Network Performance Benchmarks

Mellanox 40GE NICs, Caltech Fast Data Transfer (FDT) Application and MonALISA

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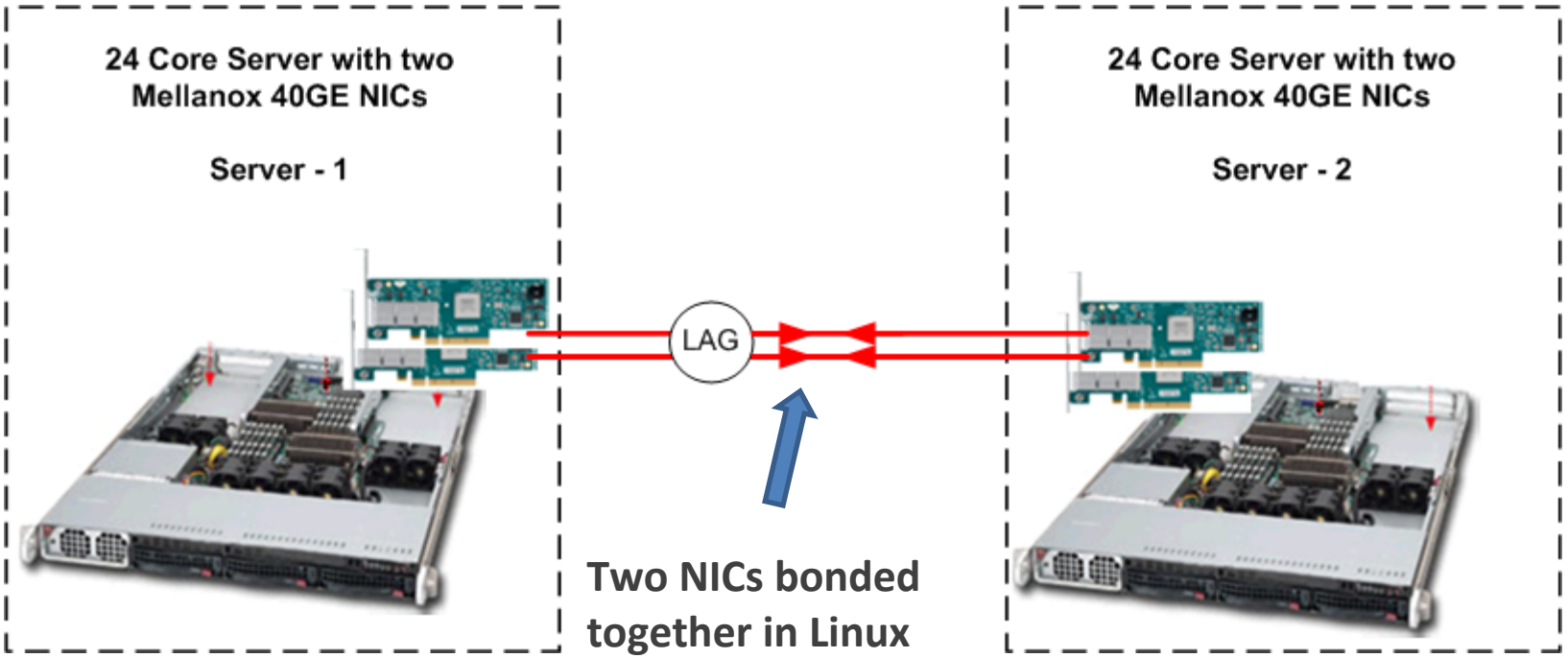
Azher Mughal
Caltech

