Vblock Infrastructure Packages: Technical Overview

VCE Solutions
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AGENDA

- Introduction
- Vblock Technical Overview (Architecture & Design)
- Management & Orchestration
- Scaling Up & Out
- Manufacturing / Build Approach
- Vblock 0 Details
- Vblock 1 Details
- Vblock 1U Details
- Vblock 2 Details
OVERVIEW
Converged Infrastructure
MEGATRENDS: TO THE NEXT GENERATION DATA CENTER

- Deployment of ubiquitous IP networks
- Expansion of networked consumer electronics
- Explosion of digital content
- Movement to unified communications
- Advancement of highly scalable, low cost compute
- Convergence of networks, compute and storage
- Recovery of the economy yields technology refresh
- Desirability of an IT utility model
- Appetite for new applications
VBLOCK: A NEW WAY TO DELIVER IT

- Roadmap interlocked, rapid deployment model of virtualized infrastructure
- Pre-integrated and validated solutions reduce total cost of ownership
- Floor Tiles become “unit of IT” with predictable performance and operational characteristics
- Single point of accountability with improved compliance/security and reduced risk

Accelerate Time to Results—Reduce TCO
INTEGRATED BEST OF BREED TECHNOLOGY

By Industry Leaders

Application & Management

Presentation (user access)

App Middleware servers

Management & DB servers

Virtualization

Unified Computing

Network

Storage

vmware

Cisco

EMC²
A CLOSER LOOK: VIRTUALIZATION

Complete Vblock platform for virtualized applications
A CLOSER LOOK: UNIFIED COMPUTING

Unified Fabric
Fabric Extender

Virtualized Adapter

Scale Out
service profiles
Extended Memory

Efficient performance & application scalability reduces cost and complexity

Presentation (user access)
App Middleware servers
Management & DB servers
Virtual switch (Nexus 1000V)
A CLOSER LOOK: STORAGE

FAST

High Speed
High Cost

Lower Speed
Lower Cost

 فلاش

Fibre Channel

SATA

Presentation (user access)
App Middleware servers
Management & DB servers

PowerPath VE

EMC² Storage

Deduplication/compression

Highest density, performance and availability
Vblock Infrastructure Packages
Core platform details

Vblock 2
• A high-end configuration that is completely extensible
to meet the most demanding IT needs of largeenterprises or service providers

Vblock 1
• A mid-sized configuration to deliver a broad range ofIT capabilities to organizations of all sizes

Vblock 0
• An entry-level configuration to meet the IT needs ofsmall datacenters
• Test/dev platform for Partners and customers

Imagine the power of three …
Scaling virtualized datacenter infrastructure backed by single support model
Management and Orchestration
Why a Vblock Without UIM is Not a Vblock

UIM as MoM

Element Managers
- vCenter
- SNMP/ NX-OS
- XML / NETCONF
- UCSM XML API
- SYMAPI / SMI-S
- CLARAP I / SMI-S

APIs
- vSphere API
- UCSM
- SMC
- Navis

VMware ESX
- vSphere
- MDS 9000
- Nexus 1Kv/5K/7K
- UCS
- VMAX
- Clariion
Tools to Cloud Stack Relationship

Application
- VMware Cloud Director
- Chargeback

Cloud OS
- Capacity Planner
- vCenter
- vSphere

Compute
- Unified Infrastructure Manager

Storage
- Unified Infrastructure Manager

Network
- Unified Infrastructure Manager

vSphere

Vblocks
Unified Vblock Element Management

- Ionix Unified Infrastructure Manager
  - IT Infrastructure Provisioning Center
  - IT Infrastructure Service Catalog
  - Cross Domain Context & Deep Visibility
  - Policy-Based Management
  - Unified Provisioning and Configuration
  - Configuration Compliance Analysis

Unified Infrastructure Management Platforms

Managed Components:
- Cisco UCS Manager
- EMC Navisphere
- EMC Symmetrix Management Console

Provisioning Requests

Configuration & Compliance Events

vCloud (or other) Portals

Manages one or more Vblocks
POLICY DRIVEN APP IT INFRASTRUCTURE WITH TEMPLATES

- Templates ensure repeatable, compliant IT processes
  - IT defines storage, server, fabric and application and OS configuration policies to meet the business SLAs

- Resources rapidly assigned according to IT policies and SLA reducing time to application availability

