



THE VIRTUAL COMPUTING
ENVIRONMENT COMPANY

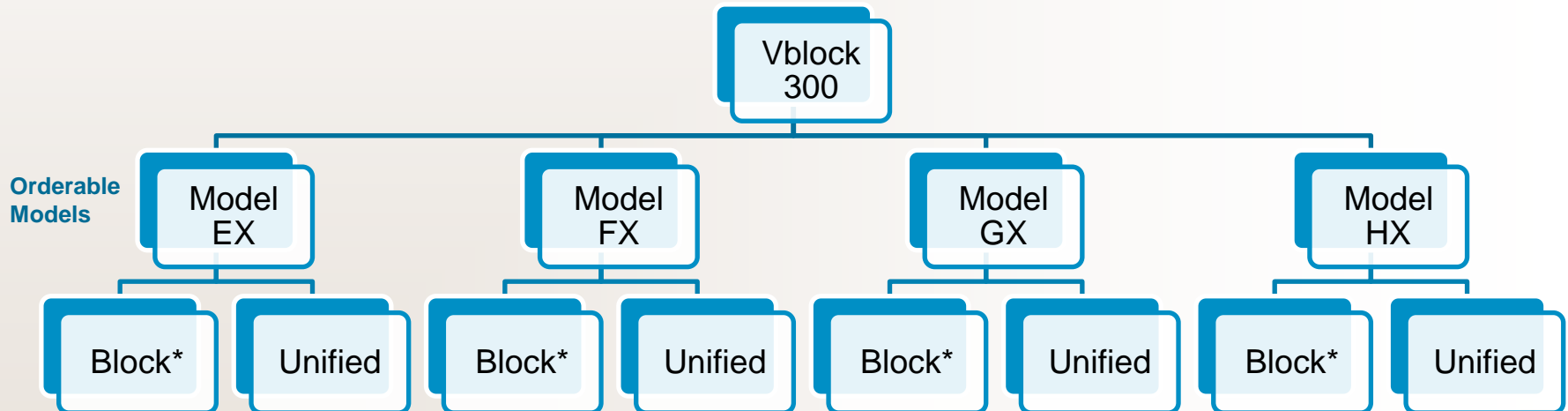
VCE VBLOCK 300 SERIES OVERVIEW

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May 23 2011



VBLOCK 300 VARIANTS

- Vblock 300 is a new line of Vblocks based on the EMC VNX series of unified storage arrays
- Vblock 300 replaces the existing Vblock 0, 1 and 1U models
- Vblock 300 does not impact the existing Vblock 2 product



** This is the base configuration model which can be expanded to become a Unified offering*



NAMING ALIGNMENT VBLOCK™ 300 SERIES

- Vblock™ 300 model EX = Vblock™ with VNX 5300
- Vblock™ 300 model FX = Vblock™ with VNX 5500
- Vblock™ 300 model GX = Vblock™ with VNX 5700
- Vblock™ 300 model HX = Vblock™ with VNX 7500



NEW BRANDING, RACKING AND POWER



- VCE has entered into an agreement with Panduit to use custom VCE branded Panduit racking for all compute, aggregation, and storage racking (except for VMAX)
- All Vblock 300 cabinets will be VCE-branded Panduit racks... including storage
- Panduit will supply highly optimized cable design within and between all racks
- Panduit will supply new optimized and internationalized in-rack power solutions
- Panduit racking and power will be applied to existing VB0, 1, 1U and 2 models sold in the future as well
 - The current cabling scheme will not change in these older models however



VBLOCK 300: NEW FEATURES

Optimized, Fast Delivery Configs
New Branded Racks
Direct Attach Storage to Compute on Low-end
Smaller & More Base Configs
Chassis Activation Kits
Scale up or Scale Out
RAID & DAE Packs
New Array Software Options
VAAI Enablement
New AMP Flavors

