IPv6 Prefix Delegation Models

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Draft History

- Draft -00 posted 11/06/2015 and announced to v6ops
- Draft -01 resolved list comments on MLD/DAD
- Draft -02 published 6/27/2016 and was reviewed by Internet Draft Review Team July/August 2016; resulted in publication of -03
- Additional revisions between August 2016-Oct 2017
- Draft -15 presented at IETF100. Significant comments received at wg session and on the list afterwards.
- Now at Draft -19 (includes version-by-version changelog)
- https://datatracker.ietf.org/doc/html/draft-templin-v6ops-pdhost

IPv6 Prefix Delegation Models

- IPv6 Prefix Delegation entails:

  1) the communication of a prefix from the network to a requesting router,

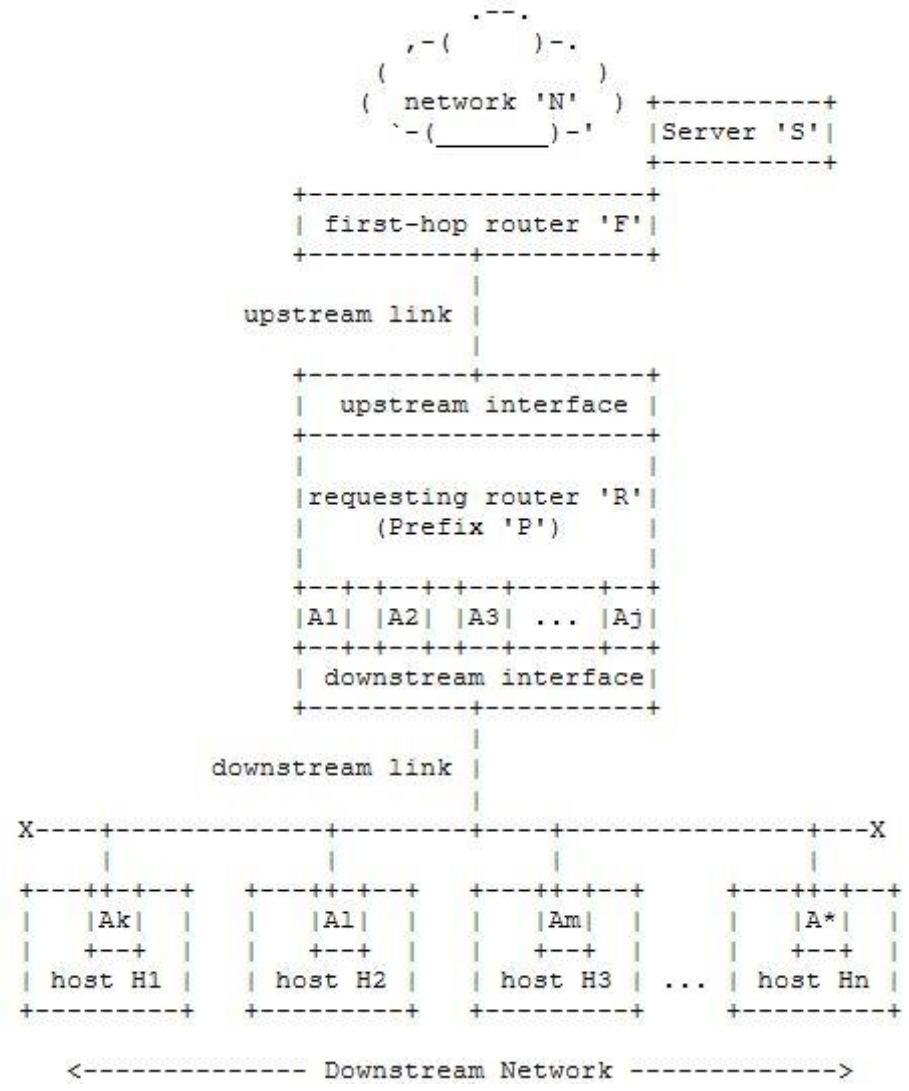
  2) a representation of the prefix in the network's Routing Information Base (RIB) and the first-hop router's Forwarding Information Base (FIB), and

  3) a control messaging service to maintain prefix lifetimes.

