

# Prefix Pool Option for DHCPv6 Relay Agent

draft-yeh-dhc-dhcpv6-prefix-pool-opt-01

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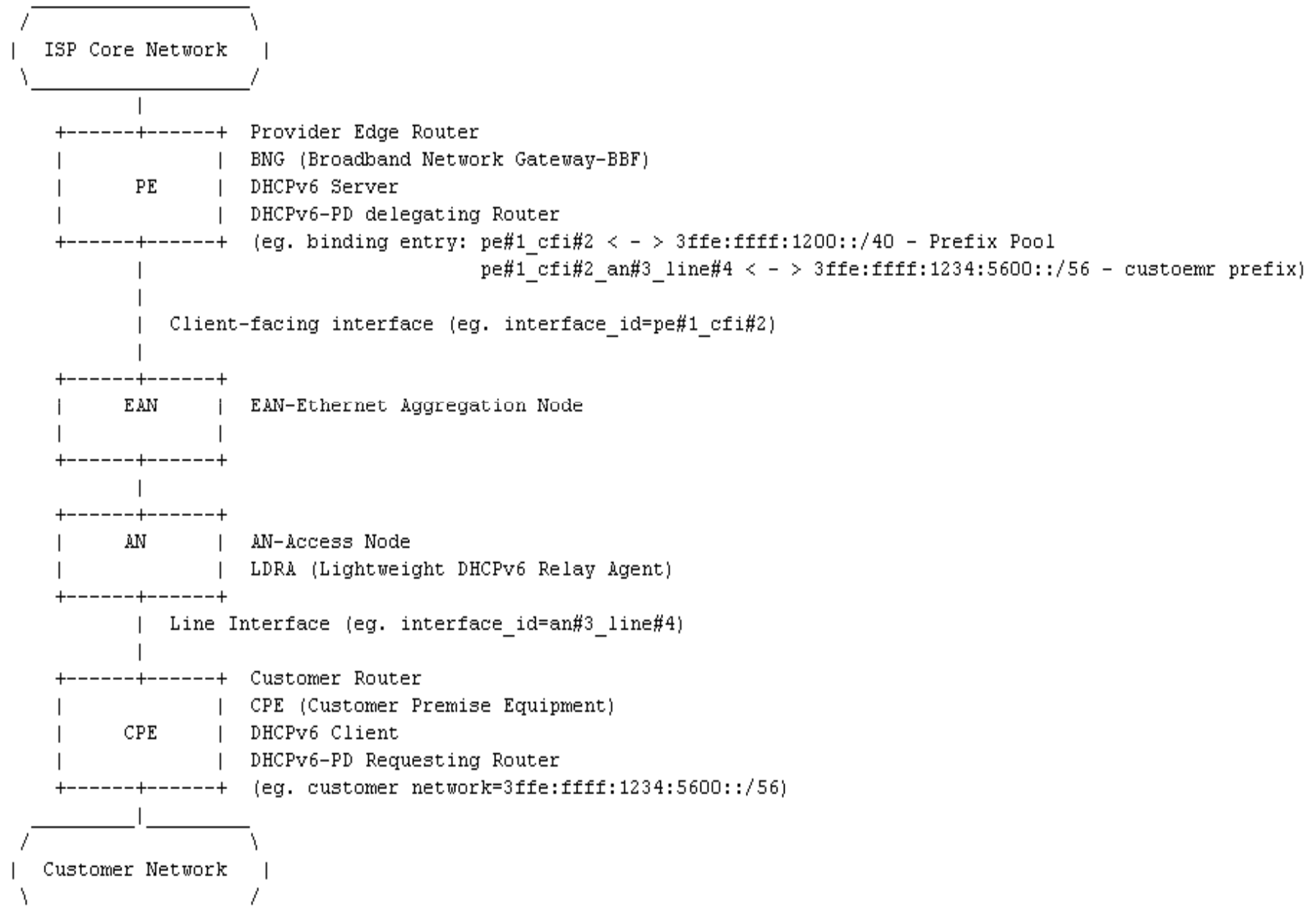
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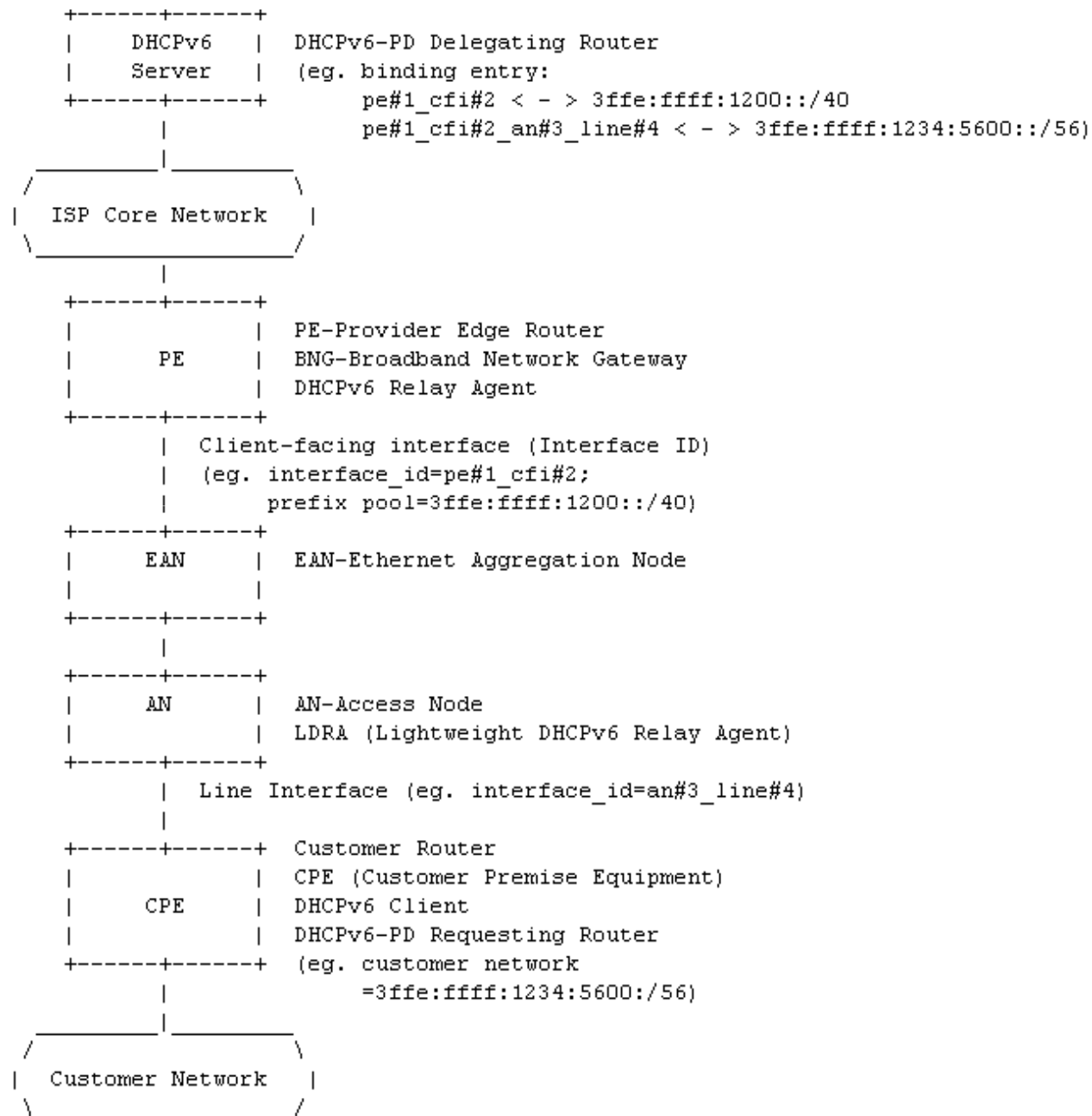
# Problem Statement

