

2020

High Performance Computing - Cloud Connected Storage (HPC CCS)

RACK DOCUMENTATION
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Security

Lock Mechanism

The rack has been shipped with two identical keys capable of locking and unlocking its front and rear doors. These doors must always be kept locked when authorized personnel are not accessing the rack. Additionally, the keys must be stored in an appropriate secure storage area within the Flexential data center when rack access is not required.

Deployment Instructions

These instructions assume the rack has been unpacked and rolled into its final position. See the shipping crate for unpacking instructions if necessary.

Initial Inspection

The rack should arrive fully populated and cabled except for certain additional cables zip-tied to the inside of the door. It should arrive unlocked, but a key is available with this documentation.

Procedure

1. Inspect the rack and identify any loose or damaged cables, components, or materials. Refer to Images (pg.) and Rack Elevation Diagram (pg.) for a “pre-shipping” state to compare against.

Reconnect loose cables according to the Cabling Diagrams (pg.) and Cabling Schema (pg.).

2. Notify NetApp of any loose or damaged components.
3. Discard any leftover packing/shipping materials.

HDD Installation

All SSDs were shipped in their associated servers and/or storage arrays, but HDDs were removed, labeled, and shipped separately.

1. Locate the separate box containing HDDs.
2. Refer to the label on each HDD to determine where it should be installed. All HDDs belong in either the front or the back of one of the two Dell R730xd servers near the bottom of the rack (dell1 ID 16 and dell2 ID 17). See the Rack Elevation Diagram (pg.) for the location of these servers.
3. To install each HDD:
 - a. Press the button on the front of the CRU so that the lever swings down.
 - b. Line up the CRU with its associated server slot and push it in as far as it will go.
 - c. Swing the lever back into its original position so that it clicks into place. This step is only possible if the CRU has been pushed in all the way in the previous step.

Patch Panel and External Network Cabling

Space has been allocated for the Flexential provided 1 RU patch panel at RU2, as shown in the Rack Elevation Diagram (pg.). The patch panel should accommodate the following connections:

- 2x RJ-45 connections for the delivery of WAN connectivity
- 2x LC SMF connections for the delivery of AWS Direct Connect connectivity

Procedure

1. Install the Flexential provided patch panel (panel ID B6) at RU2.
2. Connect one external WAN link to port 1 of the patch panel (panel ID B6).
3. Connect one external WAN link to port 2 of the patch panel (panel ID B6).
4. Connect one external Direct Connect link to port 3 of the patch panel (panel ID B6).
5. Connect one external Direct Connect link to port 4 of the patch panel (panel ID B6).

Note: It may not be possible to use the exact ports indicated in the procedure due to unforeseen constraints on space behind the patch panel. If different port numbers are used, notify NetApp so internal documentation can be updated.

Internal Network Cabling

The following cables have been rolled up and attached to the inside of the back door of the rack with zip ties.

- 2x blue Cat6 patch cables with RJ-45 connectors (ID B7 and ID B8)
- 2x yellow SMF patch cables with LC connectors (ID B9 and ID BA)

Procedure

1. Cut the zip ties and remove the cables from the door.
2. Connect port 1 of the left PA-220 firewall (firewall1 ID 08) to port 1 of the patch panel (panel ID B6) using one of the Cat6 patch cables (ID B7).
3. Connect port 1 of the right PA-220 firewall (firewall2 ID 09) to port 2 of the patch panel (panel ID B6) using one of the Cat6 patch cables (ID B8).
4. Connect port 33 of the top Cisco Nexus switch (nexus1 ID 03) to port 3 of the patch panel (panel ID B6) using one of the SMF patch cables (ID B9).
5. Connect port 33 of the bottom Cisco Nexus switch (nexus1 ID 04) to port 4 of the patch panel (panel ID B6) using one of the SMF patch cables (ID BA).

Note: If different ports on the patch panel (panel ID B6) were used in the Patch Panel and External Cabling Section, the port numbers represented in this section may be inaccurate.

Power

All components should arrive with power cables attached to the rack PDUs. Some components in the rack will power on as soon as power is supplied to the PDUs. Others will require manual intervention. The procedure below is organized from the top of the Rack Elevation Diagram (pg.) to the bottom.

Procedure

1. Connect one PDU (apc_left ID 01) power whip to data center power.
2. Connect the second PDU (apc_right ID 02) power whip to data center power.
3. Confirm that both Cisco Nexus switches (nexus1 ID 03 and nexus2 ID 04) are powered on. If they are not, check their power cables.
4. Confirm that both Cisco Catalyst switches (catalyst1 ID 05 and catalyst2 ID 06) are powered on. If they are not, check their power cables.
5. Confirm that the Lantronix switch (lantronix ID 07) is powered on. If it is not, check its power cables.
6. Confirm that both Palo Alto firewalls (firewall1 ID 08 and firewall2 ID 09) are powered on. If they are not, check their power cables.
7. Confirm that the NetBotz rack monitor (netbotz ID BC) is powered on. If it is not, check its power cable.
8. Check whether the three Lenovo SR630 servers (node1 ID 0A, node2 ID 0B, and node3 ID 0C) are powered on. If a server is not on, power it on by long pressing the power button on the front. If a server cannot be powered on, check its power cables.
9. Power on the NetApp 24-drive storage array (marray ID 0D) by flipping the TWO power switches on the back into the on position. If it cannot be powered on, check its power cables.
10. Check whether the four Lenovo SR650 servers (node4 ID 0E, node5 ID 0F, node6 ID 10, and node7 ID 11) are powered on. If a server is not on, power it on by long pressing the power button on the front. If a server cannot be powered on, check its power cables.
11. Confirm that both Brocade switches (brocade1 ID 12 and brocade2 ID 13) are powered on. If they are not, check their power cables.

12. Power on both NetApp 60-drive storage arrays (ioarray1 ID 14 and ioarray2 ID 15) by flipping the TWO power switches on the back into the on position. *Allow some time for the fans on the first array to quiet down before powering on the second array.* If an array cannot be powered on, check its power cables.
13. Check whether the two Dell R730 servers (dell1 ID 16 and dell2 ID 17) are powered on. If a server is not on, power it on by long pressing the power button on the front. If a server cannot be powered on, check its power cables.

Connectivity Check

Approximately 5 minutes after all components have been powered on, the cluster should be available for remote access.

Procedure

1. Attempt to ping the rack on its external firewall interface at 66.51.31.12 from the public internet.

If the ping is successful, notify NetApp that the rack is up and available for remote management. If the ping is unsuccessful, notify NetApp to allow for additional troubleshooting.

Final Steps

Procedure:

1. Place the binder containing this documentation on top of the topmost Lenovo server (node1 ID 33).
2. Lock both the front and back doors of the rack using one of the provided keys.
3. Store the provided keys in the appropriate secure area within the data center.

Rack Summary

Bill of Materials (BOM)

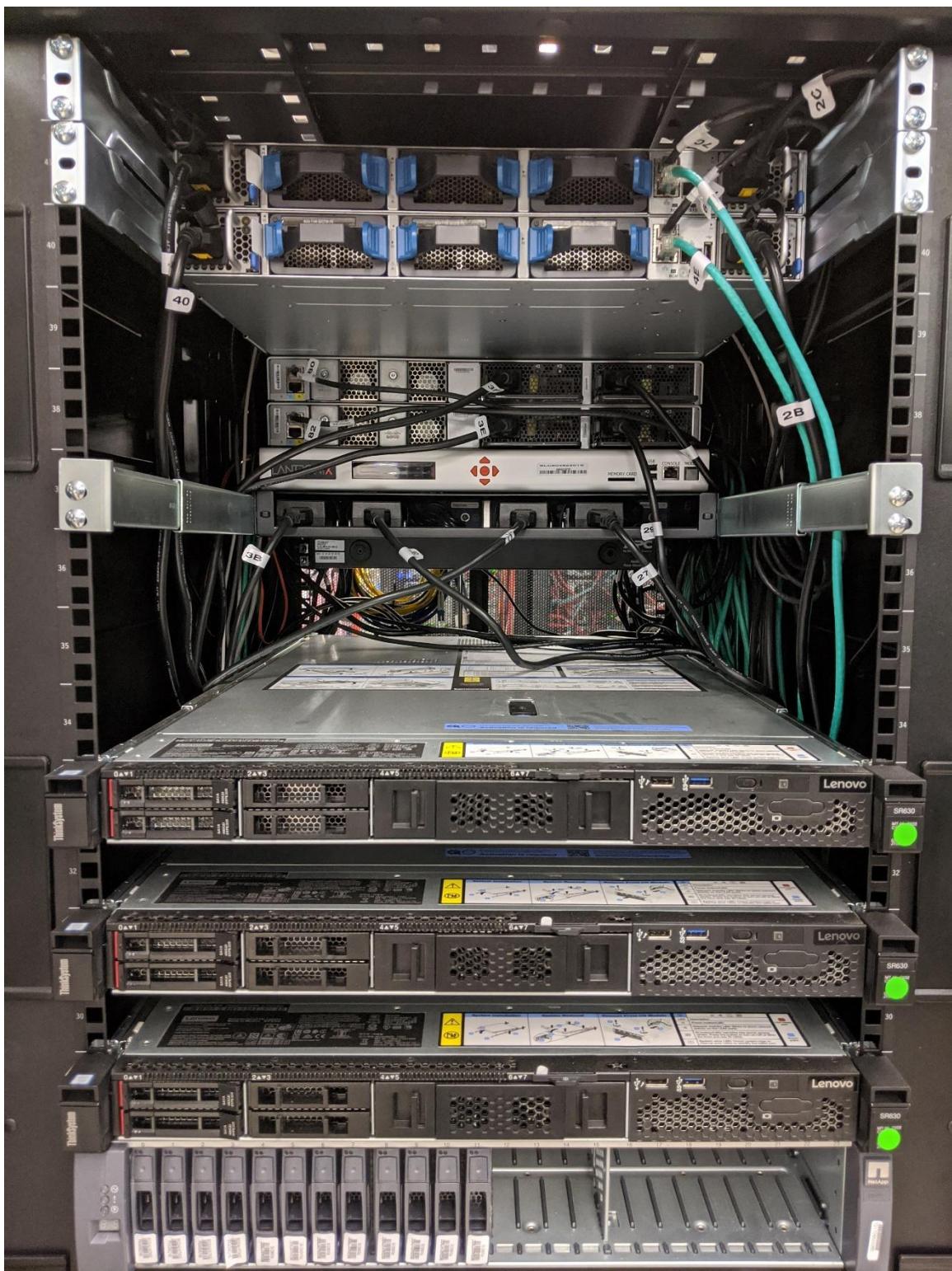
The BOM is provided for inventory tracking purposes.

