Unified IPv4-in-IPv6 Softwire CPE

draft-ietf-softwire-unified-cpe-00

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Motivation

- From discussions at IETF85, there was an agreement to ‘unify’ the CPEs for the different IPv4 in IPv6 software tunnel approaches that exist or are being developed
  - DS-Lite ‘B4’ (Stateful mode)
  - Lightweight 4 over 6 ‘lwB4’ (Binding mode)
  - MAP-E ‘MAP-CE’ (Stateless mode)
- This is to ensure compatibility between the approaches and flexibility for operators
  - Gives the operator the ability to choose which functionality they want their CPEs to support
  - Allows 3rd party CPEs to work on an operators network
  - Prevents an operator being ‘locked in’ to a single solution due to the functionality of their deployed CPEs (if they deploy CPEs with multiple capabilities)
- The tunnel concentrators for each mode are still separated for each solution (non-unified 😊)
Unified CPE Overview

• Describes logic for Softwire tunnel initiators (CPEs) to use the presence or absence of configuration parameters to determine which Softwire ‘mode’ to operate in

• Describes the different softwire modes by their functional characteristics and the parameters necessary to configure them

• **Specify** a unified behavior
  – A Generic bootstrapping logic
  – Identify the list of requirements
  – A configuration example based on DHCP options is included
  – This does not exclude other provisioning channels
Parameters Necessary for Config.

- The following parameters are necessary to configure each of the different functional modes:

<table>
<thead>
<tr>
<th>Mode</th>
<th>Parameters</th>
</tr>
</thead>
<tbody>
<tr>
<td>DS-Lite</td>
<td>Remote IPv4 in IPv6 tunnel endpoint address</td>
</tr>
<tr>
<td>Lw4o6</td>
<td>Remote IPv4 in IPv6 tunnel endpoint address</td>
</tr>
<tr>
<td></td>
<td>Public IPv4 Address</td>
</tr>
<tr>
<td></td>
<td>Restricted port-set</td>
</tr>
<tr>
<td>MAP-E</td>
<td>Mapping rules</td>
</tr>
<tr>
<td></td>
<td>MAP domain parameters *</td>
</tr>
</tbody>
</table>

* MAP uses these rules to calculate the same configuration parameters as lw4o6 uses + a Forward Mapping Rule
Parameters Necessary for Config.

- Because there is a lot of overlap in the configuration parameters necessary, we use their presence / absence so that the CPE can configure itself correctly.

<table>
<thead>
<tr>
<th></th>
<th>Tunnel Endpoint</th>
<th>Binding rule (inc. Public IPv4 addr.)</th>
<th>Restricted port set</th>
<th>Forward Mapping Rule</th>
</tr>
</thead>
<tbody>
<tr>
<td>DS-Lite</td>
<td>✔</td>
<td>✗</td>
<td>✗</td>
<td>✗</td>
</tr>
<tr>
<td>Lw4o6</td>
<td>✔</td>
<td>✔</td>
<td></td>
<td>✗</td>
</tr>
<tr>
<td>MAP-E</td>
<td>optional</td>
<td>✗</td>
<td></td>
<td>✔</td>
</tr>
</tbody>
</table>
DHCP-Based Configuration Example

• Taking the above logic and applying it to a DHCP based configuration model ...

• Two DHCP options are necessary
  – Option 64, used for provisioning the softwire concentrator (DS-Lite AFTR, MAP-E BR, lw4o6 lwAFTR)
  – OPTION_MAP (draft-ietf-softwire-map-dhcp-v03) – Some changes would be necessary

• Through the use of these DHCP options
  – The client can use DHCP request ORO to indicate which softwire modes it is capable of supporting
  – The operator can supply the relevant options to the client to tell it which mode to mount
Proposed Change to OPTION_MAP

• Remove the DMR. This functionality will be provided by DHCP Option64 (OPTION_AFTR_NAME)

• Addition of a new sub-option OPTION_MAP_BIND for lw4o6 v4 address provisioning

PROPOSAL – As OPTION_MAP would be used as a more universal softwire configuration option, it should be renamed to reflect this (e.g. OPTION_SOFTWIRE)
Alignment of Configuration

• Currently, there are two methods by which a binding mode could be configured
  – Using lw4o6
  – Using MAP-E 1:1

• This needs to be aligned to actually unify the solution: A *single way of configuring a mode*

• The underlying mechanism used to implement this function doesn’t need to change

**PROPOSAL – MAP1:1 function gets provisioned using the OPTION_MAP_BIND (but would interpret this as ‘EA=0’)**
Next steps

• MAP & lw4o6 drafts to be updated to align with the unified CPE model
• Develop OPTION_MAP as the ‘softwire’ configuration DHCP option