

Preparing the ALICE DAQ upgrade

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ALICE

Current ALICE detector read-out

- Triggered readout using 500 Detector Data Link (DDL) optical data links at 2 Gb/s
- High-Level Trigger to compress the data by a factor 4 (2011) to 7
- Bandwidth to mass storage: 1.25 GB/s (design), up to 4.0 GB/s (reality)
- Performance limited by:
 - Silicon-Drift detector (1 kHz)
 - TPC readout (530 Hz for minimum bias events)

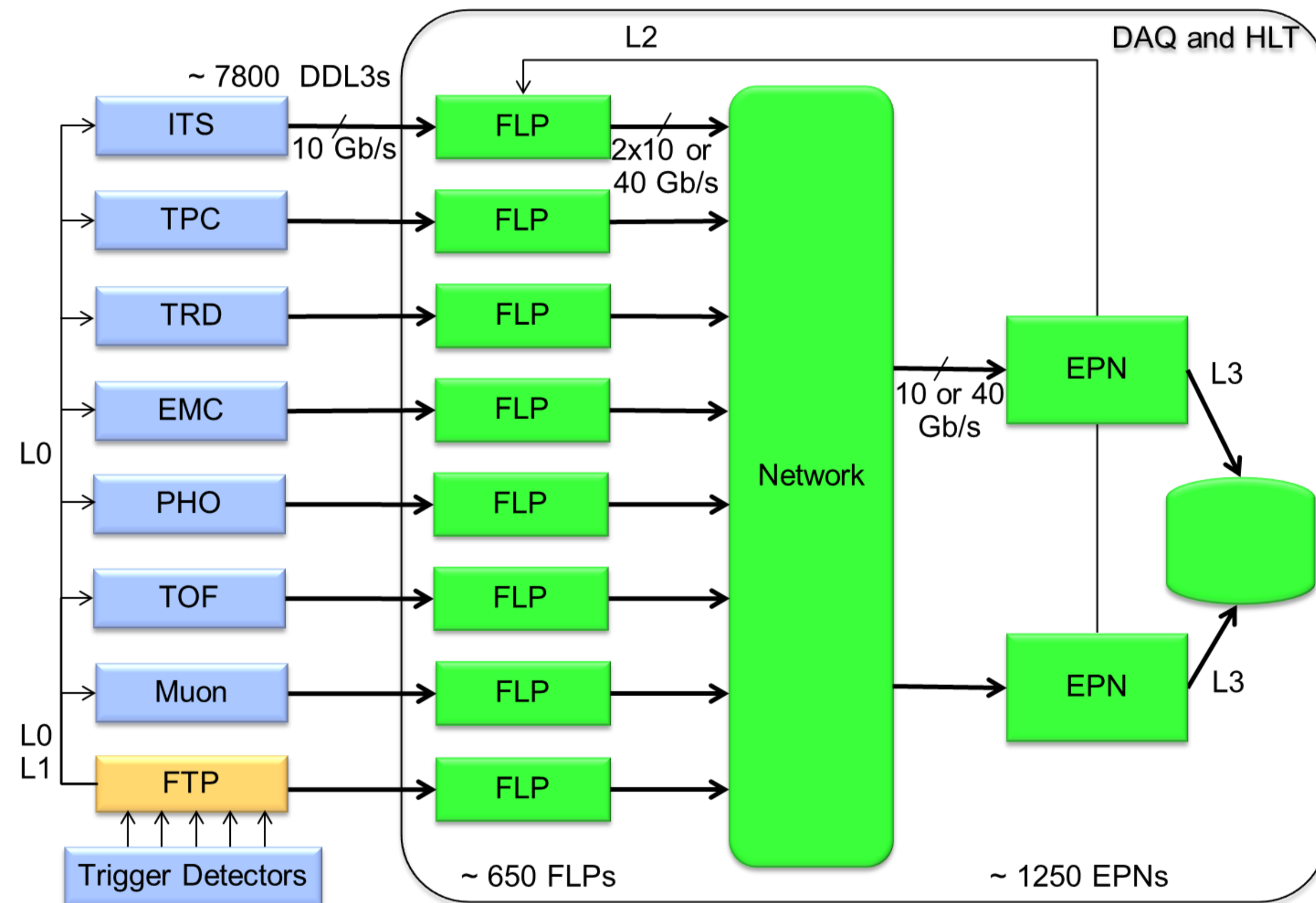
Integrated luminosity during Pb-Pb runs

- 2010 and 2011: $\sim 10 \mu\text{b}^{-1}$ and $100 \mu\text{b}^{-1}$
- Several runs at full energy and a few hundred μb^{-1} each
- By 2017: $\sim 1 \text{nb}^{-1}$

