

Core 42 Cerebras CG-1 Santa Clara

As-Built Documentation

Date: May 8th, 2024

Table of Contents

Release Notes3

Bill of Material.....3

Solution Design4

VAST Hardware Specifications5

VAST Components Serial Numbers7

Rack Elevation Design.....7

HLD Diagram8

VAST Leaf Connectivity 10

VAST Spine Connectivity 11

Logical Connectivity – ETH Frontend 12

NorthBound Connectivity..... 12

VAST Cluster Details 15

 Username & Passwords..... 15

 Cluster IP Addresses 15

Release Notes

Version	Notes
1.0	Initial Documentation of the project (Excel)
1.1	New Documentation format (PDF)

Bill of Material

COMPATIBLE HARDWARE

SKU	DESCRIPTION	QUANTITY
QUAD-4N-IL-2NIC	Quad Server Chassis inc 4 x Ice Lake Servers (Dual NIC)(Quad Port 100Gb's QSFP28 or Quad Port HDR100 QSFP56)	11
HDR-NVMEF-1X40	NVIDIA MQM8700 Quantum HDR InfiniBand Switch 40 QSFP56 Ports 2 Power Supplies (AC) x86 Dual Core Standard Depth P2C Airflow Rail Kit	8
DF-3015	Ceres Enclosure: 1U HA Enclosure (up to 50GB/s); incl. 338TB NVMe Flash, 6.4TB SCM, 8 x 100Gb Bluefield 1 (ETH or IB)	10
CERES-AOC-CABLE-KIT	Fiber optic cables and SFPs for CERES D-Boxes and C-Boxes	1

VAST SOFTWARE & ADVANCED SERVICES

SKU	DESCRIPTION	QUANTITY	TERM (Months)
SW-U-100	100TB Useable 1-Month Gemini Services Term	30	36
COPILOT	VAST Data Co-Pilot Services	1	36
INSTALL	VAST Data Installation Services	1	

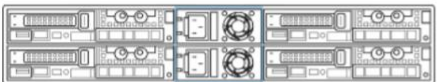
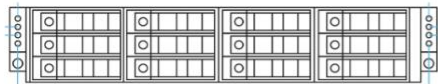
Solution Design

3PB Environment on VAST

338 TB VAST Mavericks Enclosures – HDR IB Backend

CLUSTER SPECIFICATIONS 11x10 338TB	
USABLE CAPACITY	2.98 PB @ 1:1 DATA REDUCTION
EFFECTIVE CAPACITY	4.47 PB @ 1.5:1 DATA REDUCTION
IL SERVER CHASSIS	11 (44 SERVERS)
CLIENT NETWORK CONNECTIONS	ETH 88 x 100 GbE
STORAGE CHASSIS	10 (338TB Ceres 1U ENCLOSURE)
SWITCHES	2 Spine (40 PORT HDR IB) 6 Leaves (40 PORT HDR IB)
RACKS	3 (Based on 17 kW Racks)
RACK UNITS	40
READ BANDWIDTH	532 GB/s (100% R)
WRITE BANDWIDTH	92 GB/s (100% W)
POWER	25.5 kW Total 11.2 kW (Left Rack) 12.1 kW (Middle Rack) 8.8 kW (Right Rack)

VAST Hardware Specifications



Model: QUAD-IL-2NIC
Product Name: Dell IceLake

Chassis	Nodes	4 hot-swappable dual-socket compute nodes in a 2U chassis
	Processor	Up to two 3rd Generation Intel Xeon Scalable processors per node, with up to 40 cores per processor
	Memory	<ul style="list-style-type: none">16 DDR4 DIMM slots, supports RDIMM of 1 TB max or LRDIMM of 2 TB max, speeds up to 3200 MT/sSupports registered ECC DDR4 DIMMs only
	Availability	Hot-plug redundant drives and PSUs
	Controllers	<ul style="list-style-type: none">Internal controllers: PERC H745, H750, HBA345, HBA355i, S150, H345, H350Internal Boot: Boot Optimized Storage Subsystem (BOSS-S1): HWRAID 2 x M.2 SSDs, uSD card
	Drive bays	Front bays: <ul style="list-style-type: none">Up to 12 x 3.5-inch SAS/SATA (HDD/SSD) drives max 92.16 TBUp to 24 x 2.5-inch SAS/SATA (HDD/SSD)/NVMe drives max 368.64 TB
	Power supplies	Dual hot-plug redundant 100 - 240 V AC Platinum (2600 W, 2400 W, 2000 W, 1600 W) Power supply units
	Cooling options	Air cooling
	Fans	Non-Hot plug fans