Servers and Network Test Setup

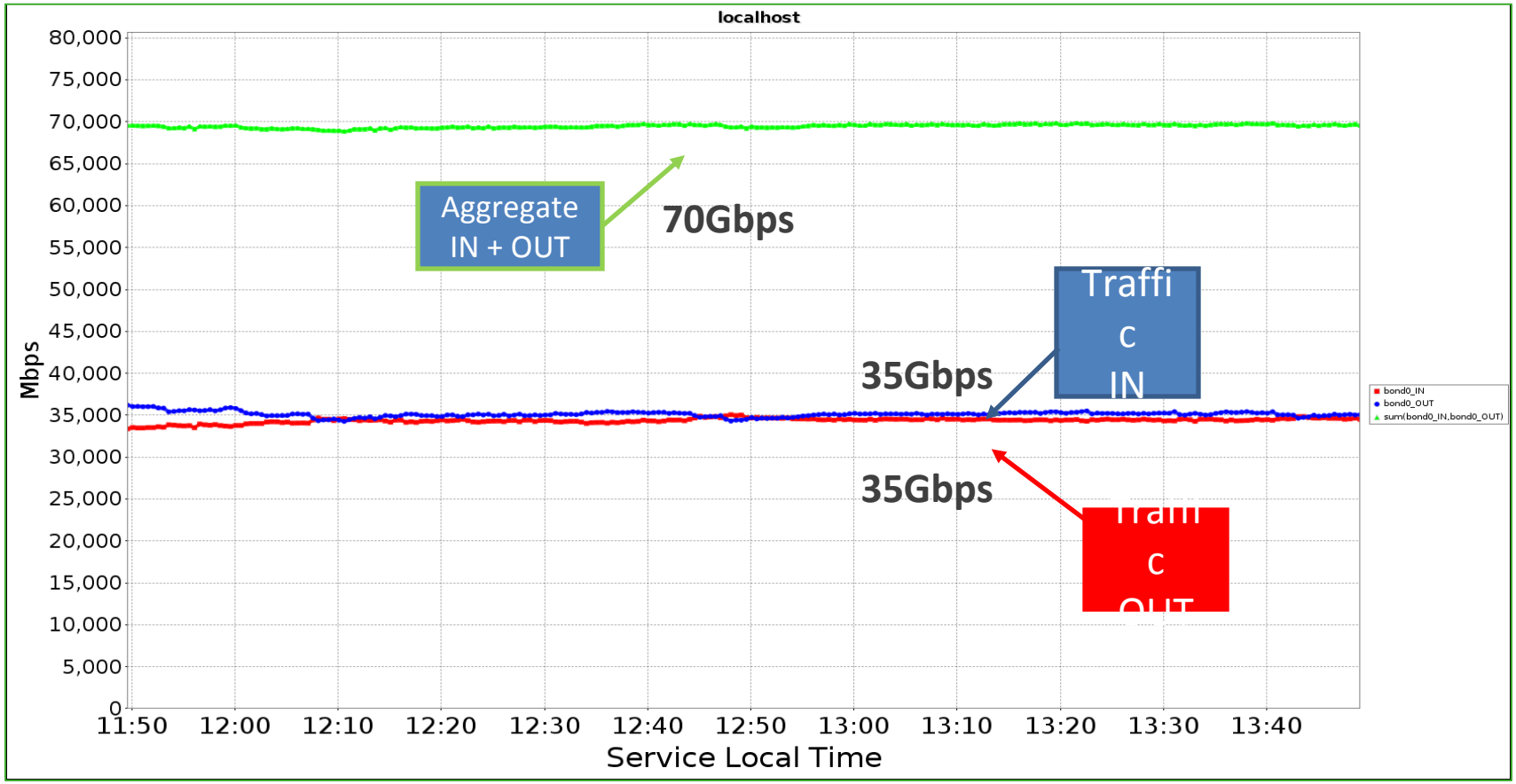
Server:
SuperMicro 6016XT-TF
Dual Intel X5670, 24GB DDR3 RAM
Supporting 4 Gen2.0 x8 slots
OS: RedHat Linux, Kernel 2.6.36

Mellanox Driver:
16 Receive queues + 16 Transmit queues
Challenge: Optimize queues to CPU cores