- Reduces configuration error and non-compliance
UIM SERVICE CATALOG

- **Compute Profile**
  - Number of compute blades – 1 to N for a cluster
  - Service grades such as Half/Full width or based on type of mezzanine cards
  - Operating system definition (currently only ESX)

- **Storage Profile**
  - Size of boot partition
  - Size and number of data stores
  - Tier of storage
    - Tier 1 (RAID 10 – high performance)
    - Tier 2 (RAID 5 – medium performance)
    - Tier 3 (RAID 5 – low performance)

- **Network Profile**
  - Network profiles identify the VLAN ID, QOS, IP Address Pool
  - Optionally PIN groups can provide dedicated or aggregated bandwidth
  - Profiles to be used and on which interfaces
    - vNIC-a use Sales Network
    - vNIC-b use Engineering Network
ADVANCED MANAGEMENT POD

2900 Series Router

4900 Series Switch

C-200 Blade Servers

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LOGICAL SERVERS IN THE AMP

- Nimsoft
- UIM
- Active Directory / DNS
- Array Management
- N1000V Supervisor
- ESRS Call-Home
- Database for Vblock
- VUM for Vblock
- vCenter for Vblock

2-node HA/DRS Cluster

- ACS
- Jump Server
- Active Directory / DNS Secondary
- Array Management Secondary
- N1000V Supervisor Secondary
- Fabric Manager
- Database for AMP
- VUM for AMP
- vCenter for AMP

C200

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Base and Upgrade example - Compute

- Starting with the “Base” which consists of rack, in-rack PDUs, cabling, patch panels, UCS chassis, fans, FEX’s, Fabric Interconnects – everything except the blades…
- Blade packs are used to populate the chassis based on customer needs and future growth.
- Initial blade packs (2) ordered with base
- Customer orders more blade packs (2) which matches VCE Type 1 minimum
- Customer fills base with more blade packs (4) which matches VCE Type 1 maximum
- Customer orders another base and blade pack (1)

Four B200M2 Blade pack upgrade
Vblock Scaling

Vblock 0, 1 and 2

Federated
Vblock Infrastructure Packages
Scalable IT Capability & Performance

Vblock2: Very Large Virtualized Compute and Storage Array

Vblock1: Virtualized Workload Environment

Vblock0: Virtualized Workload Environment

Vblock Unified Infrastructure Management

Aggregation Layer Application & Network Services
Manufacturing/Build Approach
Architectural Principles

- ‘Units’ of IT infrastructure with 'matched' performance, operational characteristics and discrete of power, space and cooling

- Repeatable design patterns facilitate rapid deployment, integration and scalability

- Built to contain, manage and mitigate failure scenarios in hardware and software environments

- Designed from the 'Facilities to the Workload' to be scaled for the highest efficiencies in virtualization and workload re-platforming

- Extensible security, management and orchestration frameworks based on industry standard tools, APIs and methods
Vblock Components Pre Mfg. Process
Vblock Components Post Mfg. Process
(Vblock 2 ready to be packaged & shipped to client)
Vblock Components Post Mfg. Process
(Vblock 2 packaged & ready to ship to client)
Infrastructure Packages: Reference Architecture

Vblock 0
Vblock 0 Configuration – Layout – Front View

2 USC Chassis
2 UCS 6120 Fabric Interconnects
Unified NS 120 Storage Array
Vblock0 Components

- **Compute**
  - Cisco UCS Chassis
  - Cisco UCS B-series Blades
  - Cisco Fabric Interconnects

- **Network**
  - Cisco Nexus Switches

- **Storage**
  - EMC NAS Storage Array

- **Hypervisor**
  - VMware vSphere 4 Enterprise Plus

- **Management**
  - EMC Ionix Unified Infrastructure Manager
  - VMware vCenter 4.0
  - EMC PowerPath/VE
  - Element Managers (UCSM, Fabric Mgr, Device Mgr, Celerra Mgr)
Vblock0 Configuration Details

Recommended Base Configuration

➢ Unified Computing System
  ➢ 2 UCS Chassis + 4 Fabric Extenders
  ➢ Fabric Interconnect 6120
  ➢ 4 Power Supplies
  ➢ 1 Blade Pack (4 * B200 M2 2.93GHz 12x4GB)
  ➢ Total 36 Cores and 192 GB RAM
  ➢ 73GB 15k SAS drive (no RAID)