Front:



Rear:



Model: DF-3015
Product Name: 338TB Ceres Enclosure

Fabric Modules	2 x Active/Active Fabric Canisters
Storage Class Memory:	6.4 TB
Management (optional):	4 x 1GbE
HyperScale SSD:	338 TB
I/O Connectivity:	8 X 100GBE OR UP TO 8 X EDR IB
Dimensions:	1U Rackmount: H: 1.7", W: 17.6", D: 36"
Weight:	65 lbs
Power Supplies:	2 x 1600W
Performance	Read: 51.0 GBs, 590K IOPs Write: 8.6GBs, 134K IOPs



Nvidia QM8700 Quantum HDR 200Gbps Switches

Mellanox QM8700

- 19" rack mountable 1U chassis
- 40 QSFP56 non-blocking ports with aggregate data throughput up to 16Tb/s (HDR)

Switch Specifications

- Compliant with IATA 1.21 and 1.3
- 9 virtual lanes: 8 data + 1 management
- 256 to 4Kbyte MTU
- Adaptive Routing
- Congestion control
- Port Mirroring

- VL2VL mapping
- 4X48K entry linear forwarding database

Management Ports

- 100/1000 RJ45 Ethernet port
- RS232 console port
- USB port
- DHCP
- Industry standard CLI
- Management over IPv6
- Management IP
- SNMP v1,v2,v3
- WebUI

FEATURES

Fabric Management

- On-board Subnet Manager (SM) supporting fabrics of up to 2K nodes
- Unified Fabric Manager (UFM) agent

Connectors and Cabling

- QSFP56 connectors
- Passive copper or active fiber cables
- Optical modules

Indicators

- Per port status LED Link, Activity
- System LEDs: System, fans, power supplies
- Unit ID LED

Power Supply

- Dual redundant slots
- Hot plug operation
- Input range: 100-127VAC, 200-240VAC
- Frequency: 50-60Hz, single phase AC, 4.5A, 2.9A

