

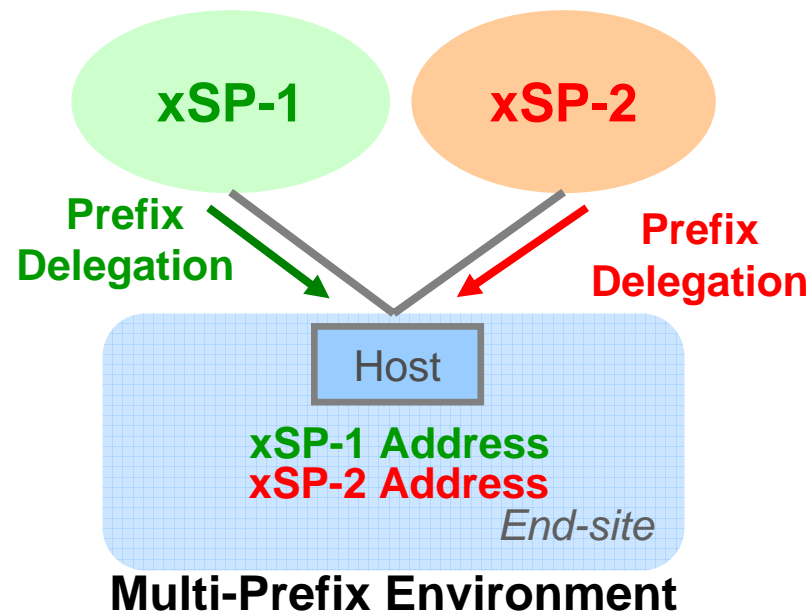
IPv6 Multi-Prefix Environment ~ Concept, Issues, and Solutions ~

APNIC Meeting 22 - IPv6 technical SIG

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What is IPv6 Multi-Prefix environment ?

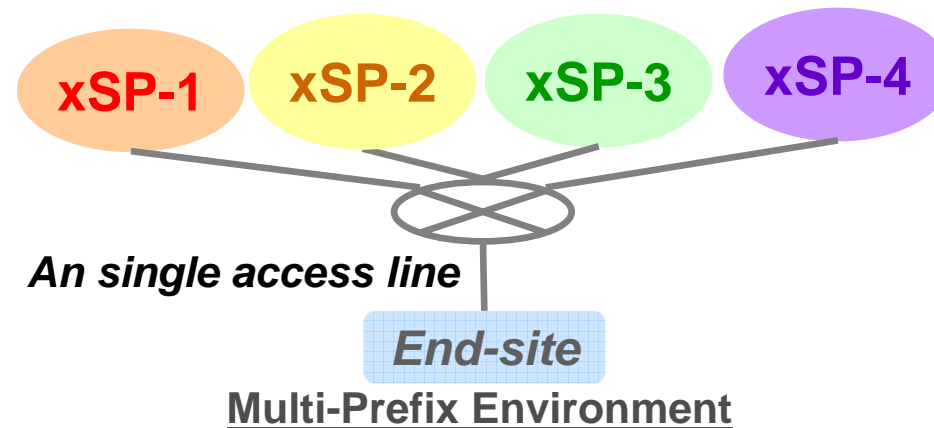
- IPv6 Multi-Prefix environment is defined as a network where end-site uses 2 or more address prefixes
- Typical example of application
 - The end-site uses 2 or more service providers at the same time.
 - And, each service provider delegates an address prefix respectively.



Address based service oriented network

IPv6 Multi-Prefix Service Model

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



● Characteristics of xSP

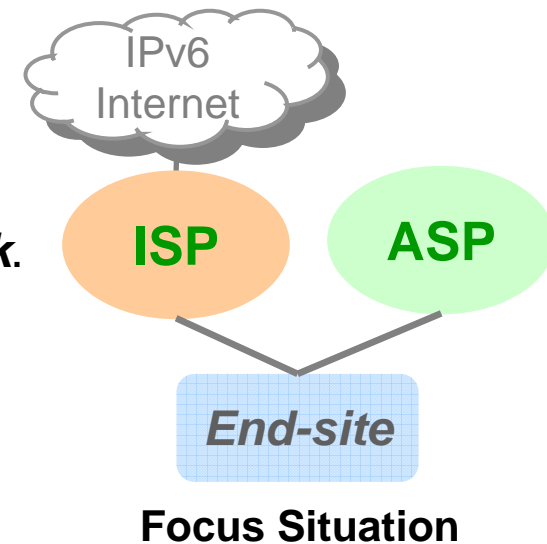
- Not only ISP, but ASP
- Maybe a Closed Network
- Provide its service to end-site directly
- Unique Global Address

