CERN openlab

High-Throughput Computing Collaboration

Silicon

21.09.2017 – CERN openlab Open Day

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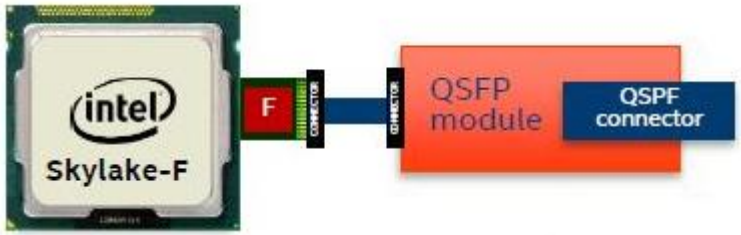
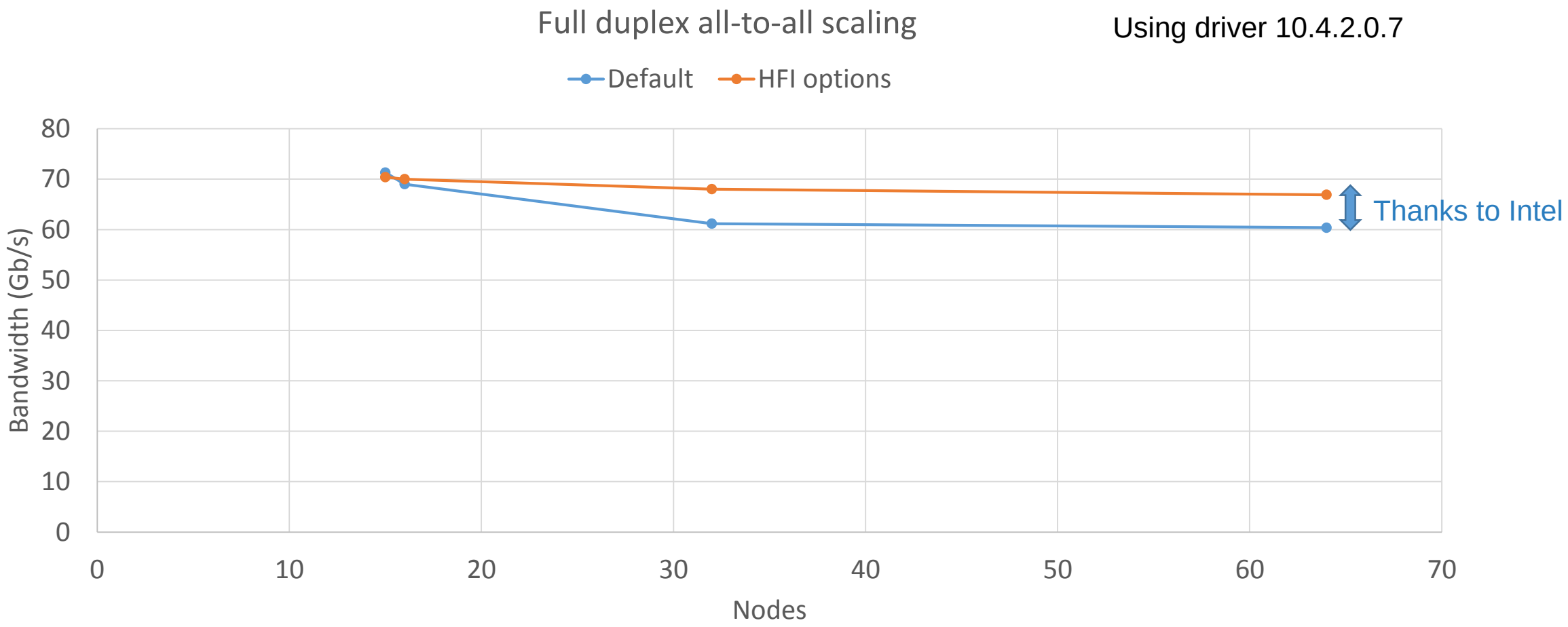
Intel® Omni-Path



