What You Make Possible

TOMORROW starts here.

Media Data Centre for SPs and Broadcasters – Evolution to a Media Cloud

BRKSPV-2106

TOMORROW starts here.

Media Data Centre Agenda

- What is Changing?
  – Youtube, iDevices, Commodity computing, Cloud
- Why build a Media optimised Data Centre?
- How to design an MDC
- Using a MDC to implement a “TV Everywhere” service

Media Entertainment Market Trends

Video Everywhere

2015 by the Numbers

81 Exabytes
Global IP traffic/month *

15 Billion
Connected Devices *

62 Gigabytes
Average Internet Household Traffic per Month *

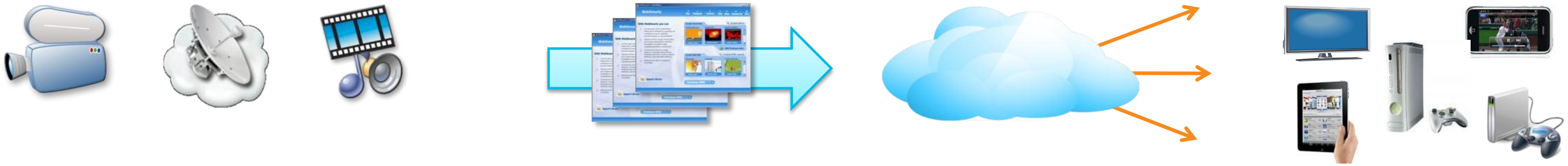
91
Percentage Share of Video in Consumer Traffic *

* Source: Cisco 2011

Open Digital Media Value Chain

So much content…so many subscriber apps…and so many devices to reach

Create Content → Aggregate Monetise → Distribute Content → Consume Content



Any Content | Any Storefront | Any Network | Any Device

Media Application Domain – The World of Many Apps

Content Creation

- Raw Asset Ingest
- Raw Transcode and Formatting (SDI, DX)
- Rough Cut Editing Apps
- Audio / Video Editing Apps
- Content Finishing
- Language Tracks and Subtitles Apps

Production Management

- Asset Creation Workflow Managers
- Asset Catalogs
- Quality Control To…
- Asset A…

…oduction Storage Services

- Master / Editing Storage
- Master / Editing Archive
- Disaster Recovery and Backup Services
- Virtual Storage Containers

Content Acquisition & ABR Processing

- Finished Asset Ingest
- ABR Transcode Packages (Adaptive Formats)
- Encryption Packages
- Digital Rights Managers
- Language Tracks and Subtitles Apps
- Digital Content Managers

Content Distribution Management

- Asset Workflo…
- EPG…
- …ment
- …gt, BSS/OSS
- …sset Catalogs

Distribution Storage Services

- Asset Storage
- Asset Archive
- Disaster Recovery and Backup Services
- Virtual Storage Containers

Enhanced TV Services

- Cloud DVR
- Enhanced EPG
- Cloud Rendered Apps
- Virtual STB
- Session Shifting
- Legacy TV Mgt Services
- Device Mgt Services

Advertisi…

- …aign Managers
- Ad Insertion Managers
- Ad Content Storage Packages
- Ad Sales and Consumer Targeting
- Ad Consumption Tracking Tools

Storefront & Consumer Apps

- Storefronts and Web Portals
- Merchandising and Promotion
- Transaction Services
- Consumer License Validatio…
- P…

Analytics

- Session Management
- Conductor
- Alert Managers and Logging Services
- Client Usage and Consumption Analytics
- Reports and Analysis Tools

Distribution Services

- Origin Servers and CDN Handoff
- Service Routing
- Conte…
- …iners
- …Centre Interconnect

Mobility

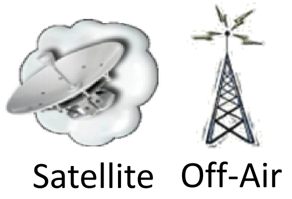
- Mobile Content Adaptation Engines
- Mobile Device Managers
- Dynamic Session Managers

Infrastructure & Session Mgt

- Data Centre Infrastructure Mgt
- Virtualisation Mgt Apps
- Load Balancers, Firewall, Security
- Service Orchestration
- Database Servers and Mgt Tools

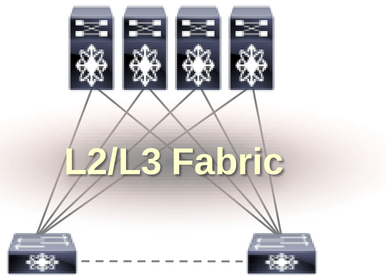
Data Centre Infrastructure required to host these Media applications

Media has Unique Requirements

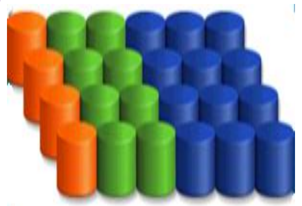


Unique Interfaces to Media Sources

Strict Media Redundancy Models



High Bandwidth Network Loading



Unique Media Storage Requirements

Media Application Diversity

Media Cloud Service Models

Security for Content and Data Centre

Media Analytics

Creates Infrastructure Challenges

Media Delivery Networks need to evolve to match the new demands of Entertainment

Scale-Constrained Infrastructure

Can your network and data Centre scale to handle new web applications?

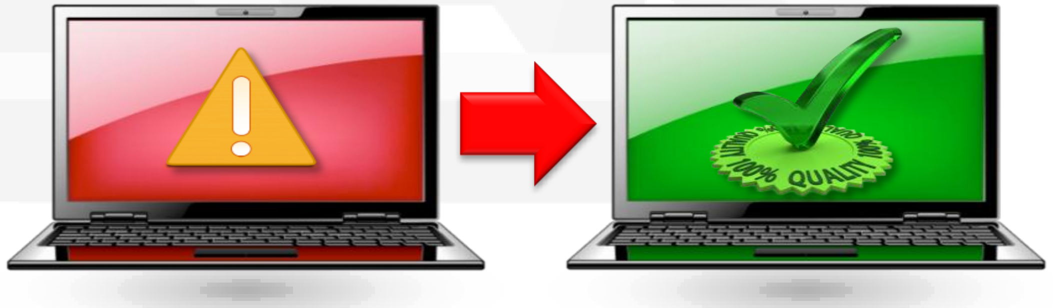
Service-Defined Silos

Do you have different infrastructures for each Media service?

Time-Intensive Deployments

How long does it take you to rollout a new service or consumer app?

Mission-Critical Applications



How confident are you in the quality of your services?

Media Cloud Business Drivers

How does this Impact Media Delivery?

What is Cloud Computing?

“A Style of Computing Where Scalable Data Centre-Enabled Capabilities Are Delivered “As a Service” to Multiple External Customers Using Internet Technologies”

Gartner 2008

What is Cloud Computing?

Visual Model of NIST's Working Definition of Cloud Computing

Essential Characteristics

Measured Service | Rapid Elasticity

Service Models

On-Demand Self Service | Broad Network Access | Resource Pooling

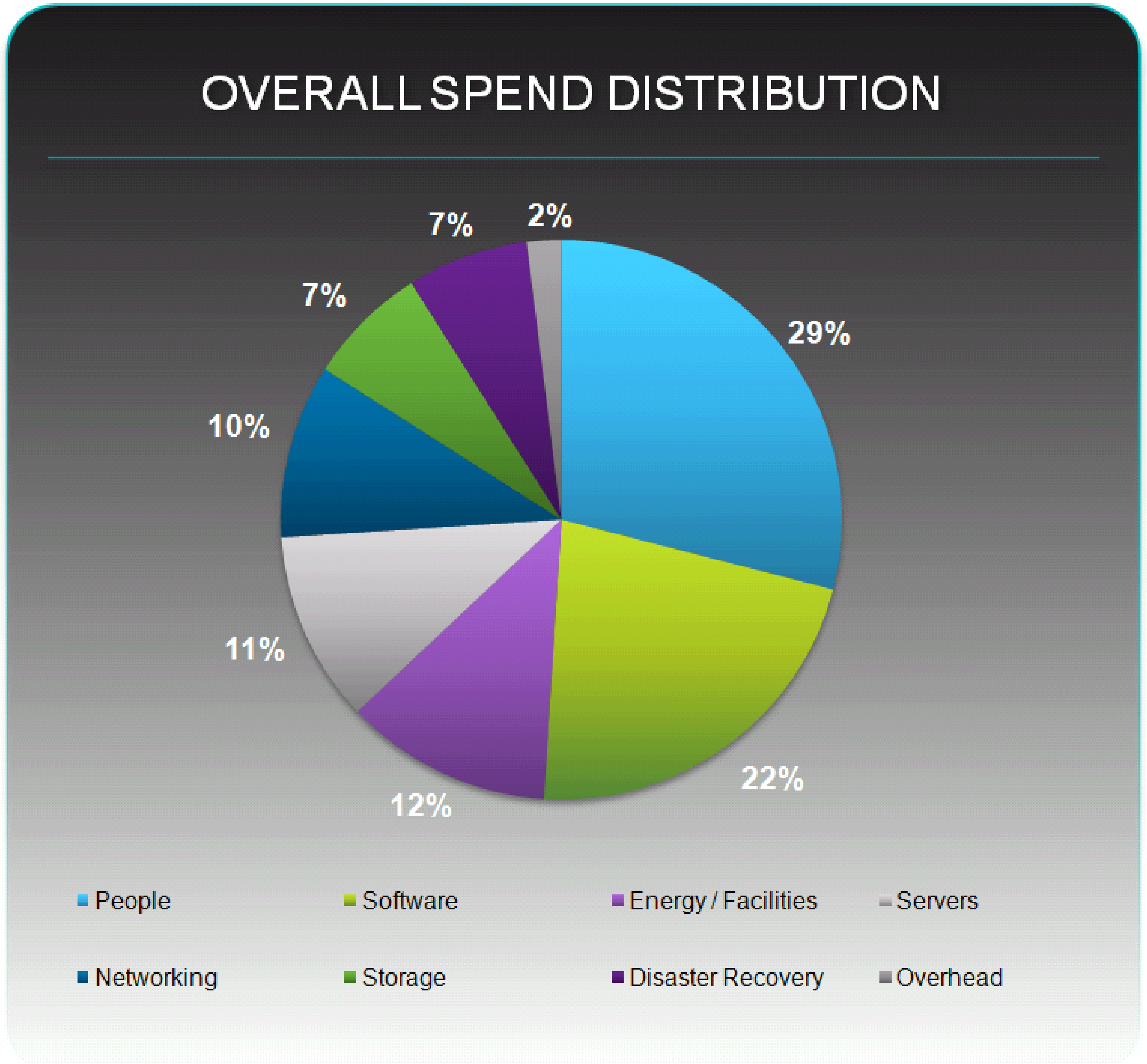
Deployment Models

Software-as-a-Service | Platform-as-a-Service | Infrastructure-as-a-Service | Media-as-a-Service