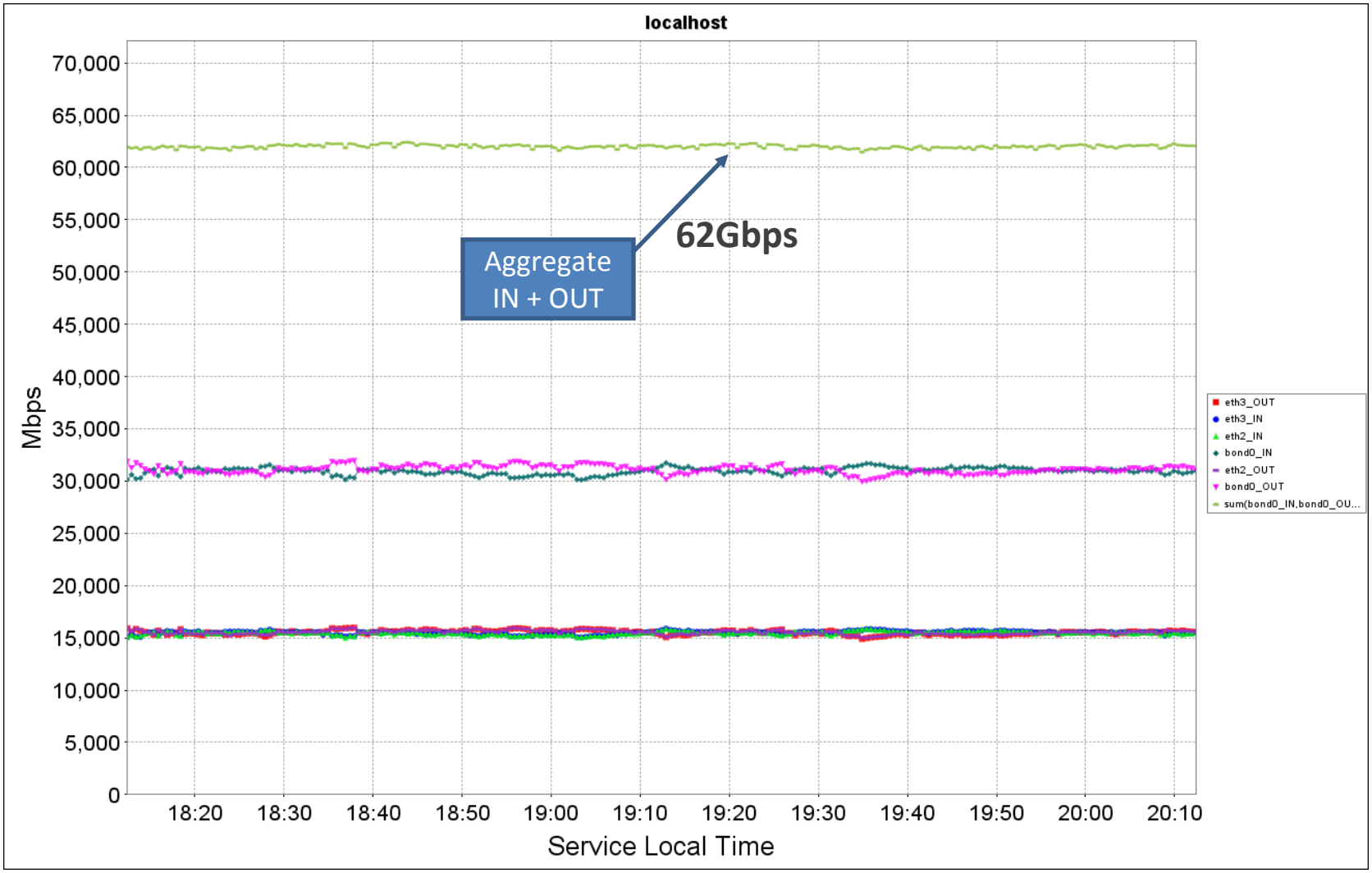
Two NICs bonded together in Linux with round robin packet flow