- Provide 100 Gb/s fabric
- Used in HPC supercomputers
  - MareNostrum (13 in Top500)
  - Maroni (14 in Top500)
- For LHCb : Data Acquisition System (DAQ)
- In 2020 we need to transport 40 Tb/s
  - Require 80 Gb/s sustained on ~500 nodes

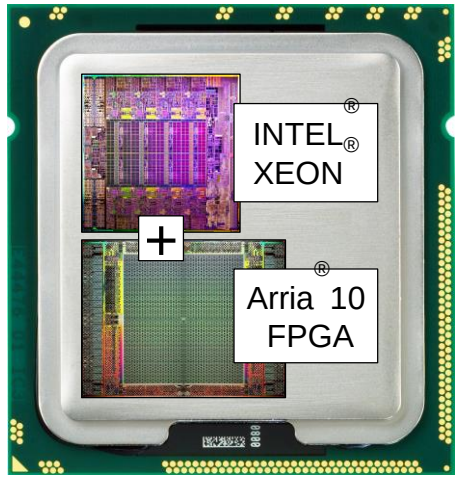
Omni-Path test on Marconi



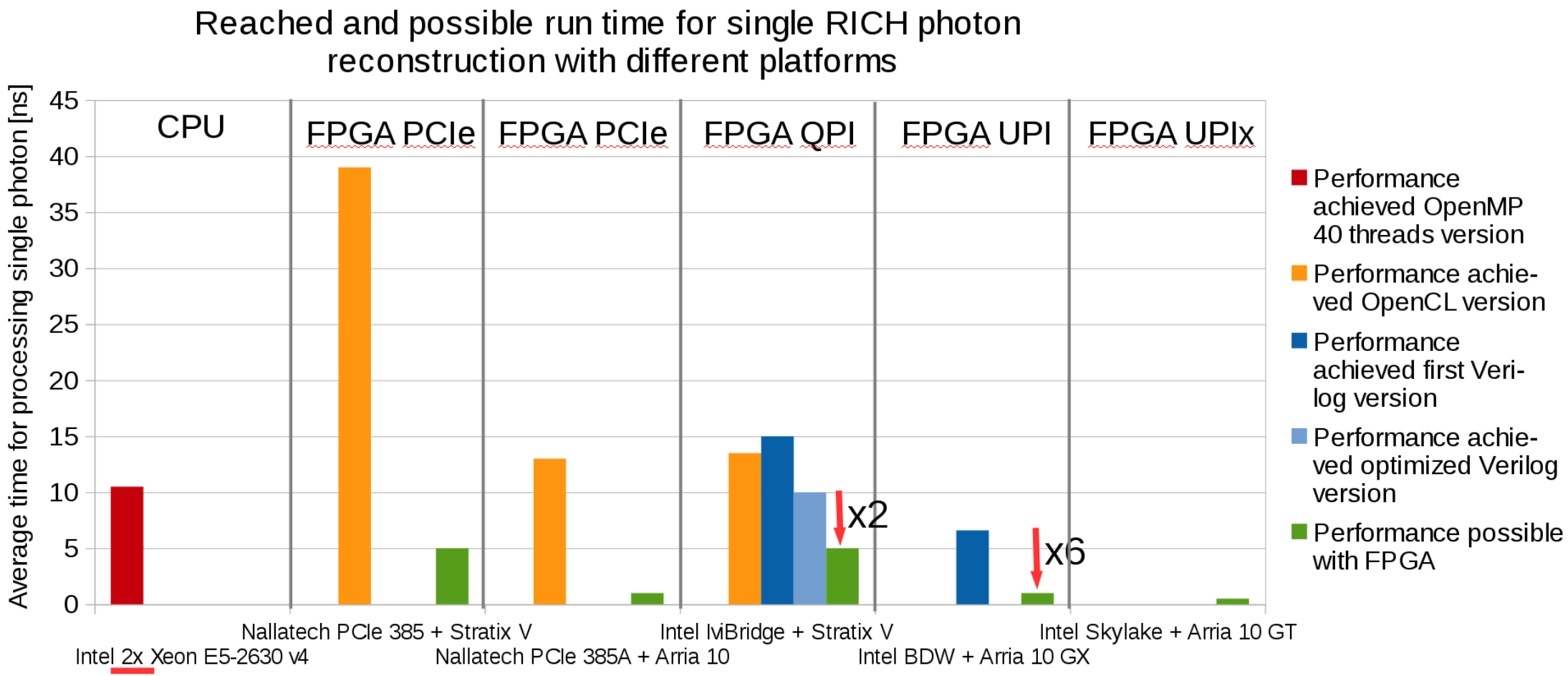
Socket embedded FPGA

Coming with the CPU

- Multi-chip Broadwell package including:
  - Intel® Xeon® E5-2600 v4
  - Intel® Arria® 10 GX 1150 FPGA
- Hardened floating point add/mult blocks (HFB)
- Memory: Cache-coherent access to main memory
- Programming model: Verilog, OpenCL for Skylake

