Prefix Delegation extension to Neighbor Discovery protocol

draft-kaiser-nd-pd-00

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Earlier works ND-PD

• draft-haberman-ipngwg-auto-prefix-02.txt, 2002. (dhcp-pd didn’t exist)

• draft-lutchann-ipv6-delegate-option-00.txt, 2002. (dhcp-pd didn’t exist)

Use-cases

• Vehicle-to-vehicle-to-infrastructure communications (V2V2I)
• On a road
• Distinction: vehicle with a SIM subscription vs. without such.
• Offer Internet to vehicles nearby
  – IV == advertisement vehicle, traffic control vehicle, etc.
• Convoy formation
• Other “vehicular” use-cases:
  – Train – a string of wagons
  – Tractor and tracted vehicle
  – Fixed buses at garage with partial wifi coverage.
• Also see
  – draft-petrescu-its-scenarios-reqs-01.txt
  – draft-ietf-mext-nemo-ro-automotive-req-02
ND-PD vs X

• ND-PD vs DHCP-PD (RFC 3633)
  • ND available on all IPv6-enabled devices, parts in kernel
    – Few additional software development needed for ND-PD
  • Two message exchange, instead of 4
    – Fast configuration
  • ND link-scope service:
    – Faster prefix(es) delegation/release compared to message-relaying (DHCPv6 Relay)
    – Link-scope discovery useful for vehicle-to-vehicle communications
  • DHCP offers little means to
    – a Server to dynamically discover a Relay, and vice-versa.
    – simultaneously delegate a prefix and exchange routes.

• ND-PD vs MIP-NEMO-DHCP-PD (RFC6276)
  • MIP-NEMO used by IV, conformance to ISO.
    – wouldn’t work when infrastructure Internet is not available (nor when non-Internet fixed infrastructure 11p is available).
    – imposes the use of tunnels.
    – subject to stalemate situations [*].
  • DHCPv6-PD used on IV to acquire prefix from home.
    – wouldn’t work when infrastructure Internet is not available.
    – imposes use of tunnels.
    – (?) imposes DHCP Relay and Client on IV wouldn’t accept a second DHCP Relay, to serve LV.

• ND-PD vs routing protocols
  • AODVv2, DYMO, LOADng, OLSR, RPL, OSPF-manet, Homenet

ND-PD Functionnalities

- ND-PD message semantics strongly inspired by DHCPv6_PD [*]

- Message types:
  - REQ: requesting prefix(es)
  - REN: renew previously delegated prefix(es)
  - REB: rebind previously delegated prefix(es)
  - REL: release prefix(es) no more needed
  - REP: reply to any of the above messages

- A delegating router advertises the ND_PD service it provides using the RA Flag Option [**]

[*] O. Troan et al., "IPv6 Prefix Options for DHCPv6", RFC 3633, December 2003
Conclusions & future work

- ND-PD: an IPv6-enabled devices built-in functionality that provides a prefix delegation mechanism in a fast way (2 messages exchange)
  - Suitable for mobile and short-lived networks

- Draft in progress: a new version of the draft will be submitted soon

- The proposed ND-PD mechanism has been experimented with two-vehicles on road (WiFi in-between vehicles, and 3G for IV).

- Feedback is very welcome and desired.

- Integrate with ND Route Exchange [*] and write new draft self-configuration of ULA prefixes out of VIN.