Network Test: Two 40GE bonded NIC



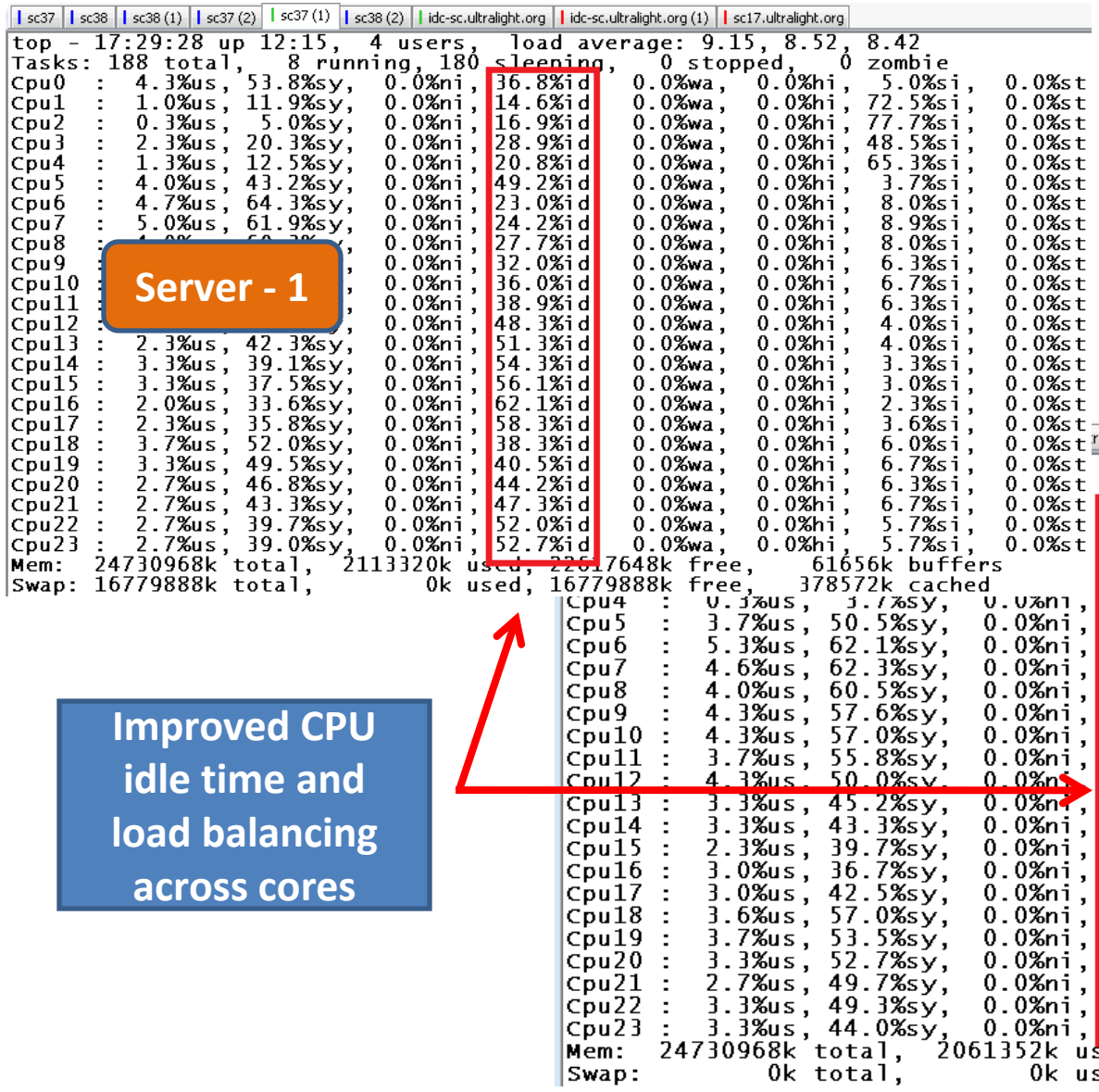
FDT “nettest” buffer tests, 16 streams in each direction

