Resource Allocation Protocol (RAP) based on 802.1CS Link-local Registration Protocol

Feature Proposal

Marcel Kießling, Franz-Josef Götz
Siemens AG

IEEE 802.1 Interim Meeting
May 2017, Stuttgart, Germany

RECAP: Stream Reservation in AVB networks

End-stations trigger Reservation for Streams using MSRP

- *Provide Stream specification and initiate reservation (Registration of Attributes)*

Distributed Stream Reservation (by MSRP) in the network

- *Health-Status for reservations (Aging of reservations to handle death registrations)*

- *Controls the forwarding of Stream Data (Configuration of Filtering Database)*

- *Dynamic reservation adopts to reconfiguration of topologies*

- *Ensures uniqueness of Stream data identification (unique Multicast DA for Streams)*

- *Avoids overbooking of Stream class (pre-condition for QoS)*

- *Calculates hardware-dependent resource requirement based on a generic Stream description (TSpec)*

- *Accumulates device-specific latency (can be hardware and configuration dependent)*

- *Configures the Traffic Class Shaper (AVB: only CBSA)*

- *Provides Reservation Failure information (1st error on path down to Listeners)*

- *…*

Resource Allocation Protocol (RAP)
Proposal for new Features

SIEMENS

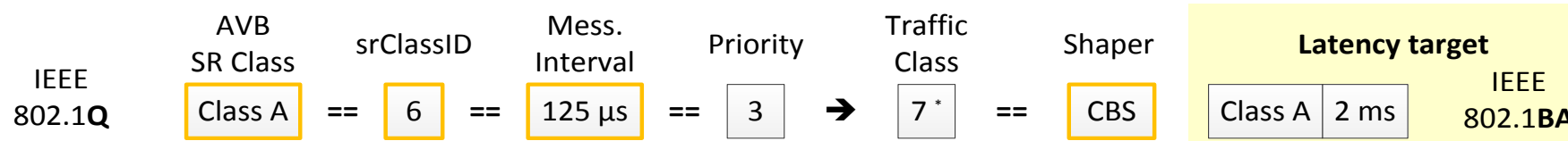**Proposal for main new Features of the Resource Allocation Protocol**

• Support configurable SR Classes with
  (Information for SR class Selection in end-stations, SR Class domain boundary detection)

• Support for further Traffic Shaper / Transmission Mechanisms (e.g. IEEE802.1Qch - CQF)

• Improved distribution of Information

• Collaboration with upper layer reservation protocol (e.g. RSVP)

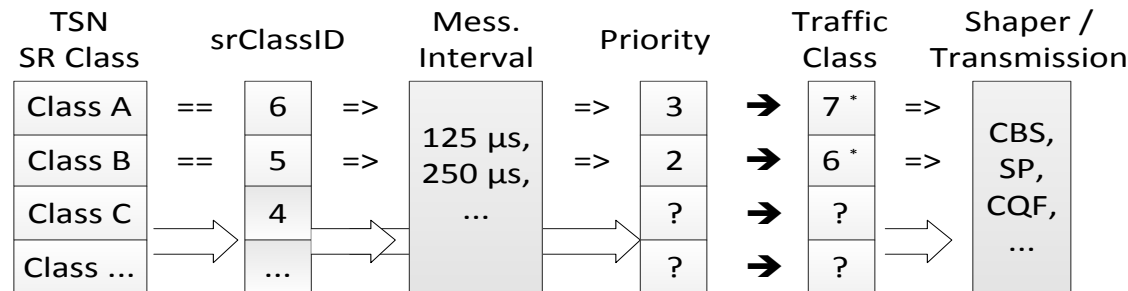**Proposal: Further potential features of a new Resource Allocation Protocol** (to discuss)

• Support Capability for enhanced diagnostic (e.g. talker and listener get diagnostic information)

• Support seamless redundancy

• Provision of information required for configuration of stream policing & metering

• Not only restricted on Streams, potentially support also for other traffic types

• *Minimal reconfiguration time for RAP in case of topology changes (reconfiguration time)*

05.2017, Stuttgart, Germany

Configurable SR Classes

- **AVB used 2 pre-defined classes for Streams** *(SR Class A – 125µs / B – 250 µs)*
  802.1BA: Audio/video applications can use the latency targets (A 2ms / B 50ms) for class selection

IEEE 802.1**Q**	AVB SR Class		srClassID		Mess. Interval		Priority		Traffic Class		Shaper	Latency target		IEEE 802.1**BA**
	Class A	==	6	==	125 µs	==	3	➔	7 *	==	CBS	Class A	2 ms	

- **TSN already supports configurable SR Classes**

TSN SR Class		srClassID		Mess. Interval		Priority		Traffic Class		Shaper / Transmission
Class A	==	6	=>		=>	3	➔	7 *	=>	CBS, SP, CQF, ...
Class B	==	5	=>	125 µs, 250 µs, ...	=>	2	➔	6 *	=>	
Class C		4				?	➔	?		
Class ...		...				?	➔	?		