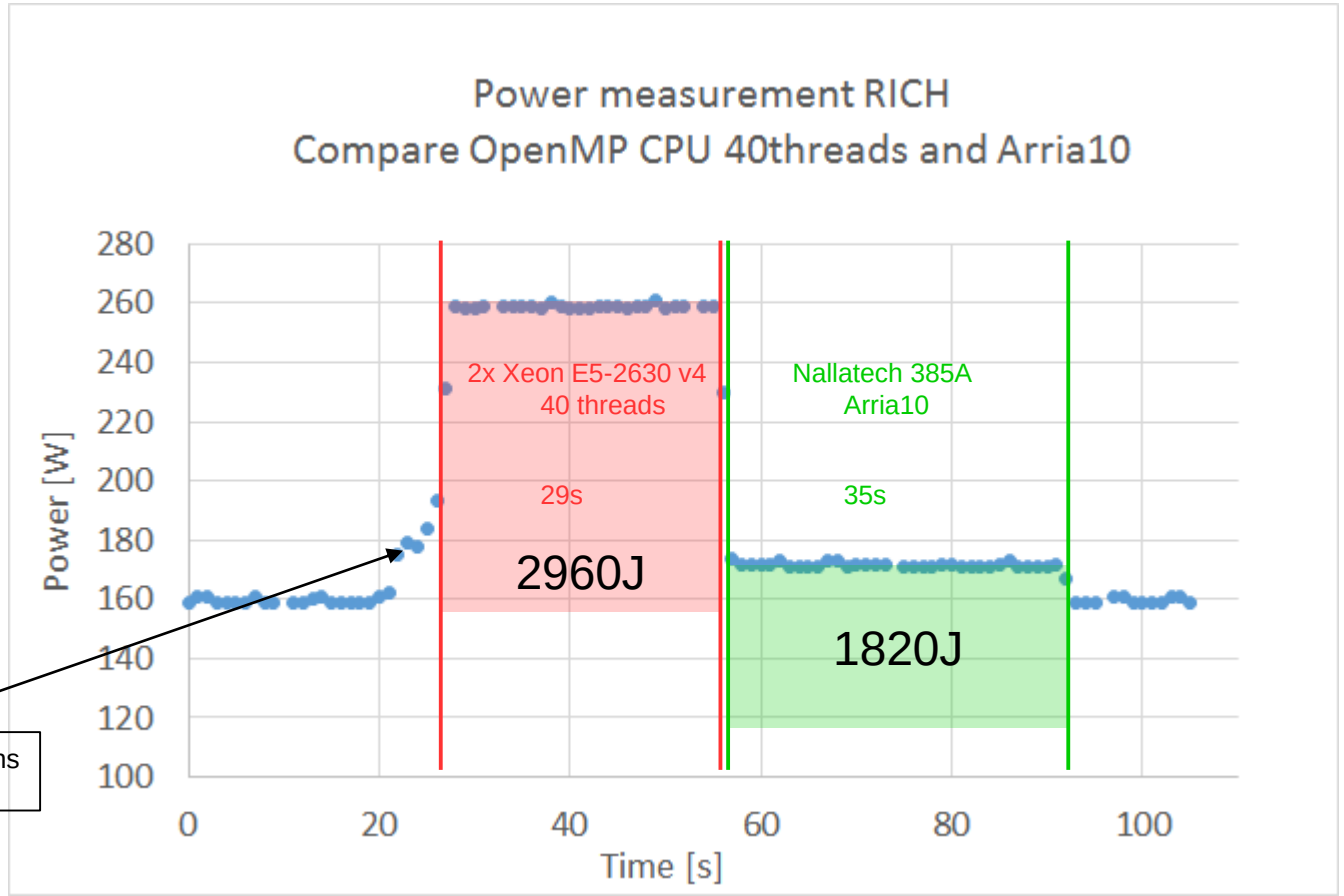


Apply on LHCb photon reconstruction



FPGA and energy

There is an opportunity to improve energy efficiency

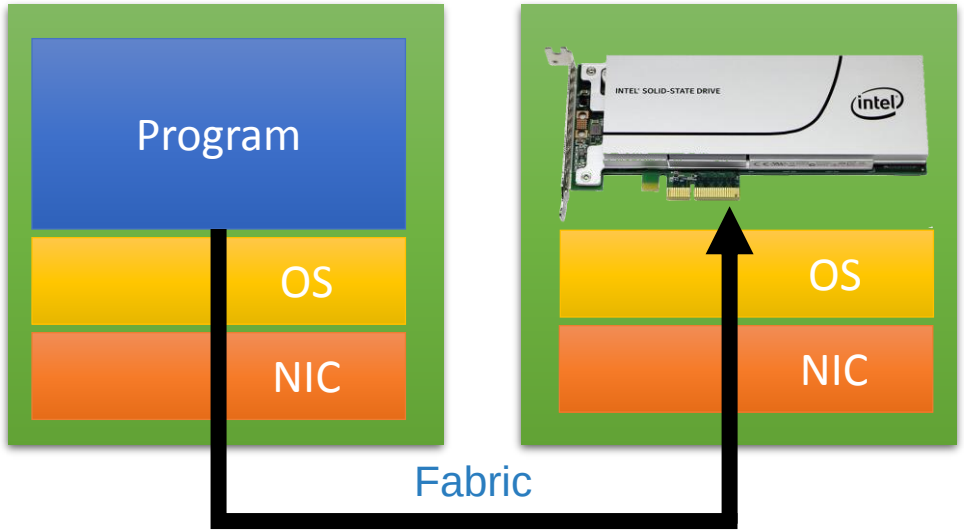


NVMe over fabric

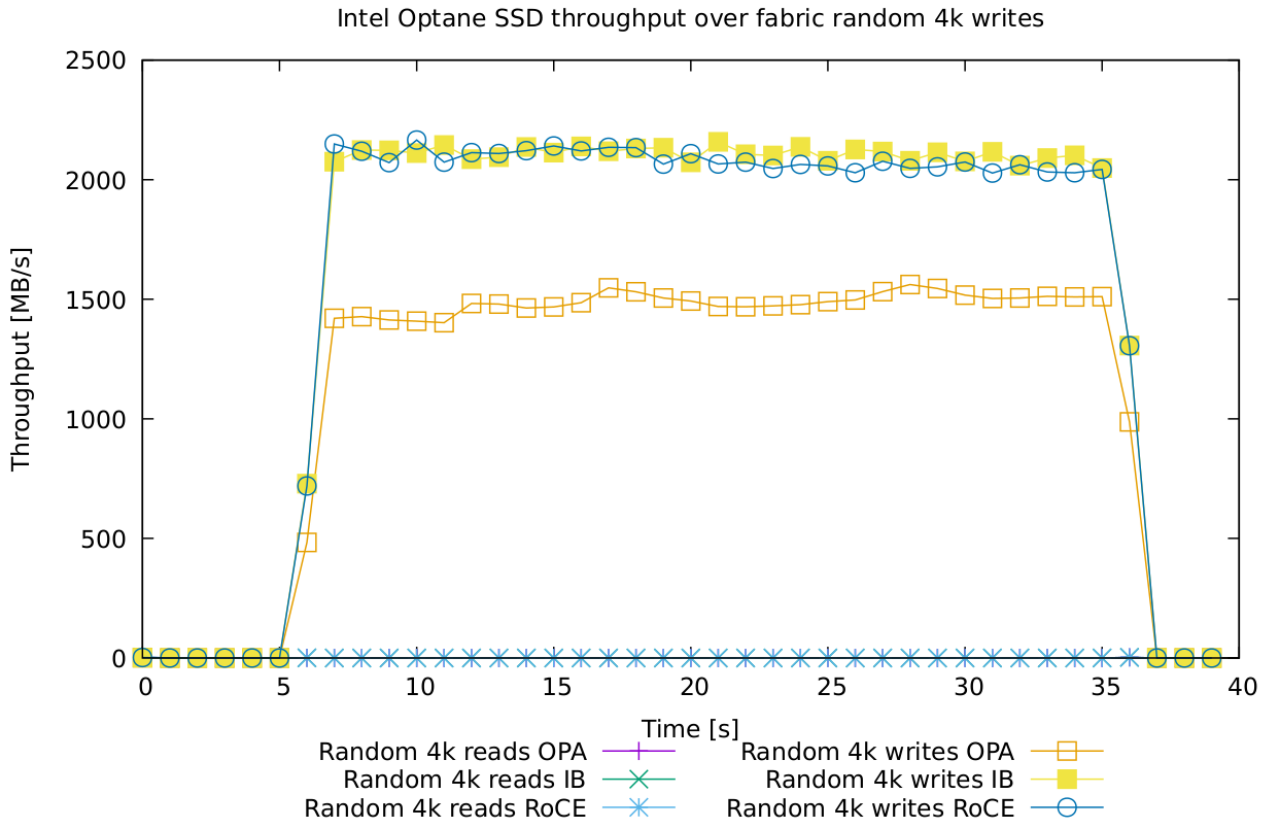
Access to remote NVMe driver transparently

Over fabric.

Tested : Omni-Path, InfiniBand RoCE



Using driver 10.4.2.0.7

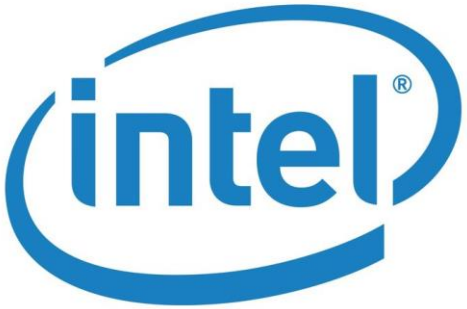


Thank you

CERN openlab High Throughput Computing Collaboration

Olof Bärring, Niko Neufeld

Alexandru Amihalachioaei, Luca Atzori, Omar Awile, Daniel Cámpora, Paolo Durante, Christian Färber, Plácido Fernandez, Jon Machen, Flavio Pisani, Rainer Schwemmer, Sébastien Valat, Balázs Vőneki



