# DAQ Comparison Among CMS, Atlas, and Intelligent FPGA DAQ System

Lu Xiaoxu
2016 12 23

# CMS DAQ System

Run-2 motivation:

1. current equipments reach end of their lifetime

2. sub-detectors upgraded, readout channels increased, off-detector readout electronics replaced

Main Design Parameters:

Readout rate:100kHz

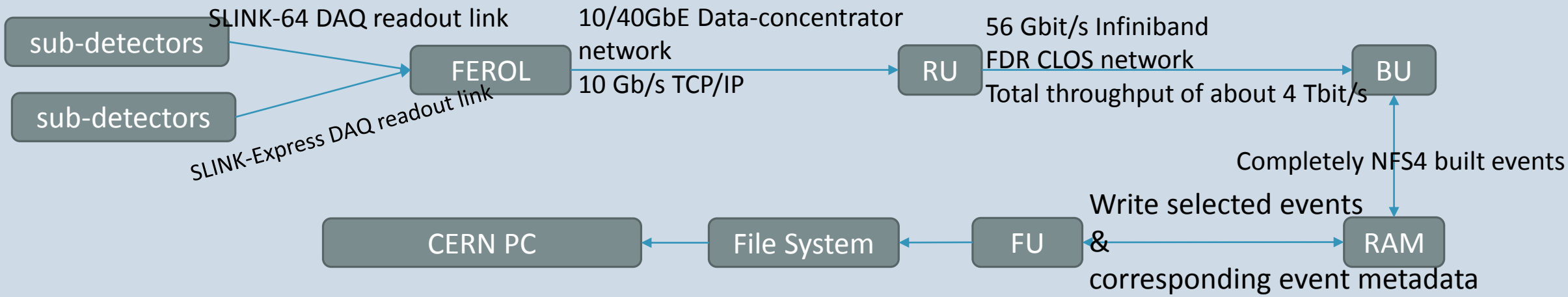
Total DAQ bandwidth:200GB/s

Event Builder Network:56Gb/s FDR infiniband

Bandwidth to storage:2GB/s write + 1GB/s read

Storage capacity: ~250TB

# CMS DAQ System



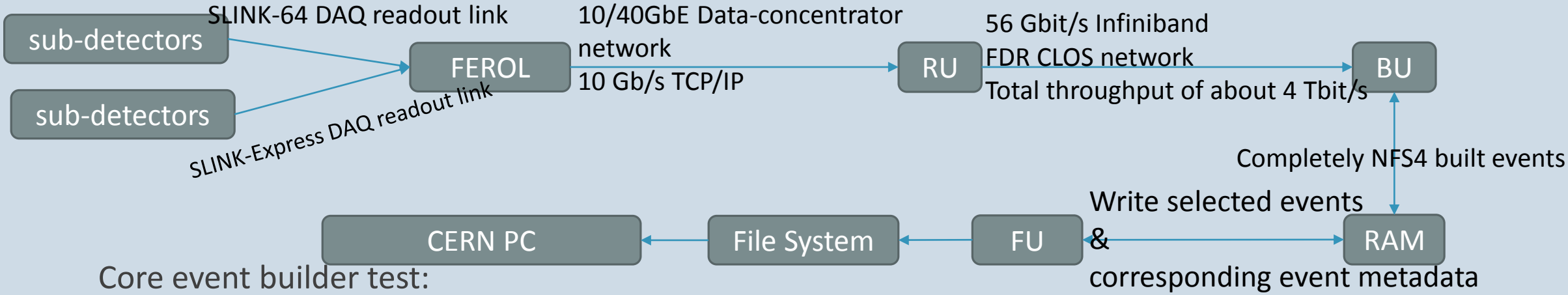

Data concentration test:

Test name: Throughput per Readout Unit as a function of fragment size for fixed size fragments in saturation mode

Conclusion:

The required rate of 100 kHz can be achieved for fragment sizes of up to 3.5 kB when merging from 12 sources, with 90% of the bandwidth used

# CMS DAQ System



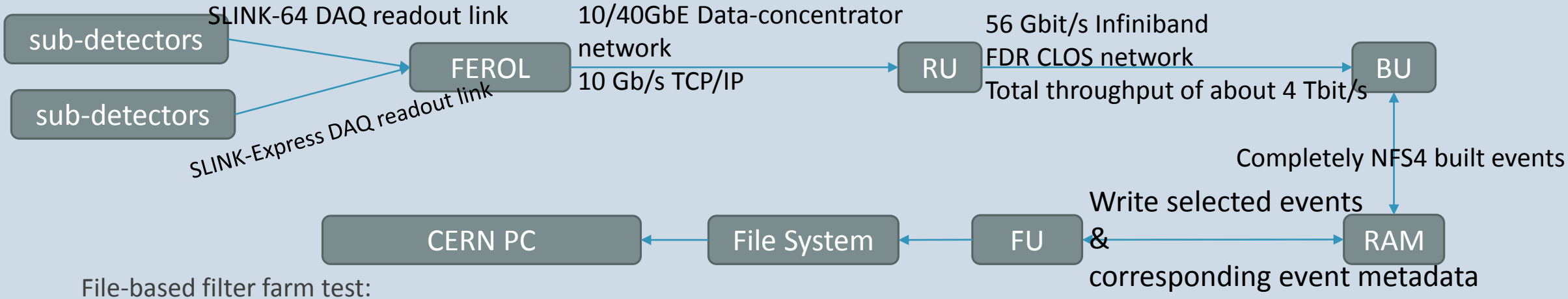

Core event builder test:

