NASA High End Computing (HEC) WAN File Transfer Experiments/Demonstrations Super Computing 2011 (SC11)

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Sample Results From NASA HEC WAN File Transfer Experiments/Demonstrations At SC11

- **NASA Partners in "Using 100G Network Technology in Support of Petascale Science" Special SC11 Demonstration/Evaluation Experiments**
- DOE's Earth Sciences Network (ESnet), Internet2, Super Computing Convention's Scinet Research Sandbox, Northwestern University International Center for Advanced Internet Research (iCAIR), University of Illinois at Chicago's Laboratory for Advanced Computing (LAC), Starlight, University of Maryland College Park's Mid-Atlantic Crossroads (MAX)
- Vendors who loaned equipment: Alcatel-Lucent, Brocade, Ciena, Cpacket, Fujitsu, Intel, Juniper, Supermicro

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Sample Results From NASA HEC WAN File Transfer Experiments/Demonstrations At SC11

Special SC11 Demonstration/Evaluation Experiments

- Use of three custom NASA/HECN Team built network-testing-workstations deployed into the LAC/iCAIR and NASA Exhibit Booths and at GSFC, capable of:

- >80Gbps bi-directional tcp memory-to-memory data flows over a 100G path
- >70Gbps (60Gbps across the WAN due to unresolved packet drops) uni-directional disk-to-disk file copies (using SSDs)

- Demonstrate/Evaluate interoperability between multiple vendor 100G products from Alcatel, Brocade, Ciena, Fujitsu, Juniper, over SCinet, ESnet, Starlight, Internet2, and MAX/DRAGON

- Demonstrate/Evaluate current status of Alpha 40G NIC from Acadia Optronics.

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High End Computer Networking (HECN) Team

Bill Fink
Acting Project Lead

Paul Lang
Network Engineer

Aruna Muppalla
Network Engineer

Jeff Martz
Network Engineer

Mike Stefanelli
Network Engineer

Pat Gary
(In Memoriam)

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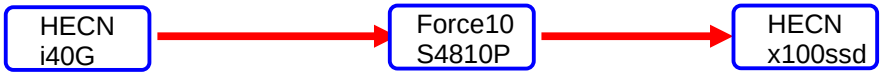
Using 100G Network Technology in Support of Petascale Science

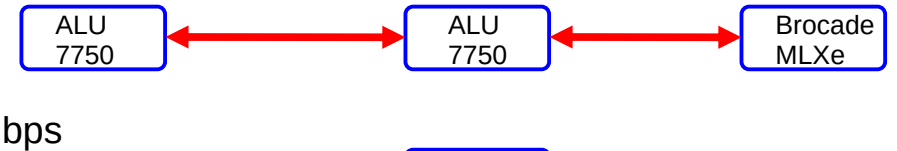
A Collaborative Initiative Among NASA, ESnet, Internet2, SCinet, Northwestern/iCAIR, UIC/LAC, Starlight, NLR, UMD/MAX/DRAGON

Demo Summary

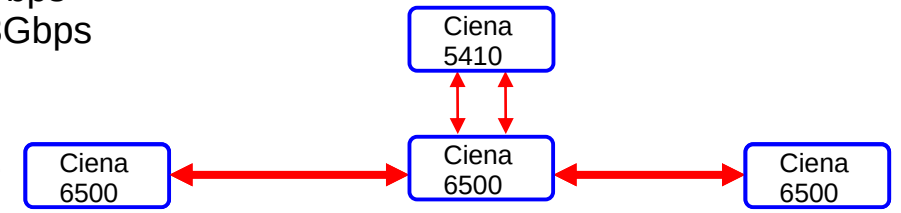
40Gbps Acadia Optronics NIC
- uni-directional udp: 20Gbps



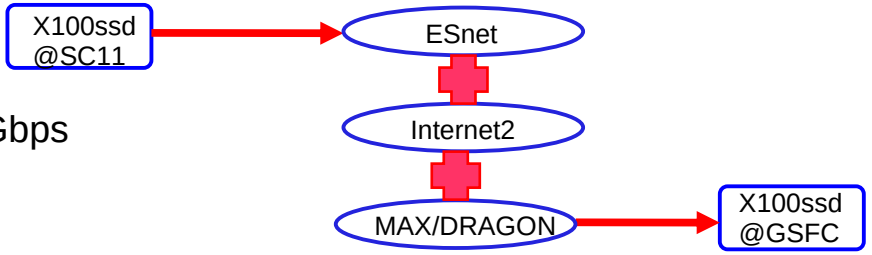
1x100Gbps full-duplex across:
- uni-directional tcp: 98.11Gbps
- bi-directional tcp: 82.19/81.46Gbps
- uni-directional disk-to-disk: ~73Gbps



10x10Gbps (100G) Muxponder
- uni-directional tcp: 99.04Gbps
- bi-directional tcp: 78.84/76.85Gbps
- uni-directional disk-to-disk: ~72.2Gbps



1x100Gbps full-duplex across:
- uni-directional tcp: 70.69Gbps
- uni-directional disk-to-disk: ~60Gbps



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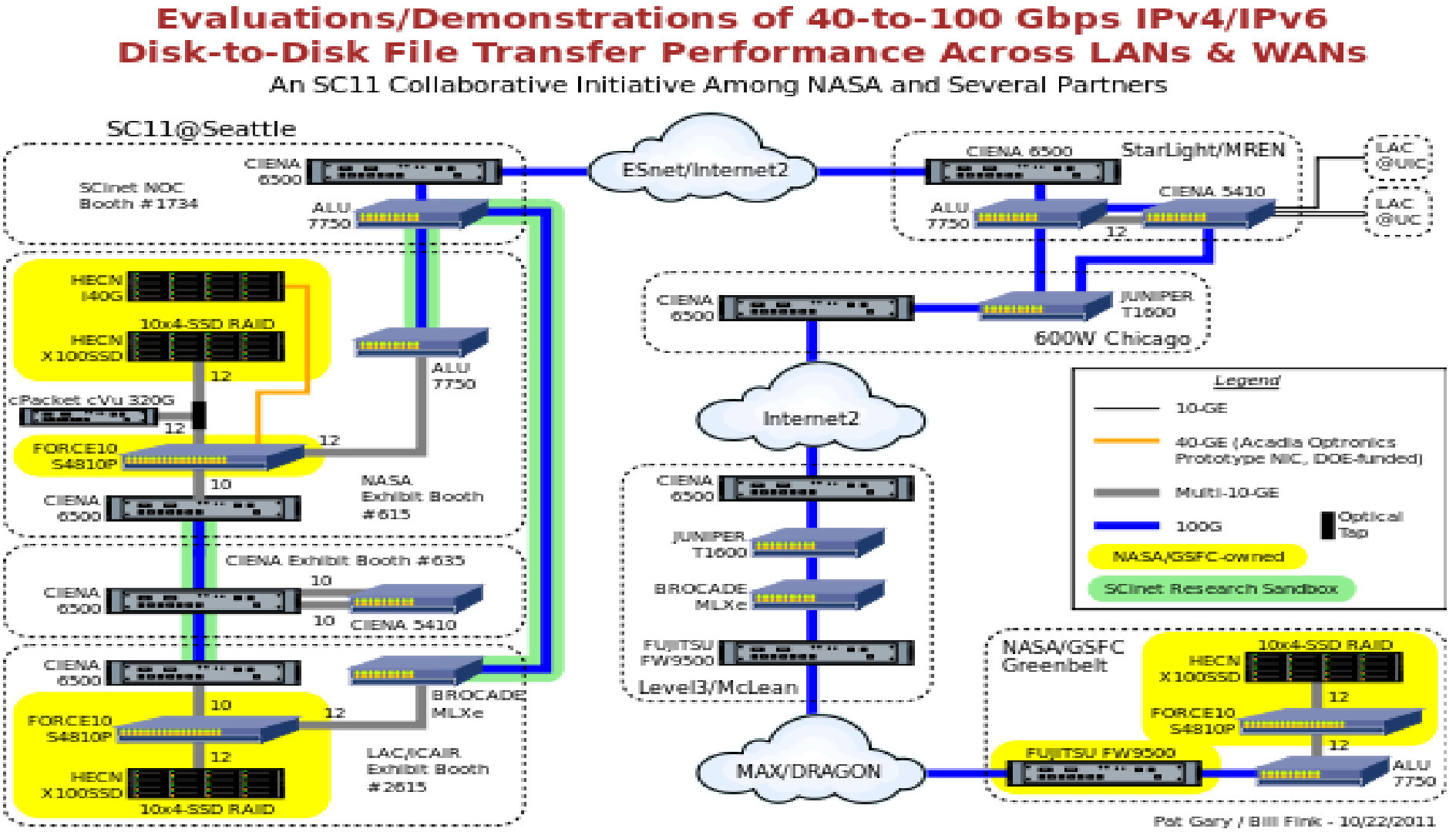
Testbed Environment



