

Multiple Stateful DHCPv6 Options Issues

DHC WG

IETF 83 – Paris

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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 has? (IA_NA or IA_PD, not both)
 - Client continues to request other type separately?
 - If not, when does client ever ask for missing?
 - Advertise is rather odd if no IA_NA can be answered – NoAddrsAvail is in message Status Code Option, not in IA_NA
- When does client send request?
 - Wait for RA for M bit?
- What happens if lifetimes for IAs are different?
 - Renew both at shortest time
 - Send separate requests
- What happens when client detects link state change?
 - IA_NA requires Confirm
 - IA_PD requires Renew

Separate Solicits for Each Type

- Increases requests
 - 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
- 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 (will say more above this later)

Propose Single Solicit

- One single set of messages exchanges is favored
 - If client doesn't get all information, it uses what it got
 - Client includes IA type options it did not get in Renew/Rebind requests if still interested in these
 - Server treats unknown binding(s) in Renew/Rebind as it does for a Request

Advertise Acceptance Change

- A client should accept Advertise messages, even when not all IA type options are being offered
- A client should 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 it would be best to move Status Code option with NoAddrsAvail into IA (i.e., same as Reply and for IA_PD), this would likely break existing clients
 - Would require 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, they need to proceed with Request if other IAs (i.e., IA_PD) were provided “leases”

T1 / T2 Timers

- To avoid need for separate Renews/Rebinds:
 - Servers should set the T1/T2 timers for all IA_ 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
 - Note 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 treats unknown bindings for Renew and Rebind as it does a Request
- Exception to above
 - If a client got has no lease at all, it is not allowed to Renew/Rebind
 - A server should return the NoBinding Status Code for each IA_ option in this case rather than treating the Renew/Rebind as a Request

Confirm / Renew Handling

- Encourage Renew instead of Confirm
 - Provides more information to client and relays
 - Should we consider Rebind (for failover, etc.)?
- Extend Confirm to include Delegated Prefixes and clients MAY use Confirm
 - 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
 - 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

- Discussion on proposal
 - Comments now
 - Comments on mailing list!
- Draft issued Wednesday (draft-troan-dhc-dhcpv6-stateful-issues-00.txt)
- Adopt as WG item
- Eventually incorporate into 3315/3633bis

Multiple Administrative Domains

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