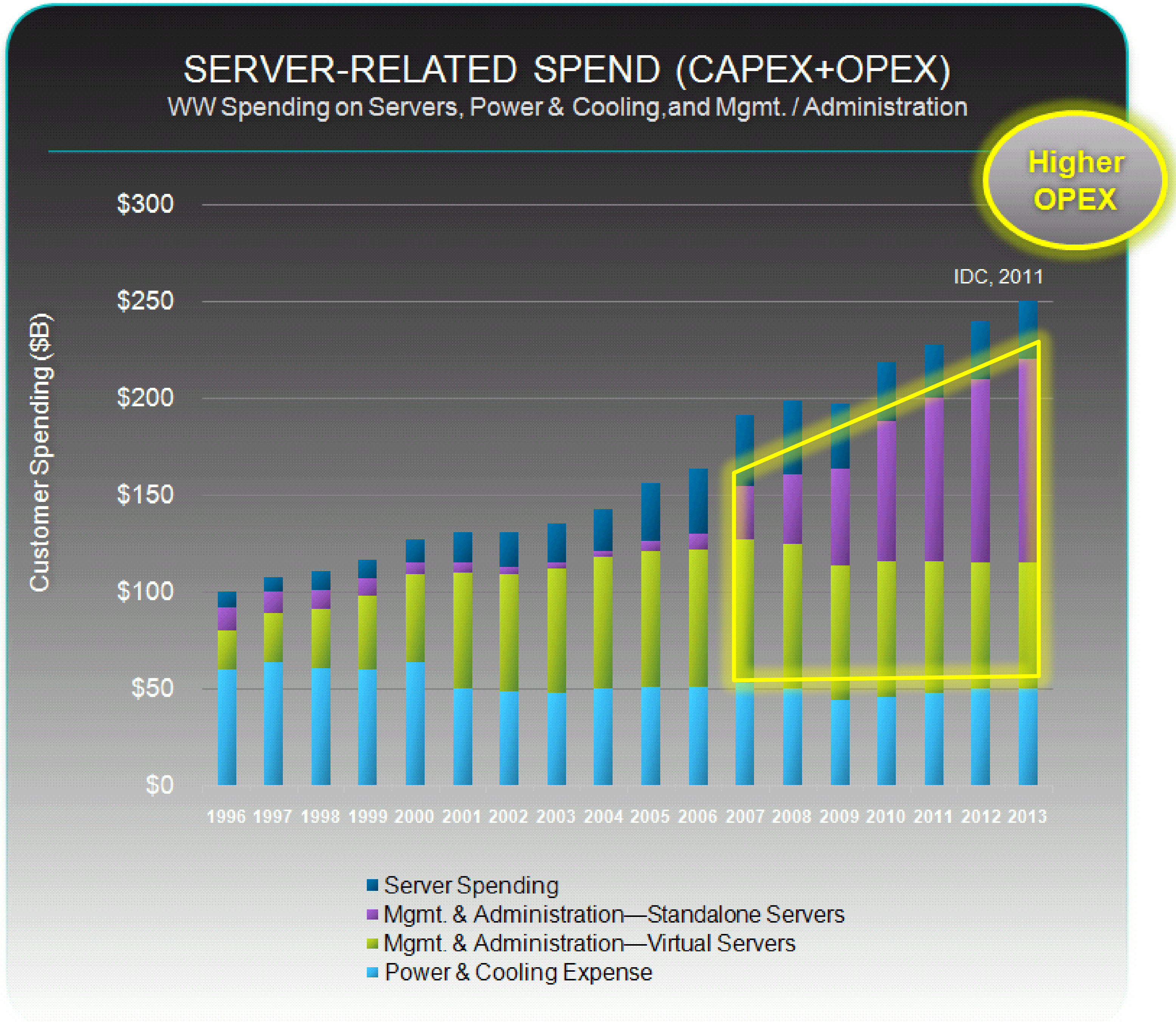
Public | Private | Hybrid | Community

Data Centre Economics

Operations will consume a larger slice of expenses



Source: Gartner—Cisco IT, "Data Center Cost Portfolio"



Source: IDC, "New Economic Model for the Datacenter"

Cisco IT Case Study

Private Cloud

2-3 Weeks

15 Minutes

Average TCO

IT Maintenance /
IT Innovation
70/**30**

Average TCO -37%

IT Maintenance /
IT Innovation
60/40

Average TCO -31%

IT Maintenance /
IT Innovation
40/**60**

6-8 Weeks to Deploy
Legacy Computer Platform

60% Virtual,
Legacy Computer Platform

65% Virtual,
Unified Computing Platform,
100% Automated

Virtualisation

Unified Infrastructure and Automation

Changing Data Centre Economics

Cisco Unified Data Centres – Enterprise/SP Cloud Lessons

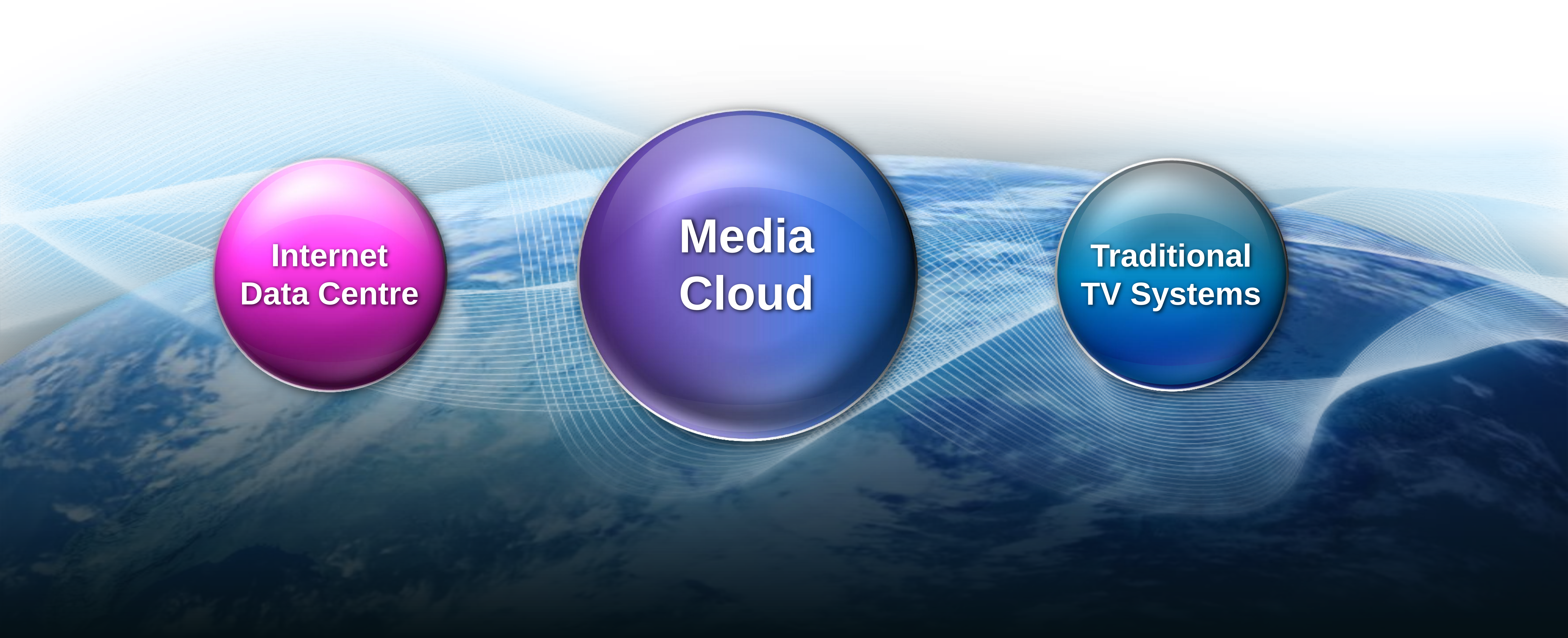
Infrastructure Costs	Disaster Recovery	Deployment Times	IT Staffing	Power Cooling	Application Performance
30% Less Cost	50% Faster	90% Less Time	Deploy 2x Capacity No Staff Increase	60% Less Cost	30% Faster

The same Economic Benefits, proven for IT Enterprise Cloud Services apply to Media Applications running in the Cloud

1 + 1 =3

Two Service Architectures are Colliding

Apply proven economic benefits from Enterprise Cloud models
to deliver new Media Applications and Content