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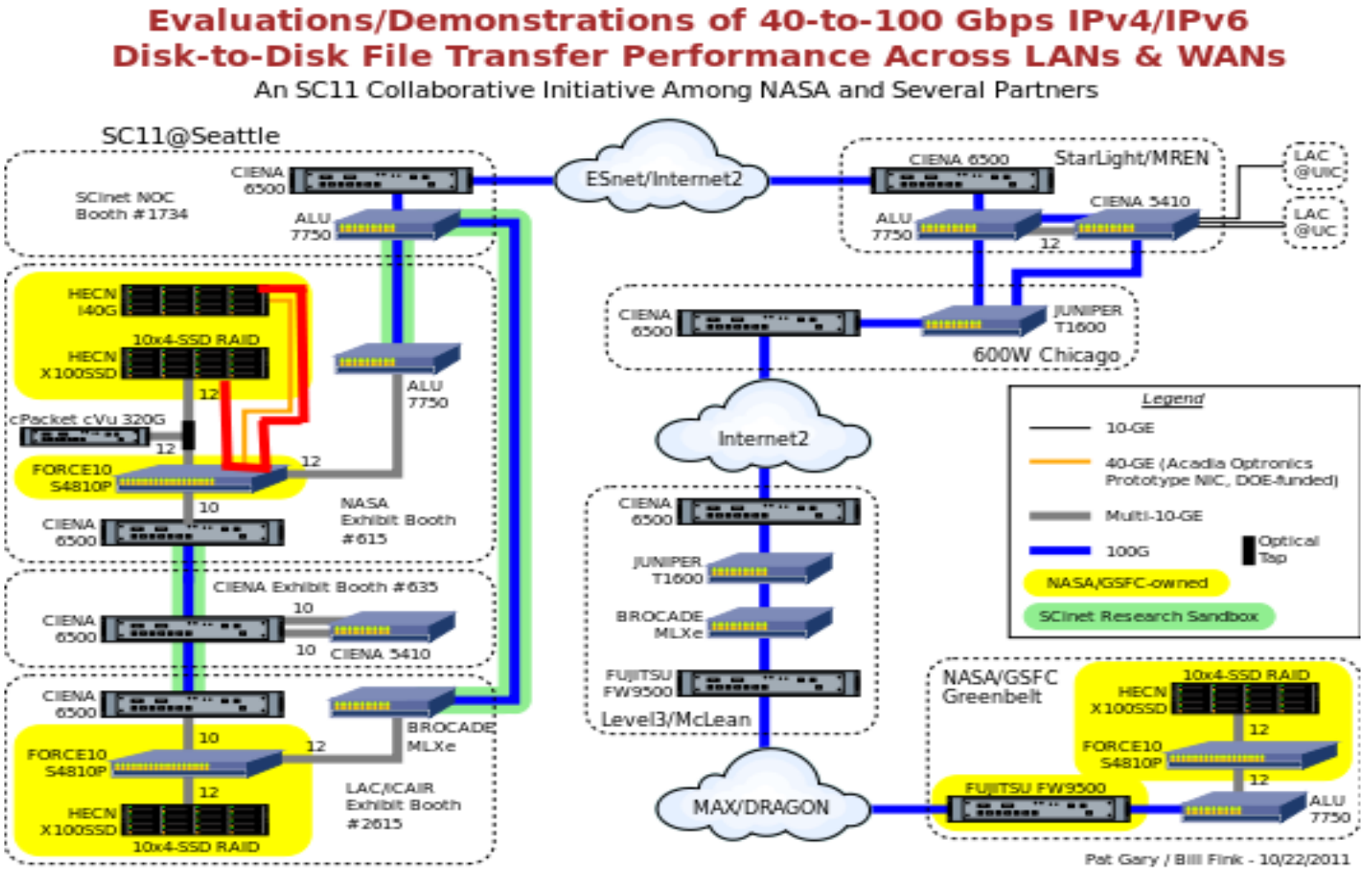
Acadia Optronics 40G NIC (red path)



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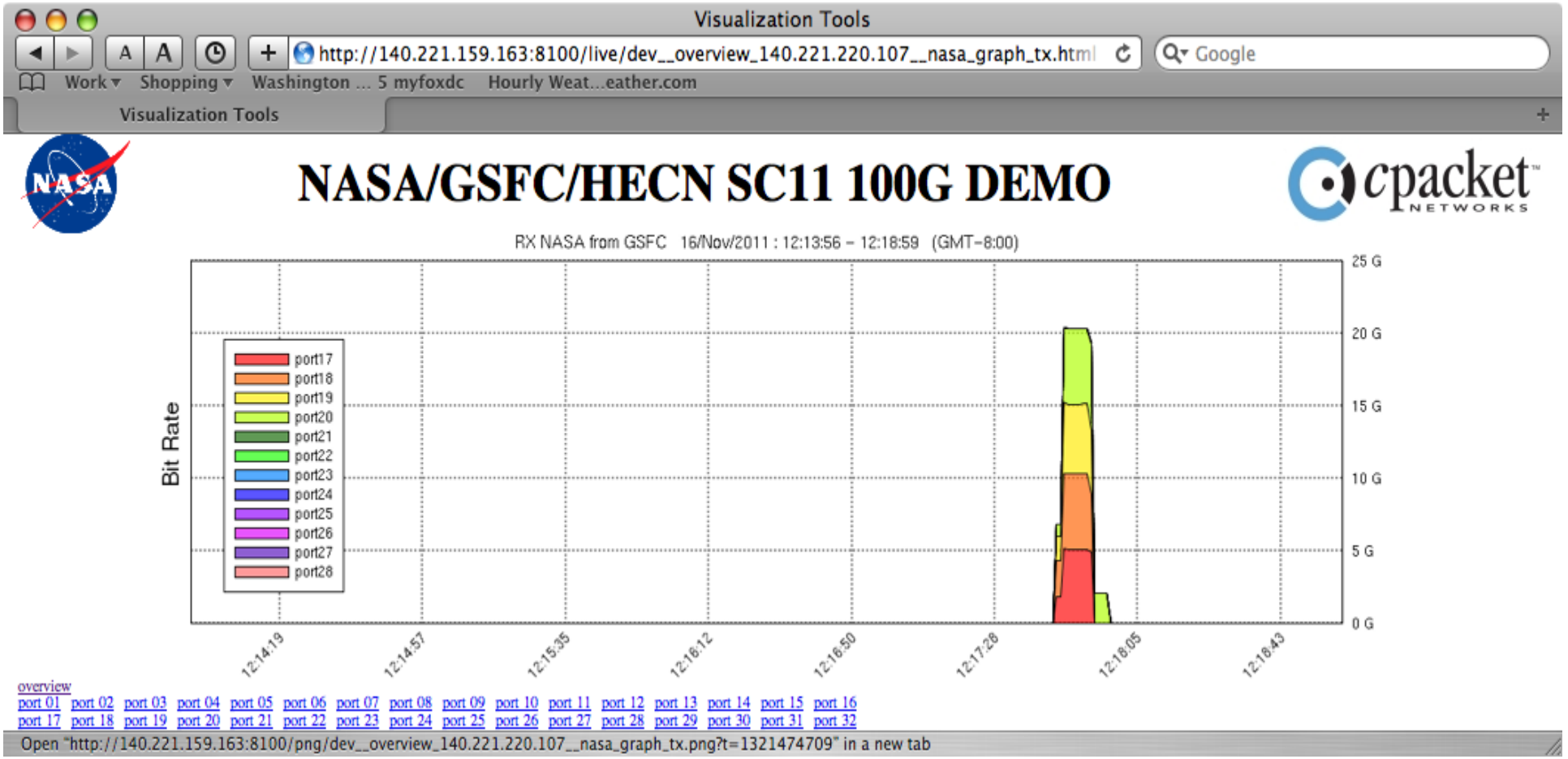
Acadia Optronics 40G NIC
nuttcp UDP memory to memory test results (20Gbps)

