A Unified Stateful/Stateless Autoconfiguration Service based on IPv6 Neighbor Discovery Extensions

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A Unified Stateless/Stateful Autoconf Service

• IPv6 Neighbor Discovery (RFC4861/RFC4862) supports Stateless Address AutoConfiguration (SLAAC)
• DHCPv6 (RFC3315/RFC3633) is a separate stateful service
• Goal: a unified stateless/stateful autoconfiguration service
Benefits of a Unified Service

• Condense complex multi-messaging exchanges into a single and concise message exchange
• Reduces congestion on low-end links (e.g., 6LoWPAN, satellite communications, aeronautical wireless, etc.)
• Reduces number of multicast messages that could unnecessarily wake up sleeping nodes
• Accommodates both stateless and stateful services in a way that combines the best aspects of both
Unified Service Mechanisms

• Define a new IPv6 ND option code known as the “DHCPv6 Option”
• Option encapsulates DHCPv6 client/server messages
• When a node comes onto a link, it can send a Router Solicitation (RS) with an embedded DHCPv6 option
• Routers on the link receive the option and forward it to the DHCPv6 server
• DHCPv6 server processes the option as a DHCPv6 client request, and forwards a DHCPv6 reply to the client via the router(s)
• Routers include the DHCPv6 reply in a DHCPv6 option in their unicast Router Advertisement (RA)

• Four or more messages condensed into just two
• No need for examining RA “M” & “O” bits
• Legacy routers that do not recognize the option simply ignore it
• A single unified service for all autoconfiguration
Unified Service Mechanisms (2)

• Other types of stateful options could be included in IPv6 ND messages, e.g., PLOX options (PIO with “X” bit set)

• Stateful services could be provided at L2, but would entail additional messaging on links where IPv6 ND messaging could provide a unified service
Draft History

• Draft -00 posted 11/20/2017. Announced to the list, with several comments received
• Draft -01 incorporated padding sub-option to pad DHCPv6 message option to even quadword alignment
• Drafts -02 thru -04 included other stateful service options, including PIOX and out-of-band L2 messaging
• Now at Draft -05
• https://datatracker.ietf.org/doc/html/draft-templin-6man-dhcppv6-ndopt
Backups