Action Plan and Milestone
Toward IPv4 Address Exhaustion
ver. 2010.10

October 8, 2010

Task Force on IPv4 Address Exhaustion, Japan

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About this document

This document describes a series of recommended action plans and milestones to prepare toward IPv4 address exhaustion, which is estimated to occur in 2011, as a reference for industry players in Japan, but it should be informative also for those in other countries.

The Task Force on IPv4 Address Exhaustion, Japan expects that industry players will study and address the issues in IPv4 address exhaustion on the basis of this reference, and create and execute individual action plans accordingly. We hope the Internet industry as a whole will smoothly overcome this problem as a result.

In order to take the latest situation into consideration, this document is supposed to be updated on a regular basis.

Revision history

Date	Version	Contents
Feb. 17, 2009	2009.2	First release
Oct. 5, 2009	2009.10	Second release; Modified diagrams based on estimated commencing time of the IPv6 access network services on the NGN services.
June 4, 2010	2010.6	Each industrial player's situation is not reviewed. Evaluation of ongoing situation and latest information are added.
Oct 8, 2010	2010.10	Assessment of the latest status and refinement of action plans for business users (incl. government agencies and local government etc)

Background of the Creation of this document

- ✓ The target date in this document is set as early 2011, unchanged from The Ministry of Internal Affairs and Communications of Japan's Report *"Study Group on Sophisticated Use of the Internet by IPv6"* (March 2010) *.
  - The above report predicts the exhaustion date of the remaining IPv4 address pool on the following assumptions:
    - Around mid to late 2011, exhaustion of the international address stock (IANA Pool)
    - the acquisition of new IPv4 addresses in Japan will be impossible in the mid 2012.
  - Geoff Huston currently estimates (as of September, 2010):
    - 2Q 2011 as the IANA exhaustion date
    - 1Q 2012 as the APNIC exhaustion date (exhaustion dates are updated every day.)
  - The exhaustion date may be delayed by reduced capital investment in the current recessionary environment, while it may also accelerate the consumption of IPv4 address through such factors as the faster deployment of wireless broadband, expanding demand mainly in Asian region, the last minute demand etc..
  - At present the target date is set as early 2011, as a result.
  - *Study Group on Sophisticated Use of the Internet by IPv6 (http://www.soumu.go.jp/main_content/000058238.pdf)
- ✓ This Action Plan and Milestone is a model example with a margin of time. Each player should set its own schedule in consideration of risks and environments.
- ✓ Even the latest movers should complete preparation before JPNIC/APNIC exhaustion.
- ✓ This Action Plan will be updated as necessary based on changing address consumption trends, IPv6 technology issues, etc.

Current Progress Review

- ✓ ISPs are getting ready for IPv6 connectivity
  - NTT NGN IPv6 connectivity method (tunneling method and native method) details have been decided.
  - There are some moves related to native method in promotion of IPv6 migration, such as establishment of new companies.
  - Each ISP is preparing IPv6 transition to be ready by April 2011, the starting date of NGN IPv6 connection.
  - Each ISP is currently preparing to provide information on their status of readiness for IPv4 address exhaustion.

- ✓ Diverse status observed for iDC, ASP/CSP
  - While some iDCs, ASPs/CSPs are in progress with IPv6 support, it is unsupported in others, and their status is diverse in two opposite directions.

- ✓ Business users (including government agencies and local government) will start to prepare for IPv6 transition from now.
  - Not enough information is getting across to them, and most of them are at the stage of starting to consider preparation for IPv4 address exhaustion from now on.(although this delay will not make a big impact right now).

Recent topics on IPv4 address exhaustion (after April 2010)

- ✓ Pace of /8 block allocations is much faster than projected.
  - Since January 2010, total 12 /8 addresses are allocated (APNIC (Asia and Pacific): 6, ARIN (North America): 2, RIPE NCC (Europe): 2, LACNIC (Latin America): 2) and current /8 address stock at IANA is 14 blocks (5 percent of the total)
- ✓ MIC published guidelines for ISPs to disclose information about their readiness on IPv4 address stock exhaustion
  - Published in April 2010（http://www.soumu.go.jp/menu_news/s-news/02kiban04_000022.html, Japanese Only）
  - None of ISPs have disclosed Information according to the guideline yet. ISPs are now preparing for IPv4 address exhaustion, so we expect their information disclosure in the early timing.
- ✓ 3 companies of NGN IPv6 native connection are considering to provide IPv4 connection service by common method, on IPv6 environment.
  - 3 companies: BBIX, JPIX, Internet Multifeed are now considering to provide IPv4 connection service over IPv6 by common method based on SAM (Stateless Address Mapping). Their aim is to promote transition to IPv6.
- ✓ KDDI CORPORATION and other companies established a new company on IPv6 business
  - 6 companies (KDDI CORPORATION, Japan Internet Exchange Co., Ltd. (JPIX) , NEC BIGLOBE, Ltd., NIFTY Corporation, ASAHI Net, Inc. and VECTANT Ltd.) established a new company Japan Network Enabler Corporation (JPNE).
  - They collaborate on a project for IPv6 Internet Roaming Services on NGN IPv6 native connection. They aim at early widespread deployment of IPv6, and support IPv6 connection business for ISPs.
- ✓ Japan Cable Laboratories published detailed version of action plans on IPv4 address exhaustion for CATVs.
  - More detailed action plan guidelines and model cases for IPv6 adaptation are introduced. (http://www.kokatsu.jp/blog/ipv4/data/jlabs-guideline-2010.html, Japanese Only)