CISCO NEW CONFIGURATION OPTIONS



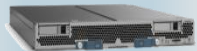
Expanded Options Extended Lead Time



B230 x 3 options



B200-M2 x 4 options



B250 x 1 options



B440 x 2 options



MDS 9513



Nexus 7010



Nexus 5020



Nexus 5010

Preferred Configuration Options



UCS 6140



B230 x 1 options



B250 x 1 options



UCS 6120



B200-M2 x 1 options



MDS 9506



UCS 5108



Nexus 5548



MDS 9148

30 Day Lead Time

Eliminated Products/Options



B230 x 21 options



B200-M2 x 20 options



B250 x 23 options



B440 x 23 options



MDS 9509



SMALLER BASE CONFIGURATIONS

- Reducing the cost of entry to each model was a key issue with the sales teams and customers
- There was a big hole between the VB0 and VB1/1U that needed to be filled
 - Added a model using the VNX5500 (replaces the NS-240) to fill the price and capacity gap between the old VB0 and VB1/1U
- Lower Cost of Entry
 - Added Chassis Activation Kits for the UCS
 - License FI 10g ports for FCoE and X-Blades as the upgrades are added
 - Reduced minimum blades to 4 (1 Blade Pack) on all models
 - Matched a minimum number of drives to the base blade pack for acceptable capacity, IOPS and throughput for the VMs would typically be run on 4 B200-M2s.
 - Scalable DAE Packs
- All models start with a Block base and Unified is optional. However rack space and FC ports are reserved for easy NAS upgrades in the future.
- FAST Cache is mandatory as is some combination of T1 / T2 / T3... HOWEVER there is no enforced combination of T1 / T2 / T3, just a base quantity for each tier if you choose to include it.



DIRECT ATTACH STORAGE TO COMPUTE



- Model EX
 - Attachment between VNX array and UCS 6100 is now direct cabling
 - Reduces complexity
 - Reduces Cost
 - Reduces exception requests for odd switch configs and models
 - X-Blades will attach directly
 - Backup and Replication solutions will still require switches

- Models FX, GX, and HX
 - Attachment between VNX array and UCS 6100 will remain switched to support scale-out configs
 - High-end scale-up configs also require switching and it would be too complex to migrate to allow full expansion

- **What changed since initial concept:**
 - Due to some UCSM limitations and UIM support, we will not be providing direct attach configurations until sometime after GA at which point UCSM fixes will have been deployed and tested and UIM supports all VNX configuration derivatives
 - Mfg and PS is endeavoring to reduce config variations and eliminate in-field upgrades wherever possible so we will be keeping the 5548 and 9148 switches in the FX, GX and HX configurations as a standard BOM component





CHASSIS ACTIVATION KITS

- To reduce initial cost of acquisition, a CB rack will be shipped with only the first two 5108s licensed for FI ports.
- All chassis PS and FEXs will be populated and cabled up
- All required Twinax cables and SFPs will be populated
- As more blades are added and additional chassis are required once deployed at the customer site, a chassis activation kit must be added which is simply the software license to enable additional FI ports.
- At customer's discretion, CAKs can be added up front to allow for optimal field flexibility in a CB.
- **What changed since initial concept:**
 - The Professional Services BU did not want to send engineers out to activate new chassis with additional components so the power supplies and FEX components will be installed at Mfg and cabled up for all chassis.
 - A software activation will be required for the port licenses which can be done by the customer or remotely
 - Action item to work with the tools team for a more automated way to activate licenses for customer self-service after purchasing licenses



SCALE UP OR SCALE OUT

- All models allow for significant scaling within a single UCS configuration or a single array configuration
- The FX, GX and HX models also allow for:
 - Multiple CB/CE (3) in a single Vblock
 - Multiple arrays (3) in a single Vblock
 - Requires the addition of Nexus switches back into the configuration for all models
 - Requires the addition of MDS switches in the configuration for FC-based models
- **What changed since initial concept:**
 - Scale Out will not be available at CA or GA and is pending certification testing and UIM support
 - Scale Out has been added for the EX as well