Quantity	Manufacturer	Model #	Description
Rack			
1	APC	AR3350	Rack Cabinet
1	Paloalto	PAN-PA-1RU-RACK4	Firewall Rack Mount
1	Paloalto	PAN-PA-220-RACKTRAY	Firewall Tray
PDU			
2	APC	AP7968B	Power
Sensors			
1	APC	NBRK0250	NetBotz Rack Monitor 250
1	APC	NBES0302	NetBotz Door Sensor Kit
Network			
2	Cisco	9336C-FX2	Nexus 100 GbE Switch
2	Cisco	C9200L-48T-4X-E	Catalyst Ethernet Switch
1	Lantronix	SLC 8000	Advanced Console Manager
2	Paloalto	PAN-PA-220	Firewall
2	Brocade	G620	Fiber Switch
Compute 1	Control Plane		
3	Lenovo	SR630	ThinkSystem
6	LSI	9300-8e	SAS HBA
Compute 2	I/O		
4	Lenovo	SR650	ThinkSystem
8		ConnectX-5	100Gbps Ethernet Host Adapter Card
8		QLE2742-SR-SP	32Gb Dual Port FC HBA
Compute 3	Clients		
2	Dell	R730xd	Not an offical part of the stamp
Storage 1	Control Plane		
1			Custom Alder Config Estimate
1	NetApp	DE224C	Alder Disk Shelf
2	NetApp	E2800	Controller 16Gb FC Baseboard 8GB Cache
12	NetApp	PX04SMQ160	Toshiba 2.5" 1.6TB 2.5in 12Gbps 10 SAS eSSD
2	NetApp	X-56027-00-0E-C	HIC 12Gb SAS, 4-ports
2	NetApp	X-00061-00	Battery E2800, E75700
Storage 2	I/O		
1			Custom Trafford Config Estimate
1	NetApp	E-X5730A-QS	Enclosure DE460C Trafford 4U-60, 2PSU,2325W
2	NetApp	E5700A-64GB	Controller E5700A,64GB Ctl,No HIC,16Gb FC
30	NetApp	KPM51VUG800G	Toshiba 800GB SSD 2.5" BiCS3 eSAS

Quantity	Manufacturer	Model #	Description
2	NetApp	X-56030-00	HIC 32Gb FC E5700/EF570,32Gb FC,4-ports
2	NetApp	X-00061-00	Battery E2800, E75700
Storage 3	I/O		
1			Custom Trafford Config Estimate
1	NetApp	E-X5730A-QS	Enclosure DE460C Trafford 4U-60, 2PSU,2325W
2	NetApp	E5700A-64GB	Controller E5700A,64GB Ctl,No HIC,16Gb FC
30	NetApp	KPM51VUG800G	Toshiba 800GB SSD 2.5" BiCS3 eSAS
2	NetApp	X-56030-00	HIC 32Gb FC E5700/EF570,32Gb FC,4-ports
2	NetApp	X-00061-00	Battery E2800, E75700
Cable			
66			CAT6 Ethernet
6			SAS
1			Single-Mode Fiber
33			Multi-Mode Fiber
11	Mellanox		100Gb Ethernet
36	APC		C14 to C13 locking power cord
6	APC		C20 to C19 locking power cord
16	Lantronix		Serial Adapters

