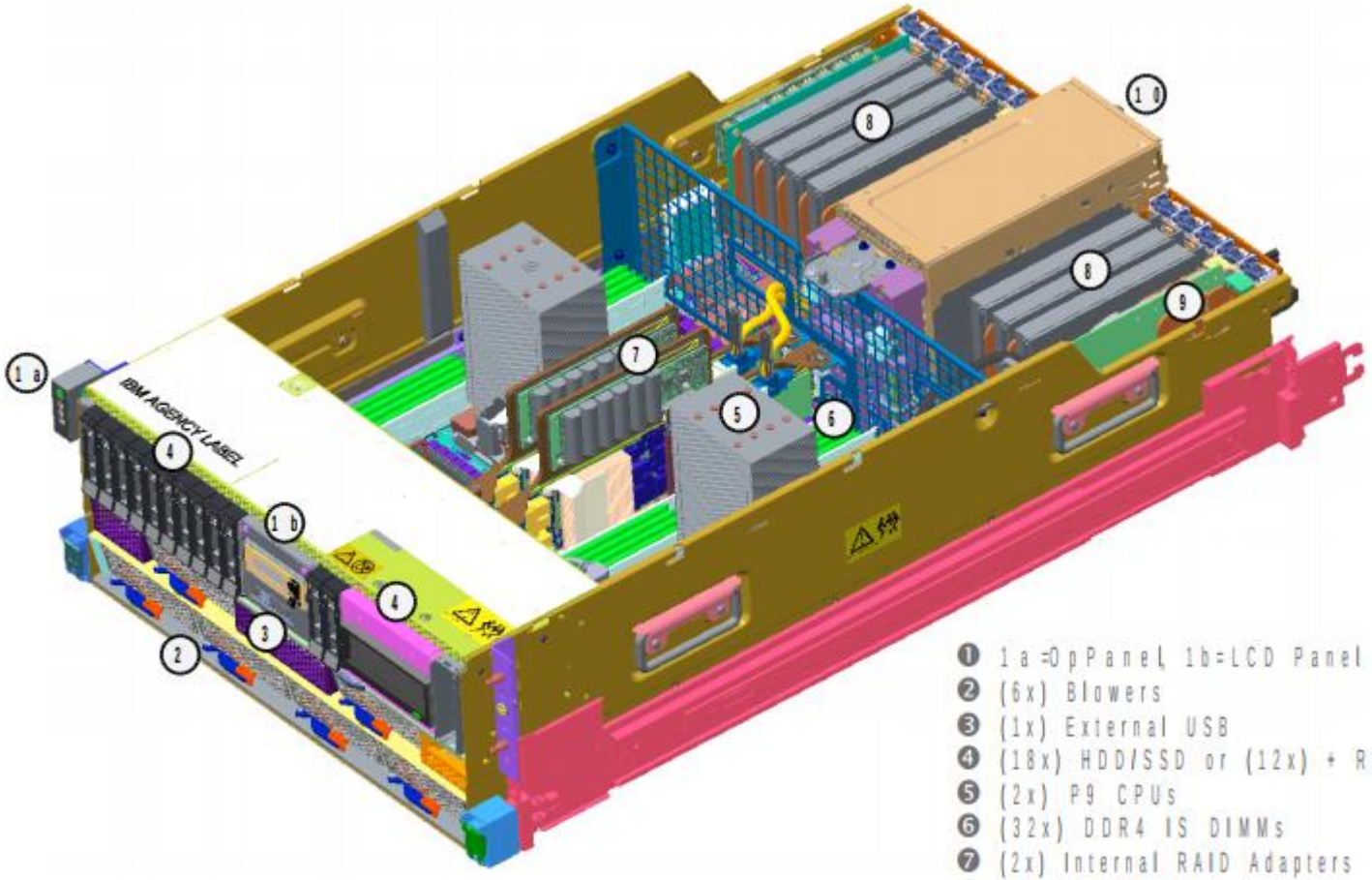
P9 MFG Handbook

ZZ 1S4U (9009-41A) ZZ2S4U (9009-42A)

The Cognitive Supply Chain

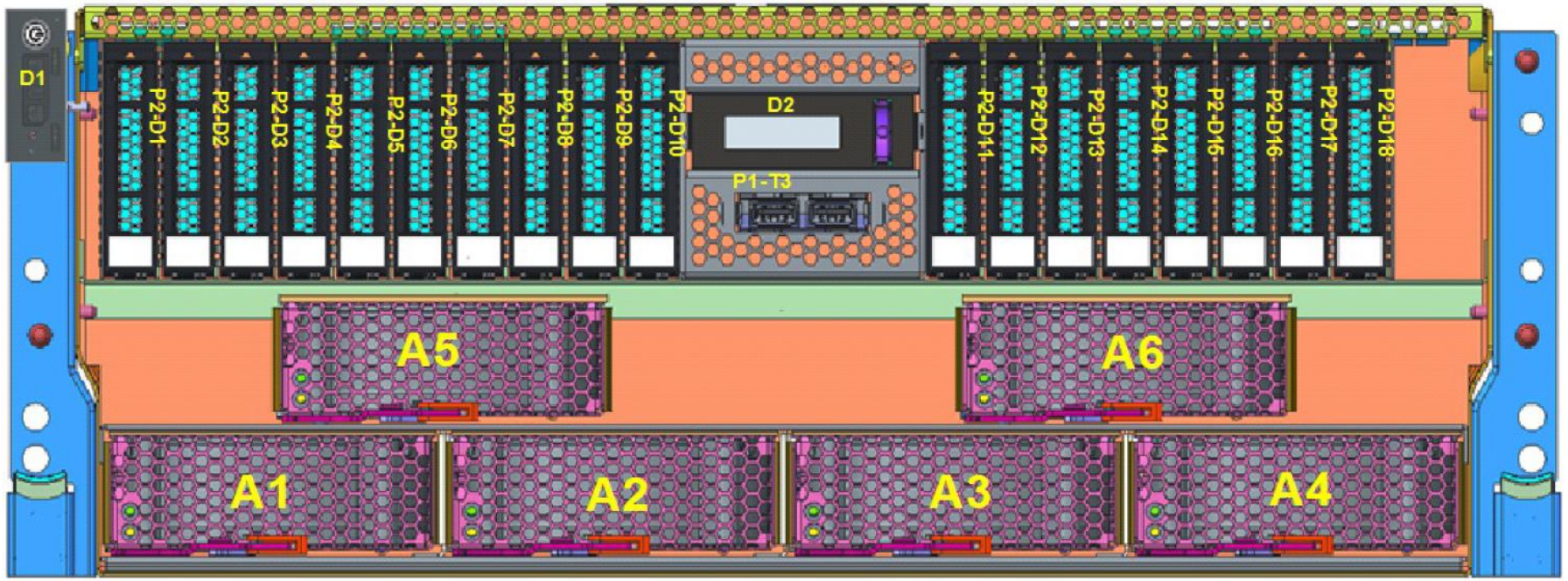
Isometric, top and front view of ZZ

ZZ PHYSICAL LOCATIONS

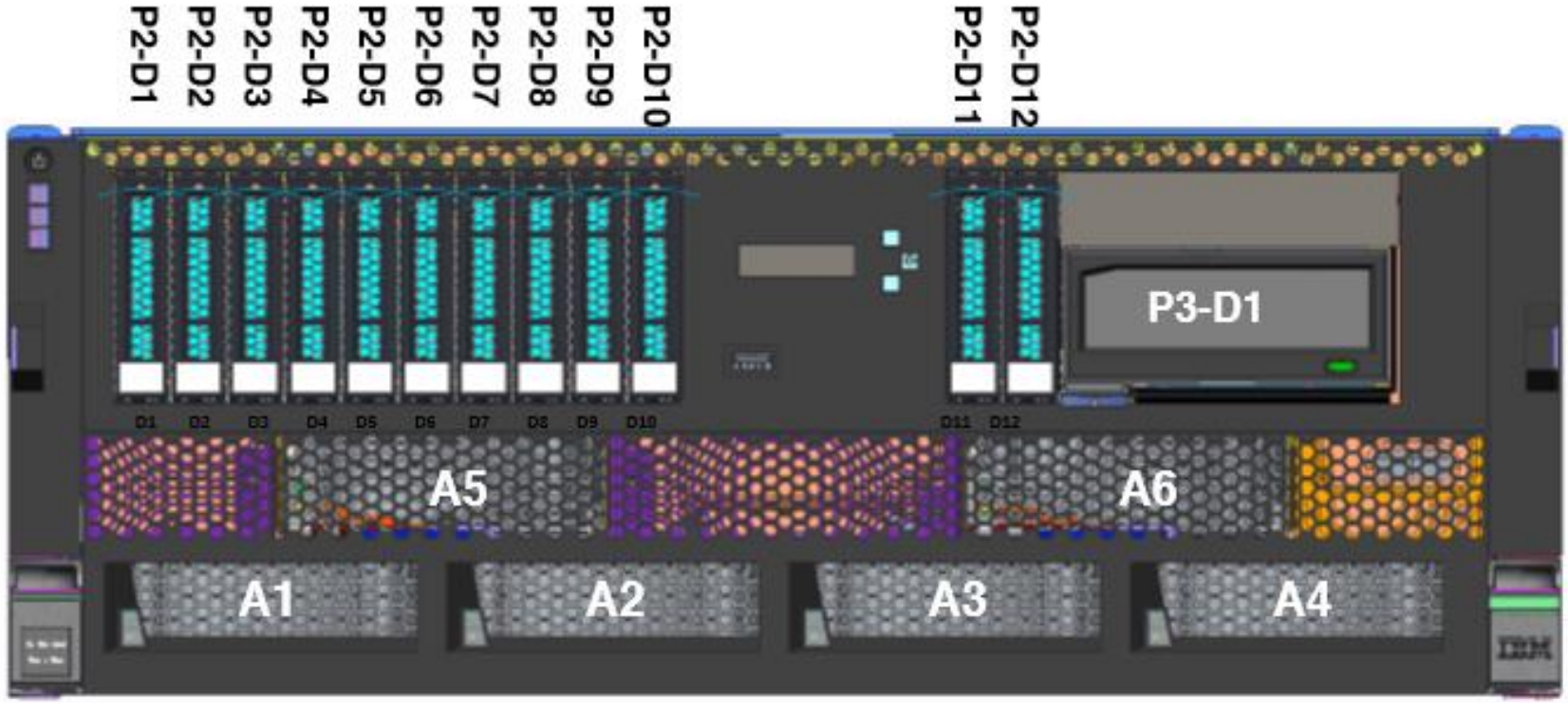


1. 1a=Op Panel, 1b=LCD Panel
2. (6x) Blowers
3. (1x) External USB
4. (18x) HDD/SSD or (12x) + RDX
5. (2x) P9 CPUs
6. (32x) DDR4 IS DIMMs
7. (2x) Internal RAID Adapters
8. (11x)PCIeAdapters
9. FSP2 Card
10. (4x) Power Supplies