LHC after LS2 (2018)

- LHC will deliver Pb beams colliding at an interaction rate of about 50 kHz and an instantaneous luminosity of $L=6 \times 10^{27} \text{cm}^{-2}\text{s}^{-1}$
- ALICE strategy: upgrade detectors and online systems to be able to inspect the 50kHz minimum bias interaction rate and accumulate $\sim 10 \text{nb}^{-1}$

ALICE Online Systems Upgrade



Upgrade of the ALICE online systems during LS2

- TPC present readout with shared busses replaced by point-to-point links
- Continuous readout using ~ 7800 DDL3 optical data links at 10 Gb/s: total 65 Tb/s
- Minimum-bias trigger for slow detectors ($< 50 \text{kHz}$)
- Two-steps High-Level Trigger to select and compress the data
- Bandwidth to mass storage: 20 GB/s (design)

Prototyping the optical link

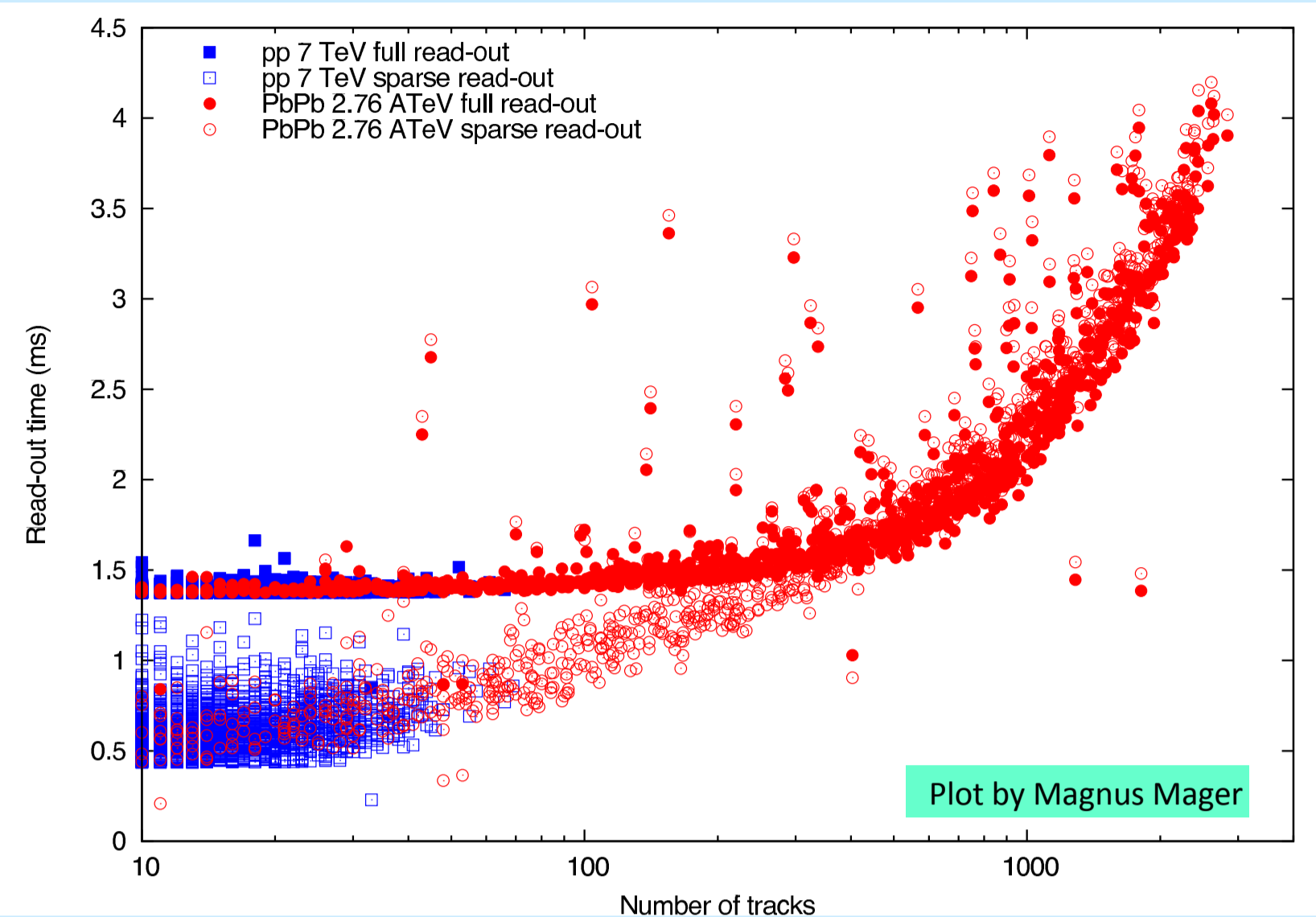
- DDL2: 12 links at 6 Gb/s interfaced to one PCI Gen 2 slot