Milestone: Network Area (ISP, iDC etc.)

The following represents recommendations of typical actions for network operators in dealing with IPv4 address exhaustion.
(* Refer to the action items in the diagram on the next page.)

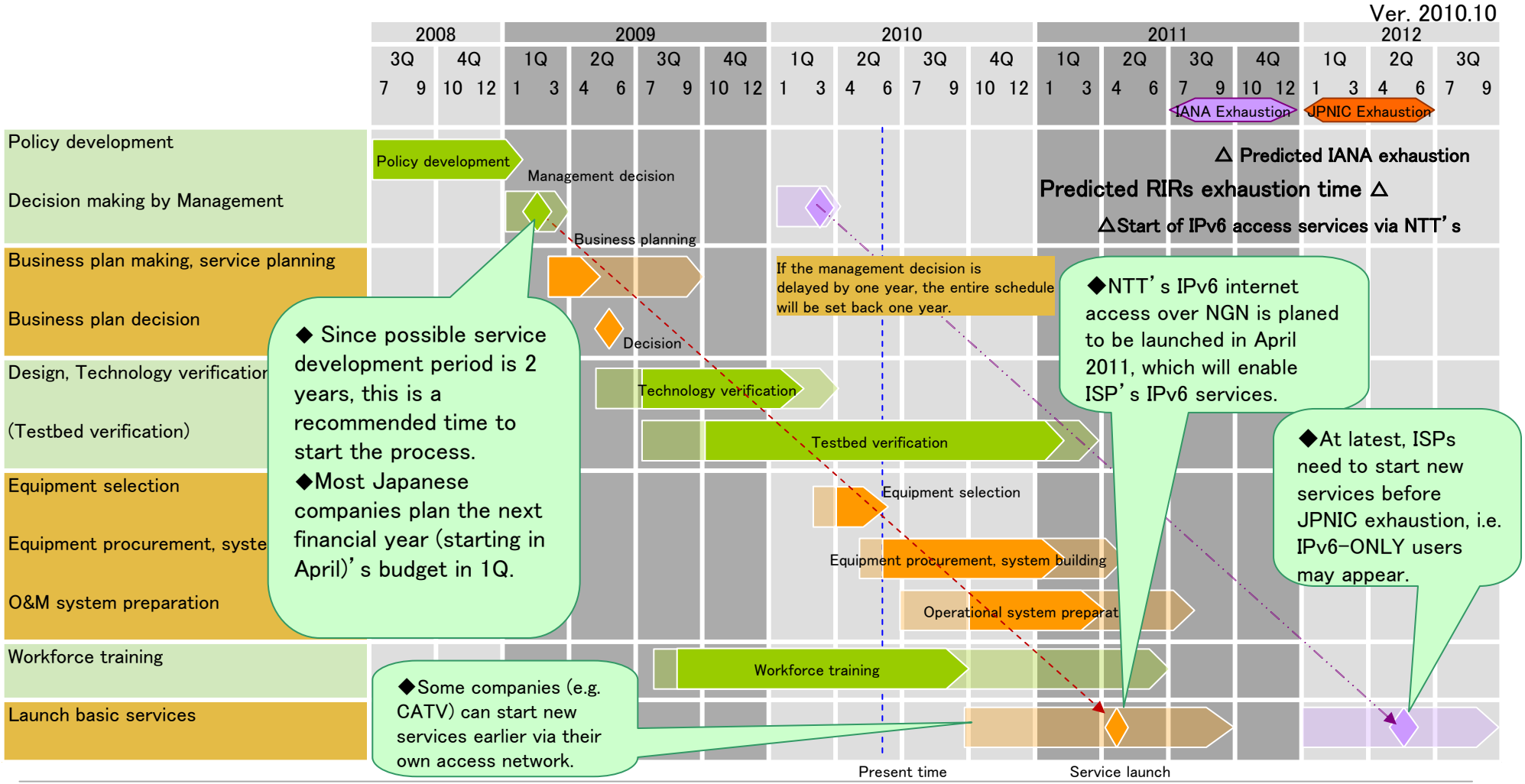
1. Policy Development, Decision Making by Management
   i. Analyze the impact of the exhaustion on your organization.
   ii. Perform the business decision for the preparation policy.
      - i.e.: ignore this exhaustion issue?, how to solve? (IPv6?, LSN?, etc.), When?, which type of access network? etc.
2. Business Planning/Review, Service Planning
   i. Policy detailing and the business plan development.
      - i.e.: service planning, basic network design, consideration of operating procedures and systems, etc.
3. Design, Technology Verification
4. Equipment Selection, Procurement, System Building, Preparation of O&M system
5. Workforce training
6. Launch Basic Services