The Journey to a Media Cloud

*Evolution of **Data Centres** + Business Agility*

Stage 1

Consolidation

Data Centre Infrastructure

Stage 2

Virtualisation

Media and Business Applications

Stage 3

Automation

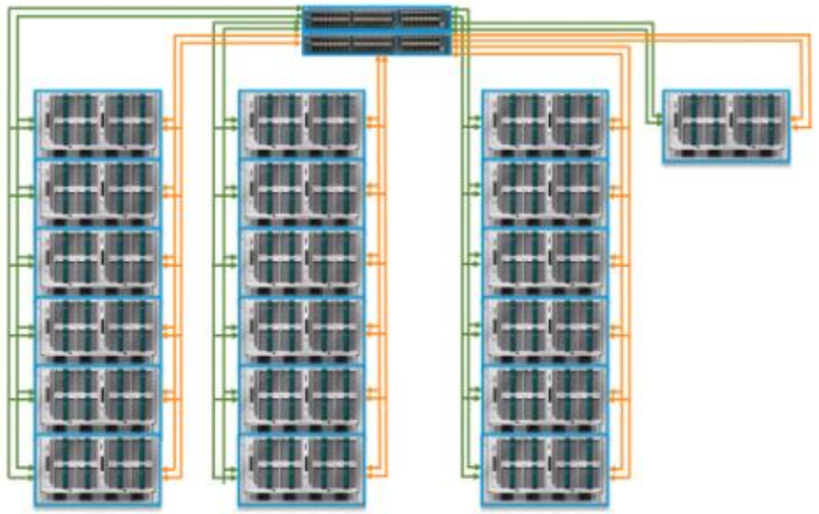
“Media-as-a-Service”

Evolution of the Media Processing

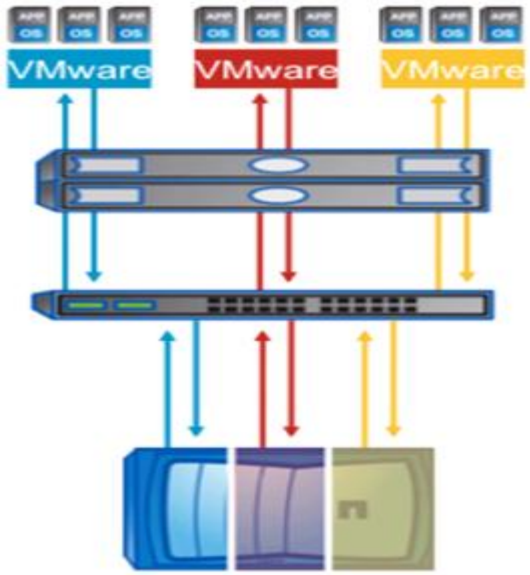
Appliances → **Blades** → **Virtualisation** → **Media Cloud**

Appliances in Racks

Blades in Media Pods



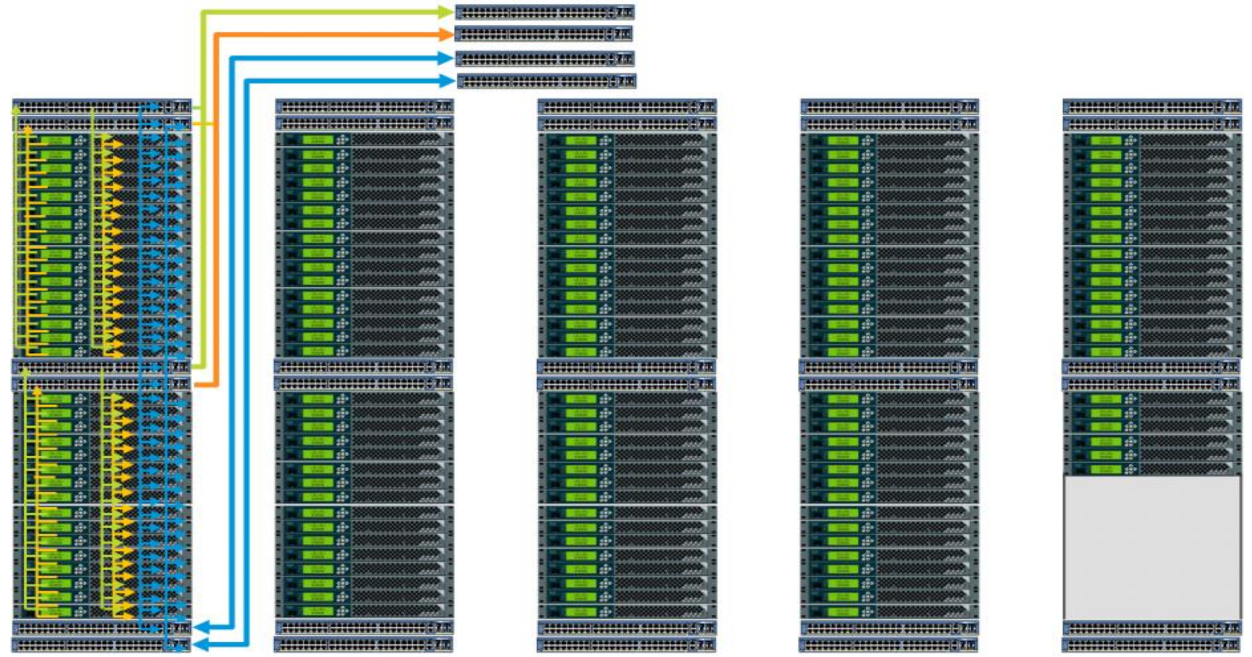
Virtual Apps and Infrastructure



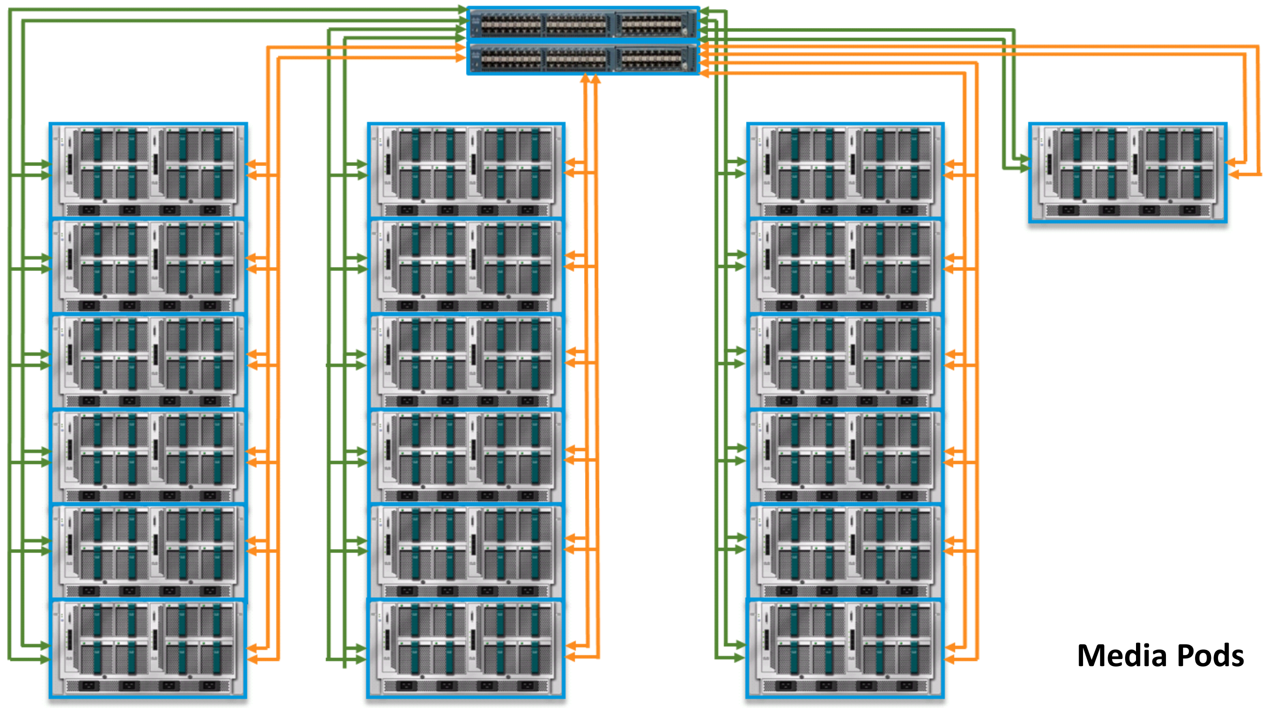
Distributed Data Centres and Media-as-a-Service

Moving from Appliances to Blade-based Media Pods

150 Unit Encoder System – Appliance Model



150 Encoder System – UCS Blade Model



Comparing 150 Unit Encoder Systems

150 Unit System	Appliance Model	UCS Model
Total Racks	5 racks	4 Racks
Total RUs	184 RU	116 RU
Cables per Server	6	2
Cables per Rack	202	24
Cables per System	950	76
# of Switches	34	2
# of Mgt Interfaces	184	1

Preliminary Calculations
Appliance versus UCS Bare Metal install

Impact of Blades

- 35% Less Rack Space
- 89% Less Cables Per Rack
- 92% Less Cables Per System
- 95% Less Switches
- **Only 1 Management Interface**
- Compute Density of Blades will improve
- Virtualisation will Yield Even More Savings

Evolution of the Media Data Centre

Media Data Centre provides a Cloudy-Ready Design

1

Extend Multi-Tier Data Centre with Media PoDs

- Extend Multi-tier Data Centre to new application domains (TV Everywhere)
- Insert Unified Media PoD for new services
- Fundamental Building Block of Media Cloud

2

Provide Unique Interfaces to Media Sources

- Data Centre support for SSM Multicast
- FabricPath and VPC+ required
- Source Redundancy based on application control plane and Media analytics (ETR-290)

