A SAVI Solution for DHCP

Draf-ietf-savi-dhcp-05
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Outline

• Solution Overview
• Major revision since IETF77
  – Supplemental Binding Process to handle the special case
  – Prefix configuration
  – Some editing changes
• Discussion on mixed address assignment environment
• Next Step
Solution Overview
Typical Scenario

The Router or SAVI device may also play the role of DHCP Relay (or even DHCP server) in implementation.
Anchor Attributes

**Attribute**: Configurable features of anchor (e.g. SAVI switch port).
- An anchor may be configured to have **one or more** compatible attributes, depending on the requirement of administrator.

<table>
<thead>
<tr>
<th>Attribute</th>
<th>Action</th>
</tr>
</thead>
<tbody>
<tr>
<td>No attribute(by default)</td>
<td>Drop DHCP server type message</td>
</tr>
<tr>
<td>SAVI-Validation</td>
<td>Snooping &amp; Filtering</td>
</tr>
<tr>
<td>SAVI-SAVI</td>
<td>No binding and no filtering</td>
</tr>
<tr>
<td>SAVI-DHCP-Trust</td>
<td>Trust DHCP server type message</td>
</tr>
<tr>
<td>SAVI-BindingRecovery</td>
<td>Recovery binding triggered by data packet</td>
</tr>
<tr>
<td>SAVI-ExtSnooping</td>
<td>Recovery binding triggered by other control packets</td>
</tr>
</tbody>
</table>
States

• **START**
  – A DHCP request (or a DHCPv6 Confirm, or a DHCPv6 Solicitation with Rapid Commit option) has been received from host, and it may trigger a new binding.

• **LIVE**
  – A DHCP address has been acknowledged by a DHCP server.

• **DETECTION** (enabled when mixed address assignment are used in the local link, e.g. DHCPv6+SLAAC, manually configured address)
  – A gratuitous ARP or Duplicate Address Detection NSOL has been sent by the host (or the SAVI device).

• **BOUND**
  – The address has passed duplicate detection and it is bound with the binding anchor.
Implemented, tested, and deployed

- It became a feature of multiple vendors: ZTE, Huawei, H3C (3Com), Ruijie, Digital China, Bitway, Centec
- CERNET had formally tested those implementations: Conformance, Performance, Interoperability, and testing in production network after deployment
- More details in CNGI-CERENT2 deployment update PPT
Deployment Example: Tsinghua Univ. Campus Network

10 models form different vendors at 3 scenarios
### DHCPv6-only

**Digital China: DHCP-SLAAC-mix**

```plaintext
[ZJ14-L01-F-01]display ip check source ipv6
Total entries found: 5

<table>
<thead>
<tr>
<th>MAC Address</th>
<th>IP Address</th>
<th>VLAN</th>
<th>Interface</th>
<th>Type</th>
</tr>
</thead>
<tbody>
<tr>
<td>001c-b3ab-6162</td>
<td>FE80::21C:B3FF:FEAB:6162</td>
<td>1</td>
<td>GE1/0/5</td>
<td>ND-SNP</td>
</tr>
<tr>
<td>940c-6d74-c244</td>
<td>FE80::960C:6DFF:FE74:C244</td>
<td>1</td>
<td>GE1/0/7</td>
<td>ND-SNP</td>
</tr>
<tr>
<td>0022-156c-ba34</td>
<td>FE80::222:15FF:FE6C:BA34</td>
<td>1</td>
<td>GE1/0/9</td>
<td>ND-SNP</td>
</tr>
<tr>
<td>0011-2517-fe6b</td>
<td>2402:F000:5:C801:3463:B3D8:E63C:8FC8</td>
<td>1</td>
<td>GE1/0/14</td>
<td>DHCPv6-SNP</td>
</tr>
<tr>
<td>001f-d0a1-45ed</td>
<td>FE80::AD55:DE48:DDC9:2EDB</td>
<td>1</td>
<td>GE1/0/17</td>
<td>ND-SNP</td>
</tr>
</tbody>
</table>
```

