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

ISIS PCR

IEEE 802.1 Interim Session – Los Angeles
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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**

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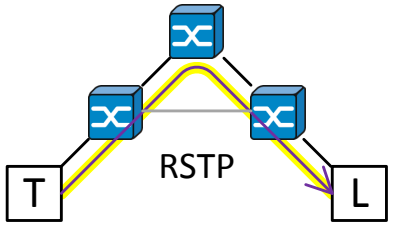
Different Application Models for TSN

Different Models how to use TSN and Routing

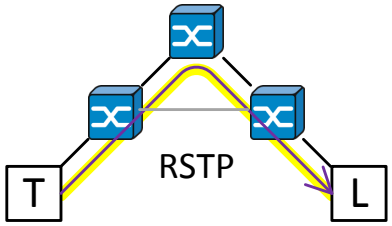
AVB



RSTP for **P**ath **C**ontrol

MSRP for **R**eservation

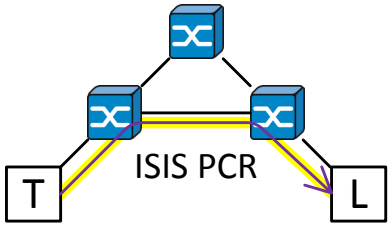
TSN & RSTP



RSTP for **P**ath **C**ontrol

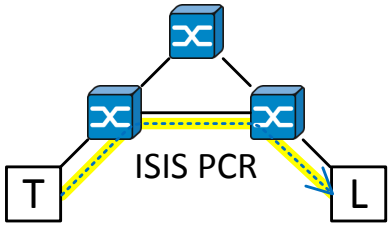
MSRP Gen 2 for **R**eservation

TSN & ISIS PCR



ISIS PCR for **P**ath **C**ontrol

MSRP for **R**eservation



ISIS PCR for **P**ath **C**ontrol and **R**eservation

PCR:

Path Control and Reservation

No MSRP in the network

Path Control for Reservation

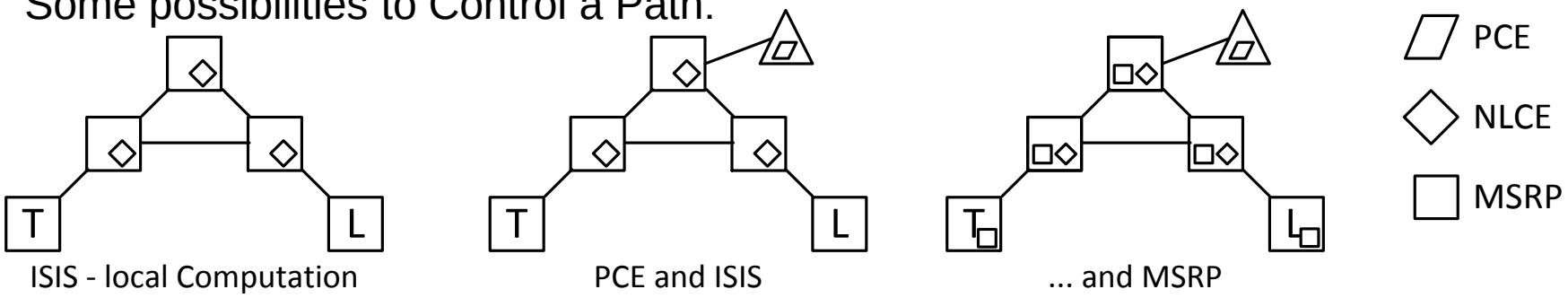
MSRP PCR follows the path for the Stream

Path Control for Reliability (when considering CB)

ISIS PCR to get redundant paths

Path Control

Some possibilities to Control a Path:



ISIS - local Computation | PCE and ISIS | ... and MSRP

How to share the necessary tasks?

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

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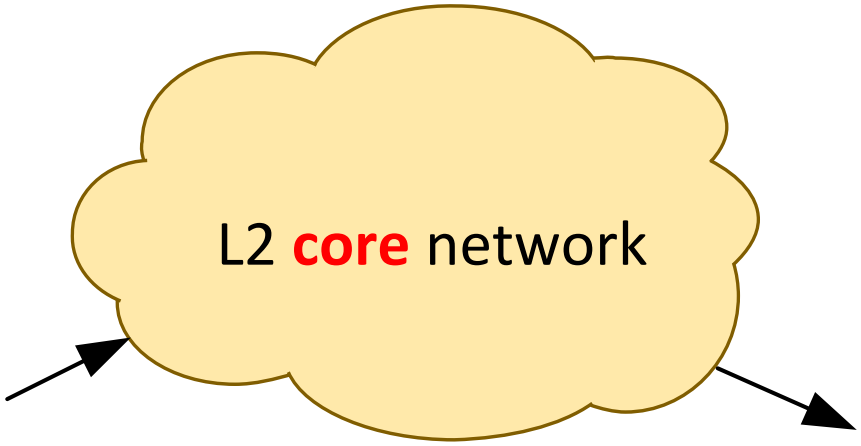
- Clarify the different usage models which ISIS PCR includes
- **Give a short introduction to SPB and help to clarify that streams are unidirectional tunnels controlled by MSRP**
- Repeat what functions MSRP Gen 1 has and what was discussed for MSRP Gen 2

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



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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

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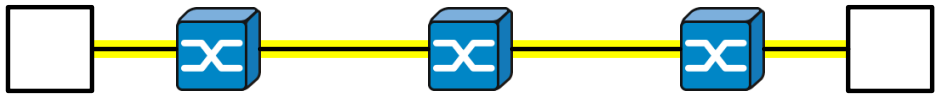
A Stream is a connection with a known bandwidth

- 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

Stream ID to identify Relationship



AVB network: RSTP to ensure loop-free connection

MAC Address to controll forwarding

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What is different with Streams

Streams have unique features (not normal traffic)

- Only one Source per Stream
  - One Talker per Stream
  - One ore 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)

http://www.ieee802.org/1/files/public/docs2013/ca-kiessling-ISIS-SPB-PCR-for-TSN-0713-v02.pdf

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

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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

http://www.ieee802.org/1/files/public/docs2013/new-avb-kiessling-MSRP-Gen-2-for-TSN.pdf

Usage of the new MSRP in TSN

Improved MSRP for AVB networks and new MSRP for ISIS SPB

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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

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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

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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 …