Action Plan: Network Area (ISPs)

Recommended Schedule

Latest start Schedule

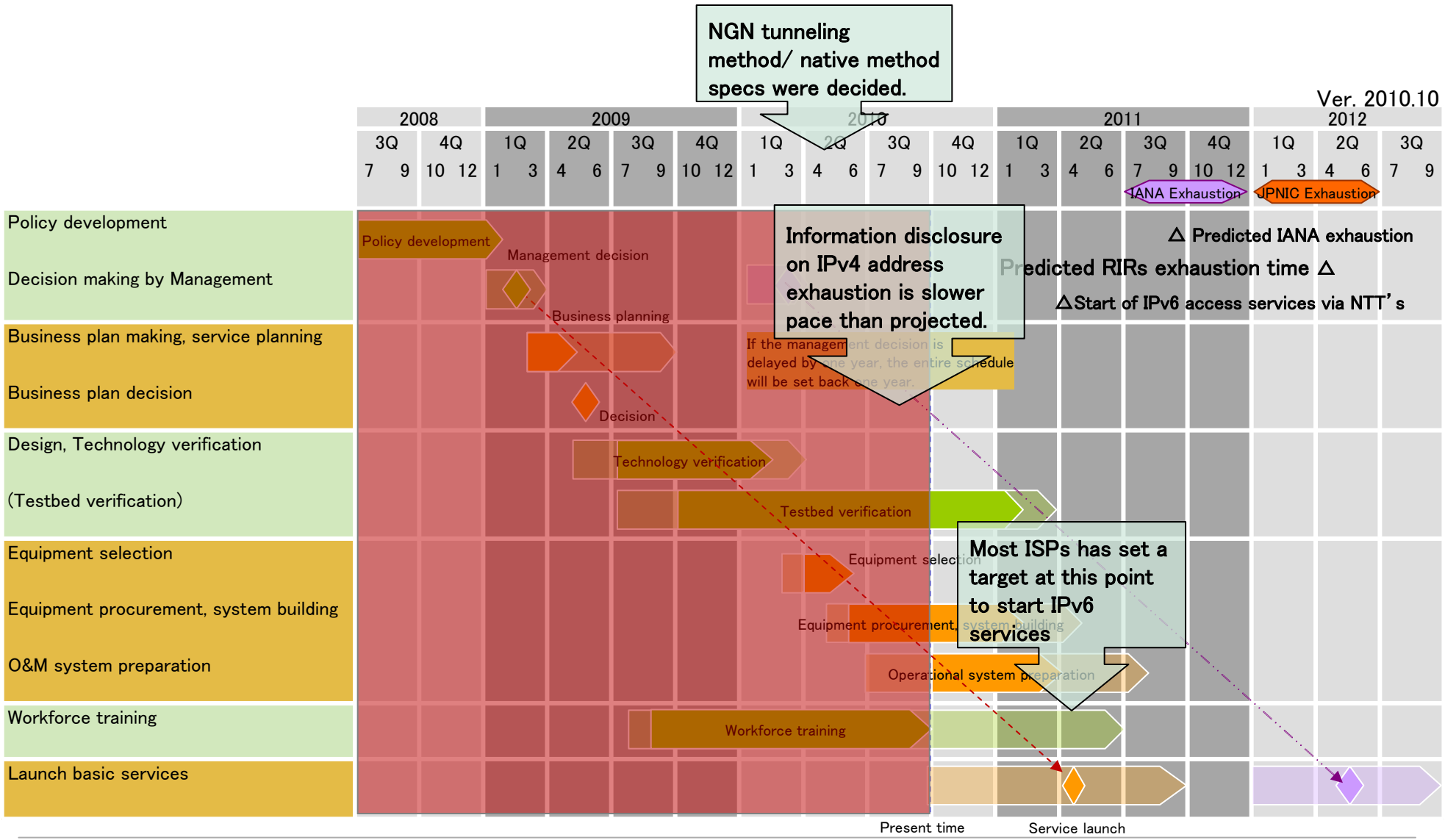
Action Plan for Network Players (ISPs)



