HiQnet AVB device behavior
A couple of HiQnet basics

• Assumes offline design capability
• Assumes full discoverability of venue
• HiQnet address
  – Upperlayer unique identifier
  – Independent of physical layer
  – Used instead of HiQnet name and the unique key
A couple of HiQnet basics

• HiQnet disco –
  – Somewhere in-between Bonjour and UPnP

• Sequence
  – Broadcast or unicast DiscoQuery
  – Respond with network info for each interface

<p>| | | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>MacAddr</td>
<td>6 bytes</td>
<td>MAC address</td>
</tr>
<tr>
<td>DHCP/AutoIP</td>
<td>UBYTE</td>
<td>1 = DHCP/AutoIP 0 = Static Addr</td>
</tr>
<tr>
<td>IPAddr</td>
<td>ULONG</td>
<td>IP address</td>
</tr>
<tr>
<td>SubnetMask</td>
<td>ULONG</td>
<td>Subnet mask</td>
</tr>
<tr>
<td>Gateway</td>
<td>ULONG</td>
<td>Gateway address</td>
</tr>
</tbody>
</table>
General goals

• Under real-time control, the user is able to route AVB from one HiQnet device to another
• Devices are powered down and then restarted. With no user intervention, streaming connections are resumed
• A venue file is designed offline, the device files are sent to the devices and streaming starts. According to our current SA design, there can be no dependency on MAC address, only HiQnet address in device files.
• A control surface be it System Architect or a Console, with no foreknowledge of the system or its behavior, is able to discover active streams/routes
• The user is notified should there be a clock error in the system and can check the clock status of any AVB node
• The user is notified should there be a 1722 error and can check the status of the 1722 streams
• The user is notified of any SRP errors and can check the status of stream reservations
Mapping of channels to slots
Stream listener object

<table>
<thead>
<tr>
<th>StreamID</th>
<th>ULONG64</th>
<th>Debug</th>
<th>Talker Mac Addr : ID</th>
</tr>
</thead>
<tbody>
<tr>
<td>StreamDA</td>
<td>ULONG64</td>
<td>Debug</td>
<td>Multicast Address – debug only</td>
</tr>
<tr>
<td>TalkerAddress</td>
<td>UWORD</td>
<td></td>
<td>HiQnet Address</td>
</tr>
<tr>
<td>Audio/Video Format</td>
<td>UBYTE</td>
<td></td>
<td>STRING(Enumerated)</td>
</tr>
<tr>
<td>MediaClockDomainID</td>
<td>UBYTE</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Name</td>
<td>STRING</td>
<td></td>
<td>Networked ordered uni-code</td>
</tr>
<tr>
<td>Slots</td>
<td>UWORD</td>
<td>Debug</td>
<td></td>
</tr>
<tr>
<td>Mapping</td>
<td>UWORD</td>
<td>Debug</td>
<td>The size of this is determined by the number of slots.</td>
</tr>
</tbody>
</table>
Start up

- The device upon boot-up will start up PTP service. In parallel the device will obtain an IP and HiQnet address as per normal device behavior.
- Once the device is locked to PTP and obtained an IP and HiQnet address then it is ready to begin media clock arbitration.
Get media clock
Listener Startup

Start

Load Stream data

Send out HiQnet Discos for Talker

Have Mac Address in StreamID

Y

Obtain Talker Mac Address HiQnet Disco

Wait for REGISTER_STREAM.indication

Set up 1722,do any hardware configuration/signal routing

Send REGISTER_ATTACH.request (streamID,Ready)

Start SRP monitoring service

End

N

Have HiQnet Address

Y

Report error

N

If HiQnet disco comes back with different MAC from StreamID, update StreamID

Note: Stream DA obtained from Talker Advertise
Listener monitoring state machine

- NOT_CONFIGURED
- WAITING_FOR_TALKER – waiting for the talker to exist
- MONITORING_RESERVATION
Listener error codes

• Stream Reservation failed
  – Reservation has failed – bandwidth can’t be allocated (first time only)
  – A network resource has become oversubscribed and the listener’s reservation has been bumped.
    (after it has been successfully working)
  – Would be nice to track the difference between these two – need to add to 2.2

• Stream reservation ended
  – Talker has stopped the Advertise
# Talker object

<table>
<thead>
<tr>
<th>Field</th>
<th>Type</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>StreamID</td>
<td>ULONG64</td>
<td>Debug</td>
</tr>
<tr>
<td>StreamDA</td>
<td>ULONG64</td>
<td>Debug</td>
</tr>
<tr>
<td>Talker Presentation Offset</td>
<td>ULONG64</td>
<td>Multicast Address. Populated by talker device.</td>
</tr>
<tr>
<td>Listen HiQnet Address</td>
<td>UWORD</td>
<td>Set to HiQnet broadcast if multicast address</td>
</tr>
<tr>
<td>TrafficClass</td>
<td>UBYTE</td>
<td>STRING(Enumerated)</td>
</tr>
<tr>
<td>Ranking</td>
<td>UBYTE</td>
<td>STRING(Enumerated)</td>
</tr>
<tr>
<td>AudioVideoFormat</td>
<td>UBYTE</td>
<td>STRING(Enumerated)</td>
</tr>
<tr>
<td>MediaClockDomainID</td>
<td>UBYTE</td>
<td></td>
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<td>Name</td>
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<td>Networked ordered uni-code</td>
</tr>
<tr>
<td>Slots</td>
<td>UWORD</td>
<td>Debug</td>
</tr>
<tr>
<td>Map</td>
<td>Array of UWORD</td>
<td>Debug</td>
</tr>
</tbody>
</table>

Size is determined by number of slots
Talker startup

1. Start
2. Load Stream data
3. Is HiQnet address in Stream a Broadcast?
   - Yes (Y): Use MAAP to obtain multi-cast stream address
   - No (N): Obtain Listener Mac Address
4. Use MAAP to obtain multi-cast stream address
5. Set up 1722, do any hardware configuration /signal routing
6. REGISTER_STREAM.request Advertise
7. Wait for Listener Ready
8. Start Stream
9. End

Note: Stream DA obtained from Talker Advertise
Talker conditions

- **NOT_CONFIGURED**
- **NO_LISTENERS** – talker is advertising but no listeners
- **READY**
- **READY_FAILED** – one or more listeners
- **FAILED**
- In the case of a Stream reservation failed
  - One or more Reservations have failed – bandwidth can’t be allocated
  - Would be good to see which devices have a reservation and which have a failed
  - Would be good to see where the reservation failed – long term we identify the switch.
Suggested next steps

- Generalize state machines
- Generalize device/stream parameters
  - Publish HiQnet documentation to 1722.1
- Fit in Bonjour for disco