SLAAC’s Reaction to Renumbering Events

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Problem Statement
Introduction

- Sample scenario:
Problem statement

- Problem scenario
  - CPE router is hard-rebooted
  - CPE router crashes and reboots

- What happens when the CPE router comes back to life?
  - Quite frequently it has no state of previously-leased prefix
  - It thus request a new prefix via DHCPv6-PD
  - The new prefix is announced on the LAN

- What about the previous prefix?
  - It is still there!
  - Announced lifetimes allow continued use for days to months
Problem statement (II)

• Result:
  • Old addresses are maintained
  • Quite frequently, such addresses are preferred
  • Old routes are maintained

• What does this mean?
  • Connectivity with new owner of prefix not possible
  • IPv6 connectivity may fail
  • In dual-stack scenarios, it may mean more IPv4 traffic
    – Due to Happy Eyeballs
Deployments that avoid the problem

- Sites that use stable prefixes
  - Pro’s
    - Nice for law-enforcement – prefix identifies the user!
    - Upon reboots CPE gets same prefix so… no problem!
  - Con’s
    - Some provisioning systems reportedly don’t support this
    - Bad for user privacy – RFC4941 mostly useless with stable prefixes!
    - Some ISPs want to charge extra for stable prefixes – ala IPv4

There is no spoon. The network should be resilient!
Deployments that avoid the problem (II)

- CPEs that record leased prefixes on stable storage
- Many (most?) simply don’t
- It’s tricky, anyway
  - They have to be able to record many prefixes
  - Lease times of days/months, ant reboots may be frequent
  - And should announce them for remaining leased time
- You cannot rely on the CPE recording prefixes on stable storage

*There is no spoon.* The network should be resilient!
How we think it should be solved

- Get rid of stale addresses and router in a timelier manner
- If the same router advertises a new prefix (but not the previous one), assume the prefix has become stale
- Count number of consecutive RAs from same router with PIOs that do not include the previous prefix:
  - After one such RA, unprefer the addresses
  - After N additional ones, remove the addresses and routes

This solves the problem at the hosts themselves
How we think it should be solved (II)

- This issue begs a number of questions...
- Does it really make sense for Prefix Lifetime > Router Lifetime?
  - In the context of RFC8028, it doesn’t make much sense
  - Announce the prefix for the whole lease time, but never with lifetimes larger than the Router Lifetime.
- What’s the point of announcing a prefix with a lifetime of one month?
  - Just keep the addresses in the event of dead router?

Making appropriate usage of timers can help legacy hosts
Ongoing Work
Ongoing work at the IETF

- We published two different IETF I-Ds
  - draft-gont-v6ops-slaac-renum
    - Problem statement and operational mitigations
  - draft-gont-6man-slaac-renum
    - Protocol improvements

The problem will not be solved unless you get involved
Questions?
Thanks!

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IPv6 Hackers mailing-list
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