Present Status of Progress : Network Area (ISPs)

Recommended Schedule

Latest start Schedule



Action Plan: Network Area (iDC)

Recommended Schedule

Latest start Schedule

Action Plan for Network Players (iDC)

***This page is especially for BtoC （The plan for enterprise can be found in Business user Area page）**

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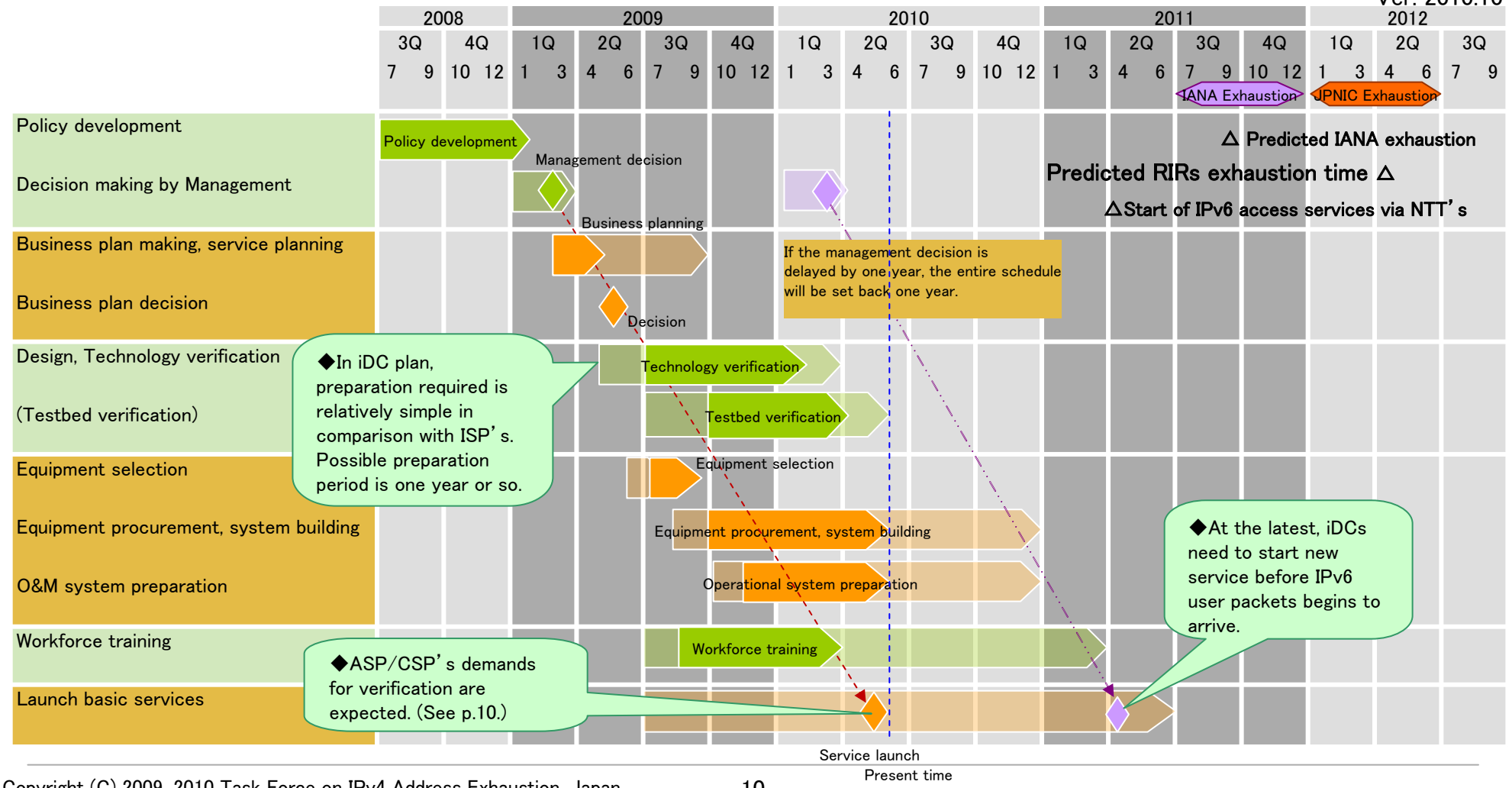
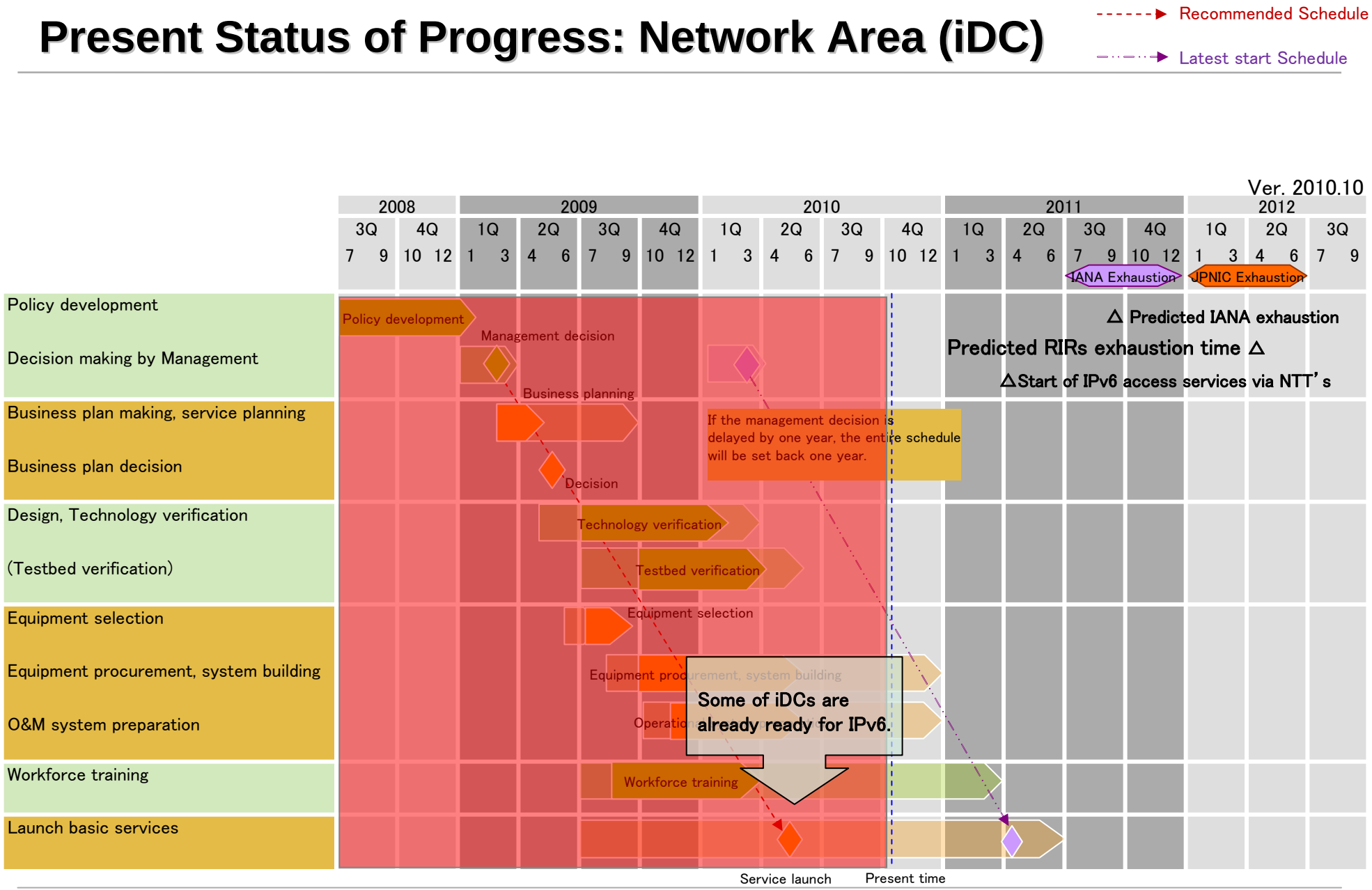


