Preemption and Scheduled Traffic – Impact on SRP

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Impact of Preemption – Preemptable Classes

- Every Traffic Class below the preemptive class(es) has to consider the preemption overhead
- Preemption is defined per port
- Preemption overhead of preemptable classes is not a stream property, it is a "per hop" property

  ➔ The bridges can calculate the resulting bandwidth overhead themselves

  ➔ It is not necessary to change the TSpec

  ➔ Every Port has to make sure that the SR classes incl. the preemption overhead do not exceed the 75% (like preamble, IPG, other tags, …)
- But the bandwidth overhead of preemption also limits the bandwidth of the non SR class traffic
- Is 75% with preemption too much?

Impact of Preemption – Preemptive Classes

- The latency of preemptive CBS125 and CBS250 streams might change with preemption
- Changes to the AVB Gen1 latency equations
  - CBS125 and CBS250 are both preemptive (but do not preempt each other) ➔ no changes to the equations
  - CBS125 is preemptive ➔ smaller maximum interfering non CBS125 stream frame ➔ lower latency

➔ Preemption alone requires only very few changes to SRP

Impact of Scheduled Traffic

- Current situation:
  - 75% can be allocated for the two SR classes
- With Scheduled Traffic:
  - There needs to be a bandwidth limit similar to AVB Gen1 in order to allow non AVB stream traffic (again 75%?)
  - Scheduled Traffic incl. the guard bands is part of this bandwidth limit
  - In order to archive a Plug and Play support for CBS125 and CBS250 streams (with a predictable latency) the Scheduled Traffic needs to be limited

SRP and Scheduled Traffic

Possible ways to deal with Scheduled Traffic:

- SRP only supports CBS125 and CBS250 streams (only add the small changes mentioned in the previous slides)
- Detection of the Scheduled Traffic domain boundaries with the SRP domain attribute
- Support for stream setup
- Fully Plug and Play capable solution

SRP Domain Attribute

- Which PCP is used for Scheduled Traffic
- (Which class uses preemption)

- First Value of the Domain Vector:
  - FirstValue ::= SRclassID, SRclassPriority, SRclassVID

- Possible solution:
  - New SR class IDs for Scheduled Traffic, (Scheduled Traffic with preemption), (CBS125 with preemption), (CBS250 with preemption)
  - Preemption should not form separate AVB domains

SRP Support for Scheduled Traffic

The configuration of an AVB Gen 2 network might be bothersome:

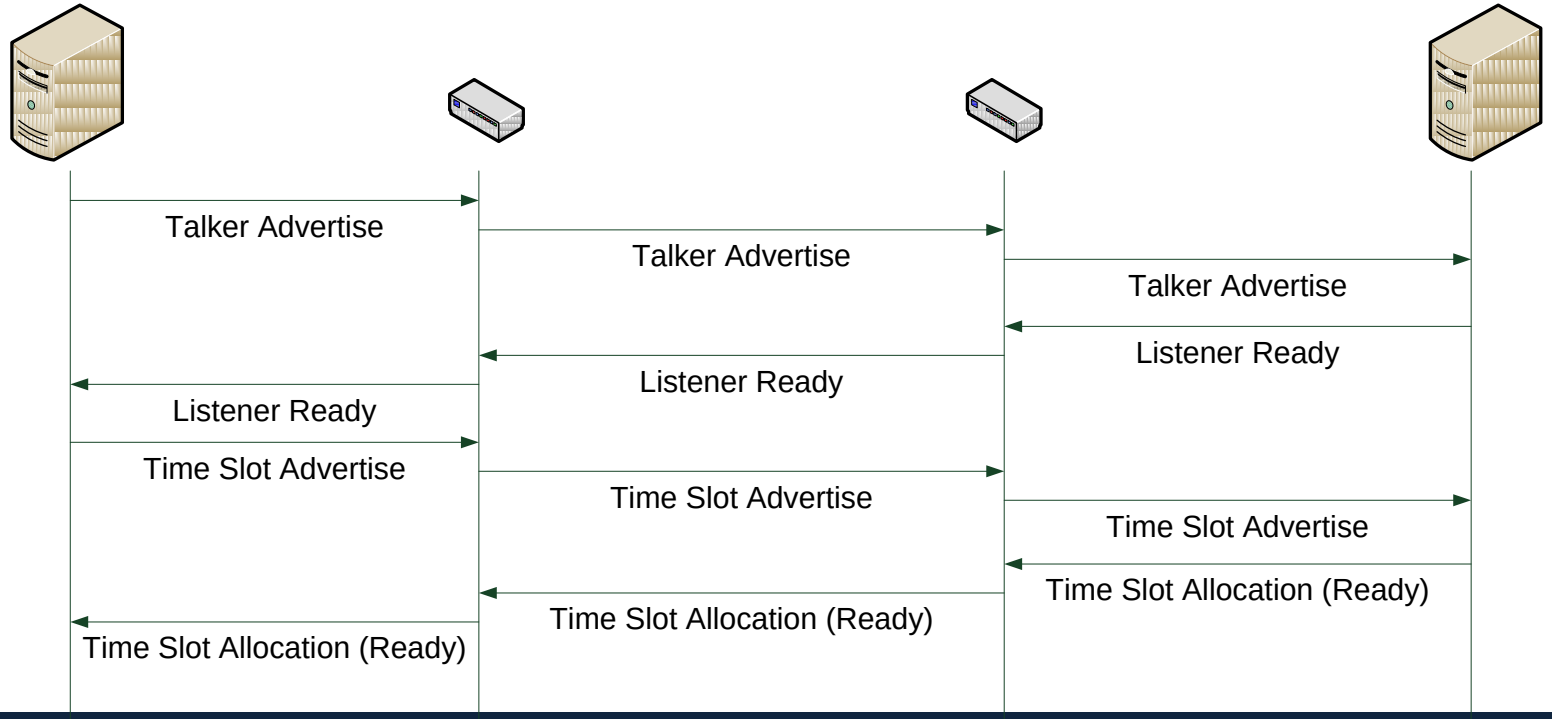
- A simple addition of a new stream requires the reconfiguration of all the bridges along its path
- The effort to set up a network with e.g. only one Scheduled Traffic stream is quite high
- There has to be a master in every network (even a small one) which validates the configuration at startup and starts the streams
- The master has to check the status of the whole network regularly
- The master is the only instance for debugging, the end stations do not get any error messages from the network

SRP Support for Scheduled Traffic

- It is very hard to get a full Plug and Play support for Scheduled Traffic
- In order to achieve the best performance in a big network with many streams a master might be necessary
- But the addition of new end stations and streams would be much simpler with a “non Plug and Play” SRP support
- With SRP support the master in a big network only has to configure the end stations
- A small network would work without a master