Network upgrade

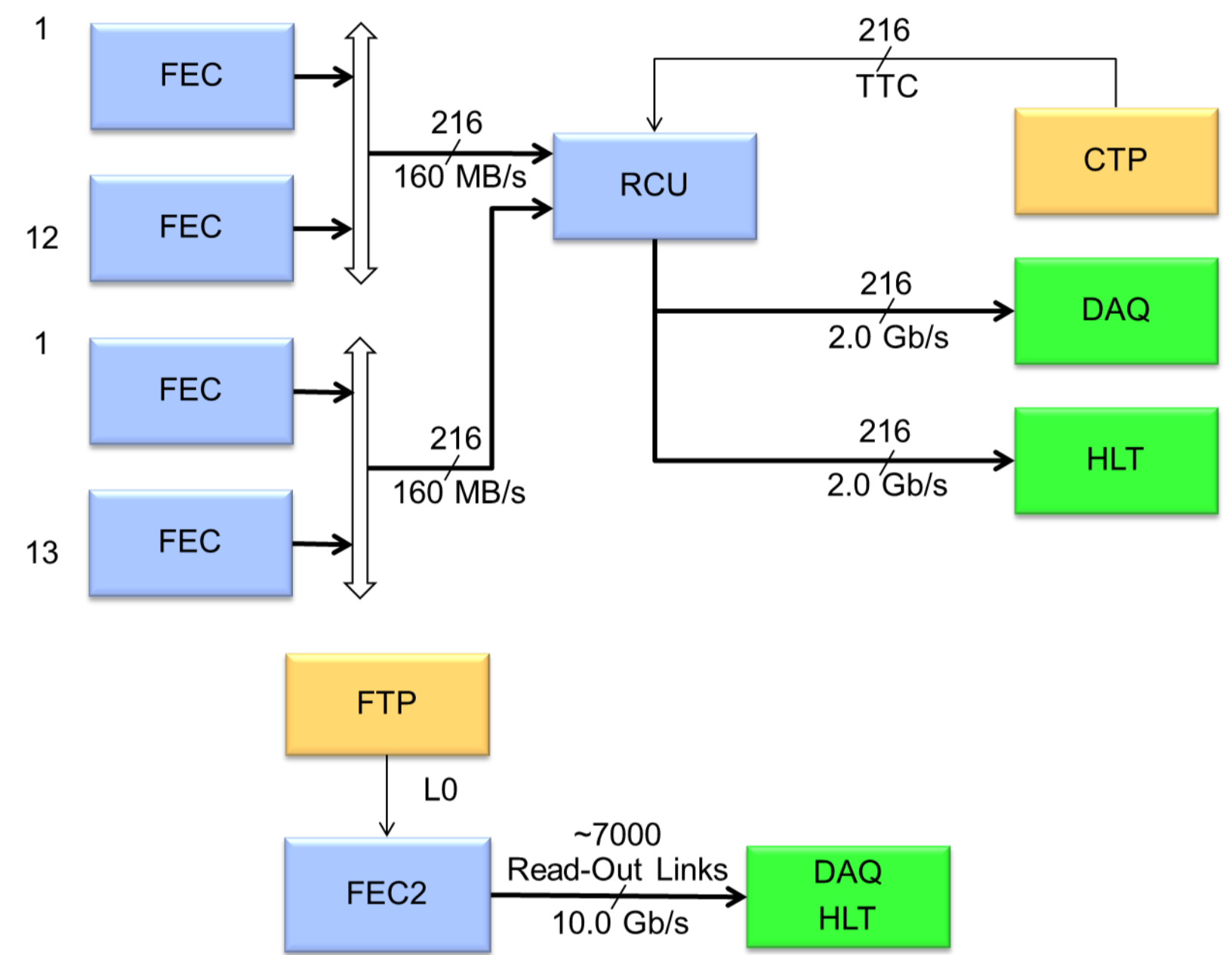
- Network for ~ 1900 nodes with a capacity of 5 Tb/s
- 2 options considered: Infiniband and Ethernet