BLADE PACKS

- Added a UC Blade Pack
- Blade Pack is now 2 blades instead of 4
- Any blade type has a minimum of 2 blade packs (qty 4 blades)
 - UC Blades do not have a 2 pack minimum
- All blade types can then be upgraded with a single blade pack
- Blade Pack Configs:
 - **B200-M1 / 2.66Ghz / 96GB - NEW**
 - B200-M2 / GHz / 48GB (UC Blade)
 - B200-M2 / 3.33GHz / 96GB
 - B200-M2 / 2.93GHz / 48GB
 - B250-M1 / 3.33GHz / 384GB
 - B250-M1 / 2.93GHz / 192GB
 - B440-M1 / 2.26GHz / 256GB – 16 Max without an RPQ
 - B440-M1 / 2.00GHz / 128GB – 16 Max without an RPQ
 - B230-M1 / 2.26GHz / 256GB – 32 Max without an RPQ
 - B230-M1 / 2.00GHz / 128GB – 32 Max without an RPQ





RAID PACKS

- RAID packs have been created to replace drive packs...
 - Customer picks the drive types for up to 3 tiers of storage & how many packs in each tier
 - Customer picks the RAID protection for ALL TIERS in a single pool
- RAID Types Supported:
 - RAID 1+0 – 8 drives per RAID set
 - RAID-5 – 5 drives per RAID set
 - RAID-6 - 8 drives per RAID set
- Tier 1
 - Base Config: Std 0 RAID Packs
 - Upgrades: 1+ RAID Packs
- Tier 2:
 - Base Config: Min 0, Std 1 RAID Pack
 - Upgrades: 3+ RAID Packs
- Tier 3:
 - Base Config: Min 0, Std 1 RAID Pack, 2 Packs min when only tier
 - Upgrades: 3+ RAID Packs
- Multiple pools have always been supported in the Vblock
- Multiple types of RAID protection for various application needs are supported



DAE PACKS



- This is new since initial concept
- When DAEs need to be added, they are added in multiples of the number of buses in the array. For example: An Model GX with 4 back-end SAS buses will have DAE packs added in groups of 4.
- Base DAE quantities and DAE Pack add-on sizes:
 - Models EX and FX: 2 DAEs (base includes DPE as the first DAE)
 - Model GX : 4 DAEs
 - Model HX: 8 DAEs
- What was it before? The whole first rack was always pre-populated and wired with DAEs. When a new rack was added, it was always added with full pre-wired DAEs.
 - This enabled us to ensure that the high performance DAE interleaving wiring scheme was always followed since it was performed in the factory.
 - This was a customer issue at times due to the added up-front cost
- Why is this better?
 - Keep initial costs down
 - Grow in smaller increments to keep upgrade costs down
 - Do a better job of spreading IO across buses
 - All busses will always have the same number of DAEs attached at all times.
 - New drive upgrades will be added in a spread manner across all buses.



VAAI ENABLEMENT

- vStorage APIs for Array Integration
- Flare 30 or VNX OE 31 combined with VMware ESX(i) 4.1 combination enables VAAI
- Features:
 - Full Copy Offload
 - Intelligently cloning a VM inside the array from one volume to another.
 - Intelligent Storage vMotion migrations within the array from one volume to another. Not support for array to array storage vMotion.
 - 10-20x performance improvement
 - Critical to VDI performance
 - Block Zeroing (Copy Same)
 - Enabling the array to complete a bulk zeroing out of a disk.
 - Creating a virtual disk as eager-zero thick in format result in immediate completion of command with background array task to zero out all blocks.
 - Hardware Assisted Lock Management
 - Enables the offloading of the VMFS datastore lock mechanism to the arrays and does so with much finer granularity than previously (an entire LUN).
 - There is significant scalability that the VMware cluster can leverage without compromising the integrity of the VMFS shared storage-pool metadata.