Images

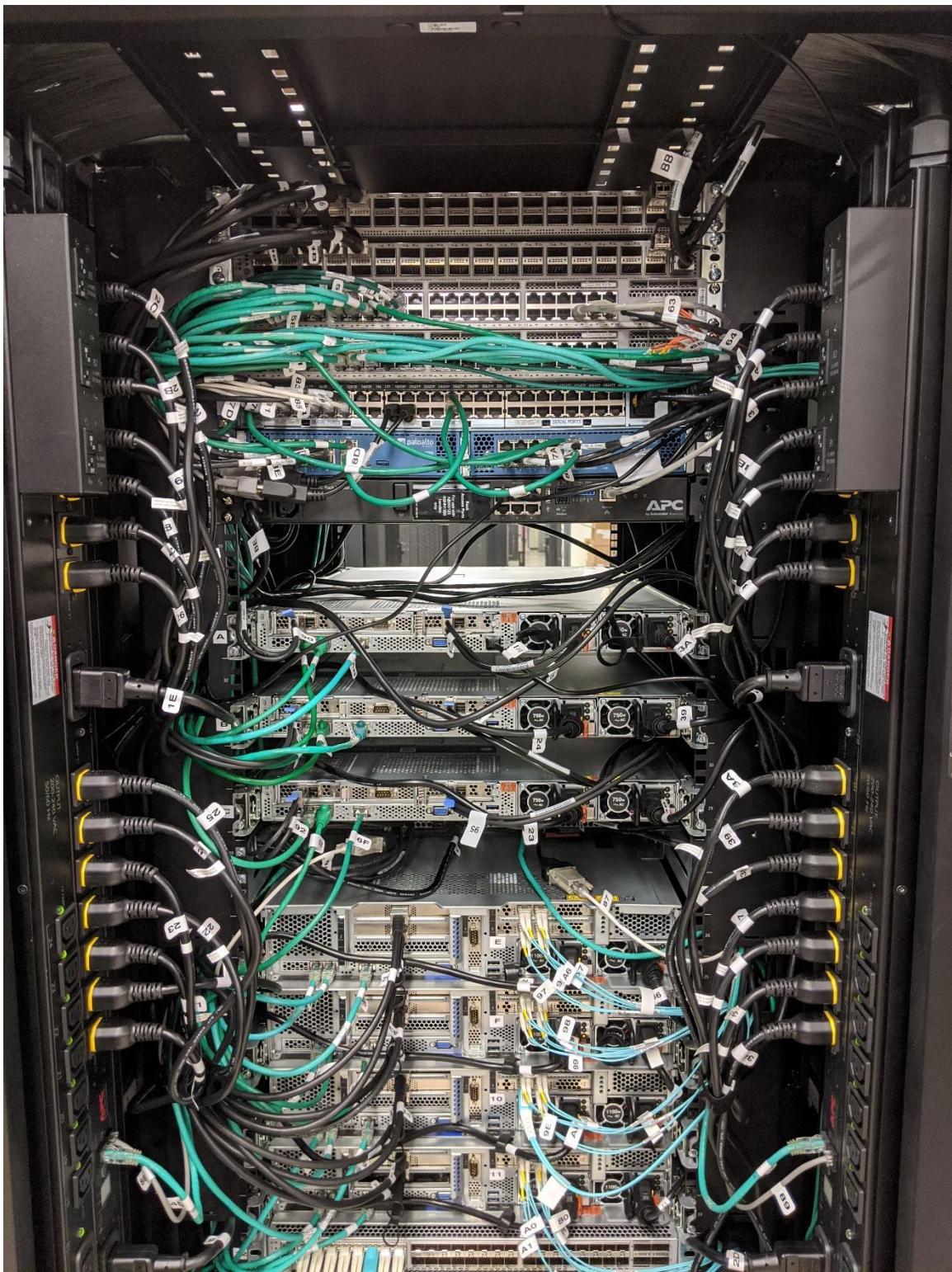


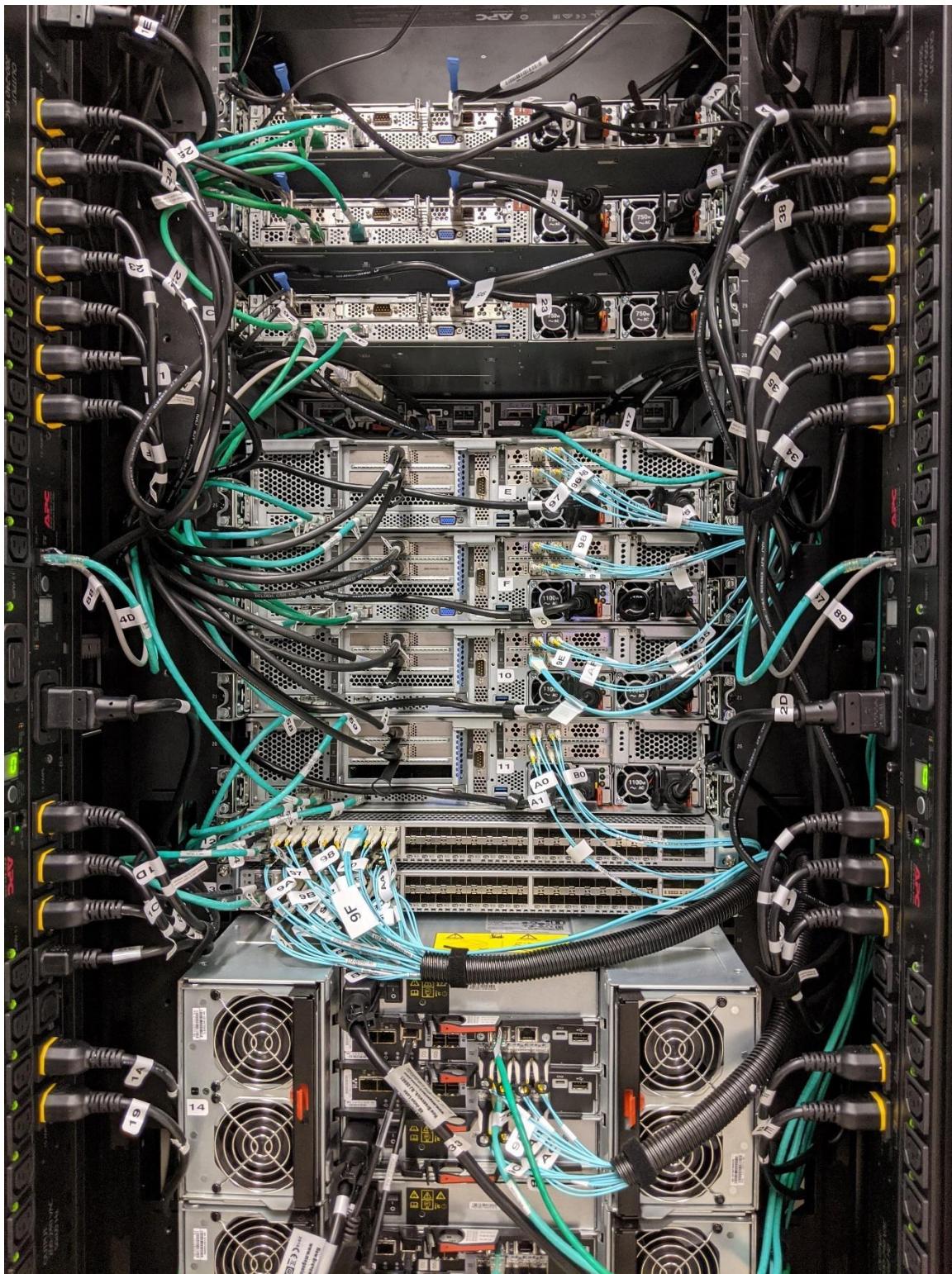


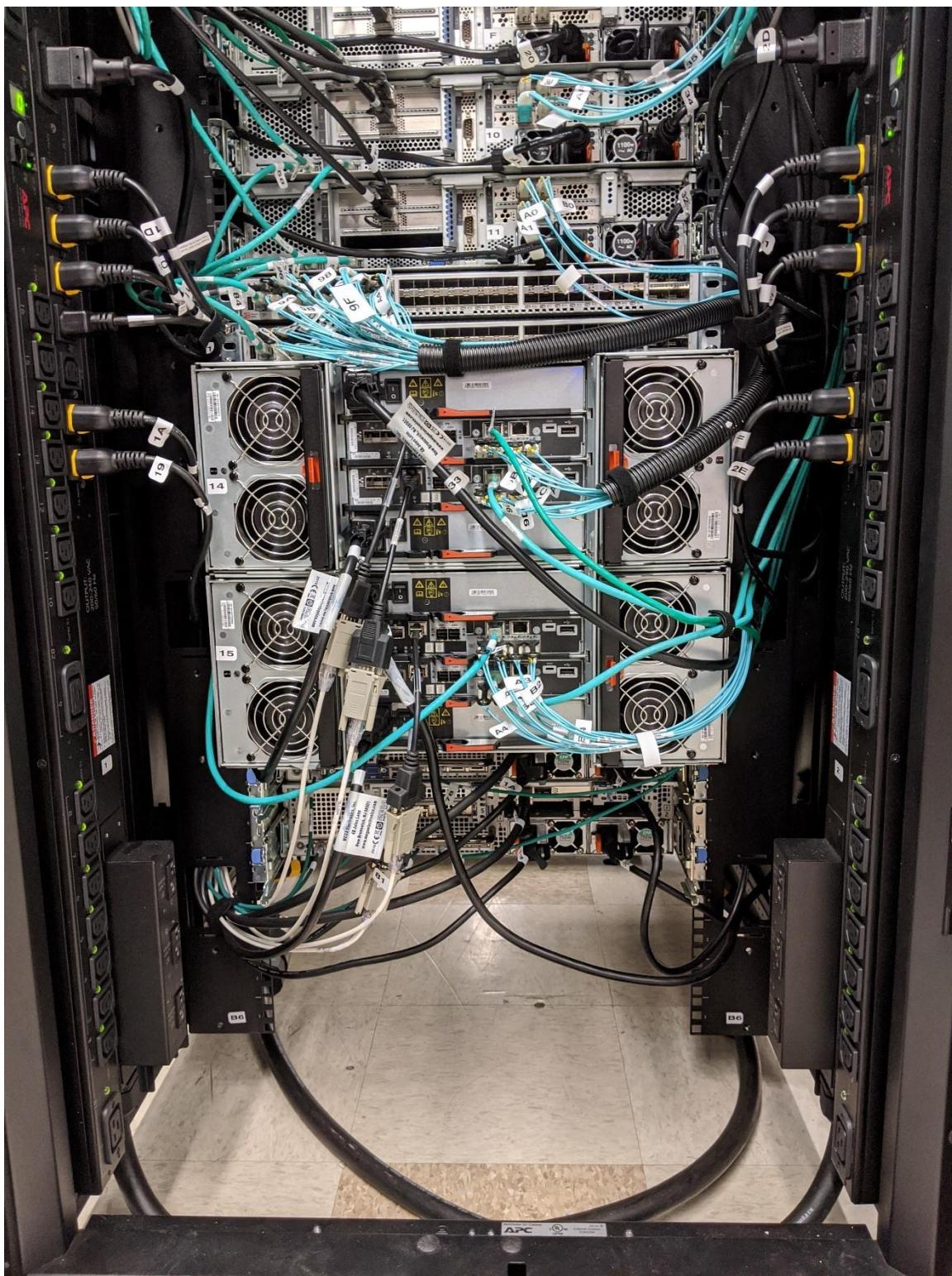




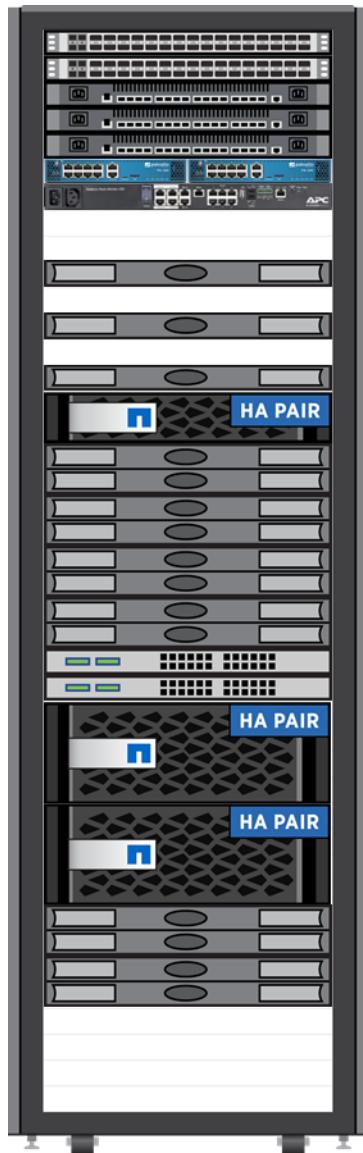








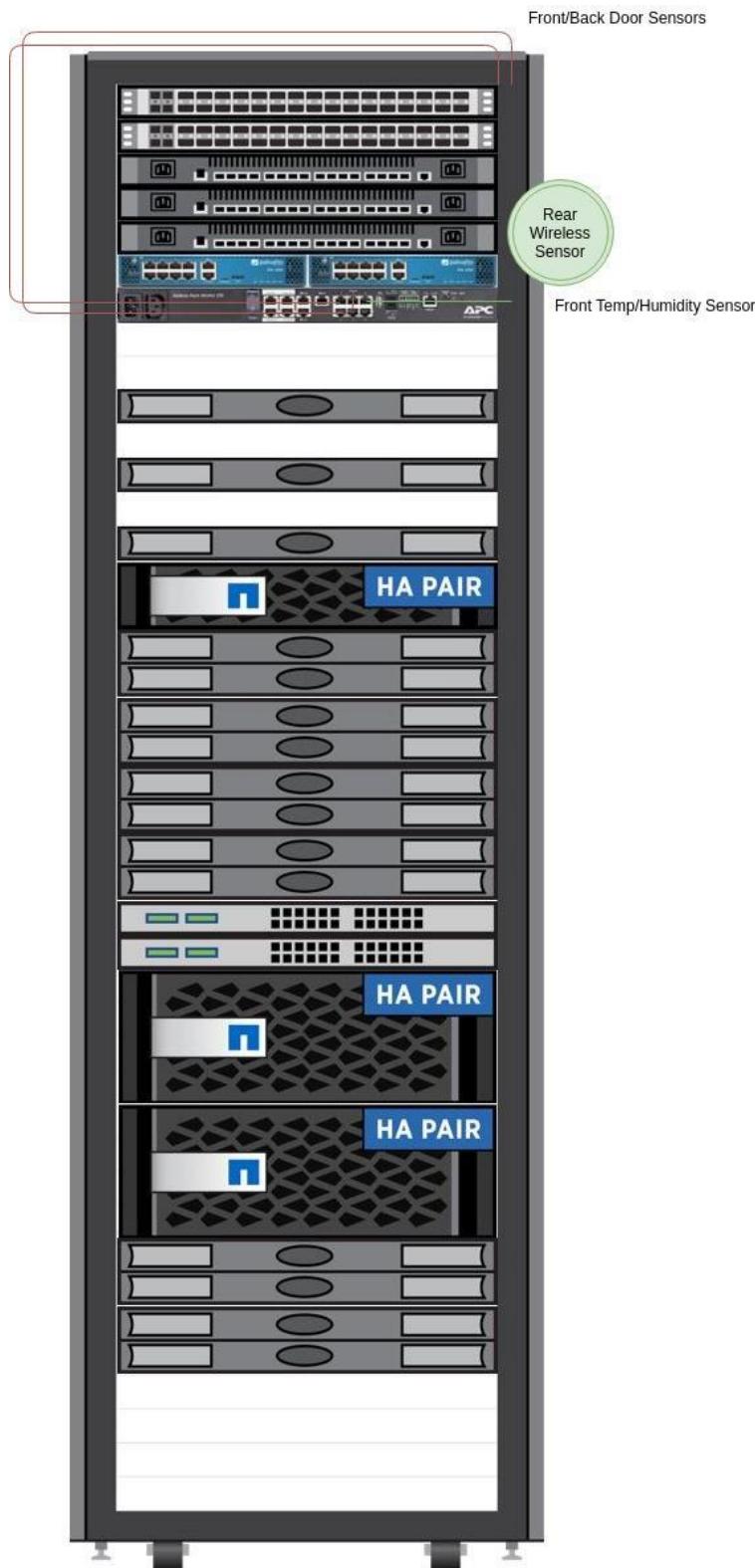
Rack Elevation Diagram



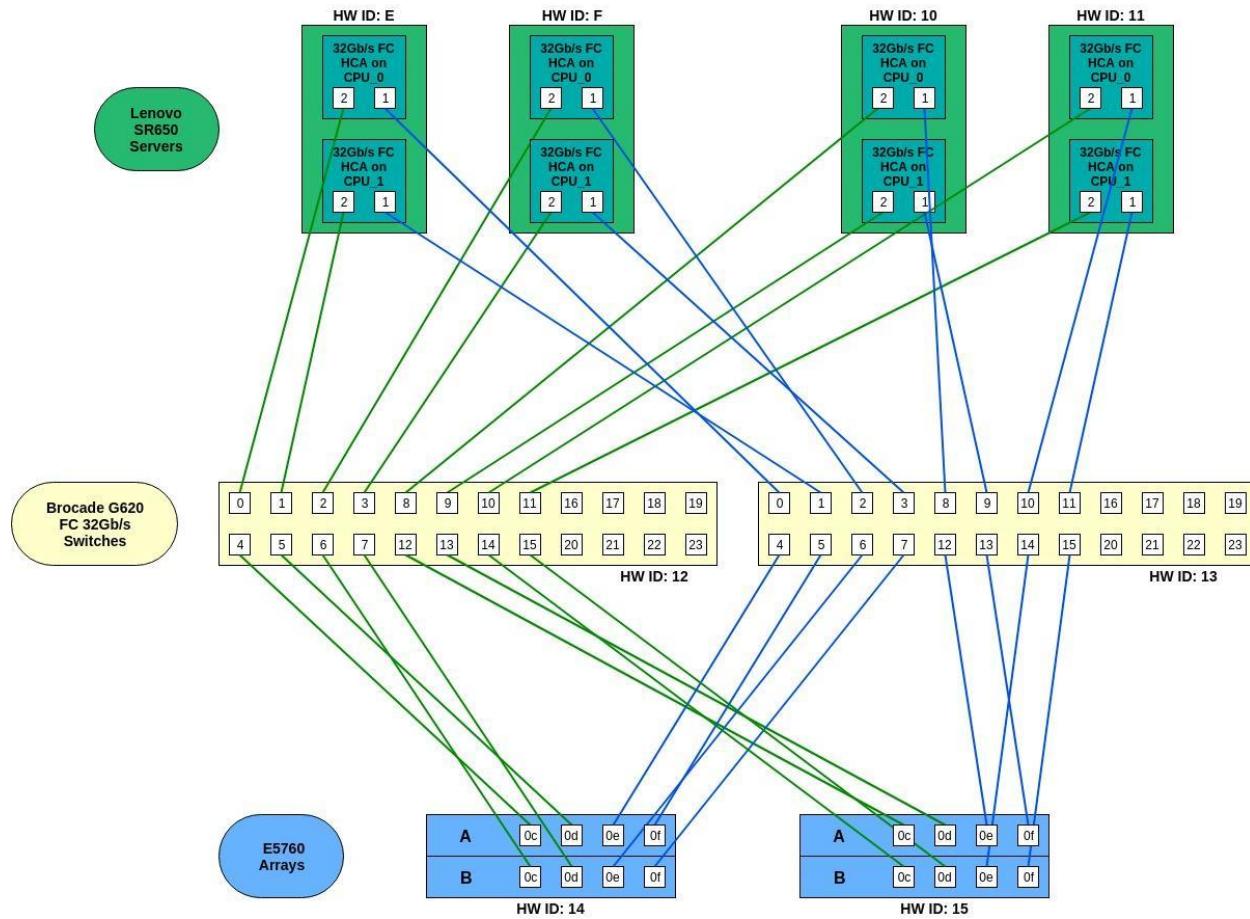
- RU 41-42 nexus1 (ID 03), nexus2 (ID 04) (Cisco 100GbE switches)
- RU 39-40 catalyst1 (ID 05), catalyst2 (ID 06) (Cisco 1GbE switches)
- RU 38 lantronix (ID 07) (Lantronix serial switch)
- RU 37 firewall1 (ID 08), firewall2 (ID 09) (Palo Alto firewalls)
- RU 36 netbotz (ID BC), firewall2 (APC rack monitor)
- RU 33 node1 (ID 0A) (Lenovo SR630 server)
- RU 31 node2 (ID 0B) (Lenovo SR630 server)
- RU 29 node3 (ID 0C) (Lenovo SR630 server)
- RU 27-28 marray (ID 0D) (NetApp 24-drive storage array)
- RU 25-26 node4 (ID 0E) (Lenovo SR650 server)
- RU 23-24 node5 (ID 0F) (Lenovo SR650 server)
- RU 21-22 node6 (ID 10) (Lenovo SR650 server)
- RU 19-20 node7 (ID 11) (Lenovo SR650 server)
- RU 17-18 brocade1 (ID 12), brocade2 (ID 13) (Brocade FC switches)
- RU 13-16 ioarray1 (ID 14) NetApp 60-drive storage array
- RU 09-12 ioarray2 (ID 15) (NetApp 60-drive storage array)
- RU 07-08 dell1 (ID 16) (Dell R720 server)
- RU 05-06 dell2 (ID 17) (Dell R720 server)
- RU 02 panel (ID B6) (Flexential provided patch panel; not installed on arrival)

