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Some notes about topics for MSRP Gen 2 – Qcc

Some thoughts about Qcc

IEEE 802.3 Interim Session – Ottawa, Canada

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Intention of this Slide Deck

The author would like to bring up some potential topics for MSRP Gen 2 (Qcc) that came up when using routed paths (e.g. Qca) and seamless redundancy for TSN streams.

This slide deck should be considered as an summary of open points for MSRP (Qcc) and should provide background for a discussion about the necessity to support these features in the next steps of the standardization process.

Agenda

Recap – Old and new MSRP model

Support in MSRP for:

- Latency report of Min. and Max. on used Path
- Multiple Paths
- seamless redundancy based on CB
- multiple CB Segments

Other Thoughts about:

- Congruency – bidirectional streams
- Separation of directed and undirected Data
- State Machine simplification
- Ranking

Recap: Old Stream Establishment model

MSRP Gen 1 is used to setup the path*, announce the stream characteristic and make the resource reservation and includes signaling
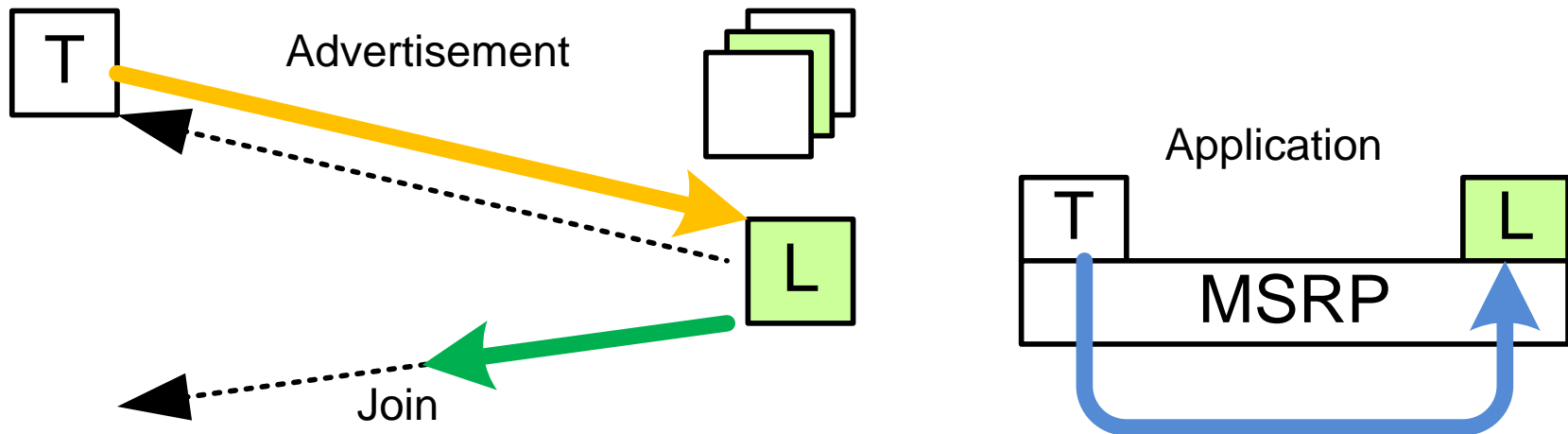
*) Only one possible path in the network because of RSTP,
  MRSP stores the direction back to the Talker (unidirectional path)

Recap: New Stream Establishment model

MSRP Gen 2 should work with given paths, **can*** announce the stream characteristic and make the resource reservation and includes signaling