(driver issues limited it to half performance)



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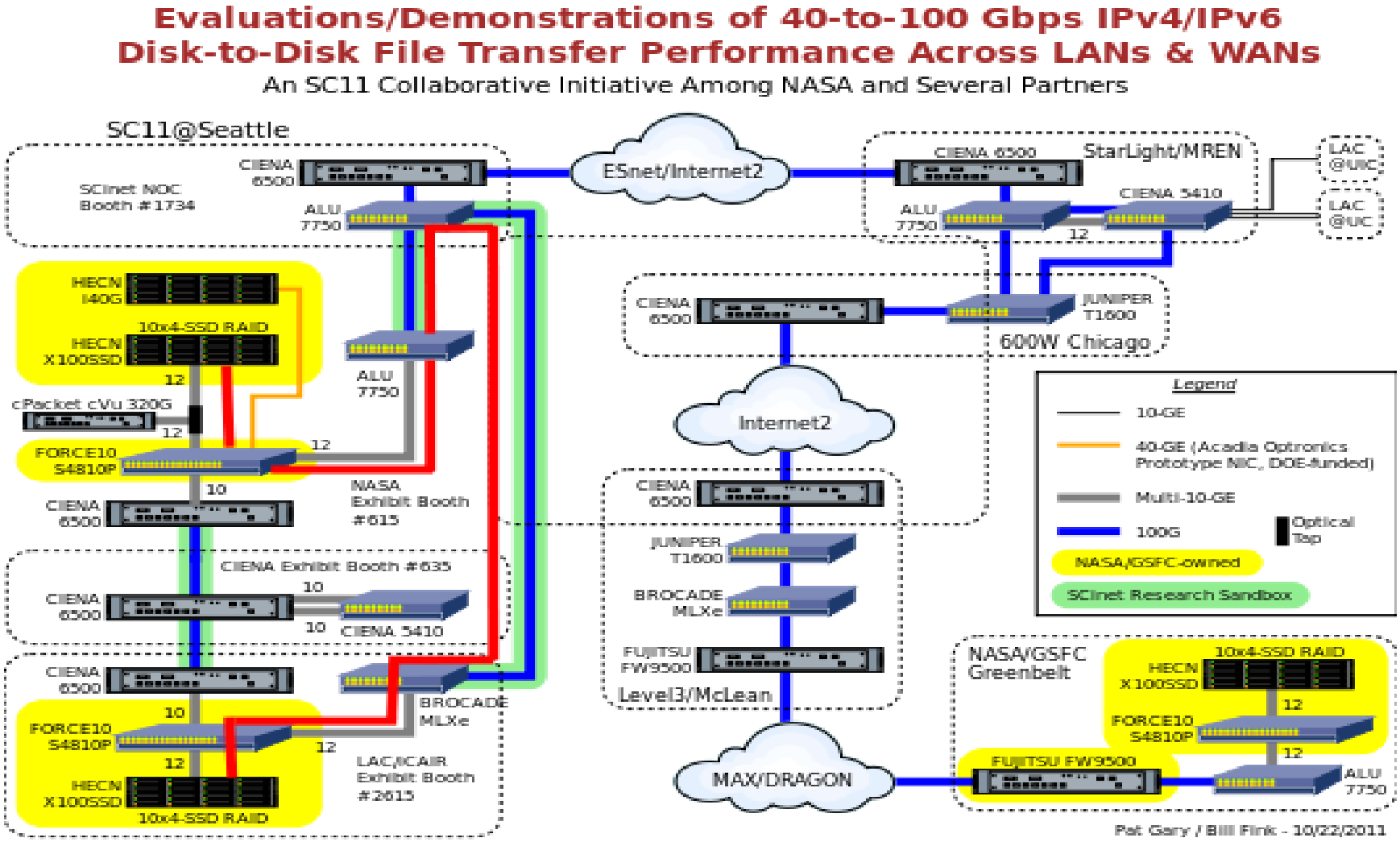
NASA to LAC Booth via ALU 7750 & Brocade MLXe



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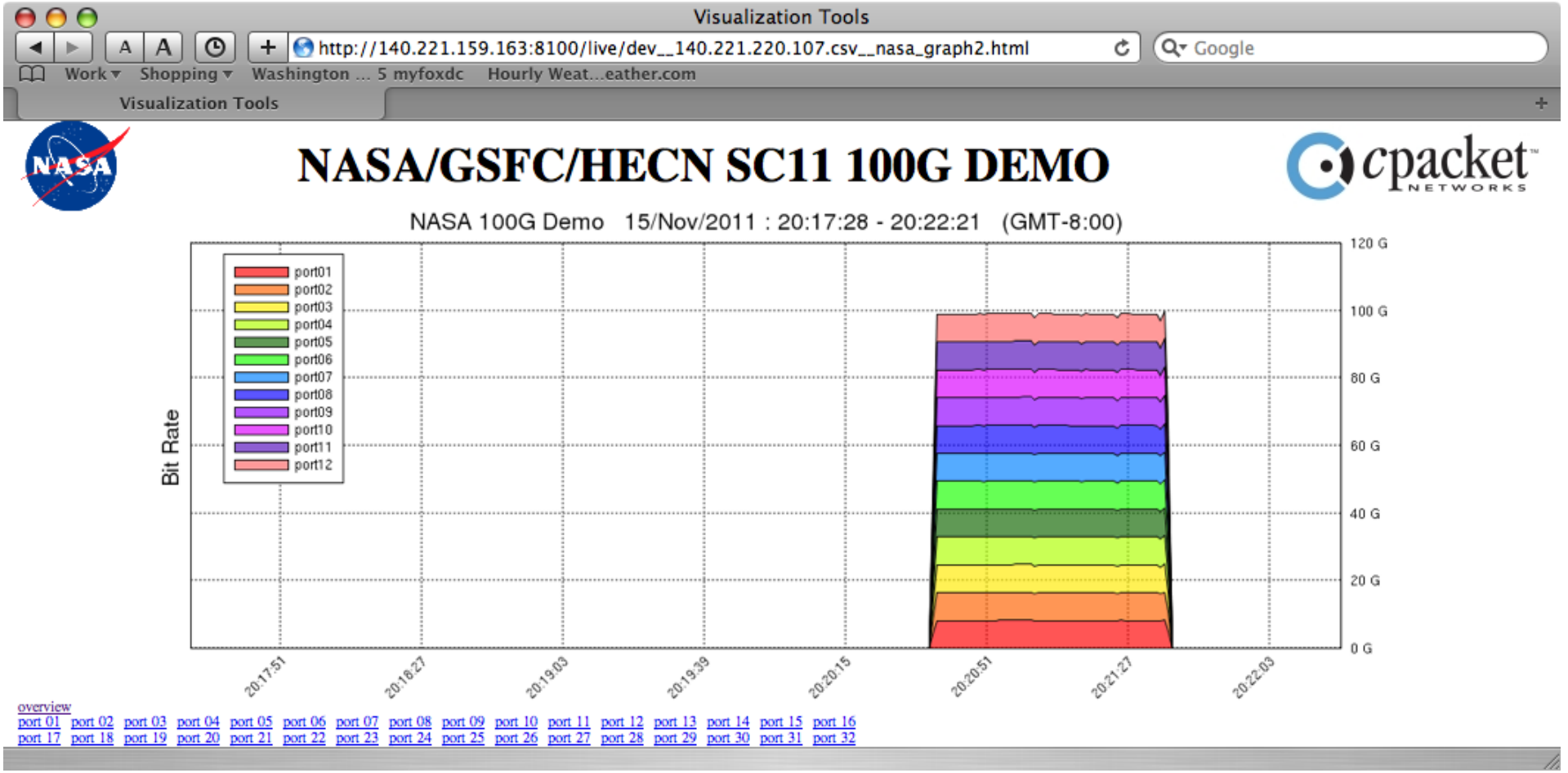
NASA to LAC Booth via Alcatel & Brocade