Cooling

- Front-to-rear or rear-to-front cooling option
- Hot-swappable fan unit

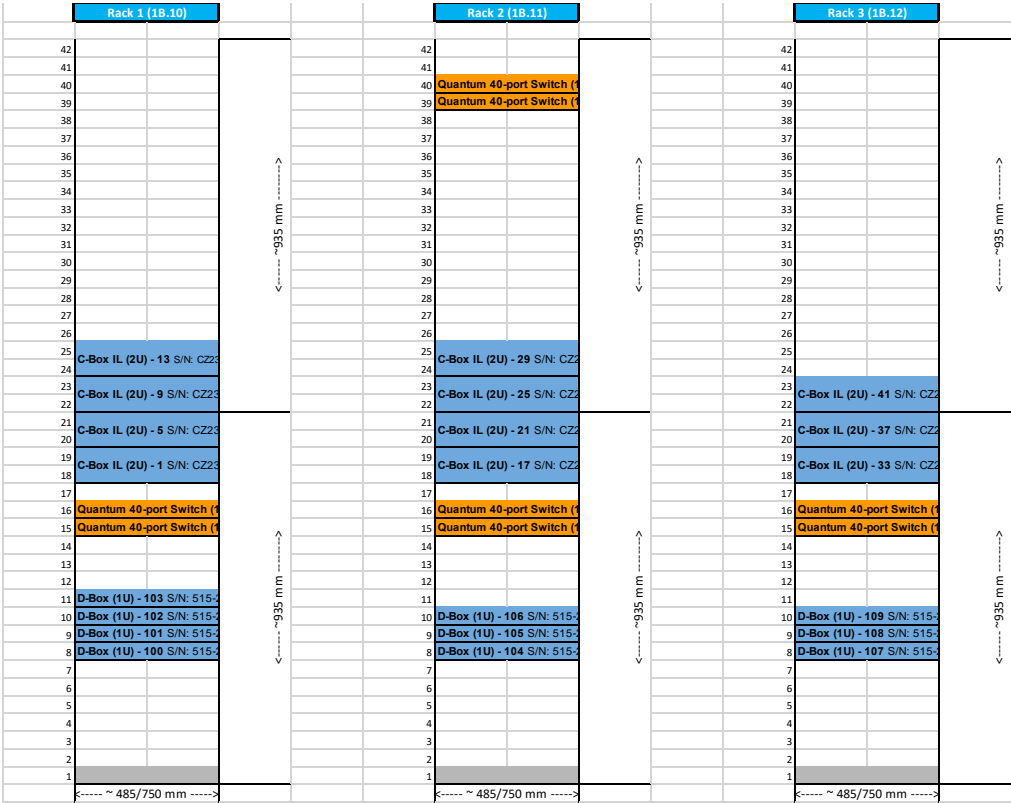
Power Consumption

- Contact Mellanox Sales

VAST Components Serial Numbers

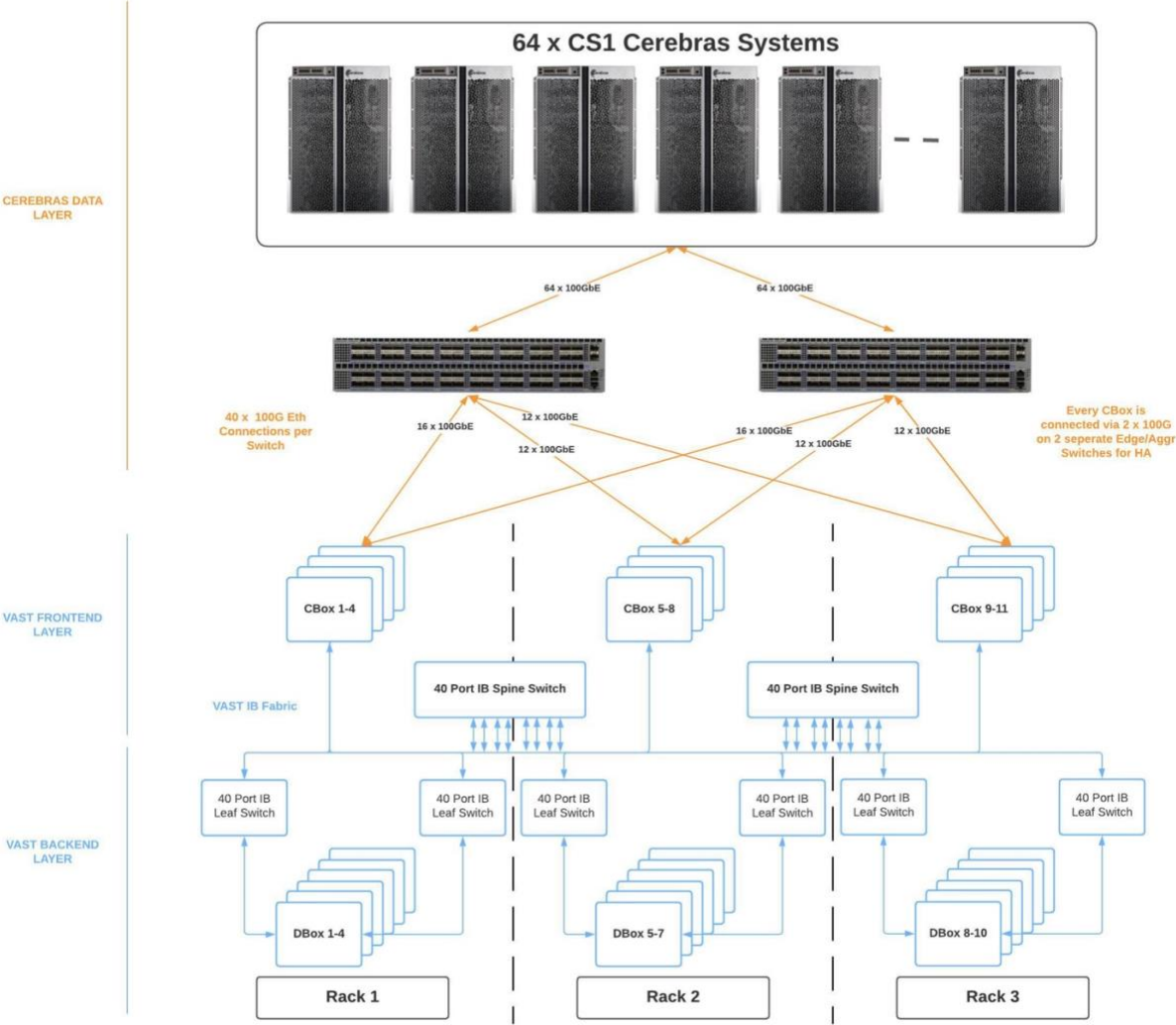
Rack	Component	Serial Numbers
Rack 1 (1B.10)	CBOX	S/N: CZ2341060V
	CBOX	S/N: CZ2332069J
	CBOX	S/N: CZ2332069X
	CBOX	S/N: CZ233206M0
	DBOX	S/N: 515-23090800900007
	DBOX	S/N: 515-23072801500026
	DBOX	S/N: 515-23072801500023
	DBOX	S/N: 515-23072801500007
Rack 2 (1B.11)	CBOX	S/N: CZ233809CG
	CBOX	S/N: CZ233809CC
	CBOX	S/N: CZ233809CF
	CBOX	S/N: CZ2332069H
	DBOX	S/N: 515-23092600400029
	DBOX	S/N: 515-23090800900028
	DBOX	S/N: 515-23070500100028
Rack 3 (1B.12)	CBOX	S/N: CZ2341060H
	CBOX	S/N: CZ2332069S
	CBOX	S/N: CZ2332069V
	DBOX	S/N: 515-23092600400028
	DBOX	S/N: 515-23072801500025
	DBOX	S/N: 515-23072801400021