3

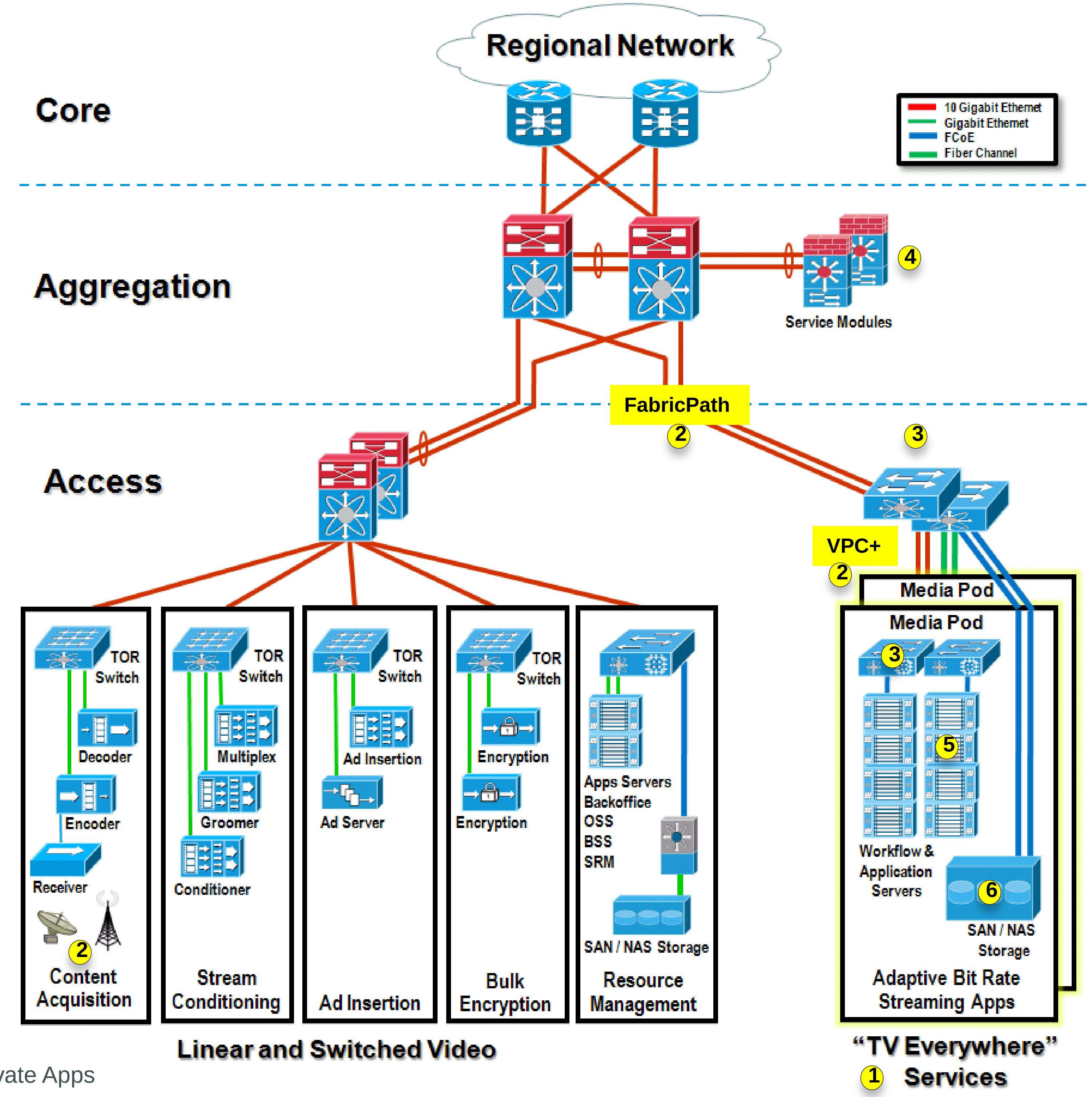
Manage High Bandwidth Network Loads

- QoS network model weighted for high volume, low latency, priority traffic over redundant paths
- Media traffic is bursty, measure cumulative loading on 10G port buffers (drops, overflows) on Nexus 5K, 7K, FI
- Less link oversubscription for North/South and East/West traffic (3:1)
- Media load dictates unified fabric and 10G switching links

4

Security Tiers and Services

- Security Tiers and Services for Public Web versus Private Apps



5

Implement Diverse Media Apps on a Unified Media PoD

- CPU intensive Media apps consuming complete blades and bare-metal (ABR Transcoders)
- Media apps with high transaction rates or fast database access (MediaSuite Content Mgt, Oracle RAC Database)
- Multiple classes of computing required: high compute, dense memory, high I/O, and virtualised workloads (B200 M2, B250 M2)
- Certain appliance products remain (DCM, D9036)

6

Optimised Media Storage Requirements

- NFS/NAS file systems and resource pools for Media workflows and content Archive
- Design scales with storage requirements: new content sources, delivery profiles, and device formats
- Storage spans Media Workflows (SAS), high capacity database (Blended Flash and SAS), and Content Archive (NL-SAS)

7

Unique Redundancy Models & Media Analytics

- Critical applications require duplicate Media Workflows on fully redundant components (N+N model)
- Validate Apps redundancy across infrastructure outages
- Media Monitoring (content acquisition stages)

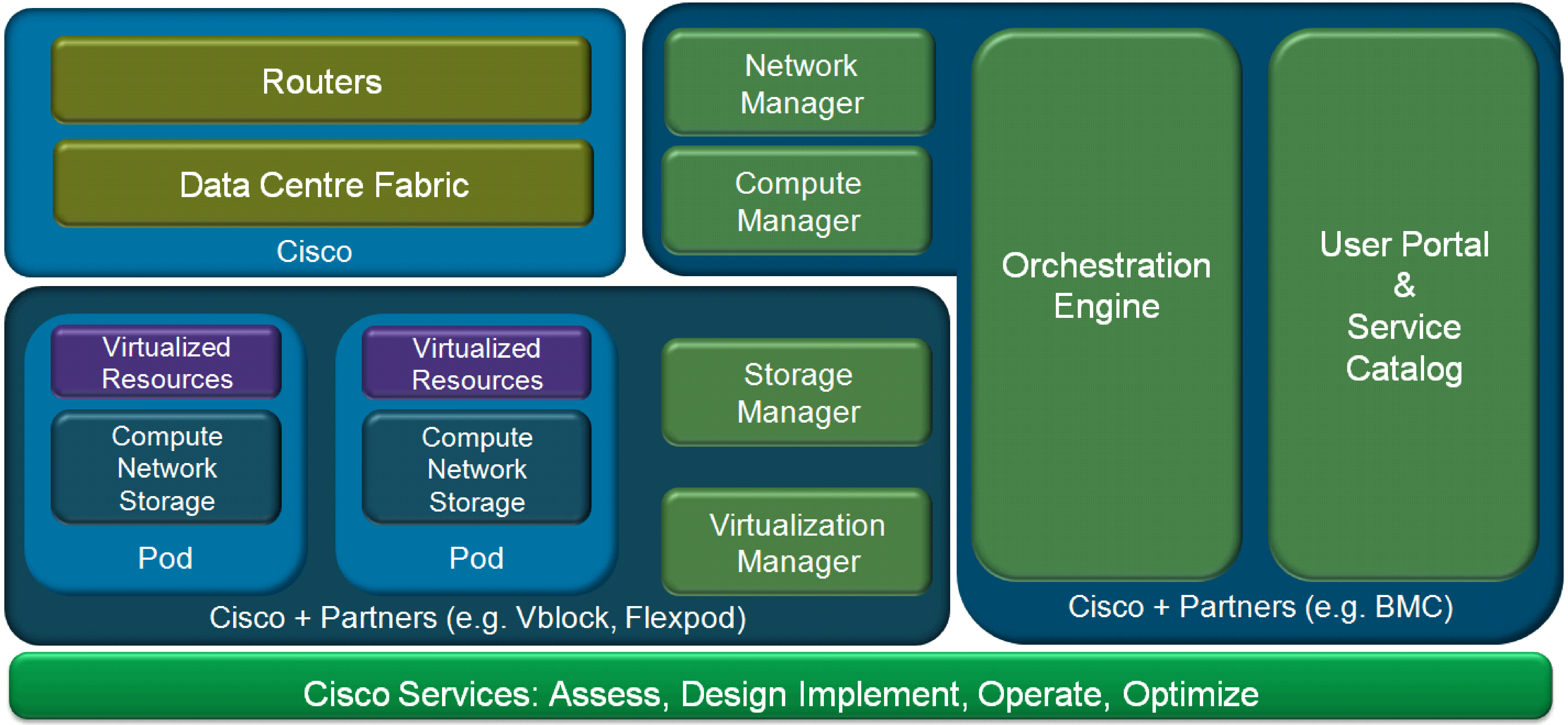
A Media Data Centre is Built from the Cisco Cloud Solution Set