- DHCPv6 **Prefix Delegation** [RFC3633] is used as the mechanism for the automated delegation of IPv6 prefix to the customer network, when a CE (or Routed-RG) is employed in the customer network.
- In order to make the customer network to be reachable in the IPv6 network, the **PE** routers always need to add or remove the **route entry directing to each customer network in its routing table** per the messages between DHCPv6 Server (Delegation Router) and Customer router (Requesting Router).
- **When the routing protocol is enabled** on the network-facing interface of the PE router, all the routes directing to the customer networks are advertised in the ISP core network. This will make the number of entries in the routing table on the ISP core router to be unacceptable huge.
- **For example, if there are 1M active subscribers in the ISP network, then the number of the route entries in the core router could be 1M.**

# Network Scenario #1- PE acts as the DHCPv6 Server



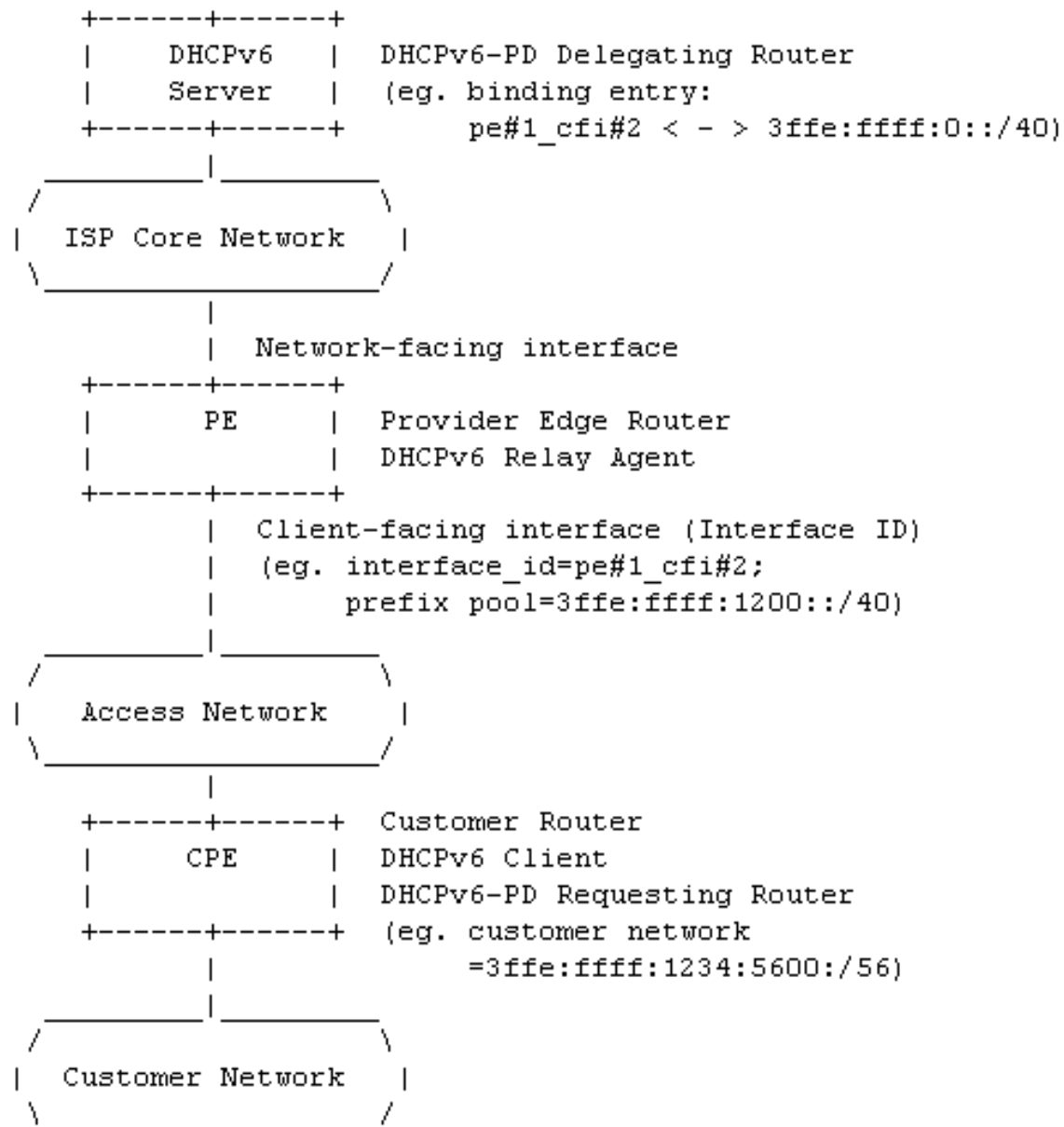
# Network Scenario #2 – PE acts as the Relay Agent