Memory Test: Two 40GE bonded NIC



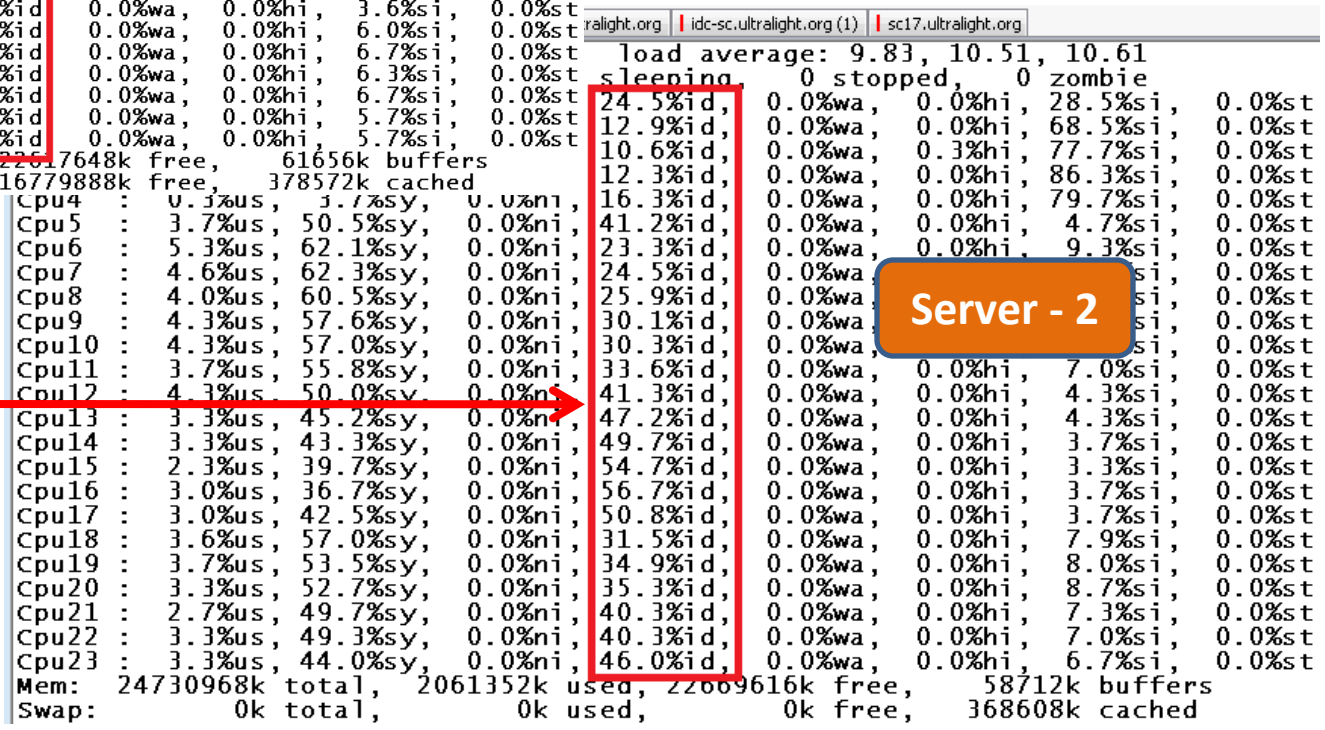
FDT reading from /dev/zero and writing to /dev/null memory tests, 16 streams in each direction

UltraLight Kernel 2.6.36-UL3



Requires manual IRQ shift across CPU Cores

Improved CPU idle time and load balancing across cores



Summary

- FDT Network Tests utilizes the available PCI-Express Gen 2.0 x8 bandwidth available to 1 x 40GE NIC to a maximum of **46Gbps** (IN+OUT).
- FDT Network Tests with 2 x 40GE NICs bonded together achieves a maximum of **70Gbps** (IN+OUT).
- FDT Memory Tests achieves a maximum of **62Gbps** (IN +OUT) when reading from memory based source /dev/zero and dropping packets to /dev/null.
- **Note:** PCI-e Gen 2.0 x8 slot offers ~24.6 Gbps real world throughput in one direction with about 7Gbps overhead due to 8b/10b encoding (20% loss per direction) and PCI-E layered architecture.
- **Note:** These transfer rates were achieved after careful IRQ steering among the CPU Cores (Dual Xeon X5670, 24 total cores).
- There is still room for more improvements in terms of Kernel, IRQ assignment and FDT.
- PCI-E 3.0 expected early 2011 will use 128b/130b encoding thus reducing loss and providing an effective double rate than PCI-E 2.0 at 1GB/s per lane or 64Gbps FD in an x8 slot.