Test name: Throughput per node on the Infiniband Clos network as a function of the message size for fixed size messages

Conclusion:

For the typical expected super-fragment size of 16 to 32 kB, a per-node throughput above 4 GB/s can be achieved. Hence, could be confident that the nominal overall event builder throughput of 200GB/s can be easily achieved with this network.

# CMS DAQ System




File-based filter farm test:

Test name: Throughput of a BU over time in a test setup of a filter farm appliance

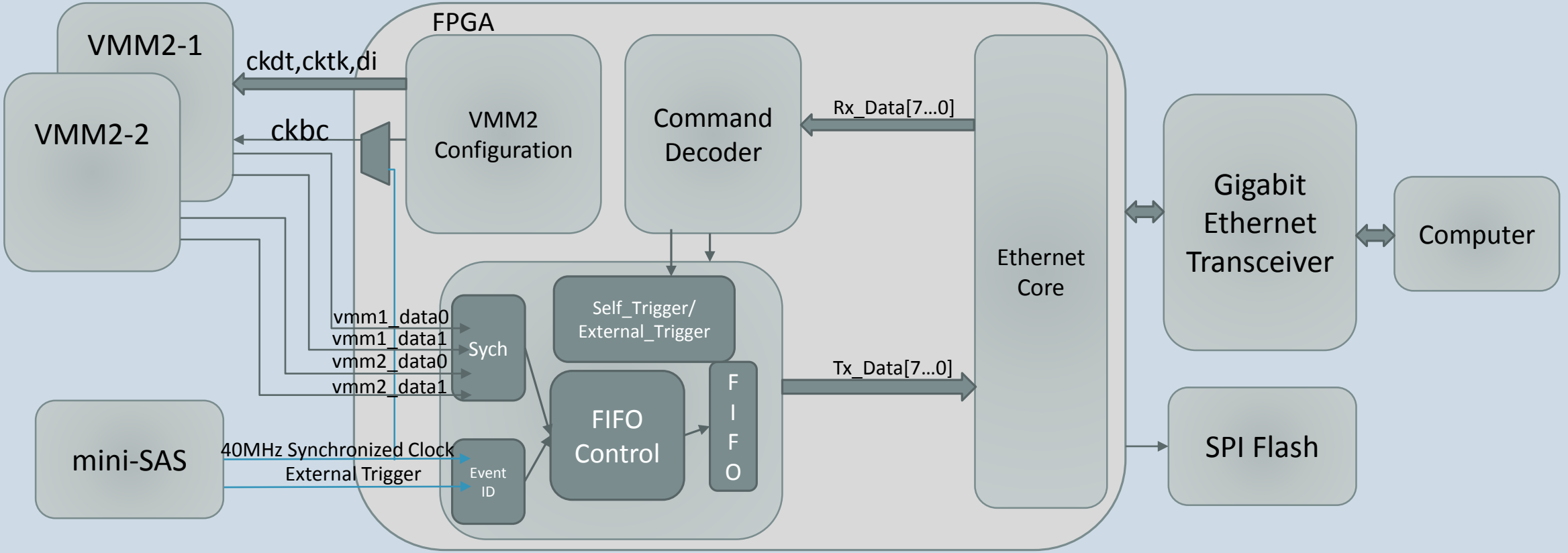
Conclusion:

A constant throughput of 3.5 GB/s could be measured for one appliance, allowing to achieve over 200 GB/s with 64 appliances.