Rack Elevation Design

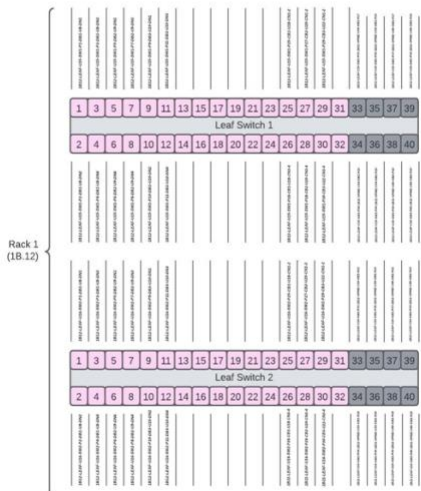
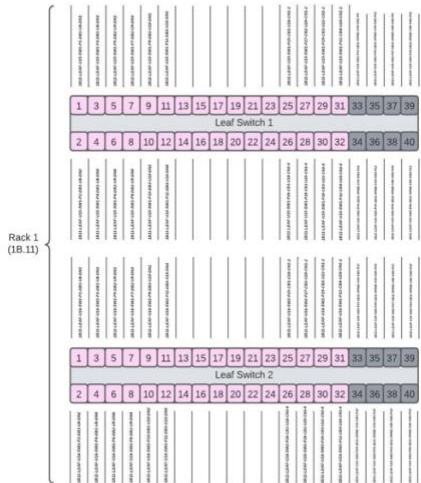
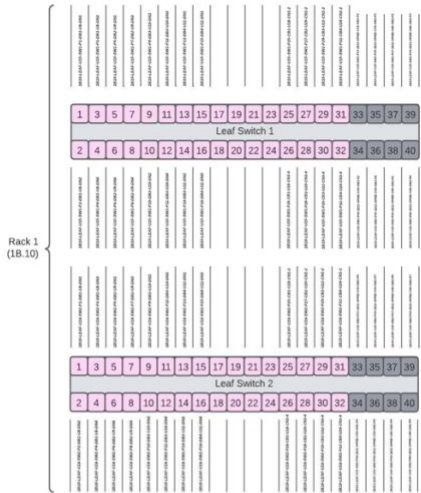


