Signalling DHCPv6 Prefix Delegation Availability

draft-collink-6man-pio-pflag-02

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IETF 117, July 2023
Recap: Problem Statement

● IPv6 devices almost always have multiple addresses
  ○ Link-local, stable, privacy, 464xlat, multiple prefixes/renumbering, …
  ○ Often, share connectivity to other IPv6 stacks (VMs, containers, tethered devices, …)

● On some networks, it’s advantageous to hand a prefix to every device
  ○ Tracking individual /128s is a scaling problem
    ■ Some enterprise APs drop packets after X (=6, 8, …) addresses per device

● Other networks, (e.g., home network with a /60) have no problem with lots of addresses, but don’t have enough prefixes to hand out a /64 per device

● This draft defines a way to tell the device which prefix (PIO or PD) to use
Recap: Proposed Solution

- Add a new P flag to the PIO
  - “If you understand this flag, please DHCPv6 PD to get a unique prefix, and assign addresses from that prefix, instead of using SLAAC on the on-link prefix”

- Why in the PIO?
  - Must be available to the device before it does SLAAC => must be in RA
  - Specific to the particular prefix
    - Allows, for example, to SLAAC for ULA and PD for global space
    - In a multihoming situation, not different upstreams might support different mechanisms
Update since IETF 116

● Requested last call for draft-ietf-v6ops-dhcp-pd-per-device in v6ops this week

● Changes since -00:
  ○ Added Security Considerations and Privacy Considerations
  ○ Spec changes:
    ■ On routers, P flag SHOULD be configurable and SHOULD be set to 0 by default
    ■ Device MUST perform a REBIND if it sees set of P-flag PIOs change
    ■ Device MUST ignore prefix if it's not of suitable size to support SLAAC (longer prefixes remove the device’s ability to extend connectivity downstream via ND proxying)
    ■ Device MAY fall back to SLAAC if it does not receive any prefixes
Changes since -01 (this week)

- **#20** Clarify that devices that is configured to run PD, or devices whose primary purpose is to provide connectivity to other devices (e.g., CE routers as described by [RFC 7084](https://tools.ietf.org/html/rfc7084)), SHOULD run PD even if P=0

- Minor changes:
  - **#18** Remove mentions of DECLINE
  - **#19** Change “host” to “device” to match v6ops document
Next steps

- Requesting WG adoption
Questions?
Appendix: Using the delegated prefix

- Device MAY use as many addresses as it wants
- Device MAY use prefix to assign IPv6 addresses to internal components such as VMs and containers
- If permitted by device policy, device MAY use prefix to extend the network
  - ➔ device MUST use DHCPv6 PD hint for prefix size sufficient to use SLAAC
    - Extending the network is already always possible via NAT44 / NAT66. PD allows extension of end-to-end connectivity as well
Appendix: Renumbering

- Device tracks every (unexpired) PIO with P=1
  - Keep DHCPv6 PD running as long as at least one such prefix exists
  - Start PD SOLICITs or REBIND when such a prefix appears or is deprecated
  - Routers that require DHCPv6 PD to work can still request PD regardless of P flag

- Why not RECONFIGURE?
  - Not widely implemented, difficult to use (requires authentication)
Appendix: Multihoming

- If multiple PVDs on link, every packet’s source address must match next-hop

- Device shall maintain the mapping between delegated prefixes and routers (relay) link-local addresses so Rule 5.5 can be used
  - (yet unclear) what if relay is not collocated with the router

- Why not PVD option in DHCPv6?
  - Previous work in this area was blocked by an IPR claim

- Why not ICMPv6 redirects?
  - Redirects not specific to source address