# Unified IPv4-in-IPv6 Softwire CPE: Focus on DHCP

**IETF 87-Berlin, July 2013**

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# Background

- A lot of work on DHCP based softwire provisioning has happened recently in both established and new drafts (in both Softwire & DHC)
- Currently, there is no up-to-date overview that describes how all of the different provisioning mechanisms work with each other
- This presentation attempts to gather together all of the current DHCP based provisioning in one place and to describe where things are unaligned or missing

# The Current Approach

- For all solution flavors, RFC6334 is used to configure the tunnel endpoint
- By default, the customer end-node should support [I-D.ietf-softwire-map-dhcp] to provision IPv4-related connectivity parameters
- If a dynamic port assignment scheme is adopted, [ I-D.ietf-dhc-dhcpv4-over-dhcpv6] should be supported

# Question to the WG

- Should that behavior be maintained or should it be simplified?
  - i.e., [I-D.ietf-softwire-map-dhcp] is used even for the dynamic port assignment scheme
  - Any thoughts?
  - If the answer is Yes
    - Then, we are done
    - If not, we still have some issues to resolve

# Isn't it great to have OPTIONs?

| OPTION Name | Purpose | Defined In |
|---|---|---|
| **OPTION_S46** | Container option | draft-ietf-softwire-map-dhcp-04 |
| **OPTION_S46_BRULE** | MAP-E Basic Mapping rule + MAP-T mode indicator (when rule IPv6 <128) | draft-ietf-softwire-map-dhcp-04 |
| **OPTION_S46_FRULE** | MAP forward mapping rule | draft-ietf-softwire-map-dhcp-04 |
| **OPTION_S46_PORTPARAMS** | Restricted ports set (PSID format) for MAP1:1 & lw4o6 port set (TBC) | draft-ietf-softwire-map-dhcp-04 |
| **OPTION_AFTR_NAME** | Tunnel Endpoint FQDN | RFC6334 |
| **OPTION_MAP_BIND** | lw4o6 v4 address for NAT | draft-ietf-softwire-unified-cpe-01 |
| **OPTION_MAP_BIND_DYN** | Indicator that DHCPv4oDHCPv6 config should be attempted | draft-ietf-softwire-unified-cpe-01 |
| **OPTION_BOOTP_MSG** | Carries DHCPv4 messages | draft-ietf-dhc-dhcpv4-over-dhcpv6-01 |
| **OPTION_DHCP4_O_DHCP6_ENABLE** | Flag to turn on DHCPv4 over DHCPv6 in the client | draft-ietf-dhc-dhcpv4-over-dhcpv6-01 |
| **OPTION_DHCP4_O_DHCP6_SERVERS** | Address(es) to send uncast DHCPv4oDHCPv6 messages to | draft-ietf-dhc-dhcpv4-over-dhcpv6-01 |
| **OPTION_lwAFTR_NAME** | lw4o6 Tunnel Endpoint FQDN | draft-sun-softwire-lw4over6-dhcpv6-00 |
| **OPTION_PORTPARAMSV4** | Restricted ports set (PSID format) in v4 for dynamic shared addressing | draft-farrer-dhc-shared-address-lease-00 |
| **OPTION_DHCPV4_O_DHCPV6_SADDR** | Convey softwire v6 addr between client&server | draft-farrer-dhc-shared-address-lease-00 |

# Possible Provisioning Approaches

1. Static configuration DHCPv6 only
2. Static configuration DHCPv6 w/ DHCPv4oDHCPv6 (for additional v4 options)
3. Dynamic Addressing Configuration DHCPv6 & DHCPv4oDHCPv6

# 1) Static configuration (DHCPv6 only) Provisioning Matrix

| | MAP-E Mesh | 1:1 Full Addr (MAP1:1, lw4o6) | 1:N Shared Addr (MAP1:1, lw4o6) |
|---|---|---|---|
| **OPTION_S46_BRULE** | Yes | No | No |
| **OPTION_S46_FRULE** | Yes (opt) | No | No |
| **OPTION_S46_PORTPARAMS** | No | No | Yes |
| **OPTION_AFTR_NAME** | Yes | Yes | Yes |
| **OPTION_MAP_BIND** | No | Yes | Yes |