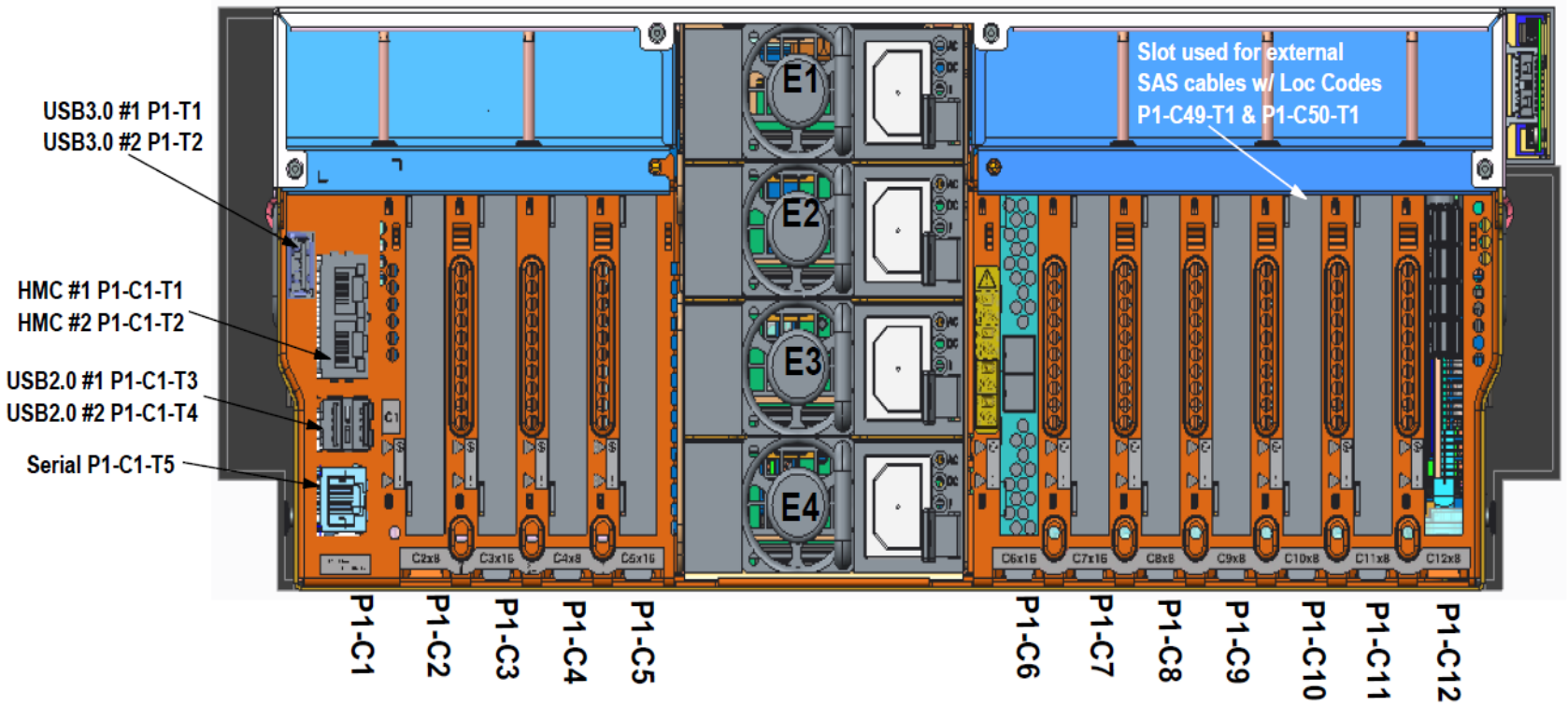
ZZ 2S4U Front Isometric View



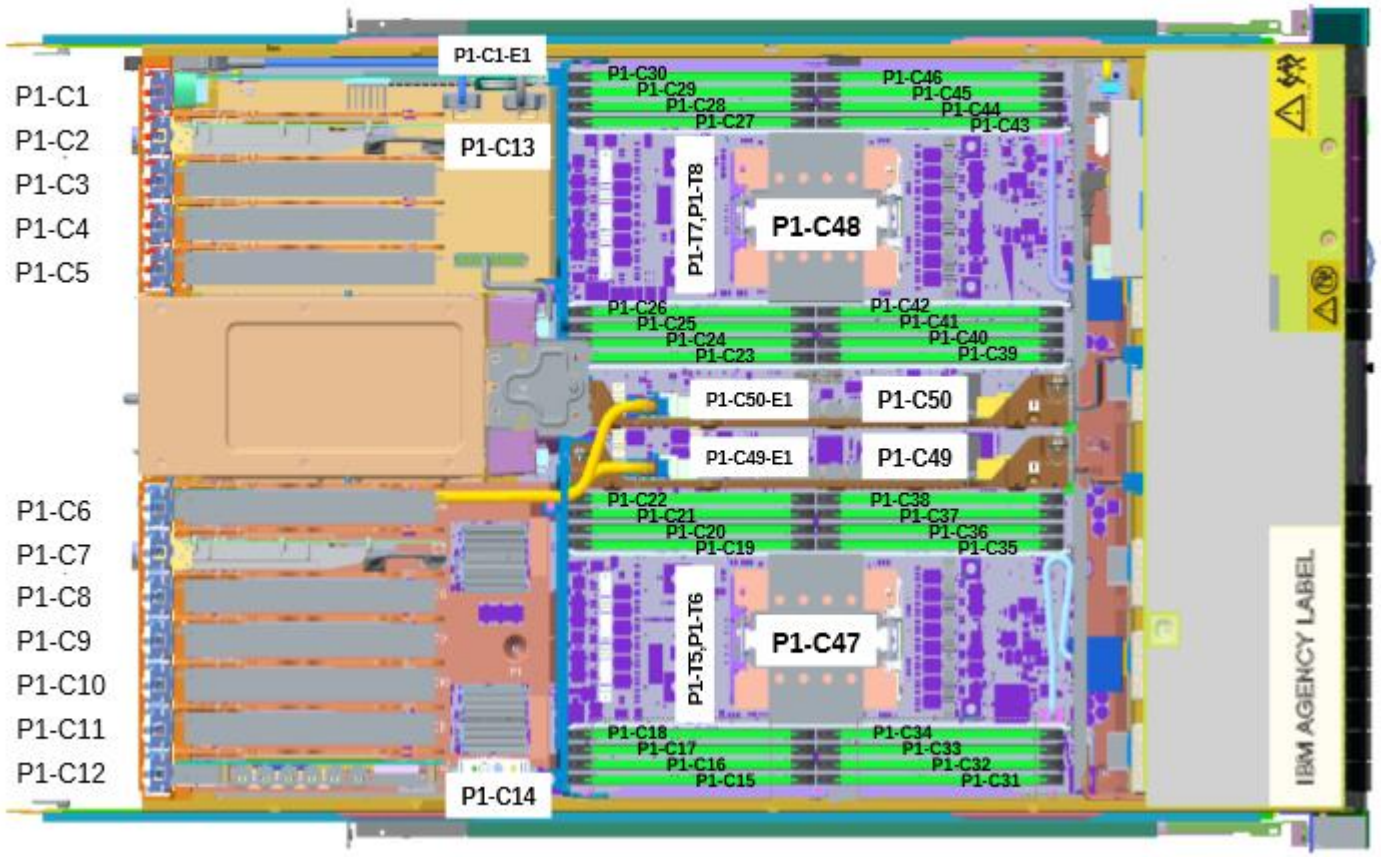
ZZ Front View w/ 18 DASDs



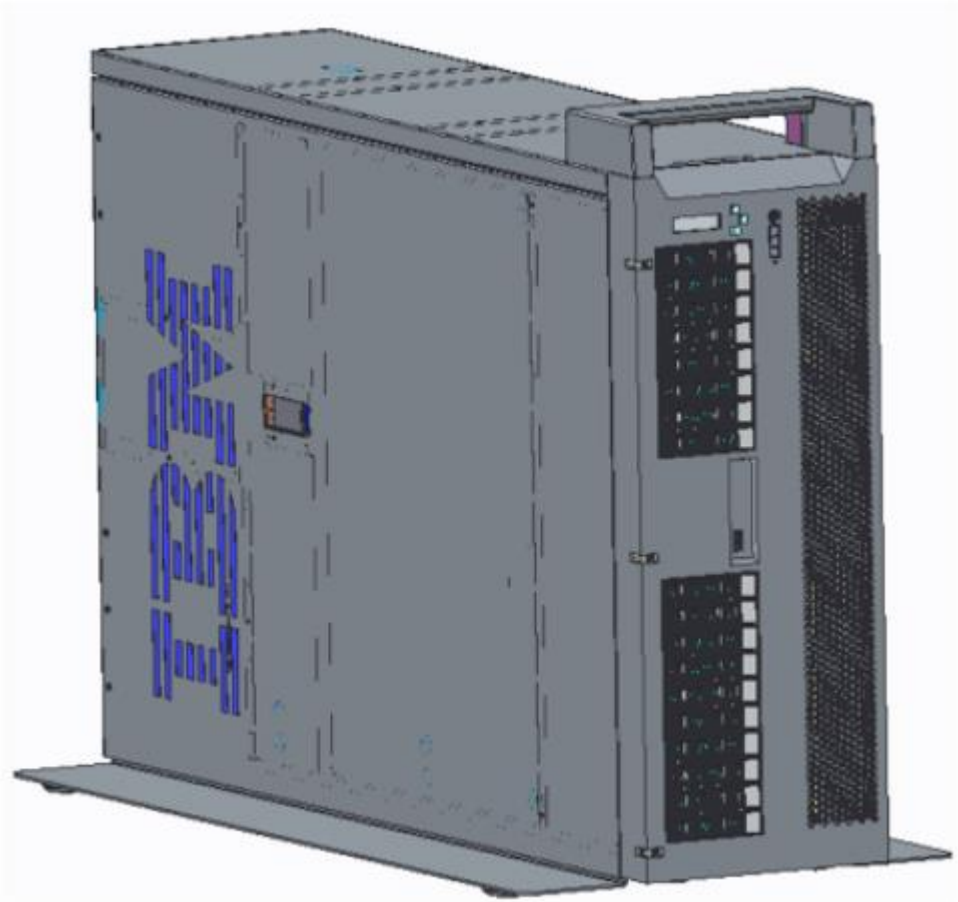
ZZ Front View w/ 12 DASDs and RDX Tape Drive


USB3.0 #1 P1-T1
USB3.0 #2 P1-T2
HMC #1 P1-C1-T1
HMC #2 P1-C1-T2
USB2.0 #1 P1-C1-T3
USB2.0 #2 P1-C1-T4
Serial P1-C1-T5
E1
E2
E3
E4
Slot used for external
SAS cables w/ Loc Codes
P1-C49-T1 & P1-C50-T1
C2x8
C3x16
C4x8
C5x16
C6x16
C7x16
C8x8
C9x8
C10x8
C11x8
C12x8
P1-C1
P1-C2
P1-C3
P1-C4
P1-C5
P1-C6
P1-C7
P1-C8
P1-C9
P1-C10
P1-C11
P1-C12

ZZ Rear View


P1-C1-E1
P1-C1
P1-C2
P1-C3
P1-C4
P1-C5
P1-C13
P1-C30
P1-C29
P1-C28
P1-C27
P1-C46
P1-C45
P1-C44
P1-C43
P1-T7,P1-T8
P1-C48
P1-C26
P1-C25
P1-C24
P1-C23
P1-C42
P1-C41
P1-C40
P1-C39
P1-C50-E1
P1-C50
P1-C49-E1
P1-C49
P1-C6
P1-C7
P1-C8
P1-C9
P1-C10
P1-C11
P1-C12
P1-C14
P1-C22
P1-C21
P1-C20
P1-C19
P1-C38
P1-C37
P1-C36
P1-C35
P1-T5,P1-T6
P1-C47
P1-C18
P1-C17
P1-C16
P1-C15
P1-C34
P1-C33
P1-C32
P1-C31
IBM AGENCY LABEL

ZZ Top View



1S4U Tower Isometric View

Block Diagrams and One Pagers

ZZ SYSTEM DIAGRAMS, LABELS

ZZ 1S4U Tower & Rack (4 & 6-core)

- **Processor (P9 LaGrange)**
  - 4 BC 130W (see note), or
  - 6 BC 130W
- **Memory**
  - Total 16 DDR4 IS DIMM slots
  - 8,16,32,64GB IS DIMM @ 2133-2400 Mbps
  - 1TB max for 6c, 64GB max for 4c
  - 153GB/s system peak bandwidth
  - Memory compression capable
  - Transactional memory capable
- **Storage (select 1 @ order)**
  - 1 Solstice RAID feature
    - JBOD, RAID 0,10,5,6
    - 12 SFF bays, 1 RDX bay
  - 1 or 2 Futura NVMe features
    - 2 or 4 NVMe M.2 sockets
  - 1 NVMe feature & 1 Solstice RAID feature
  - Split disk feature (2 Solstice RAID)
    - JBOD, RAID 0,10,5,6
    - 6+6 SFF bays, 1 RDX bay
  - High performance RAID feature (2 GXP)
    - Dynamic tiering, dual write cache
    - RAID 0,5,6,10,5T2,6T2,10T2
    - 18 SFF bays or 12 SFF bays & 1 RDX
    - 2 SAS 4x ports for 1 disk drawer expansion
- **2 NVLink 1-brick ports (6 BC feature only)**
  - 2 OpenCAPI adapters in CEC
  - MEX Accelerator module (GA3 2Q19)
- **PCIe Slots**
  - 1 PCIe x16 G4 FHHL slot
    - ✓ CAPI2.0 & IO drawer capable
  - 1 PCIe x8 G4 FHHL slot with x16 connector
    - ✓ CAPI2.0 capable
  - 2 PCIe x8 G3 FHHL slots with x16 connector
  - 3 PCIe x8 G3 FHHL slots
  - 1 PCIe x8 G3 FHHL slot for default LAN adapter

MTM 9009-41A
Power S914
(GA1 2/2018)

MEX Accelerator Module
(GA3 2Q19)
CAPI & GPU adapters
3Hombres Card

IO Drawer
MEX IO 4U Drawer
BearMountain Card

Disk Drawer
Slider HDD/SSD 2U Drawer
Homerun HDD/SSD 2U Drawer

Note: IO and Disk Drawers are NOT supported with 4 BC feature.

- **OS**
  - AIX, IBMi, Linux
- **Hypervisor**
  - PowerVM
- **RAS**
  - P9 Nimbus RAS
  - Concurrent maintenance on HDD/SSD
  - Concurrent maintenance on PCI adapters
  - Concurrent maintenance & redundant cooling
  - Concurrent maintenance & redundant power supply
    - 2+2 900W PS for Tower
      - ✓ 100-127 or 200-240 VAC
    - 1+1 1400W PS for Rack
      - ✓ 200-240 VAC
  - Customer setup, install & repair
- **Energy Efficiency**
  - 80+ Platinum Power Supply Compliant
  - EPA Energy Star Compliant
  - Built-in Advanced Thermal & Power Mgt
- **Service Interface**
  - FSP2 service processor
  - Light-Path op-panel & FRU LEDs
- **Native I/O**
  - Host USB 3.0: 1 front, 2 rear, 1 for internal RDX
  - System Management 1GE (2 rear)
  - Serial (rear), USB 2.0 (2 rear)
- **System management**
  - NovaLink, PowerVC, HMC (optional)
- **Certifications**
  - FCC: Class A for Servers
  - Acoustics: General Business Category 2E for Tower and 2D for Rack
  - Environment: ASHRAE A2
    - 10-35C, 20-80% RH, 3050m max

ZZ 1S4U 4 & 6-Core Systems

ZZ 1S4U Rack (8-core)

- **Processor (P9 LaGrange)**
  - 8 BC 190W
- **Memory**
  - Total 16 DDR4 IS DIMM slots
  - 8,16,32,64GB IS DIMM @ 2133-2400 Mbps
  - 1TB capacity, 153GB/s system peak bandwidth
  - Memory compression capable
  - Transactional memory capable
- **Storage (select 1 @ order)**
  - 1 Solstice RAID feature
    - JBOD, RAID 0,10,5,6
    - 12 SFF bays, 1 RDX bay
  - 1 or 2 Futura NVMe features
    - 2 or 4 NVMe M.2 sockets
  - 1 Futura feature & 1 Solstice RAID feature
  - Split disk feature (2 Solstice RAID)
    - JBOD, RAID 0,10,5,6
    - 6+6 SFF bays, 1 RDX bay
  - High performance RAID feature (2 GXP)
    - Dynamic tiering, dual write cache
    - RAID 0,5,6,10,5T2,6T2,10T2
    - 18 SFF bays or 12 SFF bays & 1 RDX
    - 2 SAS 4x ports for 1 disk drawer expansion
- **2 NVLink 1-brick ports**
  - 2 OpenCAPI adapters in CEC
  - MEX Accelerator module (GA3 2Q19)
- **PCIe Slots**
  - 1 PCIe x16 G4 FHHL slot
    - ✓ CAPI2.0 & IO drawer capable
  - 1 PCIe x8 G4 FHHL slot with x16 connector
    - ✓ CAPI2.0 capable
  - 2 PCIe x8 G3 FHHL slots with x16 connector
  - 3 PCIe x8 G3 FHHL slots
  - 1 PCIe x8 G3 FHHL slot for default LAN adapter

MTM 9009-41A
Power S914
(GA1 2/2018)

MEX Accelerator Module
(GA3 2Q19)
CAPI & GPU adapters
3Hombres Card

IO Drawer
MEX IO 4U Drawer
BearMountain Card

Disk Drawer
Slider HDD/SSD 2U Drawer
Homerun HDD/SSD 2U Drawer

- **OS**
  - AIX, IBMi, Linux
- **Hypervisor**
  - PowerVM
- **RAS**
  - P9 Nimbus RAS
  - Concurrent maintenance on HDD/SSD
  - Concurrent maintenance on PCI adapters
  - Concurrent maintenance & redundant cooling
  - Concurrent maintenance & redundant power supply
    - 1+1 1400W PS, 200-240 VAC
  - Customer setup, install & repair
- **Energy Efficiency**
  - 80+ Platinum Power Supply Compliant
  - EPA Energy Star Compliant
  - Built-in Advanced Thermal & Power Mgt
- **Service Interface**
  - FSP2 service processor
  - Light-Path op-panel & FRU LEDs
- **Native I/O**
  - Host USB 3.0: 1 front, 2 rear, 1 for internal RDX
  - System Management 1GE (2 rear)
  - Serial (rear), USB 2.0 (2 rear)
- **System management**
  - NovaLink, PowerVC, HMC (optional)
- **Certifications**
  - FCC: Class A for Servers
  - Acoustics: Data Center Category 1B
  - Environment: ASHRAE A2
    - 10-35C, 20-80% RH, 3050m max

ZZ 1S4U 8-Core Systems

ZZ 2S4U

- **Processor (P9 LaGrange)**
  - 1x 8 BC 225W, or
  - 1x 10 BC 225w, or
  - 2x 8 BC 225W, or
  - 2x 10 BC 225w, or
  - 2x 12 BC 225W, or
  - 2x 20 SC 225W (GA2 3Q18)
- **Memory**
  - Total 32 DDR4 IS DIMM slots
  - 8,16,32,64,128GB IS DIMM @ 2133-2400 Mbps
  - 4TB capacity, 306GB/s system peak bandwidth
  - Memory compression capable
  - Transactional memory capable
- **Storage (select 1 @ order)**
  - 1 Solstice RAID feature
    - JBOD, RAID 0,10,5,6
    - 12 SFF bays, 1 RDX bay
  - 1 or 2 Futura NVMe features
    - 2 or 4 NVMe M.2 sockets
  - 1 Futura feature & 1 Solstice RAID feature
  - Split disk feature (2 Solstice RAID)
    - JBOD, RAID 0,10,5,6
    - 6+6 SFF bays, 1 RDX bay
  - High performance RAID feature (2 GXP)
    - Dynamic tiering, dual write cache
    - RAID 0,5,6,10,5T2,6T2,10T2
    - 18 SFF bays or 12 SFF bays & 1 RDX bay
    - 2 SAS 4x ports for 1 disk drawer expansion
- **4 NVLink 1-brick ports**
  - 4 OpenCAPI adapters in CEC
  - MEX Accelerator module (GA3 2Q19)
- **PCIe Slots**
  - 3 PCIe x16 G4 FHHL slots
    - ✓ CAPI2.0 & IO drawer capable
  - 2 PCIe x8 G4 FH slots with x16 connector
    - ✓ x8 G4 FH slot driven by SCM0 is CAPI2.0 capable
  - 2 PCIe x8 G3 FHHL slots with x16 connector
  - 3 PCIe x8 G3 FHHL slots
  - 1 PCIe x8 G3 FHHL slot for default LAN adapter

MTM 9009-42A
Power S924
(GA1 2/2018)

