Conditional Router Advertisements
for
Enterprise PA Multihoming

draft-linkova-v6ops-conditional-ras-01

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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!
“Enterprise Multihoming using Provider-Assigned Addresses without Network Prefix Translation: Requirements and Solution” I-D(*)

- attempts to define a complete solution to the problem;
- relies on SADR and the default address selection Rule 5.5
  - “Prefer addresses in a prefix advertised by the next-hop.”

(*) IETF96 v6ops slides
What Can Be Done Right Now, Right Here?

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
   w/o Rule 5.5 by deprecating undesirable prefixes
Selecting the Uplink

- Two uplinks used for Internet access (primary/backup or active/active)
- Simple network topology
- Each ISP allocates a prefix
- Packets SHOULD NOT be sent to the uplink if
  - It’s backup uplink and the primary one is up
  - The packet source address does not belong to that ISP
INTERNET

ISP_A

ISP_B

Enterprise network

R1

2001:db8:1::/48

2001:db8:2::/48

R2

2001:db8:1::f00/64

host

2001:db8:2::f00/64
Influencing the Source Address Selection

If the primary uplink is operational

Address from the backup prefix SHOULD NOT be used

If the ISP uplink fails

Addresses from that ISP prefix SHOULD NOT be used

deprecate the address
Proposed Approach

RA fields values are set based on the present network state ("conditionally")

prefix 2001:db8:1:1::/64
preferred lifetime 604800

prefix 2001:db8:1:1::/64
if SOME_CONDITION is true
  then
    preferred lifetime 604800
else
  preferred lifetime 0
Potential Triggers
- Interface state
- Route presence

...anything else?

Fields to Be Updated
- PIO Preferred Lifetime
- Router Lifetime

...anything else?
Examples
2001:db8:1::/48
- if Uplink_A is up:
  - Preferred lifetime 7d
- else:
  - Preferred lifetime 0

2001:db8:2::/48
- if Uplink_A is up:
  - Preferred lifetime 0
- else:
  - Preferred lifetime 7d

condition: Primary ISP_A Uplink Status

2001:db8:1::/64 preferred
2001:db8:2::/64 deprecated
2001:db8:1::/64
If Uplink_A is up:
Preferred lifetime 7d
Else:
Preferred lifetime 0

2001:db8:2::/64
If Uplink_A is up:
Preferred lifetime 0
Else:
Preferred lifetime 0

2001:db8:1::/64 deprecated
2001:db8:2::/64 preferred
2001:db8:1::/48

if Uplink_A is up:
Preferred lifetime 7d
Else:
Preferred lifetime 0

2001:db8:2::/48

if Uplink_B is up:
Preferred lifetime 7d
Else:
Preferred lifetime 0

Active/Active Uplinks

Non-zero preferred lifetime for the active uplink prefix

Condition: Upinks Status

2001:db8:1::/64 preferred
2001:db8:2::/64 preferred

Non-zero preferred lifetime for the active uplink prefix
2001:db8:1::/48
if Uplink_A is up:
Preferred lifetime 7d
else:
Preferred lifetime 0

2001:db8:2::/48
if Uplink_B is up:
Preferred lifetime 7d
else:
Preferred lifetime 0

Active/Active Uplinks

Zero preferred lifetime for the failed uplink prefix

Non-zero preferred lifetime for the active uplink prefix

Condition:
Uplinks Status

ISP_A

ISP_B

R1

host

2001:db8:1::/48 deprecated
2001:db8:2::/48 preferred
2001:db8:1::/64

if Uplink_A is up:
Preferred lifetime 7d
Else:
Preferred lifetime 0

2001:db8:2::/64

if Uplink_A_route::
Preferred lifetime 0
else:
Preferred lifetime 7d

**R1 Policy:**

2001:db8:1::/64
if Uplink_A is up:
Preferred lifetime 7d
Else:
Preferred lifetime 0

**R2 Policy:**

2001:db8:2::/64
if Uplink_A_route::
Preferred lifetime 0
else:
Preferred lifetime 7d

**Primary/Backup Uplinks, Two Routers**

**Non-Zero preferred lifetime for the primary uplink prefix**

**Prefered Lifetime: 604800**
Prefix: 2001:db8:1::/64

**Prefered Lifetime: 0**
Prefix: 2001:db8:2::/64

**Zero preferred lifetime for the backup uplink prefix**
2001:db8:1:1::/64

If Uplink_A is up:
Preferred lifetime 7d
Else:
Preferred lifetime 0

2001:db8:2:1::/64

If Uplink_A_route:
Preferred lifetime 0
Else:
Preferred lifetime 7d

R1 Policy:
2001:db8:1:1::/64
If Uplink_A is up:
Preferred lifetime 7d
Else:
Preferred lifetime 0

R2 Policy:
2001:db8:2:1::/64
If Uplink_A_route:
Preferred lifetime 0
Else:
Preferred lifetime 7d

Zero preferred lifetime for the failed primary uplink prefix

Non-Zero preferred lifetime for the backup uplink prefix
2001:db8:1:1::/64
if Uplink_A is up:
  Preferred lifetime 7d
else:
  Preferred lifetime 0

2001:db8:2:1::/64
if Uplink_B is up:
  Preferred lifetime 7d
else:
  Preferred lifetime 0

R1 Policy:
2001:db8:1:1::/64
if Uplink_A is up:
  Preferred lifetime 7d
else:
  Preferred lifetime 0

R2 Policy:
2001:db8:2:1::/64
if Uplink_B is up:
  Preferred lifetime 7d
else:
  Preferred lifetime 0
2001:db8:1::/64
if Uplink_A is up:
Preferred lifetime 7d
Else:
Preferred lifetime 0

2001:db8:2::/64
if Uplink_B is up:
Preferred lifetime 7d
else:
Preferred lifetime 0

R1 Policy:
2001:db8:1:1::/64
if Uplink_A is up:
Preferred lifetime 7d
else:
Preferred lifetime 0

R2 Policy:
2001:db8:2:1::/64
if Uplink_B is up:
Preferred lifetime 7d
else:
Preferred lifetime 0

Active/Active Uplinks, Two Routers
2001:db8:1::/64
if Uplink_A_route:
Preferred lifetime 7d
Else:
Preferred lifetime 0

2001:db8:2::/64
if Uplink_B_route:
Preferred lifetime 7d
Else:
Preferred lifetime 0

R3 Policy:
2001:db8:1:1::/64
if Uplink_A_route:
Preferred lifetime 7d
Else:
Preferred lifetime 0

2001:db8:2:1::/64
if Uplink_B_route:
Preferred lifetime 7d
Else:
Preferred lifetime 0
et cetera, et cetera...