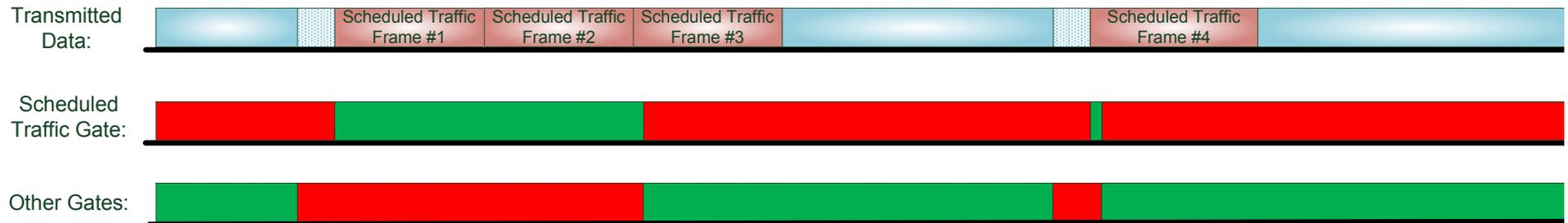


# Interspersing Express Traffic and Time Aware Shaping

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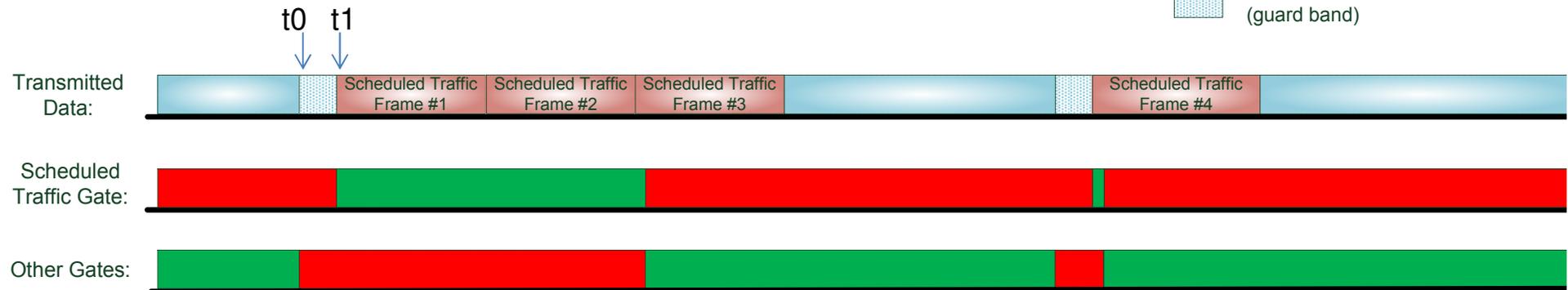
## Example (1)



### Example:

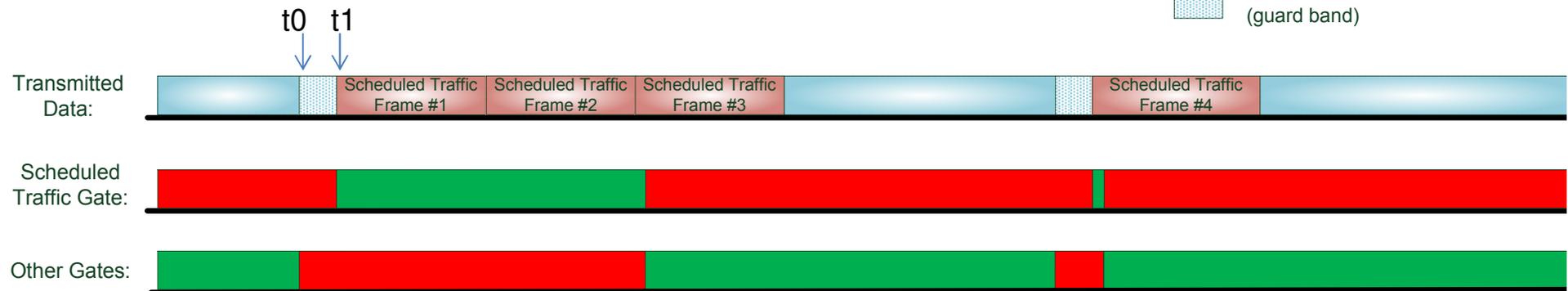
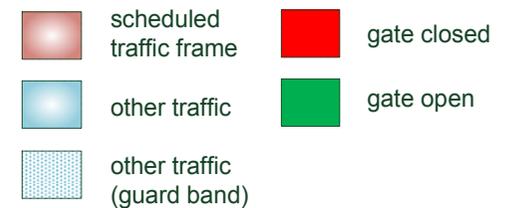
- Three streams (frames) are scheduled for transmission in the first transmission window, one stream (frame) is scheduled in the second one
- What are the impacts on DMLT in order to minimize the guard band in front of the two scheduled transmission windows?