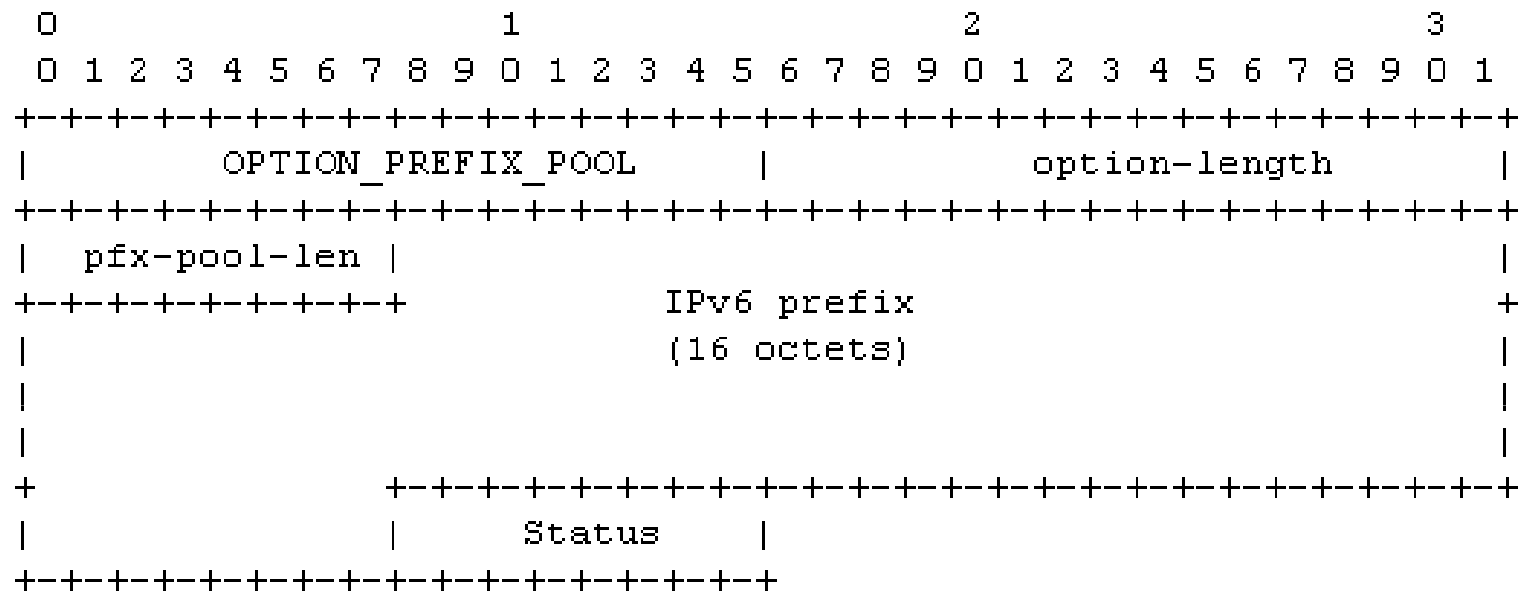
## Aggregate Route on PE

- Do you agree it is **necessary** to aggregate the routes directing to the customer networks on the PE router?
- If the answer is yes, then how to aggregate route when PE acts as a Relay Agent in the above **scenario #2**?
  - We need a mechanism to transfer the information about Prefix Pool from Server to Relay Agent?