T

Advertisement

L

Path

Calculate

Reserve

T   Application   L
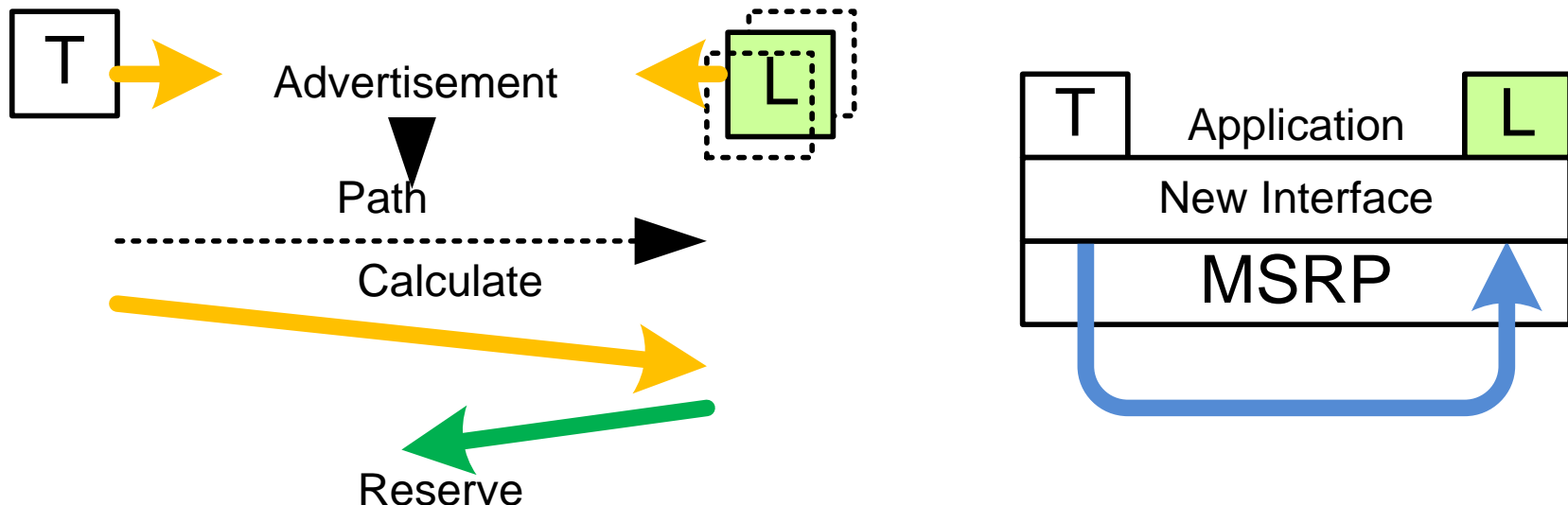
New Interface

MSRP

*) Qca includes a note and IS-IS extensions (annex Z.3.1) to announce the Stream characteristic

More about possible Control Flows and the Interface:
http://www.ieee802.org/1/files/public/docs2014/
tsn-nfinn-Deterministic-Networking-L2-L3-0714-v1.pdf

Support Min. and Max. Latency

MSRP only supports **1 path** between Talker and Listener.

AV Applications require the maximum Latency for a Stream.

The buffer depends on the Jitter (difference between the Maximum and Minimum Latency).
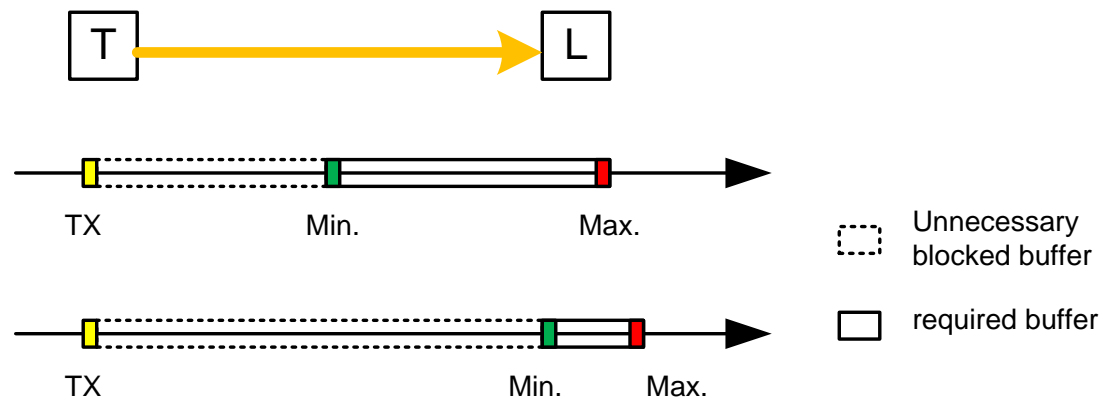
A known minimum latency can lower the buffer resources (see SQF)!

Support for CB – more than a single path

Seamless redundancy is an important feature for some industries.

CB needs **multiple** (at least 2) disjoint paths to ensure a "seamless" redundancy.

MSRP only supports **1 path** between Talker and Listener.

