

DAQ status report

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on behalf of DAQ group

Estimation of raw data flow

**Bunch crossing each 80 ns; crossing rate 12.5 MHz,
Collision rate ~3–4 MHz (1st stage about 100kHz)→
Triggerless (or streaming) DAQ to avoid any hardware biases**

**Data flux was estimated for the maximum luminosity $L = 10^{32} \text{ cm}^{-2}\text{s}^{-1}$ and
maximum energy $\sqrt{s} = 27 \text{ GeV}$.**

**Within simplified simulation and some safety margin the data flux is
estimated as **20 GBytes/s**.**

Front-end electronics for the triggerless DAQ

Front-end electronics of the detectors has to meet the requirements of a free-running DAQ

General FEE requirements from the DAQ system:

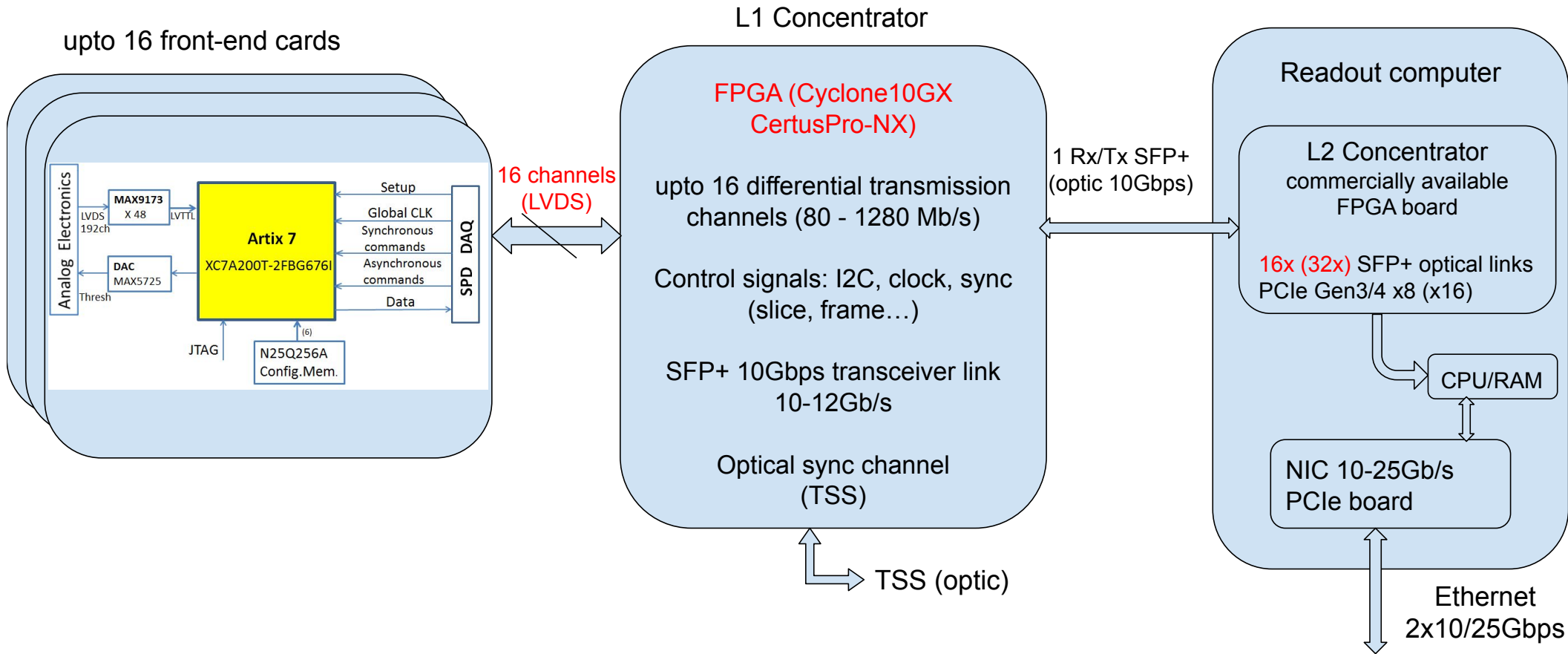
- Self-triggered (*trigger-less*) FEE operation
- Digitizing on-board
- Timestamp included in the output format
- Large memory to store the data accumulated in a time slice
- Zero suppression

