Implementing UPnP-QoS on AVB

Felix Feng
SAIT / SAMSUNG Electronics
feng.fei@samsung.com

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AVB clouds
UPnP QoS side

- Horizontal (in-line) integration
  - AVB cloud acts as a QoS segment which is specified by UPnP QoS 3.0. UPnP QoS 3.0 specification explicitly defines the operation
Homogeneous case

Assumption
- Source and destination devices exist in the same AVB cloud (identical segment ID)
- Source and destination devices are AVB devices
- Source and destination devices are UPnP-QoS capable

System Operation
- QM gets information from CP
  - Source IP, Destination IP, etc.
- Determination of policy (or just use default policy)
- No need for determination of QoSDevice services that should be configured
  - Simply the source and destination devices
- Configuration of QoSDevice services
  - Configure the ingress device for QoS setup preparation
    - Feedback (from QD to QM) of necessary QoS path information: Stream Identifier, etc..
  - Configure the egress device for admission control
    - Feedback (from QD to QM) of QoS setup results
  - The above two-phase procedure is similar to PrepareForConnection actions in UPnP-AV
- Feedback of the results of the QoS setup to the Control Point
System operation flow

QM

GetTrafficPolicy

Optional, since QM is aware that the source and destination devices are in the same AVB QoS segment.

other QDs

GetQosDeviceCapabilities

Optional, since QM is aware that the source and destination devices are AVB devices.

Dest.

SetupTrafficQoS

FeedBack
Simple heterogeneous case

Assumption
- The QoS path may traverse several segments, including AVB or other L2 networks
- Relevant AVB cloud(s) ingress and egress edge devices are UPnP-QoS capable
- Relevant AVB cloud(s) ingress and egress edge devices support GetPathInformation, and are able to determine that they are the ingress and egress edge devices

System Operation
- Get information from CP
  - Source IP, Destination IP, etc.
- Determination of policy (or just use default policy)
- Determination of QoSDevice Services that should be configured
  - Use GetPathInformation and GetQoSDeviceCapabilities to determine the ingress device and egress devices for AVB cloud(s)
    - Ingress device: Source device is reachable via a non-AVB interface and destination device is reachable via an AVB interface
    - Egress device: Source device is reachable via an AVB interface and destination device is reachable via a non-AVB interface
- Configuration of QoSDevice services
  - Configure the ingress device for QoS setup preparation
    - Feedback (from QD to QM) of necessary QoS path information: Stream Identifier, etc.
  - Configure the egress device for admission control
    - Feedback (from QD to QM) of QoS setup results
  - The above two-phase procedure is similar to PrepareForConnection actions in UPnP-AV
  - Configure relevant QD services in other segments
- Feedback of the results of the QoS setup to the Control Point
System operation flow

(QM::GetTrafficPolicy)

(QD::GetPathInformation)

(QD::GetQosDeviceCapabilities (optional, since QM is aware that the ingress and egress devices are AVB devices))

(QD::SetupTrafficQoS)

(QD::SetupTrafficQoS)

(AVSBP operations)

(Just exemplary for one AVB segment: Relevant QD services in other segments are not shown here)
More complex cases

- Including:
  - AVB cloud(s) ingress and egress edge devices are not UPnP-QoS capable
  - AVB cloud(s) ingress/egress edge devices are UPnP-QoS capable but can not correctly determine whether they are ingress/egress edge devices:
    - not support GetPathInformation, or
    - source/destination MAC addresses are not recognized/stored

- UPnP QoS can detect these situations, and then falls back to Policy/Priority based QoS for the corresponding AVB segments
  - This fall-back is merely from an UPnP QoS point of view
  - AVB admission control function still exist but not available via UPnP QoS
  - AVB timing synchronization or other functions still exist without any impact