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Measured TPC readout performance

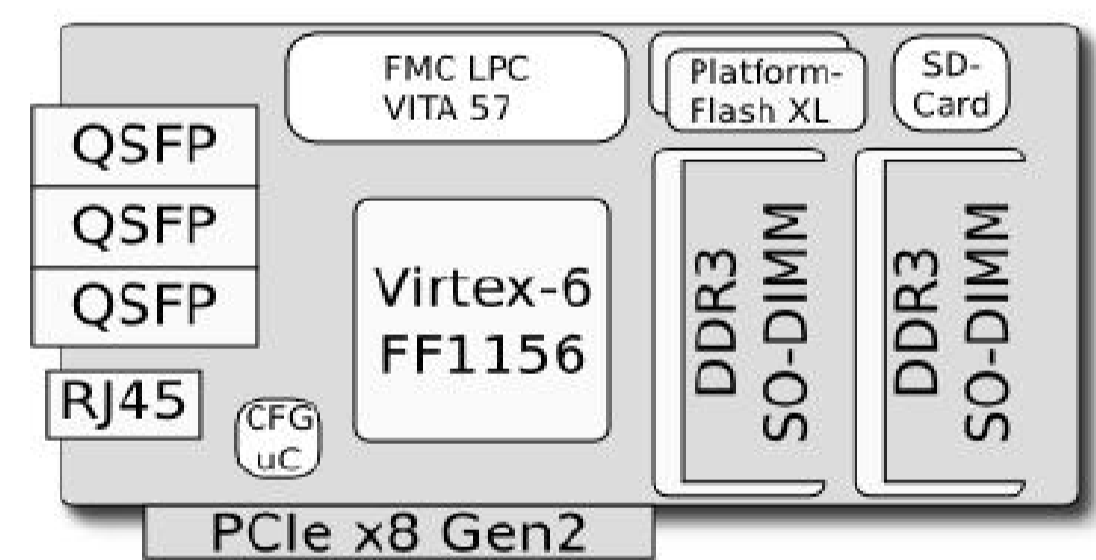


Present and future TPC readout system



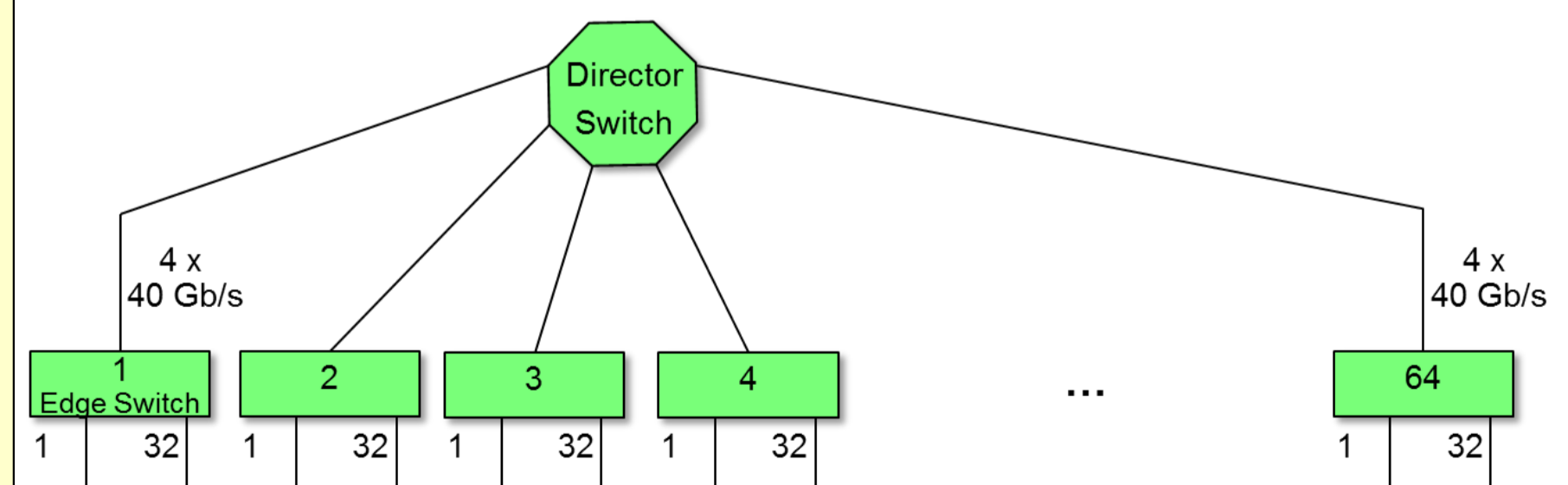
Prototype of the readout system for the ALICE upgrade