## Example (2)



- At  $t_1$  the port needs to be idle
- DMLT needs to be initiated before  $t_1$  (i.e. at  $t_0$ )
- The time interval  $t_1-t_0$  is the guard band
- The guard band is defined by the maximum frame size which can interfere with Scheduled Traffic (without DMLT a maximum 802.3 frame)

## Example (3)



- At  $t_0$  the Time Aware Shaper needs to signal the MAC Merge Sublayer to initiate preemption
- This cannot be signaled by sending a frame to the higher priority MAC, as there might be no frame in the Scheduled Traffic queue at this point in time
- In addition the Scheduled Traffic queue is still disconnected from the transmission selection, i.e. even if there is a frame, it is not visible to the transmission selection

## Example (4)



- At  $t_1$  the Time Aware Shaper connects the Scheduled Traffic queue to transmission selection and the first ST frame is sent to the higher priority MAC
- Between  $t_1$  and  $t_2$  the MAC Merge Sublayer is not allowed to resume the transmission of the lower priority traffic, even if there is no frame to transmit from the higher priority MAC. I.e. if the second ST frame in this example is missing, the port needs to stay idle till  $t_2$ .

## Example (5)



- At  $t_2$  the MAC Merge Sublayer is allowed to resume the transmission of frames/framelets from the lower priority MAC.

## What are the goals of the DMLT SG?

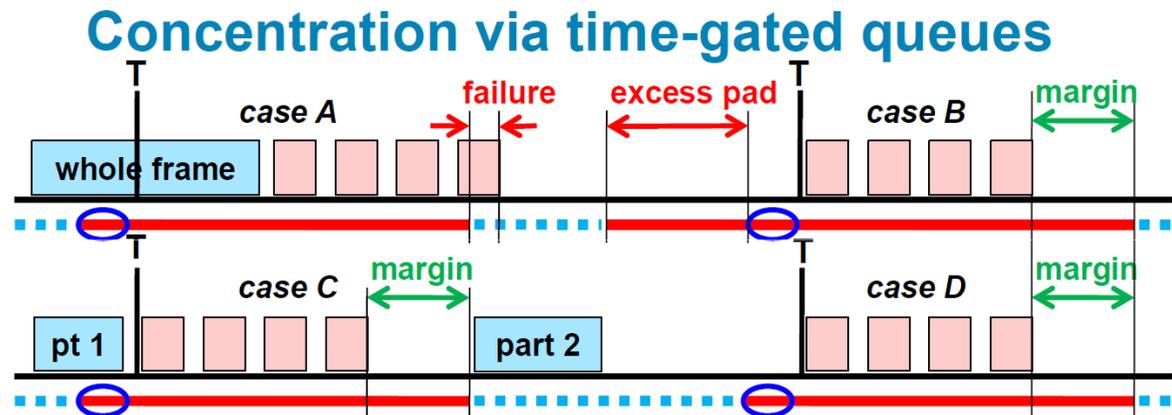
- The DMLT SG liaison report at the last 802.1 Closing Plenary contained some, in my opinion, worrying statements about whether the mechanism to be defined should include an optimization for the Time Aware Shaper (minimizing the guard band)
- Also the following short discussions contained some misinterpretations (at least from my point of view, I might be wrong)
- E.g. it was mentioned that Preemption was requested for P802.1Qbu and not for P802.1Qbv

## Is the reduction of the guard band a new idea?

- **Not really!**
- Since the beginning of the discussion between .1 and .3 this was mentioned as the major goal.

