Unicast Lookup for WiND

draft-thubert-6lo-unicast-lookup

Pascal Thubert
IETF 105
Montreal
A proactive setting of proxy/routing state to avoid multicast due to reactive Duplicate address detection and lookup in IPv6 ND

- **RFC 8505** (Issued 11/2018)
  - The registration mechanism for proxy and routing services
  - Analogous to a Wi-Fi association but at Layer 3
- **draft-ietf-6lo-backbone-router** (WGLC complete 1/25)
  - Federates 6lo meshes over a high-speed backbone
  - ND proxy analogous to Wi-Fi bridging but at Layer 3
- **draft-ietf-6lo-ap-nd** (WGLC complete 3/26)
  - Protects addresses against theft (Crypto ID in registration)
- **draft-thubert-6lo-unicast-lookup**
  - Provides a 6LBR on the backbone to speed up DAD and lookup
- **draft-thubert-6man-ipv6-over-wireless** (new draft)
  - IPv6 ND vs. WiND applicability to wireless networks
Unmet expectations

• An IPv6 subnet should scale (like above 10K Nodes)
  • Required in case of IOT and overlays serving VMs
  • Already works in route-over mesh (deployed e.g., in Smartgrid applications)
  • Impaired by broadcast storms in case of broadcast emulation
  • Need to eliminate per node broadcast (as used in DAD and AR)

• Overlays need a Map resolver for the tunnel endpoints
  • Problems with snooping (silent node, missed packets, rapid movements...)
  • Need a solid state (contract with lifetime and maintenance), not a cache
  • Need a standard way to populate the resolver, a natural side effect of ND
Status

  - Unicast registration and lookup via NS/NA
  - (indirect) Address Mapping messages derived from EDAR / EDAC
  - A new Status “Not Found” in NA(EARO) and Address Mapping Confirm
  - 6LBR signals itself by new "B" bit in 6CIO (RFC 7400) in RA msgs
  - (Other) Routers use Authoritative Border Router Option (RFC 6775)
  - Anycast address for 6LBR ala MIP-HA?

Next Questions

- Generalize WiND to non-6lo networks?
- Transfer to 6MAN?
General Design

Place a 6LBR (RFC 6775 / RFC 8505) on the backbone (designed for DAD not AR)

Centralizes the registrations for all nodes in the subnet that register

Additions to use 6LBR for Address Resolution as a unicast request
Within WiND General Design

- Registration for guaranteed service
  - Even with intermittent connectivity
  - DAD protection on behalf for lifetime
  - Extensible for lookup

- Routing vs. Bridging Proxy
  - Bridging advertises the SLLA of the 6LN
  - Routing hides the 6LN and routes
  - Routing keeps L2 stable

- Model
  - Link is broadcast domain
  - Subnet <> Link
  => Not on-link and routing
No new ICMP type, extend existing 157/158 used for DAR / DAC (RFC 6775)

Use different ICMP Code – which is split in code prefix and suffix (RFC 8505)

Also support for unicast NS(Lookup) which requires the 6LBR to be on link

### Table 2: New Code Prefixes for ICMP type 157 DAR message

<table>
<thead>
<tr>
<th>Code Prefix</th>
<th>Meaning</th>
<th>Reference</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>Duplicate Address Detection</td>
<td>RFC 6775</td>
</tr>
<tr>
<td>1</td>
<td>Address Mapping</td>
<td>This RFC</td>
</tr>
<tr>
<td>2...15</td>
<td>Unassigned</td>
<td></td>
</tr>
</tbody>
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### Table 3: New Code Prefixes for ICMP type 158 DAC message

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