Cabling Diagrams

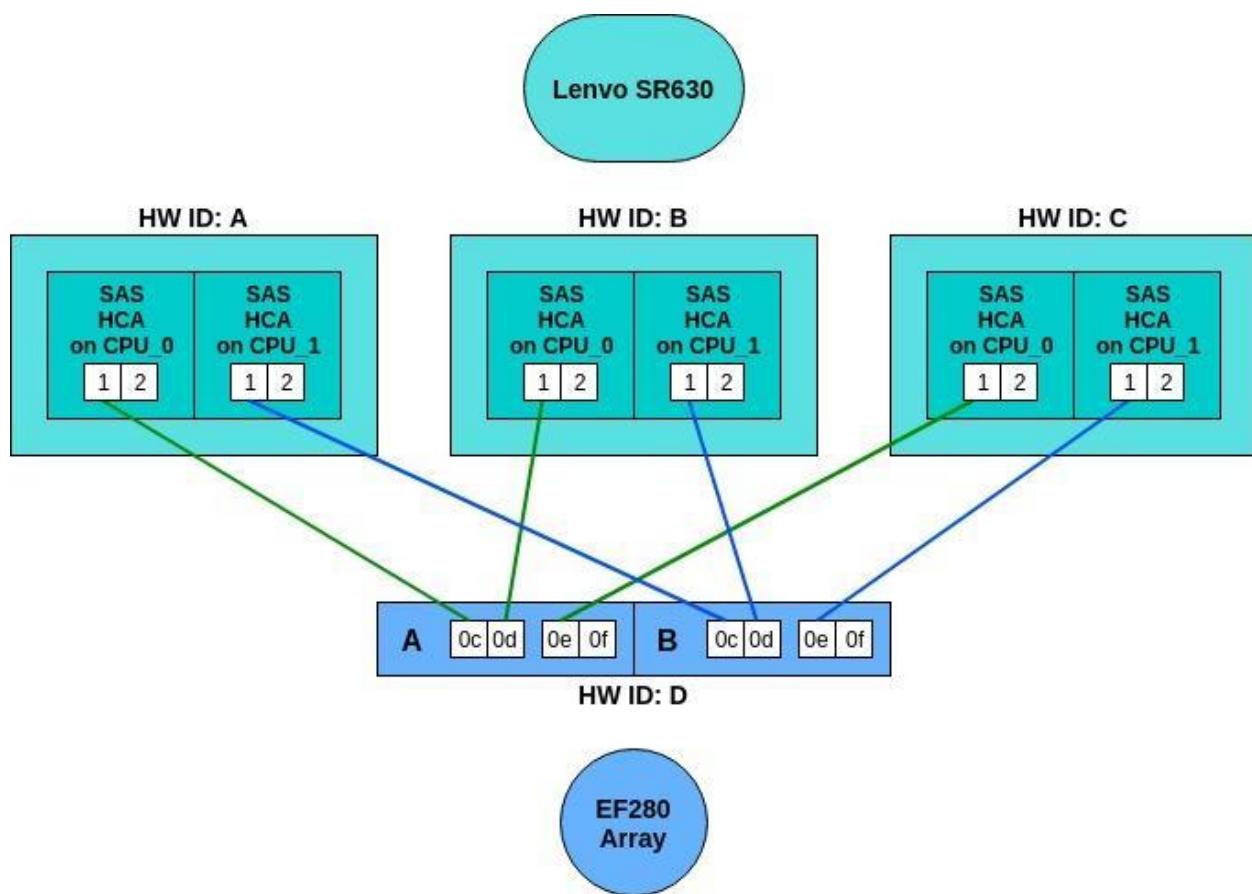
APC NetBotz Appliance Wiring Diagram



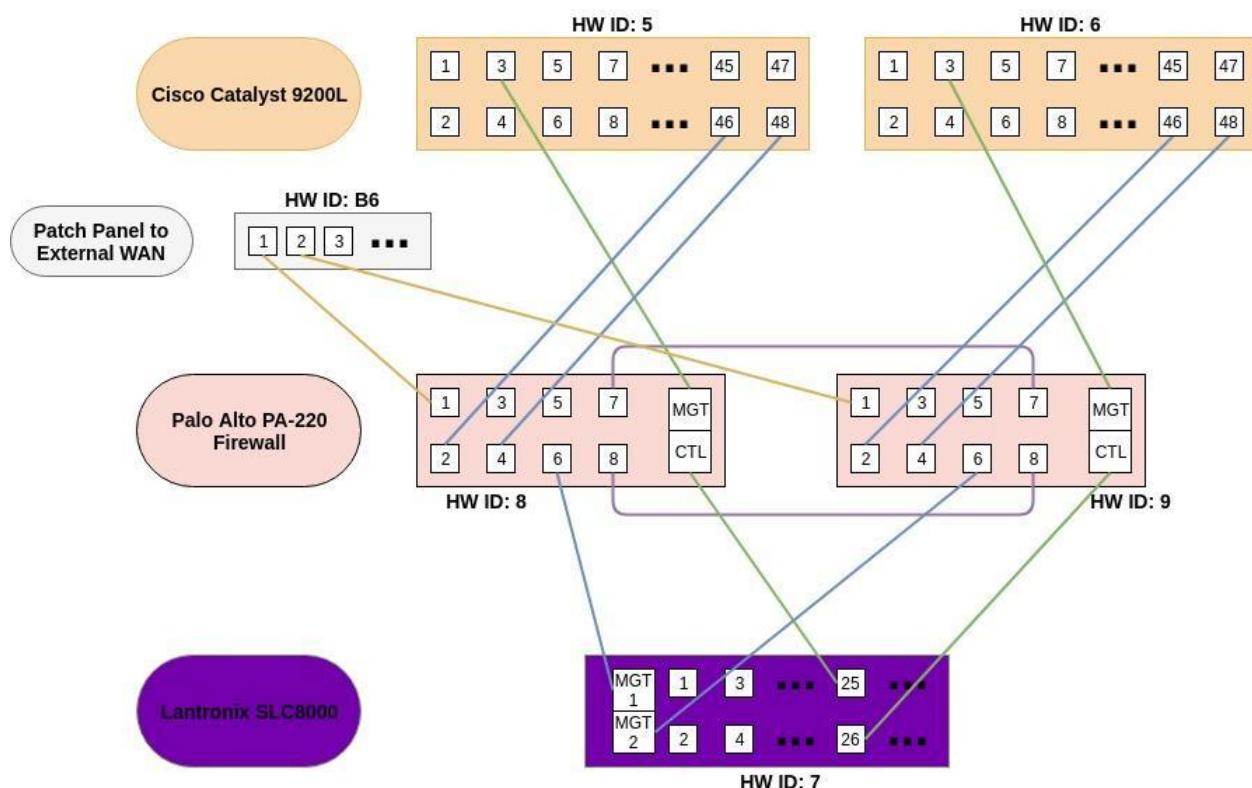
Back End I/O Network Cabling



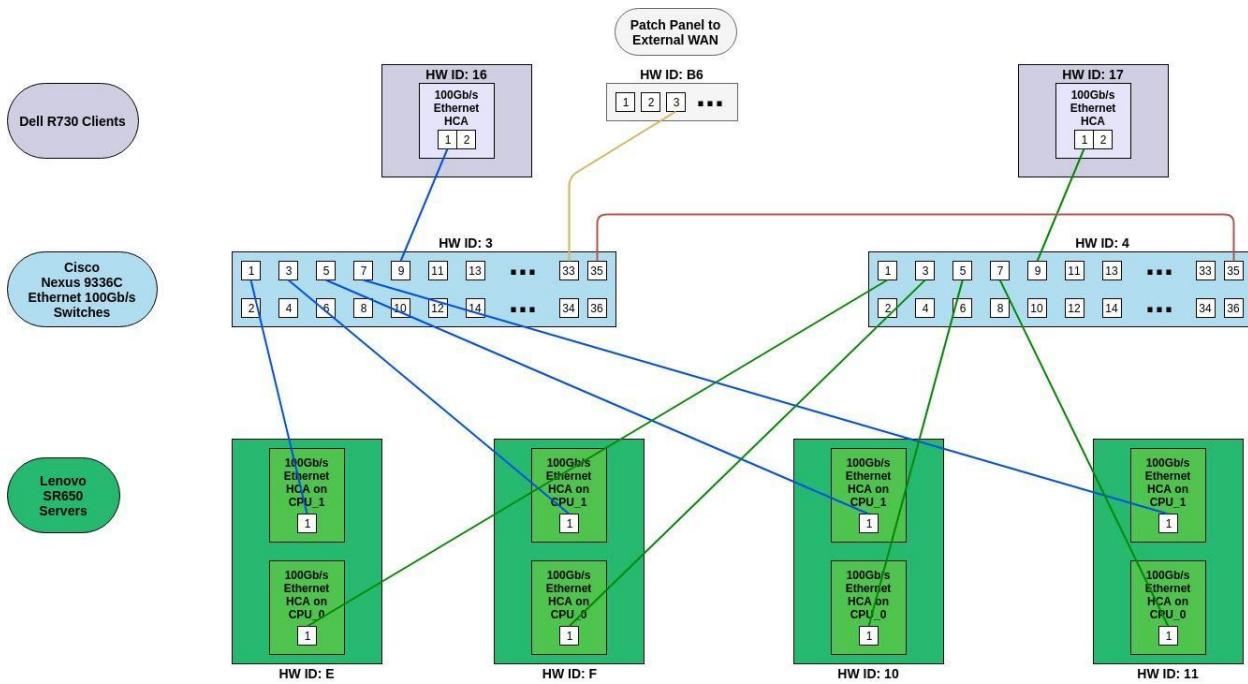
Control Plane I/O Network Cabling



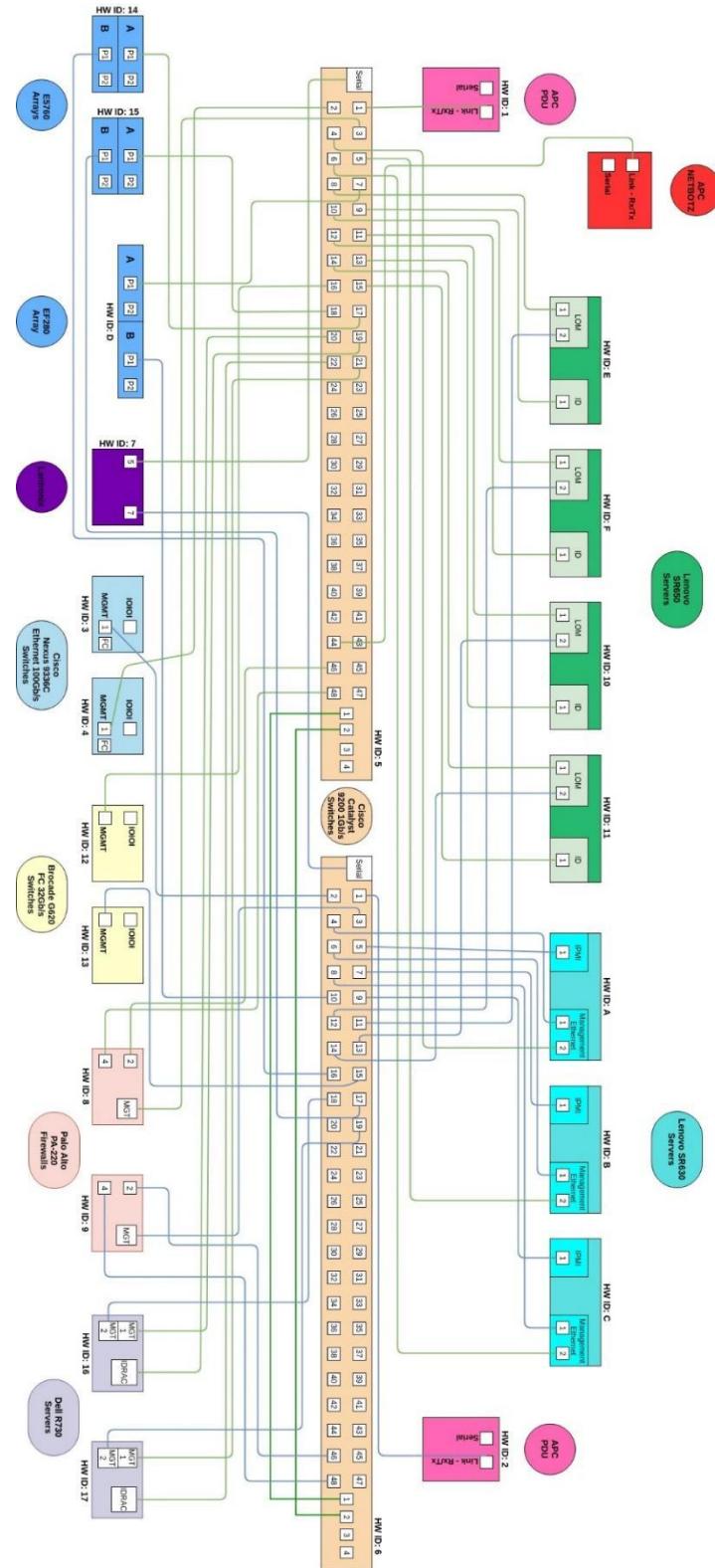
Firewall Network Cabling



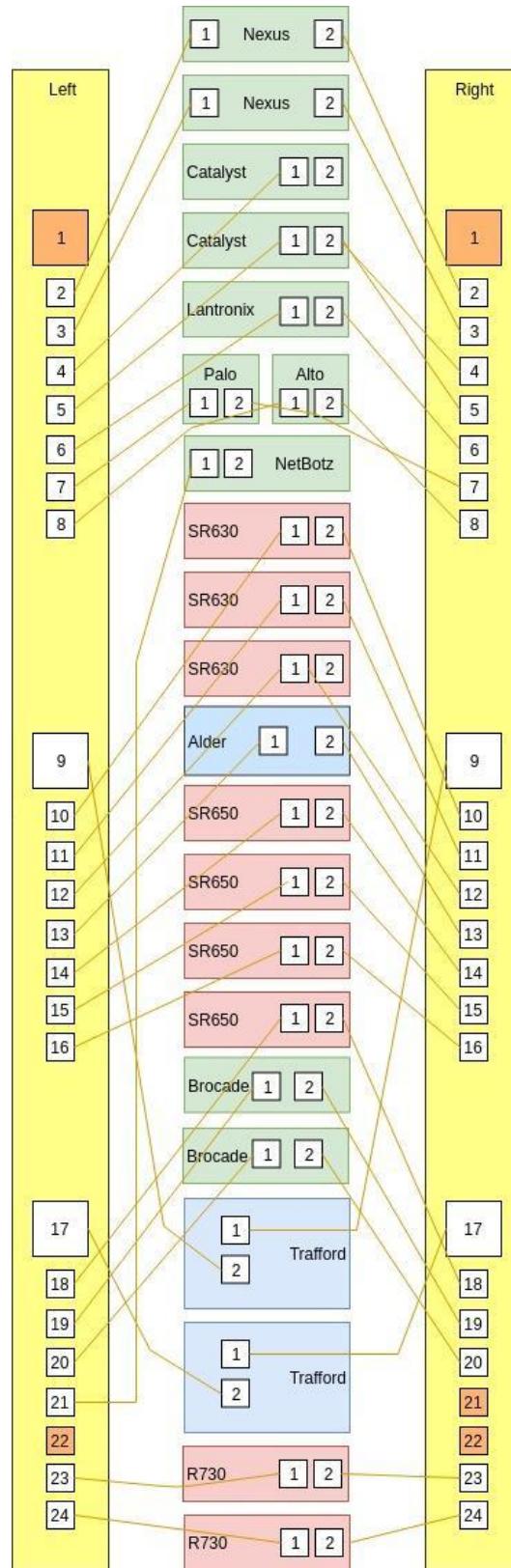
Front End I/O Network Cabling



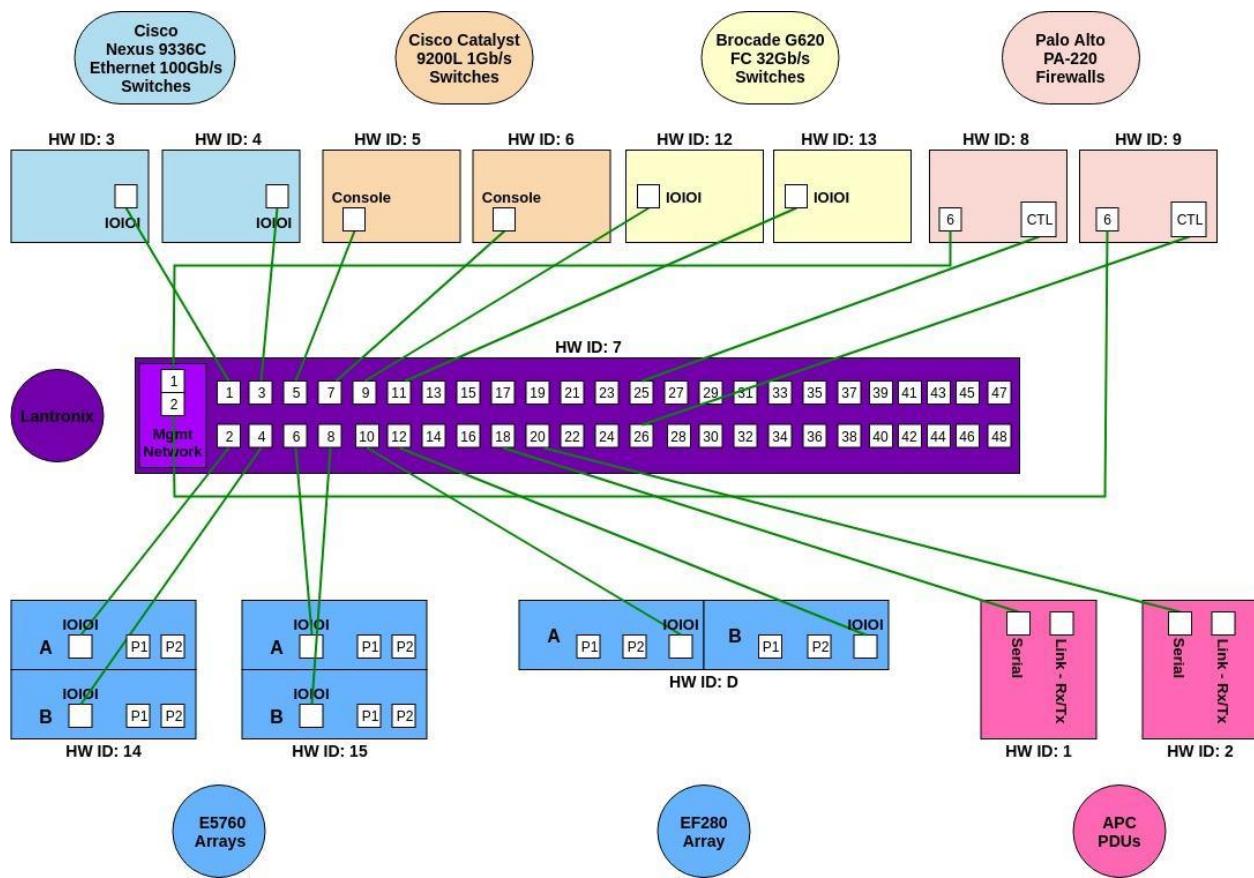
Management Network Cabling



Power Distribution Cabling (Flipped Colocation Spec)



Serial Network Cabling



Cabling Schema

About

A labeling schema is provided in the following sections. Every piece of hardware, every cable, and every misc. cable port are all individually accounted for with “IDs”. Hardware and port IDs can be read from the Hardware and Port Identifiers section (pg.) and cable IDs can be read from the Cables section (pg.).

By design, the “Hardware IDs” utilize a base 16 number system (ex. [0, 1, 2, 3, 4, 5, 6, 7, 8, 9, A, B, C, D, E, F]). Everything else follows a positive integer base 10 number system (ex. [1,2,3,4,5,6,7,8,9]).

Port Description Legend

Port Abbreviation	Meaning
P	Power
E	Ethernet (RJ45 port for 1GbE or slower)
ME	Management ethernet (RJ45 port used for OOB ethernet management)
SP	Serial port (RJ45 or DB9 port for OOB serial management)
SAS	Serial attached SCSI (SAS)
FC	Fiber channel (SFP or SFP+ port for FC over multimode fiber)
XbE	High Throughput Ethernet (SFP+ or QSFP port for 10GbE or faster)

Hardware and Port Identifiers

Hardware ID	Hardware Description	Port ID	Port Description	Hardware Alias
01	Left APC Hardware			apc_left
	Left APC	1	1P	
	Left APC	2	2P	
	Left APC	3	3P	
	Left APC	4	4P	
	Left APC	5	5P	
	Left APC	6	6P	
	Left APC	7	7P	
	Left APC	8	8P	
	Left APC	9	9P	
	Left APC	10	10P	
	Left APC	11	11P	
	Left APC	12	12P	
	Left APC	13	13P	
	Left APC	14	14P	
	Left APC	15	15P	
	Left APC	16	16P	
	Left APC	17	17P	
	Left APC	18	18P	
	Left APC	19	19P	
	Left APC	20	20P	
	Left APC	21	21P	
	Left APC	22	22P	
	Left APC	23	23P	
	Left APC	24	24P	
	Left APC	25	1ME	
	Left APC	26	1SP	
02	Right APC Hardware			apc_right
	Right APC	1	1P	
	Right APC	2	2P	
	Right APC	3	3P	
	Right APC	4	4P	
	Right APC	5	5P	
	Right APC	6	6P	
	Right APC	7	7P	
	Right APC	8	8P	
	Right APC	9	9P	