- Example service is DHCPv6 Prefix Delegation (DHCPv6 PD)
- Document considers the case where the "requesting router" is a node that obtains a delegated prefix for its own internal multi-addressing purpose or to attach a tethered "Internet of Things"

Case 1: Classic Routing Model

- Network ‘N’ delegates prefix ‘P’ to requesting router ‘R’
- ‘R’ can delegate sub-prefixes from ‘P’ to downstream networks and/or assign addresses ‘A(i)’ taken from ‘P’ to a downstream interface
- Hosts ‘H(j)’ assign addresses ‘A(i)’ taken from ‘P’, and may also further delegate sub-prefixes from ‘P’ on their own downstream interfaces
- Example 1: cellphone with tethered external network (e.g., bluetooth)
- Example 2: laptop with an internal virtual network of VMs



Case 2: Weak End System Model

- ‘R’ can assign addresses ‘A(i)’ to an internal virtual interface (e.g., a loopback) without invoking MLD/DAD on the upstream interface
- Example: any host with an internal virtual interface on which addresses can be assigned

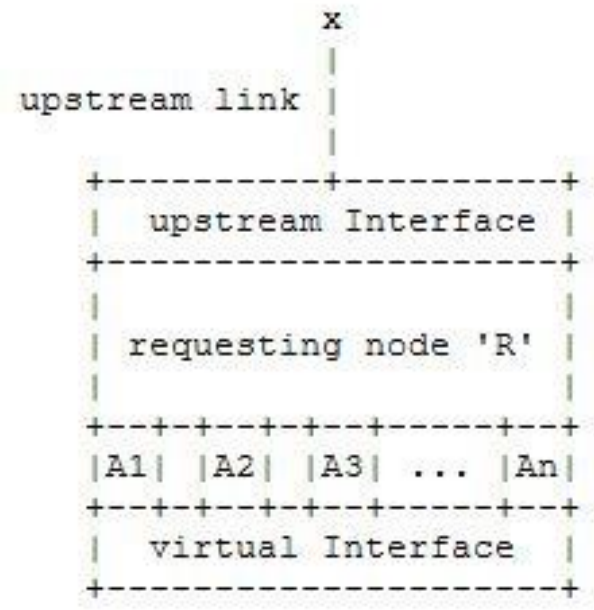


Figure 2: Weak End System Model

Case 3: Strong End System Model

- ‘R’ can assign addresses ‘A(i)’ to an upstream interface without invoking MLD/DAD
- Example: any host that cannot assign addresses to any other interfaces besides the upstream

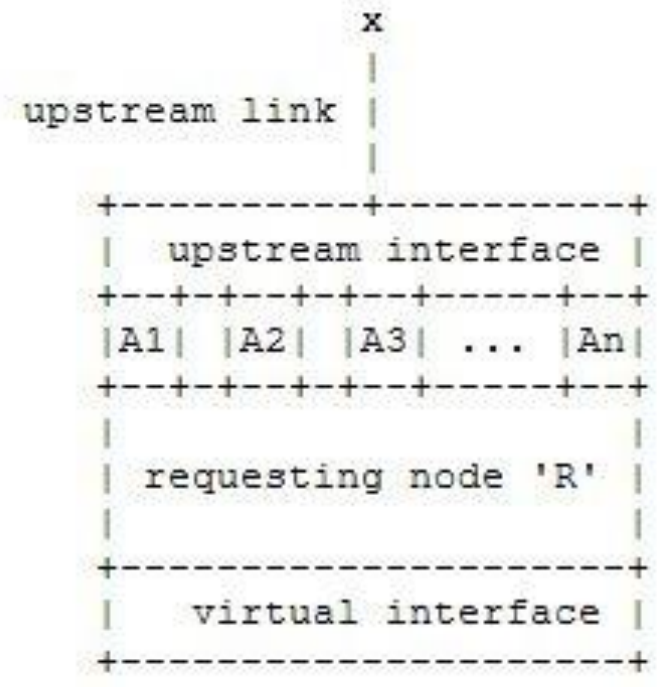


Figure 3: Strong End System Model

Changes since IETF100

- Title changed from “IPv6 Prefix Delegation for Hosts” to “IPv6 Prefix Delegation Models” (based on list comments)
- New section on Address Autoconfiguration Considerations
  - Cites RFC6434(bis) Section 6 as autoconfig reference
  - Acknowledges that Subnet Router Anycast address must be honored
- Updated figures to relax strict dependency on “Delegating Router / Requesting Router” model
  - Opens possibility for prefix delegation service options that do not instrument the first-hop router
  - But, network must still somehow inject routing information

Changes since IETF100 (2)

- New section on Prefix Delegation Services (list comments):

  “Selection of prefix delegation services must be considered according to specific use cases. An example service is that offered by DHCPv6 [RFC3633]. An alternative service based on IPv6 ND messaging has also been proposed [I-D.pioxfolks-6man-pio-exclusive-bit].

  Other, non-router, mechanisms may exist, such as proprietary IPAMs, [I-D.ietf-anima-prefix-management] and [I-D.sun-casm-address-pool-management-yang].”

Questions

1. Do we want to remain prefix delegation service agnostic, or focus on one specific service (e.g., DHCPv6-PD)?
2. What do we call end systems that receive a prefix delegation? Host? Router? Node?
3. Does the answer to 2. depend on the weak-host, strong-host distinction?

Backups