nuttcp tcp memory-to-memory test results (98.11Gbps)



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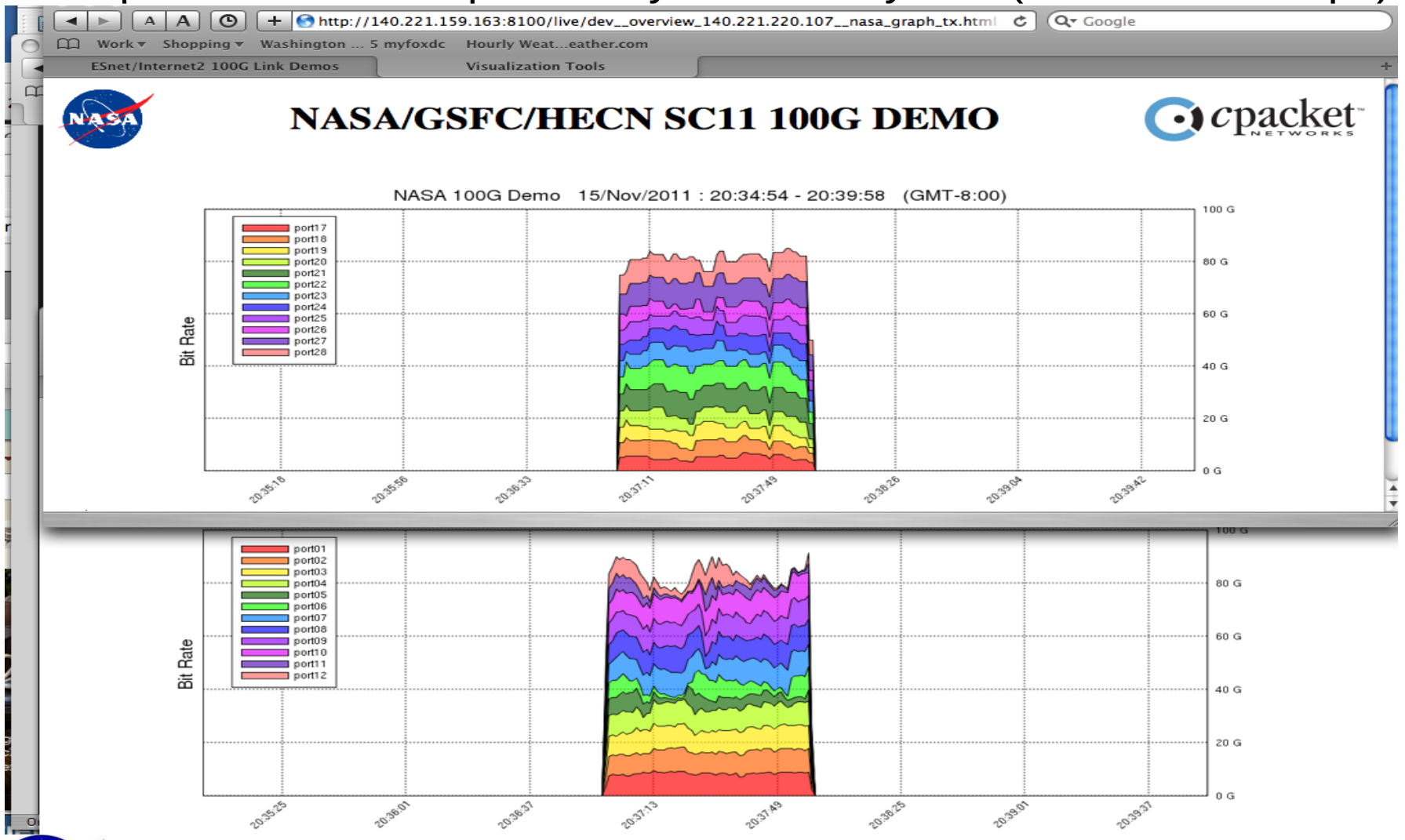
NASA to LAC Booth via Alcatel & Brocade

nuttcp bi-directional tcp memory-to-memory test (81.46/82.19Gbps)



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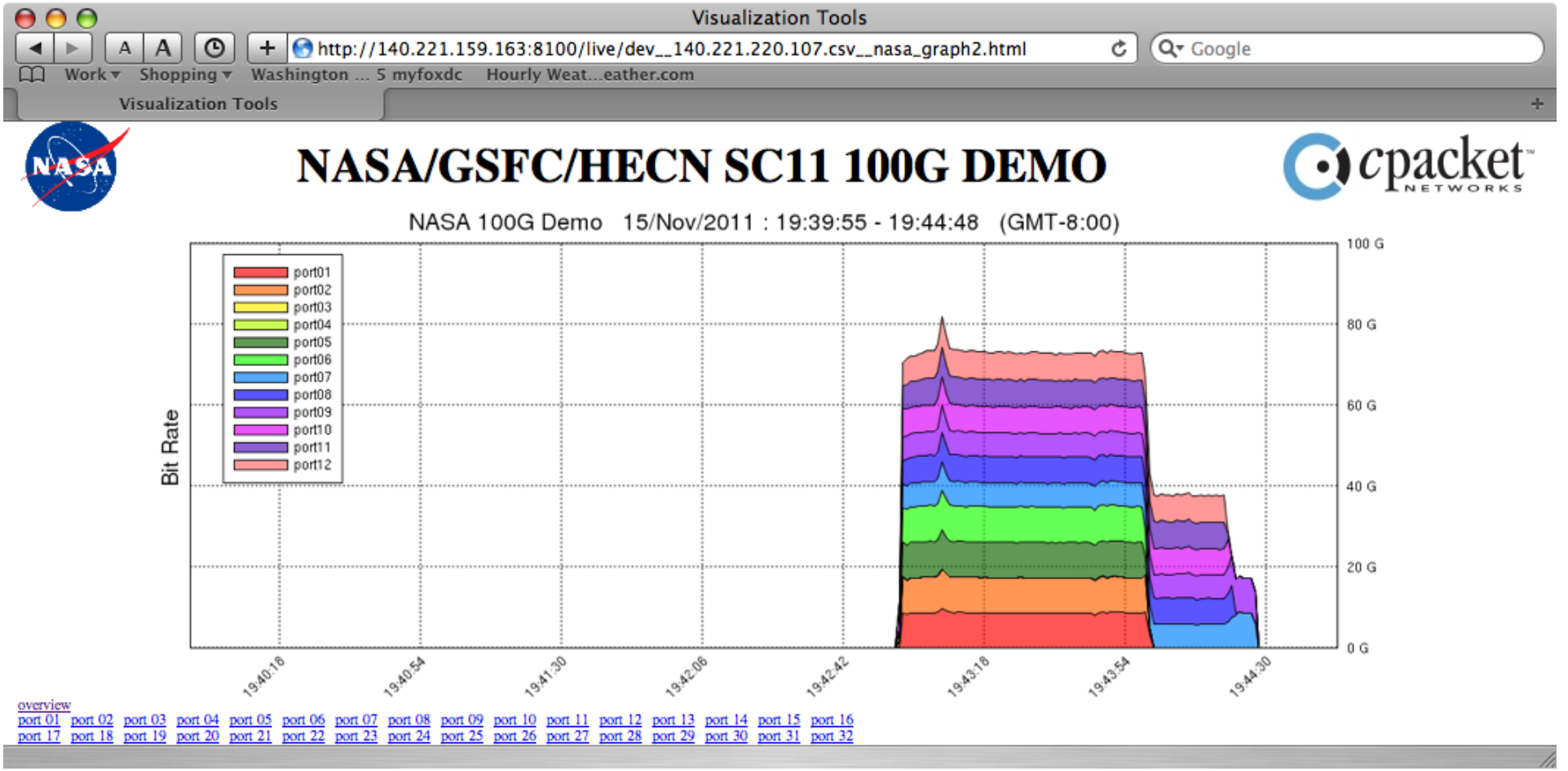
NASA to LAC Booth via Alcatel & Brocade nuttscp disk-to-disk test results (~73Mbps)