Hardware ID	Hardware Description	Port ID	Port Description	Hardware Alias
	Right APC	10	10P	
	Right APC	11	11P	
	Right APC	12	12P	
	Right APC	13	13P	
	Right APC	14	14P	
	Right APC	15	15P	
	Right APC	16	16P	
	Right APC	17	17P	
	Right APC	18	18P	
	Right APC	19	19P	
	Right APC	20	20P	
	Right APC	21	21P	
	Right APC	22	22P	
	Right APC	23	23P	
	Right APC	24	24P	
	Right APC	25	1ME	
	Right APC	26	1SP	
03	RU42 Cisco Nexus Hardware			nexus1
	RU42 Cisco Nexus	1	1XbE	
	RU42 Cisco Nexus	2	2XbE	
	RU42 Cisco Nexus	3	3XbE	
	RU42 Cisco Nexus	4	4XbE	
	RU42 Cisco Nexus	5	5XbE	
	RU42 Cisco Nexus	6	6XbE	
	RU42 Cisco Nexus	7	7XbE	
	RU42 Cisco Nexus	8	8XbE	
	RU42 Cisco Nexus	9	9XbE	
	RU42 Cisco Nexus	10	10XbE	
	RU42 Cisco Nexus	11	11XbE	
	RU42 Cisco Nexus	12	12XbE	
	RU42 Cisco Nexus	13	13XbE	
	RU42 Cisco Nexus	14	14XbE	
	RU42 Cisco Nexus	15	15XbE	
	RU42 Cisco Nexus	16	16XbE	
	RU42 Cisco Nexus	17	17XbE	
	RU42 Cisco Nexus	18	18XbE	
	RU42 Cisco Nexus	19	19XbE	
	RU42 Cisco Nexus	20	20XbE	
	RU42 Cisco Nexus	21	21XbE	

Hardware ID	Hardware Description	Port ID	Port Description	Hardware Alias
	RU42 Cisco Nexus	22	22XbE	
	RU42 Cisco Nexus	23	23XbE	
	RU42 Cisco Nexus	24	24XbE	
	RU42 Cisco Nexus	25	25XbE	
	RU42 Cisco Nexus	26	26XbE	
	RU42 Cisco Nexus	27	27XbE	
	RU42 Cisco Nexus	28	28XbE	
	RU42 Cisco Nexus	29	29XbE	
	RU42 Cisco Nexus	30	30XbE	
	RU42 Cisco Nexus	31	31XbE	
	RU42 Cisco Nexus	32	32XbE	
	RU42 Cisco Nexus	33	33XbE	
	RU42 Cisco Nexus	34	34XbE	
	RU42 Cisco Nexus	35	35XbE	
	RU42 Cisco Nexus	36	36XbE	
	RU42 Cisco Nexus	37	1ME	
	RU42 Cisco Nexus	38	1SP	
	RU42 Cisco Nexus	39	1P	
	RU42 Cisco Nexus	40	2P	
04	RU41 Cisco Nexus Hardware			nexus2
	RU41 Cisco Nexus	1	1XbE	
	RU41 Cisco Nexus	2	2XbE	
	RU41 Cisco Nexus	3	3XbE	
	RU41 Cisco Nexus	4	4XbE	
	RU41 Cisco Nexus	5	5XbE	
	RU41 Cisco Nexus	6	6XbE	
	RU41 Cisco Nexus	7	7XbE	
	RU41 Cisco Nexus	8	8XbE	
	RU41 Cisco Nexus	9	9XbE	
	RU41 Cisco Nexus	10	10XbE	
	RU41 Cisco Nexus	11	11XbE	
	RU41 Cisco Nexus	12	12XbE	
	RU41 Cisco Nexus	13	13XbE	
	RU41 Cisco Nexus	14	14XbE	
	RU41 Cisco Nexus	15	15XbE	
	RU41 Cisco Nexus	16	16XbE	
	RU41 Cisco Nexus	17	17XbE	
	RU41 Cisco Nexus	18	18XbE	
	RU41 Cisco Nexus	19	19XbE	

Hardware ID	Hardware Description	Port ID	Port Description	Hardware Alias
	RU41 Cisco Nexus	20	20XbE	
	RU41 Cisco Nexus	21	21XbE	
	RU41 Cisco Nexus	22	22XbE	
	RU41 Cisco Nexus	23	23XbE	
	RU41 Cisco Nexus	24	24XbE	
	RU41 Cisco Nexus	25	25XbE	
	RU41 Cisco Nexus	26	26XbE	
	RU41 Cisco Nexus	27	27XbE	
	RU41 Cisco Nexus	28	28XbE	
	RU41 Cisco Nexus	29	29XbE	
	RU41 Cisco Nexus	30	30XbE	
	RU41 Cisco Nexus	31	31XbE	
	RU41 Cisco Nexus	32	32XbE	
	RU41 Cisco Nexus	33	33XbE	
	RU41 Cisco Nexus	34	34XbE	
	RU41 Cisco Nexus	35	35XbE	
	RU41 Cisco Nexus	36	36XbE	
	RU41 Cisco Nexus	37	1ME	
	RU41 Cisco Nexus	38	1SP	
	RU41 Cisco Nexus	39	1P	
	RU41 Cisco Nexus	40	2P	
05	RU40 Cisco Catalyst Hardware			catalyst1
	RU40 Cisco Catalyst	1	1E	
	RU40 Cisco Catalyst	2	2E	
	RU40 Cisco Catalyst	3	3E	
	RU40 Cisco Catalyst	4	4E	
	RU40 Cisco Catalyst	5	5E	
	RU40 Cisco Catalyst	6	6E	
	RU40 Cisco Catalyst	7	7E	
	RU40 Cisco Catalyst	8	8E	
	RU40 Cisco Catalyst	9	9E	
	RU40 Cisco Catalyst	10	10E	
	RU40 Cisco Catalyst	11	11E	
	RU40 Cisco Catalyst	12	12E	
	RU40 Cisco Catalyst	13	13E	
	RU40 Cisco Catalyst	14	14E	
	RU40 Cisco Catalyst	15	15E	
	RU40 Cisco Catalyst	16	16E	
	RU40 Cisco Catalyst	17	17E	

Hardware ID	Hardware Description	Port ID	Port Description	Hardware Alias
	RU40 Cisco Catalyst	18	18E	
	RU40 Cisco Catalyst	19	19E	
	RU40 Cisco Catalyst	20	20E	
	RU40 Cisco Catalyst	21	21E	
	RU40 Cisco Catalyst	22	22E	
	RU40 Cisco Catalyst	23	23E	
	RU40 Cisco Catalyst	24	24E	
	RU40 Cisco Catalyst	25	25E	
	RU40 Cisco Catalyst	26	26E	
	RU40 Cisco Catalyst	27	27E	
	RU40 Cisco Catalyst	28	28E	
	RU40 Cisco Catalyst	29	29E	
	RU40 Cisco Catalyst	30	30E	
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	RU40 Cisco Catalyst	41	41E	
	RU40 Cisco Catalyst	42	42E	
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	RU40 Cisco Catalyst	44	44E	
	RU40 Cisco Catalyst	45	45E	
	RU40 Cisco Catalyst	46	46E	
	RU40 Cisco Catalyst	47	47E	
	RU40 Cisco Catalyst	48	48E	
	RU40 Cisco Catalyst	49	1XbE	
	RU40 Cisco Catalyst	50	2XbE	
	RU40 Cisco Catalyst	51	3XbE	
	RU40 Cisco Catalyst	52	4XbE	
	RU40 Cisco Catalyst	53	1ME	
	RU40 Cisco Catalyst	54	1SP	
	RU40 Cisco Catalyst	55	1P	
	RU40 Cisco Catalyst	56	2P	

Hardware ID	Hardware Description	Port ID	Port Description	Hardware Alias
06	RU39 Cisco Catalyst Hardware			catalyst2
	RU39 Cisco Catalyst	1	1E	
	RU39 Cisco Catalyst	2	2E	
	RU39 Cisco Catalyst	3	3E	
	RU39 Cisco Catalyst	4	4E	
	RU39 Cisco Catalyst	5	5E	
	RU39 Cisco Catalyst	6	6E	
	RU39 Cisco Catalyst	7	7E	
	RU39 Cisco Catalyst	8	8E	
	RU39 Cisco Catalyst	9	9E	
	RU39 Cisco Catalyst	10	10E	
	RU39 Cisco Catalyst	11	11E	
	RU39 Cisco Catalyst	12	12E	
	RU39 Cisco Catalyst	13	13E	
	RU39 Cisco Catalyst	14	14E	
	RU39 Cisco Catalyst	15	15E	
	RU39 Cisco Catalyst	16	16E	
	RU39 Cisco Catalyst	17	17E	
	RU39 Cisco Catalyst	18	18E	
	RU39 Cisco Catalyst	19	19E	
	RU39 Cisco Catalyst	20	20E	
	RU39 Cisco Catalyst	21	21E	
	RU39 Cisco Catalyst	22	22E	
	RU39 Cisco Catalyst	23	23E	
	RU39 Cisco Catalyst	24	24E	
	RU39 Cisco Catalyst	25	25E	
	RU39 Cisco Catalyst	26	26E	
	RU39 Cisco Catalyst	27	27E	
	RU39 Cisco Catalyst	28	28E	
	RU39 Cisco Catalyst	29	29E	
	RU39 Cisco Catalyst	30	30E	
	RU39 Cisco Catalyst	31	31E	
	RU39 Cisco Catalyst	32	32E	
	RU39 Cisco Catalyst	33	33E	
	RU39 Cisco Catalyst	34	34E	
	RU39 Cisco Catalyst	35	35E	
	RU39 Cisco Catalyst	36	36E	
	RU39 Cisco Catalyst	37	37E	
	RU39 Cisco Catalyst	38	38E	

Hardware ID	Hardware Description	Port ID	Port Description	Hardware Alias
	RU39 Cisco Catalyst	39	39E	
	RU39 Cisco Catalyst	40	40E	
	RU39 Cisco Catalyst	41	41E	
	RU39 Cisco Catalyst	42	42E	
	RU39 Cisco Catalyst	43	43E	
	RU39 Cisco Catalyst	44	44E	
	RU39 Cisco Catalyst	45	45E	
	RU39 Cisco Catalyst	46	46E	
	RU39 Cisco Catalyst	47	47E	
	RU39 Cisco Catalyst	48	48E	
	RU39 Cisco Catalyst	49	1XbE	
	RU39 Cisco Catalyst	50	2XbE	
	RU39 Cisco Catalyst	51	3XbE	
	RU39 Cisco Catalyst	52	4XbE	
	RU39 Cisco Catalyst	53	1ME	
	RU39 Cisco Catalyst	54	1SP	
	RU39 Cisco Catalyst	55	1P	
	RU39 Cisco Catalyst	56	2P	
07	RU38 Lantronix Hardware			lantronix
	RU38 Lantronix	1	1E	
	RU38 Lantronix	2	2E	
	RU38 Lantronix	3	3E	
	RU38 Lantronix	4	4E	
	RU38 Lantronix	5	5E	
	RU38 Lantronix	6	6E	
	RU38 Lantronix	7	7E	
	RU38 Lantronix	8	8E	
	RU38 Lantronix	9	9E	
	RU38 Lantronix	10	10E	
	RU38 Lantronix	11	11E	
	RU38 Lantronix	12	12E	
	RU38 Lantronix	13	13E	
	RU38 Lantronix	14	14E	
	RU38 Lantronix	15	15E	
	RU38 Lantronix	16	16E	
	RU38 Lantronix	17	17E	
	RU38 Lantronix	18	18E	
	RU38 Lantronix	19	19E	
	RU38 Lantronix	20	20E	