# Network Scenario #3 – Simplified #2 for the reference mode in this I.D.



# Prefix Pool Option - Solve the problem within DHCPv6



```
option-code:      OPTION_PREFIX_POOL (TBD)
option-length:    18
pfx-pool-len:     Length for the prefix pool in bits
IPv6 prefix:      IPv6 prefix of the prefix pool
```

```
Status:           Status of the prefix pool
                  Name      Code
                  Valid     0
                  Released   1
```

# Design Goal

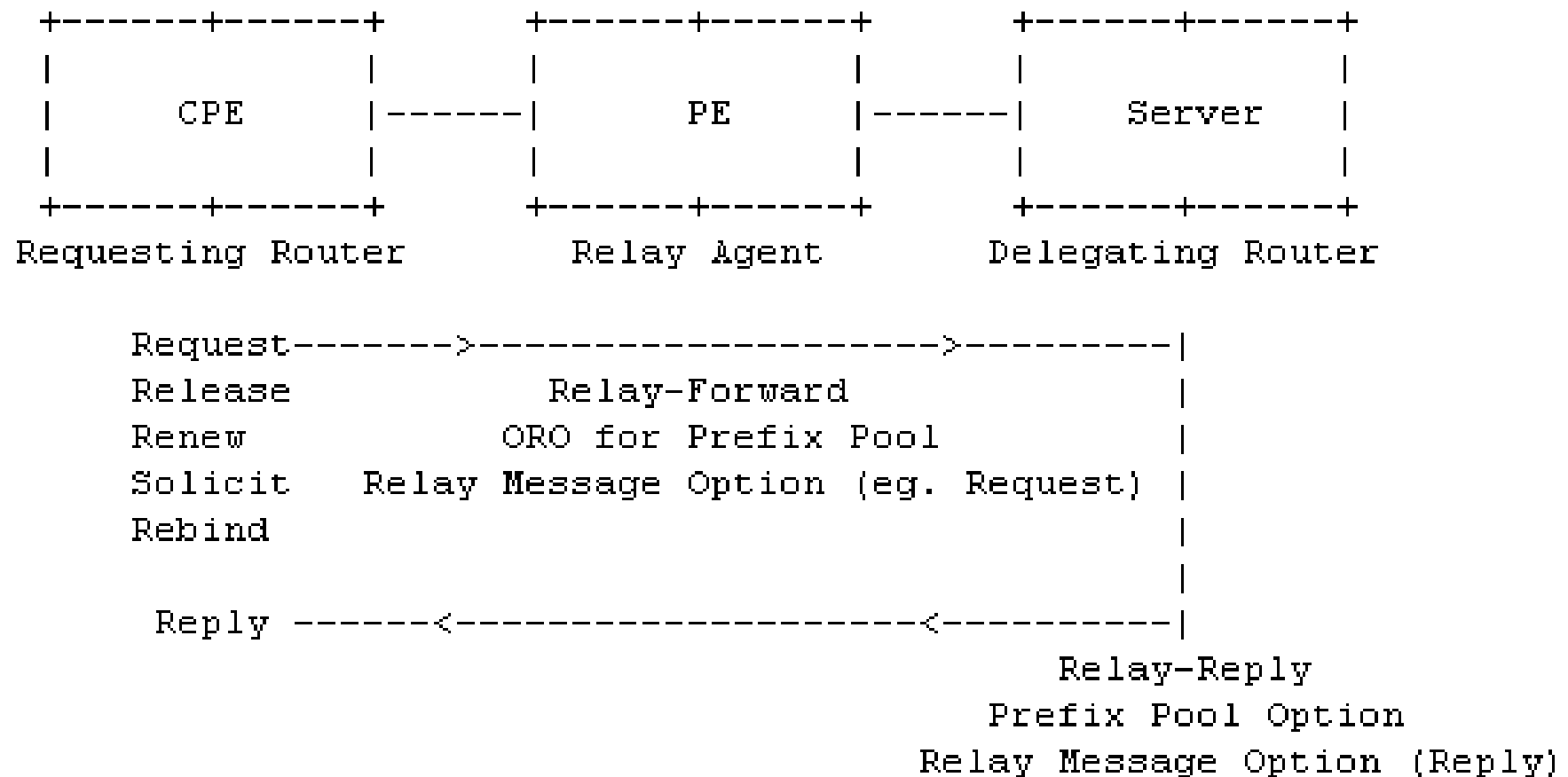
- The Relay Agent can **enable** or disable the function of the route aggregation.
- The status of Prefix Pool can be **re-set** by the Server.