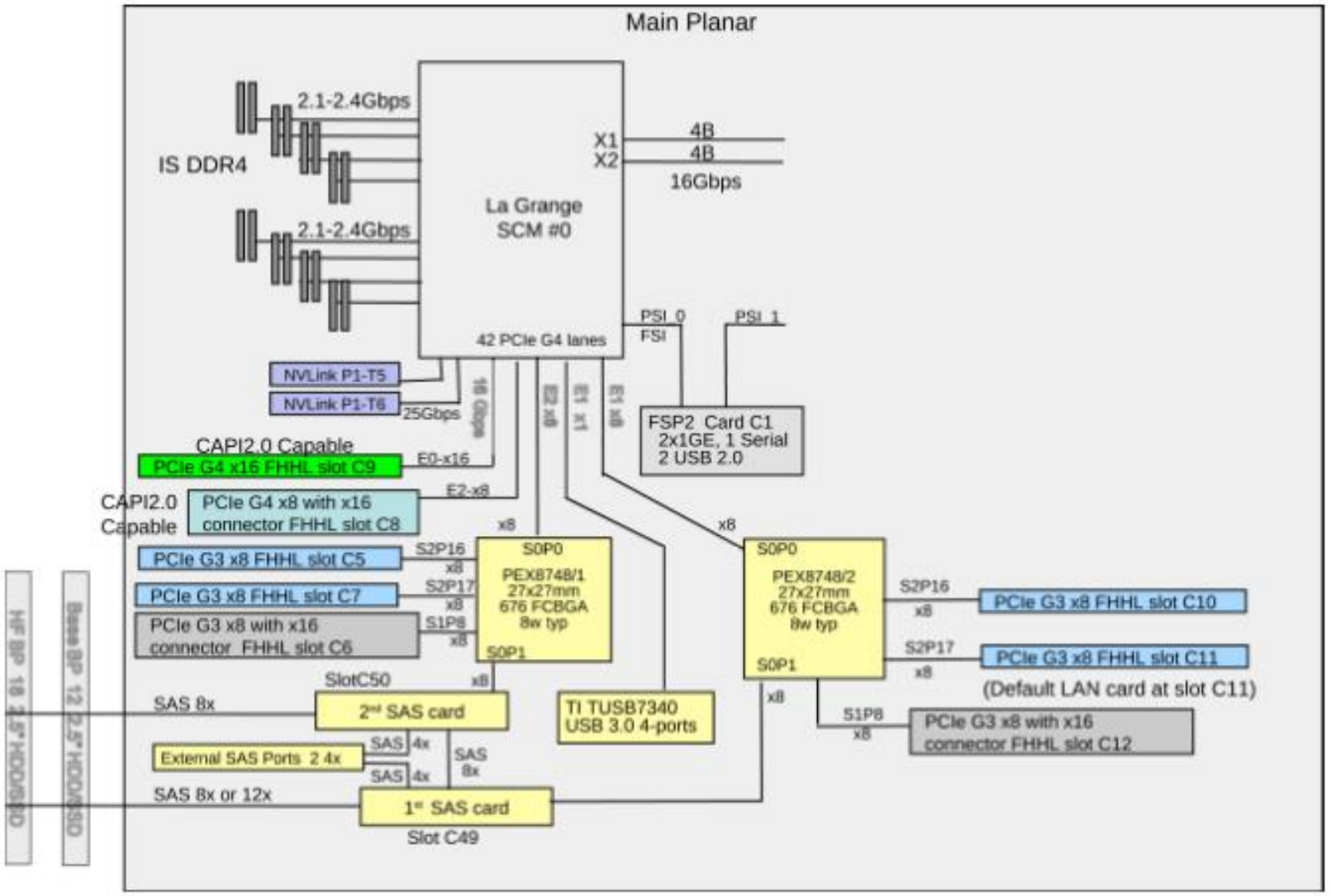
MEX Accelerator Module
(GA3 2Q19)
CAPI & GPU adapters
3Hombres Card

IO Drawer
MEX IO 4U Drawer
BearMountain Card

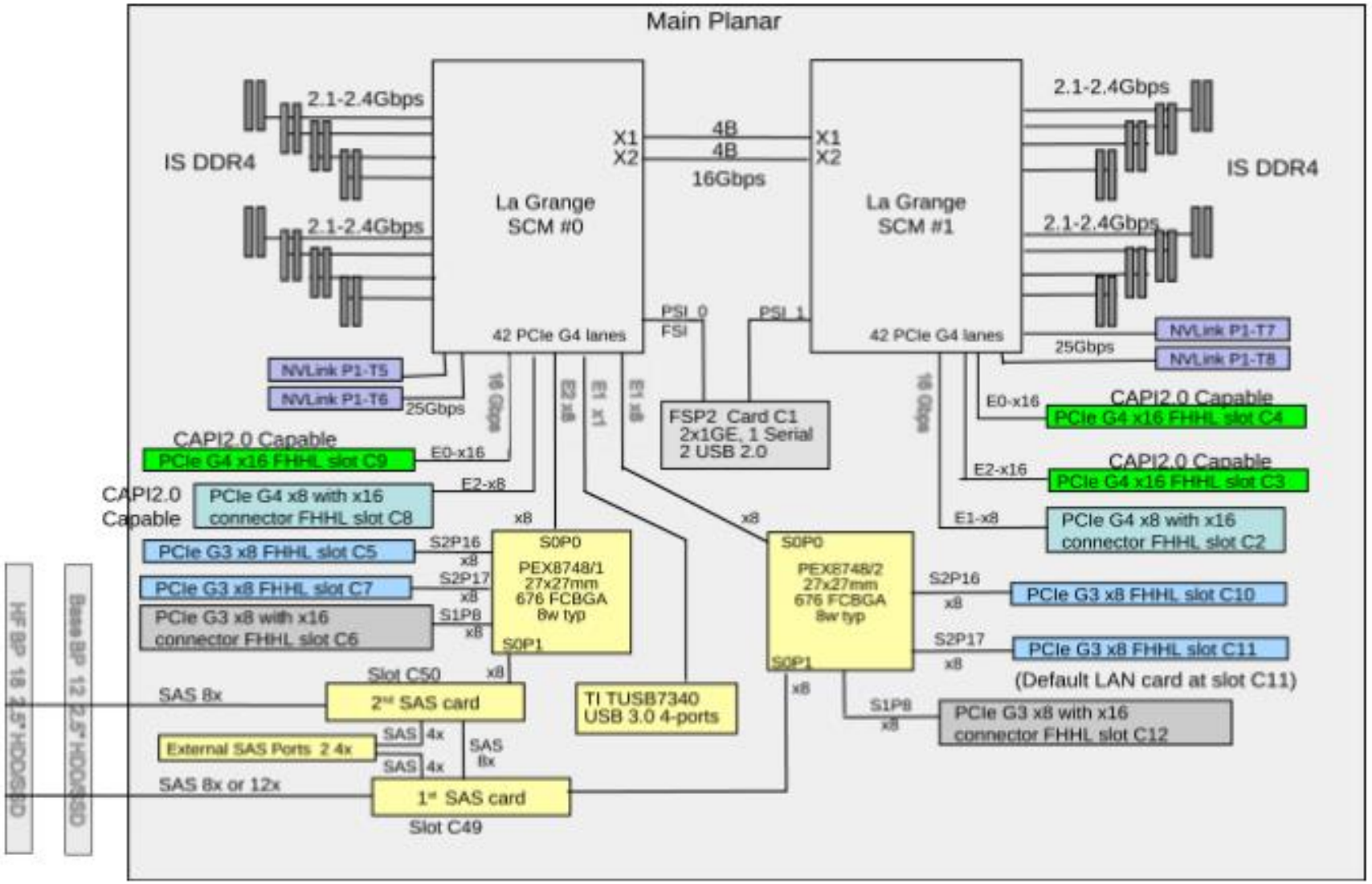
Disk Drawer
Slider HDD/SSD 2U Drawer
Homerun HDD/SSD 2U Drawer

- **OS**
  - AIX, IBMi, Linux
- **Hypervisor**
  - PowerVM with BC
  - OPAL/BM or KVM with Linux & SC (GA2 3Q18)
- **RAS**
  - P9 Nimbus RAS
  - Concurrent maintenance on HDD/SSD
  - Concurrent maintenance on PCI adapters
  - Concurrent maintenance & redundant cooling
  - Concurrent maintenance & redundant power supply
    - 2+2 1400W PS, 200-240 VAC
  - Customer setup, install & repair
- **Energy Efficiency**
  - 80+ Platinum Power Supply Compliant
  - EPA Energy Star Compliant
  - Built-in Advanced Thermal & Power Management
- **Service Interface**
  - FSP2 service processor
  - Light-Path op-panel & FRU LEDs
- **Native I/O**
  - Host USB 3.0: 1 front, 2 rear, 1 for internal RDX
  - System Management 1GE (2 rear)
  - Serial (rear), USB 2.0 (2 rear)
- **System management**
  - NovaLink, PowerVC, HMC (optional)
- **Certifications**
  - FCC: Class A for Servers
  - Acoustics: Data Center Category 1A
  - Environment: ASHRAE A2
    - 10-35C, 20-80% RH, 3050m max

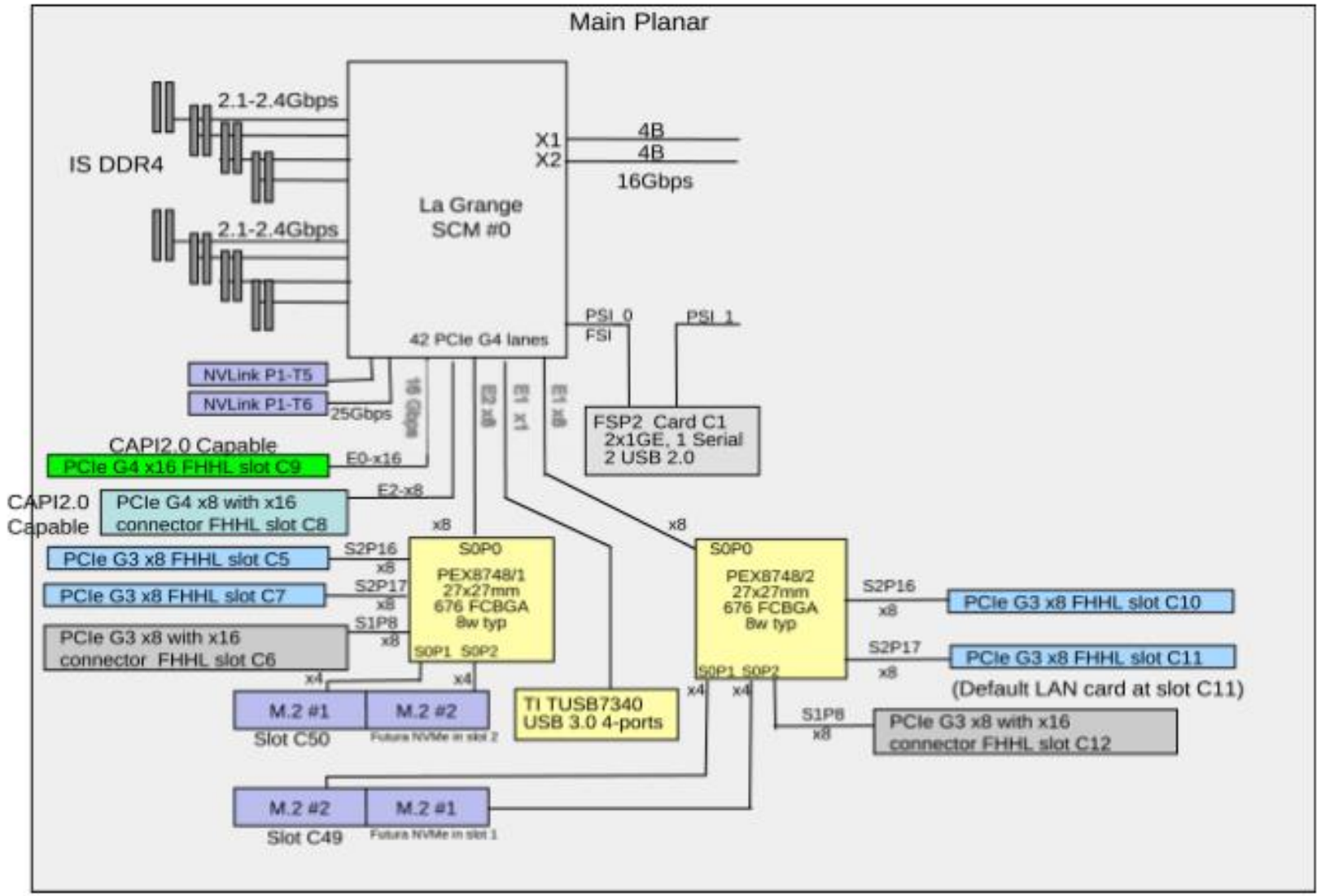
ZZ 2S4U



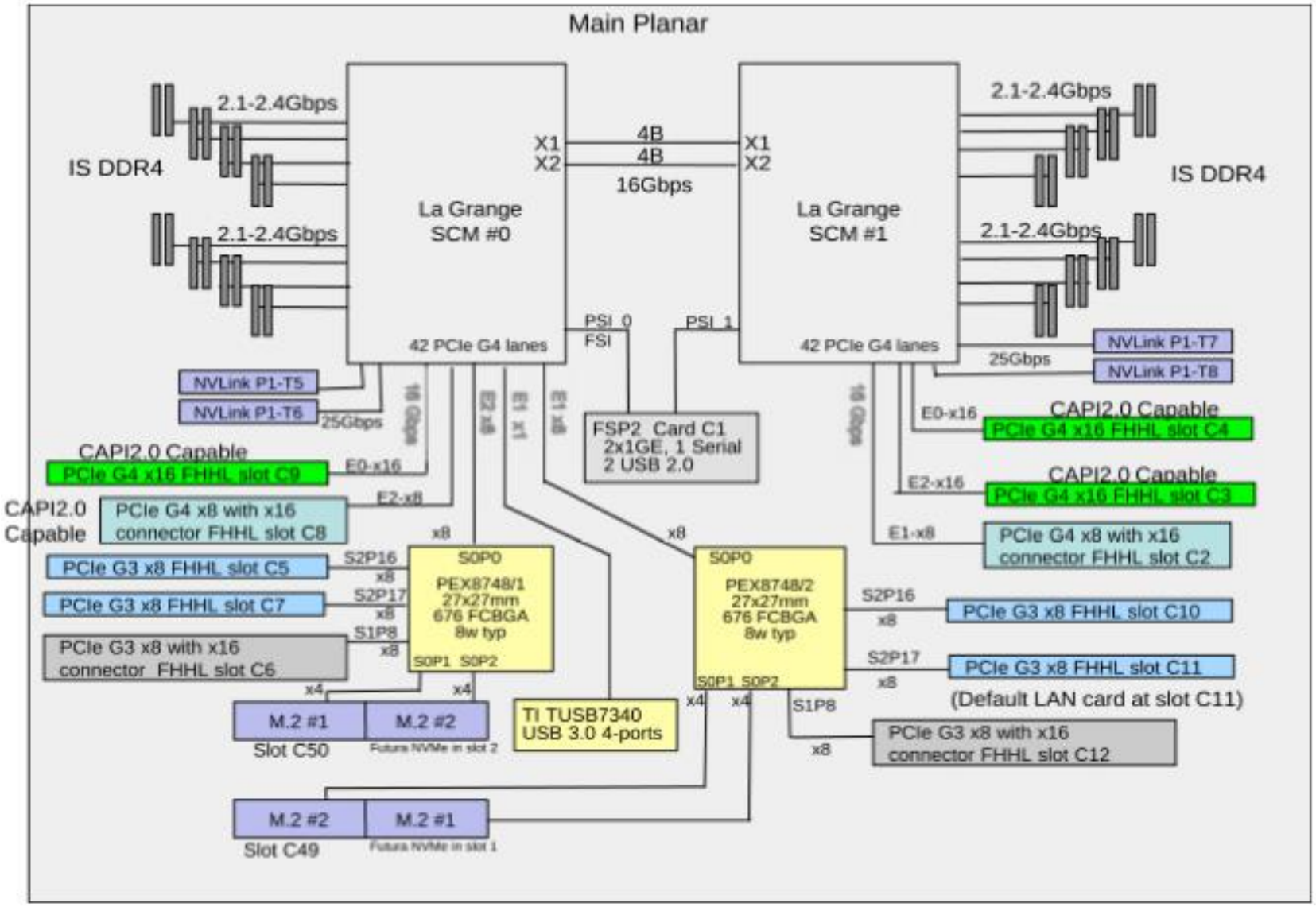
ZZ 1S4U with SAS RAID Cards - PLX G3 Switch



ZZ 2S4U with SAS RAID Cards - PLX G3 Switch



ZZ 1S4U with NVMe Cards - PLX G3 Switch



ZZ 2S4U with NVMe Cards - PLX G3 Switch

Bulleted Description of ZZ System

ZZ SYSTEM DESCRIPTION

ZZ Parts Codenames

Card Name	Description
Gibbons	System Planar
Beard	Service Processor Card (FSP2)
Tejas	TPM Card
Deguello	4U Low Function DASD BP - 12 SFF HDD/SSD, w/ or w/o RDX
Eliminator	4U Hi Function DASD BP - 18 SFF HDD/SSD w/ SAS Expanders
Dusty	Power On/Off Card
Hill	LCD Display Card
Futura	NVMe Adapter Card
Fandango	2U Low Function / Split DASD BP - 8 SFF HDD/SSD
Antenna	4U Hi Function DASD BP w/ RDX - 12 SFF HDD/SSD w/ SAS Expander
Afterburner	LP PCI-Like NV Link Cable Paddle Card
El Loco	LP PCI-Like NV Link Sideband Signal Card
3 Hobmres	FFHL PCI-Like NV Link Cable & Sideband Signal Card
Recycler 2U/4U	Jasper (RAID SuperCap) Interposers 2U & 4U

The ZZ 4U server will be positioned as an entry-level SMP (Symmetric MultiProcessor) sever based on the POWER 9 superscalar microprocessor. Each POWER 9 processor module can provide up to 12 cores (n-ways).