➢ SAN
  ➢ 2 * Nexus 5010

➢ EMC Storage
  ➢ NS-120 Storage Array
  ➢ 17.5 TB Raw Storage
  ➢ 2 Service Processors / 2 Data Movers
  ➢ Mixture of drives types optimized for best price / performance ratio
    ▪ T1 – 0 Flash Drives @ 100 GB
    ▪ T2 – 21 Fibre Channel Drives @ 450 GB
    ▪ T3 – 8 SATA Drives @ 1 TB

Optional Configuration

➢ Unified Computing System
  ➢ B200, B250, B440 series blades
  ➢ 2 Socket 6-Cores
  ➢ 4 Socket 8-Cores
  ➢ 73/146/300 GB 6Gb SAS 15K RPM SFF Internal HDD

➢ SAN / Network
  ➢ 2 * Nexus 5k 8 Port 4GB FC Modules
  ➢ Fabric Interconnect Fibre Channel 8 Port Upgrade

➢ EMC Storage
  ➢ Additional Disk Array Enclosures
  ➢ Fully Automated Storage Tiering (FAST) Suite
  ➢ PowerPath/VE
  ➢ Mixture of drive types optimized for best price / performance ratio
    ▪ T1 – Flash Drives @ 100 GB
    ▪ T2 – Fibre Channel Drives @ 450 GB
    ▪ T3 – SATA Drives @ 1 TB

➢ Logical Layer
  ➢ Nexus 1000v Switch
  ➢ Ionix Unified Infrastructure manager (UIM)
Infrastructure Packages: Reference Architecture

Vblock 1
Vblock1 Configuration - Rack Layout – Front View

- 2 UCS Chassis
- 2 UCS 6120 Fabric Interconnects
- 2 Cisco MDS Switches
- Clariion CX4-480 Storage Array
Vblock1 Components

- **Compute**
  - Cisco UCS Chassis
  - Cisco UCS B-series Blades
  - Cisco Fabric Interconnects

- **Network**
  - Cisco Nexus Switches
  - Cisco MDS Switches

- **Storage**
  - EMC Clariion Storage Array

- **Hypervisor**
  - VMware vSphere 4 Enterprise Plus

- **Management**
  - EMC Ionix Unified Infrastructure Manager
  - VMware vCenter 4.0
  - EMC PowerPath/VE
  - Element Managers (UCSM, Fabric Mgr, Device Mgr, Navisphere)
Vblock1 Configuration Details

Recommended Configuration

- **Unified Computing System**
  - 4 * UCS 5108 Chassis + 8 Fabric Extenders
  - 2 * Fabric Interconnect 6120 + 8 Port FC Modules (2)
  - 8 Power Supplies
  - 2 Blade Packs (8 * B200 M2 3.33GHz 12x8GB)
  - Total 96-CPU and 768 GB RAM
  - No local disk drives

- **SAN**
  - 2 * MDS 9148
  - 48 * 8Gb/s Fibre Channel ports
  - 2 * 16 Port Module

- **EMC Storage**
  - CX4-480 Storage Array
  - XX TB Raw Storage
  - 2 Service Processors
  - 9 Disk Array Enclosures (105 disk drives)
  - Fully Automated Storage Tiering (FAST)
  - Mixture of drive types optimized for best price / performance ratio
    - T1 – X Flash Drives @ 100 GB
    - T2 – X Fibre Channel Drives @ 450 GB
    - T3 – X SATA Drives @ 1 TB

- **Logical Layer**
  - Nexus 1000v Switch
  - Ionix Unified Infrastructure Manager (UIM)
  - PowerPath for Virtual Environment
  - vSphere Enterprise Plus
  - vCenter Server Standard

Optional Configuration

- **Unified Computing System**
  - B200, B250, B440 series blades
  - 2 Socket 6-Cores
  - 4 Socket 8-Cores
  - 2 * Fabric Interconnect 6140

- **SAN / Network**
  - 2 * MDS 9506
  - 2 * Nexus 5020
  - 2 * Nexus 7010

- **EMC Storage**
  - Additional Disk Array Enclosures
  - Fully Automated Storage Tiering (FAST) Suite
  - Mixture of drive types optimized for best price / performance ratio
    - T1 – Flash Drives @ 100 GB
    - T2 – Fibre Channel Drives @ 450 GB
    - T3 – SATA Drives @ 1 TB
Infrastructure Packages: Reference Architecture

Vblock 1U
Vblock1U Configuration – Rack Layout – Front View

- 2 UCS Chassis
- 2 UCS 6120 Fabric Interconnects
- 2 Nexus 5010 Switches
- Unified NS960 Storage Array
Vblock1U Components

