IPv6 Neighbor Discovery Prefix Registration

draft-ietf-6lo-prefix-registration

IETF 122

Bangkok

6LoWPAN ND (IPv6 Stateful Address Autoconfiguration)

RFC 6775 (original 6LoWPAN ND)

Defines ARO for registration and DAD operations for stateful AAC

RFC 8505 (Issued 11/2018)

The protocol agnostic registration for ULA/GUA for proxy ND and routing services

Analogous to a Wi-Fi association but at Layer 3: a deterministic and query-able state for all addresses

RFC 8929 (Issued 11/2020)

Federates 6lo meshes over a high-speed backbone

ND proxy analogous to Wi-Fi bridging but at Layer 3

RFC 8928 (Issued 11/2020)

Protects addresses against theft (Crypto ID in registration)

RFC 9685 (Issued 11/2024)

Extends RFC 8505 for multicast and anycast

draft-thubert-6lo-unicast-lookup

Provides a 6LBR on the backbone to speed up DAD and lookup

Coexistence with classical ND

draft-ietf-6lo-prefix-registration

Extends RFC 8505 for prefixes

News

- Technical content stable since IETF 121
- Added text to clarify motivations (next slides)
- Passed WG last call

Addition N°1: Saving Energy

6LoWPAN was a pioneering attempt at the IETF to design protocols that conserve energy, with the primary goal to serve LLNs, though the general design could be applied in other environments where lowering carbon emissions is also a priority. The general design points include:

* Placing the protocol complexity in the routers to simplify the host implementation and avoid expanding the control traffic to all nodes.

* Restful operations from the host perspective to enable transient disconnections where the power usage can be lowered.

This translates into:

* Stateful proactive knowledge in the routers that is available at any point of time.

* Unicast host to router operations stimulated by the host and its applications.

* Minimal use of asynchronous broadcast operations that would keep the host awake and listening with no application-level need to do so.

Addition N°2: Use NS/NA

This specification extends the above registration and subscription methods to enable a node to register a prefix to the routing system and get it injected in the routing protocol. As with [RFC8505], the prefix registration is agnostic to the routing protocol in which the router injects the prefix, and the router is agnotic to the method that was used to allocate the prefix to the node. The energy conservation principles in [RFC8505] are retained as well, meaning that the node does not have to send or expect asynchronous broadcast messages.

It can be noted that an energy-conserving node is not necessarily a router, so even when advertising a prefix, it is a design choice not to use RA messages that would make the node appear as a router to peer nodes. From the design principles above, it is clearly a design choice not to leverage broadcasts from or to the node, or complex state machines in the node. It is also a design choice to use and extend the EARO as opposed to the Route Information Option (RIO) [RFC4191] because the RIO is explicitly not intended to serve in routing, and is lacking related control information like the R bit in the EARO. Additionally, an RA with RIO cannot be trusted for a safe injection in the routing protocol for the lack of the equivalent of the Registration Ownership Verifier (ROVR) [RFC8928] in the EARO.

Thanks!

Questions?