## Preemption History (1)

Presentation from Norman Finn at the first joint 802.1/.3 joint meeting on that topic in November 2011.



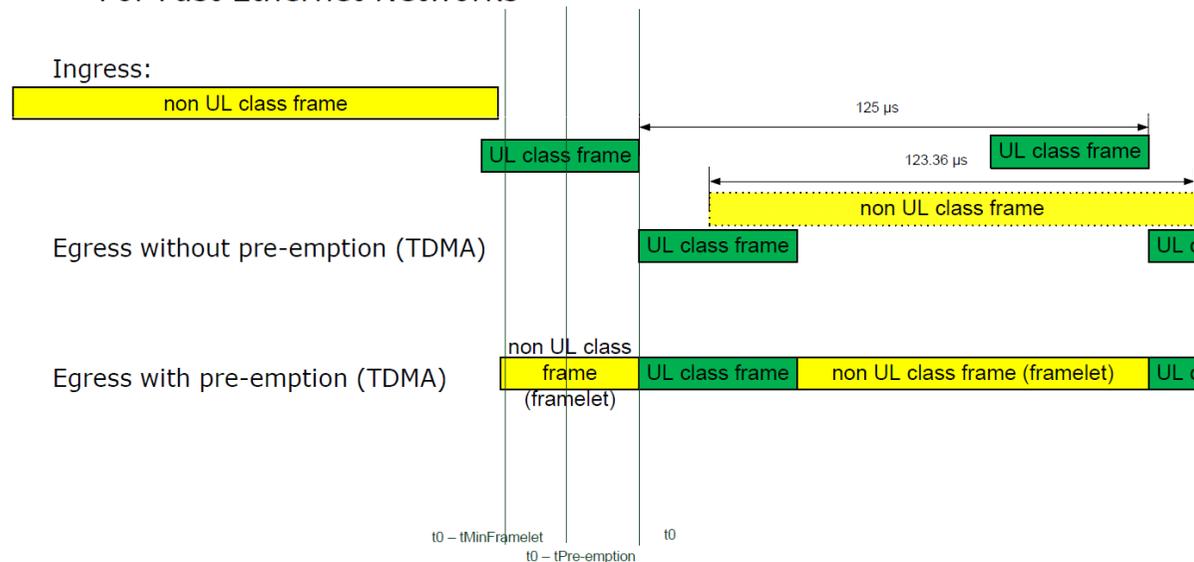
- **Time-gated queues** in the bridges can be used to prohibit any but critical frames in the critical windows.
- But, the critical gate must be extended ahead of the transmission point **T** in order to prevent long frames from delaying the start of the critical data.
- **Preemption** eliminates the need for excessively-long pre-**T** extensions, which would disrupt reserved traffic.

# Preemption History (2)

Also my presentation at the joint meeting in November 2011 addressed this topic.

## Advantages of Pre-emption with TABS

- For Fast Ethernet Networks



$t_0$ : UL class frame is ready to be transmitted and UL class queue is de-blocked

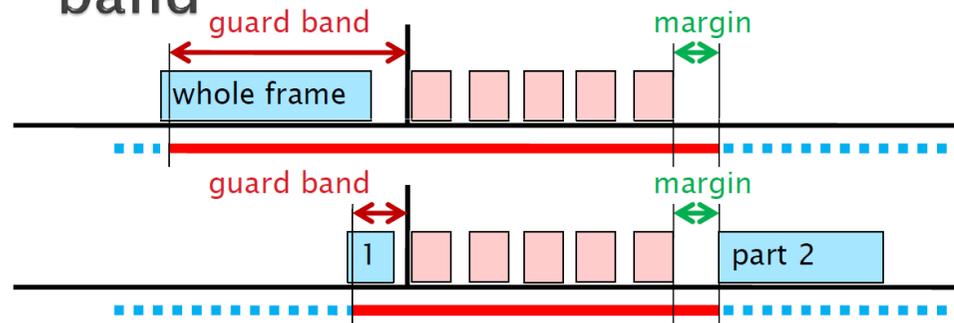
$t_0 - t_{MinFramelet}$ : Egress port is blocked for non UL class frames

$t_0 - t_{Pre-emption}$ : Pre-emption mechanism is activated

## Preemption History (3)

At the failed Preemption CFI consensus building meeting in March 2012 the minimization of the guard band was presented as **the** technical reason to do preemption.