HLD Diagram

Santa Clara Cerebras LLD Diagram

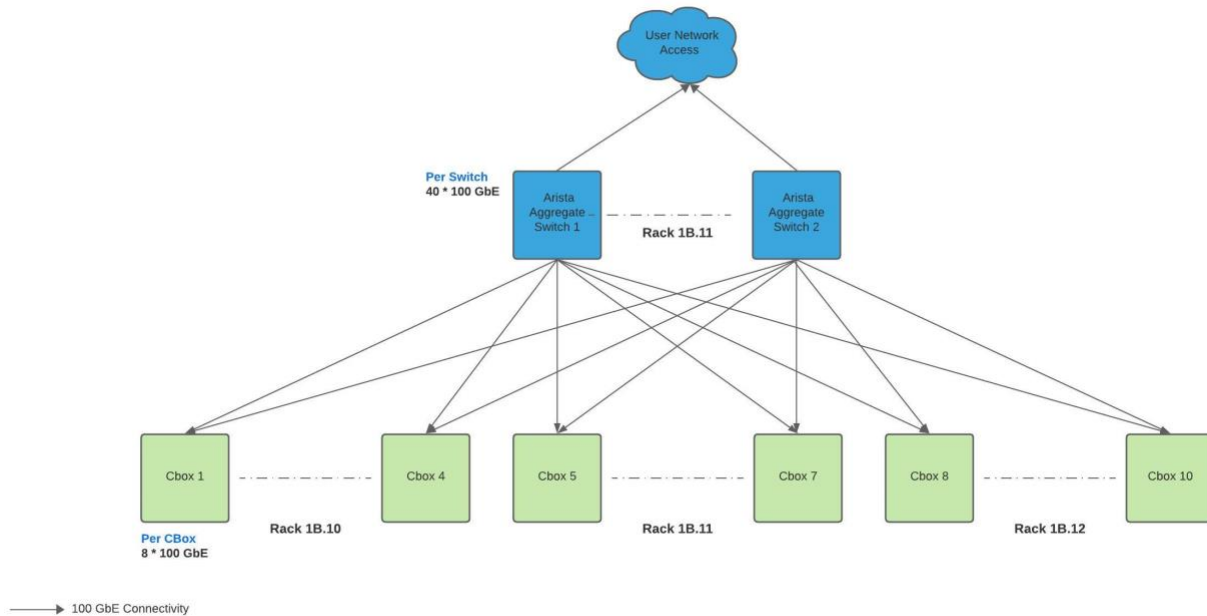


VAST Leaf Connectivity



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Logical Connectivity – ETH Frontend



NorthBound Connectivity

CNode Name	Switch	Port	Cable Length	Cable Type
c-128-3	Arista Aggregate Switch 1	Port 1 (Right)	50M	MTP®-12 (Female) to MTP®-12 (Female) OM4 Multimode Elite Trunk Cable, 12 Fibers, Type B, Plenum (OFNP), Magenta
c-128-4	Arista Aggregate Switch 1	Port 1 (Right)	50M	MTP®-12 (Female) to MTP®-12 (Female) OM4 Multimode Elite Trunk Cable, 12 Fibers, Type B, Plenum (OFNP), Magenta
c-128-5	Arista Aggregate Switch 1	Port 1 (Right)	50M	MTP®-12 (Female) to MTP®-12 (Female) OM4 Multimode Elite Trunk Cable, 12 Fibers, Type B, Plenum (OFNP), Magenta
c-128-6	Arista Aggregate Switch 1	Port 1 (Right)	50M	MTP®-12 (Female) to MTP®-12 (Female) OM4 Multimode Elite Trunk Cable, 12 Fibers, Type B, Plenum (OFNP), Magenta
c-128-7	Arista Aggregate Switch 1	Port 1 (Right)	50M	MTP®-12 (Female) to MTP®-12 (Female) OM4 Multimode Elite Trunk Cable, 12 Fibers, Type B, Plenum (OFNP), Magenta
c-128-8	Arista Aggregate Switch 1	Port 1 (Right)	50M	MTP®-12 (Female) to MTP®-12 (Female) OM4 Multimode Elite Trunk Cable, 12 Fibers, Type B, Plenum (OFNP), Magenta
c-128-9	Arista Aggregate Switch 1	Port 1 (Right)	50M	MTP®-12 (Female) to MTP®-12 (Female) OM4 Multimode Elite Trunk Cable, 12 Fibers, Type B, Plenum (OFNP), Magenta
c-128-10	Arista Aggregate Switch 1	Port 1 (Right)	50M	MTP®-12 (Female) to MTP®-12 (Female) OM4 Multimode Elite Trunk Cable, 12 Fibers, Type B, Plenum (OFNP), Magenta
c-128-11	Arista Aggregate Switch 1	Port 1 (Right)	50M	MTP®-12 (Female) to MTP®-12 (Female) OM4 Multimode Elite Trunk Cable, 12 Fibers, Type B, Plenum (OFNP), Magenta
c-128-12	Arista Aggregate Switch 1	Port 1 (Right)	50M	MTP®-12 (Female) to MTP®-12 (Female) OM4 Multimode Elite Trunk Cable, 12 Fibers, Type B, Plenum (OFNP), Magenta
c-128-13	Arista Aggregate Switch 1	Port 1 (Right)	50M	MTP®-12 (Female) to MTP®-12 (Female) OM4 Multimode Elite Trunk Cable, 12 Fibers, Type B, Plenum (OFNP), Magenta
c-128-14	Arista Aggregate Switch 1	Port 1 (Right)	50M	MTP®-12 (Female) to MTP®-12 (Female) OM4 Multimode Elite Trunk Cable, 12 Fibers, Type B, Plenum (OFNP), Magenta
c-128-15	Arista Aggregate Switch 1	Port 1 (Right)	50M	MTP®-12 (Female) to MTP®-12 (Female) OM4 Multimode Elite Trunk Cable, 12 Fibers, Type B, Plenum (OFNP), Magenta
c-128-16	Arista Aggregate Switch 1	Port 1 (Right)	50M	MTP®-12 (Female) to MTP®-12 (Female) OM4 Multimode Elite Trunk Cable, 12 Fibers, Type B, Plenum (OFNP), Magenta
c-128-19	Arista Aggregate Switch 1	Port 1 (Right)	50M	MTP®-12 (Female) to MTP®-12 (Female) OM4 Multimode Elite Trunk Cable, 12 Fibers, Type B, Plenum (OFNP), Magenta