Merits

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

Technical Problems to be solved

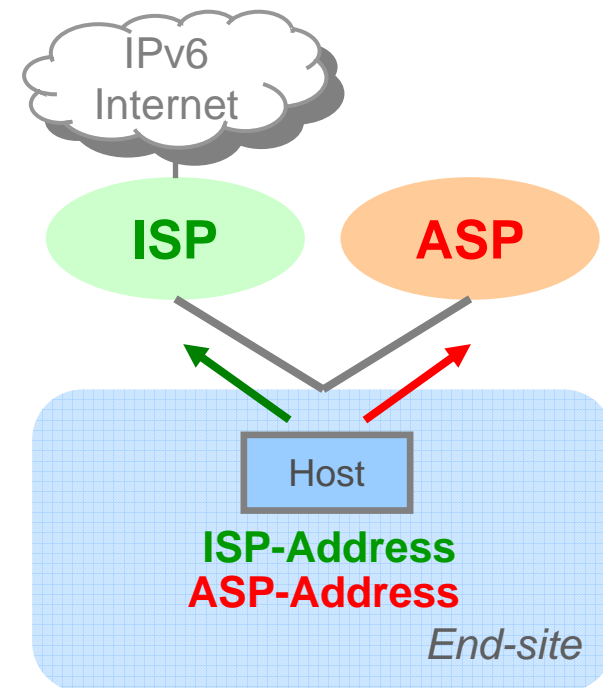
- There are still some possible problems of multi-prefix environment in some situation.
- This presentation focuses on the following situation.
 - **ISP x 1 + ASP x N(1 or more)**
 - Multihome is out of scope.
 - ASP is a xSP which is NOT ISP.
Its service is provided on a ***closed network***.



- The following slides introduce 3 main problems and solving methods.

Problem 1: Source Address Selection

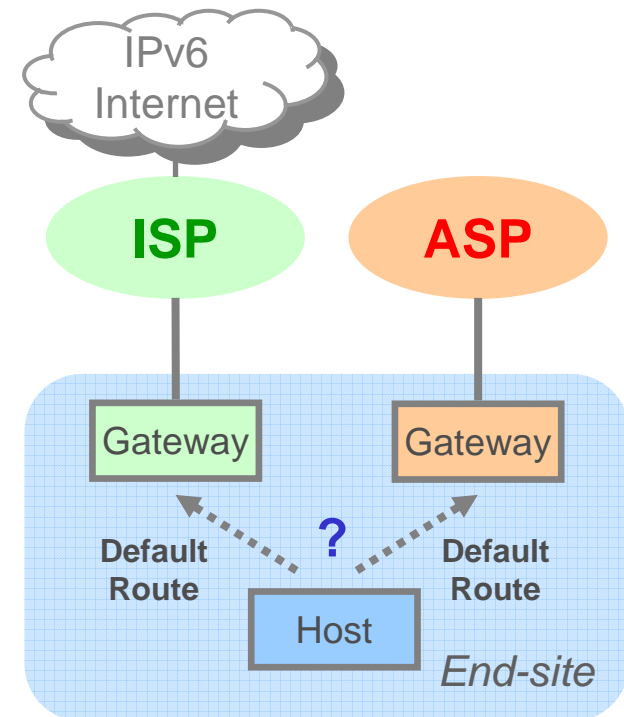
- Conditions
 - A host uses both of prefixes (addresses) from ISP and ASP at the same time.
- Problems
 - There are possibility that hosts select wrong source address for a destination address.
 - If wrong source address was selected, the return packet will be lost in this situation.
 - “Default Address 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 3484 policy table has been proposed in IETF “draft-arifumi-v6ops-addr-select-ps-00.txt”



How to select the proper source address for each destination ?

