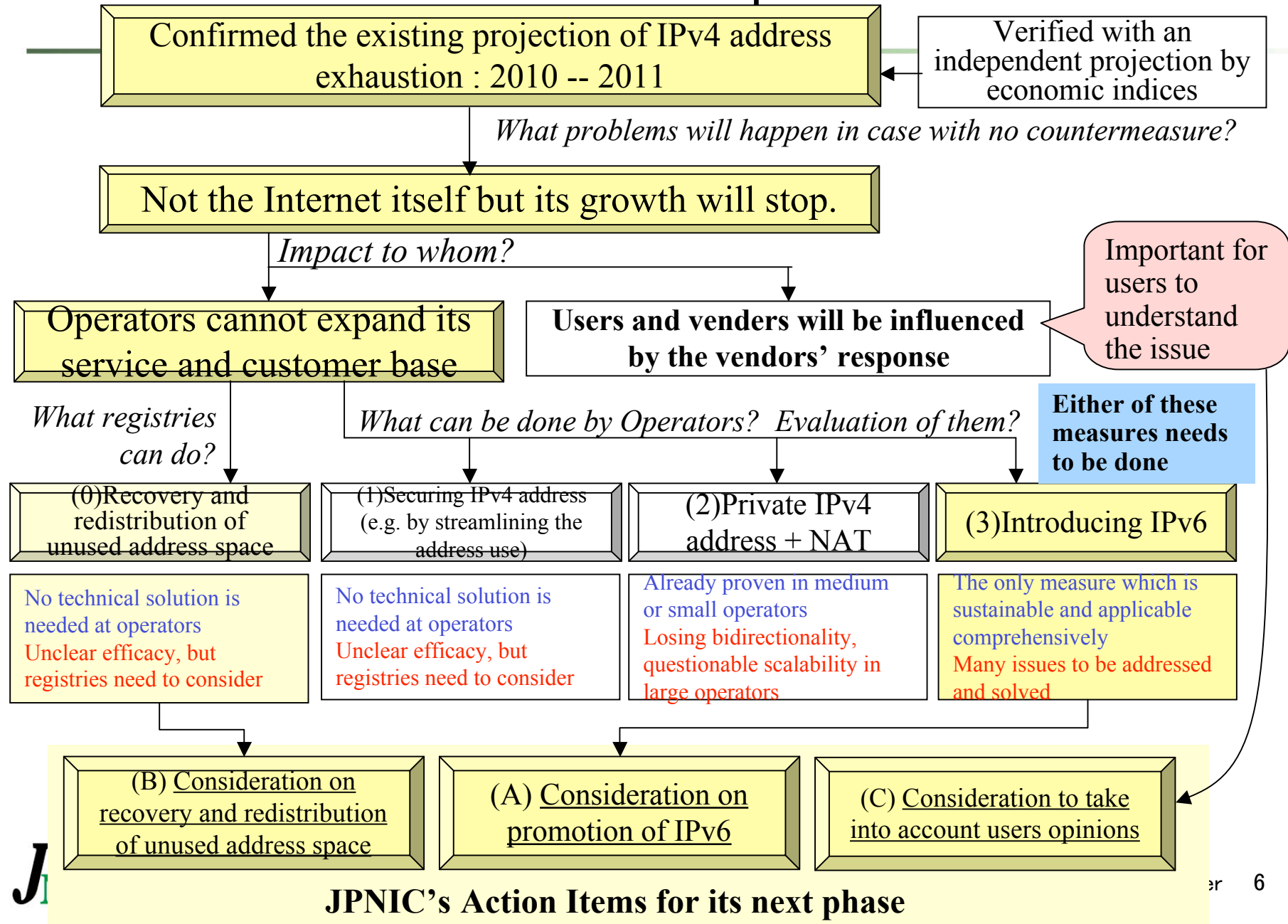
Overview

- JPNIC conducted its study on the IPv4 address space exhaustion issue since its press release on June 19

    – Target readers: JPNIC members and ISPs

    – The original study report was published on December 7, 2007

    – The English version has just been published!!

