Addressing Streams in Residential Ethernets

Dirceu Cavendish, NEC
CE addressing schemes

Considered options
- Source MAC address plus “plug” identifier
- Destination MAC address plus VLAN tag
- Per stream group MAC address
  - Without priorities, without tags
  - With priorities, without tags
  - With priorities and tags
Source MAC + plug ID addressing scheme

RE proposed frame format

destinationAddress

sourceAddress

type/length

otherInfo

FCS

-sourceAddress + plugID addressing scheme

Advantages
• there is no need for a multicast-address server
• the number of associative bridge-resident tables is reduced

Disadvantages
• Not compatible with 802.1 frame forwarding

Observations
- The most-significant 32 bits of the destinationAddress explicitly identify:
  • the multicast nature of this frame
  • the distinct meaning of this frame (an RE frame)
  • the plugID value itself (the 16 LSBs)
Destination MAC + VLAN addressing scheme

RE proposed frame format

<table>
<thead>
<tr>
<th>bytes</th>
<th>Destination Address</th>
<th>Source Address</th>
<th>Length/Type=802.1Q</th>
<th>Tag Control Info</th>
<th>MAC Client Length/Type</th>
<th>MAC Client Data</th>
<th>Padding</th>
<th>Frame Check Sequence</th>
</tr>
</thead>
<tbody>
<tr>
<td>6</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
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<td></td>
<td></td>
</tr>
<tr>
<td>6</td>
<td></td>
<td></td>
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<td></td>
<td></td>
</tr>
<tr>
<td>2</td>
<td></td>
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<td>2</td>
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<td></td>
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</tr>
<tr>
<td>1500</td>
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<td></td>
</tr>
</tbody>
</table>

- Advantages
  - Vanilla 802.1Q frames used
  - RSTPs should be used so as to relay related multimedia traffic together (FDB sharing)
  - CE industry should agree on a set of VLAN values for applications (mapping)

- Disadvantages
  - NO residential bridge is to be managed by a residential user, to avoid “clash” of VLAN values
  - PC applications are VLAN unaware, so VLAN collision with RE VLAN values is possible
    Only if RE user accesses a bridge to configure VLAN space.
Group MAC address – no priority

Observations

-Advantages
  - Avoids VLAN tag management at home
  - Standard multicast forwarding scheme

-Disadvantages
  - Large number of group MAC addresses
  - Group MAC address registration/allocation required
  - A single spanning tree is used
  - Hotspots on richly connected network
Group MAC Address – with priority, no tag

RE proposed frame format

<table>
<thead>
<tr>
<th>bytes</th>
<th>Description</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>6</td>
<td>Destination Address</td>
<td></td>
</tr>
<tr>
<td>6</td>
<td>Source Address</td>
<td>00000001</td>
</tr>
<tr>
<td>2</td>
<td>Length/Type=802.1Q</td>
<td>000000000</td>
</tr>
<tr>
<td>2</td>
<td>Tag Control Info</td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>MAC Client Length/Type</td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>MAC Client Data</td>
<td></td>
</tr>
<tr>
<td>4</td>
<td>Padding</td>
<td></td>
</tr>
<tr>
<td>4</td>
<td>Frame Check Sequence</td>
<td></td>
</tr>
</tbody>
</table>

- Advantages
  - Avoids VLAN tag management at home
  - Allows better networking of QoS stringent traffic
  - Standard multicast forwarding

- Disadvantages
  - Large number of group MAC addresses
  - Group MAC address registration/allocation required
Group MAC address—with priority, with tag

Observations

- Advantages
  - Allows better networking of QoS stringent traffic

- Disadvantages
  - Group MAC address registration/allocation required
  - VLAN tag management required
# RE addressing schemes - summary

<table>
<thead>
<tr>
<th></th>
<th>S-MAC+plugID</th>
<th>D-MAC+q</th>
<th>G-MAC</th>
<th>G-MAC+p</th>
<th>G-MAC+p+q</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Address mgm</strong></td>
<td>No multicast address server</td>
<td>No multicast address server</td>
<td>Multicast address server needed</td>
<td>Multicast address server needed</td>
<td>Multicast address server needed</td>
</tr>
<tr>
<td><strong>FDB</strong></td>
<td>NA</td>
<td>Scales with RE sources</td>
<td>Scales with RE source/destination</td>
<td>Scales with RE source/destination</td>
<td>Scales with RE source/destination</td>
</tr>
<tr>
<td><strong>Forwarding</strong></td>
<td>No MRP required</td>
<td>No MRP required</td>
<td>MRP required</td>
<td>MRP required</td>
<td>MRP required</td>
</tr>
<tr>
<td><strong>Application mgm (PnP)</strong></td>
<td>Simple</td>
<td>VLAN space Mgm</td>
<td>G-MAC space mgm</td>
<td>G-MAC + p mgm</td>
<td>G-MAC + p +q mgm</td>
</tr>
<tr>
<td><strong>Routing</strong></td>
<td>Single path</td>
<td>Multiple path</td>
<td>Single path</td>
<td>Single path</td>
<td>Multiple path</td>
</tr>
<tr>
<td><strong>Backward compatibility</strong></td>
<td>Breaks bridge forwarding</td>
<td>Backward compatible</td>
<td>Backward compatible</td>
<td>Backward compatible</td>
<td>Backward compatible</td>
</tr>
</tbody>
</table>
Thank you!