

**2005 Version**

**IPv6 Deployment Guideline**

**Case Study of IPv6 Usage**

**in Operation Branch System in SOHO  
Environment**

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**IPv6 Promotion Council of Japan**

**DP-WG SOHO SWG**

## Present State of Company A

In this section, we study an IPv6 deployment example of a shop network employed by a certain travel agent.

Company A is a travel agent on a nationwide scale and runs nearly 1,000 branches throughout the country. They control the sales of each branch and reservation state centrally online.

Each operation branch has 5 - 10 staff, and PCs, printers and facsimile machines as office terminals there. One of A's characteristics is that they close and merge branches frequently.

The network environment is in a Star type configuration centralized on the headquarters, and they use broadband routers that support VPN and connect the Headquarters and operation branches via the Internet VPN. This VPN is composed as one segment, and IPv4 private address is used for the IP address.

Company A performs NAT using broadband in order to reduce the operational burden caused by moving, etc., and uses the same IPv4 network address at all bases (192.168.0.0/24). In this company, the network is created, removed or moved at the timing of closing or merging branches.

## Issues of Company A

However, because they are not able to station IT staff at each branch on a full-time basis, the system management of many small operational branches such as this case causes a problem of heavy operational burden such as the large amount of man-hours required to maintain terminals or to setup at closing and merging branches.

Company A is thinking of deploying an auto maintenance system of terminals in order to realize a direct push distribution to each terminal, and to obtain the terminal status dynamically from the server.

The requirements to realize this sort of system are;

- operation of IP addresses in a fixed manner in order to specify terminals directly from a server
- assignment of auto addresses in order to simplify operation.

## Solution Using IPv6

When IPv6 is used on an operation branch network such as that of Company A, it is possible to realize the system shown below.

### 1. Terminal addresses are fixed when IPv6 addresses are used.

Direct access from a server becomes possible based on fixed address.

Operational burden for assignment of fixed addresses is reduced.

### 2. Auto assignment of network prefix of the site

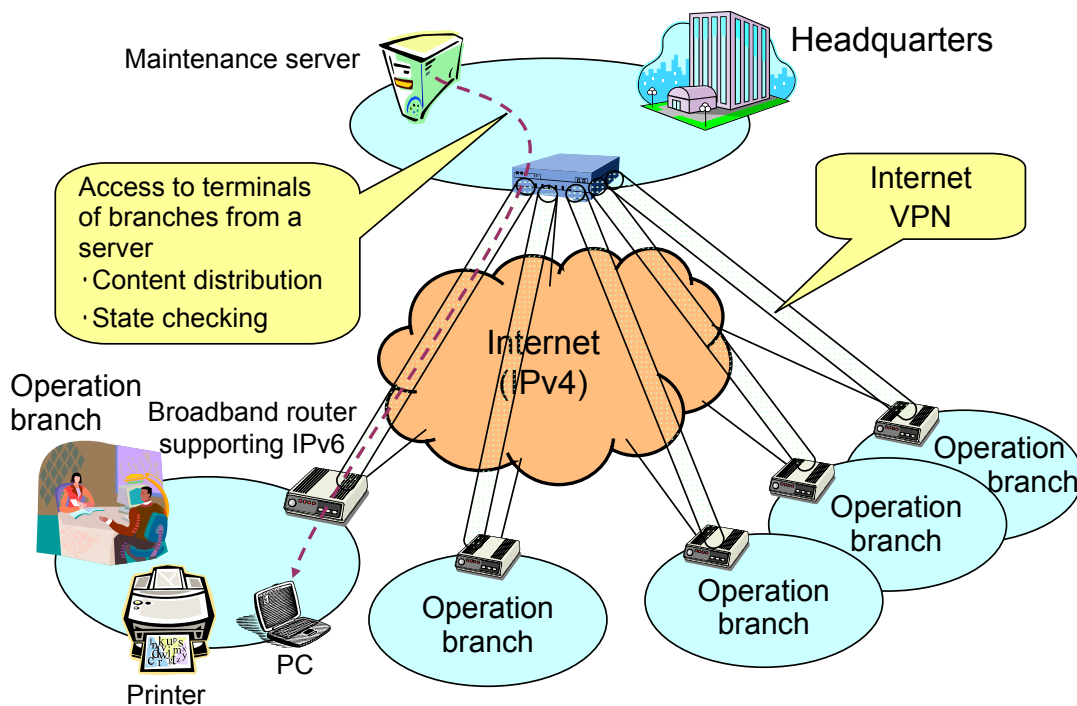
When Prefix Delegation is used, not only host addresses but also network prefixes can be distributed automatically.

