DHCPv4 over DHCPv6 Source Address Option
(draft-fsc-softwire-dhcp4o6-saddr-opt-06)

Ian Farrer, Qi Sun, Yong Cui

DHC, ietf97, Nov 2016
Motivation

- Deterministic 4over6 mechanisms require coupling IPv4 and IPv6 addresses
  - A Softwire has to be sourced from a specific IPv6 address
  - Addresses are pre-allocated (blocked out) for clients
  - Results are address wastage and lack of flexibility

- This proposal allows the client to signal its v6 binding source address to server using DHCPv4 over DHCPv6 (RFC7341) and Dynamic Allocation of Shared IPv4 Addresses (RFC7618)
  - The DHCPv4o6 then holds all of the client’s binding information so this can be used to provision lwAFTRs

- The final standards track draft needed for the architecture described in draft-liu-softwire-lw4over6-dynamic-provisioning
  - Enables the dynamic set up of softwires v4/v6 bindings
  - More efficient v4 usage (pools only need to be big enough for active clients)
  - Flexible source v6 address choice
    - Any routable v6 address is OK
History

• The draft has been worked on in Softwire for some time
• But all of the described functions need to be implemented in the DHCPv4 over DHCPv6 client and server
• DHCPv4 over DHCPv6 (RFC7341) and Dynamic Allocation of Shared IPv4 Addresses (RFC7618) were worked on in DHC
• So (hopefully) DHC is the right place for it!
Dynamic Provisioning Overview

1. DHCPv6: DHCP4o6 server address

2. DHCP4o6: BR address IPv4 Address+PSID Prefix hint

3. DHCP4o6: Client’s IPv6 Tunnel Endpoint

4. IPv4 over IPv6 communication

(Binding table update for the Lease (Netconf/NMS/foo)

• (2&3) are carried by the new source address options within the normal DHCP4o6 message flow (two arrows shown, but normal DHCP4o6 4 messages)
Two New DHCP4o6 Options Defined

- **DHCPv4 over DHCPv6 Source Address Hint Option** (guides the client to select the best prefix to construct the softwire from)

```
0 1 2 3 4 5 6 7 8 9 0 1 2 3 4 5 6 7 8 9 0 1
+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+
|                   OPTION_DHCP4O6_SADDR_HINT                      |
+-------------------+------------------------------------------+-------------------+
|    option-length  |                          cipv6-hintlen                     |
|                   |                         cipv6-prefix-hint                  |
|                   |                          (variable length)                  |
+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+
```

- **DHCPv4o6 Source Address Option** (informs the server of the /128 softwire source address that the client will use)

```
0 1 2 3 4 5 6 7 8 9 0 1 2 3 4 5 6 7 8 9 0 1
+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+
|                   OPTION_DHCP4O6_SADDR                      |
+-------------------+------------------------------------------+-------------------+
|    option-length  |                          cipv6-src-address                      |
|                   |                         (128 bits)                               |
+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+
```
Dynamic Provisioning Overview

DHCP 4o6 Client

Step 1

DHCPDISCOVER (DHCPv4)

ORO with OPTION_S46_BR,
OPTION_DHCP4O6_SADDR_HINT(DHCPv6)

Step 2

DHCOFFER (DHCPv4)

OPTION_S46_BR, OPTION_DHCP4O6_SADDR_HINT
(cipv6-prefix-hint with service provider’s
preferred prefix) (DHCPv6)

Step 3

DHCPREQUEST (DHCPv4)

OPTION_S46_BR,
OPTION_DHCP4O6_SADDR (cipv6-bound-prefix with
client’s bound /128 IPv6 address) (DHCPv6)

Step 4

DHCPACK (DHCPv4)

OPTION_S46_BR,
OPTION_DHCP4O6_SADDR (cipv6-bound-prefix with
client’s bound /128 IPv6 prefix) (DHCPv6)
Implementation Experience

• Currently implementing this in
• DHCP4o6 OpenWRT Client (alongside RFC7341(done) and RFC7618)
• Kea DHCP4o6 Server
• Implementation not completed yet, but a race condition in the message flow (requesting DHCPv4o6 configuration before a suitable prefix is configured on the client)
• Draft will be updated with this and any additional findings as the implementation proceeds
Next Steps

• Please review / comment
• Move the draft to DHC?
• Call for adoption?
Thank you!

IETF97, Seoul