Deadline based Forwarding

draft-peng-detnet-deadline-based-forwarding-11

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Main Updates (09 -> 11)

1) Supplement the figure of E|D decoupling with 2-tier Schedulers for easy understanding.

2) Correct the misleading drawing in the figure example of Policing on the Ingress.

3) Change the evaluation of "need frequency sync" to "NO" based on new analysis.

Update 1: E|D Decoupling

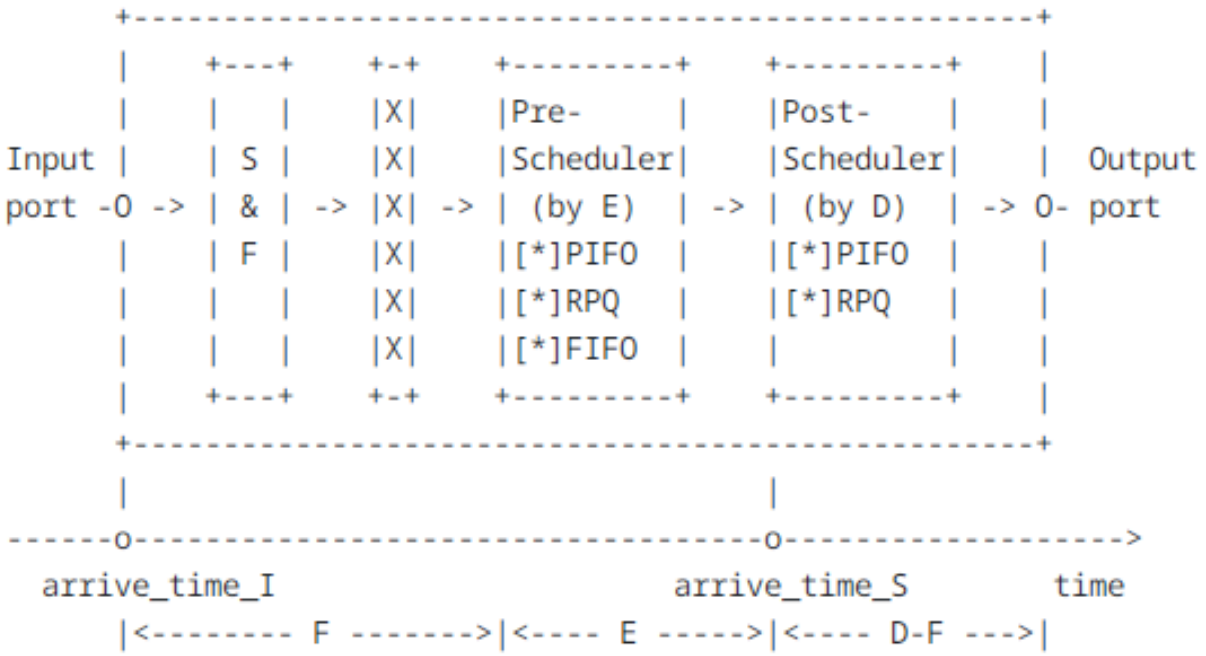


Figure 9: E|D decoupling with 2-tier Schedulers

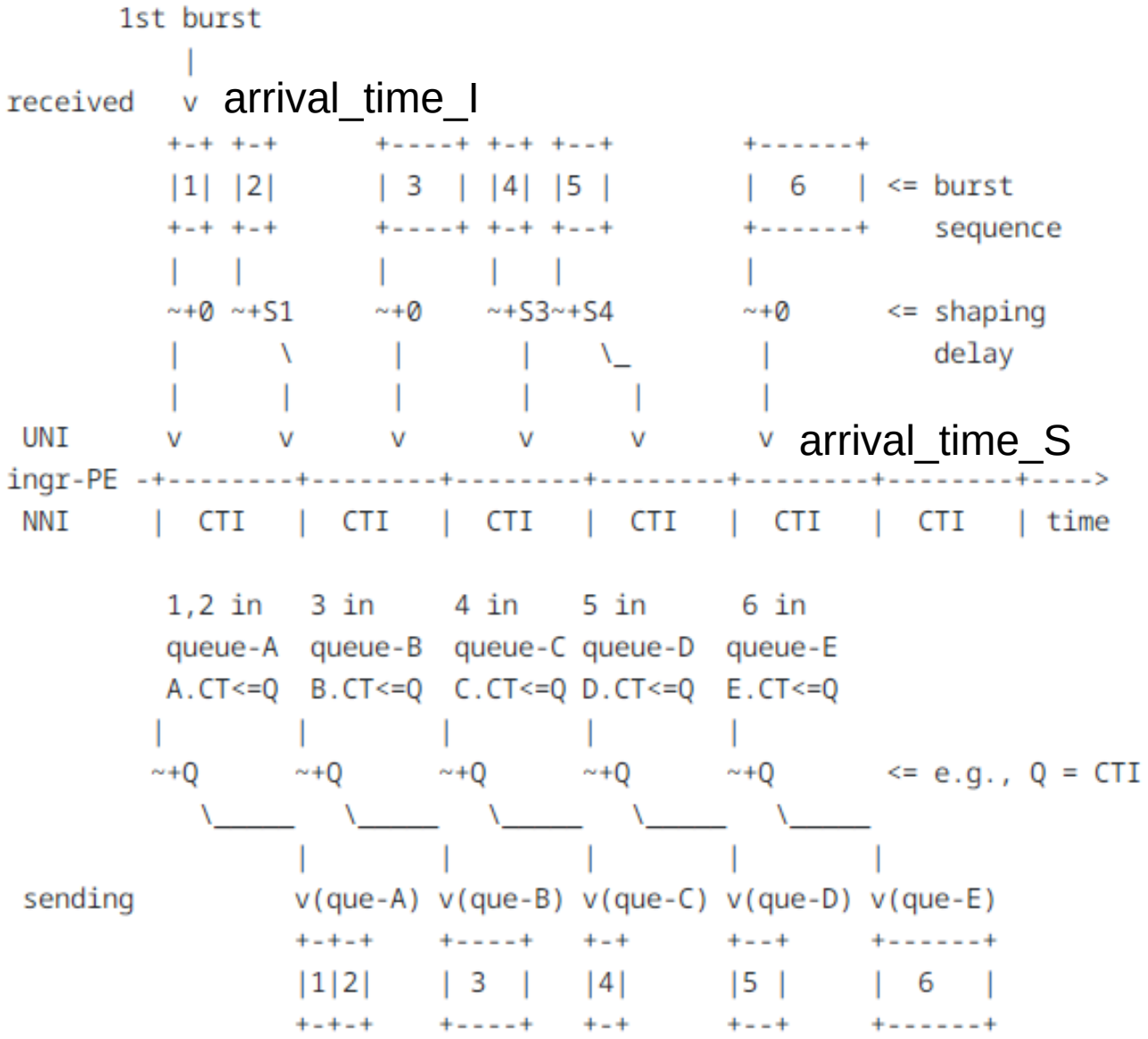
- The pre-sheduler scheduling with on-time mode based on E.
- The post-scheduler scheduling with in-time mode based on D.
- The pre-scheduler may maintain a PIFO, an RPQ, or FIFO per incoming port + delay level.

Update 2: Policing on the Ingress

- Simple rule:

it is the arrival_time_S (after policing), but not arrival_time_I, used for the enqueue operation.

- The fig shows an RPQ example.



Update 3: Frequency Sync Considerations

- EDF do not require complete synchronization of crystal oscillator frequencies between devices, and the latency error caused by the deviations of clocks from their nominal rates (e.g., -100ppm) is generally in the nanosecond range and can be ignored.

  - e.g, for the planned residence time 100us, the latency error by -100ppm may be 100us * 100ppm/(1-100ppm), approximately 10 ns. 100 hops only accumulate 1 us.

Review of CEDF's Taxonomy Considerations

- ***Per hop latency dominant factor***: Delay level itself.
- ***Non-periodic***: There is no defined periodic quantification unit of scheduling power.
- ***Asynchronous***: All DetNet flows arrive asynchronously, and schedulers work independently without synchronization (such as time synchronization).
- ***Class level***: DetNet Flows is grouped by delay levels.
- ***Work-conserving/non-work-conserving configurable***: Scheduler configured with in-time mode is work-conserving, while the EDF scheduler configured with on-time mode is non work-conserving.
- ***In-time/on-time configurable***: Scheduler may be configured with in-time mode or on-time mode.
- ***Delay based***: A DetNet flow is scheduled based on its expected delay level, rather on its reserved bandwidth (i.e., rate), to fit well the case of low bandwidth consumption but urgent flows.

Next step

- Any questions/comments ?

Thank you!