The 41A will be offered in a 4U deskside tower or a 19" rack mount drawer.

The 41A CEC unit will contain/support the following:

- One system planar board
  - Up to two P9 processor modules
  - Two PCIe switch chips
  - One or two Crocodile SAS controller(s) (SOLSTICE or GXP) or one or two NVMe M.2 SSD cards (FUTURA)
  - One FSP service chip
  - Two NVLink cards
  - Quantity 32 DDR4 Industry Standard (IS) DIMM slots (with 2 processors present) (quantity 16 DIMM slots with 1 processor present)
- No memory riser cards are used this 42A 4U server.
- One DASD backplane
  - Which supports 12 or 18 SFF disk bays (depending on the backplane type)
  - No 1.8-inch SSD module carge is offered/supported on ZZ servers.
  - One RDX bay (only available with x12 disk bays, not available with x18 disk bays)
  - No DVD bay
  - No tape bay is supported/provided on ZZ servers
  - Hardware RAID 0, 10 or RAID 5/6 (with hot spare) (depending on the backplane type)

- One PCIe x16 Gen 4, full height, half length slot
  - This slot can contain a CAPI capable card or an I/O drawer interface card.
- Two PCIe x16 Gen 3, full height, half length slots (NOT CAPI)
- One PCIe x8 Gen 4, full height, half length slot (with x16 connector) (CAPI)
- Four PCIe x8 Gen 3, full height, half length slots (one of these slots is used for the required base LAN adapter)
- All PCIe slots are concurrently maintainable.
- Four blowers
- A 41A requires four 900W AC power supplies (900W) (for tower and rack version) or two 1400W AC power supplies (for rack version) (DC power NOT supported on ZZ).

The 42A will be offered in a 4U 19” rack mount drawer.

The 42A CEC unit will contain/support the following:

- One system planar board
  - Up to two P9 processor modules
  - Two PCIe switch chips
  - One or two Crocodile SAS controller(s) (SOLSTICE or GXP) or one or two NVMe M.2 SSD cards (FUTURA)
  - One FSP service chip
  - Two NVLink cards
  - Quantity 32 DDR4 Industry Standard (IS) DIMM slots (with 2 processors present) (quantity 16 DIMM slots with 1 processor present)
- No memory riser cards are used this 42A 4U server.
- One DASD backplane
  - Which supports 12 or 18 SFF disk bays (depending on the backplane type)
  - No 1.8-inch SSD module carge is offered/supported on ZZ servers.
  - One RDX bay (only available with x12 disk bays, not available with x18 disk bays)
  - No DVD bay
  - No tape bay is supported/provided on ZZ servers
  - Hardware RAID 0, 10 or RAID 5/6 (with hot spare) (depending on the backplane type)

- PCIe slots with two processors present:
  - Three PCIe x16 Gen 4, full height, half length slots
    - These slots can contain a CAPI capable card or an I/O drawer interface card.
  - Two PCIe x16 Gen 3, full height, half length slots (NOT CAPI)
  - Two PCIe x8 Gen 4, full height, half length slots (with x16 connector) (CAPI)
  - Four PCIe x8 Gen 3, full height, half length slots (one of these slots is used for the required base LAN adapter)
- PCIe slots with one processor present:
  - One PCIe x16 Gen 4, full height, half length slot
    - This slot can contain a CAPI capable card or an I/O drawer interface card.
  - Two PCIe x16 Gen 3, full height, half length slots (NOT CAPI)
  - One PCIe x8 Gen 4, full height, half length slot (with x16 connector) (CAPI)
  - Four PCIe x8 Gen 3, full height, half length slots (one of these slots is used for the required base LAN adapter)
- All PCIe slots are concurrently maintainable.
- Six blowers
- A 42A requires four AC power supplies (1400W) (DC power NOT supported on ZZ)

Side-by-side Comparison of ZZ and Tuleta

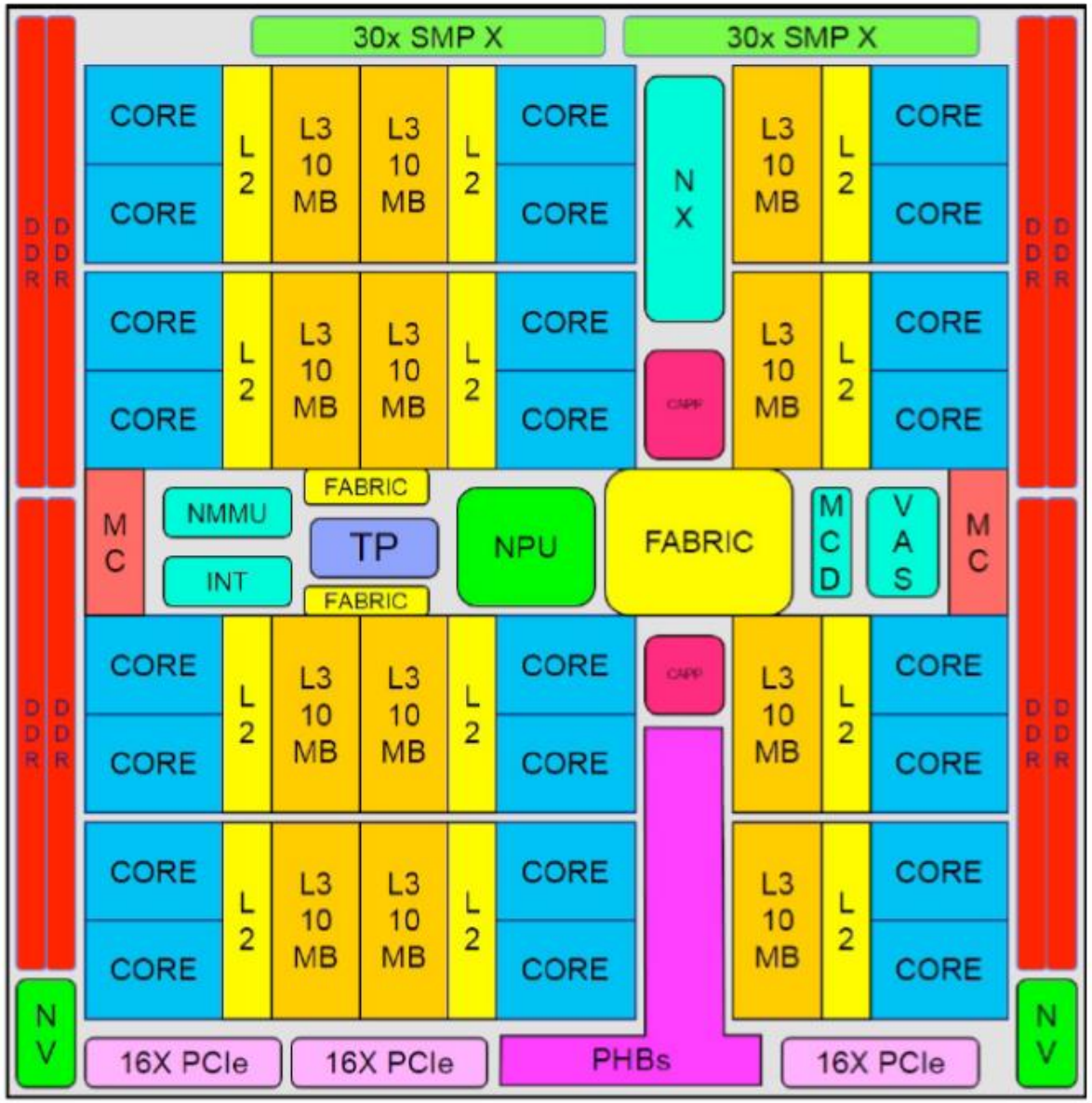
ZZ VS. TULETA

Description	ZZ 2S4U	Tuleta 2S4U
*** Processor & Cache ***		
Processor	2 P9 SCM sockets up to 12 fused cores per socket	2 Murano DCM Sockets up to 12 cores per socket
Pluggable Processor Module	Yes	
Max N-Way	24	
L3 Cache	10MB/core	8MB/core
Threads	8/core	
LPAR max	480	
Capacity on Demand	Available (not offered in entry server)	
*** Memory ***		
Memory Slots & Type	32 IS RDIMM 2133/2400 MHz	16 Centaur DIMM 1600 MHz
DIMM Offerings	DDR4 8, 16, 32, 64, 128GB	DDR3 16, 32, 64GB
Memory Capacity (max)	4TB	1TB
Memory Bandwidth (100% DRAM utilization)	153 GB/s per socket	192 GB/s per socket
Memory Cache	N/A	16MB/buffer
Memory Chipkill	Yes	Yes
Memory Spare	No	Yes (more spared DRAM)
Memory Mirroring	No	Yes
Memory Compression	Yes	
RA/CIE/UIRA (per field data)	Meets compliance targets	better
Memory Hot-Plug	No	
*** Storage (DAS) ***		
Storage (DAS)	Crocodile Gen2 6Gb SAS	
Storage (DAS default)	JBOD, RAID 0,10,5,6 12 SFF (2.5") HDD/SSD	
Split Disk Feature	Yes (6+6)	
Storage High Performance RAID (optional)	Dual Controller, dual Write Cache RAID 0,5,6,10,5T2,6T2,10T2 (High Performance)	
	18 SFF (2.5") HDD/SSD	18 SFF (2.5") HDD/SSD and 8 1.8" SSD
	2 SAS 4x ports	
	Dynamic Tiering, Write Cache compression	

Description	ZZ 2S4U	Tuleta 2S4U
Concurrent Maintenance Disk	Yes / Yes	
DVD Bay	No	1 Slimline
Tape Drive Bay	Yes, RDX bay	No
*** LAN ***		
LAN (default)	Austin Broadcom 5719 4x1Gb	
		No SRIOV
*** I/O Expansion ***		
I/O Bandwidth (total)	320 GB/s	192 GB/s
PCIe Slots	3 PCIe x16 G4 FHHL slots 2 PCIe x8 G4 FHHL slots 2 PCIe x8 G3 FHHL slots w/ x16 connector 4 PCIe x8 G3 FHHL slots	4 PCIe x16 G3 FHFL slots 6 PCIe x8 G3 FHFL slots
PCIe Concurrent Maintenance	Yes	
CAPI Mode	C8: PCIe x8 G4 slot (1st socket) C9: PCIe x16 G4 slot (1st socket) C3: PCIe x16 G4 slot (2nd socket) C4: PCIe x16 G4 slot (2nd socket)	C7: PCIe x16 G3 slot (1st socket) C3: PCIe x16 G3 slot (2nd socket)
I/O Expansion Slot	3 PCIe x16 G4 slots	4 PCIe x16 slots
Host USB Port	4 USB 3.0	
*** Energy Management ***		
Integrated AEM	OCC (inside P9 Chips)	OCC (inside Murano Chips)
*** Native I/O ***		
FSP Ports	2 HMC, 1 Serial, 2 USB 2.0	
UPS	Via USB 2.0 port	
*** Reliability / Serviceability / Service Management ***		
Redundant Power	Yes	
Concurrent Maintenance Power	Yes	
Redundant Cooling	Yes	
Concurrent Maintenance Cooling Fans	Yes	
CRU/FRU LEDs	Yes	
Op-Panel	Yes, Light Path	
Service Processor	FPS2	
System management Console	Optional	
*** Mechanical Packaging ***		

In-depth View of ZZ Systems

ZZ INTERNALS



POWER 9 Processor Block Diagram

ZZ P9 DD2.21 Attributes (v11-Final 12/21/2017)

Model	P9 Cores & Type	P9 Target CLY	Nominal Fixed Freq	Nominal Power	Turbo Freq	Turbo Power	Max Freq	CCIN	Feature Code
ZZ 2S4U - S924 9009-42A (2S or 1S upgradeable) SC w/ BM or KVM	12 BC 10 BC 8 BC 20 SC	50% 70% 50% 70%	2.75 GHz 2.9 GHz 3.3 GHz 2.9 GHz	225W 225W 225W 225W	3.4 GHz 3.5 GHz 3.8 GHz 3.5 GHz	325W 300W 300W 300W	3.9 GHz 3.9 GHz 4.0 GHz 3.9 GHz	5C29 5C25 5C28 TBD	EP1G EP1F EP1E EP1K
ZZ 1S4U - S914 9009-41A (Tower)	6 BC 4 BC	100% 100%	2.3 GHz 2.3 GHz	130W 130W	2.8 GHz 2.8 GHz	160W 160W	3.8 GHz 3.8 GHz	5C23 5C22	EP11 EP10
ZZ 1S4U - S914 9009-41A (Rack)	8 BC 6 BC 4 BC	100% 100% 100%	2.8 GHz 2.3 GHz 2.3 GHz	190W 130W 130W	3.15 GHz 2.8 GHz 2.8 GHz	225W 160W 160W	3.8 GHz 3.8 GHz 3.8 GHz	5C31 5C23 5C22	EP12 EP11 EP10
ZZ 2S2U - S922 9009-22A (2S or 1S upgradeable)	10 BC 8 BC 4 BC	100% 50% 100%	2.5 GHz 3.0 GHz 2.3 GHz	190W 190W 130W	2.9 GHz 3.4 GHz 2.8 GHz	225W 225W 160W	3.8 GHz 3.9 GHz 3.8 GHz	5C24 5C27 5C22	EP19 EP18 EP16
ZZ 2S2U - S922L 9008-22L (2S or 1S upgradeable) with BM or KVM	24 SC 20 SC 16 SC	100% 100% 50%	2.3 GHz 2.5 GHz 3.0 GHz	190W 190W 190W	2.7 GHz 2.9 GHz 3.4 GHz	225W 225W 225W	3.8 GHz 3.8 GHz 3.9 GHz	TBD TBD TBD	ELPS ELPR ELPQ
ZZ 2S2U - S922L 9008-22L (2S or 1S upgradeable) with PowerVM	12 BC 10 BC 8 BC	100% 100% 50%	2.3 GHz 2.5 GHz 3.0 GHz	190W 190W 190W	2.7 GHz 2.9 GHz 3.4 GHz	225W 225W 225W	3.8 GHz 3.8 GHz 3.9 GHz	5C26 5C24 5C27	ELPX ELPW ELPV