FPGA or ASIC based digital output to DAQ

For the moment only Range System has the Front-End electronics designed according to these requirements (high level of readiness)

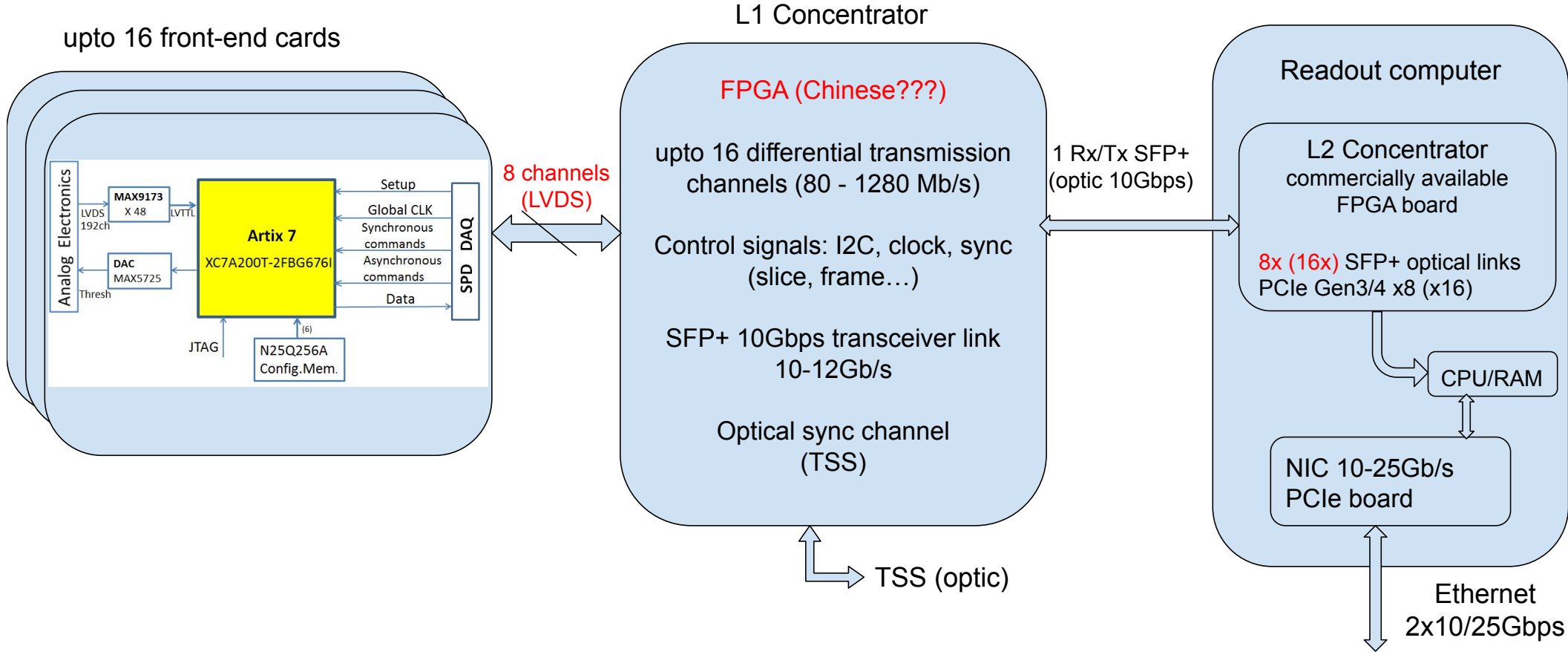
Data Readout chain

2022

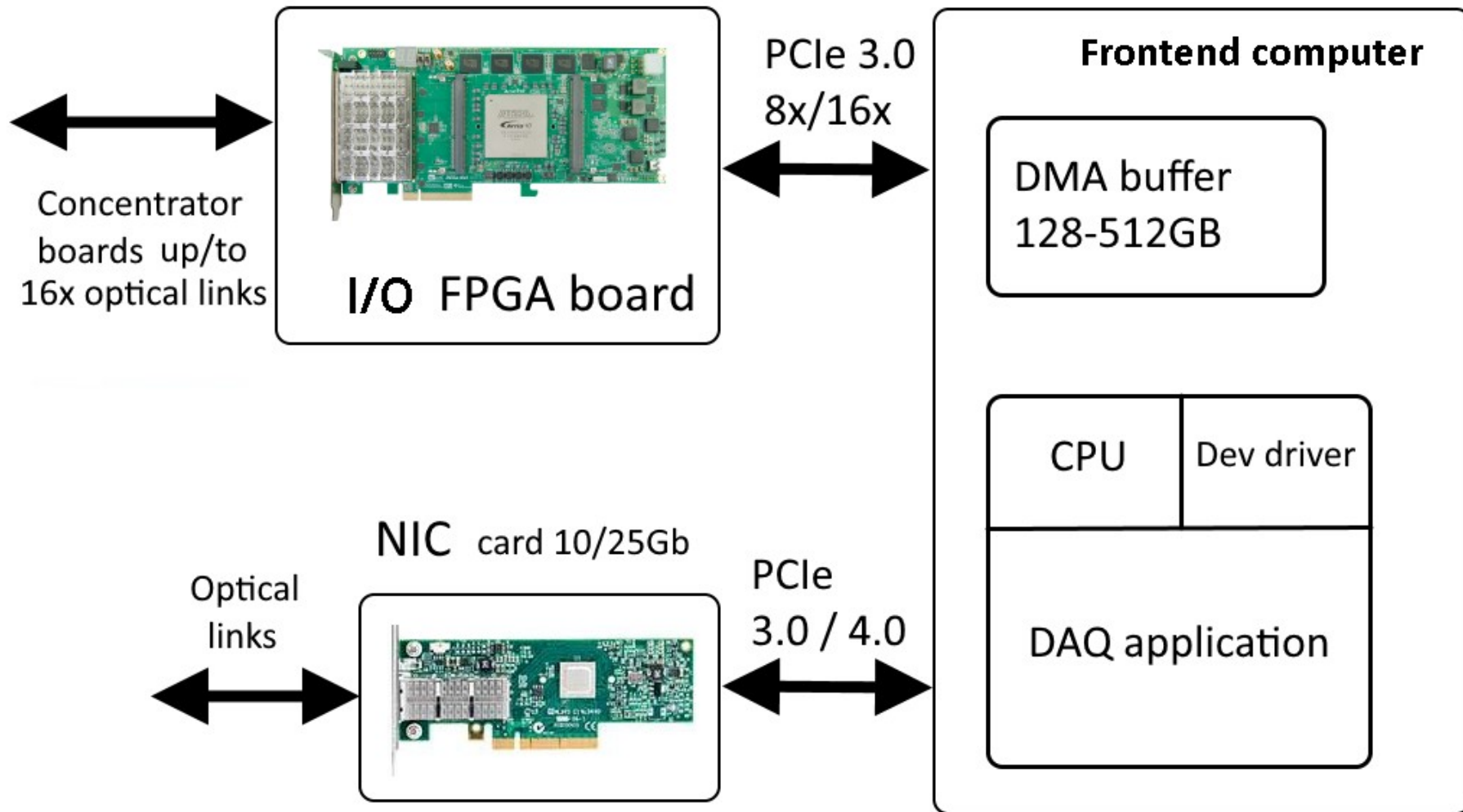


Data Readout chain