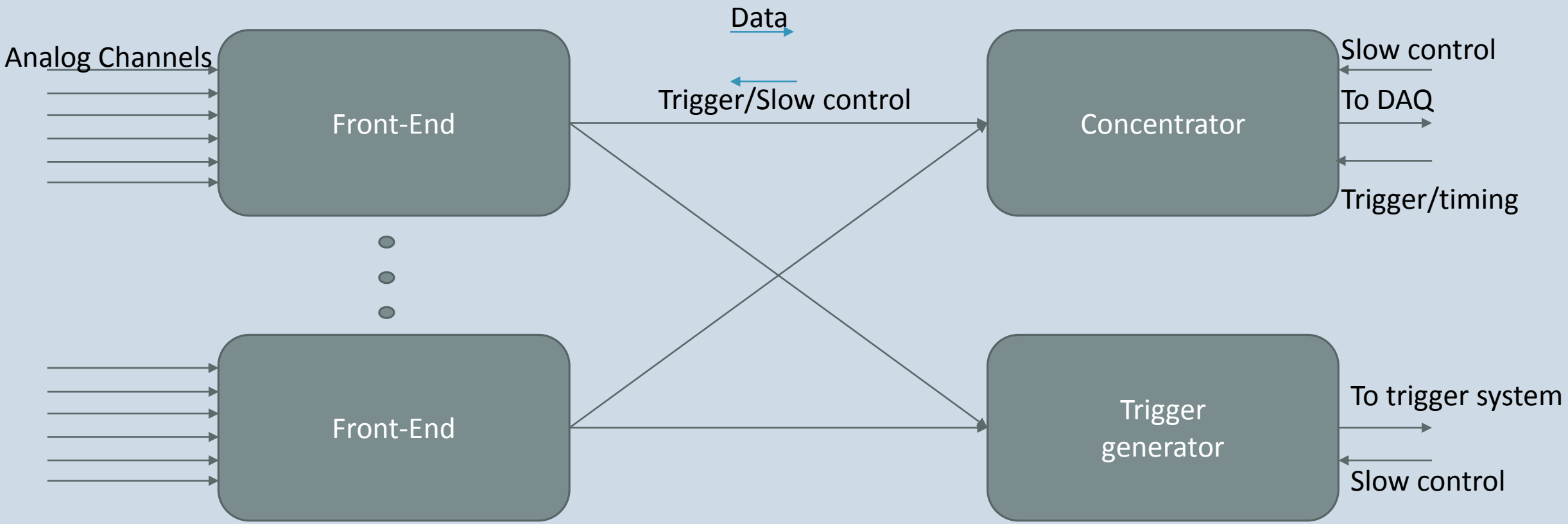
Data collection and storage test:

Conclusion: could write throughput of 2 GB/s in total and keep a simultaneous read throughput of 1 GB/s for transfers to the CERN computing center

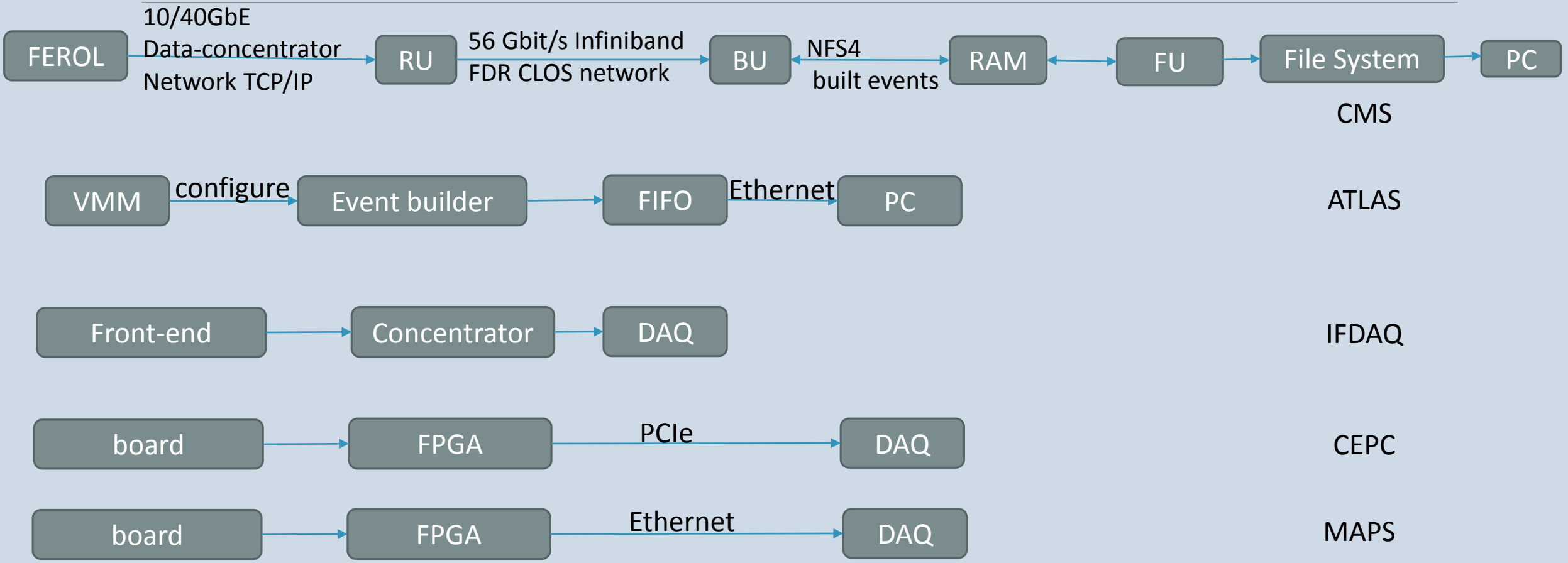
# ATLAS DAQ System



# Intelligent FPGA Data Acquisition Framework



# Structure Comparison



# THANK YOU!