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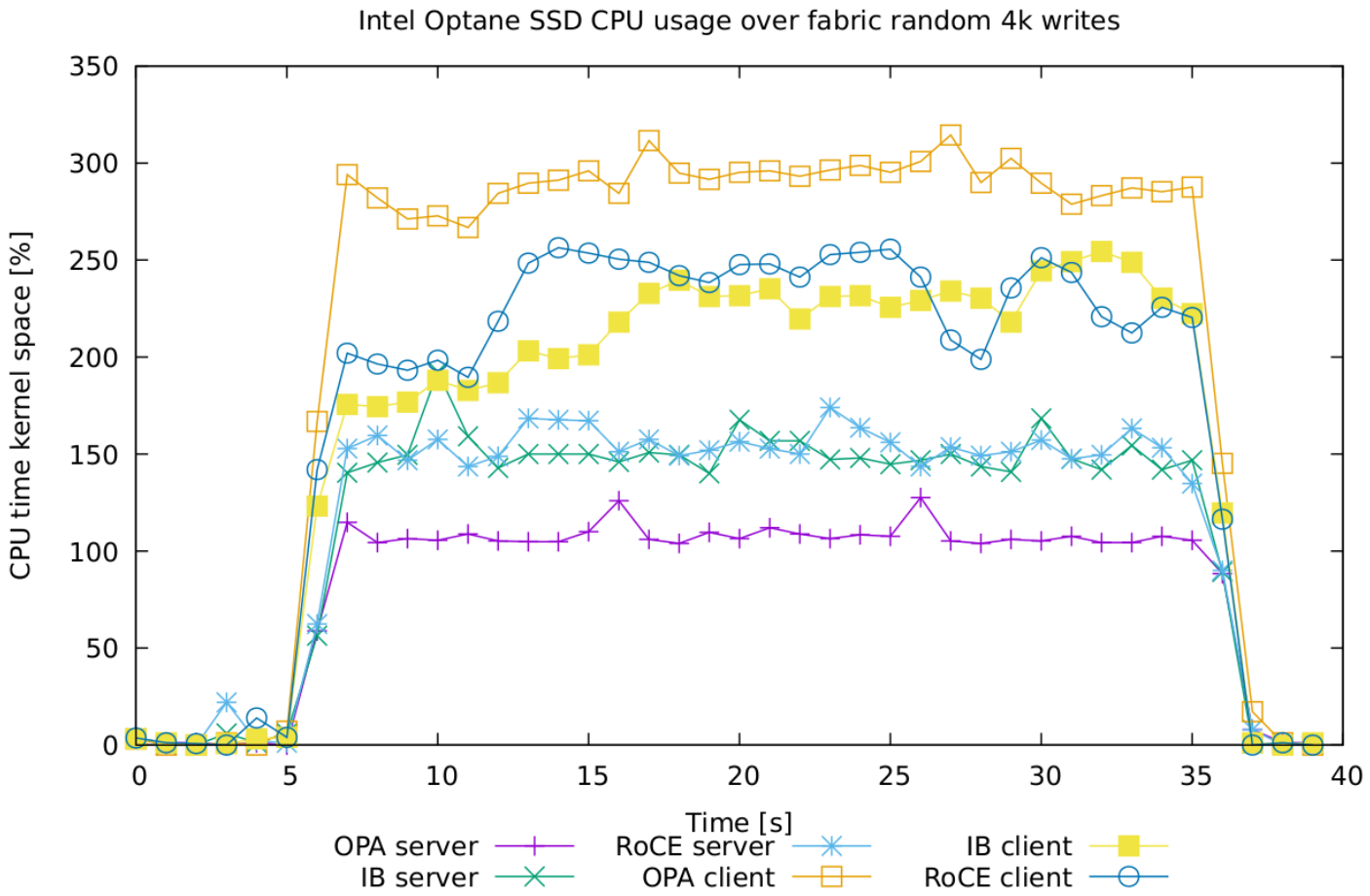
EXTRA

NVMe over fabric

CPU usage



HTCC

- Members from Intel®, CERN LHCb and CERN IT
- Test Intel® technologies in the LHC computing environment
  - online computing
  - trigger and data acquisition (TDAQ) systems
  - accelerators for the High Level Trigger
- LHCb upgrade as use case, but applicable to all experiments