AVB

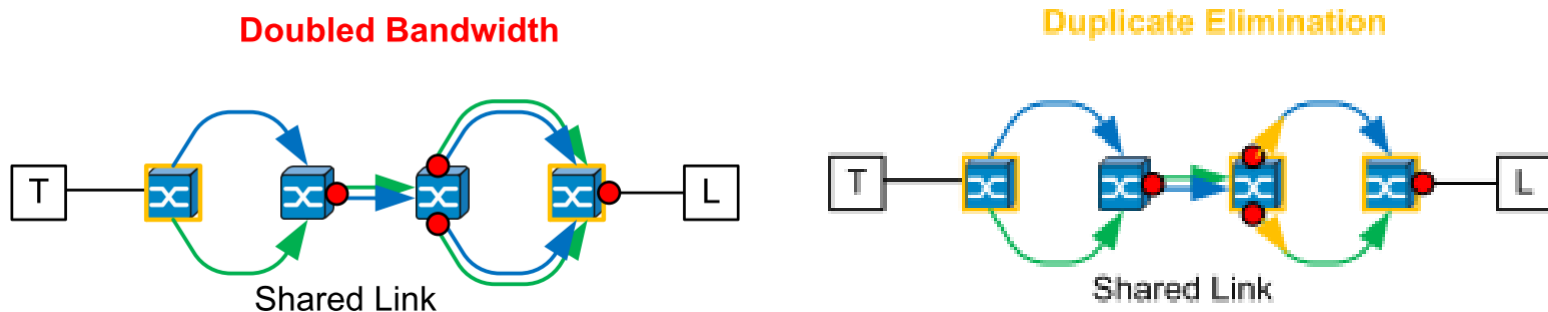RSTP Tree

TSN with CB

Path B

Path A
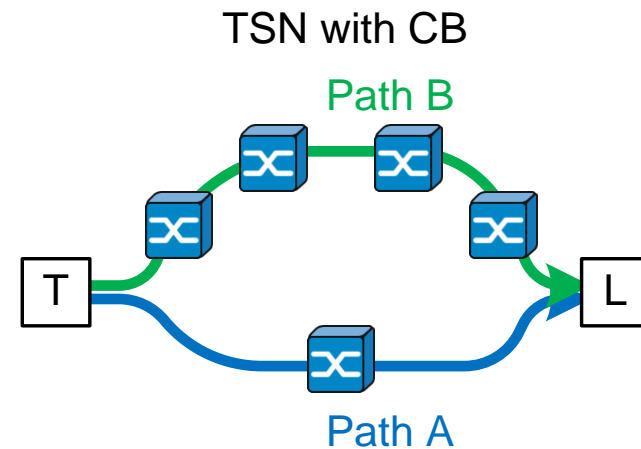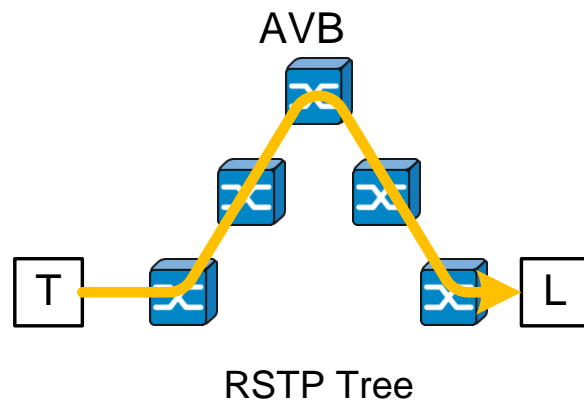
Support for CB – Merge of Streams

The resource reservation should be extended to support seamless streams.

Duplicate Elimination must be considered in order to safe bandwidth!
"Merge" of Streams is a new possible case with CB!
see http://www.ieee802.org/1/files/public/docs2014/cb-kiessling-Using-CB-with-TSN-features-0714-v01.pdf

see http://ieee802.org/1/files/public/docs2014/cb-kiessling-Details-0514-v01.pdf
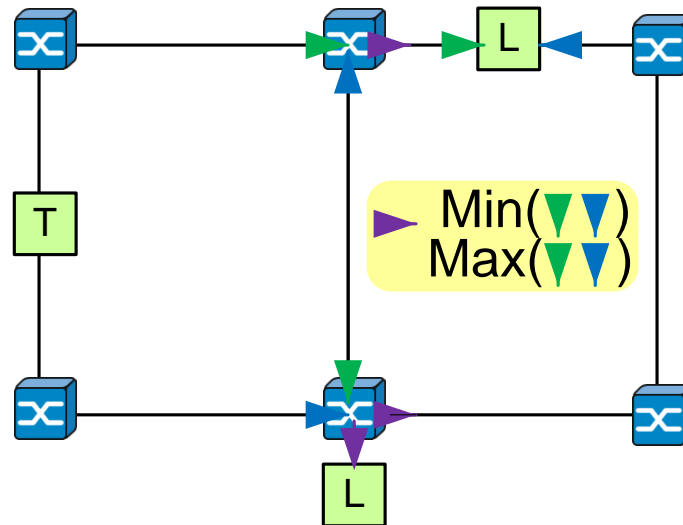
Support for CB – Min. and Max. Latency

CB Bridges "merge" two (multiple) streams

New Min./Max. Latency of the "merged" Stream is influenced from the Min./Max. Latency of both path.

