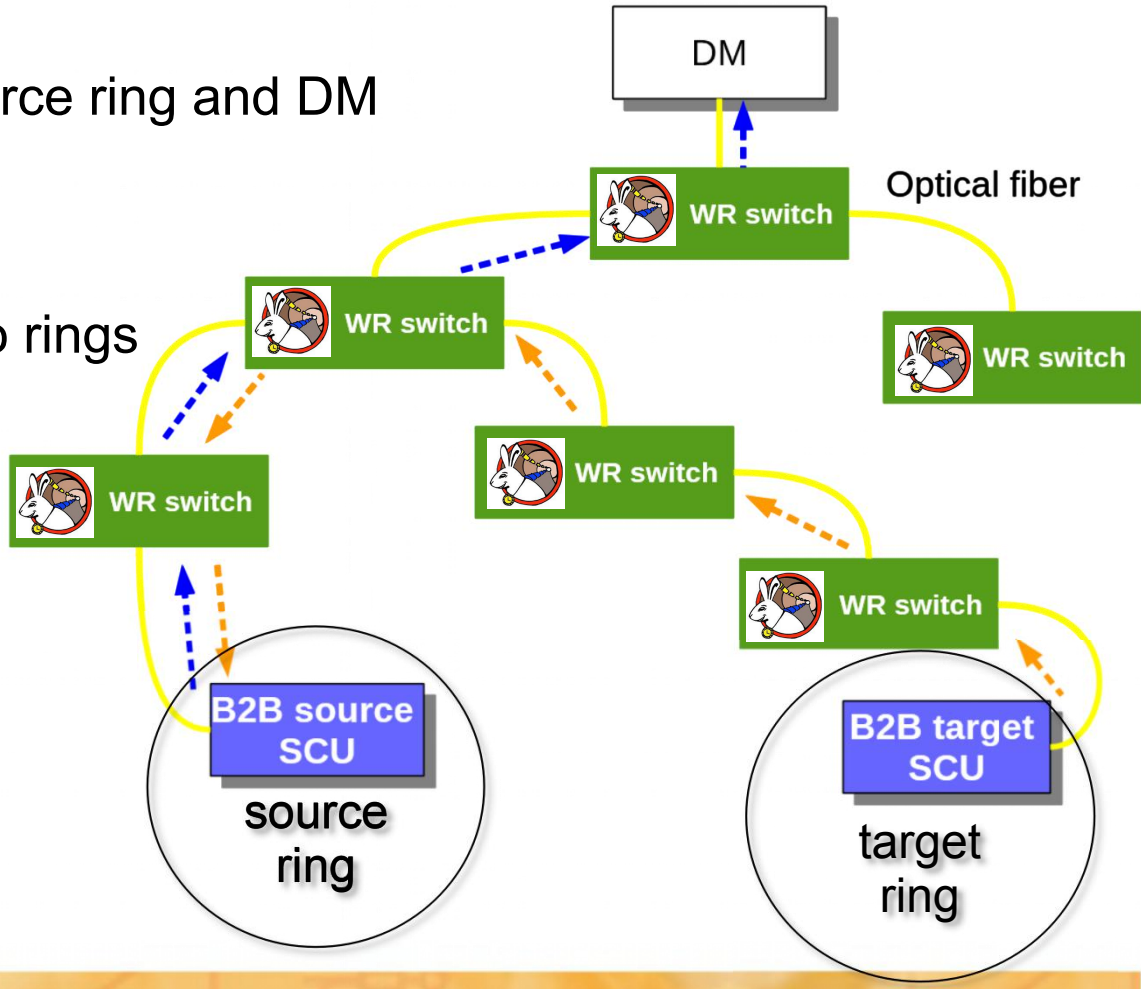
Characterization of WR Network for B2B Transfer

Two type B2B messages

- 1st type B2B message between source ring and DM (B2B Unicast traffic)
- 2nd type B2B message between two rings (B2B Broadcast traffic)



Characterization of WR Network for B2B Transfer

Requirements:

- No misordered frame

B2B related events can not receipted and executed in time, which causes the failure of the B2B transfer.

- Transfer latency on network ≤ 400 µs

Hard upper bound time constraints 10 ms

- Tolerable frame loss rate

Re-transmission of the lost frame increases the transfer latency (> 1 ms), which causes the failure of the B2B transfer.

Characterization of WR Network for B2B Transfer

Requirements:

- Tolerable frame loss rate - one B2B transfer failure every month
  - 1st type 0.22×10^{-7}

$$0.22 \times 10^{-7} = \frac{880}{5 \times 10^{3} \times 60 \times 60 \times 24 \times 30 \times 3}$$

bandwidth 5kbps

per month

maximal 3 parallel B2B transfers

  - 2nd type 0.43×10^{-8}

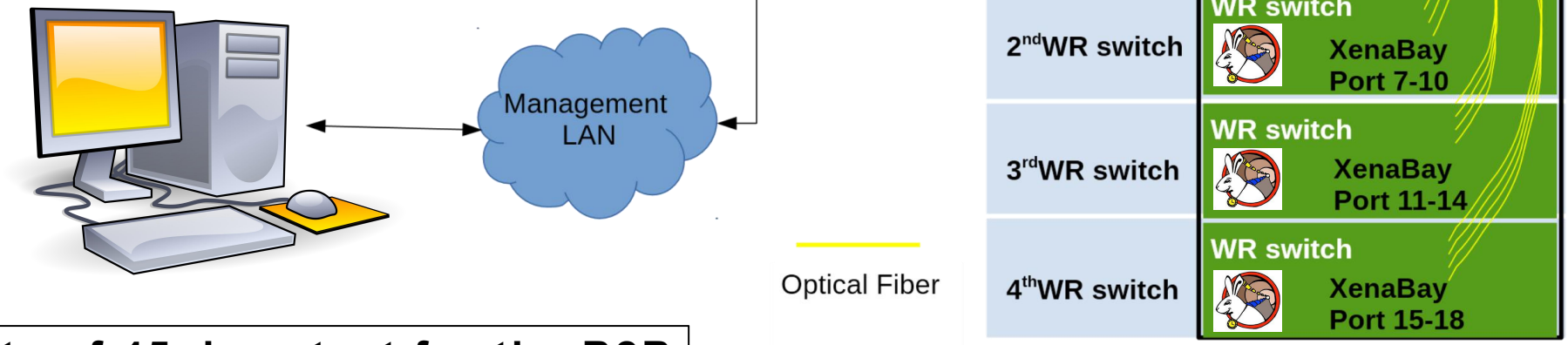
$$0.43 \times 10^{-7} = \frac{880}{25 \times 10^{3} \times 60 \times 60 \times 24 \times 30 \times 3}$$

bandwidth 25kbps

Characterization of WR Network for B2B Transfer

Test setup

Simulate actual FAIR WR network traffic



Results of 45 days test for the B2B transfer [1]:

- Misordered frame → Requirement met
- Transfer latency → Requirement met
- Lost frame → Requirement not met

Firmware update of the WR switch is triggered by this result

In case all requirements are met:

- Up to 38 WR switch layers can be used between DM and source ring
- Up to 8 WR switch layers can be used between two rings

Fit FAIR WR network architecture

[1] C. Prados and J. Bai. Testing the WR Network of the FAIR General Machine Timing System, 2016.