The burden from moving is reduced.

### 3. Influence of independent path control with IPv4 on existing networks is eliminated.

Separation from existing line of application traffic by using policy routing of IPv6 and IPv4

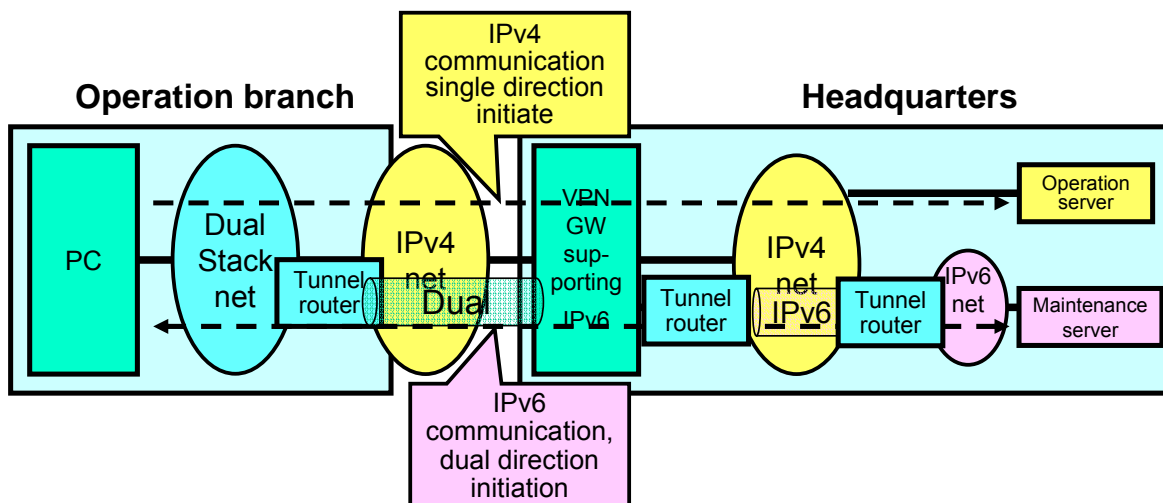
## Network Concept When IPv6 is Used



In this solution, IPv4 communication for business use and IPv6 communication for maintenance of operation branches are put through on Internet VPN. In the network of the headquarters, only the segment of the maintenance server is changed to support IPv6 and other segments inside the company are left as they are. IPv6 communication of maintenance server is performed from a gateway set in the headquarters using “IPv6 over IPv4 tunneling”.

A dual stack network is configured inside operation branches. Then, two types of protocols are used selectively according to the application used as IPv4 for business operation and IPv6 for maintenance. “IPv6 over IPv4 tunneling” terminates with the routers of each branch.

## Configuration of Network



### Inside Headquarters

Segment of maintenance server only is changed to support IPv6

Network inside the company keeps IPv4 as it is

IPv6 communication of maintenance server is performed from GW using “IPv6 over IPv4”

### Inside operation branch

Communication is performed using Dual Stack

IPv6 and IPv4 are used selectively according to applications used

➤ Business operation: IPv4, Maintenance: IPv6

## Address Configuration

Addresses are configured as shown below.

### IPv6 server segment

Reserve 2000:200:100:0::/56 (for 256 segments).

Assign one segment (/64) according to usage.

### Address of base

For IPv6, reserve 2000:200:100:8000::/52 (for 4,096 segments).

