SAVI Design Taxonomy and Analysis

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- challenges
- framework & components
- design freedom
- analysis
Framework for SAVI Solutions

1. derive legitimate IP address from on-link traffic
2. bind legitimate IP address to lower-layer entity
3. enforce binding
Functional Components

binding
association between IP source address and lower-layer entity

binding anchor
lower-layer entity in a binding

binding verification
method for verifying a binding

binding cache
memory that stores verified bindings to avoid repeated binding verification

binding conflict
when a packet’s IP source address is in binding cache, but with different binding anchor

binding conflict resolution
method for handling a binding conflict
Degrees of Freedom

which binding anchor?
- switch port
- link layer address

which binding verification?
- check sending host (direct)
- ask other hosts (indirect)

which binding conflict resolution?
- drop packets that cause a binding conflict
- re-verify on binding conflict
Challenges for SAVI Solutions

- multiple IP addresses per interface, or address translator
- multiple link layer addresses per interface
- host mobility at link layer
- hosts with multiple interfaces on same link, or anycast addressing
- routers

SAVI solution can be “default-on” only if it never disrupts legitimate traffic despite these challenges
## Analysis

<table>
<thead>
<tr>
<th>binding verification</th>
<th>binding conflict resolution</th>
<th>multiple IP addresses</th>
<th>multiple link layer addresses</th>
<th>mobility at link layer</th>
<th>multiple interfaces on same link</th>
<th>routers</th>
</tr>
</thead>
<tbody>
<tr>
<td>check sending host (direct)</td>
<td>drop packet</td>
<td>yes</td>
<td>yes (switch port)</td>
<td>yes</td>
<td>no</td>
<td>no</td>
</tr>
<tr>
<td>re-verify binding</td>
<td>yes</td>
<td>yes</td>
<td>yes</td>
<td>yes</td>
<td>yes</td>
<td>no</td>
</tr>
<tr>
<td>ask other hosts (indirect)</td>
<td>drop packet</td>
<td>yes</td>
<td>yes (switch port)</td>
<td>yes</td>
<td>no</td>
<td>yes</td>
</tr>
<tr>
<td>re-verify binding</td>
<td>yes</td>
<td>yes</td>
<td>no (L2 address)</td>
<td>yes</td>
<td>no</td>
<td>yes</td>
</tr>
</tbody>
</table>

**binding anchor**