POWER 9 Processor Attributes

3.2 IS RDIMM Features

RDIMM Size	DRAM Density	DIMM Physical Rank	DRAM Type	RDIMM Height	Stack DRAM	# DRAM	Data Rate (1 RDIMM per Channel) (Mbps)	Data Rate[1] (2 RDIMMs per Channel) (Mbps)
8GB[1]	4Gb	1Rx4	1.2V	30mm	NA	18	2400	2133
16GB[2]	4Gb	2Rx4	1.2V	30mm	NA	36	2400	2133
16GB	8Gb	1Rx4	1.2V	30mm	NA	18	2400	2133
32GB	8Gb	2Rx4	1.2V	30mm	NA	36	2400	2133
64GB	8Gb	2Rx4	1.2V	30mm	2H 3DS	36	2400	2133
128GB	8Gb	2Rx4	1.2V	30mm	4H 3DS	36	2400	2133

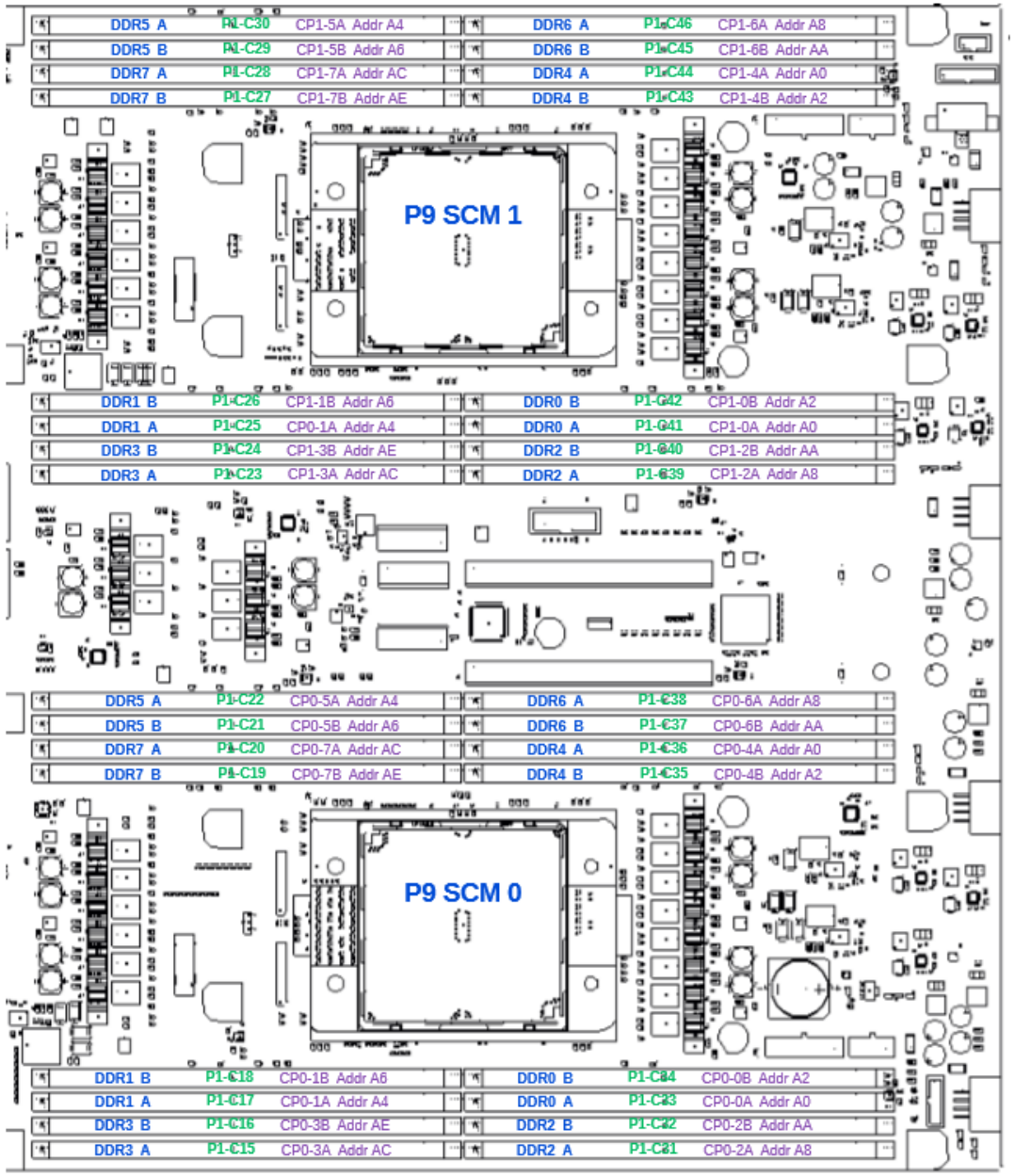
3.3 Minimum Memory Mainstore

ZZ 1S4U	ZZ 2S4U	ZZ 2S4U w/ 1 Socket Populated	ZZ 2S2U w/ 1 Socket Populated	ZZ 2S2U	ZZ-L 2S2U w/ 1 Socket Populated	ZZ-L 2S2U
2x8 GB	4x8 GB	2x8 GB	2x8 GB	4x8 GB	2x8 GB	4x8 GB

ISDIMM Configurations

DIMM Layout on Gibbons Planar

REAR



FRONT

Memory DIMM Ordering/Plugging Rules

- A 41A and 42A/42H with a single processor installed has 16 available DIMM slots.
- A 42A/42H with two processors installed has 32 available DIMM slots.

<u>General DIMM placement rules are listed as follows:</u>

- Each 41A and 42A/42H DIMM feature code equates to a single physical DIMM.

- Model 41A and 42A/42H
  - ❑ All 41A and 42A/42H memory features must be ordered in even quantities.
  - ❑ All physical DIMMs must be placed/installed in pairs (DIMM pairs).

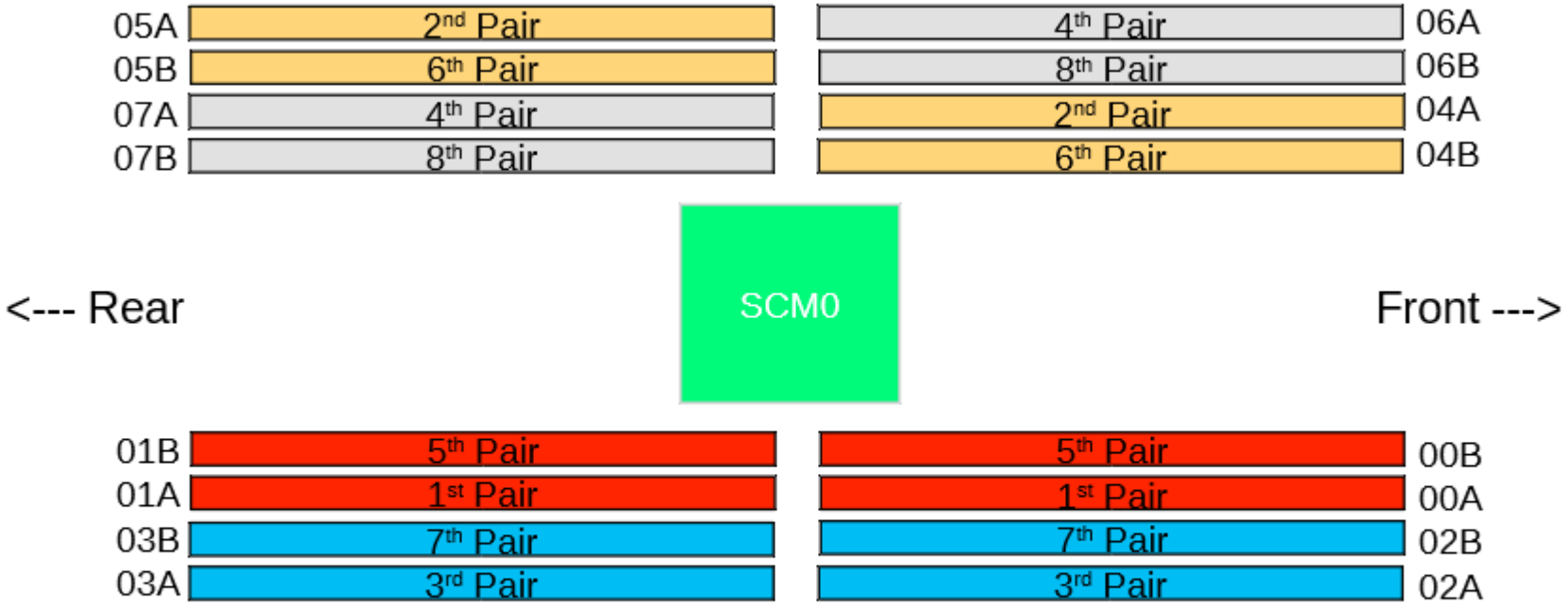
- Each DIMM within a DIMM pair must be of the same capacity and same type.

- There ARE DIMM quading placement rules for the 41A or the 42A/42H.

- No mixing of 1R DIMMs and 2R DIMMs on single drop within a MCU Group because they run at different DIMM data rates.

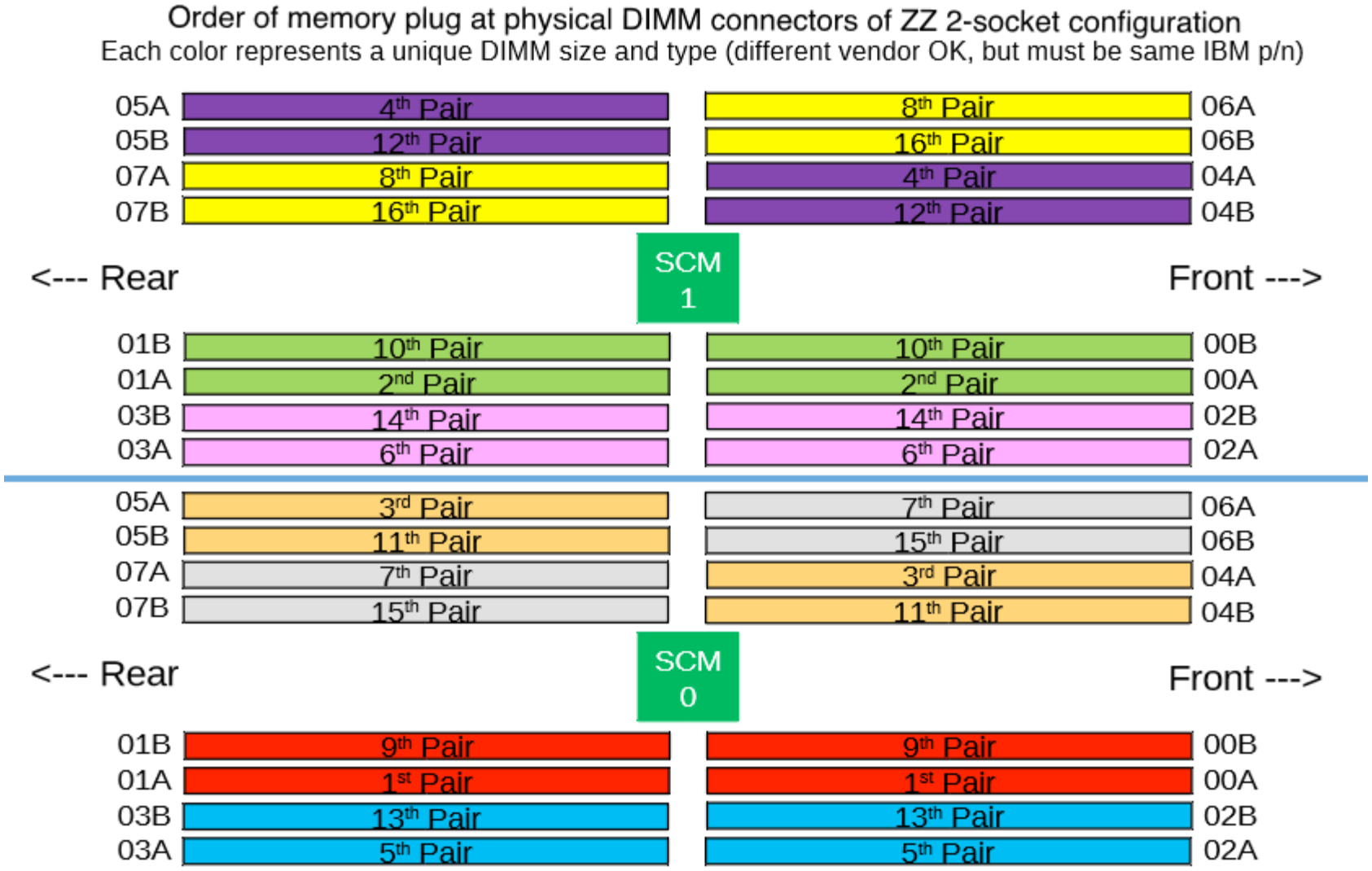
- Supported DIMM plug orders of each P9 SCM module are 2, 4, 6, 8, 12, 16. Note: No support of 10 and 14 DIMMs behind each P9 SCM module

Memory DIMM Ordering/Plugging Rules (1S4U)



Each color represents a unique DIMM size and type (different vendor OK, but must be same IBM p/n)

Memory DIMM Ordering/Plugging Rules (2S4U)



ZZ Storage Options

Features	ZZ 1S4U & 2S4U	ZZ 2S2U	Use Case
Storage (OS Boot)	1 or 2 NVMe SSD card (2 M.2 modules on each card)	1 or 2 NVMe SSD card (2 M.2 modules on each card)	OS Boot (AIX & Linux)
Storage	1 Solstice Crocodile 6Gb adapter JBOD, RAID 0,5,6,10	1 Solstice Crocodile 6Gb adapter JBOD, RAID 0,5,6,10	Low cost RAID for OS or OS and local data
	12 SFF bays + 1 RDX bay (Deguello backplane)	8 SFF bays (Fandango backplane)	
Storage – split	2 Solstice Crocodile 6Gb adapters JBOD, RAID 0,5,6,10	2 Solstice Crocodile 6Gb adapters JBOD, RAID 0,5,6,10	Redundant OS, dual partitions with or without an external storage system for large remote data
	6+6 SFF bays + 1 RDX bay (Deguello backplane)	4+4 SFF bays (Fandango backplane)	
Storage – high function	2 GXP Crocodile 6Gb adapters RAID 0,5,6,10,5T2,6T2,10T2 + 2 ext SAS ports	1 Coupe Crocodile 6Gb adapter RAID 0,5,6,10 + 1 ext SAS port	4U: local data resilience and high availability with easy tier RAID arrays
	18 SFF bays (Eliminator backplane)	8 SFF bays (Fandango backplane)	
Storage – high function w/ RDX	2 GXP Crocodile 6Gb adapters RAID 0,5,6,10,5T2,6T2,10T2 + 2 ext SAS ports	n/a	
	12 SFF bays + 1 RDX bay (Antenna backplane)	n/a	

- Resilience & high availability
- An internal RDX drive option in 4U provides local data backup for IBM i customers
  - ✓ the RDX drive utilizes one of the USB3.0 ports from the Gibbons-embedded USB3.0 controller.
- Reuse Tuleta 6Gb RAID adapters
  - ✓ NOTE: Coupe single cache single controller RAID feature. Linux support is at GA1 2/2018. AIX support at GA2 9/2018. No IBM i support.