Problem 2: Next-hop Selection

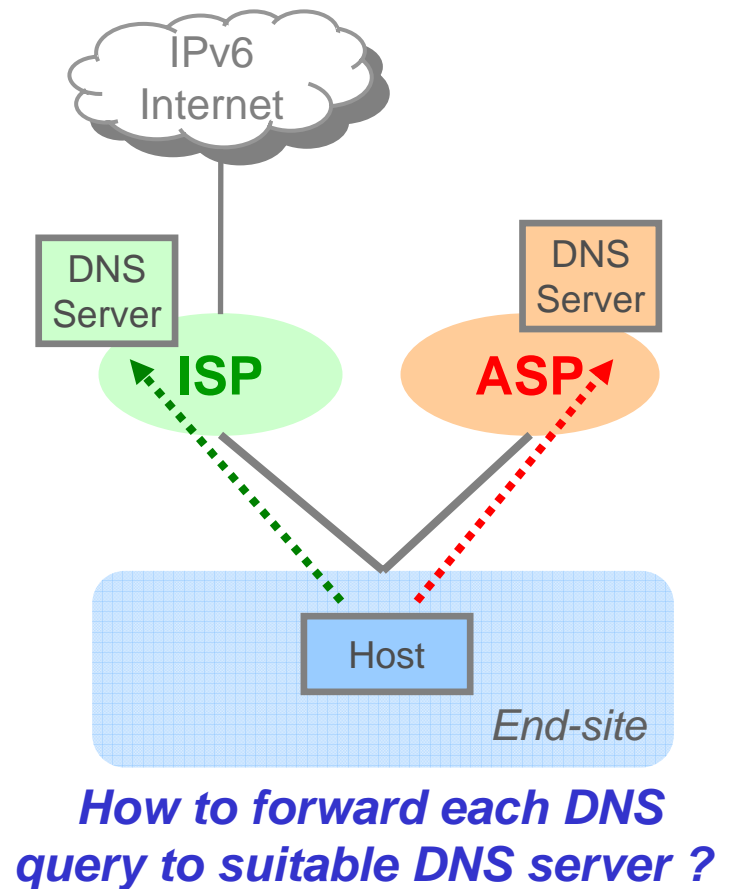
- Conditions
 - End-site connects to each xSP with a respective gateway.
 - Each gateway sends ICMPv6 RA (Router Advertisement) messages to hosts in the end-site.
- Problems
 - hosts select only one gateway of a xSP as the preferred default gateway.
 - Then, the reachabilities to the other xSPs are lost.
- 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



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.



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

→ solves “Problem 1: next-hop selection”

● RFC 3484 policy table

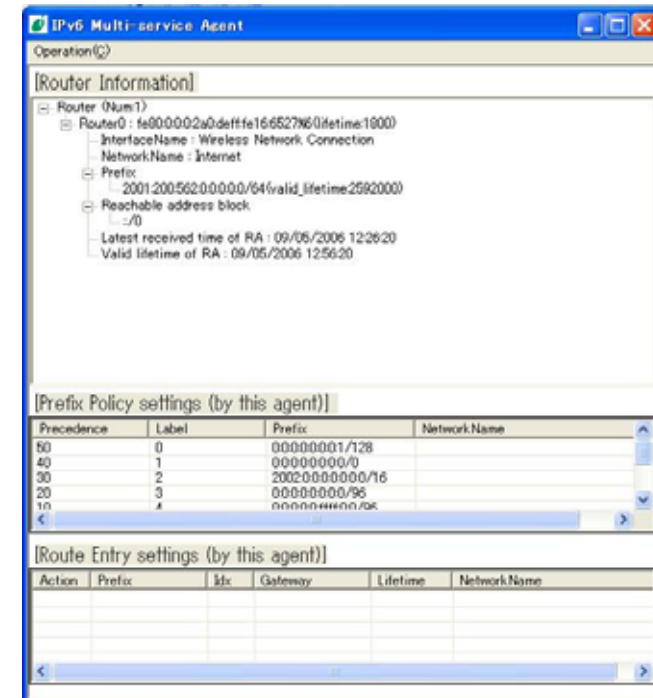
→ solves “Problem 2: source address selection”

● System requirements

- OS: Windows XP SP2

(supports Vista in near future)

Screenshot of status info display



If you have any interest in this tool, please contact us 😊

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