Cisco Cloud Solution Set

Media Data Centre is Mapped to this Solution Set

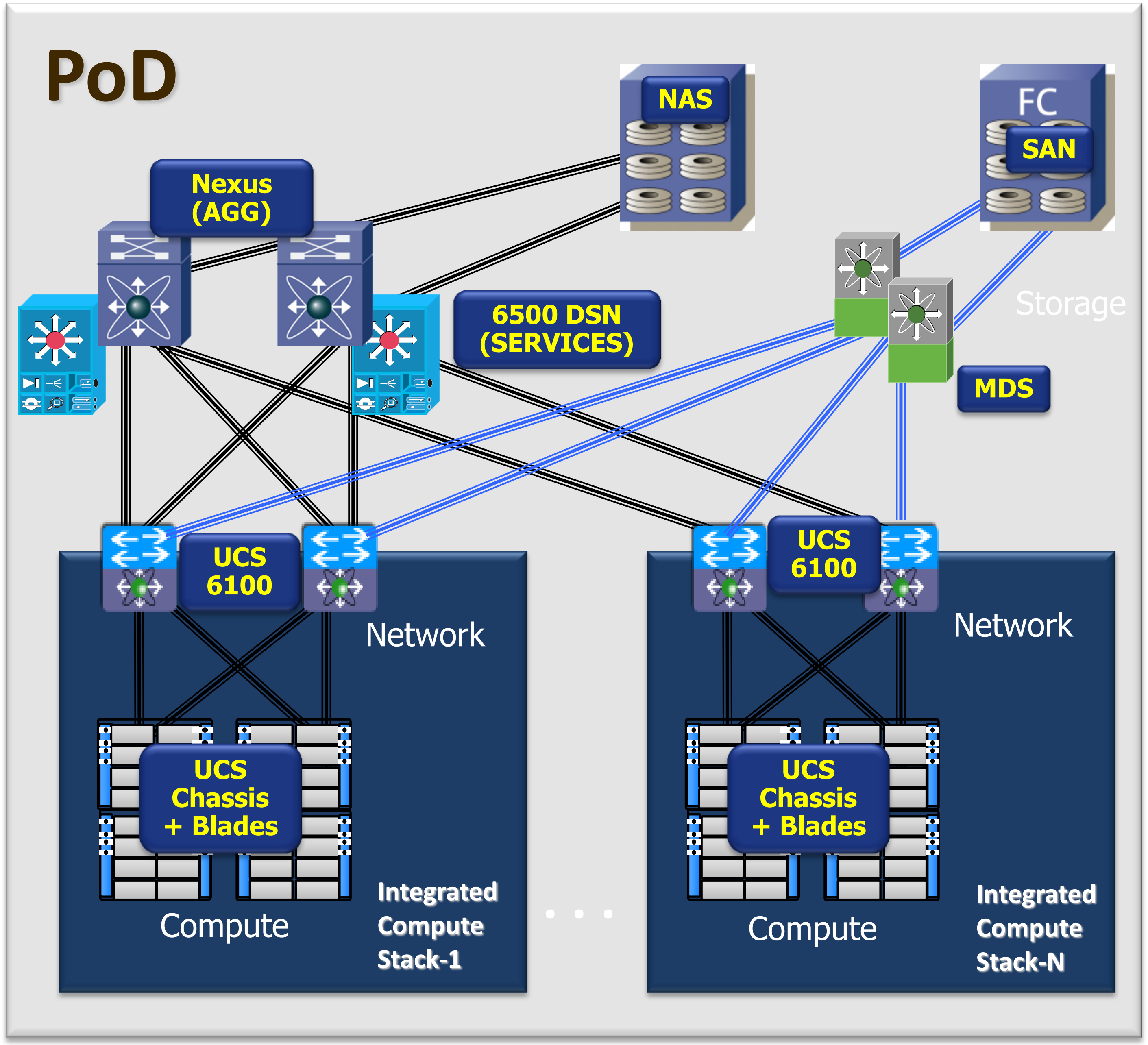
Common Physical Infrastructure

Infrastructure Service Management Software



Cloud Building Blocks

The Pod is the Fundamental Building Block of the Media Cloud

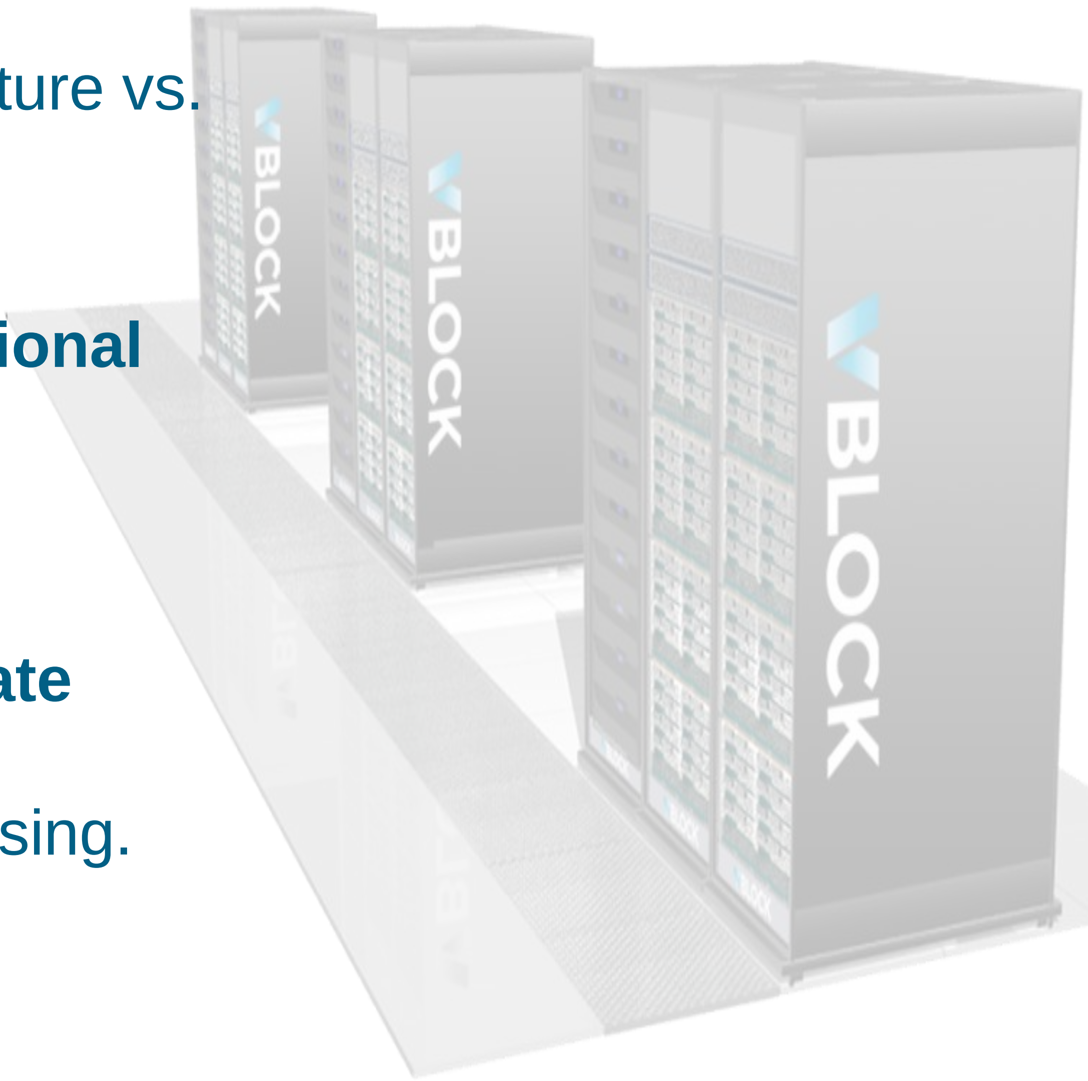


- Modular construct consisting of groupings of **Integrated Compute Stacks** plus **Storage** and **Unified Networking**
- A single PoD can be deployed and operated by itself or connected together to other PoDs to achieve scale
- Scale of Applications dictates styles of PoDs: Compact and Large

Vblock: Integrated Compute Stack

THE VIRTUAL COMPUTING ENVIRONMENT COMPANY

- **Pre-integrated and supported cloud infrastructure**
  Focus teams on using infrastructure vs. assembling and supporting the individual components
- **Cloud service provider operational model**
  provisioning, service delivery, chargeback, etc.
- **Accelerates the shift to a private cloud model**
  Less time debating, more time using.



- **Vblock Series 700**
  Storage: **EMC Symmetrix Vmax**
  Compute: Cisco UCS
  Virtualisation: VMware
  Orchestration: Unified Infrastructure Manager (UIM)
  Vblock Series 700 model MX
- **Vblock Series 300**
  Storage**: EMC VNX**
  Compute: Cisco UCS
  Virtualisation: VMware
  Orchestration: Unified Infrastructure Manager (UIM)
  4 Models

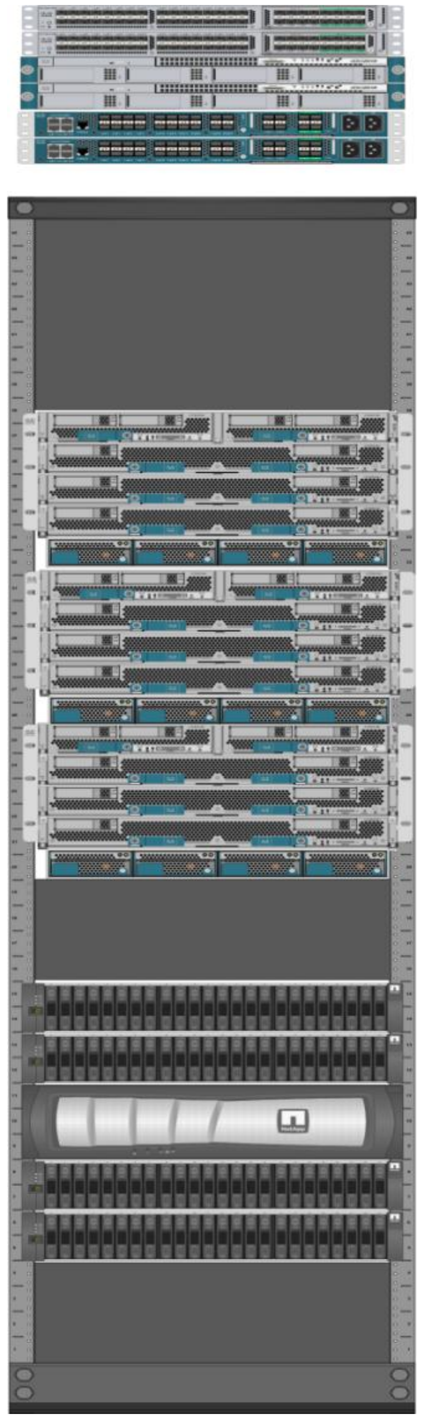
FlexPod: Integrated Compute Stack

VMware vSphere™
vSphere Enterprise Plus
vCentre™ Standard

Cisco Unified Fabric
2 Nexus 5548 (per 3 FlexPods)
      with Fabric Services
2 Nexus 1010 & Nexus 1000v

