Enterprise Multihoming 
using Provider-Assigned Addresses 
without Network Prefix Translation: 
Requirements and Solution

draft-ietf-rtgwg-enterprise-pa-multihoming-02

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Refresh: Problems with PA Multihoming

Q: How to send packets to the correct uplink (BCP38)?
Q: How to implement policies?
Q: How to react to links failure/recovery?

WITHOUT NAT!
Q: How to send packets to the correct uplink (BCP38)?
A: Source Address Dependent Routing (SADR)

Q: How to implement policies?
Q: How to react to link failure and recovery?
A: Influence source address & next-hop selection on hosts

Solutions with PA Multihoming
The only change since -01

Changing the Step3 of Generating Source-Prefix-Scoped Forwarding Tables process:

- Might lead to routing loops in mixed environments
Example Topology: Routing

2001:db8:aaaa::/48

eth0

Scoped to 2001:db8:ffff::/48

RouterB, SADR

2001:db8::/32

eth1

 Scoped to 2001:db8::/32

RouterA

src-dst

D=::/0  S=::/0


D=::/0  S=::/0

D=2001:db8::/32  S=2001:db8::/32
Augment each source-prefix-scoped forwarding table with unscoped forwarding table entries based on the following rule. If the destination prefix of the unscoped forwarding entry exactly matches the destination prefix of an existing source-prefix-scoped forwarding entry (including destination prefix length), then do not add the unscoped forwarding entry. If the destination prefix does NOT match an existing entry, then add the entry to the source-prefix-scoped forwarding table.
unscoped forwarding entries
D=::/0                           NH=RA

forwarding entries scoped to S=2001:db8:ffff:/48
D=2001:db8:aaaa::/48     NH=Eth0

forwarding entries scoped to S=2001:db8::/32
D=2001:db8::/32       NH=Eth1

unscoped forwarding entries
D=::/0                          NH=RA

scoped to S=2001:db8:ffff:/48
D=::/0                            NH=RA
D=2001:db8:aaaa::/48 NH=Eth0

scoped to S=2001:db8::/32
D=2001:db8::/32     NH=Eth1
D=::/0                          NH=RA

unscoped forwarding entries
D=::/0                          NH=SERb1
Loop Scenario

**Router B, SADR**

- Scoped to 2001:db8:ffff::/48
- D=2001:db8:aaaa::/48
- NH=Eth0
- D=::/0 NH=RA

- Scoped to 2001:db8::/32
- D=2001:db8::/32
- NH=Eth1
- D=::/0 NH=RA

**Router A**

- src-dst
- D=::/0
- S=::/0

**Source IP**
- 2001:db:ffff::1

**Destination IP**
- 2001:db::1

Loop!!!
Root Cause

Routes are copied from the unscoped table to scoped

Solution

Consider “unscoped” as “scoped for ::/0” and copy from “less specific to more specific” starting from “::/0” aka “unscoped”
unscoped forwarding entries
D=::/0          NH=RA

forwarding entries scoped to S=2001:db8:ffff::/48
D=2001:db8:aaaa::/48     NH=Eth0

forwarding entries scoped to S=2001:db8::/32
D=2001:db8::/32     NH=Eth1

unscoped forwarding entries
D=::/0     NH=RA

RB

scoped to S=2001:db8:ffff::/48
D=2001:db8:aaaa::/48     NH=Eth0
D=2001:db::/32     NH=Eth1
D=::/0     NH=RA

RB

scoped to S=2001:db8::/32
D=2001:db8::/32     NH=Eth1
D=::/0     NH=RA

unscoped forwarding entries
D=::/0     NH=SERb1
QUESTIONS/COMMENTS?