Support for CB – more than one segment

CB can "hide" one error in each segment (e.g. ring topology) for the application.

Multiple Segments can be "seamlessly" connected.

CB Bridges can be seen as
  "Listener" for the Talker of redundant streams **and**
  "Talker" for the Listener in the following Segment.

Congruency – bidirectional communication

MSRP paths are part of the tree topology

Bidirectional streams are congruent (**1 path** between Talker and Listener)

AVB   TSN

TSN adds the freedom to use arbitrary setup paths

(lowest latency – shortest - highest available bandwidth - …)

Option to ensure congruency (with diagnostic) for Streams in MSRP?

A new Data Modell – un-/directed Data

MSRP Gen 1 separates directed and undirected Data:

- Stream Database for **undirected**, network-wide valid data *(e.g. TSpec)*
- Other tables for **directed**, locally, port-/bridge-wide valid data *(e.g. Latency)*

The resource reservation should keep this separation!

ISIS (Qca) can share the undirected Data globally in the whole network
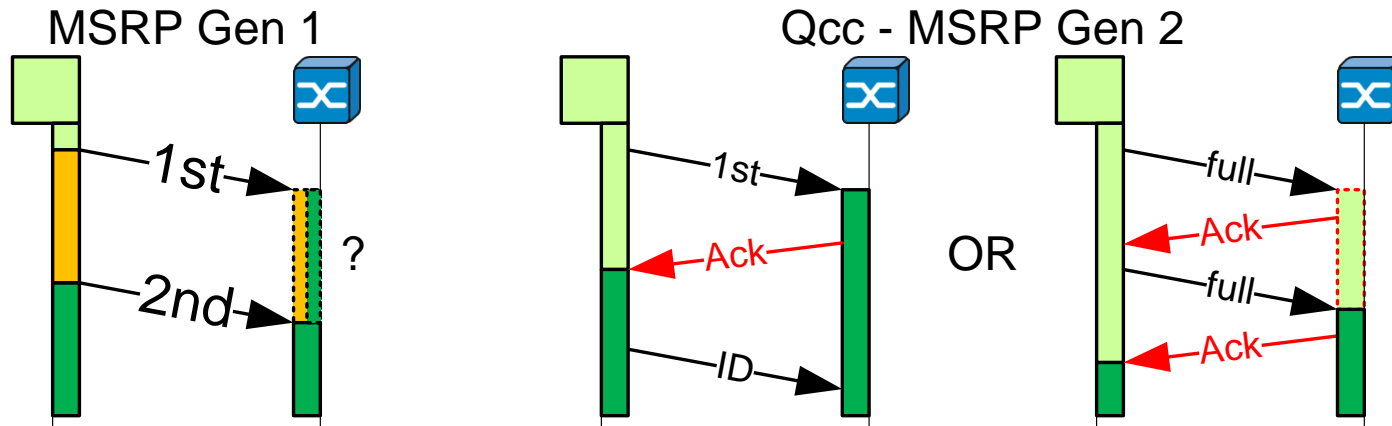
Directed data must be manipulated along the path.
Transport is P-2-P along the path with manipulation in every hop.

Simplification of SM's

MSRP Gen 1 uses the MRP State machines to ensure the transport of data

- transport is not 100 percent reliable
- repeated transmission for reliable* transport
- **States** to remember the repeated event

MSRP Gen 1 — **Qcc - MSRP Gen 2**

Qcc will use a different model to ensure that the data is valid – checksums

- transport is not 100 percent reliable
- Checksums with synchronization mechanism to ensure that the **data** is valid
- Repeated transmission only in case of failure

Simple *"State machines"* to avoid unnecessary synchronization overhead

*reliable because one of the two messages is expected to arrive correct

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Support for designed networks

Parts of Industrial Automation networks are **designed** for an application
• Known necessary streams with there characteristics

Flexibility requires cooperation of planned Streams with plug-and-play streams in the same network

How to define the behavior of the Reservation?
• Static reservations for fixed applications
• Multiple flexible applications with known importance (by design)

e.g. Priority / **Ranking** to control the behavior of the reservations?