**Proposal**: **RAP distributes also the latency target of the SR Class**

Information to support SR Class selection for applications in End-Stations (dependent on the current configuration of the network – provided to end stations)

Further detail: Usage of srClassID within the reservation to reference to a SR Class

Support for further Traffic Shaper / Transmission Mechanisms
(RAP should not be restricted to CBS)

TSpec   TSpec

T

Configuration of Shaper
Ressource Allocation
...

- **AVB** introduced for AV Streams a generic traffic description
  (in AVB for CBSA with classMeasurementInterval)

  - MSRP configures the specific Shaper based on the
   generic traffic description of Streams
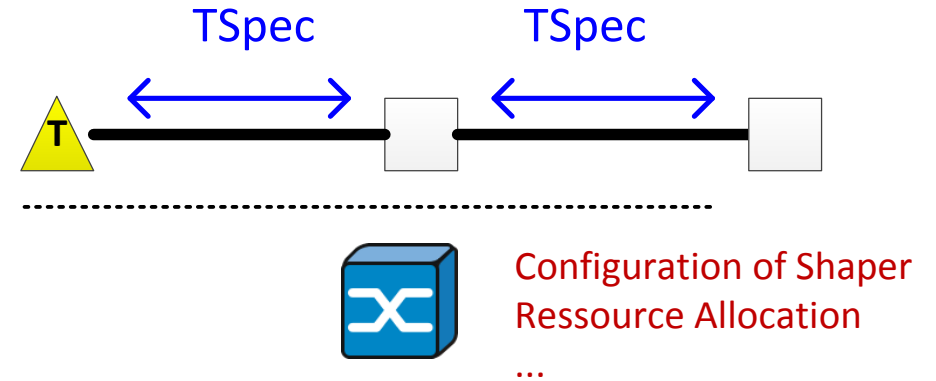
- **TSN** introduces more shapers / transmission mechanism and allows different usage models for their combination

  - The new allocation protocol (RAP) should include a generic part
    (independent from shaper / transmission mechanism)

    - Bandwidth and resource requirements *(like Tspec)*

    - Resource allocation for Streams depends on hardware and SR Class configuration

  - Implementation specific configuration of local resources based on generic values
    (generic calculation as abstraction layer for implementation specific configuration)

Proposal: Provide profiles for different Traffic Shaper / Transmission Mechanisms

   (AVB defined the generic traffic description an provided a mapping to the AVB Shaper – the credit-based-shaper CBS)

Improved distribution of Information

- All information is distributed in SRP using two attributes

  - Talker Advertise Vector goes downward
    (diagnostic by Talker Advertise Failed Vector)

  - Listener Advertise Vector goes upwards
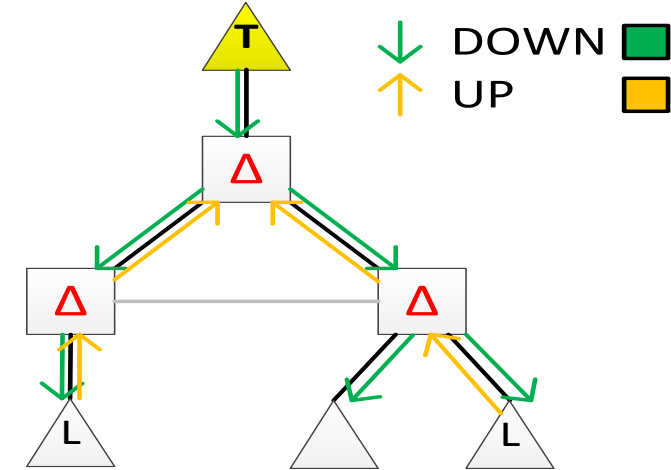
Proposal: Attributes with individual distribution mechanism for Resource Allocation

- *More attributes to allow different distribution*

- *Attribute defines his distribution*

- *New kind of distribution:*
  Unchanged over all links (flood)