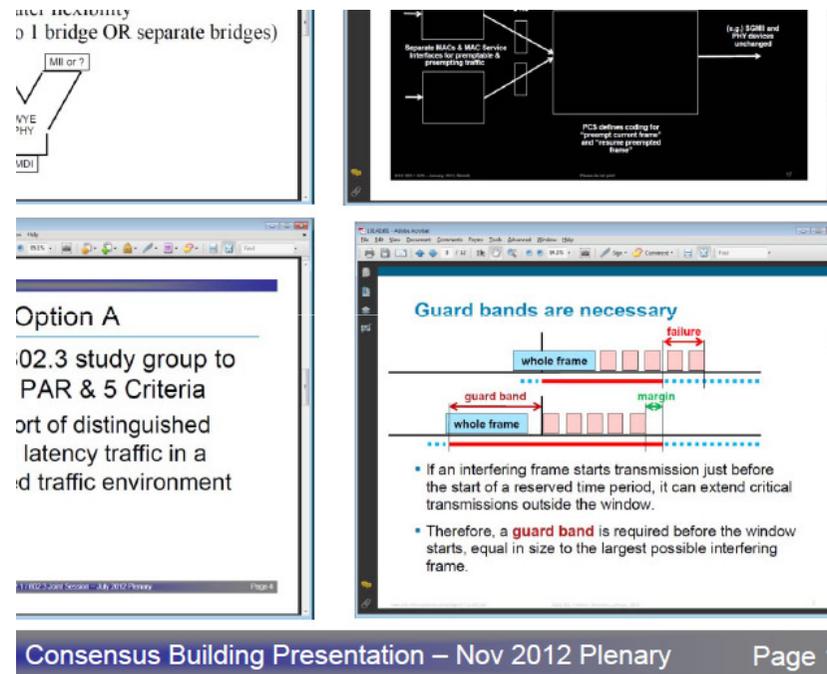
### Preemption shrinks the guard band



- ▶ If preemption is used, the guard band need only be as large as the largest possible interfering fragment, instead of the largest possible interfering frame.
- ▶ It is easy to see that **the smaller the size of the time-reserved windows, the larger the impact of preemption.**

## Preemption History (4)

And even at the CFI consensus building meeting for the DMLT SG it was part of the slides.



[http://www.ieee802.org/3/DMLT/public/nov12/CFI\\_01\\_1112.pdf](http://www.ieee802.org/3/DMLT/public/nov12/CFI_01_1112.pdf)

**Reducing the guard band is not a new requirement!**

## Why is it essential to reduce the guard band?

- Allows small TAS transmission periods @Fast Ethernet
- Significantly improves bandwidth utilization
  - see Norms calculations (<http://www.ieee802.org/1/files/public/docs2012/new-avb-nfinn-preempt-advantage-0112-v02.pdf>)
- Significantly improves convergence
  - without it is very hard to determine the latency of the lower priorities
  - the bandwidth which is available for the lower priority traffic would vary significantly

## IET changes the QoS architecture

- Until now .3 is priority agnostic, with IET .3 gets 2 priorities
- This means, that the current prioritization is split in to two parts
- This involves the danger that we end up with yet another place to introduce QoS features
- Therefore we need to make sure that this two parts work together
- One possible way is to keep the control about it in 802.1, i.e. not only the control about sending the frames to .3 this also includes the control over preemption
- This is not only essential for the TAS, this would also allow other solutions in the future, e.g. the TSTS idea presented in March would also need the control over IET. (There was no decision to do this shaper, but if we do not have control over the IET mechanism in .1 we significantly limit the future use of this feature.)

## Summary

- I don't say that there are not other reasons to do IET, but the minimization of the guard band was always and is one of the most important.
- So we should try really hard to get a IET mechanism which supports the TAS.
- Furthermore we have to make sure that we do not end up with completely separate QoS mechanisms in every layer that are not interoperating.
- If the mechanisms in .1 (controlling the queues) and the .3 priority aware Dual-MAC/MAC-Merge do not work together, this seems to be wasted time.

# Thank You