Assign one segment (/64) to each base

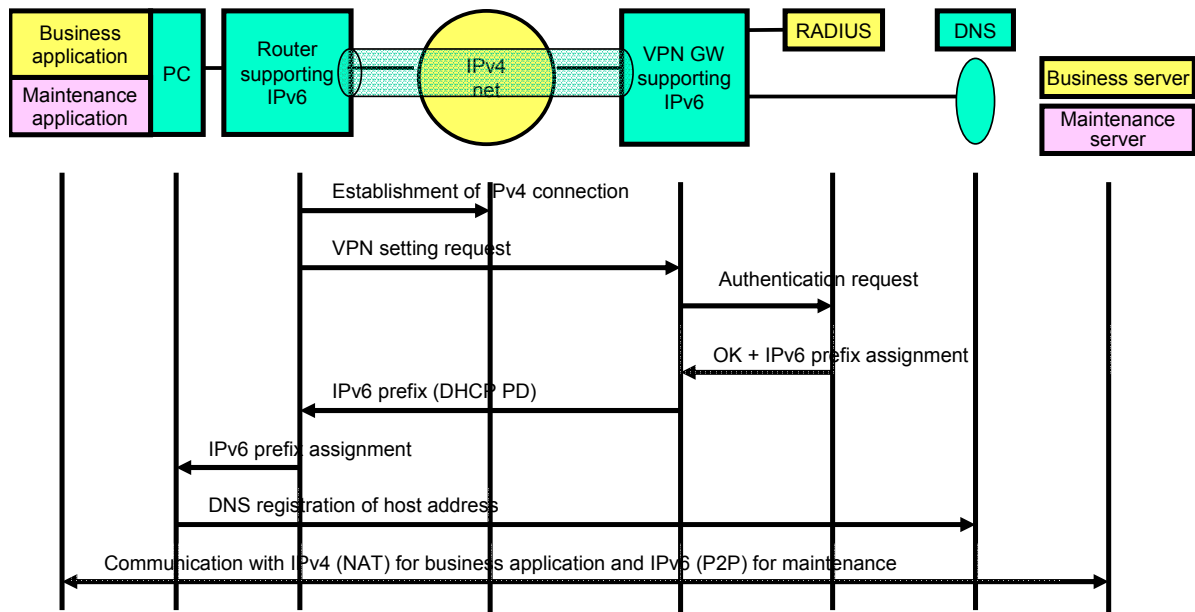
For IPv4, fix address inside LAN at 192.168.0.0/24.

Router address is 192.168.0.1

Host address (/32) as address on WAN side

## Concept of the System When Using IPv6

Fig. below shows the establishment process of IPv6 for maintenance in this example case.



## Evaluation of Cost Reduction

The following is a cost comparison of former IPv4 network and above mentioned IPv6 solution.

Deployment cost:

Design cost – Cost for IPv6 is calculated as 1.3 times that for IPv4

Setup work cost – No need to change terminal settings (IP address) → reduction by 30%

Router purchased – Assuming router model is not changed, so no change for the case of IPv6 as well.

Running cost:

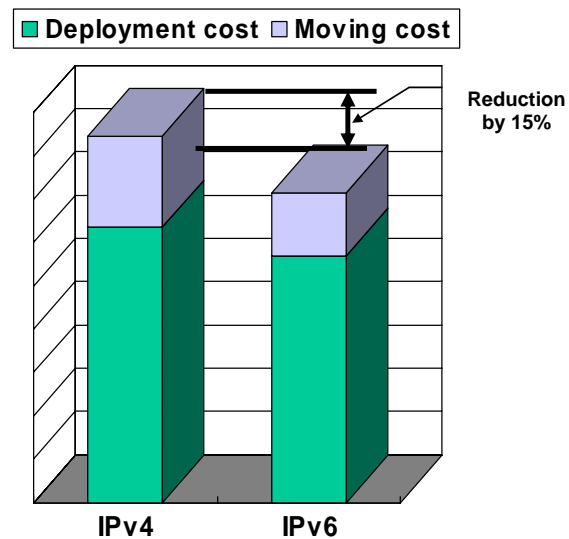
Line cost – No change in line cost because a tunnel on IPv4 is used.

Moving cost (when 100 bases move in half term, twice a year) – No terminal settings (IP address) are changed for IPv6 → reduction of setup work cost by 30%

### Cost factors

- Deployment cost: Once at beginning
  - ◆ Design cost
    - Calculated as 1.3 times for IPv6
  - ◆ Setup work cost
    - No terminal setting (IP address) is changed for IPv6
    - Reduction by 30%
  - ◆ Router purchased
    - Assuming no router model is changed, so no change in the case of IPv6 either.
- Running: Every month
  - ◆ Line cost
    - No change in line cost because a tunnel on IPv4 is used.
- Moving cost: Twice a year
  - ◆ 100 bases move in half term
  - ◆ Setup work cost
    - No terminal setting (IP address) is changed for IPv6
    - Reduction by 30%

### Comparison of work cost over 3 years



The side-effects shown below will be received.

#### • Prevention of duplicate investment for propagation of IPv6 in future

Infrastructure is capable of supporting IPv6 and helpful in learning IPv6 skill.

#### • Easier usage of other new applications realized by IPv6

Hard IP phones, wireless LAN phones, sensor net and P2P secure communication will be easier for the user.

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### Inquiries

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