Hardware ID	Hardware Description	Port ID	Port Description	Hardware Alias
	RU38 Lantronix	21	21E	
	RU38 Lantronix	22	22E	
	RU38 Lantronix	23	23E	
	RU38 Lantronix	24	24E	
	RU38 Lantronix	25	25E	
	RU38 Lantronix	26	26E	
	RU38 Lantronix	27	27E	
	RU38 Lantronix	28	28E	
	RU38 Lantronix	29	29E	
	RU38 Lantronix	30	30E	
	RU38 Lantronix	31	31E	
	RU38 Lantronix	32	32E	
	RU38 Lantronix	33	33E	
	RU38 Lantronix	34	34E	
	RU38 Lantronix	35	35E	
	RU38 Lantronix	36	36E	
	RU38 Lantronix	37	37E	
	RU38 Lantronix	38	38E	
	RU38 Lantronix	39	39E	
	RU38 Lantronix	40	40E	
	RU38 Lantronix	41	41E	
	RU38 Lantronix	42	42E	
	RU38 Lantronix	43	43E	
	RU38 Lantronix	44	44E	
	RU38 Lantronix	45	45E	
	RU38 Lantronix	46	46E	
	RU38 Lantronix	47	47E	
	RU38 Lantronix	48	48E	
	RU38 Lantronix	49	1ME	
	RU38 Lantronix	50	2ME	
	RU38 Lantronix	51	1MI	
	RU38 Lantronix	52	1P	
	RU38 Lantronix	53	2P	
08	RU37 Left Palo Alto Hardware			firewall1
	RU37 Left Palo Alto	1	1E	
	RU37 Left Palo Alto	2	2E	
	RU37 Left Palo Alto	3	3E	
	RU37 Left Palo Alto	4	4E	
	RU37 Left Palo Alto	5	5E	

Hardware ID	Hardware Description	Port ID	Port Description	Hardware Alias
	RU37 Left Palo Alto	6	6E	
	RU37 Left Palo Alto	7	7E	
	RU37 Left Palo Alto	8	8E	
	RU37 Left Palo Alto	9	1ME	
	RU37 Left Palo Alto	10	1SP	
	RU37 Left Palo Alto	11	1P	
	RU37 Left Palo Alto	12	2P	
09	RU37 Right Palo Alto Hardware			firewall2
	RU37 Right Palo Alto	1	1E	
	RU37 Right Palo Alto	2	2E	
	RU37 Right Palo Alto	3	3E	
	RU37 Right Palo Alto	4	4E	
	RU37 Right Palo Alto	5	5E	
	RU37 Right Palo Alto	6	6E	
	RU37 Right Palo Alto	7	7E	
	RU37 Right Palo Alto	8	8E	
	RU37 Right Palo Alto	9	1ME	
	RU37 Right Palo Alto	10	1SP	
	RU37 Right Palo Alto	11	1P	
	RU37 Right Palo Alto	12	2P	
0A	RU33 Lenovo SR630 Hardware			node1
	RU33 Lenovo SR630	1	1SAS	
	RU33 Lenovo SR630	2	2SAS	
	RU33 Lenovo SR630	3	3SAS	
	RU33 Lenovo SR630	4	4SAS	
	RU33 Lenovo SR630	5	1E	
	RU33 Lenovo SR630	6	2E	
	RU33 Lenovo SR630	7	1ME	
	RU33 Lenovo SR630	8	1SP	
	RU33 Lenovo SR630	9	1P	
	RU33 Lenovo SR630	10	2P	
0B	RU31 Lenovo SR630 Hardware			node2
	RU31 Lenovo SR630	1	1SAS	
	RU31 Lenovo SR630	2	2SAS	
	RU31 Lenovo SR630	3	3SAS	
	RU31 Lenovo SR630	4	4SAS	
	RU31 Lenovo SR630	5	1E	
	RU31 Lenovo SR630	6	2E	
	RU31 Lenovo SR630	7	1ME	

Hardware ID	Hardware Description	Port ID	Port Description	Hardware Alias
	RU31 Lenovo SR630	8	1SP	
	RU31 Lenovo SR630	9	1P	
	RU31 Lenovo SR630	10	2P	
0C	RU29 Lenovo SR630 Hardware			node3
	RU29 Lenovo SR630	1	1SAS	
	RU29 Lenovo SR630	2	2SAS	
	RU29 Lenovo SR630	3	3SAS	
	RU29 Lenovo SR630	4	4SAS	
	RU29 Lenovo SR630	5	1E	
	RU29 Lenovo SR630	6	2E	
	RU29 Lenovo SR630	7	1ME	
	RU29 Lenovo SR630	8	1SP	
	RU29 Lenovo SR630	9	1P	
	RU29 Lenovo SR630	10	2P	
0D	RU28/27 Alder Hardware			marray
	RU28/27 Alder	1	1SAS	
	RU28/27 Alder	2	2SAS	
	RU28/27 Alder	3	3SAS	
	RU28/27 Alder	4	4SAS	
	RU28/27 Alder	5	5SAS	
	RU28/27 Alder	6	6SAS	
	RU28/27 Alder	7	7SAS	
	RU28/27 Alder	8	8SAS	
	RU28/27 Alder	9	1E	
	RU28/27 Alder	10	2E	
	RU28/27 Alder	11	1ME	
	RU28/27 Alder	12	2ME	
	RU28/27 Alder	13	1SP	
	RU28/27 Alder	14	2SP	
	RU28/27 Alder	15	1P	
	RU28/27 Alder	16	2P	
0E	RU26/25 Lenovo SR650 Hardware			node4
	RU26/25 Lenovo SR650	1	1FC	
	RU26/25 Lenovo SR650	2	2FC	
	RU26/25 Lenovo SR650	3	3FC	
	RU26/25 Lenovo SR650	4	4FC	
	RU26/25 Lenovo SR650	5	1XbE	
	RU26/25 Lenovo SR650	6	2XbE	
	RU26/25 Lenovo SR650	7	1E	

Hardware ID	Hardware Description	Port ID	Port Description	Hardware Alias
	RU26/25 Lenovo SR650	8	2E	
	RU26/25 Lenovo SR650	9	1ME	
	RU26/25 Lenovo SR650	10	1SP	
	RU26/25 Lenovo SR650	11	1P	
	RU26/25 Lenovo SR650	12	2P	
OF	RU24/23 Lenovo SR650 Hardware			node5
	RU24/23 Lenovo SR650	1	1FC	
	RU24/23 Lenovo SR650	2	2FC	
	RU24/23 Lenovo SR650	3	3FC	
	RU24/23 Lenovo SR650	4	4FC	
	RU24/23 Lenovo SR650	5	1XbE	
	RU24/23 Lenovo SR650	6	2XbE	
	RU24/23 Lenovo SR650	7	1E	
	RU24/23 Lenovo SR650	8	2E	
	RU24/23 Lenovo SR650	9	1ME	
	RU24/23 Lenovo SR650	10	1SP	
	RU24/23 Lenovo SR650	11	1P	
	RU24/23 Lenovo SR650	12	2P	
10	RU22/21 Lenovo SR650 Hardware			node6
	RU22/21 Lenovo SR650	1	1FC	
	RU22/21 Lenovo SR650	2	2FC	
	RU22/21 Lenovo SR650	3	3FC	
	RU22/21 Lenovo SR650	4	4FC	
	RU22/21 Lenovo SR650	5	1XbE	
	RU22/21 Lenovo SR650	6	2XbE	
	RU22/21 Lenovo SR650	7	1E	
	RU22/21 Lenovo SR650	8	2E	
	RU22/21 Lenovo SR650	9	1ME	
	RU22/21 Lenovo SR650	10	1SP	
	RU22/21 Lenovo SR650	11	1P	
	RU22/21 Lenovo SR650	12	2P	
11	RU20/19 Lenovo SR650 Hardware			node7
	RU20/19 Lenovo SR650	1	1FC	
	RU20/19 Lenovo SR650	2	2FC	
	RU20/19 Lenovo SR650	3	3FC	
	RU20/19 Lenovo SR650	4	4FC	
	RU20/19 Lenovo SR650	5	1XbE	
	RU20/19 Lenovo SR650	6	2XbE	
	RU20/19 Lenovo SR650	7	1E	

Hardware ID	Hardware Description	Port ID	Port Description	Hardware Alias
	RU20/19 Lenovo SR650	8	2E	
	RU20/19 Lenovo SR650	9	1ME	
	RU20/19 Lenovo SR650	10	1SP	
	RU20/19 Lenovo SR650	11	1P	
	RU20/19 Lenovo SR650	12	2P	
12	RU18 Brocade Hardware			brocade1
	RU18 Brocade	1	0FC	
	RU18 Brocade	2	1FC	
	RU18 Brocade	3	2FC	
	RU18 Brocade	4	3FC	
	RU18 Brocade	5	4FC	
	RU18 Brocade	6	5FC	
	RU18 Brocade	7	6FC	
	RU18 Brocade	8	7FC	
	RU18 Brocade	9	8FC	
	RU18 Brocade	10	9FC	
	RU18 Brocade	11	10FC	
	RU18 Brocade	12	11FC	
	RU18 Brocade	13	12FC	
	RU18 Brocade	14	13FC	
	RU18 Brocade	15	14FC	
	RU18 Brocade	16	15FC	
	RU18 Brocade	17	1ME	
	RU18 Brocade	18	1SP	
	RU18 Brocade	19	1P	
	RU18 Brocade	20	2P	
13	RU17 Brocade Hardware			brocade2
	RU17 Brocade	1	0FC	
	RU17 Brocade	2	1FC	
	RU17 Brocade	3	2FC	
	RU17 Brocade	4	3FC	
	RU17 Brocade	5	4FC	
	RU17 Brocade	6	5FC	
	RU17 Brocade	7	6FC	
	RU17 Brocade	8	7FC	
	RU17 Brocade	9	8FC	
	RU17 Brocade	10	9FC	
	RU17 Brocade	11	10FC	
	RU17 Brocade	12	11FC	

Hardware ID	Hardware Description	Port ID	Port Description	Hardware Alias
	RU17 Brocade	13	12FC	
	RU17 Brocade	14	13FC	
	RU17 Brocade	15	14FC	
	RU17 Brocade	16	15FC	
	RU17 Brocade	17	1ME	
	RU17 Brocade	18	1SP	
	RU17 Brocade	19	1P	
	RU17 Brocade	20	2P	
14	RU16/15/14/13 Trafford Hardware			ioarray1
	RU16/15/14/13 Trafford	1	1FC	
	RU16/15/14/13 Trafford	2	2FC	
	RU16/15/14/13 Trafford	3	3FC	
	RU16/15/14/13 Trafford	4	4FC	
	RU16/15/14/13 Trafford	5	5FC	
	RU16/15/14/13 Trafford	6	6FC	
	RU16/15/14/13 Trafford	7	7FC	
	RU16/15/14/13 Trafford	8	8FC	
	RU16/15/14/13 Trafford	9	1E	
	RU16/15/14/13 Trafford	10	2E	
	RU16/15/14/13 Trafford	11	1ME	
	RU16/15/14/13 Trafford	12	2ME	
	RU16/15/14/13 Trafford	13	1SP	
	RU16/15/14/13 Trafford	14	2SP	
	RU16/15/14/13 Trafford	15	1P	
	RU16/15/14/13 Trafford	16	2P	
15	RU12/11/10/9 Trafford Hardware			ioarray2
	RU12/11/10/9 Trafford	1	1FC	
	RU12/11/10/9 Trafford	2	2FC	
	RU12/11/10/9 Trafford	3	3FC	
	RU12/11/10/9 Trafford	4	4FC	
	RU12/11/10/9 Trafford	5	5FC	
	RU12/11/10/9 Trafford	6	6FC	
	RU12/11/10/9 Trafford	7	7FC	
	RU12/11/10/9 Trafford	8	8FC	
	RU12/11/10/9 Trafford	9	1E	
	RU12/11/10/9 Trafford	10	2E	
	RU12/11/10/9 Trafford	11	1ME	
	RU12/11/10/9 Trafford	12	2ME	
	RU12/11/10/9 Trafford	13	1SP	

