Multiple Stateful DHCPv6 Options Issues

DHC WG

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Background

- When RFC 3315 was written, did not have a clear model of how multiple IA type options (i.e., IA_NA and IA_PD) should be handled

- RFC 3633 added Prefix Delegation, but did not clarify model

- Implementation experience of CPE model in RFC 6204 has shown multiple issues with the DHCPv6 protocol in supporting multiple IA type options

- Assumption is single administrative domain

One Solicit with Multiple IA Types

- What happens if server can not supply all?
  - Client uses what it gets? (IA_NA or IA_PD, not both)
  - Client continues to request other IA type option(s) separately?
  - If not, when does client ever ask for not supplied bindings?
  - Advertise "odd" if no IA_NA/IA_TA can be provided – NoAddrsAvail is in message Status Code Option, not encapsulated in IA_NA/IA_TA option(s)
- What happens if lifetimes for IAs are different?
  - Does client renew both at shortest time?
  - Does it send separate requests when each time is reached?
- What happens when client detects link state change?
  - IA_NA requires Confirm
  - IA_PD requires Rebind (Confirm not allowed)

Separate Transactions for each IA Type

- Increases requests when address and prefix needed
  - 8 packets instead of 4 for Solicit/Advertise Request/Reply
  - 4 packets instead of 2 for Renew/Rebind
  - Avoids link state issue (Confirm vs Renew)
- Increases complexity
  - Requires separate state machines
  - Requires handling multiple sets of other configuration options
- Does simplifies when to initiate DHCPv6
  - IA_PD can be done 'immediately'
  - IA_NA could wait for RA with M
- Supports split (address vs prefix delegation) administrative domains
  - Considered out-of-scope and unlikely to be realistic

Draft Proposes Single Transaction

- One single set of messages exchanges is favored
  - Client uses bindings that it gets from server
  - Client uses shortest lifetime across all bindings for Renew/Rebind timings
  - Client includes IA type options it did not get in subsequent Renew/Rebind requests
  - Server essentially treats unknown bindings in Renew/Rebind as it does for a Request
  - Confirm extended to PD

Advertise Acceptance Change

- A client should accept Advertise messages even when not all IA type options are being offered

- A client should only ignore an Advertise message when no IA type options at all are being offered
  - Important for client implementers to understand that these Advertises do NOT terminate Solicit retransmissions

Advertise Status Code Change

- While be great to move Status Code option with NoAddrsAvail into IA (i.e., same as for Reply and IA_PD in Solicit), this would break existing clients
  - Could add option for client to signal it can handle this but that complicates client/server implementations and not worth it
- Thus live with existing Advertise handling and change clients to understand that if multiple IA types requested, client should proceed with Request if any IAs (i.e., IA_PD) were provided "leases"

T1 / T2 Timers

- To avoid need for separate Renews/Rebinds
  - Servers should set the T1/T2 times for all IA type options in a Reply (and Advertise) to the same values (using the 'shortest' lifetime)
  - Clients should use the shortest T1/T2 values (either explicit or implied) from any IA type option
  - Above means updating either client or server will introduce new behavior

Renew / Rebind Handling

- Client includes all IA_ options from Solicit and Request, even those for which it got no lease

- Server essentially treats unknown bindings for Renew and Rebind as it does for a Request

- If a client has no lease at all, it is not allowed to Renew/Rebind
  - A server should return the NoBinding Status Code for all IA type options in this case rather than treating the Renew/Rebind as a Request

PD - Confirm or Rebind?

- Extend Confirm to Delegated Prefixes
- Clients SHOULD use Confirm; not Rebind
  - Confirm has a specific meaning and doesn't overload Renew (or Rebind)
  - Confirm is lower processing cost as the server does not need to extend lease times or otherwise send back options
  - The NotOnLink status code is sufficient to cover all IA type options as it indicates to the client that it must Solicit for new information

Release / Decline

- Client may release or decline individual leases

- How does client get "back" lease?

  – Recommend using Renew, as long as client still has a lease; otherwise should Solicit / Request

  – Client MAY do this at any time, though must avoid Renew storm (i.e., if IA type not assigned lease, MUST NOT retry immediately – wait until T1)

Next Steps

- ✓ Adopted, updated, and published as WG item after IETF 83
- ✓ Has had discussion on mailing list
- ➢ Start WG Last Call as soon as possible
- ➢ Eventually incorporate into a 3315/3633bis

Multiple Administrative Domains

- Still planning to write new Internet-Draft on multiple administrative domains
- Basic proposal will be for Advertise to include "Administrative Domain" option which contains an "administrative domain string"
- Clients treat Advertises with the same administrative domain string as 'equal'
- Clients may select one or several administrative domains
  - If multiple, each is a separate state machine