Default Storage Using Solstice RAID Adapter

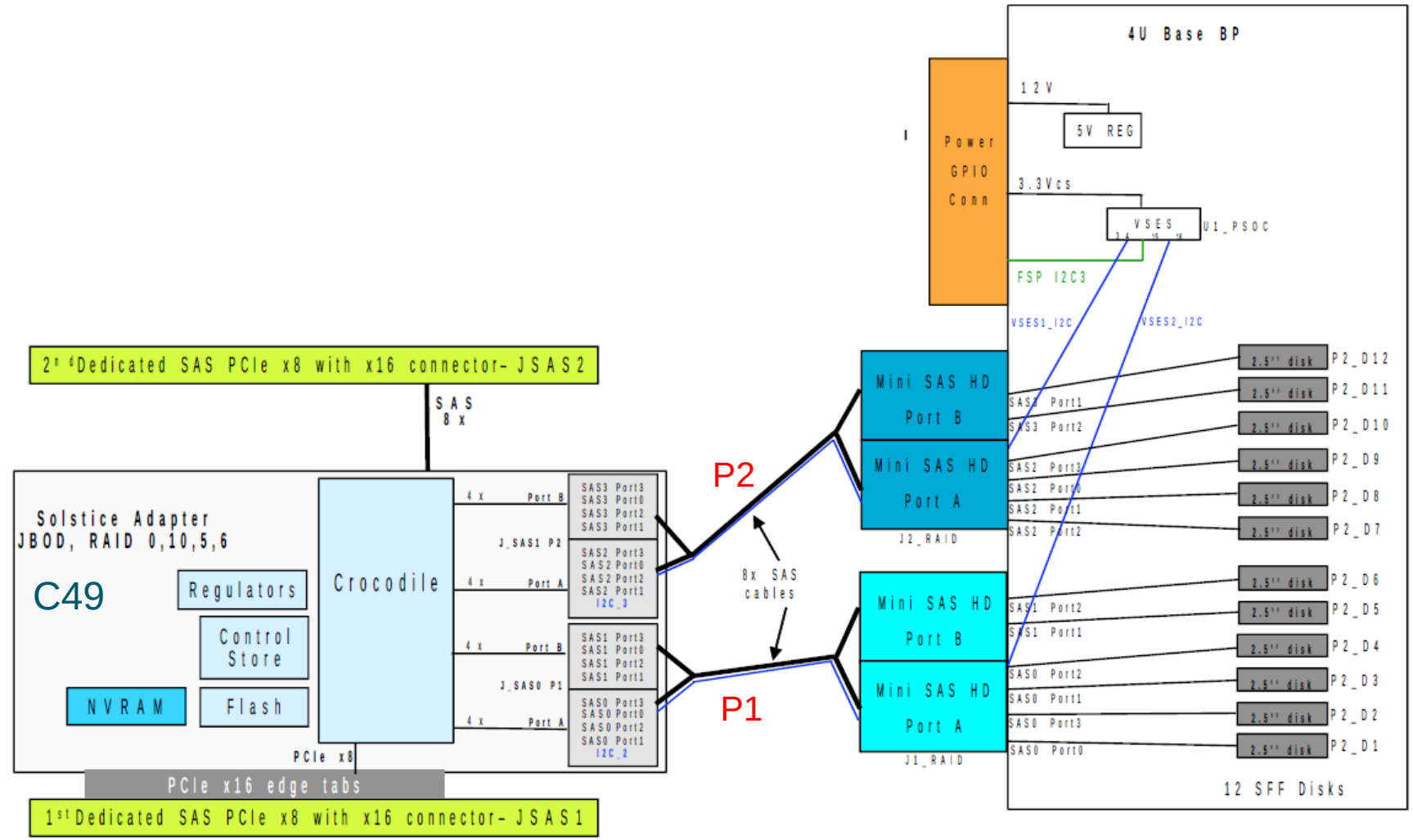


Illustration 19: ZZ 4U Default Storage Configuration Using Solstice RAID Adapter

- One Solstice Crocodile 6Gb JBOD & RAID 0,10,5,6 adapter
- One RDX bay
- One Deguello default disk backplane which supports 12x SFF (2.5") bays
- Two 8x miniSAS HD cables

Note: The PSOC module on the Deguello backplane is segmented into three parts:

- Slot map information #1
- Slot map information #2
- FRU VPD

Split Disk 6+6 Feature using Solstice Adapters

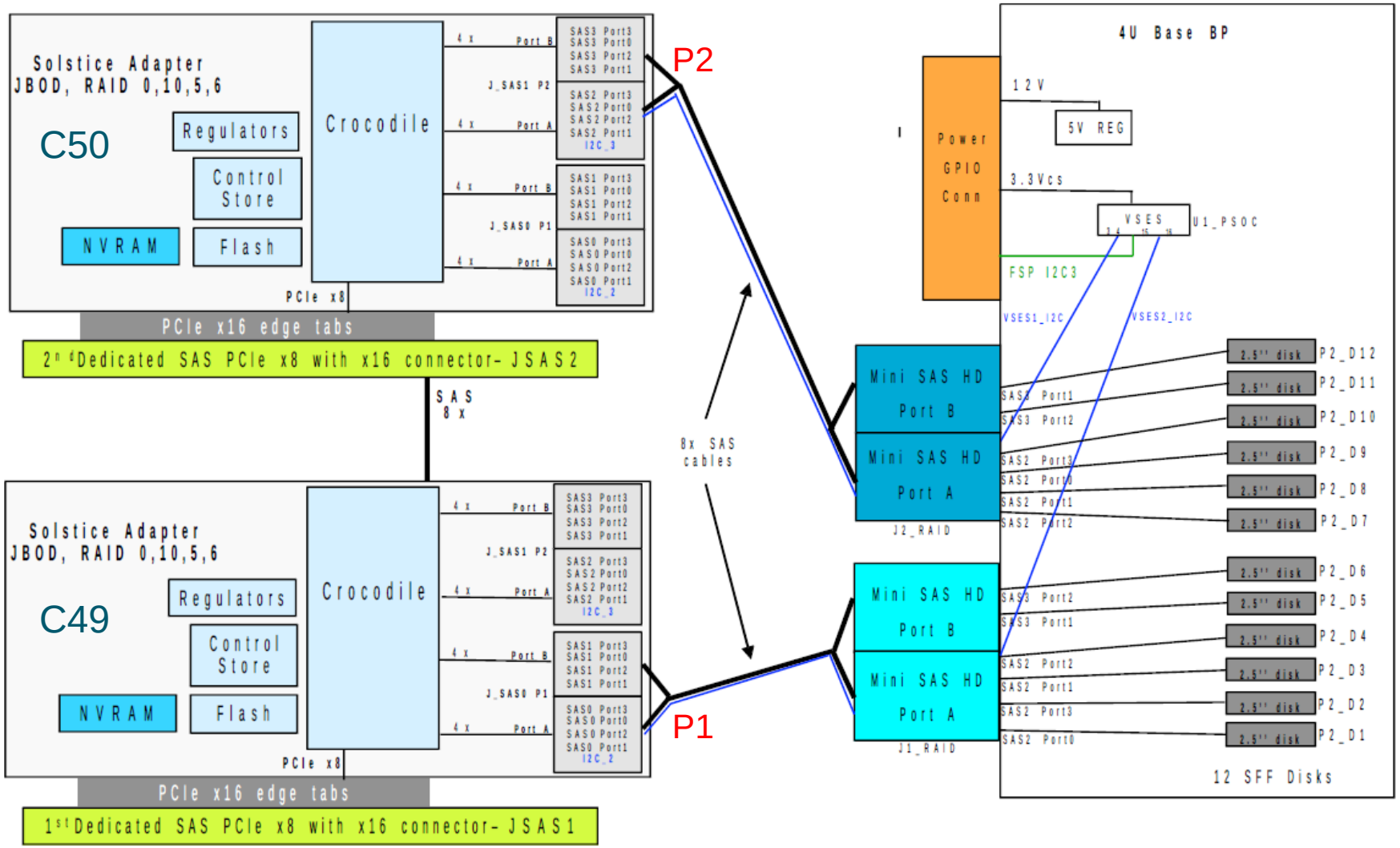


Illustration 25: ZZ 4U Split Disk 6+6 Feature using Solstice Adapters

- Two Solstice Crocodile 6Gb RAID adapters
- One RDX bay
- One Deguello default disk backplane which supports 12x SFF (2.5") bays
- Two 8x miniSAS HD cables

Note: The PSOC module on the Deguello backplane is segmented into three parts:

- Slot map information #1
- Slot map information #2
- FRU VPD

High Performance RAID 0, 5, 6, 10, 5T2, 6T2, 10T2 Using GXP

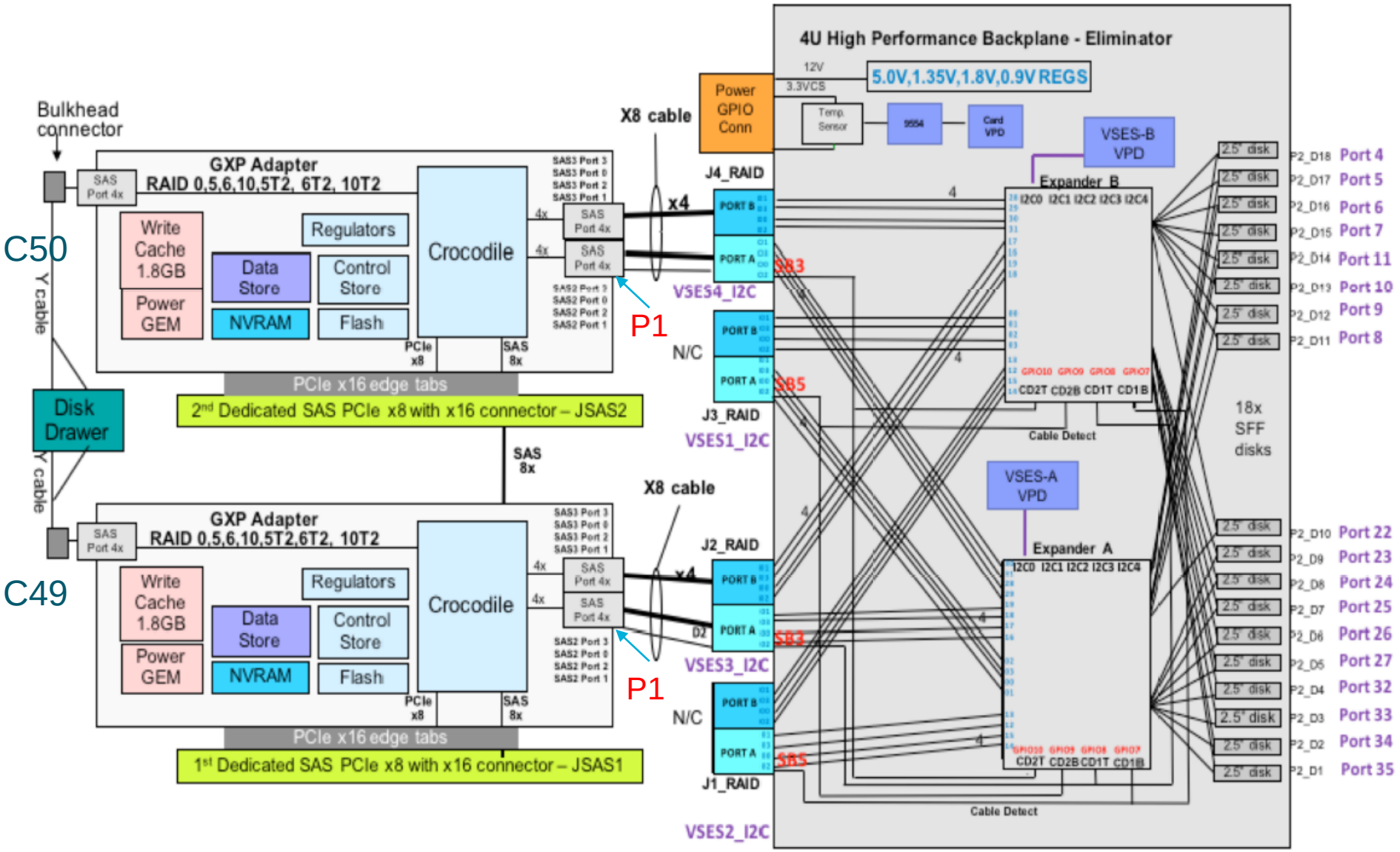


Illustration 27: ZZ 4U High Performance RAID 0, 5, 6, 10, 5T2, 6T2, 10T2 Feature Using the GXP Adapter

- Two GXP Crocodile high performance 6Gb RAID 0,5,6,10,5T2,6T2,10T2 adapters
- One Eliminator high-performance 4U 12Gb disk backplane which supports 18x SFF (2.5") bays
- Two 8x miniSAS HD cables