Hardware ID	Hardware Description	Port ID	Port Description	Hardware Alias
	RU12/11/10/9 Trafford	14	2SP	
	RU12/11/10/9 Trafford	15	1P	
	RU12/11/10/9 Trafford	16	2P	
16	RU8/7 Dell R730 Hardware			dell1
	RU8/7 Dell R730 Hardware	1	1XbE	
	RU8/7 Dell R730 Hardware	3	1E	
	RU8/7 Dell R730 Hardware	4	2E	
	RU8/7 Dell R730 Hardware	5	1ME	
	RU8/7 Dell R730 Hardware	6	1SP	
	RU8/7 Dell R730 Hardware	7	1P	
	RU8/7 Dell R730 Hardware	8	2P	
17	RU6/5 Dell R730 Hardware			dell2
	RU6/5 Dell R730	1	1XbE	
	RU6/5 Dell R730	3	1E	
	RU6/5 Dell R730	4	2E	
	RU6/5 Dell R730	5	1ME	
	RU6/5 Dell R730	6	1SP	
	RU6/5 Dell R730	7	1P	
	RU6/5 Dell R730	8	2P	
B6	RU2 Patch Panel Hardware			panel
	RU2 Patch Panel	1	1E	
	RU2 Patch Panel	2	2E	
	RU2 Patch Panel	3	1XbE	
	RU2 Patch Panel	4	2XbE	
BC	RU36 APC NetBotz Hardware			netbotz
	RU36 APC NetBotz	1	1E	
	RU36 APC NetBotz	2	2P	

Cables

ID	Description	HW-1	HW-2	Port-1	Port-1 Desc.	Port-2	Port-2 Desc.	Alias
18	Power	01	15	17	1P	16	2P	apc_left
19	Power	01	17	24	2P	7	1P	
1A	Power	01	16	23	3P	7	1P	
1B	Power	01	13	20	6P	19	1P	
1C	Power	01	12	19	7P	19	1P	
1D	Power	01	11	18	8P	11	1P	
1E	Power	01	14	9	9P	16	2P	
1F	Power	01	10	16	10P	11	1P	
20	Power	01	0F	15	11P	11	1P	
21	Power	01	0E	14	12P	11	1P	
22	Power	01	0D	13	13P	15	1P	
23	Power	01	0C	12	14P	9	1P	
24	Power	01	0B	11	15P	9	1P	
25	Power	01	0A	10	16P	9	1P	
26	Power	01	09	8	18P	11	1P	
27	Power	01	08	7	19P	11	1P	
28	Power	01	07	6	20P	52	1P	
29	Power	01	06	5	21P	55	1P	
2A	Power	01	05	4	22P	55	1P	
2B	Power	01	04	3	23P	39	1P	
2C	Power	01	03	2	24P	39	1P	
BE	Power	01	BC	21	5P	2	2P	
2D	Power	02	15	17	1P	15	1P	apc_right
2E	Power	02	17	24	2P	8	2P	
2F	Power	02	16	23	3P	8	2P	
30	Power	02	13	20	6P	20	2P	
31	Power	02	12	19	7P	20	2P	
32	Power	02	11	18	8P	12	2P	
33	Power	02	14	9	9P	15	1P	
34	Power	02	10	16	10P	12	2P	
35	Power	02	0F	15	11P	12	2P	
36	Power	02	0E	14	12P	12	2P	
37	Power	02	0D	13	13P	16	2P	
38	Power	02	0C	12	14P	10	2P	
39	Power	02	0B	11	15P	10	2P	
3A	Power	02	0A	10	16P	10	2P	

ID	Description	HW-1	HW-2	Port-1	Port-1 Desc.	Port-2	Port-2 Desc.	Alias
3B	Power	02	09	8	18P	12	2P	
3C	Power	02	08	7	19P	12	2P	
3D	Power	02	07	6	20P	53	2P	
3E	Power	02	06	5	21P	56	2P	
3F	Power	02	05	4	22P	56	2P	
40	Power	02	04	3	23P	40	2P	
41	Power	02	03	2	24P	40	2P	
42	100GbE Copper	03	0E	1	1XbE	6	2XbE	nexus1
43	100GbE Copper	03	0F	3	3XbE	6	2XbE	
44	100GbE Copper	03	10	5	5XbE	6	2XbE	
45	100GbE Copper	03	11	7	7XbE	6	2XbE	
46	100GbE Copper	03	16	9	9XbE	1	1XbE	
47	100GbE Copper	03	04	35	35XbE	35	35XbE	
BB	100GbE Copper	03	04	36	36XbE	36	36XbE	
48	100GbE Copper	04	0E	1	1XbE	5	1XbE	nexus2
49	100GbE Copper	04	0F	3	3XbE	5	1XbE	
4A	100GbE Copper	04	10	5	5XbE	5	1XbE	
4B	100GbE Copper	04	11	7	7XbE	5	1XbE	
4C	100GbE Copper	04	17	9	9XbE	1	1XbE	
4D	Ethernet	05	01	1	1E	25	1ME	catalyst1
4E	Ethernet	05	04	2	2E	37	1ME	
4F	Ethernet	05	08	3	3E	9	1ME	
50	Ethernet	05	0A	4	4E	6	2ME	
51	Ethernet	05	0B	5	5E	6	2ME	
52	Ethernet	05	0C	6	6E	6	2ME	
53	Ethernet	05	0D	7	7E	11	1ME	
54	Ethernet	05	0E	8	8E	7	1ME	
55	Ethernet	05	0E	9	9E	9	1ME	
56	Ethernet	05	0F	10	10E	7	1ME	
57	Ethernet	05	0F	11	11E	9	1ME	
58	Ethernet	05	10	12	12E	7	1ME	
59	Ethernet	05	10	13	13E	9	1ME	
5A	Ethernet	05	11	14	14E	7	1ME	
5B	Ethernet	05	11	15	15E	9	1ME	
5C	Ethernet	05	12	16	16E	17	1ME	
5D	Ethernet	05	14	17	17E	11	1ME	

ID	Description	HW-1	HW-2	Port-1	Port-1 Desc.	Port-2	Port-2 Desc.	Alias
5E	Ethernet	05	15	18	18E	11	1ME	
5F	Ethernet	05	16	19	19E	3	1ME	
60	Ethernet	05	16	20	20E	5	1ME	
61	Ethernet	05	17	21	21E	3	1ME	
62	Ethernet	05	17	22	22E	5	1ME	
63	Ethernet	05	08	46	46E	2	2E	
64	Ethernet	05	08	48	48E	4	4E	
65	10GbE Optical	05	06	49	1XbE	49	1XbE	
66	10GbE Optical	05	06	50	2XbE	50	2XbE	
67	Ethernet	06	02	1	1E	25	1ME	catalyst2
68	Ethernet	06	03	2	2E	37	1ME	
69	Ethernet	06	09	3	3E	9	1ME	
6A	Ethernet	06	0A	4	4E	5	1ME	
6B	Ethernet	06	0A	5	5E	7	1ME	
6C	Ethernet	06	0B	6	6E	5	1ME	
6D	Ethernet	06	0B	7	7E	7	1ME	
6E	Ethernet	06	0C	8	8E	5	1ME	
6F	Ethernet	06	0C	9	9E	7	1ME	
70	Ethernet	06	0D	10	10E	12	2ME	
71	Ethernet	06	0E	11	11E	8	2ME	
72	Ethernet	06	0F	12	12E	8	2ME	
73	Ethernet	06	10	13	13E	8	2ME	
74	Ethernet	06	11	14	14E	8	2ME	
75	Ethernet	06	13	15	15E	17	1ME	
76	Ethernet	06	14	16	16E	12	2ME	
77	Ethernet	06	15	17	17E	12	2ME	
78	Ethernet	06	16	18	18E	4	2ME	
79	Ethernet	06	17	19	19E	4	2ME	
7A	Ethernet	06	09	46	46E	2	2E	
7B	Ethernet	06	09	48	48E	4	4E	
7C	Serial	07	03	1	1E	38	1SP	Iantronix
7D	Serial	07	14	2	2E	13	1SP	
7E	Serial	07	04	3	3E	38	1SP	
7F	Serial	07	14	4	4E	14	2SP	
80	Serial	07	05	5	5E	54	1SP	
81	Serial	07	15	6	6E	13	1SP	
82	Serial	07	06	7	7E	54	1SP	

ID	Description	HW-1	HW-2	Port-1	Port-1 Desc.	Port-2	Port-2 Desc.	Alias
83	Serial	07	15	8	8E	14	2SP	
84	Serial	07	12	9	9E	18	1SP	
85	Serial	07	0D	10	10E	13	1SP	
86	Serial	07	13	11	11E	18	1SP	
87	Serial	07	0D	12	12E	14	2SP	
88	Serial	07	01	18	18E	26	1SP	
89	Serial	07	02	20	20E	26	1SP	
8A	Serial	07	08	25	25E	10	1SP	
8B	Serial	07	09	26	26E	10	1SP	
8C	Ethernet	07	08	49	1ME	6	6E	
8D	Ethernet	07	09	50	2ME	6	6E	
8E	Ethernet	08	09	7	7E	7	7E	firewall1
8F	Ethernet	08	09	8	8E	8	8E	
90	SAS	0D	0A	1	1SAS	1	1SAS	marray
91	SAS	0D	0B	2	2SAS	1	1SAS	
92	SAS	0D	0C	3	3SAS	1	1SAS	
93	SAS	0D	0A	5	5SAS	3	3SAS	
94	SAS	0D	0B	6	6SAS	3	3SAS	
95	SAS	0D	0C	7	7SAS	3	3SAS	
96	FC	12	0E	1	0FC	1	1FC	brocade 1
97	FC	12	0E	2	1FC	3	3FC	
98	FC	12	0F	3	2FC	1	1FC	
99	FC	12	0F	4	3FC	3	3FC	
9A	FC	12	14	5	4FC	1	1FC	
9B	FC	12	14	6	5FC	2	2FC	
9C	FC	12	14	7	6FC	5	5FC	
9D	FC	12	14	8	7FC	6	6FC	
9E	FC	12	10	9	8FC	1	1FC	
9F	FC	12	10	10	9FC	3	3FC	
A0	FC	12	11	11	10FC	1	1FC	
A1	FC	12	11	12	11FC	3	3FC	
A2	FC	12	15	13	12FC	1	1FC	
A3	FC	12	15	14	13FC	2	2FC	
A4	FC	12	15	15	14FC	5	5FC	
A5	FC	12	15	16	15FC	6	6FC	
A6	FC	13	0E	1	0FC	2	2FC	brocade 2

ID	Description	HW-1	HW-2	Port-1	Port-1 Desc.	Port-2	Port-2 Desc.	Alias
A7	FC	13	0E	2	1FC	4	4FC	
A8	FC	13	0F	3	2FC	2	2FC	
A9	FC	13	0F	4	3FC	4	4FC	
A A	FC	13	14	5	4FC	3	3FC	
A B	FC	13	14	6	5FC	4	4FC	
A C	FC	13	14	7	6FC	7	7FC	
A D	FC	13	14	8	7FC	8	8FC	
AE	FC	13	10	9	8FC	2	2FC	
AF	FC	13	10	10	9FC	4	4FC	
B0	FC	13	11	11	10FC	2	2FC	
B1	FC	13	11	12	11FC	4	4FC	
B2	FC	13	15	13	12FC	3	3FC	
B3	FC	13	15	14	13FC	4	4FC	
B4	FC	13	15	15	14FC	7	7FC	
B5	FC	13	15	16	15FC	8	8FC	
B7	Ethernet	B6	08	1	1E	1	1E	panel
B8	Ethernet	B6	09	2	2E	1	1E	
B9	10GbE Optical	B6	03	3	1XbE	33	33XbE	
B A	10GbE Optical	B6	04	4	2XbE	33	33XbE	
B D	Ethernet	05	BC	44	44E	1	1E	netbotz