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c-128-42	Arista Aggregate Switch 2	Port 2 (Left)	50M	MTP®-12 (Female) to MTP®-12 (Female) OM4 Multimode Elite Trunk Cable, 12 Fibers, Type B, Plenum (OFNP), Magenta
c-128-43	Arista Aggregate Switch 2	Port 2 (Left)	50M	MTP®-12 (Female) to MTP®-12 (Female) OM4 Multimode Elite Trunk Cable, 12 Fibers, Type B, Plenum (OFNP), Magenta
c-128-44	Arista Aggregate Switch 2	Port 2 (Left)	50M	MTP®-12 (Female) to MTP®-12 (Female) OM4 Multimode Elite Trunk Cable, 12 Fibers, Type B, Plenum (OFNP), Magenta

VAST Cluster Details

Username & Passwords

User Names Passwords		
Access	Username	Password
GUI	admin	123456
SSH on Cnode & Dnode	vastdata	vastdata
IPMI on Cnodes	admin	admin
IPMI on Dnodes	admin	123456

Cluster IP Addresses

Spine Switches Details			
Hostname	IP address	Username	Password
1B11-SPINE-U39-SW1	172.28.122.3	admin	admin
1B11-SPINE-U40-SW2	172.28.122.4	admin	admin

LEAF Switches Details			
Hostname	IP address	Username	Password
1B10-LEAF-U15-SW1	Unmanaged	admin	admin
1B10-LEAF-U16-SW2	Unmanaged	admin	admin
1B11-LEAF-U15-SW1	Unmanaged	admin	admin
1B11-LEAF-U16-SW2	Unmanaged	admin	admin

1B12-LEAF-U15-SW1	Unmanaged	admin	admin
1B12-LEAF-U16-SW2	Unmanaged	admin	admin

Rack	Subsystem	Hostname	Mgmt IP Address	IPMI IP Address	Netmask	Gateway
Rack 1 (1B.10)	subsystem 0	c-128-1	172.28.122.6	192.168.2.1	255.255.255.0	172.28.122.254
		c-128-2	172.28.122.7	192.168.2.2		
		c-128-3	172.28.122.8	192.168.2.3		
		c-128-4	172.28.122.9	192.168.2.4		
		c-128-5	172.28.122.10	192.168.2.5		
		c-128-6	172.28.122.11	192.168.2.6		
		c-128-7	172.28.122.12	192.168.2.7		
		c-128-8	172.28.122.13	192.168.2.8		
		c-128-9	172.28.122.14	192.168.2.9		
		c-128-10	172.28.122.15	192.168.2.10		
		c-128-11	172.28.122.16	192.168.2.11		
		c-128-12	172.28.122.17	192.168.2.12		
		c-128-13	172.28.122.18	192.168.2.13		
		c-128-14	172.28.122.19	192.168.2.14		
		c-128-15	172.28.122.20	192.168.2.15		
		c-128-16	172.28.122.21	192.168.2.16		
		d-128-100	172.28.122.22	169.254.2.100		
		d-128-101	172.28.122.23	169.254.2.101		
		d-128-102	172.28.122.24	169.254.2.102		
		d-128-103	172.28.122.25	169.254.2.103		
		d-128-104	172.28.122.26	169.254.2.104		
		d-128-105	172.28.122.27	169.254.2.105		
		d-128-106	172.28.122.28	169.254.2.106		
		d-128-107	172.28.122.29	169.254.2.107		
		d-128-108	172.28.122.30	169.254.2.108		