        • http://www.nic.ad.jp/en/ip/ipv4pool/ipv4exh-report-071207-en.pdf

        • Why not Japanese Version if it works for you?
          http://www.nic.ad.jp/ja/ip/ipv4pool/ipv4exh-report-071207.pdf

Content

- Independent projection of the exhaustion date by additional economic indices for ICT demands

  – A similar result with Geoff Huston's projection

- Identified three fundamental measures by Operators, and evaluated them by sorting out the problems caused by each

- Input from JPNIC members survey and Multi-stakeholder Advisory Group

- Conclude promoting IPv6 would be needed sustainable evolution and expansion of the Internet

- Set the action items for the next phase of JPNIC's activity
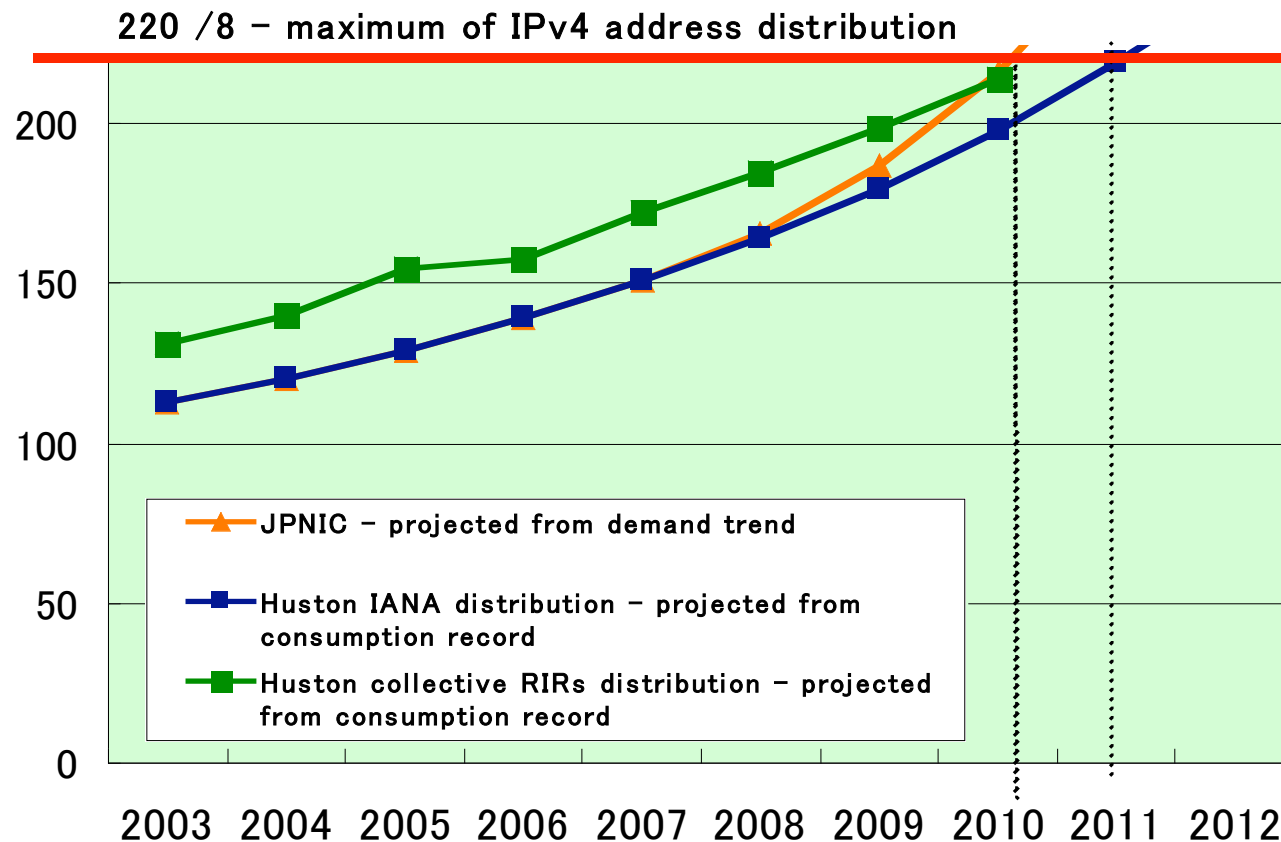
Structure of Report

Confirmed the existing projection of IPv4 address exhaustion : 2010 -- 2011

Verified with an independent projection by economic indices

What problems will happen in case with no countermeasure?

Not the Internet itself but its growth will stop.

Impact to whom?

