

# Improving Current QoS Mechanisms

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- This presentation shows how a reduction of interference can improve current IEEE 802.1 QoS mechanisms
- I do not propose that all of these improvements should be objectives for DMLT
- Some improvements might be less useful or even out of scope

## Overview QoS Mechanisms

- Strict Priority
- Reserved Traffic
- Scheduled Traffic

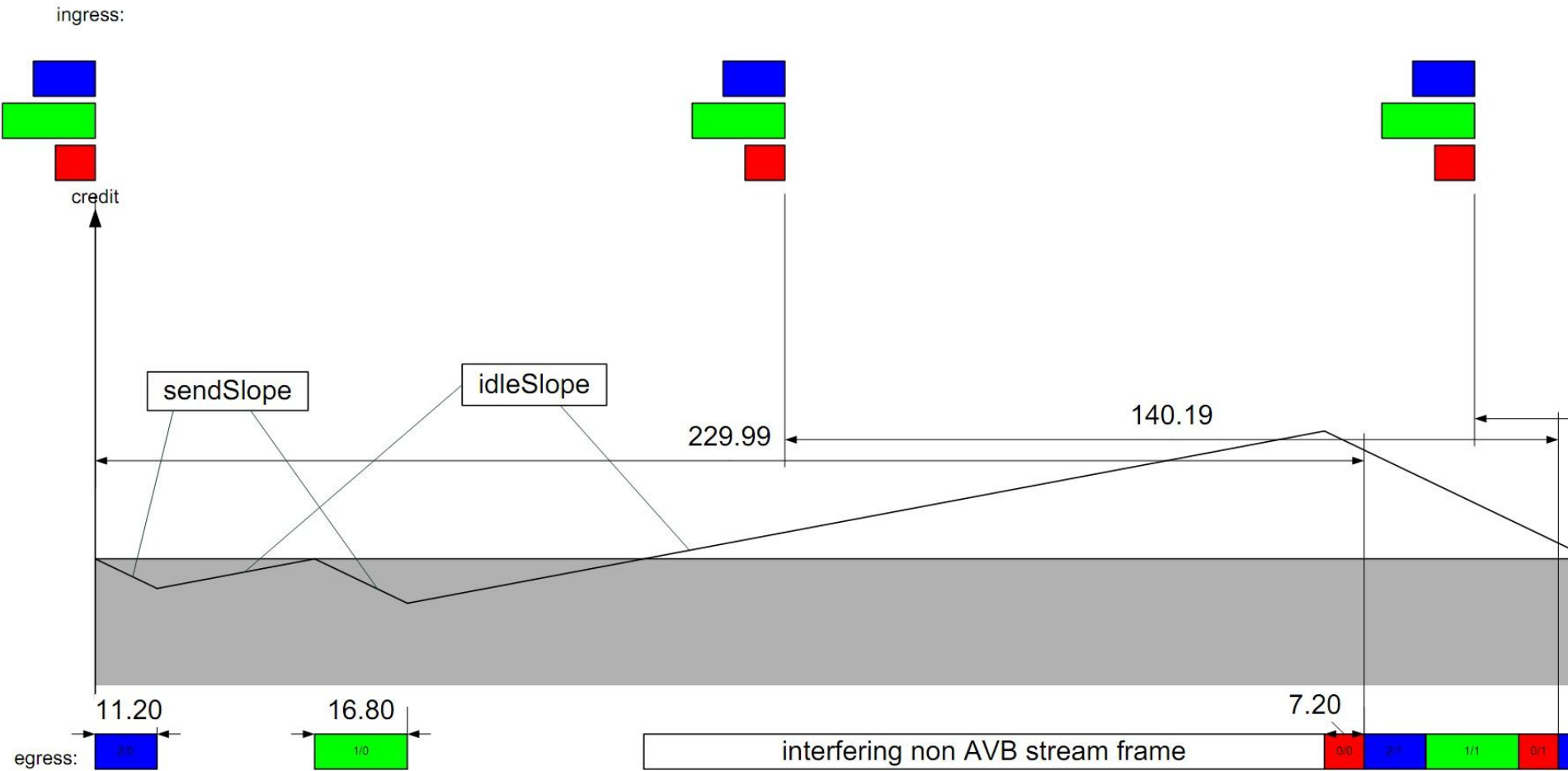
## Strict Priority

- Highest priority goes first
- No guarantees
- Improvements for low bandwidth high priority traffic
- Possible improvements:
  - Reduction of interference with lower priority frames
    - => Reduces latency
    - => But no latency guarantees
    - => Improvements in very small and completely engineered environments with low bandwidth utilization possible

## Reserved Traffic (AVB)

- AVB is a set of mechanisms
- QoS is guaranteed (e.g. latency guarantees)
- High bandwidth utilization possible
- High priority AVB stream traffic (SR class A and B) is protected (bandwidth reservation, stream registration specifies forwarding -> no flooding, domain concept, priority regeneration, ...)
- Traffic is shaped (Credit Based Shaper)
  - Protects the best effort traffic as the maximum interference (AVB stream burst) for the highest best effort priority is limited and known
  - Protects the AVB streams, as it limits the AVB stream bursts which can interfere in a bridge
  - Enforces bandwidth reservation