Design by H Engel (7), U KebSchull (7), C Soos, T Kiss
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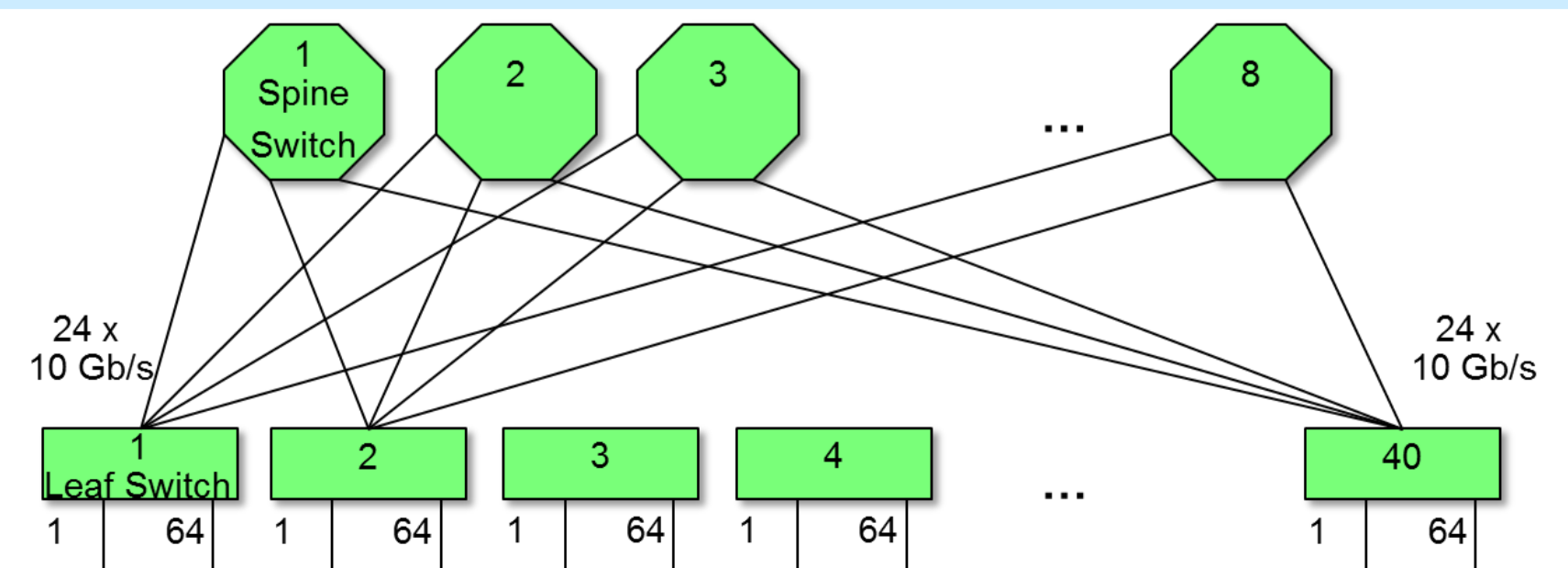


Two options for the online network upgrade:

1) Infiniband fat-tree network



2) Ethernet spine and leaf network



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