High Performance RAID 0,5,6,10,5T2,6T2,10T2 and RDX Feature Using GXP

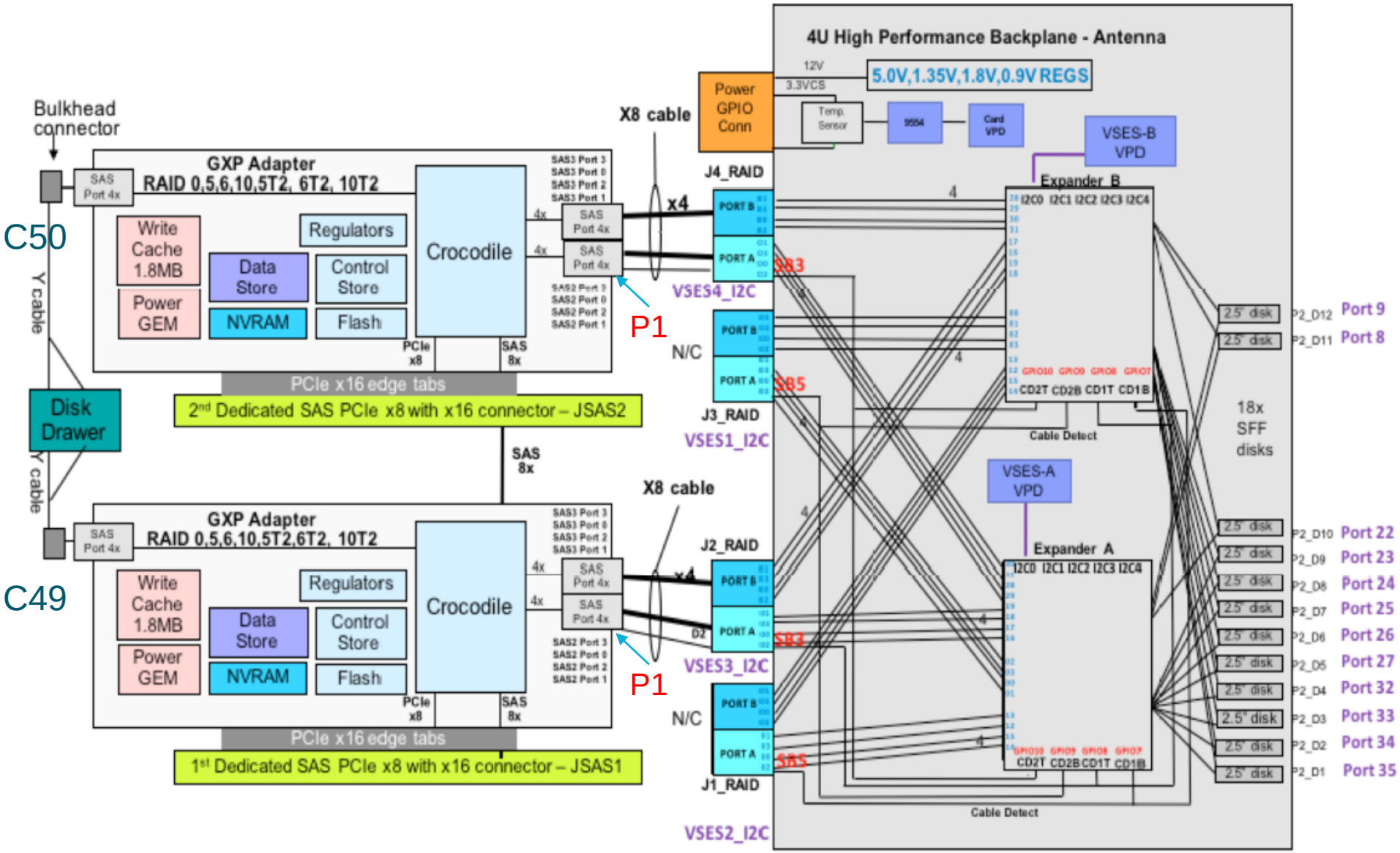
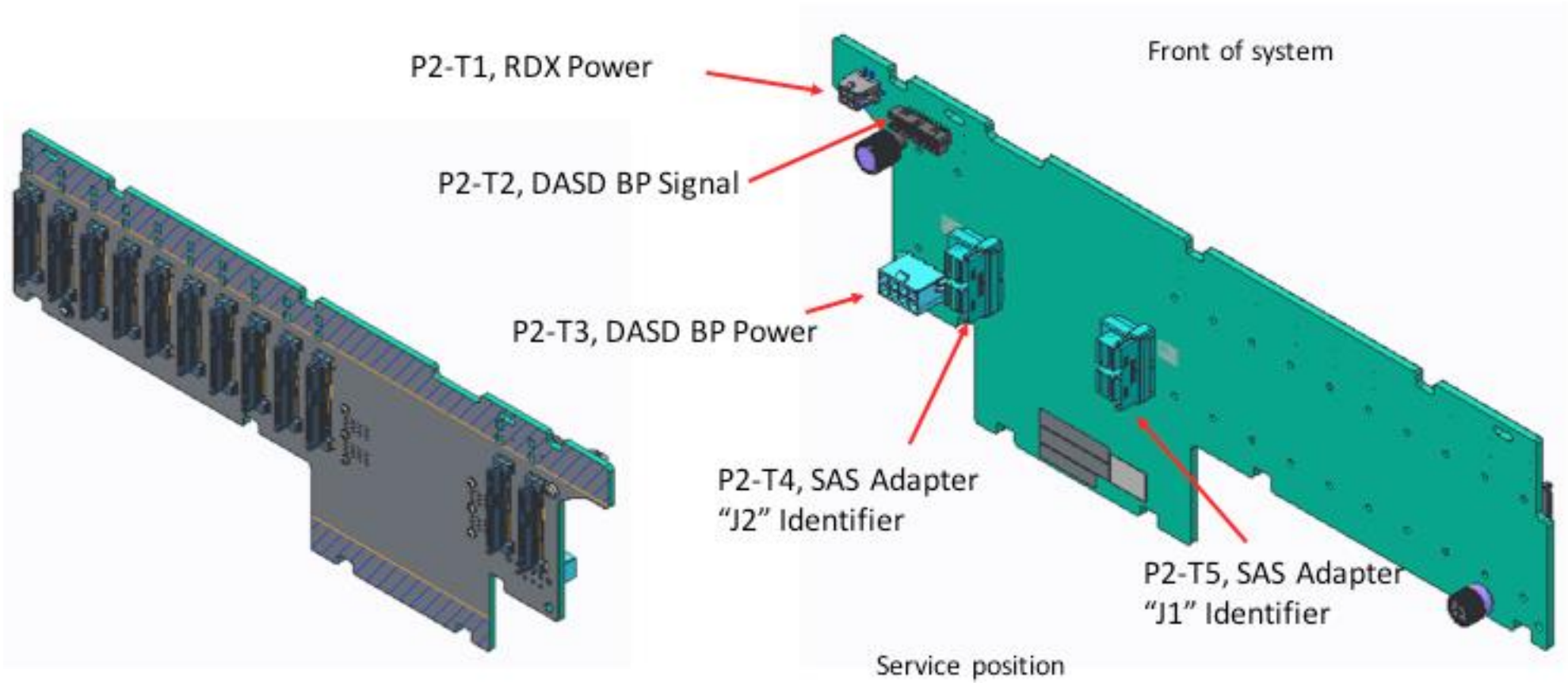
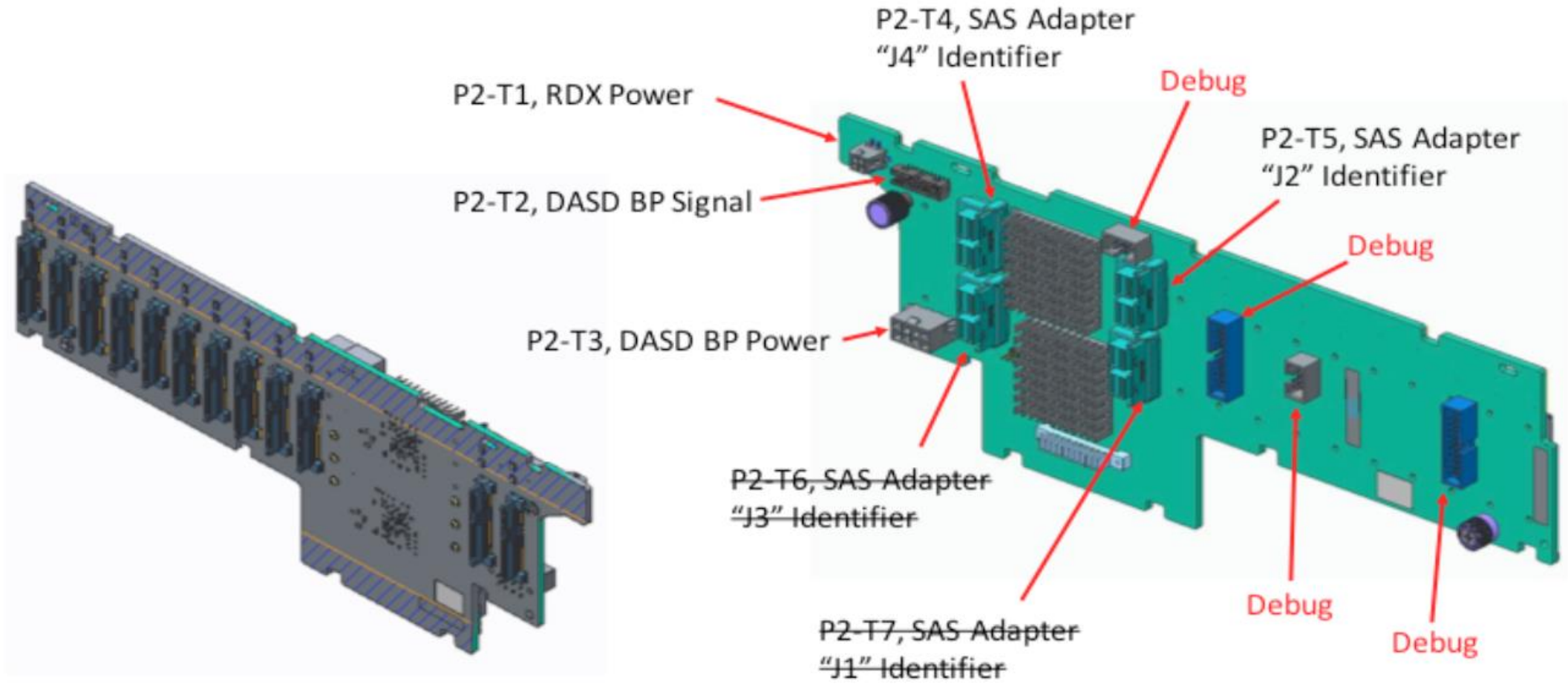


Illustration 30: ZZ 4U High Performance RAID 0,5,6,10,5T2,6T2,10T2 and RDX Feature Using the GXP

- Two GXP Crocodile high performance 6Gb RAID 0,5,6,10,5T2,6T2,10T2 adapters and one RDX device
- One Antenna high performance 4U 12Gb disk backplane which supports 12x SFF (2.5") bays
- Two 8x miniSAS HD cables and an internal USB cable (the number of front USB ports is reduced from 2 to 1)

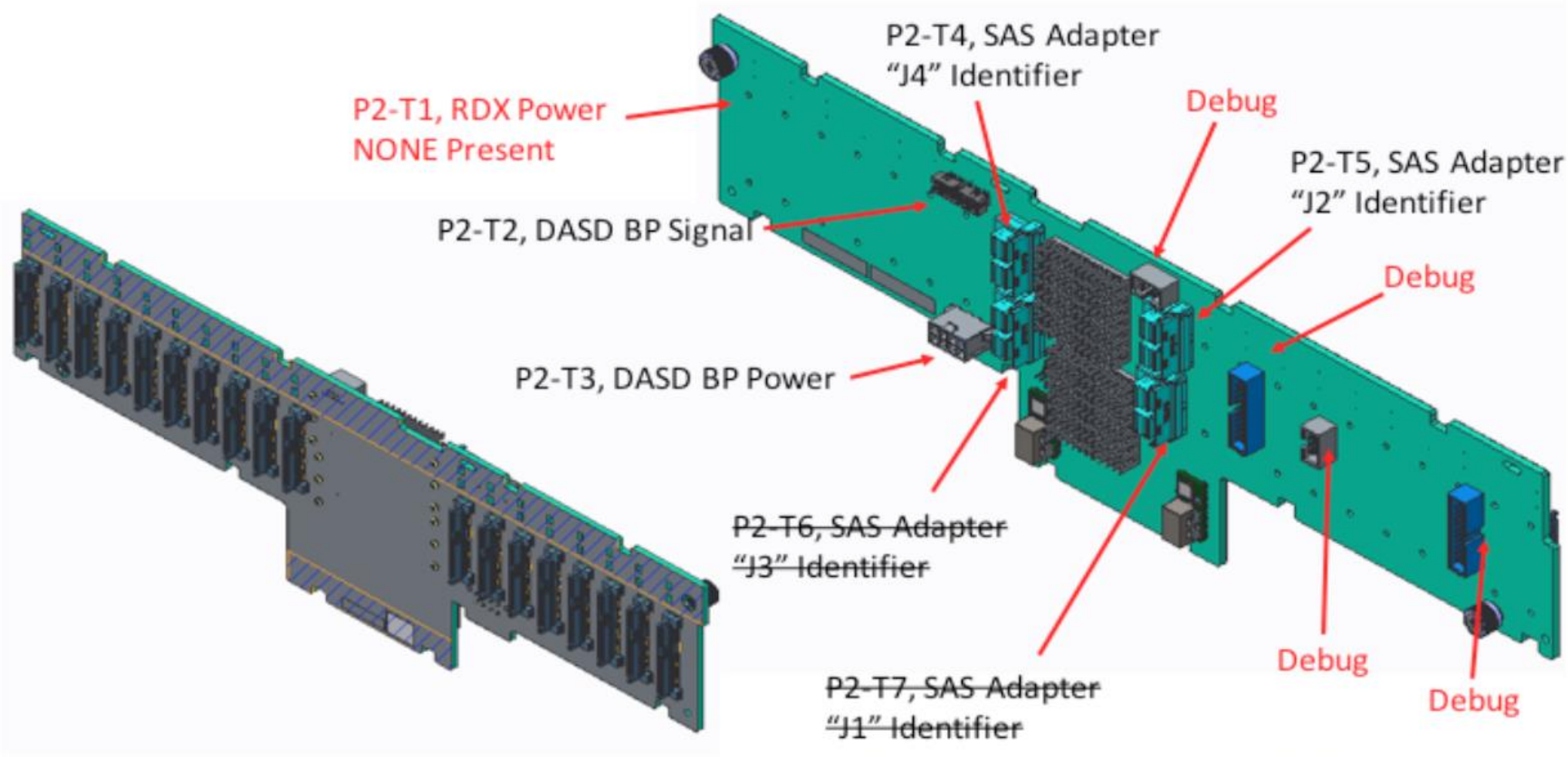


Deguello Base DASD Backplane

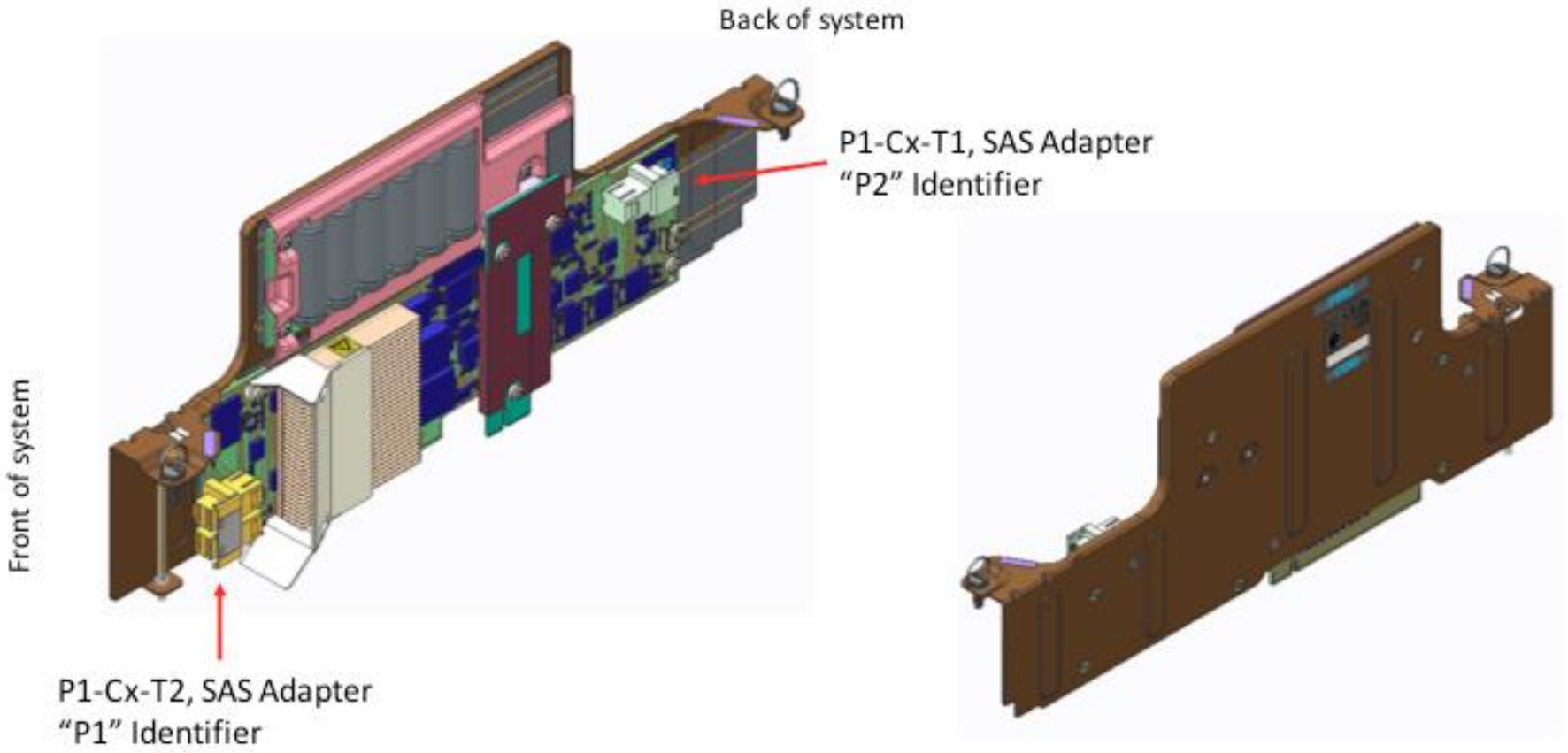


J3 and J1 are going away for this DASD BP, per Ruby Z., 10/17/17

Antenna HF DASD Backplane



Eliminator HF DASD Backplane



GXP SAS Adapter

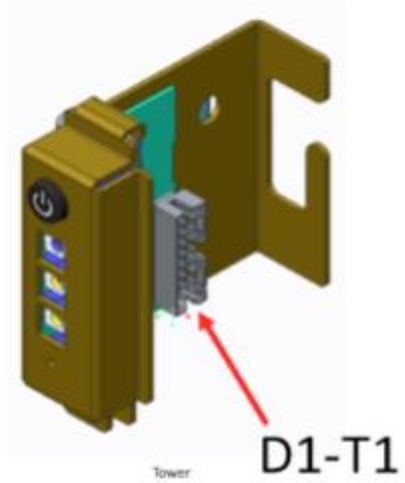
ZZ 4U IO Slot Attributes

- Special IO Cards
  - 3Hombres card is for connection to external OpenCAPI or NVLink2.0 module in MEX Drawer
  - Bear Mountain (single wide) card is for connection to external IO module in MEX Drawer