Possible Way of SRP Support for Scheduled Traffic

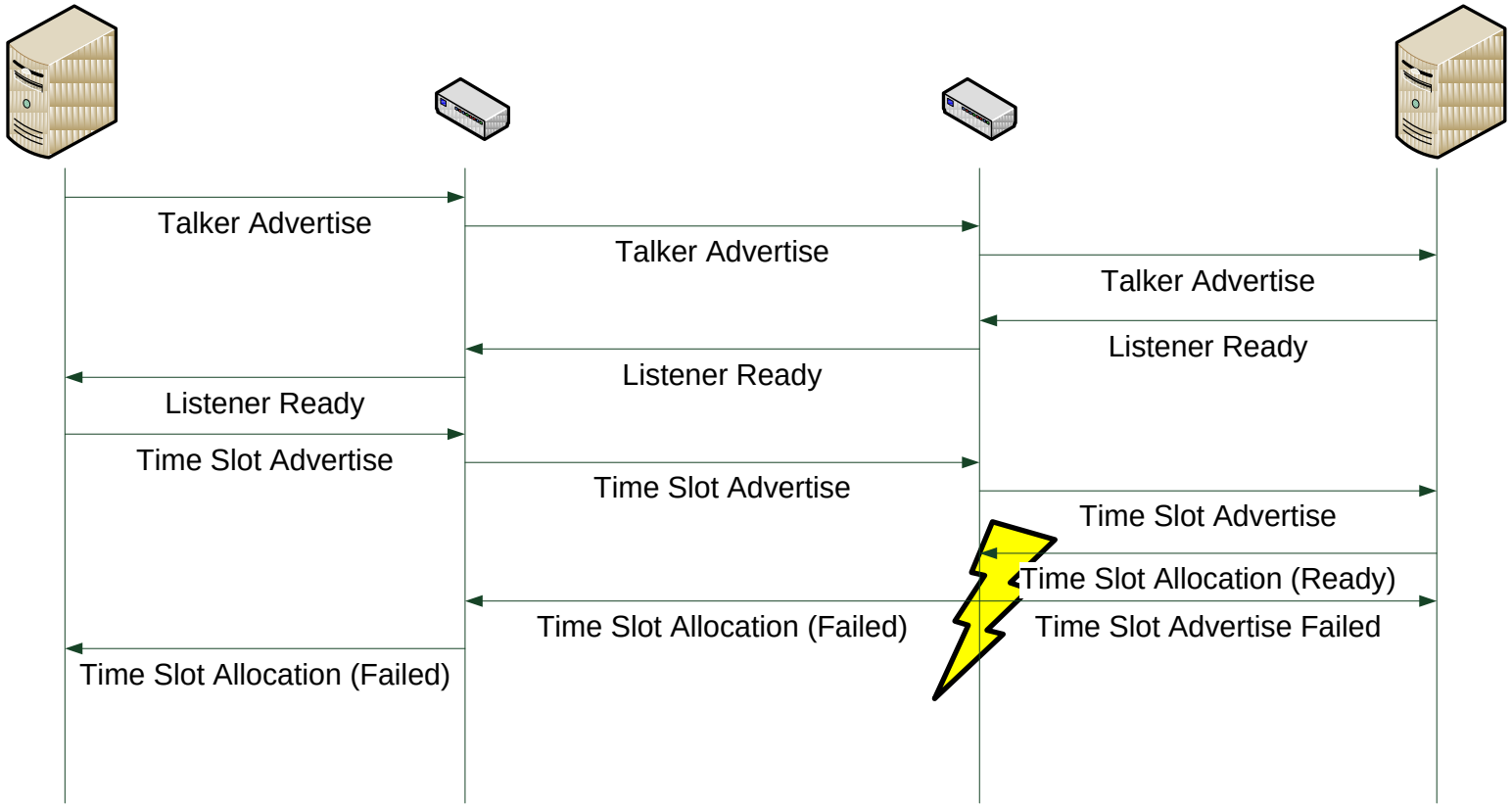
- The first part of the stream reservation is equals the current stream reservation
- The second part reserves a timeslot on top of the reserved stream
- The timeslot allocation needs only very few resources, as the attribute would be only distributed along the reserved path of the stream
- The end station knows when the path is completely allocated



Possible Way of SRP Support for Scheduled Traffic

- Misconfigured networks (e.g. two timeslots overlap, different PCPs used, etc.) would cause error messages

  ➔ Easy to debug



Time Slot Advertise

- Propagates the TimeSlot along the path of the stream
- The TimeSlot information has to be provided and precalculated by management

- Possible First Value:
  - FirstValue ::= StreamID, TimeSlot

- TimeSlot contains the time when the frame egresses the bridge (and a TimeSlot ID?)
- TimeSlot has to be adjusted in every bridge

- Similar to Talker Advertise attribute

Time Slot Advertise Failed

- Reports a failure to the listener
- Possible First Value:
  - FirstValue ::= StreamID, FailureInformation
- FailureInformation consists of an Bridge ID and a Failure Code
- Similar to Talker Failed attribute