Operators cannot expand its service and customer base

Users and venders will be influenced by the vendors' response

Important for users to understand the issue

What registries can do?

What can be done by Operators? Evaluation of them?

Either of these measures needs to be done

(0)Recovery and redistribution of unused address space

(1)Securing IPv4 address (e.g. by streamlining the address use)

(2)Private IPv4 address + NAT

(3)Introducing IPv6

No technical solution is needed at operators
Unclear efficacy, but registries need to consider

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Unclear efficacy, but registries need to consider

Already proven in medium or small operators
Losing bidirectionality, questionable scalability in large operators

The only measure which is sustainable and applicable comprehensively
Many issues to be addressed and solved

(B) Consideration on recovery and redistribution of unused address space

(A) Consideration on promotion of IPv6

(C) Consideration to take into account users opinions

JPNIC's Action Items for its next phase

When IPv4 address space will exhaust

• Unallocated IPv4 address space of Regional Internet Registries will exhaust in 2010 or 2011
  – Geoff Huston's prediction from consumption history projects mid of 2011
  – JPNIC's prediction by demand trend from economic indices projects latter half of 2010

220 /8 – maximum of IPv4 address distribution

Legend:
- JPNIC – projected from demand trend
- Huston IANA distribution – projected from consumption record
- Huston collective RIRs distribution – projected from consumption record

Three measures by Operators and evaluations of them

- Operators can only take either of these three measures or some combination of them

  - (1) Securing IPv4 address space in some way
    - E.g. by streamlining IPv4 address use in their network
      - Efficacy is unclear, but registries need to continue consideration as their mission

  - (2) Accommodating new customers by using private IPv4 addresses and NATs
    - possibly a short-term measure but efficacy is very limited

  - (3) Accommodating new customers by using IPv6
    - The only measure that takes into account sustainable development of the Internet, but many issues still remain
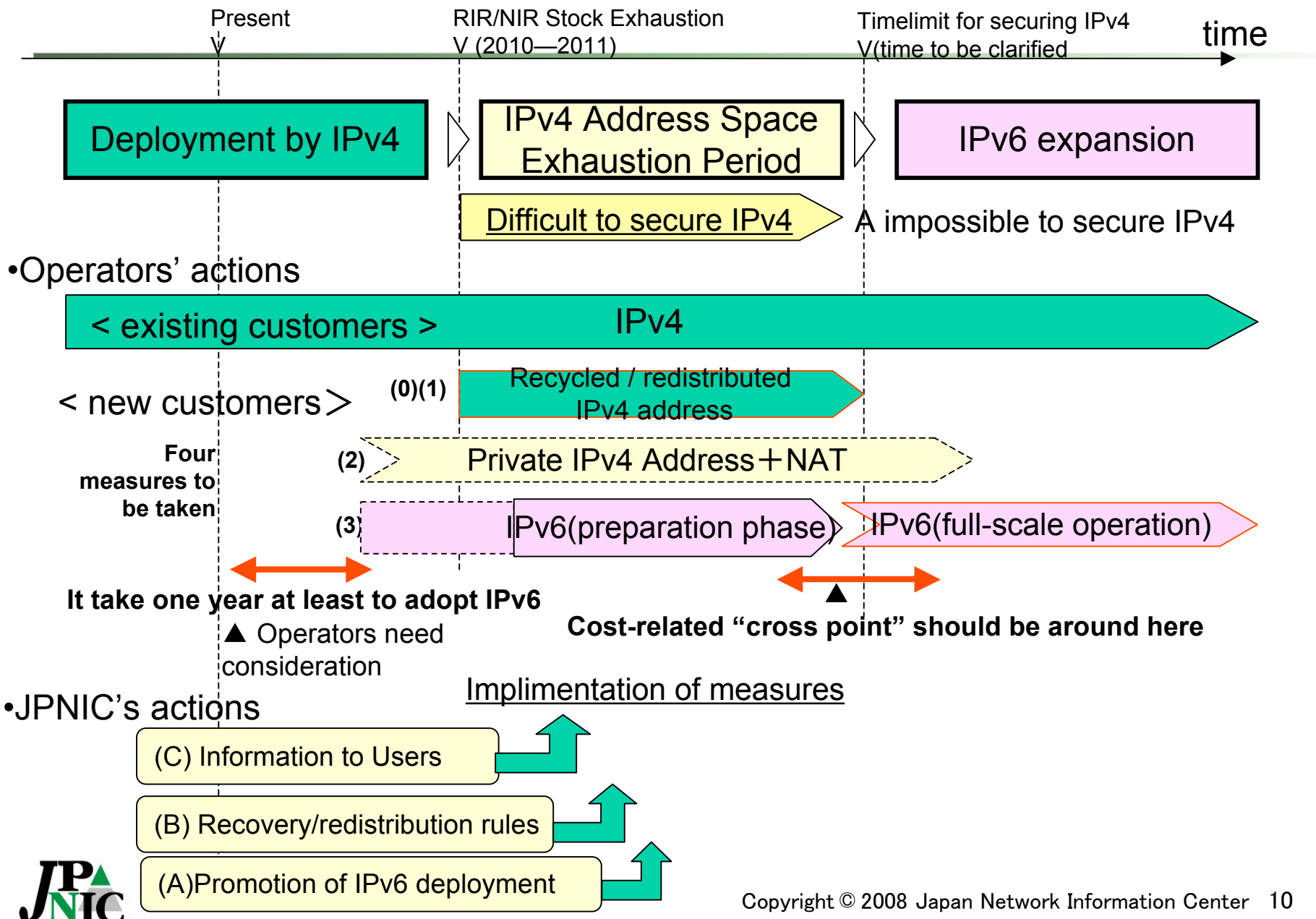
Conclusion in short