Present Status of Progress: Network Area (iDC)



Action Plan: Service Area (ASP/CSP)

The following represents recommendations of typical actions for Service (ASP/CSP: Application Service Provider/Contents Service Provider) Area are as follows.

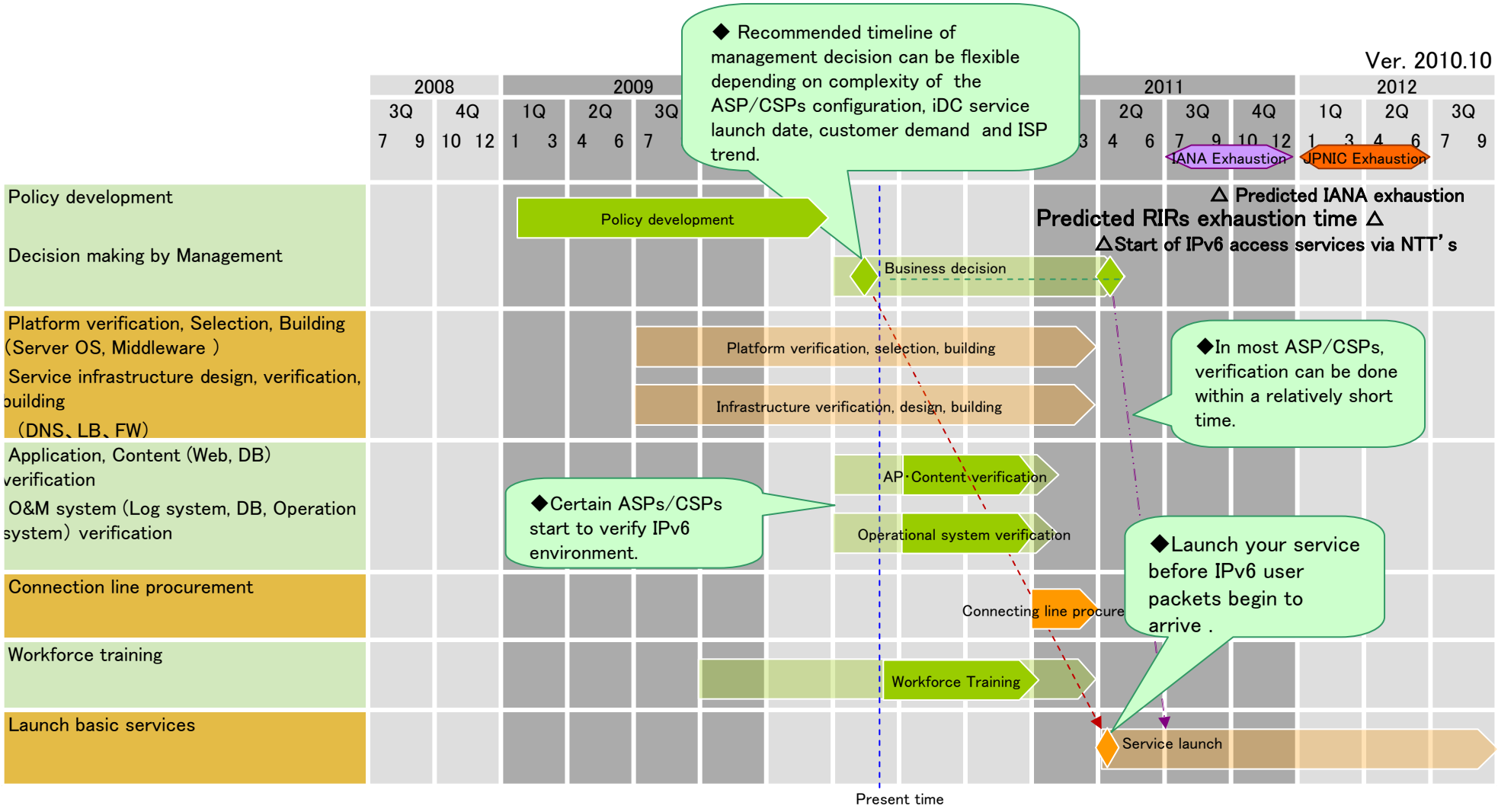
1. Policy Drafting, Management Decision Making
2. Technology Verification, System Building
   i. Platform verification, selection, and building
      - Server OS, Middleware
   ii. Service infrastructure design, verification and building
      - DNS, Load Balancer, Firewall etc.
3. Application, Content
   i. Verify applications and contents under exhaustion situations (i.e. under such environments as IPv6, LSN)
4. O&M System
   i. Verify correct behavior of system log, database, operation system under the exhaustion situation (i.e. under such environments as IPv6, LSN)
5. Connection Line Procurement
   i. Selection of Internet connection line (dual stack access etc.), procurement, etc.
6. Workforce training
7. Launch Basic Services

Action Plan: Service Area (ASP/CSP)