Cisco UCS
2 Fabric Interconnect 6120
3 B-Series 5108 Chassis
9 B-Series B250M2 + VIC
6 B-Series B200M2 + VIC

NetApp FAS3210A
4 DS2246 450GB SAS Shelves
2 256 GB Flash Cache
2 10Gbps IP Interfaces
4 4Gbps FC Interfaces
NetApp Complete Bundle



1 Rack DC Solution
30 Westmere CPUs (180 Cores)
2TB Server Memory (Up to 4TB)
40Gbps Interconnect (4 x 10GbE)
512GB SSD Storage Cache
42TB Storage

1 Enterprise IT Infrastructure
Catering for an organisation of 1,500 users with a mixed workload of:

- VMware View 4.5 (Windows 7)
- MS Exchange 2010
- MS SharePoint 2010
- MS SQL Server 2008R2
- Headroom for more applications

Two classes of compute supporting dense memory and general virtualised workloads

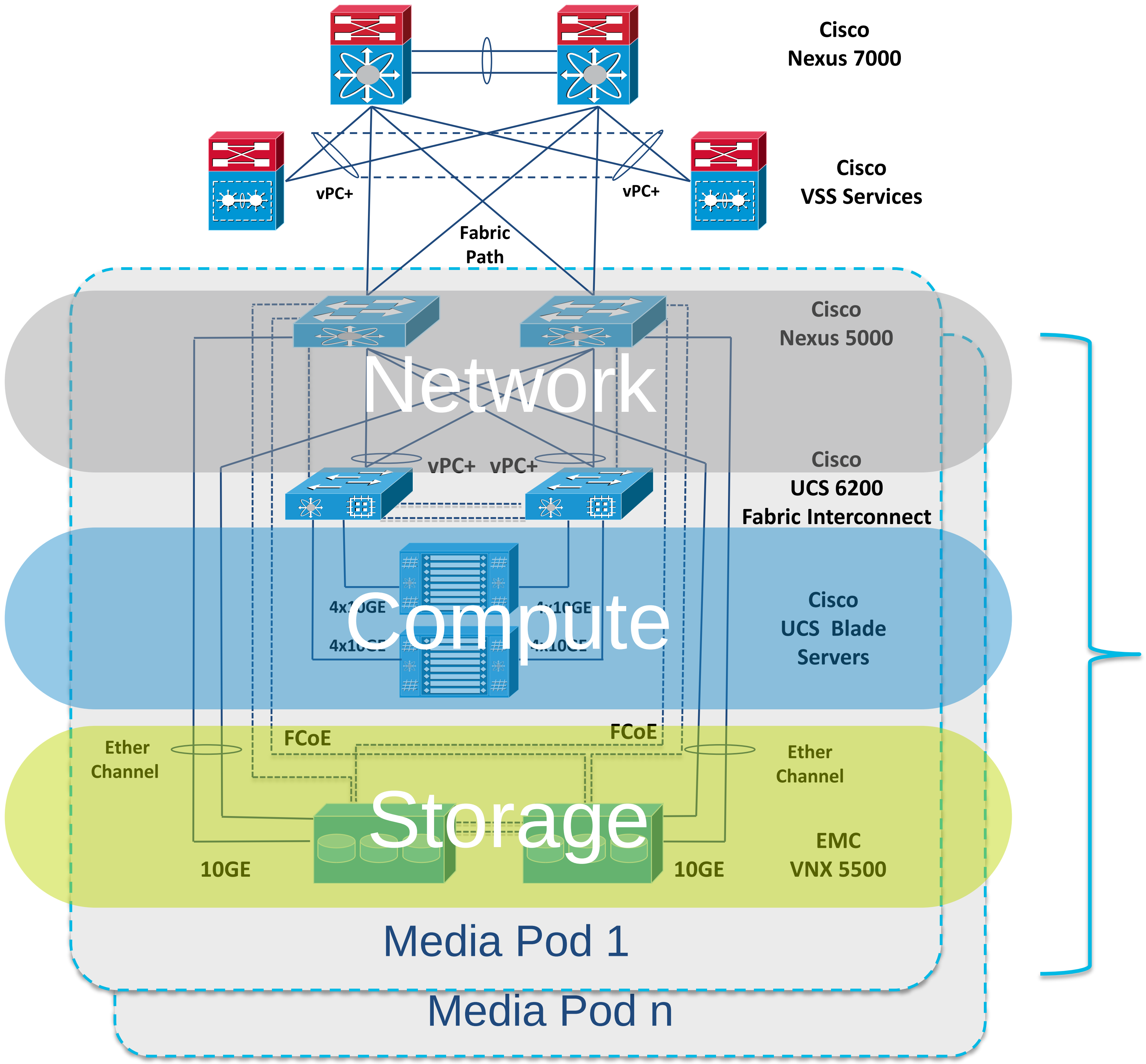
Media Data Centre Architecture

MDC Functional Layers

- Management
- Storage
- Compute
- Services
- Network

Mapping MDC to Media Pods

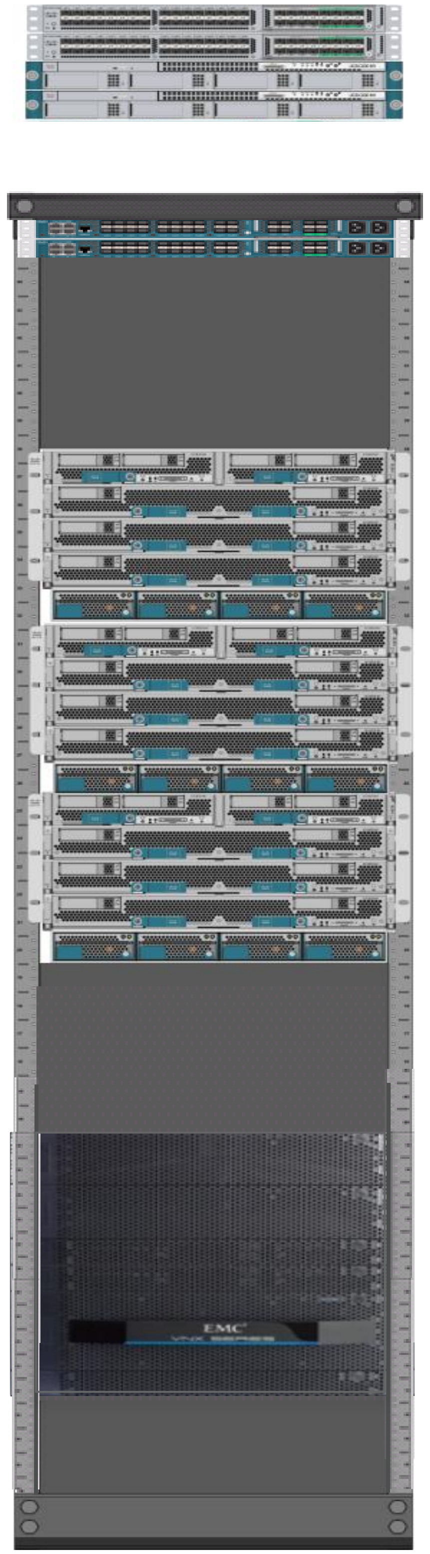
Massively Scalable



Redundant &
Replicable
Media Pods

Media PoD Components

Infrastructure Building Block of the Media Cloud



VMware vSphere
VMware vSphere Enterprise Plus
VMware vCentre Standard

Cisco® Unified Fabric
2 Cisco Nexus® 5548UP with fabric services
(per 3 Media Pod configurations)
2 Cisco Nexus 1000V

Cisco UCS Platform
2 Cisco UCS 6248UP Fabric Interconnect
3 Cisco UCS 5108 Blade Server Chassis
4 Cisco UCS B-250 M2 plus VIC
16 Cisco UCS B-200 M2 plus VIC

