Path Control and Reservation
Path Control for Reservation
Path Control for Reliability

ISIS PCR

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Marcel Kiessling, Siemens AG
Franz-Josef Goetz, Siemens AG
Aim of this presentation

This presentation should

• Clarify the different usage models which ISIS PCR includes

• Give a short introduction to SPB and help to clarify that streams are unidirectional tunnels controlled by MSRP

• Repeat what functions MSRP Gen 1 has and what was discussed for MSRP Gen 2
• Clarify the different usage models which ISIS PCR includes

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Different Application Models for TSN

Different Models how to use TSN and Routing

**PCR:**
- **Path Control and Reservation**
  - No MSRP in the network
- **Path Control for Reservation**
  - MSRP PCR follows the path for the Stream
- **Path Control for Reliability (when considering CB)**
  - ISIS PCR to get redundant paths

**AVB**
- RSTP for Path Control
- MSRP for Reservation

**TSN & RSTP**
- RSTP for Path Control
- MSRP Gen 2 for Reservation

**TSN & ISIS PCR**
- ISIS PCR for Path Control
- MSRP for Reservation
- ISIS PCR for Path Control and Reservation
Path Control

Some possibilities to Control a Path:

- **ISIS** can supply the network Topology as *network-wide* shared database (ISIS for MSRP)
- **ISIS PCR** can describe algorithms for path calculation defines additional TLVs for the path in the ISIS database
  - **PCE** to centrally calculate paths and share them using ISIS
  - **NLCE** to make local settings and calculate loose-hop paths
- **MSRP** can calculate latency and make reservations as End-to-End signaling and check of the reservation along the path

How to share the necessary tasks?
• Clarify the different usage models which ISIS PCR includes

• **Give a short introduction to SPB and help to clarify that streams are unidirectional tunnels controlled by MSRP**

• Repeat what functions MSRP Gen 1 has and what was discussed for MSRP Gen 2
ISIS SPB – difference between SPB-M and SPB-V

SPB-V and SPB-M
- Work inside a domain
- Encapsulate incoming traffic
- Unpacking of outgoing traffic
- Use the shortest path to forward frames
- Forwarding based on MAC + VLAN ID in the L2 core network
ISIS SPB – difference between SPB-M and SPB-V

SPB-V

Uses a VLAN ID to identify the source / forwarding path
Uses a default tree per VLAN ID and shared learning
Forwarding based on MAC + VLAN ID
small topologies with learning

SPB-M

Uses a MAC Address to identify the source / forwarding path
Use VLANs to form Service-Groups
large topologies with nailed up paths
Forwarding based on MAC + VLAN ID
No connectivity without setting up a path
A Stream is a connection with a known bandwidth

- Relationship from Talker to Listener with known properties
- Managed by MSRP (Reservation, Signaling and Status-Report)
- Streams are mapped to a own class during transmission

AVB network: RSTP to ensure loop-free connection
MAC Address to control forwarding
What is different with Streams

Streams have unique features (not normal traffic)

- Only one Source per Stream
  - One Talker per Stream
  - One or multiple Listener
  - Connection between Talker and Listener(s)
- Unique Stream ID for management (“higher” layers)
  - Needed to identify Streams and associate properties
  - Needed to ensure unique Stream Destination MAC Address
- Known Unique Stream Destination MAC Address
  - Unique to be able to identify the forwarding path per stream

New Stream Features:

Redundant paths (802.1 CB)

Multiple VLAN IDs for Redundant paths in the TSN VLAN (K in 802.1 Qca)

• Clarify the different usage models which ISIS PCR includes

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AVB/TSN Features
What was done to get a guaranteed QoS

**AVB introduced features for Streams** (Streams are not normal traffic)

- Announcement of Stream properties
  - Protocol based along the pruned RSTP tree
  - Defined Interface and Parameters to start a Reservation
- Transmit Guarantee
  - Setting up a path for the Stream
  - Protocol based Resource Reservation along the path
    (Memory for queuing, unique address, FDB Entries, …)
- Guaranteed Latency
  - Protocol based setting of the Shapers (based on the stream properties)
  - Calculation of the max. Latency along the path
- Signaling along the path
  - Ensures a finished reservation along the path before transmission

Usage of the new MSRP in TSN
Improved MSRP for AVB networks and new MSRP for ISIS SPB

**Improvement for MSRP Gen 1**

- **Size of buffer unknown**
  Only Max. Latency – no Min. Latency
- **Limited Number of Streams**
  periodic retransmission of Stream Properties
- **Usage of RSTP**
  Only one active path (not the shortest/best) – reconfiguration of RSTP
- **No Pre-Reserved Streams**
  needed for improved Startup of the network
- **No Ranking**
  Time of reservation affects the result

**And MSRP for ISIS PCR**

- **Support for 802.1 CB**
- **Routing features from ISIS PCR**
  better paths and network usage
  ISIS for improved shared Database
Usage of the new MSRP in TSN
Improved MSRP for AVB networks and new MSRP for ISIS SPB

MSRP for ISIS PCR

• **Support for 802.1 CB**
  • defines the replication for redundant transmission and elimination of duplicates
  • ISIS PCR to establish redundant paths in the network

• **Routing features from ISIS PCR**
  • better paths and network usage

• **Shared database from ISIS**
  • ISIS for improved shared Database of stream properties
Summary

Streams need no encapsulation
  MSRP makes the reservation
  the data is already “encapsulated”

MSRP is more than a shared table
  Reservation and Signaling
  Setting up the shapers along the path (lead to **guaranteed** QoS)
  Improvements possible when using ISIS database

Qca describes more than one use-case
  TSN with MSRP and ISIS PCR
  Full ISIS PCR (no MSRP)
  See comments for Qca D0-5:
    o No Talker Failed
    o No Setting of the Shapers
    o …