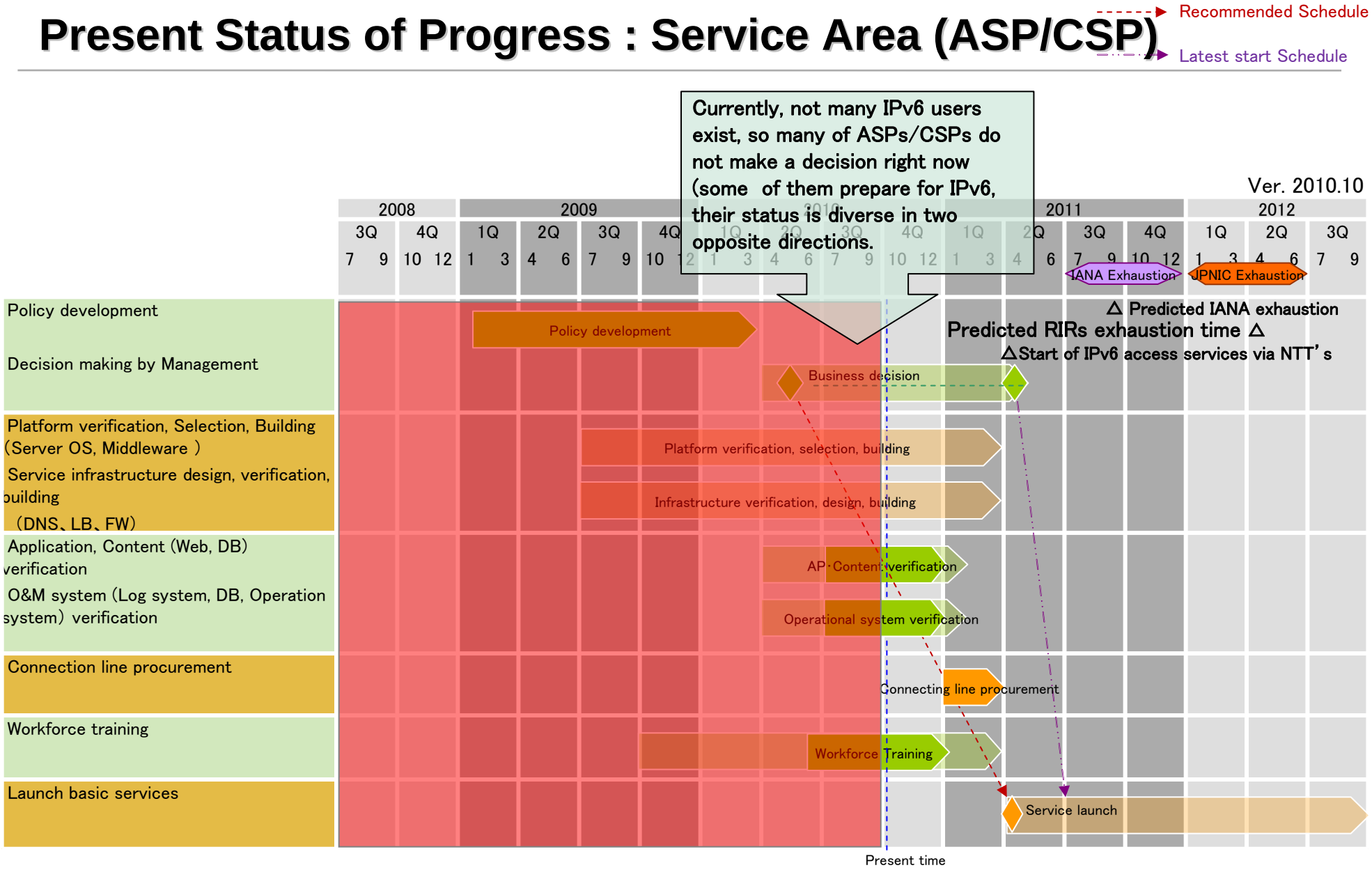
Recommended Schedule

Latest start Schedule

Action Plan for Service (ASP/CSP) Area



Present Status of Progress : Service Area (ASP/CSP)



IPv4 EXHAUSTION

Action Plan: Business users (incl. government agencies and local government)

As not many business users (including government agencies and local government etc.) require new IPv4 addresses, IPv4 address exhaustion will not make a big impact for them, but they should think about following issues carefully.

✓Preparation of IPv6/IPv4 dual stack on DMZ for public servers

- After April 2011, starting time of IPv6 connection service on NGN, IPv6 users for consumer side will appear for real, therefore, public servers should be accessible by IPv6.
- Most of the standard equipment for DMZ (router/switch, firewall, load-balancer and servers etc) is ready for IPv6, so IPv6/IPv4 dual stack preparation is not so difficult now.

✓IPv6 utilization for WAN line (IP-VPN etc)

- NGN of NTT or coming Next Generation mobile communication “LTE”, will provide services based on IPv6, such as NGN IPv6 Native Connection. After 2011, cases where even co-operate users utilize IPv6 for IP-VPN, etc, are likely to emerge.