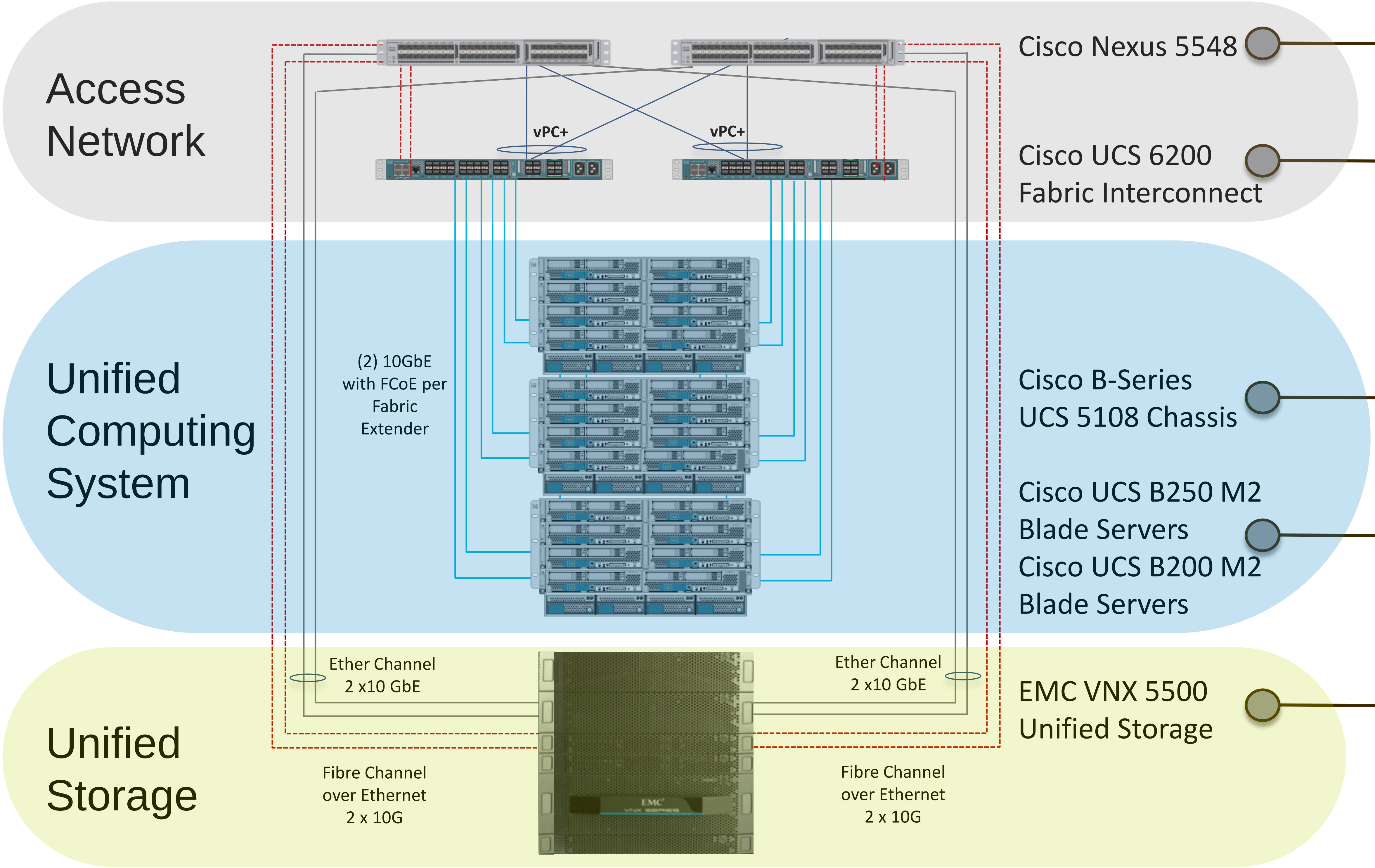
EMC VNX-5500 Storage
VNX 600GB 15K SAS Drives
VNX 2TB 7.2K SAS Drives
4 10-Gbps IP interfaces
8 8-Gbps Fibre Channel interfaces
2 10-Gbps FCoE interfaces

1 Rack Data Centre Solution
36 Westmere CPUs (218 cores)
2 TB server memory (up to 4 TB)
40-Gbps interconnect (4x 10 GE)
512-GB SSD storage cache
50 TB storage

1 Flexible Media Infrastructure
Plus headroom for more servers and storage capacity
Two classes of computing supporting dense memory and general virtualised workloads

Media PoD – Redundant Unified Architecture

One architecture, One data Centre infrastructure to manage



Unified Access Switch supports GE, Fibre Channel, and FCoE

“Wire-once” Fabric Interconnect

Fully redundant server I/O, backplane, and network connections

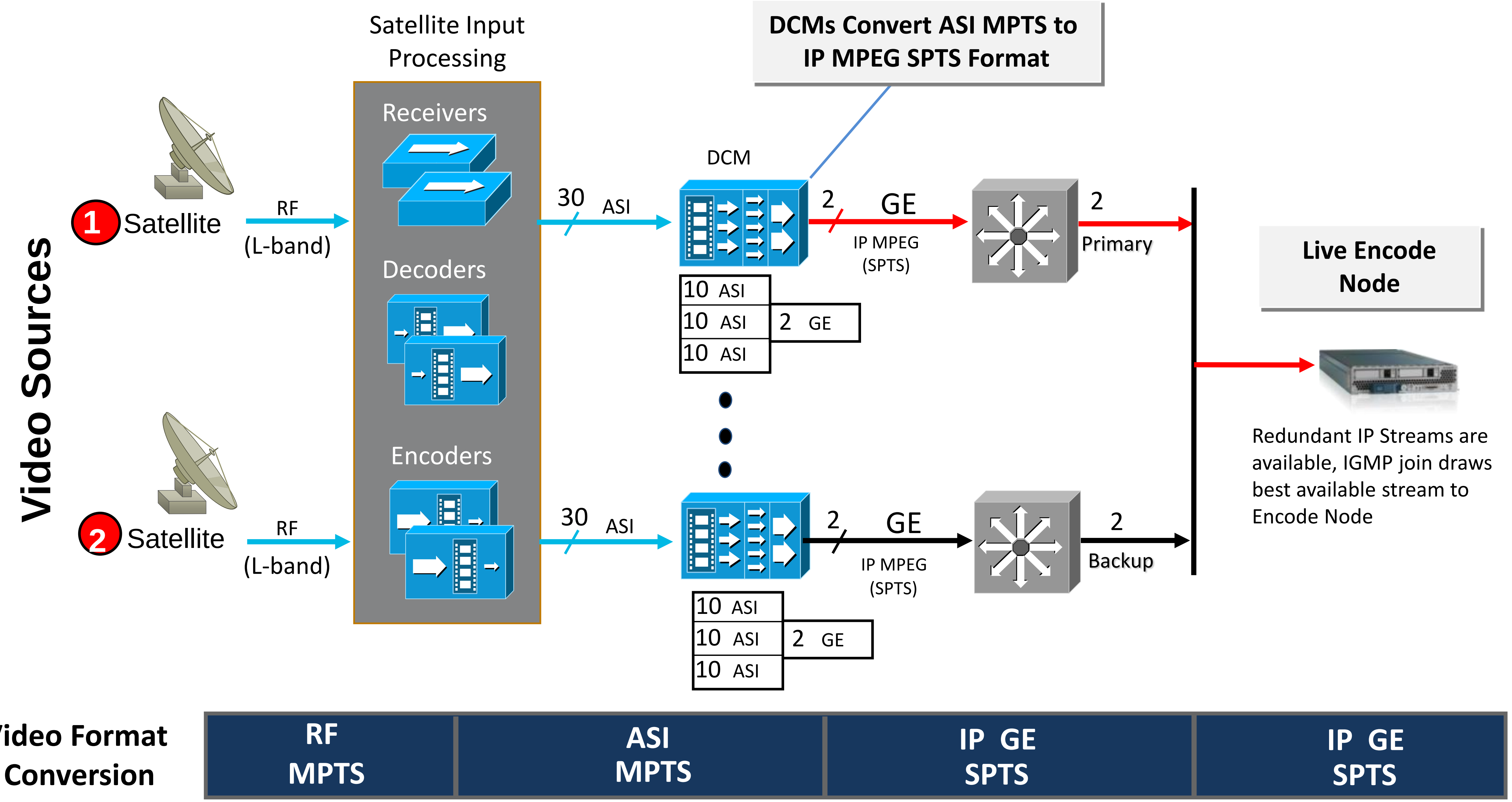
High performance Blades support multiple classes of computing and dense memory

Unified Storage supports both SAN and NAS, and virtual resource pools

Media Data Centre Traffic Flows

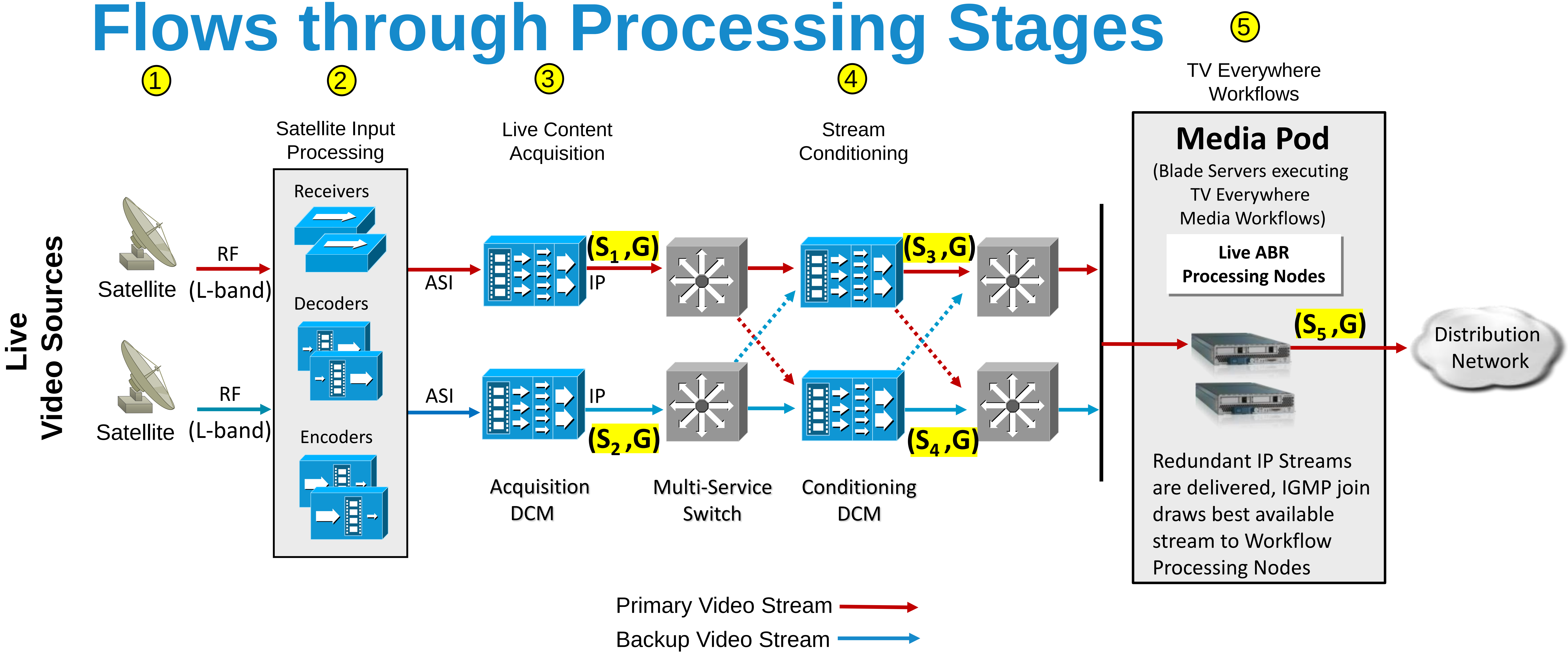
Live Content Acquisition - Satellite Example

