Prefix Delegation extension to Neighbor Discovery protocol

draft-kaiser-nd-pd-00

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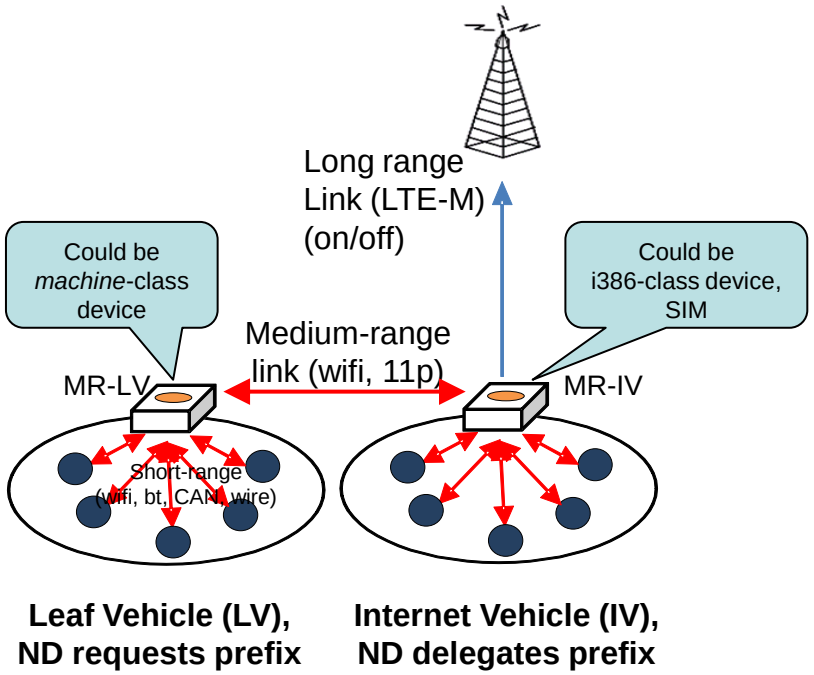
Earlier works ND-PD

- 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)
- draft-rao-ipv6-prefix-delegation-01.txt, 2007. (dhcp-pd existed 2003)

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

[*] C. Ng *et al.*, " Network Mobility Route Optimization Problem Statement", section 2.7, RFC4888, July 2007.

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

[**] B. Haberman *et al*. "IPv6 Router Advertisement Flags Option", RFC 5175, March 2008

Conclusions & future work

- ND-PD: an IPv6-enabled devices built-in functionnality 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.

[*] A. Petrescu *et al.*, "Router Advertisements for Routing between Moving Networks", draft-petrescu-autoconf-ra-based-routing-02.txt, Work in Progress, February 2012.