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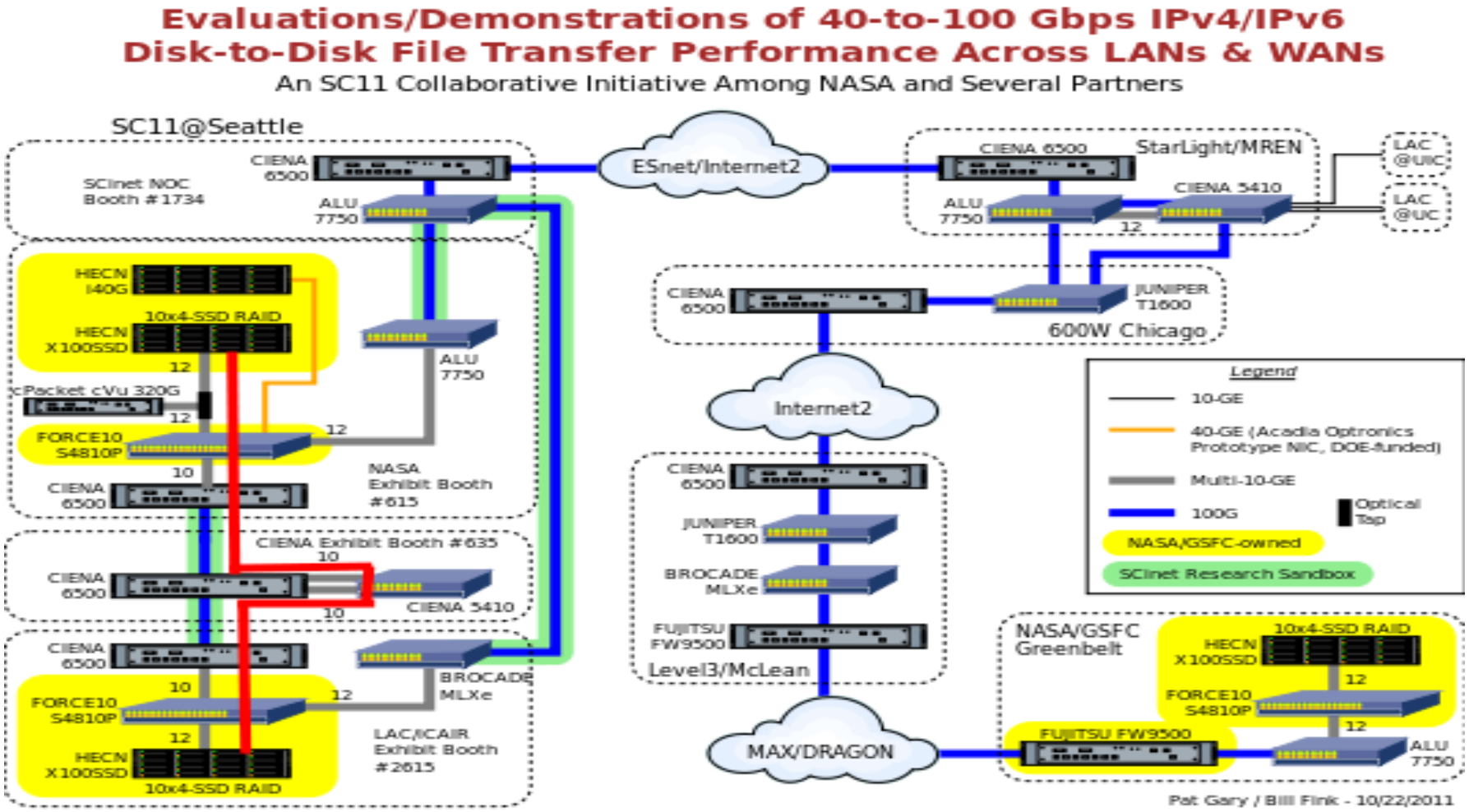
NASA to LAC Booth via Ciena 5410 & 10x10G Muxponder



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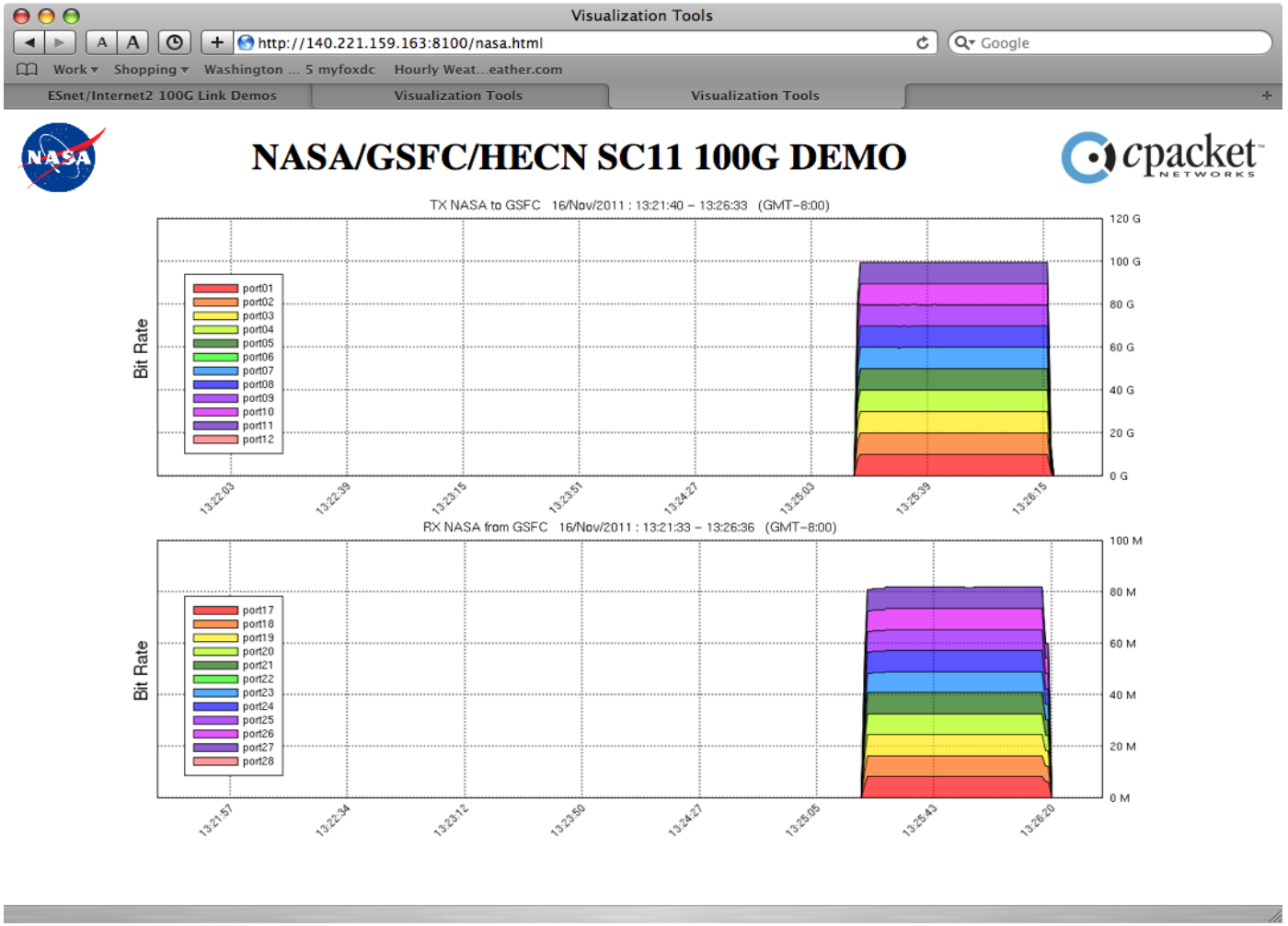
NASA to LAC Booth via Ciena 5410 and 10x10G Muxponder
nuttcp tcp uni-directional memory-to-memory test (99.04Gbps)