		d-128-109	172.28.122.31	169.254.2.109		
		d-128-110	172.28.122.32	169.254.2.110		
		d-128-111	172.28.122.33	169.254.2.111		
		d-128-112	172.28.122.34	169.254.2.112		
		d-128-113	172.28.122.35	169.254.2.113		
		d-128-114	172.28.122.36	169.254.2.114		
		d-128-115	172.28.122.37	169.254.2.115		
Rack 2 (1B.11)	subsystem 0	c-128-17	172.28.122.46	192.168.5.17	255.255.255.0	172.28.122.254
		c-128-18	172.28.122.47	192.168.5.18		
		c-128-19	172.28.122.48	192.168.5.19		
		c-128-20	172.28.122.49	192.168.5.20		
		c-128-21	172.28.122.50	192.168.5.21		
		c-128-22	172.28.122.51	192.168.5.22		
		c-128-23	172.28.122.52	192.168.5.23		
		c-128-24	172.28.122.53	192.168.5.24		
		c-128-25	172.28.122.54	192.168.5.25		
		c-128-26	172.28.122.55	192.168.5.26		
		c-128-27	172.28.122.56	192.168.5.27		
		c-128-28	172.28.122.57	192.168.5.28		
		c-128-29	172.28.122.58	192.168.5.29		
		c-128-30	172.28.122.59	192.168.5.30		
		c-128-31	172.28.122.60	192.168.5.31		
		c-128-32	172.28.122.61	192.168.5.32		
		d-128-116	172.28.122.62	169.254.2.116		
		d-128-117	172.28.122.63	169.254.2.117		
		d-128-118	172.28.122.64	169.254.2.118		
		d-128-119	172.28.122.65	169.254.2.119		
		d-128-120	172.28.122.66	169.254.2.120		
		d-128-121	172.28.122.67	169.254.2.121		
		d-128-122	172.28.122.68	169.254.2.122		
		d-128-123	172.28.122.69	169.254.2.123		
		d-128-124	172.28.122.70	169.254.2.124		
		d-128-125	172.28.122.71	169.254.2.125		
		d-128-126	172.28.122.72	169.254.2.126		
		d-128-127	172.28.122.73	169.254.2.127		
	subsystem 0	c-128-33	172.28.122.86	192.168.2.33	255.255.255.0	172.28.122.254

Rack 3 (1B.12)	c-128-34	172.28.122.87	192.168.2.34
	c-128-35	172.28.122.88	192.168.2.35
	c-128-36	172.28.122.89	192.168.2.36
	c-128-37	172.28.122.90	192.168.2.37
	c-128-38	172.28.122.91	192.168.2.38
	c-128-39	172.28.122.92	192.168.2.39
	c-128-40	172.28.122.93	192.168.2.40
	c-128-41	172.28.122.94	192.168.2.41
	c-128-42	172.28.122.95	192.168.2.42
	c-128-43	172.28.122.96	192.168.2.43
	c-128-44	172.28.122.97	192.168.2.44
	d-128-128	172.28.122.102	169.254.2.128
	d-128-129	172.28.122.103	169.254.2.129
	d-128-130	172.28.122.104	169.254.2.130
	d-128-131	172.28.122.105	169.254.2.131
	d-128-132	172.28.122.106	169.254.2.132
	d-128-133	172.28.122.107	169.254.2.133
	d-128-134	172.28.122.108	169.254.2.134
	d-128-135	172.28.122.109	169.254.2.135
	d-128-136	172.28.122.110	169.254.2.136
	d-128-137	172.28.122.111	169.254.2.137
	d-128-138	172.28.122.112	169.254.2.138
	d-128-139	172.28.122.113	169.254.2.139