- IPv4 address will exhaust in 3—4 years

- and the way to go is IPv6

- but deployment of IPv6 is still problematic.

    - Most operators know the way to go, but don't know HOW to go the way – lack of information and confidence

    - We still have some technical missing pieces

        - DNS, translator, dual-stack operations,

- JPNIC commits the effort toward solution

    - Information, Tech research by collaboration, and reach to End Users, as well as registry jobs

Roadmap Image to respond to IPv4 address exhaustion

Present
V

RIR/NIR Stock Exhaustion
V (2010—2011)

Timelimit for securing IPv4
V(time to be clarified

time

| Deployment by IPv4 | IPv4 Address Space Exhaustion Period | IPv6 expansion |

Difficult to secure IPv4 → A impossible to secure IPv4

• Operators' actions

< existing customers > IPv4

< new customers >

(0)(1) Recycled / redistributed IPv4 address

Four measures to be taken

(2) Private IPv4 Address＋NAT

(3) IPv6(preparation phase) IPv6(full-scale operation)

It take one year at least to adopt IPv6

▲ Operators need consideration

Cost-related "cross point" should be around here

Implimentation of measures

• JPNIC's actions

(C) Information to Users

(B) Recovery/redistribution rules

(A)Promotion of IPv6 deployment

Ministry's Study Group
on the smooth transition to IPv6

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Ministry's Study Group

- Kicked off in August 2007, to be concluded End of March 2008

- Parent Group of executives of multi-stakeholders + Working Group of various types of operators and vendors led by Hiroshi ESAKI

- Dense and exhaustive discussion in WG

  – A meeting every two weeks for half a year

The planned report

- The original report in Japanese will be published in April.

    – English version will be also published, hopefully by May

- Analysis on prediction of IPv4 address exhaustion date

- Analysis of Identified problems

- Recognition of IPv6 as the key solution

- Consideration on architectural models of the interconnection of IPv4 and IPv6 Internets

- Consideration on timeframe of the series of measure

Activities from other bodies

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Various Activities in Japan

- **IPv6 Promotion Council of Japan**

  – IPv6/IPv4 co-existence WG

    • Case studies for various use cases and devices

- **DISTIX Project**

  – IPv6 Interconnection WG

    • Prototyping the implementations to be needed – DNS resolvers , translators

- **Internet Association of Japan (iaJapan)**

  – IPv6 deployment Committee

    • Identifying an exhaustive map of various problems including element technologies, operations practice, business planning from different types, public policy, IP address policy…

Thank you

- Your questions and comments are appreciated for us to identify the difference of situation in other countries

  – To any JPNIC people here

  – To *ipv4exh-comment@nic.ad.jp*

- Japanese participants here might show you their experiences and perspectives from their points of view. Why don't you come up to them for a talk?

- Hardcopies of English version of JPNIC's report is <u>available here!</u> Ask for that any JPNIC staff here <u>later</u>

Q&A

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