# 2) Static configuration w/ Additional Options (DHCPv6 + DHCPv4oDHCPv6) Provisioning Matrix

| | MAP-E Mesh | 1:1 Full Addr (MAP1:1, lw4o6) | 1:N Shared Addr (MAP1:1, lw4o6) |
|---|---|---|---|
| **OPTION_S46_BRULE** | Yes | No | No |
| **OPTION_S46_FRULE** | Yes (opt) | No | No |
| **OPTION_S46_PORTPARAMS** | No | No | Yes |
| **OPTION_AFTR_NAME** | Yes | Yes | Yes |
| **OPTION_MAP_BIND** | No | Yes | Yes |
| **OPTION_DHCP4_O_DHCP6_ENABLE OR OPTION_MAP_BIND_DYN (See Issue #3)** | Yes | Yes | Yes |
| **OPTION_DHCP4_O_DHCP6_SERVERS** | Yes (opt) | Yes (opt) | Yes (opt) |

# 3) Dynamic Addressing Configuration DHCPv6 & DHCPv4oDHCPv6 Provisioning Matrix

| | MAP-E Mesh | 1:1 Full Addr (MAP1:1, lw4o6) | 1:N Shared Addr (MAP1:1, lw4o6) |
|---|---|---|---|
| **OPTION_S46_BRULE** | n/a | No | No |
| **OPTION_S46_FRULE** | n/a | No | No |
| **OPTION_S46_PORTPARAMS** | n/a | No | No |
| **OPTION_AFTR_NAME** | n/a | Yes | Yes |
| **OPTION_MAP_BIND** | n/a | No | No |
| **OPTION_DHCP4_O_DHCP6_ENABLE OR OPTION_MAP_BIND_DYN (See Issue #3)** | n/a | Yes | Yes |
| **OPTION_DHCP4_O_DHCP6_SERVERS** | n/a | Yes (opt) | Yes (opt) |
| **OPTION_PORTPARAMSV4** | n/a | No | Yes |
| **OPTION_DHCPV4_O_DHCPV6_SADDR** | n/a | Yes | Yes |

# Issue #1

- softwire-map-dhcp-04 doesn't contain an OPTION_MAP_BIND as the lw4o6 configuration flag (described in softwire-unified-cpe) for static full and shared address allocation
  - **Proposed Action**: update softwire-map-dhcp to include this

# Issue #2

- When dynamic port set assignment is enforced using I-D.ietf-dhc-dhcpv4-over-dhcpv6, a new DHCPv4 option to distribute port sets is needed
  - **Proposed Action**: Use PSID format from softwire-map-dhcp for all restricted port range provisioning (DHCPv6, DHCPv4oDHCPv6, static and dynamic)
  - Add defaults for the offset field – ‘6’ for MAP – ‘0’ for lw4o6 to relevent drafts

# Issue #3

- A trigger necessary to indicate whether I-D.ietf-dhc-dhcpv4-over-dhcpv6 configuration should be attempted
- Currently, OPTION_MAP_BIND_DYN & OPTION_DHCP4_O_DHCP6_ENABLE (+ unicast option) both describe this
  - **Proposed action**: Include OPTION_DHCPv_O_DHCP6_ENABLE + unicast option in OPTION_S46 (desc. In map-dhcp draft)
  - If OPTION_S46_FRULE or OPTION_MAP_BIND are also present, then it is used to obtain additional DHCPv4 options, not for addressing

# Issue #4

- So far, MAP-T hasn't been included within provisioning
- Softwire-map-dhcp (sec 6.1) describes MAP-T as being configured by using a value <128 for prefix6-len within OPTION_S46_FRULE
- This is contrary to the Unified CPE approach of using presence/absence of options NOT option values to indicate which function to configure
  - **Proposed solution:** Create a new option using the OPTION_S46_FRULE format specifically to configure MAP-T (where prefix6-len must be <128)
  - Change OPTION_S46_FRULE so that 128 is the only valid value for prefix6-len, or remove it altogether

# Issue #5

- Currently, all concentrator configuration (AFTR, lwAFTR, BR) is done through OPTION64
- OPTION_lwAFTR_NAME describes a second concentrator configuration option used for lw4o6 only
- This brings two questions

1. Is a second concentrator provisioning option needed?
2. If yes, then shouldn't other softwire mechanisms also have them?

# Next Steps

- Update draft-ietf-softwire-unified-cpe to reflect the outcome of this discussion
- Update other affected drafts in line