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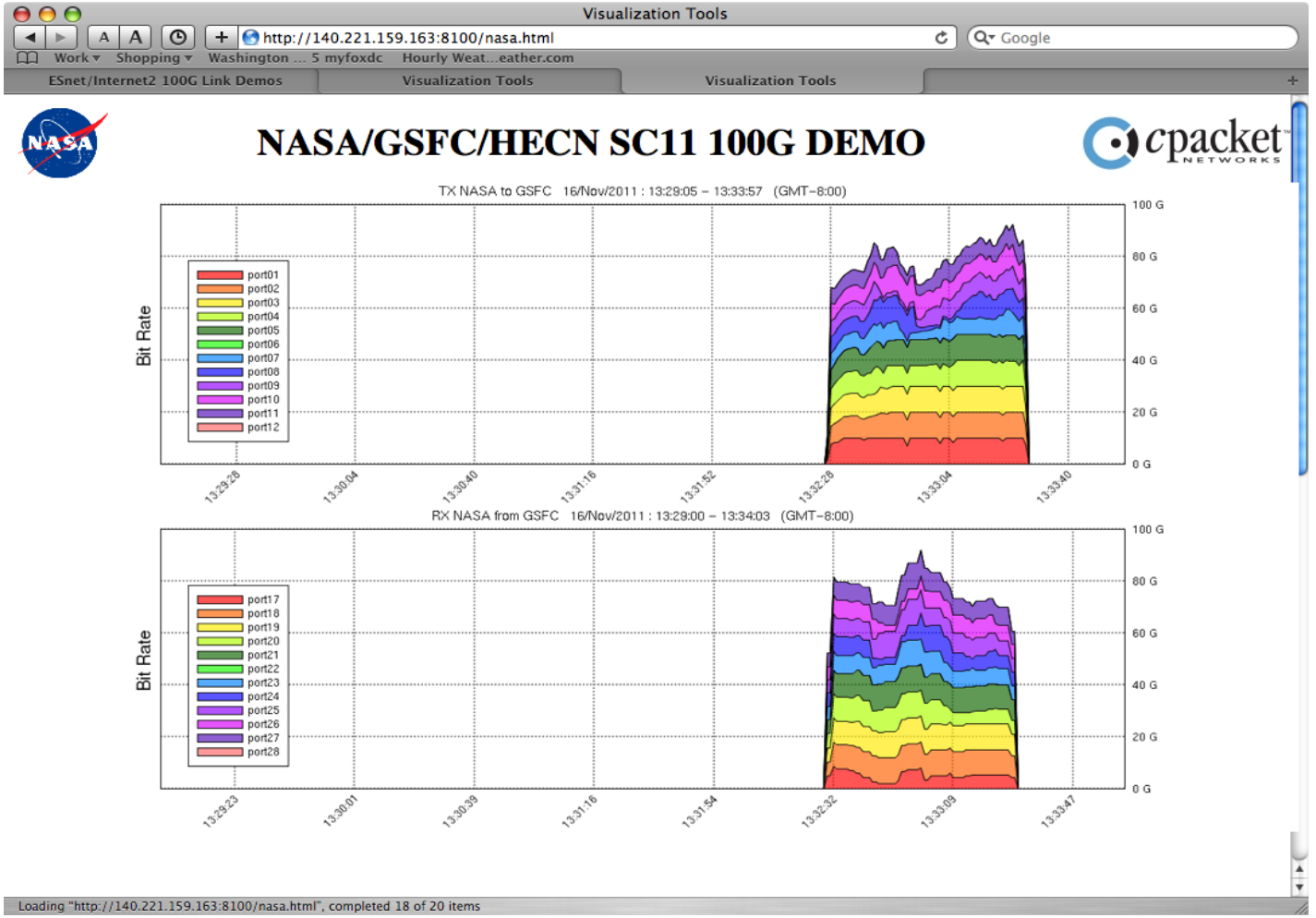
NASA to LAC Booth via Ciena 5410 & 10x10G Muxponders

nuttcp bi-directional tcp memory-to-memory test (78.84/76.85Gbps)



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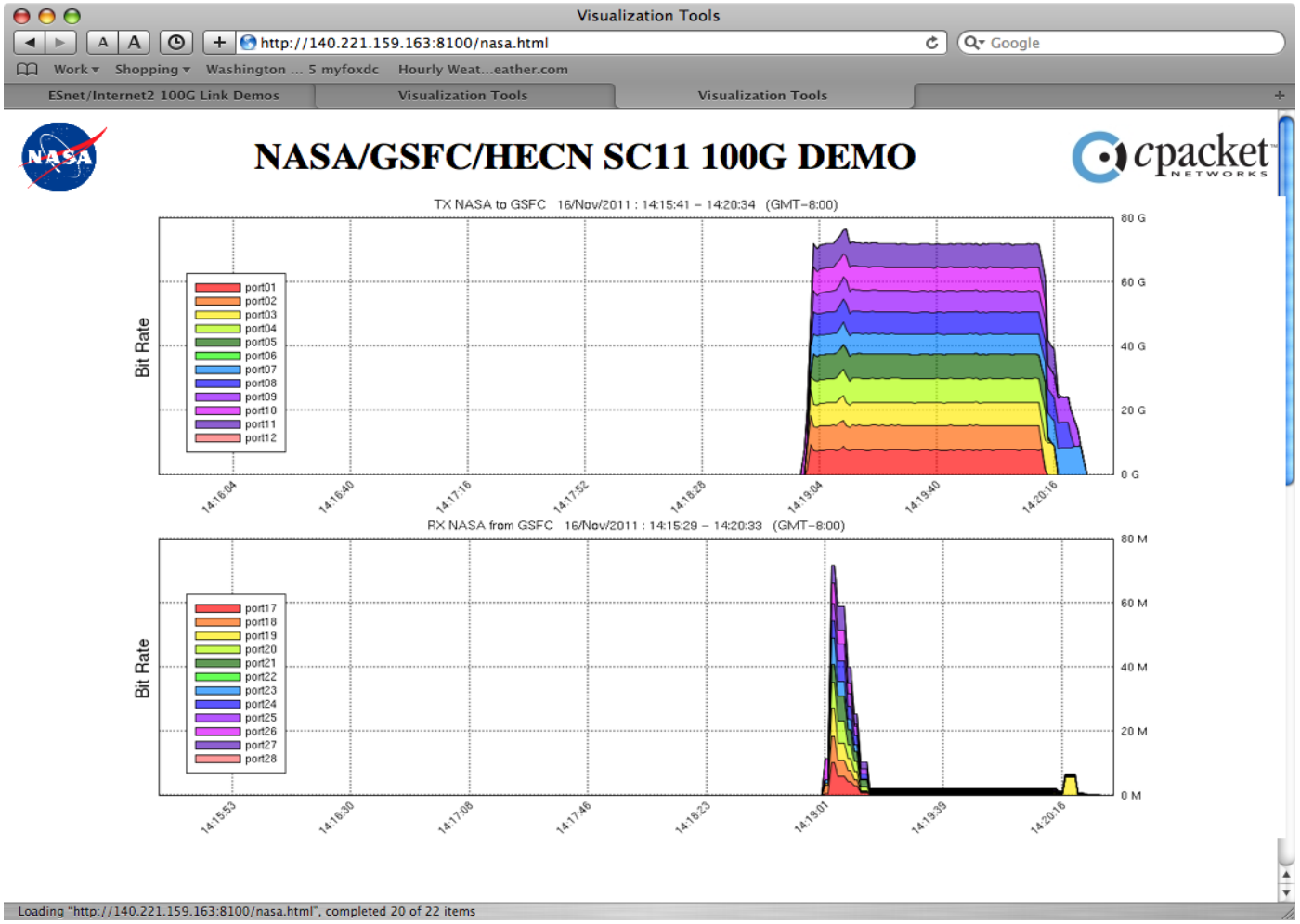
NASA to LAC Booth via Ciena 5410 & 10x10G Muxponder nuttscp disk-to-disk test (~72.2Gbps)