- **Compute**
  - Cisco UCS Chassis
  - Cisco UCS B-series Blades
  - Cisco Fabric Interconnects

- **Network**
  - Cisco Nexus Switches

- **Storage**
  - EMC NAS Storage Array

- **Hypervisor**
  - VMware vSphere 4 Enterprise Plus

- **Management**
  - EMC Ionix Unified Infrastructure Manager
  - VMware vCenter 4.0
  - EMC PowerPath/VE
  - Element Managers (UCSM, Fabric Mgr, Device Mgr, UniSphere)
Vblock1U Configuration Details

**Recommended Hybrid Configuration**

- **Unified Computing System**
  - 4 * UCS 5108 Chassis + 8 Fabric Extender Cards
  - 2 * Fabric Interconnect 6120 + 8 Port FC Modules (2)
  - 8 Power Supplies
  - 2 Blade Packs (8 * B200 M2 3.33GHz 12x8GB)
  - Total 96-CPU and 768 GB RAM
  - No local disk drives

- **SAN**
  - 2 * Nexus 5020
  - 2 * 8 Port 4GB FC Modules, 4GBPs Optics (16)

- **EMC Storage**
  - Unified NS-480 Array
  - 43.5 TB Raw Storage
  - 2 Service Processors
  - 7 Disk Array Enclosures
  - Fully Automated Storage Tiering (FAST)
  - Mix of drive types optimized for best price / performance ratio
    - T1 – 0 Flash Drives @ 100 GB
    - T2 – 10+3 Fibre Channel Drives @ 450 GB
    - T3 – 3+1 SATA Drives @ 1 TB

- **Logical Layer**
  - Nexus 1000v Switch
  - Ionix Unified Infrastructure Manager
  - PowerPath for Virtual Environment
  - vSphere Enterprise Plus
  - vCenter Server Standard

**Optional configuration**

- **Unified Computing System**
  - B200, B250, B440 series blades
  - 2 Socket 6-Cores
  - 4 Socket 8-Cores
  - 2 * Fabric Interconnect 6140
  - Local disk drives (73/146/300GB SAS 10K RPM SFF HDD)

- **SAN**
  - Nexus 5k 4GB FC modules
  - 2 * Nexus 7010

- **EMC Storage**
  - NS-960 Array
  - Additional Disk Array Enclosures
  - Advanced Fully Automated Storage Tiering (FAST) Suite
  - Mixt of drive types optimized for best price / performance ratio
    - T1 – Flash Drives @ 100 GB
    - T2 – Fibre Channel Drives @ 450 GB
    - T3 – SATA Drives @ 1 TB
Infrastructure Packages: Reference Architecture

Vblock 2
Vblock2 Configuration – Rack Layout – Front View

(4) UCS 5108 Chassis - 32 B200 Blades
(2) MDS 9506 SAN Switches – 24 FC Ports
(2) UCS 6140 Fabric Interconnects - 40 Fixed Ports, 8 FC Ports
(1) VMAX – 2 Engines, 80.6 TB Raw Storage
Vblock2 Components

- **Compute**
  - Cisco UCS Chassis
  - Cisco UCS B-series Blades
  - Cisco Fabric Interconnects

- **Network**
  - Cisco Nexus Switches
  - Cisco MDS Switches

- **Storage**
  - EMC Symmetrix V-Max

- **Hypervisor**
  - VMware vSphere 4 Enterprise Plus

- **Management**
  - EMC Ionix Unified Infrastructure Manager
  - VMware vCenter 4.0
  - EMC PowerPath/VE
  - Element Managers (UCSM, Fabric Mgr, Device Mgr, SMC)
Vblock2 Configuration Details

Bill of Materials Base configuration

- **Unified Computing System**
  - 4 * UCS 5108 Chassis + 8 Fabric Extenders
  - 2 * Fabric Interconnect 6120 + 8 Port FC Modules (2)
  - 8 Power Supplies
  - 2 Blade Packs (8 * B200 M2 3.33GHz 12x8GB)
  - Total 96-CPU and 768 GB RAM

- **SAN**
  - 2 * MDS 9148
  - 48 * 8Gb/s Fibre Channel ports
  - 2 * 16 Port Module

- **EMC Storage**
  - V-MAX 2-Engine Base
  - 80.6 TB Raw Storage
  - 64GB RAM Cache
  - Fully Automated Storage Tiering (FAST)
  - Mixture of drives types optimized for best price / performance ratio
    - T1 – 0 Flash Drives @ 200 GB
    - T2 – 112 Fibre Channel Drives @ 450 GB
    - T3 – 32 SATA Drives @ 1 TB