05.2017, Stuttgart, Germany

IEEE 802.1 Interim Meeting
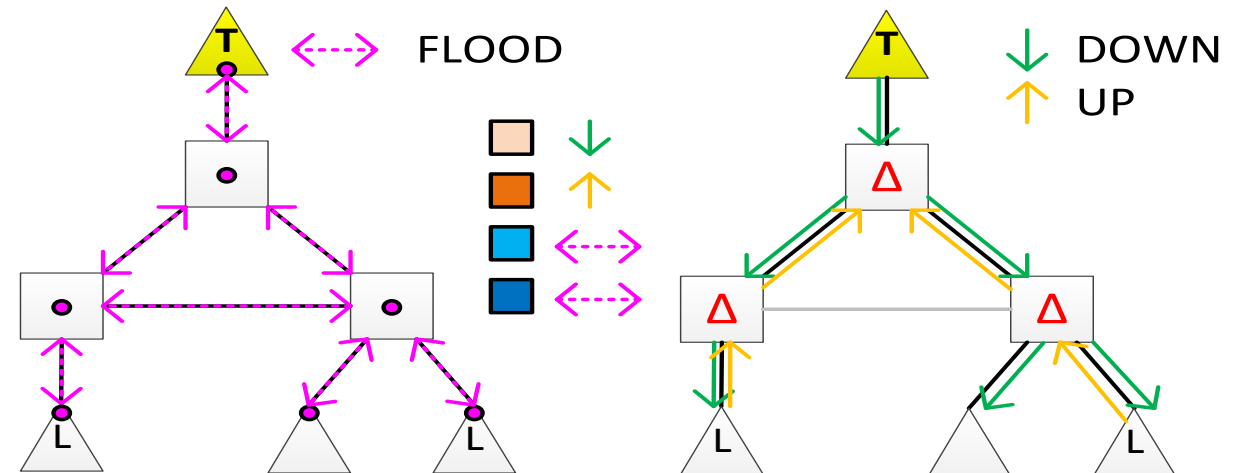
Collaboration with upper Layer
Resource Reservation Protocol *(e.g. RSVP)*

End-Station
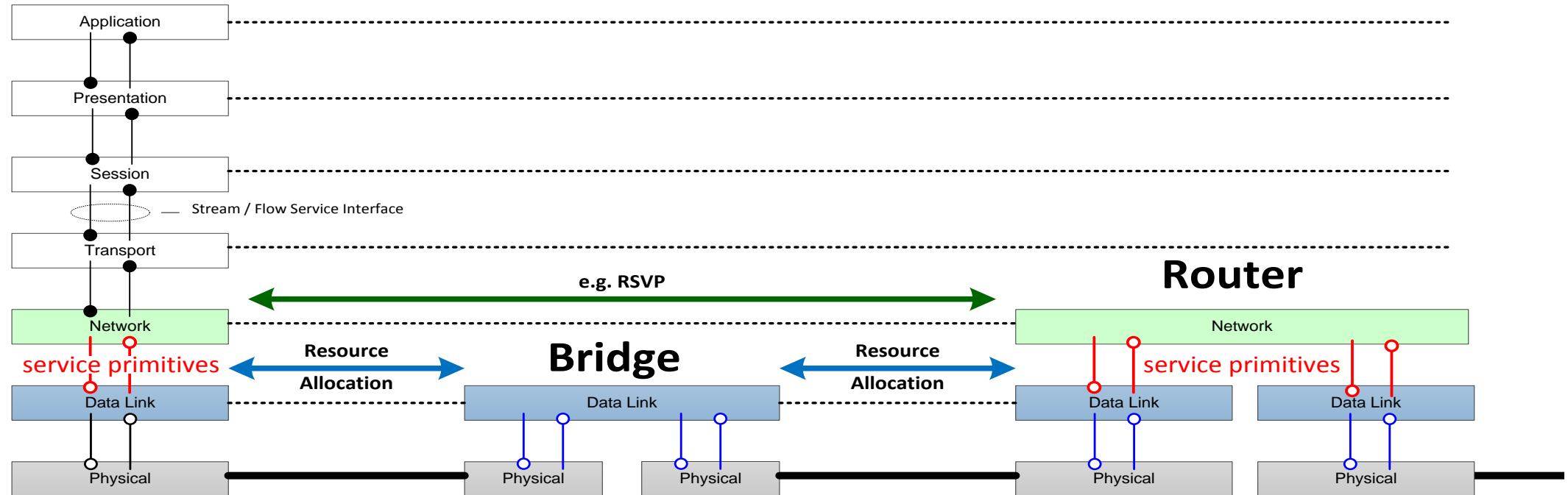
Proposal: Specify service primitives to the upper layer or resource allocation

(similar like the Talker and Listener primitives in IEEE 802.1Q – table 35-8 and table 35-9)

Thank You!

Questions?

SIEMENS