### show savi ipv6 check source binding

```
static binding count: 0
Dynamic binding count: 8
Binding count: 8

<table>
<thead>
<tr>
<th>MAC</th>
<th>IP Address</th>
<th>VLAN</th>
<th>Port</th>
<th>Type</th>
<th>State</th>
<th>Expires</th>
</tr>
</thead>
<tbody>
<tr>
<td>90-e6-0a-78-f2-06</td>
<td>2402:f000:5:ca01:d999:3fae:bf36:4178</td>
<td>1</td>
<td>Ethernet1/14</td>
<td>dhcp</td>
<td>BOUND</td>
<td>1012389</td>
</tr>
<tr>
<td>90-e6-0a-78-f2-06</td>
<td>2402:f000:5:ca01:d999:3fae:bf36:4178</td>
<td>1</td>
<td>Ethernet1/14</td>
<td>sLaac</td>
<td>BOUND</td>
<td>4374</td>
</tr>
<tr>
<td>90-e6-0a-78-f2-06</td>
<td>2402:f000:5:ca01:d999:3fae:bf36:4178</td>
<td>1</td>
<td>Ethernet1/14</td>
<td>sLaac</td>
<td>BOUND</td>
<td>14276</td>
</tr>
<tr>
<td>90-e6-0a-78-f2-06</td>
<td>2402:f000:5:ca01:d999:3fae:bf36:4178</td>
<td>1</td>
<td>Ethernet1/14</td>
<td>sLaac</td>
<td>BOUND</td>
<td>14276</td>
</tr>
<tr>
<td>c8-0a-a9-41-b5-a1</td>
<td>2402:f000:5:ca01:d999:3fae:bf36:4178</td>
<td>1</td>
<td>Ethernet1/21</td>
<td>dhcp</td>
<td>BOUND</td>
<td>1036459</td>
</tr>
<tr>
<td>c8-0a-a9-41-b5-a1</td>
<td>2402:f000:5:ca01:d999:3fae:bf36:4178</td>
<td>1</td>
<td>Ethernet1/21</td>
<td>sLaac</td>
<td>BOUND</td>
<td>14058</td>
</tr>
<tr>
<td>c8-0a-a9-41-b5-a1</td>
<td>2402:f000:5:ca01:d999:3fae:bf36:4178</td>
<td>1</td>
<td>Ethernet1/21</td>
<td>sLaac</td>
<td>BOUND</td>
<td>14058</td>
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<td>Ethernet1/21</td>
<td>sLaac</td>
<td>BOUND</td>
<td>14058</td>
</tr>
</tbody>
</table>
```
Major revision since IETF77
Review and Revision

• After IETF77, there were at least two detail reviews from Christian Vogt, and Joel Halpern and some discussions

• After taking comments from Christian, e.g., remove the prefix configuration at DHCP (but we propose to have prefix conf. at savi-slaac), and the supplemental binding for binding recovery is also updated based on poll in the mailing-list, then we generated savi-dhcp-04

• After taking comments from Joel, we generated savi-dhcp-05
Discussion on mixed address assignment environment
Question Raised

• There is some discussion recently in the mailing-list on if savi needs to work for mixed address assignment
  – Static configured address is necessary when using DHCPv6
  – Joel Halpern proposed to not support SAVI-SLAAC and SAVI-DHCPv6 in the same link

• In our opinion, SAVI needs to support dhcpv6-slaac mixed environment; Based on the vendors implementation, it’s not heavy cost, not too complicated to implement
Our Opinion

• In reality, the operators are widely using slaac when using dhcpv6
  – E.g., in CNGI-CERNE2 IPv6 campus networks, it’s a common case.

• Not every user has the right dhcpv6 client software to interoperate with dhcpv6 server, then those users needs SLAAC to access IPv6.
  – we had interoperability testing on different OSes with different dhcpv6 servers, e.g. the linux with dibbler can not work well with Win 2008 server.

• The dhcp-slaac-mixed is allowed by standard RFCs, so if SAVI supports dhcp-slaac-mixed, then it will make the solution more deployable.
Next Step
Next Step

• Consider the suggestion from Joel, one way is to make DETECTION state optional, another way is to simplify the state machine to make the savi-dhcp-05 only work for dhcpv6-only, and move the functions of dhcp-slaac mixed environment to savi-framework or additional document

• Ask for last call

• China Telecom and China mobile had asked vendors to upgrade switch software and will enable the function in their IPv6 networks
Thank you very much!
Back up
Events

• **Timer expiration event**
  – EVE_ENTRY_EXPIRE: The lifetime of an entry expires

• **Control message arriving event**
  – EVE_DHCP_REQUEST
  – EVE_DHCP_CONFIRM
  – EVE_DHCP_OPTION_RC
  – EVE_DHCP_REPLY
  – EVE_DHCP_REPLY_NULL
  – EVE_DAD
  – EVE_DAD_RESPONSE
  – EVE_DHCP_DECLINE
  – EVE_DHCP_RELEASE
  – EVE_DHCP_REPLY_RENEW