- **Logical Layer**
  - Nexus 1000v Switch
  - Ionix Unified Infrastructure Manager
  - PowerPath for Virtual Environment
  - vSphere Enterprise Plus
  - vCenter Server Standard

Optional Configuration

- **Unified Computing System**
  - B200, B250, B440 series blades
  - 2 Socket 6-Cores
  - 4 Socket 8-Cores
  - 2 * Fabric Interconnect 6140

- **SAN / Network**
  - 2 * MDS 9506
  - 2 * Nexus 5020
  - 2 * Nexus 7010

- **EMC Storage**
  - 2,4,6 or 8 Engine Base
  - Mixture of drives types optimized for best price / performance ratio
    - T1 – Flash Drives @ 200 GB
    - T2 – Fibre Channel Drives @ 450 GB
    - T3 – SATA Drives @ 1 TB
D/R?

VM Density?

Trusted Multi-tenancy?

Pontifications...
## Vblock Infrastructure Packages

### Legacy vs. Vblock Infrastructure Packages

<table>
<thead>
<tr>
<th>Optimized Infrastructure</th>
<th>Streamlined Operational Control</th>
<th>Cost and Risk Management</th>
</tr>
</thead>
<tbody>
<tr>
<td>30% increase in server utilization</td>
<td>80% faster dynamic provisioning of storage and server infrastructure</td>
<td>40% cost reduction in cabling (fibre / patch cords etc.) and associated labor</td>
</tr>
<tr>
<td>50% increase in server density</td>
<td></td>
<td></td>
</tr>
<tr>
<td>200% increase in VM density</td>
<td>Day to day task automation (vCenter and UCS Manager)</td>
<td>30% less power consumption</td>
</tr>
<tr>
<td>Minimum of 72 VMs per KW</td>
<td>Continuous operation and availability (DRS/HA)</td>
<td>4X standard consolidation ratios (footprint)</td>
</tr>
<tr>
<td>Deterministic Performance Envelope for Individual or classes of workloads</td>
<td>20X increase in workload mobility</td>
<td></td>
</tr>
<tr>
<td></td>
<td>3X increase in local replication speed</td>
<td>'Pre-integrated' Vblock Infrastructure Packages</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>1MW, 10,000 Sq Ft</th>
<th>Traditional (c-Class blade)</th>
<th>Vblock</th>
</tr>
</thead>
<tbody>
<tr>
<td>DC efficiency</td>
<td>100%</td>
<td>170-200%</td>
</tr>
<tr>
<td>Cabling costs</td>
<td>$2.7M</td>
<td>&lt;$1.6M</td>
</tr>
<tr>
<td># physical server</td>
<td>720</td>
<td>1200-1400</td>
</tr>
<tr>
<td># VMs</td>
<td>9300-10800</td>
<td>12000-28000</td>
</tr>
<tr>
<td>VM per KW</td>
<td>7.2</td>
<td>12-28</td>
</tr>
</tbody>
</table>

Imagine the power of three …
Combining best of breed technologies from market leaders
## Physical Architecture

- Power, cooling, and space including
  - Compute chassis and blades
  - SAN and IP Network Components
  - Storage

<table>
<thead>
<tr>
<th>Vblock1</th>
<th>Minimum Configuration</th>
<th>Maximum Configuration</th>
</tr>
</thead>
<tbody>
<tr>
<td>Power</td>
<td>23.5 KVA</td>
<td>34.2 KVA</td>
</tr>
<tr>
<td>Cooling</td>
<td>89776 BTU/hr</td>
<td>121306 BTU/hr</td>
</tr>
<tr>
<td>Space</td>
<td>64 Rack Units (RU) 2 Racks</td>
<td>91 Rack Units (RU) 3 Racks</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Vblock2</th>
<th>Minimum Configuration</th>
<th>Maximum Configuration</th>
</tr>
</thead>
<tbody>
<tr>
<td>Power</td>
<td>41.76 KVA</td>
<td>58.56 KVA</td>
</tr>
<tr>
<td>Cooling</td>
<td>144280 BTU/hr</td>
<td>192340 BTU/hr</td>
</tr>
<tr>
<td>Space</td>
<td>155 Rack Units (RU) 4 Racks</td>
<td>179 Rack Units (RU) 5 Racks</td>
</tr>
</tbody>
</table>
THANK YOU!