Time Slot Allocation

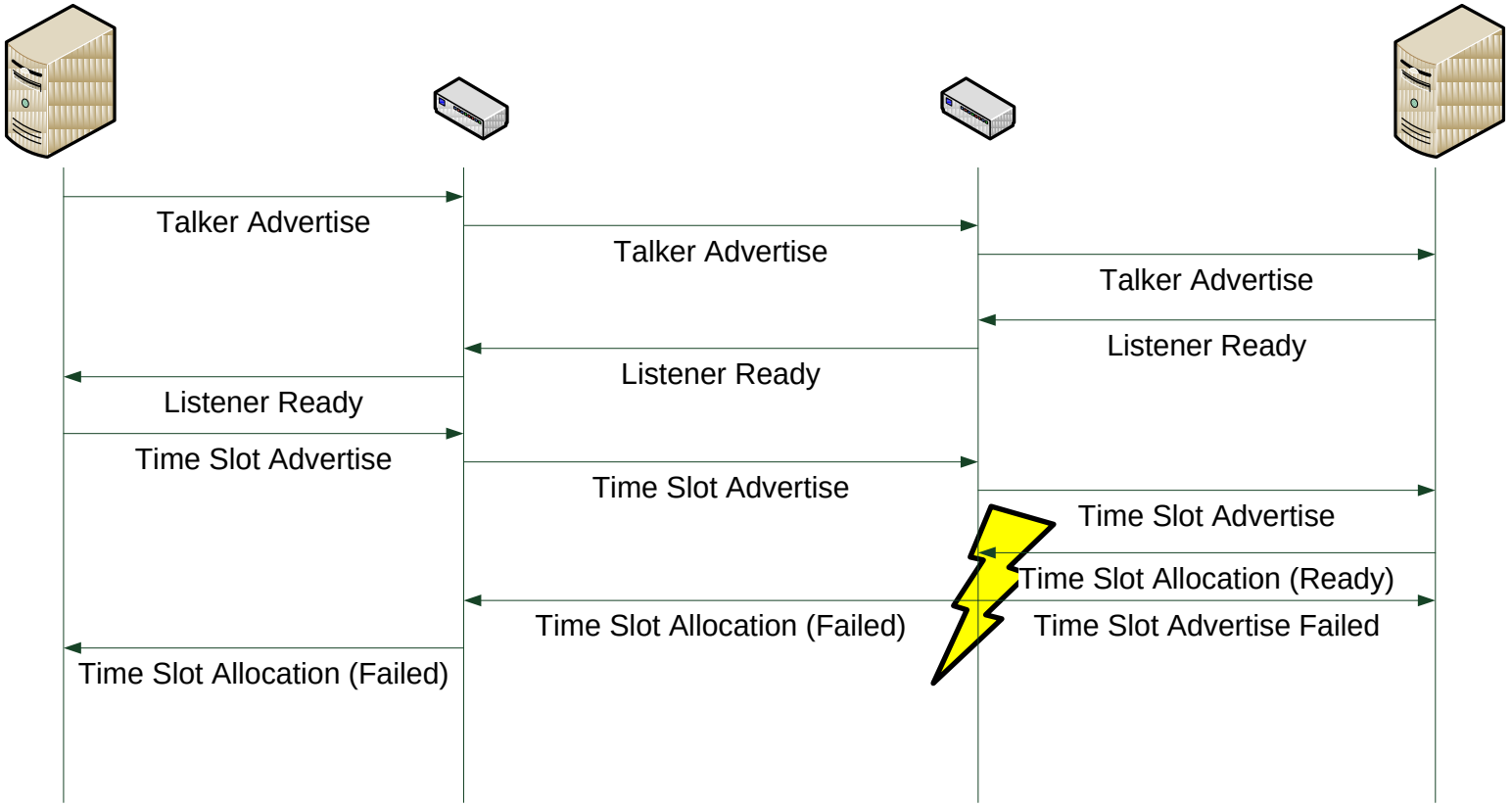
- Reports to the talker when the network is configured and if there is a failure

- Possible First Value:
  - FirstValue ::= StreamID
- Similar to Listener attribute

- In order to give the talker more information e.g. on a collision of two timeslots it might be useful to add FailureInformation

  ➔ Talker can try to use a different timeslot

SRP Support for Scheduled Traffic



Conclusion

A support for stream setup is relatively easy to accomplish

Advantages:

- Better failure diagnosis
- Simpler stream setup
- More dynamic
- Better integration into AVB
- Offline engineering is enough, no online network master necessary
- Only the end stations have to be configured

Thank You