AMP OPTIONS

- Mini AMP
 - Non-redundant components
 - Lower cost switches
 - No router
 - No Windows or Red Hat licenses
 - No vCenter License / No separate AMP vCenter instance
 - Optional:
 - Internal backup software
- HA AMP
 - The equipment is equal to 2 Mini-AMPs... plus...
 - Shared lomega storage
 - Configured into a clustered HA environment
 - Dedicated Avamar backup appliance
- **What changed since initial concept:**
 - This has been decoupled from the Vblock 300 critical path and will continue development and testing in parallel.
 - In the meantime the current AMP has been reduced in price by making certain components optional.





MODEL HX

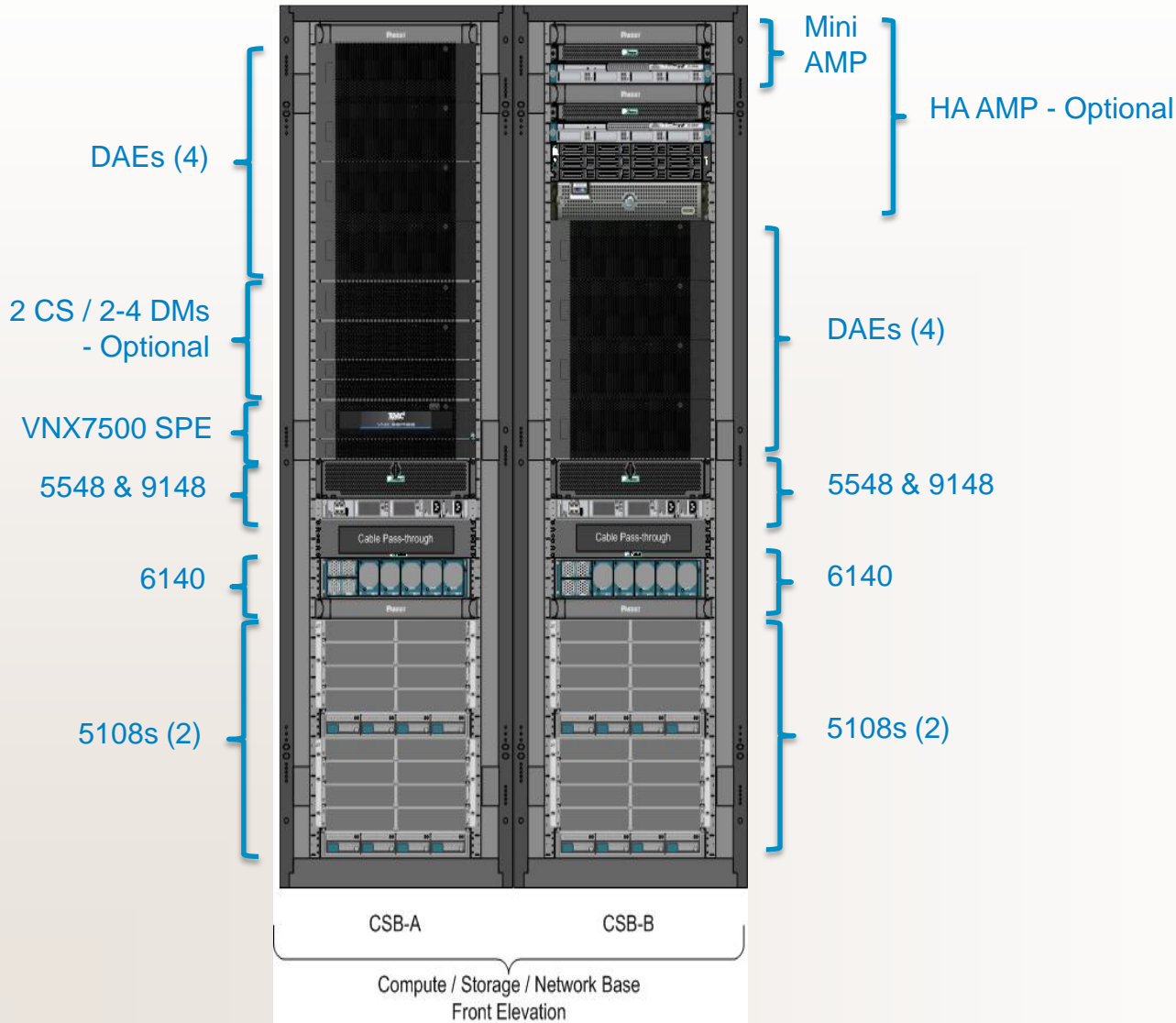
Multi-Rack

Scale-up and Scale-out Expansion

Optional Aggregation Networking

Integrated AMP

HX – COMPUTE/STORAGE BASE



HX BLOCK CONFIGURATION

- VNX7500 Base Configuration
 - Standard Storage Processor config:
 - Dual SPs with a 6-core 2.8GHz Intel Westmere CPU and 24GB of cache per SP
 - Front-end Options per SP:
 - 4 10Gb FCoE and 4 8Gb FC FE ports (2 FC ports per SP rep/mig and 2 for X-Blade)
 - 12 8Gb FC FE ports per SP (2 FC ports per SP rep/mig and at least 4 for X-Blade)
 - 8 6Gb BE 4-lane SAS buses per SP
 - Dual Standby Power Supply (SPS)
 - 8 DAEs
 - **Minimum Drive Config: 18 drives with R5 (Vault, SAN boot, FAST Cache, no T1, 5 T2, 0 T3, 2 HS)**
 - Standard Drive Config:
 - Vault: 1 RAID group (4 drives)
 - Boot: 1 RAID group – Supports 32 20GB boot LUNs max
 - FAST Cache: 2x100GB EFD drives (100GB useable) plus HS
 - T2: 2 RAID groups (Plus global HS to cover Vault & Boot)
 - T3: 1 RAID group (Plus global HS)
