## IPv6 Multi-Prefix Environment ~ Concept, Issues, and Solutions ~

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- IPv6 Multi-Prefix environment is defined as a network where end-site uses 2 or more address prefixes
- Typical example of application
  - The end-site uses 2 or more service providers at the same time.
  - And, each service provider delegates an address prefix respectively.





## IPv6 Multi-Prefix Service Model

Various xSPs can provide its service to an end-site directly using an single access line.



- Characteristics of xSP
  - Not only ISP, but ASP
  - Maybe a Closed Network
  - Provide its service to end-site directly
  - Unique Global Address



### Merits

- Reduction in cost
- Higher Reliability
- manageability
- Encouragement of new type of ASP
  - QoS sensitive service
  - Critical service



# Technical Problems to be solved

- There are still some possible problems of multi-prefix environment in some situation.
- This presentation focuses on the following situation.
  - ISP x 1 + ASP x N(1 or more)
    - Multihome is out of scope.
    - ASP is a xSP which is NOT ISP.
      - Its service is provided on a *closed network*.



The following slides introduce 3 main problems and solving methods.



# **Problem 1: Source Address Selection**

- Conditions
  - A host uses both of prefixes (addresses) from ISP and ASP at the same time.
- Problems
  - There are possibility that hosts select wrong source address for a destination address.
  - If wrong source address was selected, the return packet will be lost in this situation.
  - "Default Address Selection for IPv6 (RFC 3484)" specifies a address selecting mechanism, but it does not always work properly with the default rule.
- Solving Methods
  - Proper configuration of RFC 3484 policy table of hosts manually.



automatic configuration function of RFC How to select the proper source 3484 policy table has been proposed in IETEddress for each destination ?

"draft-arifumi-v6ops-addr-select-ps-00.txt"



# **Problem 2: Next-hop Selection**

- Conditions
  - End-site connects to each xSP with a respective gateway.
  - Each gateway sends ICMPv6 RA (Router Advertisement) messages to hosts in the end-site.
- Problems
  - hosts select only one gateway of a xSP as the preferred default gateway.
  - Then, the reachabilies to the other xSPs are lost.
- Solving methods
  - Manual configuration of specific routes on hosts
    - Add specific route entries to ASP
    - Invalidate RA messages from the gateway of ASP
  - Automatic configuration of specific routes on hosts
    - "Default Router Preferences and More-Specific Routes (RFC 4191)" is published by IETF.
    - But, there are still many gateway products and hosts which does not support this All Rights Reserved.



How to select the proper next-hop for each destination ?

# Problem 3: Name Resolution with DNS

- Conditions
  - ASP allows only its users to look DNS records of the service.
- Problems
  - Each DNS query from hosts must be forwarded to suitable DNS server.
  - Hosts usually does not have the function to select DNS server for each DNS query target.
- Solving methods
  - As a reference about *IPv4*, in Japan, some gateway products has a DNS forwarding function which changes the forwarding target for each domain name in DNS query from hosts.
  - But there is no standard method at present.



How to forward each DNS query to suitable DNS server ?



# Multi-Prefix Agent to solve problems

Introduction of our tool to solve problems for current practice.

### Function

proper the following configurations automatically and dynamically according to the received *RA* messages

#### Routing Table

 $\rightarrow$  solves "Problem 1: next-hop selection"

### RFC 3484 policy table

→ solves "Problem 2: source address selection"

### System requirements

OS: Windows XP SP2

(supports Vista in near future)

### If you have any interest in this tool, please contact us E-mail: 6agent@inetcore.com

#### Screenshot of status info display

Operation(Q)					
Router Info	rmation]				
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