✓Getting IP addresses when a company’s new overseas branch establishment

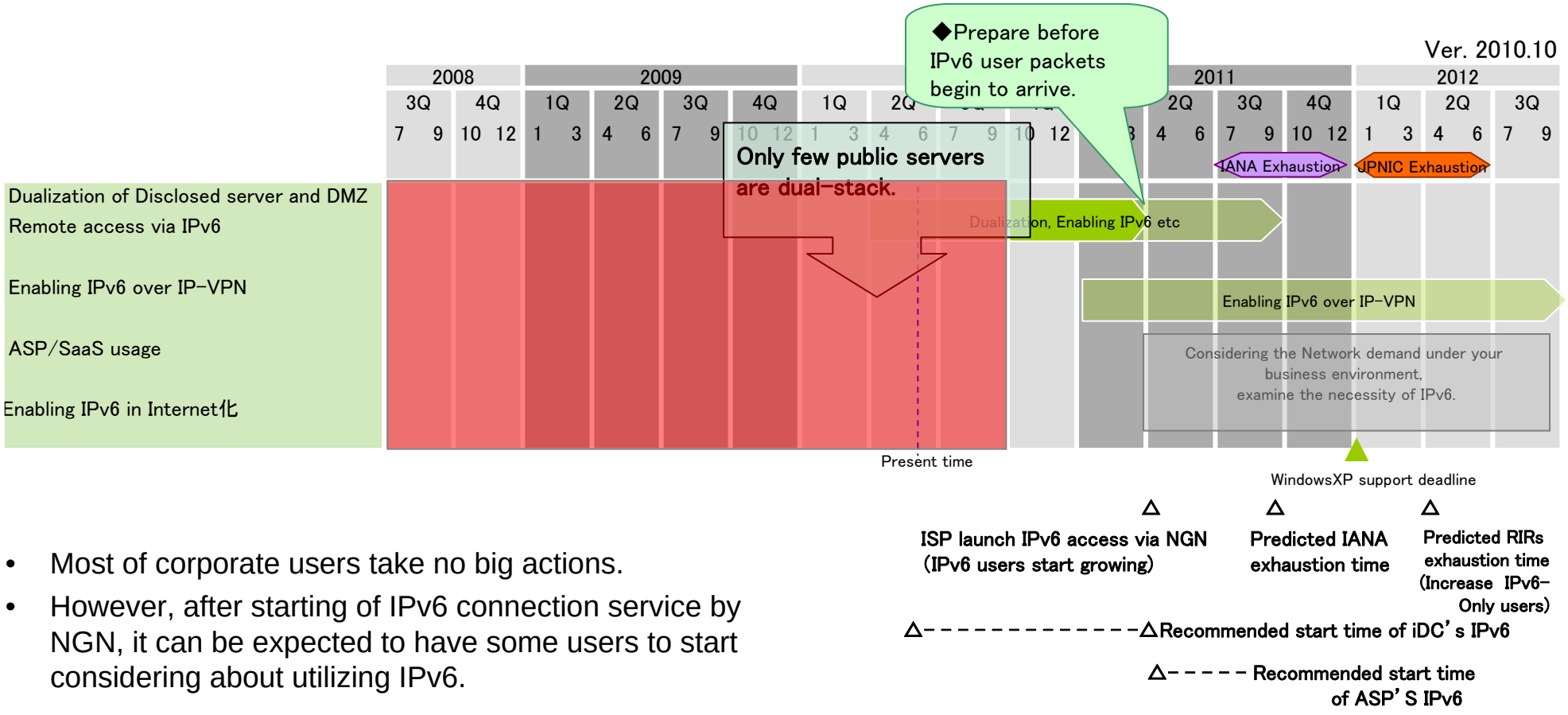
- In a region such as Asia where IP address demand is rapidly rising, it may be necessary to consider the use of IPv6, as it is expected to be difficult to obtain new IPv4 addresses, or extremely high priced even if they can be obtained.

✓IPv6 communication inside of the intranet

- Most of the applications which are used by corporate users do not take account of IPv6, so it is not realistic to transit to IPv6 for whole intra-net. However, IPv6 support should be taken into consideration when deploying new equipment and software.
- Furthermore, as some equipment such as a PC is ready for IPv6 by default, corporate users need to manage security matters like IPv6 communication monitoring.

Action Plan/ Status of Progress: Business User Area (incl. National and Local govt.)

Action Plan and Progress situation for Business User Area



- Most of corporate users take no big actions.
- However, after starting of IPv6 connection service by NGN, it can be expected to have some users to start considering about utilizing IPv6.

Action Plan: Other Players' Area

✓ System Integrator / Outsourcee

- System Integrators and outsourcees basically follow the demands of their customers. Development and verification of solution for the IPv4 address exhaustion, preempting customer's schedule and action plan, may give some advantages to their business
  - For Enterprise customer service -> Start Preparation based on the Milestone for Business User Area
  - For ISP/iDC -> Start Preparation based on the Milestone for Network Area

✓ Consumer electronics company etc.

- UPnP will not go through in some part of the internet when IPv6 connection or IPv4 connection through LSN services are launched with IPv4 address exhaustion. At this timing, all devices to be connected to the internet should be ready for IPv6. It should be noted that the life cycle of home electronics is long, so those products should be ready for IPv6 in the earlier timing.

✓ Home users

- Required actions depend on the ISP that each user connects to.
- Basically, ISPs are trying to minimize influences to customers.