 - Base Software: **FAST Cache**, VNX OE for Block
 - Optional Software: VNX OE for Unified, Fast Suite, Local Protection Suite, Remote Protection Suite, Application Protection Suite





HX STORAGE UPGRADES

- Boot upgrade (20GB boot LUNs for 32 ESX hosts max / Variable boot LUN size for Bare Metal)
 - Min upgrade 1 RAID group (5 drives)
- FAST Cache Options
 - 100 to 2,000GB in mirrored pairs of EFD drives
- T1 RAID Pack
 - 1 RAID group
- T2 RAID Pack
 - 3 RAID groups or more
- T3 RAID Pack
 - 3 RAID groups or more
- VNX 7500 Maximum Rack Growth:
 - 72 DAEs / 1000 drives (depending on drive type mixture and DAE model)



HX NAS CONFIGURATION

- VNX7500 Base Configuration
 - NAS personality in a base Vblock model is not required. 6U reserved for 2 DMEs (Data Mover Enclosure) and 2 CSs.
 - Dual Control Stations
 - Standard X-Blade config:
 - DME and 2 X-Blades in a 1+1 cluster plus NFS/CIFS licensing
 - 1 6-core 2.8GHz Intel Westmere CPU with 24GB memory and up to 256TB storage per X-Blade
 - 1 4p 8Gb FC SLIC per X-Blade (2p for BE connectivity / 2p for tape backup)
 - 2 2p 10Gb Ethernet SLICs per X-Blade (FE NFS/CIFS connectivity)
 - Max expansion to 8 X-Blades in a 7+1 cluster configuration in pairs of 2 X-Blades
- NAS Upgrades
 - 2 x-blade upgrade (grow to 4 x-blades)
 - Add DME and 2 x-blades to VNX chassis plus NFS/CIFS licensing
 - Migrate to a 3+1 (active-standby) cluster
 - 2 x-blade upgrade (grow to 6 x-blades)
 - Add DME and 2 x-blades to VNX chassis plus NFS/CIFS licensing
 - Expand to a 5+1 (active-standby) cluster
 - 2 x-blade upgrade (grow to 8 x-blades)
 - Add DME and 2 x-blades to VNX chassis plus NFS/CIFS licensing