# Credit Based Shaper



## Credit Based Shaper

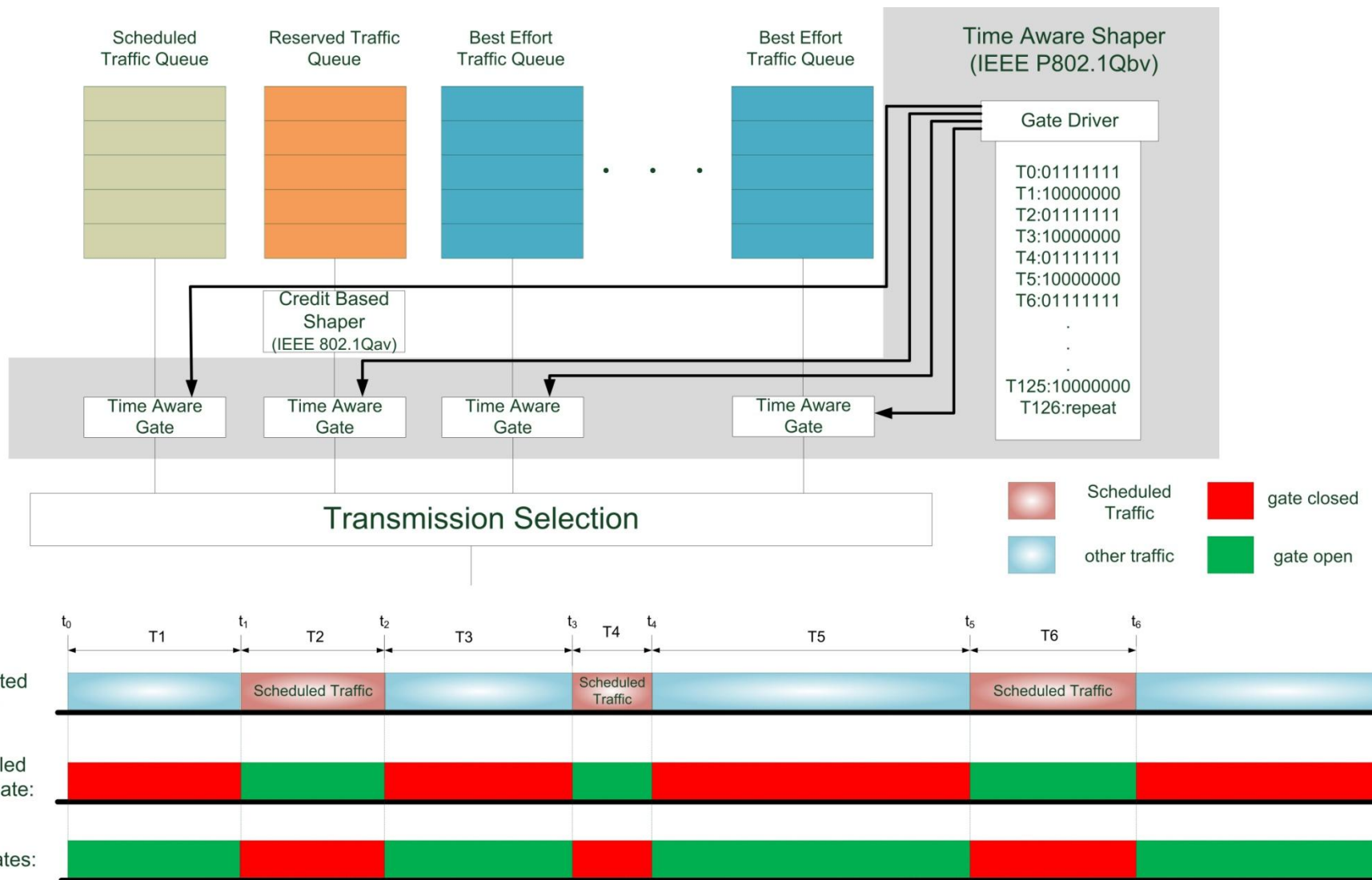
- Possible improvements:
  - Reduction of interference between SR class A and lower priority traffic
    - => Reduces maximum SR class A latency
    - => Reduces maximum SR class A burst size (better shaping quality)
    - => Less interference inside SR class A
  
- Other possibility (out of scope):
  - Reduction of interference between all SR classes and lower priority traffic (= > no worst case latency improvements)
    - => AVB could be used in networks with irregular long frames

## Scheduled Traffic

- Time Aware Shaper forwards frames with different priorities based upon a schedule
- The Time Aware Shaper blocks the non Scheduled Traffic, so that the port is idle when the Scheduled Traffic is scheduled for transmission
- Scheduled Traffic needs to be engineered
- No interference between high and lower priority traffic
- But “interference” between schedule and lower priority traffic (e.g. Best Effort, Reserved Traffic)



# Scheduled Traffic



## Scheduled Traffic

- Possible improvements:
  - Reduction of interference between schedule of high priority traffic and lower priority traffic
    - => Improving bandwidth utilization
    - => Reduction of lower priority traffic latency (i.e. Best Effort Traffic, Reserved Traffic)
    - => Improved convergence of Best Effort, Reserved and Scheduled Traffic

## New QoS mechanisms

- DMLT will introduce a completely new mechanism
- All current QoS mechanisms were designed without the knowledge of such a mechanism
- It might be worthwhile to think about a new QoS mechanism which is specifically designed to make use of the minimization of interference
- The definition of such a mechanism might be part of 802.1, but cooperation is necessary

## Proposed Ranking of the Shown Improvements

- Scheduled Traffic: ++
- New QoS Mechanism: ++
- Reserved Traffic: +
- Strict Priority: -

## Conclusion

- Various possible latency improvements
- The technical requirements behind this improvements might be similar (with DMLT all of the former mentioned improvements might be possible)
- But they are not identical, some might have special requirements
- So we have to decide which of these are real goals and which of these are less important.
- But in order to get low latency guarantees other mechanisms (like stream reservation, scheduling, shaping, ...) are necessary
- Set of 802.1/802.3 mechanisms is necessary to provide a whole solution rather than single mechanisms

# Thank You