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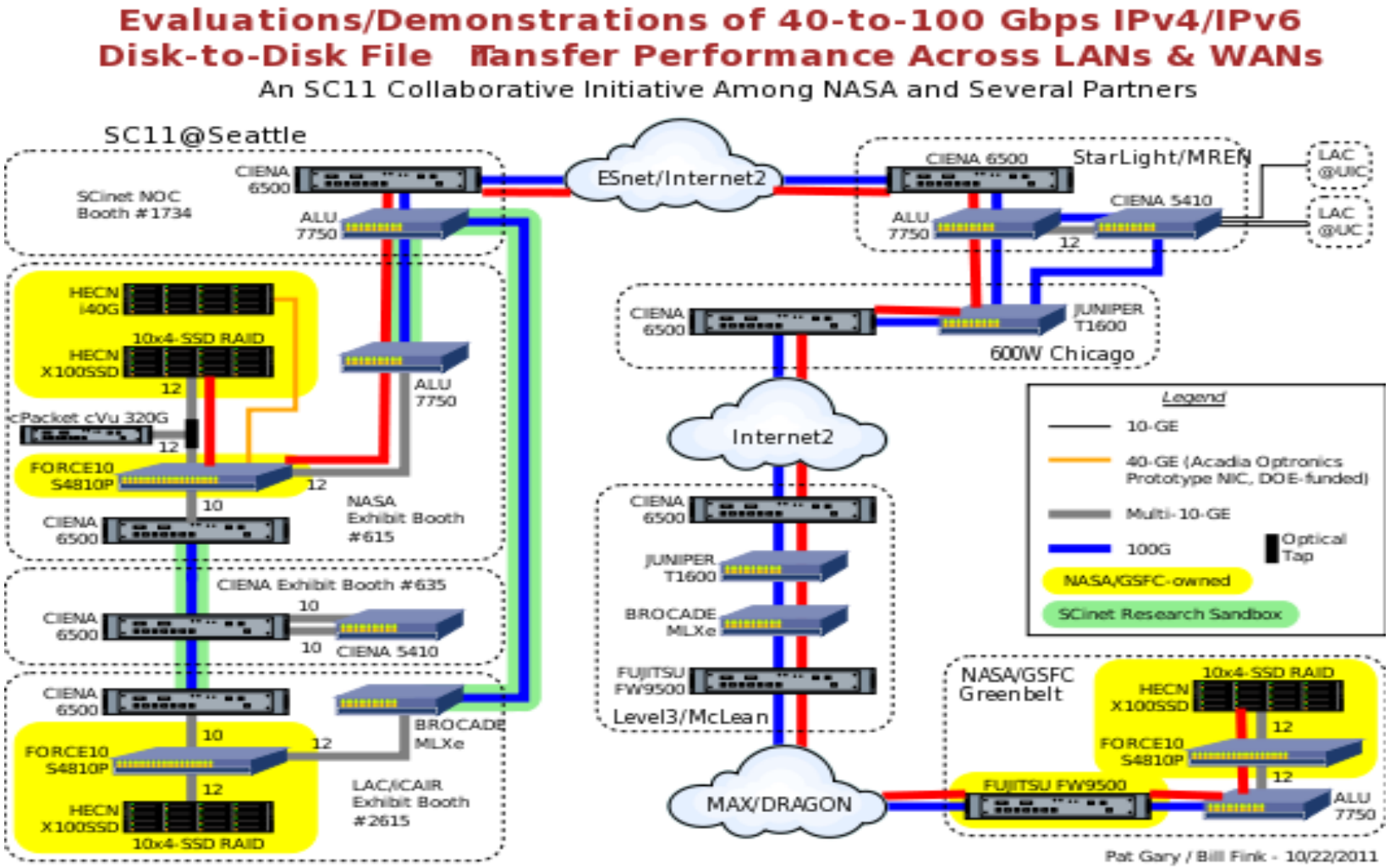
NASA Booth to GSFC



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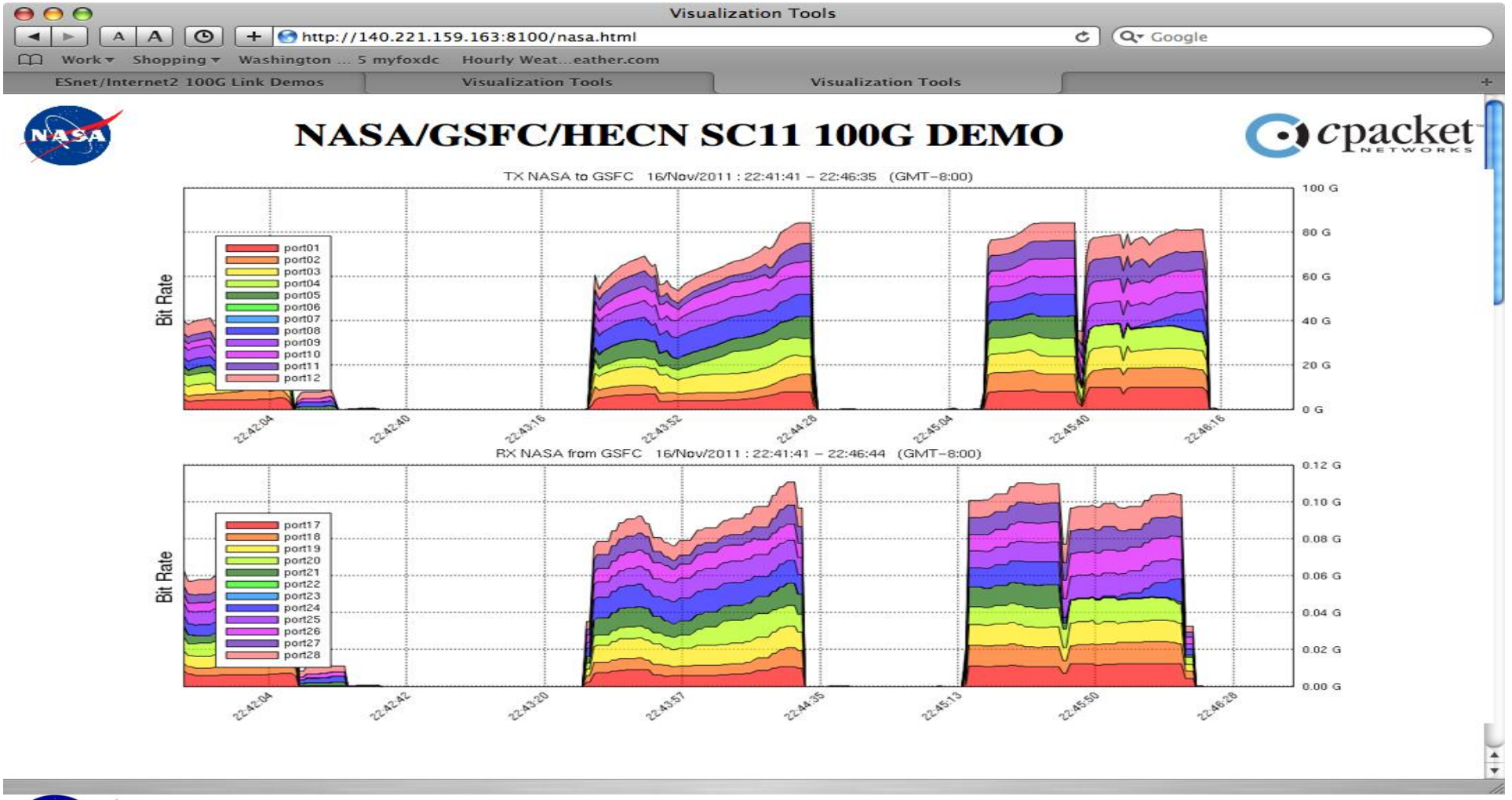
NASA Booth to GSFC

