On Multi-Level Preemption In Ethernet

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Preemption in ethernet

- Frame preemption is recommended in the IEEE 802.3br and 802.1Qbu standards, to support real-time traffic.

The Standards specify one-level preemption for ethernet networks to protect an express traffic class from interference by other traffic classes.

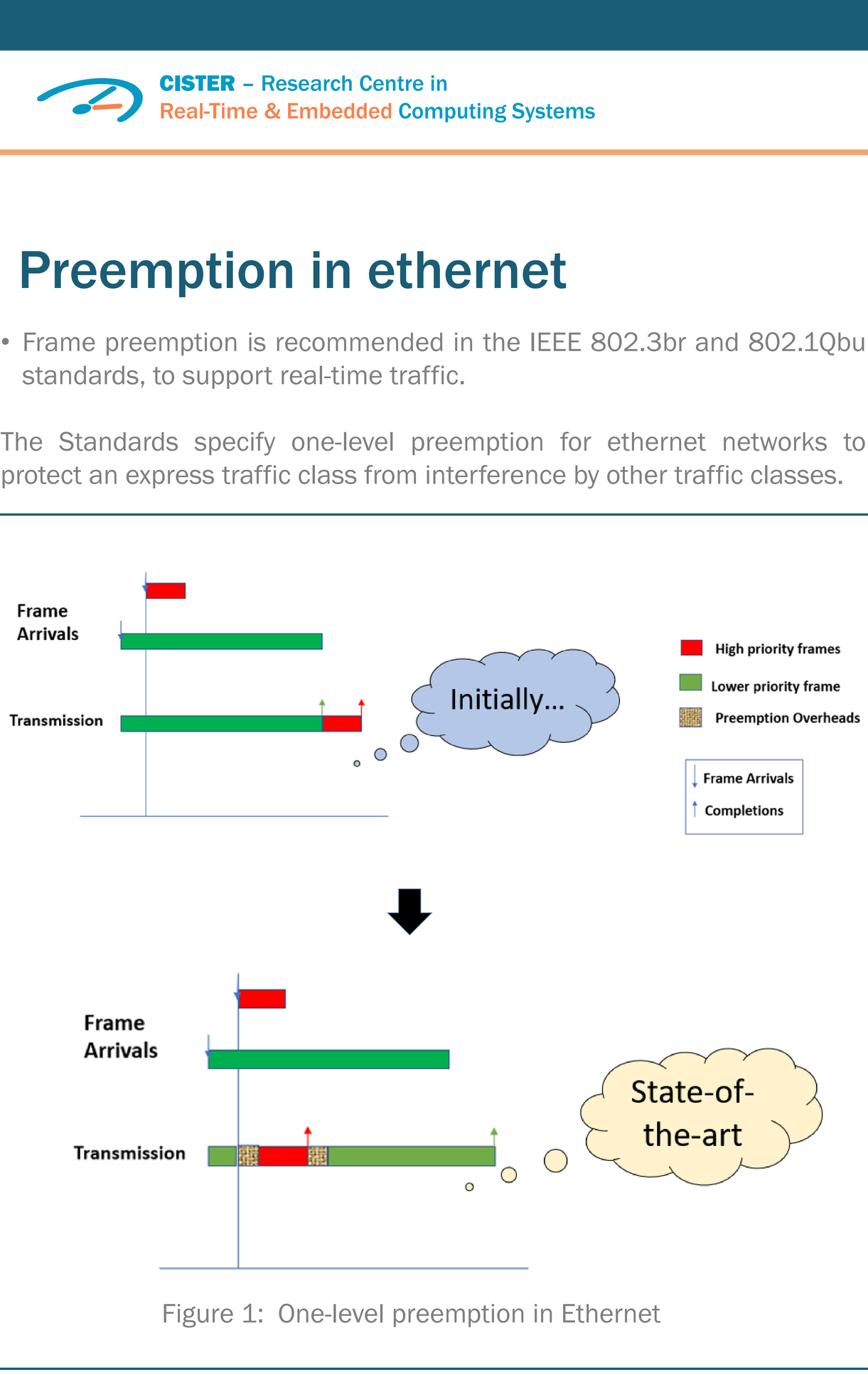

Figure 1: One-level preemption in Ethernet

Limitation of the state-of-the-art

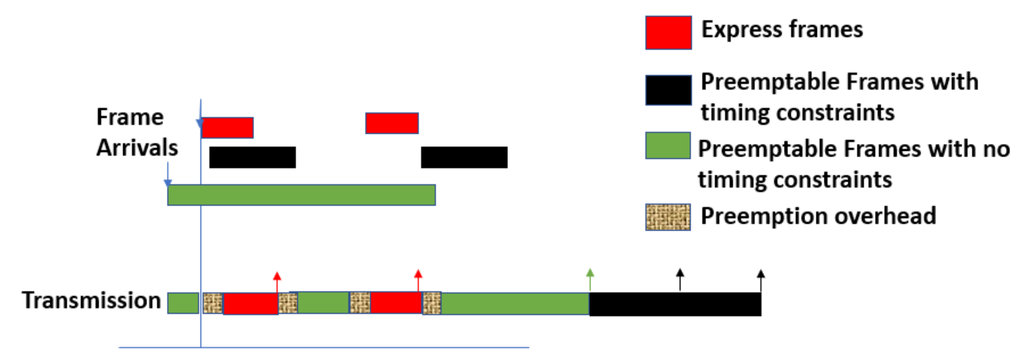

Figure 2: Frame transmission with 1-level preemption

Ethernet preemption mechanism

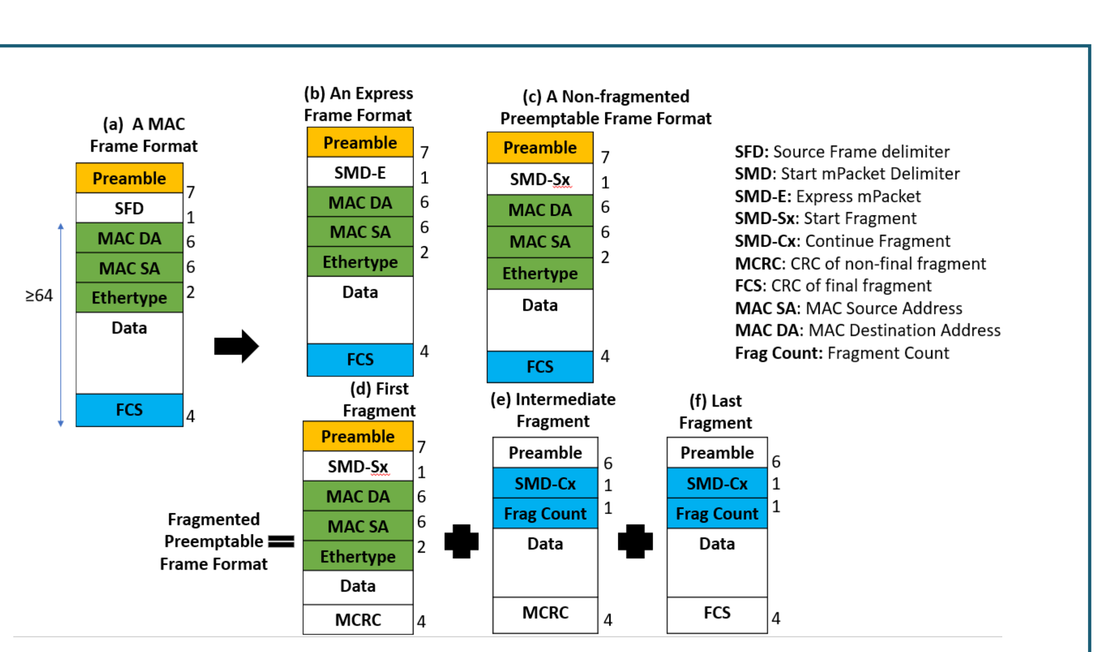

Figure 3: Ethernet frame format to support preemption

Proposed solution

By allowing more than one level of pre-emption, we can improve on the transmission time of non-express frames with stringent timing constraints

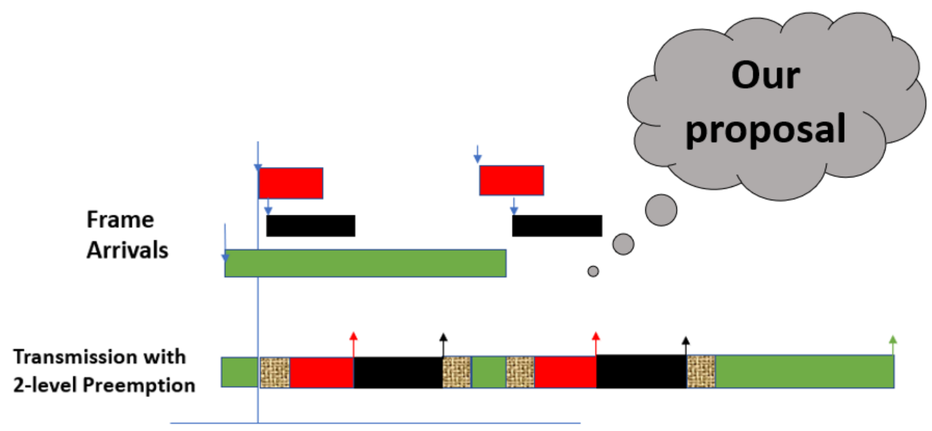

Figure 4: Transmission under multi-level Preemption in Ethernet

Ongoing work

- With very little modifications to the specifications in the current standards, we argue that multi-level preemption is operationally feasible
- We are conducting a worst-case transmission time analysis for multi-level preemption
- We intend to demonstrate the feasibility of multi-level preemption by experimentation
- We are investigating how the preemption overhead grows to affect link utilization

References

[1] “IEEE approved draft standard for local and metropolitan area networks media access control (MAC) bridges and virtual bridged local area networks amendment: Frame preemption.” P802.1Qbu/D3.1, September 2015, pp. 1–50, Jan 2015.

[2] “IEEE standard for ethernet amendment 5: Specification and management parameters for interspersing express traffic,” IEEE Std 802.3br-2016 (Amendment to IEEE Std 802.3-2015), pp. 1–58, Oct 2016.

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