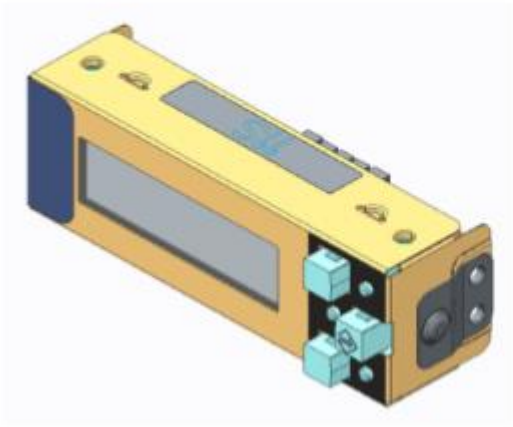
System	IO Slot	Property	Card Size	Power & Thermal Capability	Special Card Capable
1S & 2S	C1	FSP card			
2S only	C2	PCIe G4 x8 with x16C	FHHL	55W	3Hombres card OpenCAPI adapter
2S only	C3	PCIe G4 x16 or 2x8	FHHL	75W	GPU adapter PCIe CAPI adapter OpenCAPI adapter Bear Mountain card
2S only	C4	PCIe G4 x16	FHHL	75W	GPU adapter PCIe CAPI adapter Bear Mountain card
1S & 2S	C5	PCIe G3 x8	FHHL	25W	
1S & 2S	C6	PCIe G3 x8 with x16C	FHHL	25W	
1S & 2S	C7	PCIe G3 x8	FHHL	60W	3Hombres card OpenCAPI adapter
1S & 2S	C8	PCIe G4 x8 with x16C	FHHL	55W	PCIe CAPI adapter
1S & 2S	C9	PCIe G4 x16	FHHL	75W	GPU adapter PCIe CAPI adapter OpenCAPI adapter Bear Mountain card
1S & 2S	C10	PCIe G3 x8	FHHL	25W	
1S & 2S	C11	PCIe G3 x8	FHHL	25W	
1S & 2S	C12	PCIe G3 x8 with x16C	FHHL	60W	

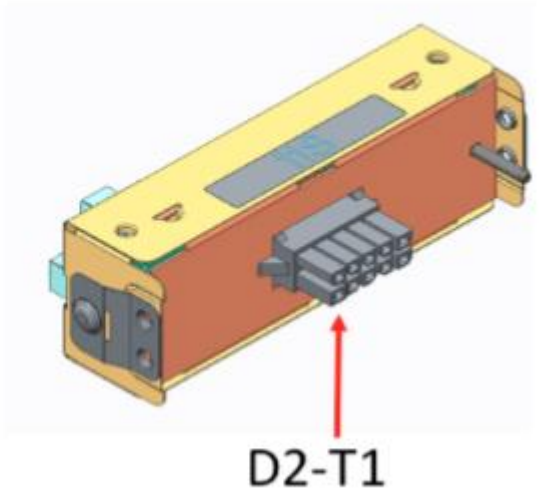
Dusty and Hill Cards (Op-Panel and LCD)

Dusty Op Panel (D1)

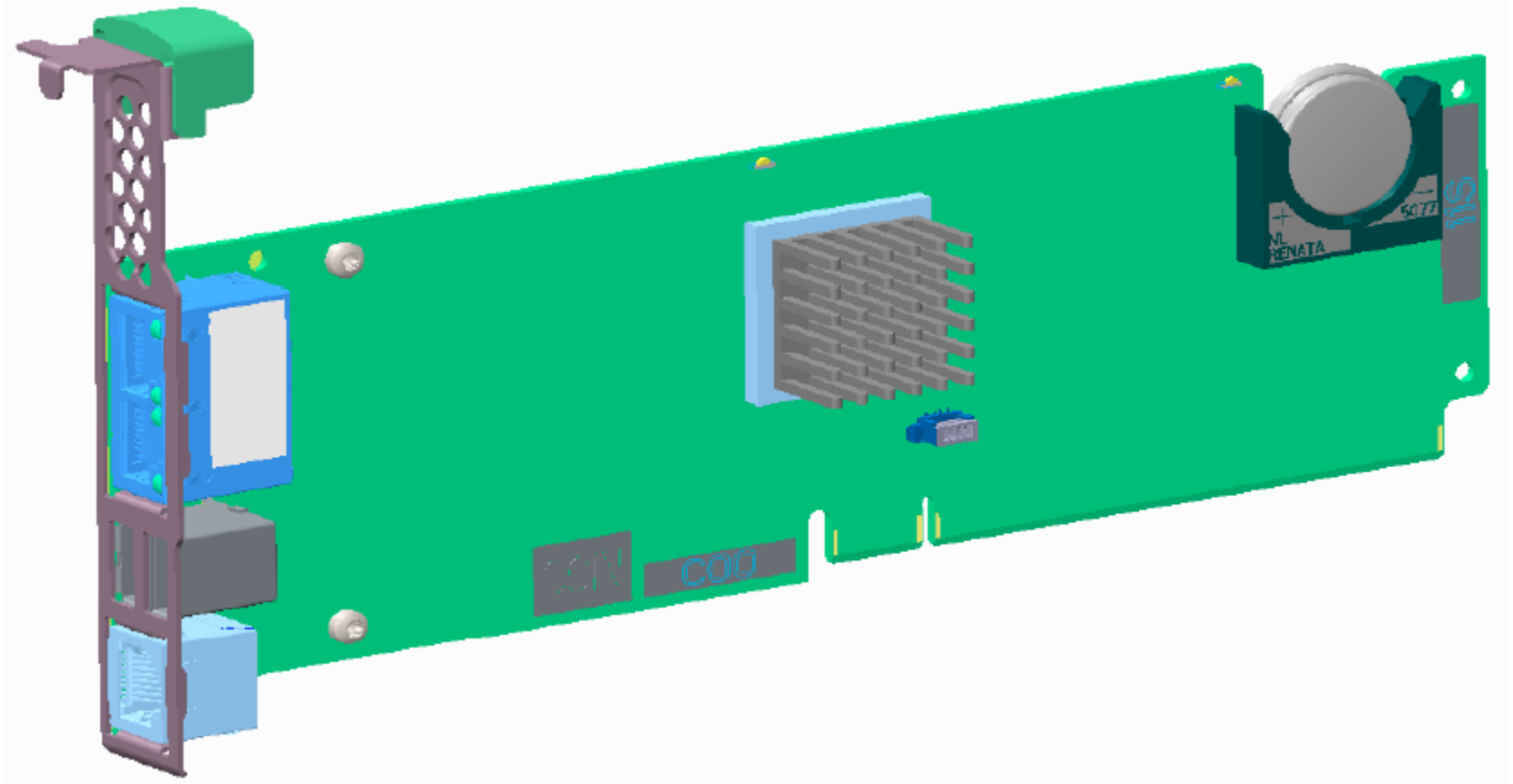


Hill LCD (D2)

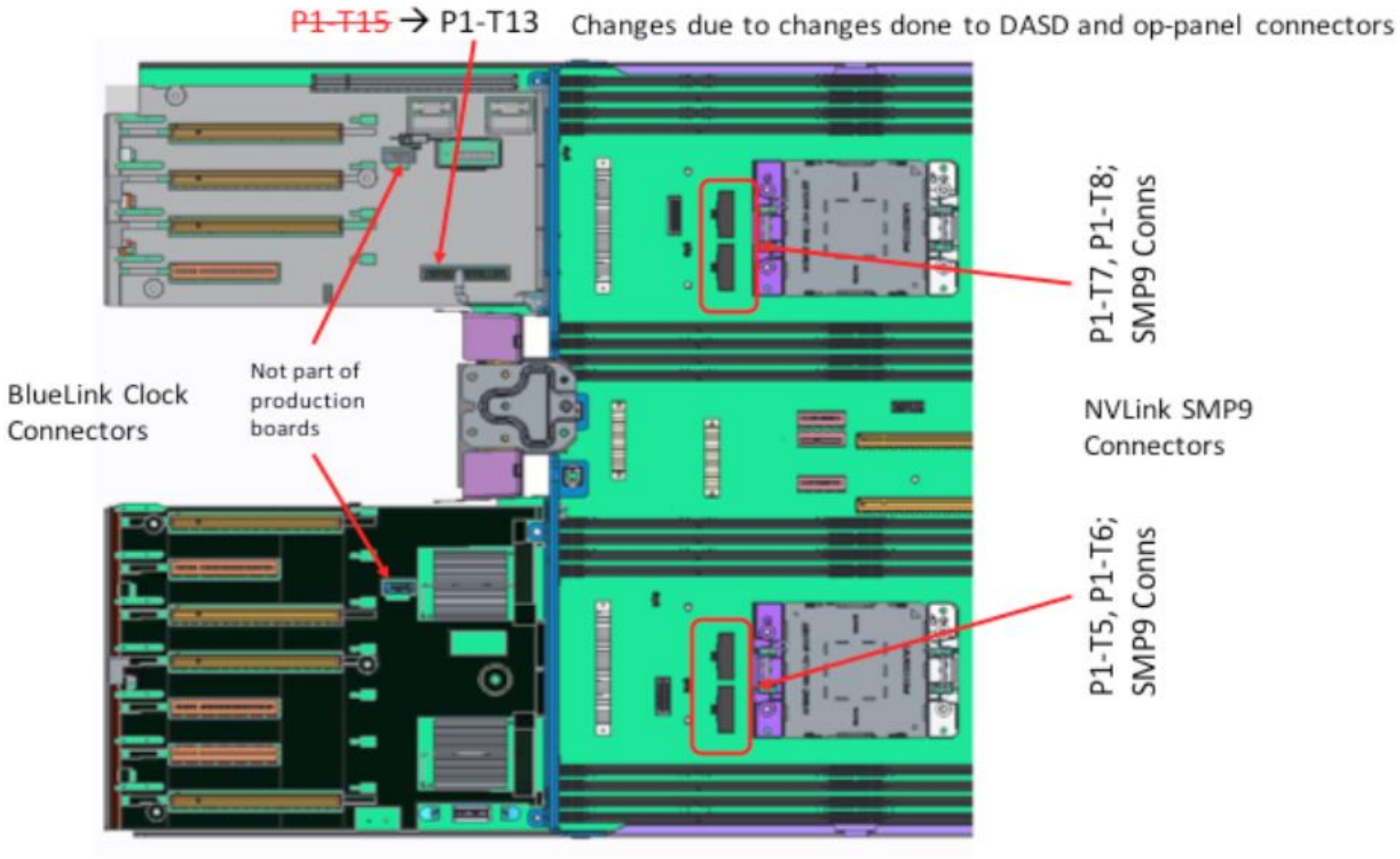




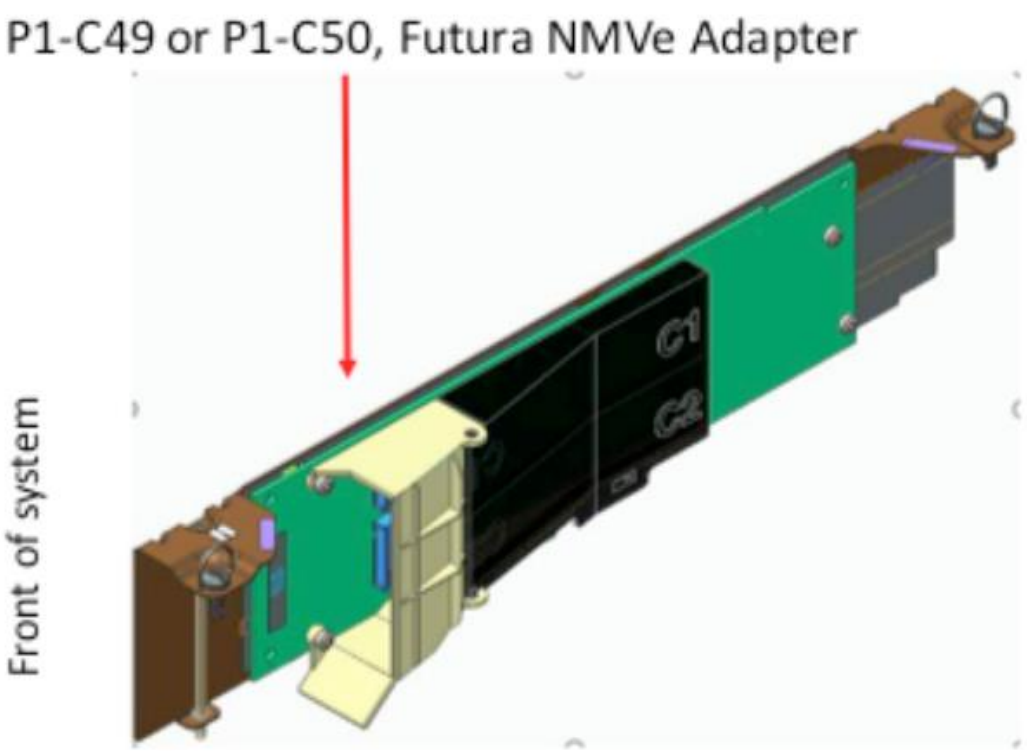
Beard (FSP) Card

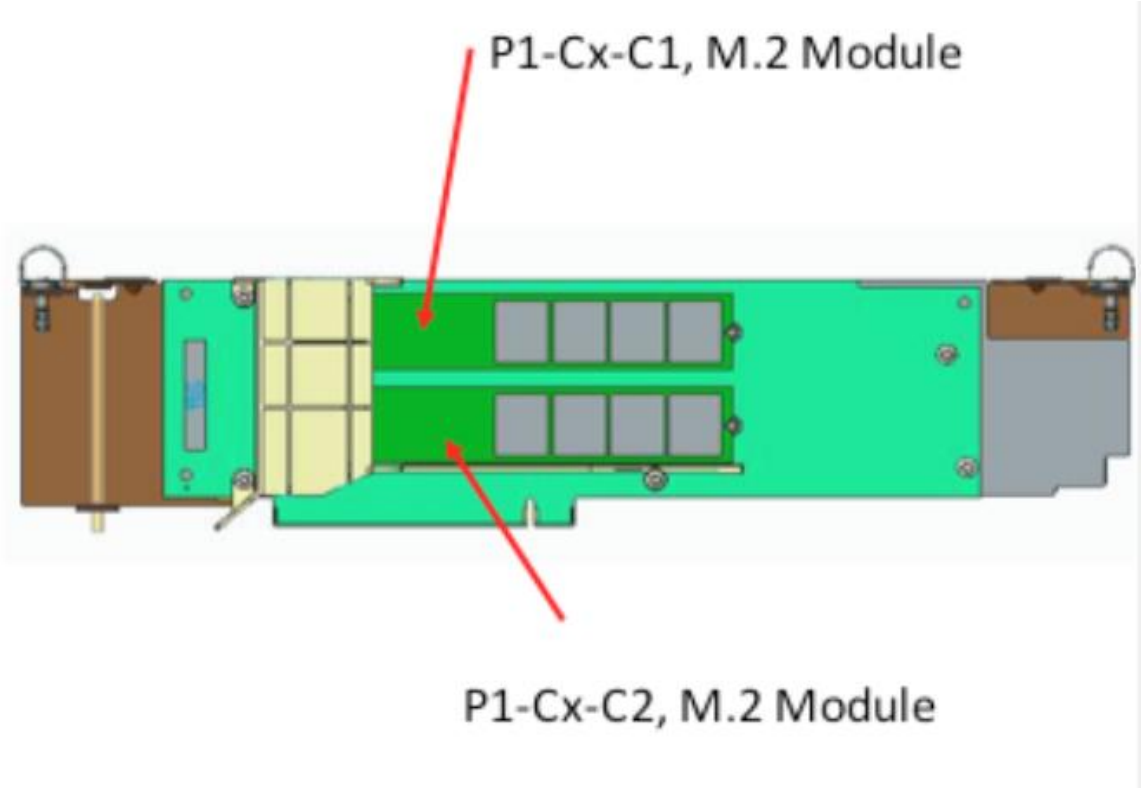


NVLink / SMP Connectors



Futura (NVMe) Adapter





END