# Message Exchange - 1

- Prefix Pool Option is **nested** (or included) in the message between server and client.
  - Relay include ORO in the relay-forward message
  - Server include Prefix Pool Option in the relay-reply message
- It shall work with **PD** process closely.
  - Delegating Router Solicitation (Section 11 of RFC3633)
    - Solicit-Reply exchange
  - Requesting Router initiated PD (Section 12 of RFC3633)
    - Request-Reply exchange
    - Renew-Reply exchange
    - Release-Reply exchange
    - Rebind-Reply exchange
  - PD Reconfiguration (Section 13 of RFC3633)
    - Renew-Reply exchange

# Message Exchange - 2



# Relay Agent Behavior

- The Relay Agent includes **Option Request Option** (6) to request Prefix Pool option from the server, who maintains the status of the prefix pools associated to the particular client-facing interface of the Relay Agent where receiving the message from clients.
- The Relay Agent may include the ORO for Prefix Pool Option in the relay-forward (12) message of **SOLICIT (1)**, **REQUEST (3)**, **RENEW (5)**, **REBIND (6)** and **RELEASE (8)**.
- The Relay Agent should includes **Interface ID option** (18) for the server to identify the associated interface on which the prefix pool is configured.
- After received the Prefix Pool option for that particular client-facing interface in the relay-reply message (13) message of **REPLY (7)** from the server, the Relay Agent shall **add or remove the aggregation route entry per the status of the prefix pool**.
- The Relay Agent **advertises its routing table** including the entries of the aggregation routes based on the information of prefix pools when the routing protocol is enabled on its network-facing interface.

# Server Behavior

- The Server shall use the **Interface ID** included in the relay-forward message by the relay agent to identify the client-facing interface of the relay agent on which the associated prefix pool will be configured.
- After receives the ORO in the relay-forward message, the Server **should** include **Prefix Pool option** with the status indicated for the associated client-facing interface of the relay agent in the relay-reply message of **REPLY**.
- If the prefix of the customer network associated to the IA\_PD option in the relay-forward message of **RELEASE** is **the last releasing prefix within the associated prefix pool**, the Server shall turn the status of the associated prefix pool to be 'Released'. After receives the ORO in the relay-forward message, the Server must include Prefix Pool option with the status of 'Released' for the associated client-facing interface of the relay agent in the relay-reply message of **REPLY**.
- When the status of prefix pool is reset by manual configuration, the Server shall initiate the relay-reply message of **RECONFIGURE (10)**, **if there is at least one prefix indicated to be valid within the associated prefix pool on the Server**.

# Summary of the Discussion in the Mail-list

(<http://www.ietf.org/mail-archive/web/dhcgw/current/threads.html>)

- Prefix Pool Option is Different with RAAN (RA Assignment Notification) option defined in the previous expired I.D.
  - Prefix Pool Option – Necessary for Prefix Pool
  - RAAN – RA has the alternative way , such as snooping, to get the information about the customer prefix delegated or addresses assigned
- Interface ID nested by RA of PE is different with the Interface ID nested by LDRA of AN.
  - Interface ID of RA - Client-facing interface where the prefix pool is located
  - Interface ID of AN – Subscriber Line for the identification of customer prefix
- Efficiency for the message exchange
  - RA could decide whether it will include the ORO for the Prefix Pool if it already got the same prefix pool for that customer; (eg. In the case of Renew)
  - Server could decide whether it will include the prefix pool option in the relay-reply message if the same prefix pool has been sent before.
- Reliability
  - Rely on the robustness of DHCPV6-PD

# Proposal

- Thanks for the discussion in the mail-list before this presentation with:
  - *Roberta Maglione*
  - *Bernie Volz*
  - *Ted Lemon*
  - *Ole Troan*
  - *JOSHI, SHRINIVAS ASHOK*
- Is it a good idea to let this I.D. to be a WG item?