MODEL GX

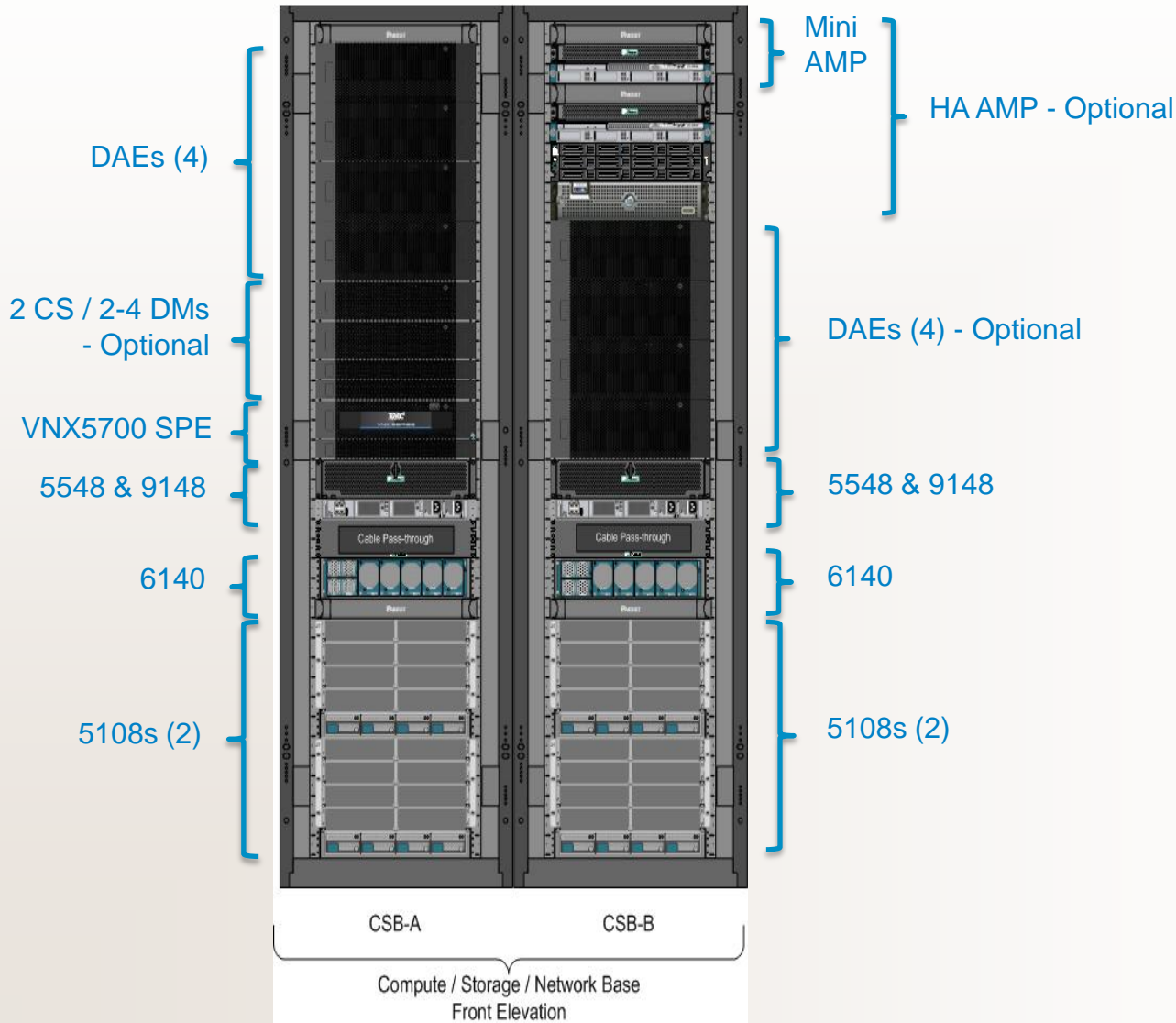
Multi-Rack

Scale-up and Scale-out Expansion

Optional Aggregation Networking

Integrated AMP

GX – COMPUTE/STORAGE BASE





MODEL FX

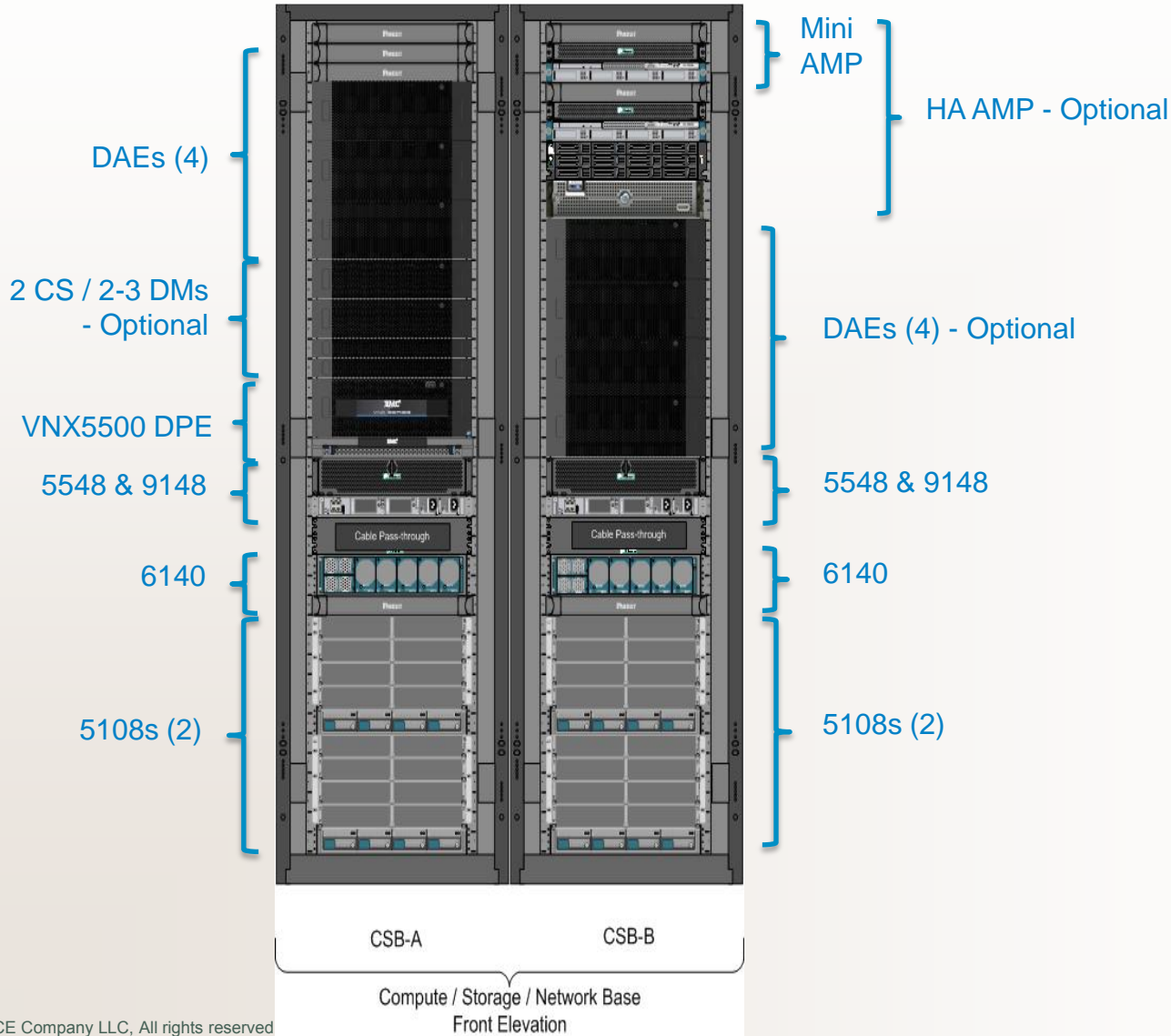
Multi-Rack

Scale-up and Scale-out Expansion

Optional Aggregation Networking

Integrated AMP

FX – COMPUTE/STORAGE BASE





MODEL EX

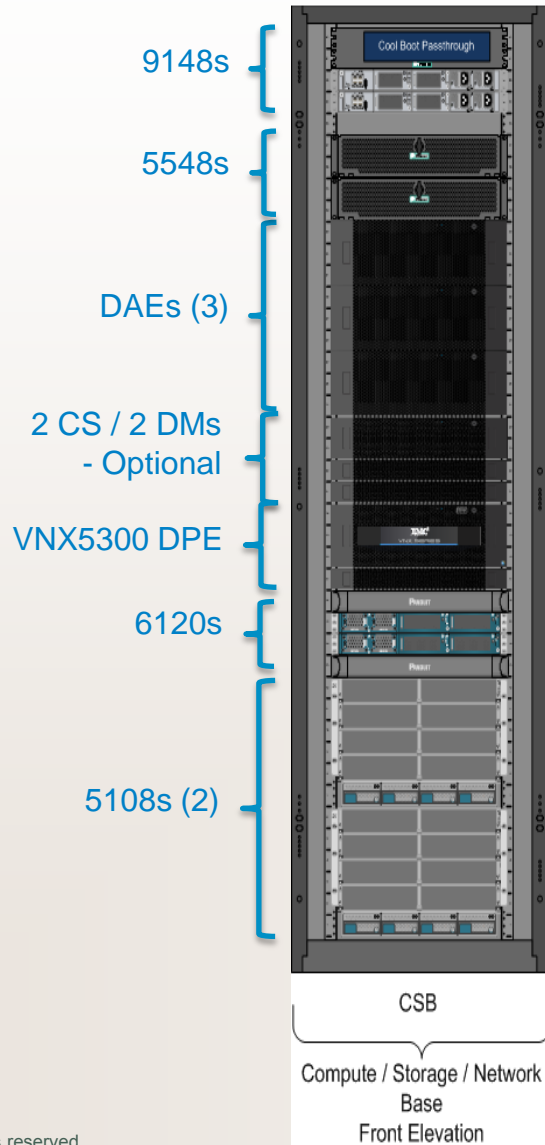
Multi-Rack

Limited Expansion

Optional Networking

Integrated AMP

EX – BASE



Note: No in-rack AMP in Base





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STORAGE MANAGEMENT ARCHITECTURE



MINI-AMP COMPONENTS

- 1 UCS C200 M2 server with 4 2TB SAS disks RAID-1 local storage
- 1 24-port Catalyst 3560X Ethernet switch
- Customer Supplied Software:
 - VMware licenses
 - Windows Server 2008 R2
 - Red Hat Linux
- AMP apps & VMs...
 - AMP vCenter, VCDB & VUM
 - Production vCenter, VCDB & VUM
 - Jump, Tools/Syslog, Utility
 - UIM
 - Array Management (Unisphere Client & Server / USM / CSA / SMC / SPA / Fabric Manager)
 - EMC Secure Remote Support (ESRS) x 2
 - Optional: AD/DNS, SMTP, FMS, ACS
- Avamar for AMP backup (optional)
 - Infrastructure backup scripts
 - Avamar Virtual Edition
 - Replication out of Vblock or offsite if required by customer (optional)
 - Uses internal C200 storage

