Passive DAD for Dynamic Host Configuration Protocol (DHCP)
draft-forte-dhc-passive-dad-01

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Past Issues

• Support for Client ID (draft-ietf-dhc-3515id)
  – AUC builds a second table recording MAC - DUID associations.

• Traffic load between AUC and DHCP server
  – Results obtained in the Columbia University network show low traffic load.
pDAD - Architecture

DHCP server

TCP Connection

Address Usage Collector (AUC)

<table>
<thead>
<tr>
<th>IP</th>
<th>MAC</th>
<th>Expire</th>
</tr>
</thead>
<tbody>
<tr>
<td>IP1</td>
<td>MAC1</td>
<td>570</td>
</tr>
<tr>
<td>IP2</td>
<td>MAC2</td>
<td>580</td>
</tr>
<tr>
<td>IP3</td>
<td>MAC3</td>
<td>590</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Client ID</th>
<th>MAC</th>
</tr>
</thead>
<tbody>
<tr>
<td>DUID1</td>
<td>MAC1</td>
</tr>
<tr>
<td>DUID2</td>
<td>MAC2</td>
</tr>
<tr>
<td>DUID3</td>
<td>MAC3</td>
</tr>
</tbody>
</table>

Router/Relay Agent

Broadcast-ARP-DHCP

• AUC builds **DUID:MAC** pair table (DHCP traffic only).
• AUC builds **IP:MAC** pair table (broadcast and ARP traffic).
• The AUC sends a packet to the DHCP server when:
  – a **new pair** IP:MAC is added to the table
  – a potential **duplicate address** has been detected
  – a potential **unauthorized IP** has been detected
• DHCP server checks if the pair is correct or not and it records the IP address as **in use**. (DHCP has the **final** decision!)
Traffic load – AUC and DHCP
Packets/sec received by DHCP
Conclusions

• pDAD is **not** performed during IP address acquisition
  – Low delay for mobile devices
• Much more reliable than current DAD
  – Current DAD is based on ICMP echo request/response
    • not adequate for real-time traffic (seconds - too slow!)
    • most firewalls today block incoming echo requests by default
  – A duplicate address can be discovered in real-time and not only if a station requests that particular IP address
  – A duplicate address can be resolved (i.e. FORCE_RENEW)
• Intrusion detection …
  – Unauthorized IPs are easily detected
Open Issues

- **Security**
  - Authentication of Relay Agents (AUCs)
- **Other types of devices (non 802-like)**
  - MAC and Unique ID
  - draft-ietf-dhc-3515id
- **Changes to Relay Agent**
  - AUC is a new logical entity – easy to integrate
- **IPv6**