HPC Interconnect Power Measurement

Presented to: EEHPCWG Workshop @ SC14

November 17, 2014

Robin Goldstone
HPC Solutions Architect, LLNL

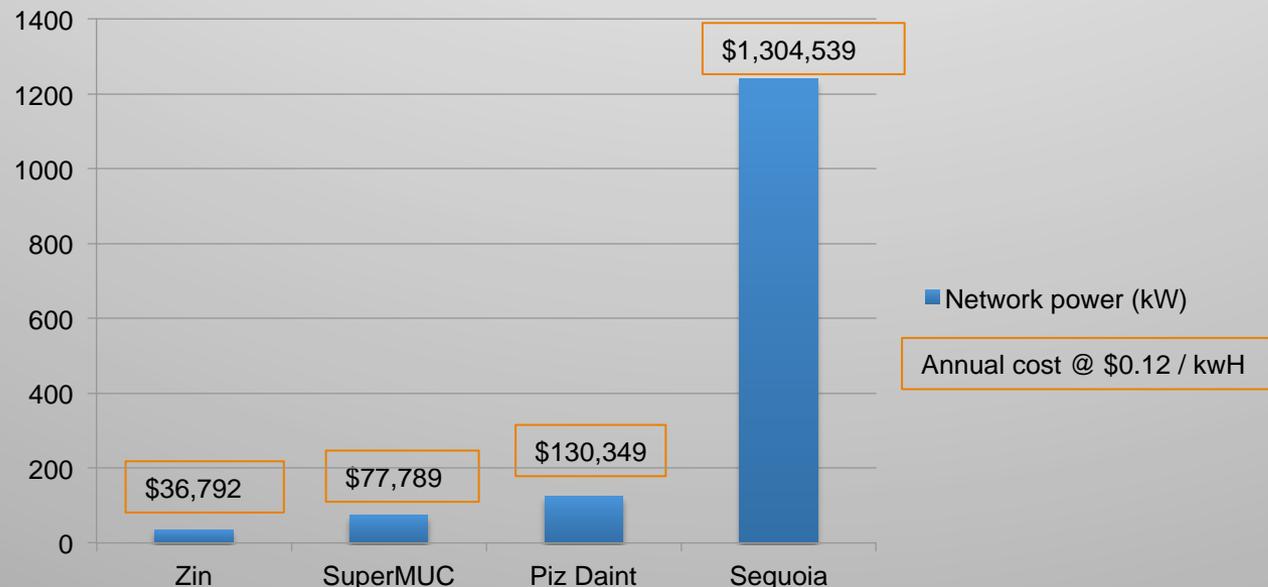**Lawrence Livermore National Laboratory**

HPC Interconnect Power

- Measurement of network power was not required by original Green500 rules.
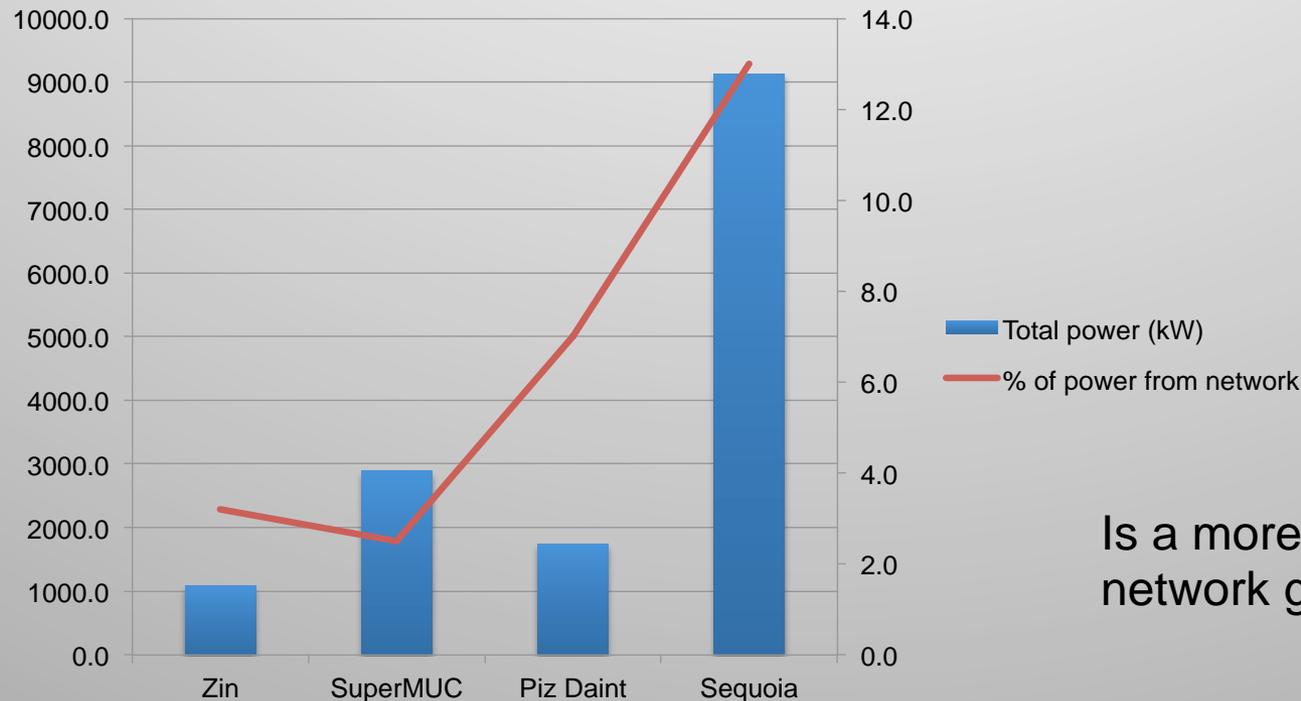
- Network power is not insignificant

  …especially if you have to pay for it!

LINPACK Network power

Value	Label
$36,792	Zin
$77,789	SuperMUC
$130,349	Piz Daint
$1,304,539	Sequoia

■ Network power (kW)

Annual cost @ $0.12 / kwH

Network Power vs. Total Power

Now that we can measure network power, what can we glean from the data?

Is a more power-hungry network good or bad?

Food for Thought

- What is the right metric to judge the energy efficiency of the interconnect?
  - Bandwidth: GB/s/watt
  - Message injection rate: messages/sec/watt
  - Other ?

- What benchmark(s) capture the desired metric?

- How much does network power increase under a communication-heavy workload?
  - Optics use power whether transmitting data or not
  - Some interconnects offer power-saving modes (Mellanox IB ~8% switch power reduction possible)
  - If network power is mostly static, do we even need a workload to measure it?

Lawrence Livermore National Laboratory