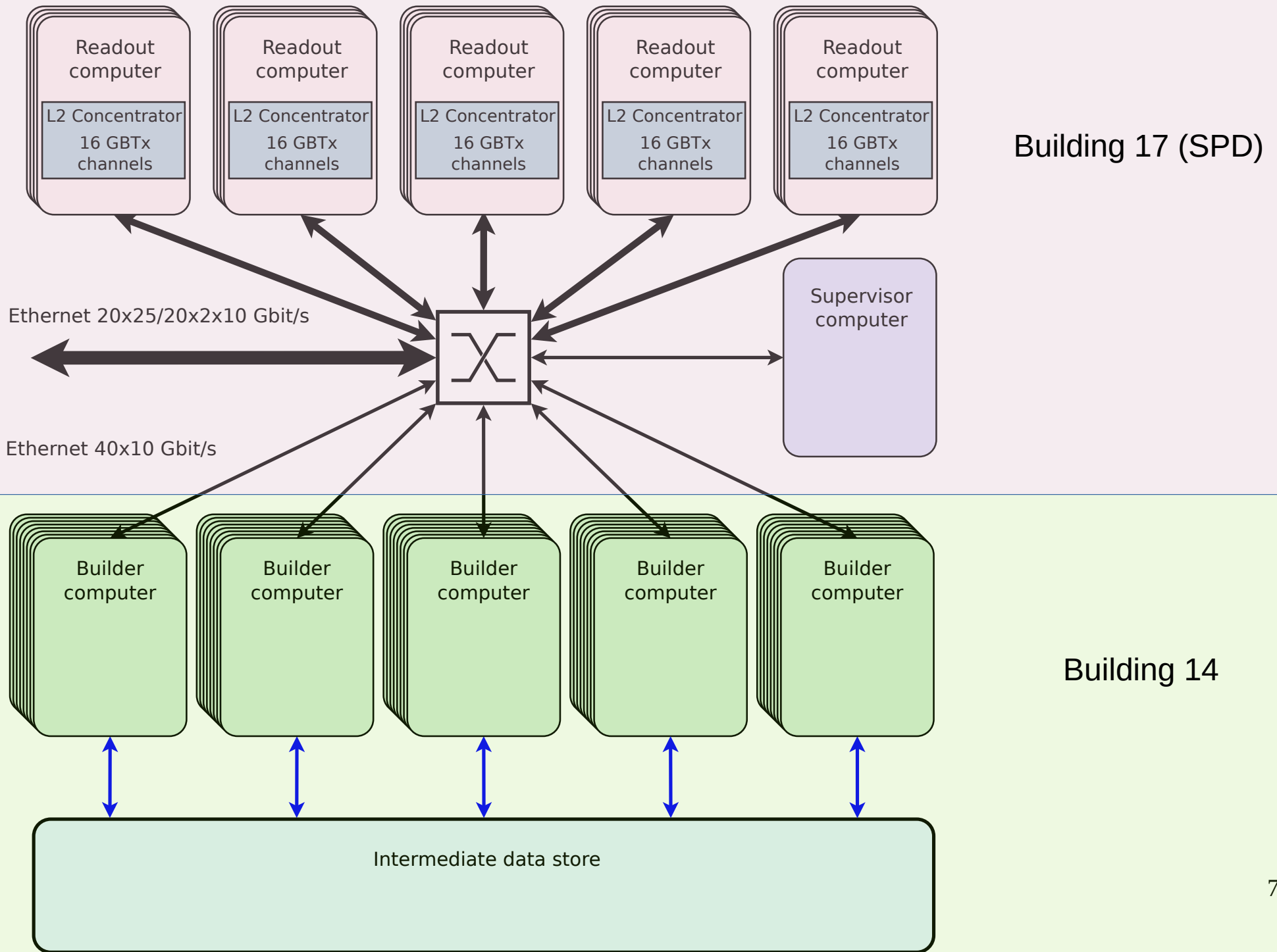
2024



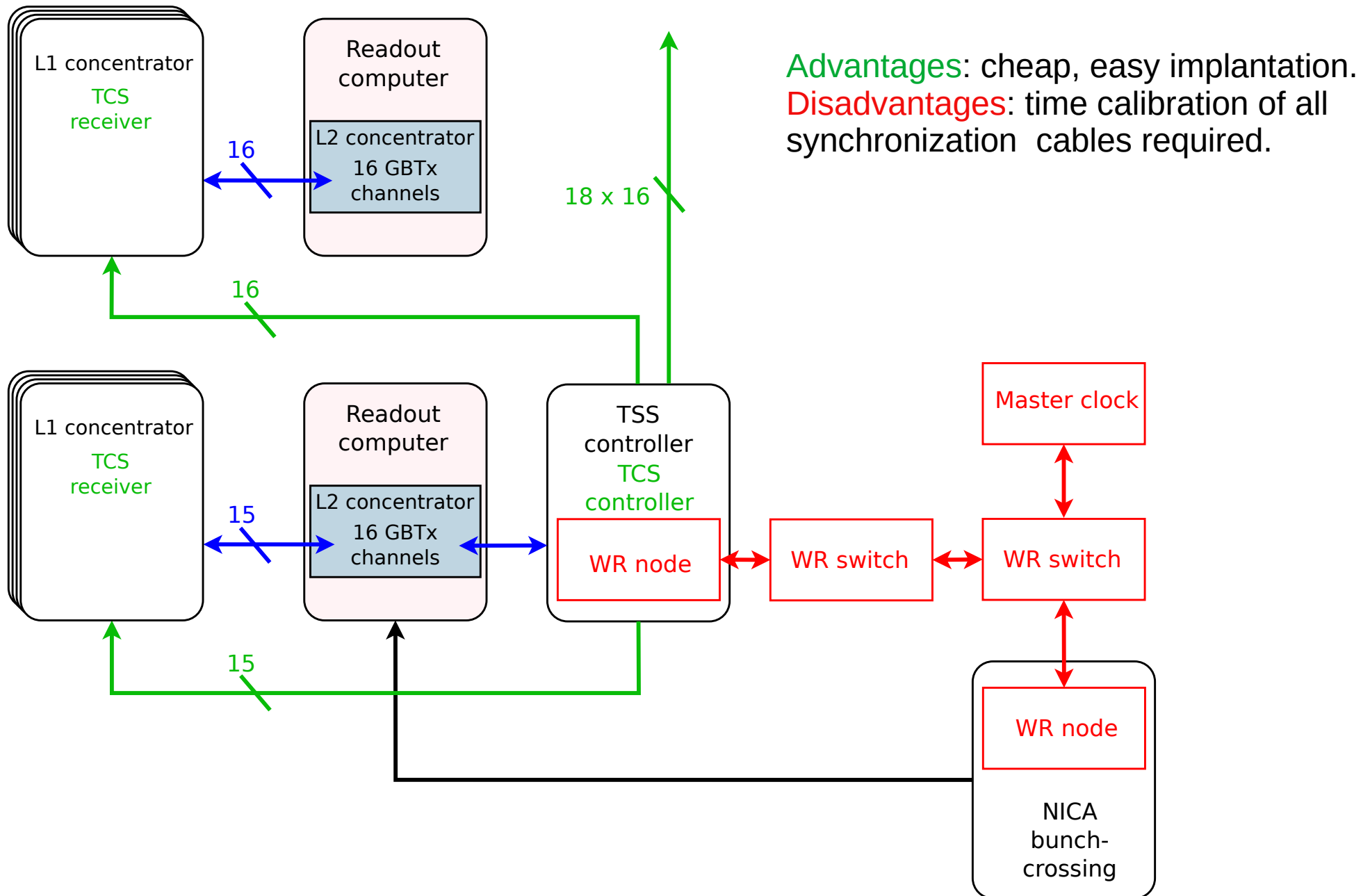
Frontend computer



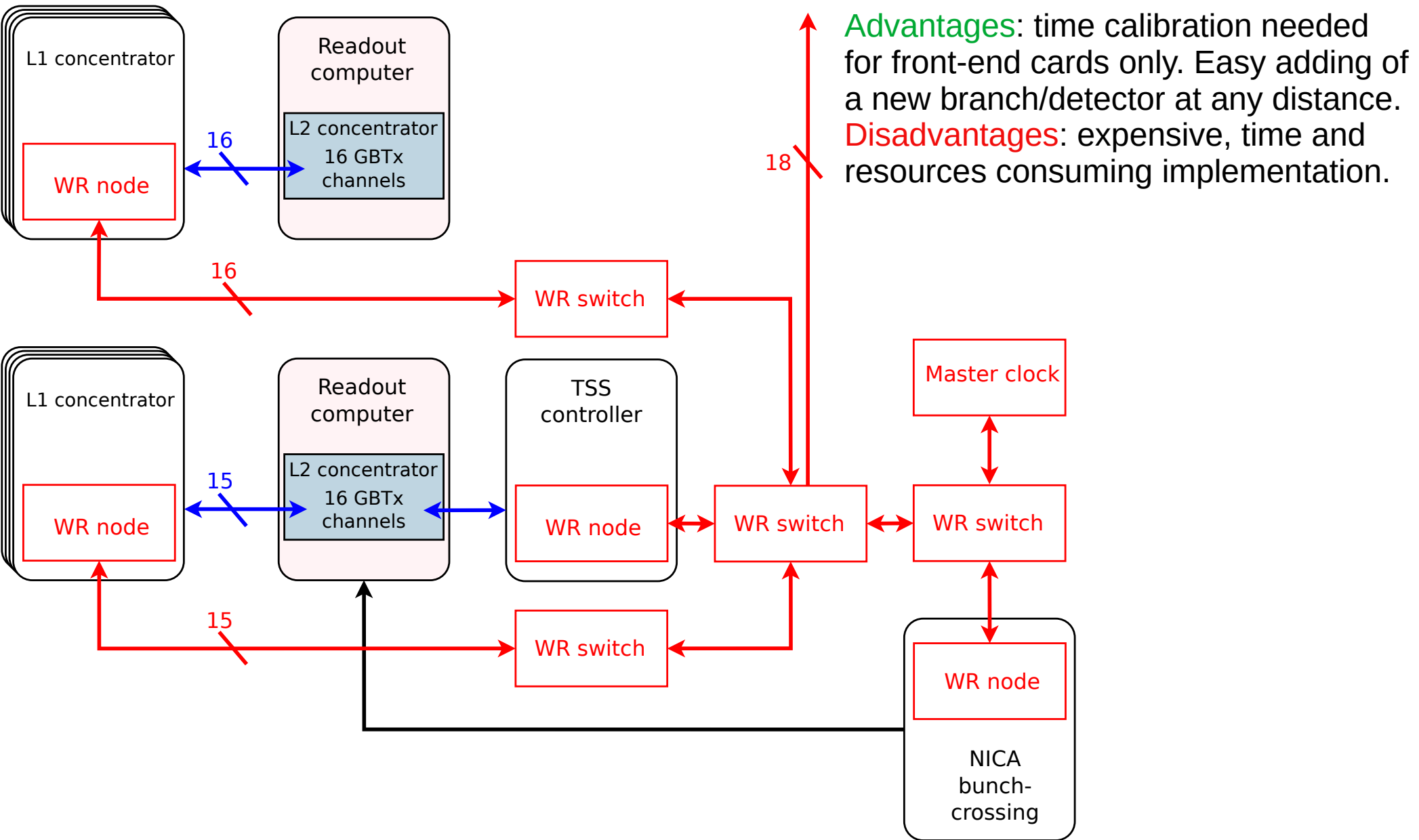
Data collection



Time Synchronization System with TCS-based delivery



Time Synchronization System with WR-based delivery



Open questions

- Front Electronics cards exists for RS only. Development of dedicated ASICs is started.
- Development of L1 Concentrator: Which FPGA circuit ???
- Where L1 Concentrator will be installed: inside or outside the Range system?
(e-link <10m)
- Radiation hardness of FPGA, in the case of installation of L1 Concentrator inside the Range system
- Which Time Synchronization: White Rabbit or TCS. A working bench for development of the White Rabbit node now is under production.

R&D is required

2023 progress

- The first attempt to place DAQ elements in place.
- Development of some parts of the DAQ software.
- Purchase of 5 computers for the DAQ prototype.
- Repair of the room for the DAQ prototype in LIT.
- Purchase of 3 White Rabbit switches and development kits for TSS development.
- Development of the L1 concentrator prototype.
- Agreement on the development of the L2 concentrator with Tomsk University.

Thank you for your attentions.