nuttcp uni-directional tcp memory-to-memory results (70.69Gbps)



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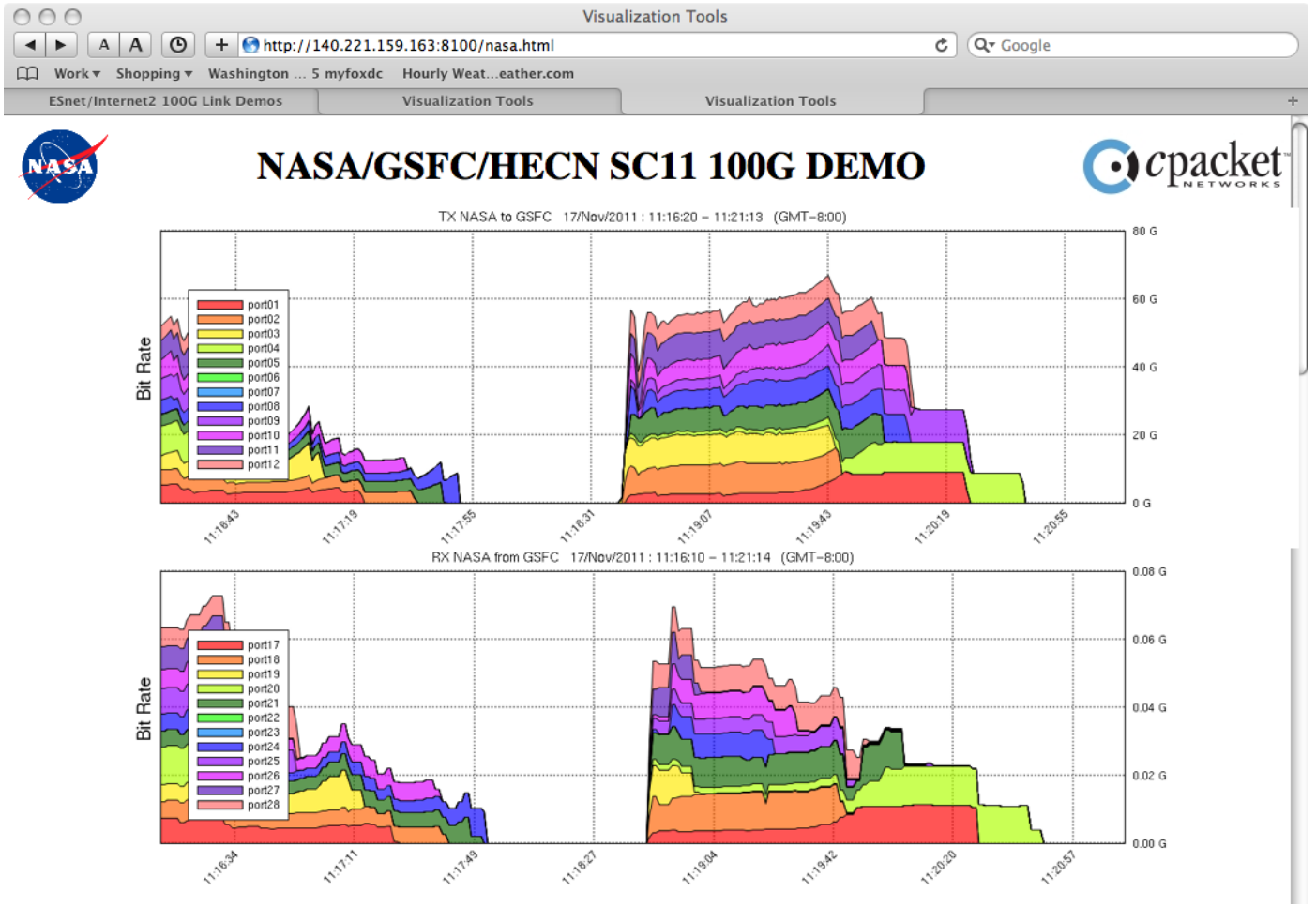
NASA Booth to GSFC
nuttscp uni-directional disk-to-disk test (~60Gbps)



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X100SSD Parts/Price List

Description	Model#	Price	Quantity	Subtotals
SM 3u 16bay chassis	836TQ-R800B	$890	1	$890
IcyDock 2.5" adaptor	MB882SP-1S-2B	$17	16	$272
SM front pannel cable	CBL-0084	$3	1	$3
Fan extension cable	12" 3-pin fan extension	$1	1	$1
Red Greatland	18" Slimline SATA adapter	$6	1	$6
SM FDD tray for 2.5”	CP-220-83601-0B	$8	1	$8
Power extension cable	8" 8pin power extension	$8	1	$8
SM 2u 24bay chassis	216A-R900LPB	$890	1	$890
SM motherboard	X9DRi-F-O (sample)	$550	1	$550
Intel Xeon processors	Sandy Bridge EP	on-loan	2	on-loan
CPU cooler	Dynatron R14 2U	$46	2	$92
WD 250GB system disk	WD2500BEKT	$110	1	$110
DDR3 ECC Reg 4GB	DR3512X72RPC1600-AV2	$113	8	$904
HotLava 6port 10GE	6ST2A30A1F1	$1,400	2	$2,800
LSI 9265-8i raid	LSI00277	$635	4	$2,680
LSI 9285-8e raid card	LSI00284	$866	1	$866
OCZ Vertex3 SSD	VTX3-25SAT3-120G	$220	40	$8,800
SAS-SATA cable	CBL-SFF8087OCF-10M	$16	4	$64
intSAS-intSAS	1 meter SFF-8087 cable	$20	6	$120

(continued)

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X100SSD Parts/Price List (continued)

Description	Model#	Price	Quantity	Subtotals
.5m ext SAS cable	SAS-7070-05M	$41	2	$82
SAS int/ext adapter	SAS-AD8788-2	$55	1	$55
OSS PCIe expander	OSS-PCIe-ATX-BP-2023	$1,232	1	$1,232
OSS PCIe X16 cable	CABLE-PCIe-x16-1M	$270	1	$270
OSS PCIe 2x16 card	OSS-PCIe-HIB25-x16-H	$494	1	$494
			Total	$21,197+

+ (note: Total does not include XEON processors or SFP+ transceivers/cables)
SM = Supermicro, OSS = One Stop Systems, WD = Western Digital

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