Redundant Video Sources Acquired and Transcoded



- Redundant Content is made available in a common format (IP MPEG SPTS)
- The ABR Live Encode Node joins the “best available” stream (SSM IGMP Multicast Join)

Source Specific Multicast Draws Video Flows through Processing Stages



FabricPath and vPC+ in the Media Data Centre

Unified network for Media Applications, Workflows, and Consumer Services

A Single Fabric that supports Multiple Protocols

- Single control protocol is used for unicast forwarding, multicast forwarding, and VLAN pruning, which is ideal for mixed Media environments

Support for SSM Multicast Video flows

- Media Data Centre requires SSM Multicast flows to be delivered to compute and storage Pods
- Virtual Port Channel (vPC) does not support SSM Multicast

Lower Latency between Distributed Server Hosts

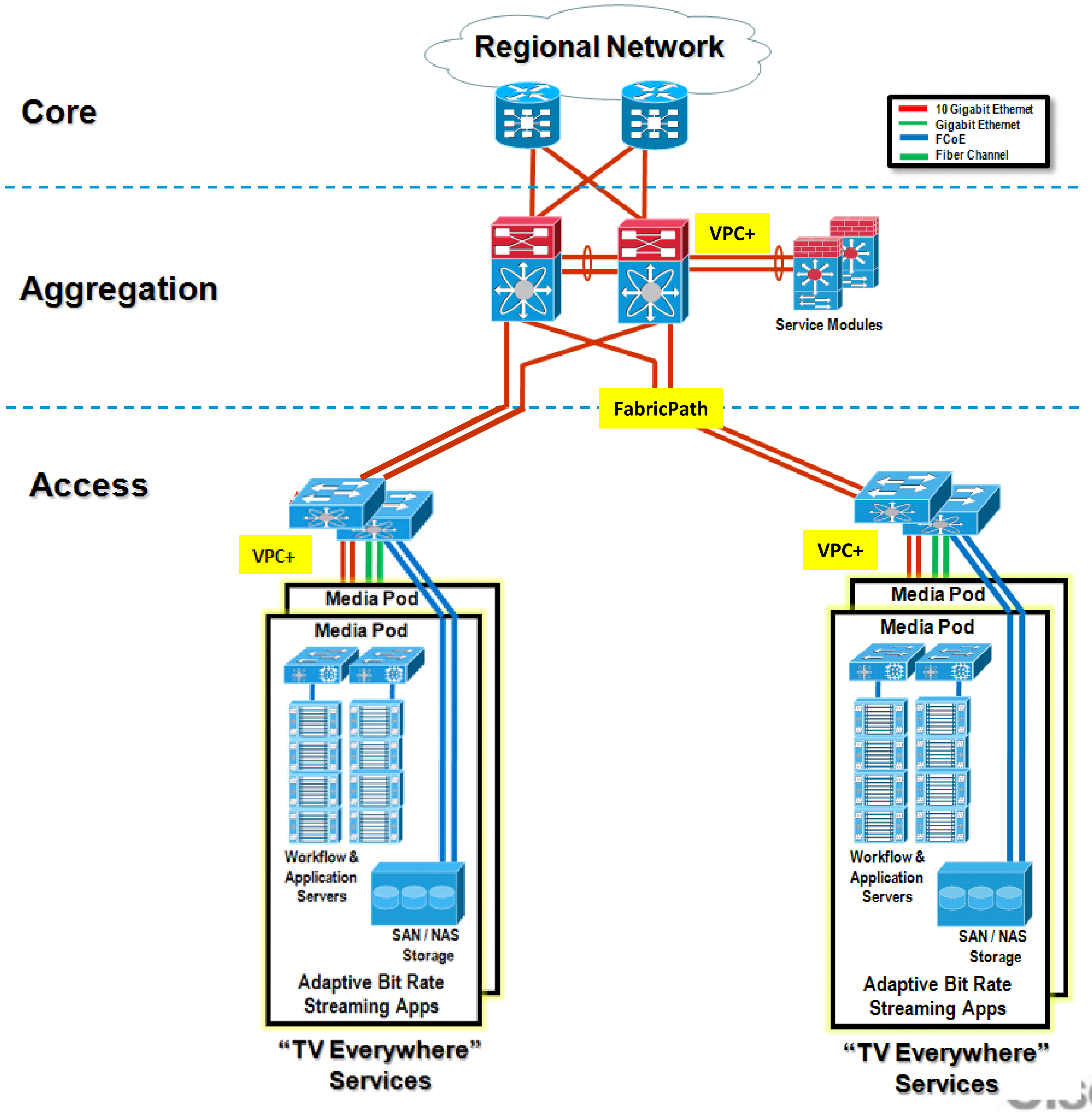
- Frames are forwarded along the shortest path to their destination, reducing the latency of the exchanges between end stations compared to a spanning-tree-based solution
- This provides Media workflows lower latency switching across different compute and storage Pods

Better Media Application Mobility and Scale

- FabricPath allows better mobility of Virtual applications from one compute Pod to another
- FabricPath provides unlimited bandwidth for east-west Media flows

Non-Disruptive Config Modifications

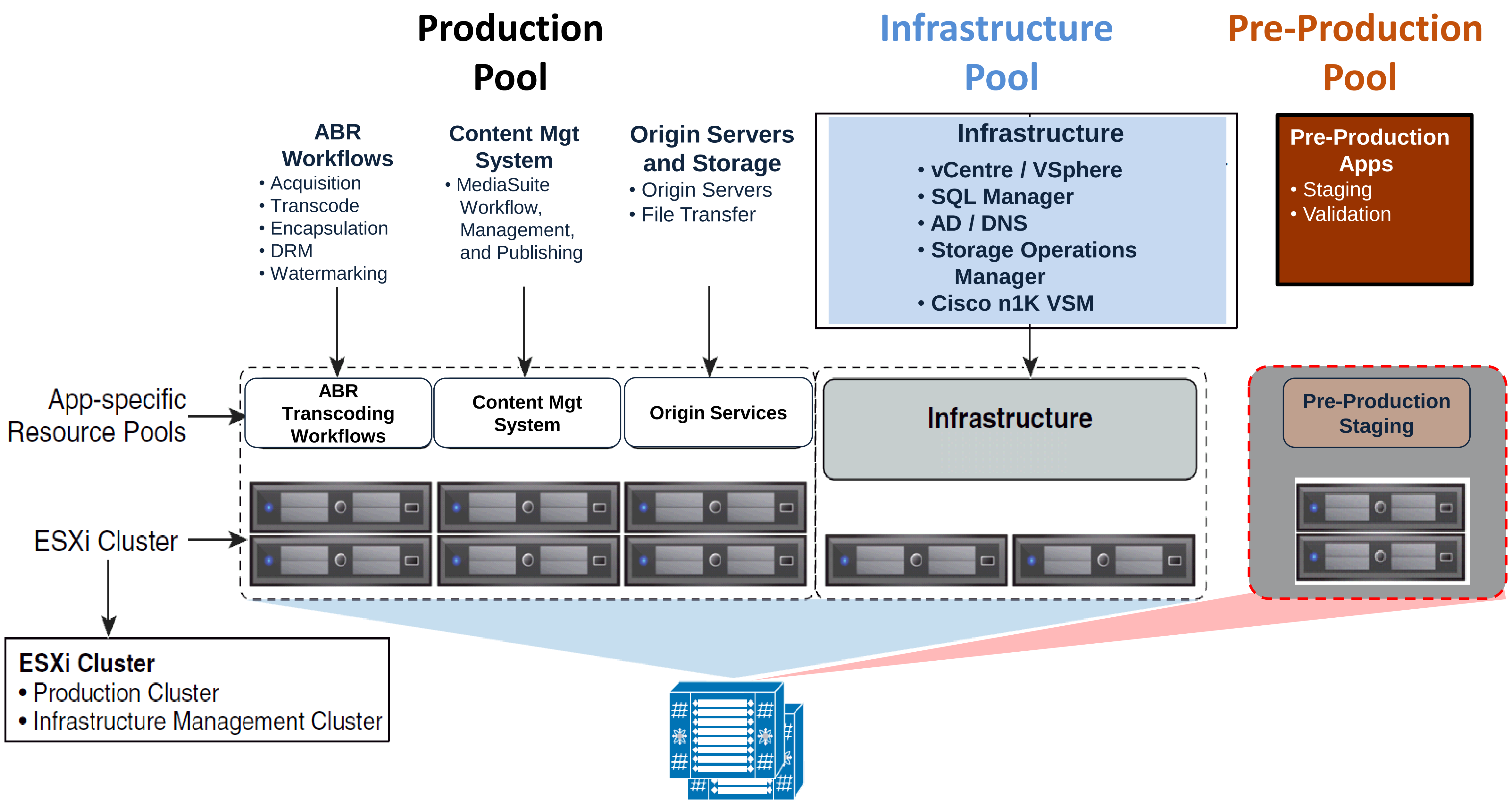
- FabricPath allows for configuration changes to be implemented without disrupting active host nodes.
- This is critical in a Media environment in which new network capabilities must be added while maintaining existing Media services.



Media Data Centre Compute Resources

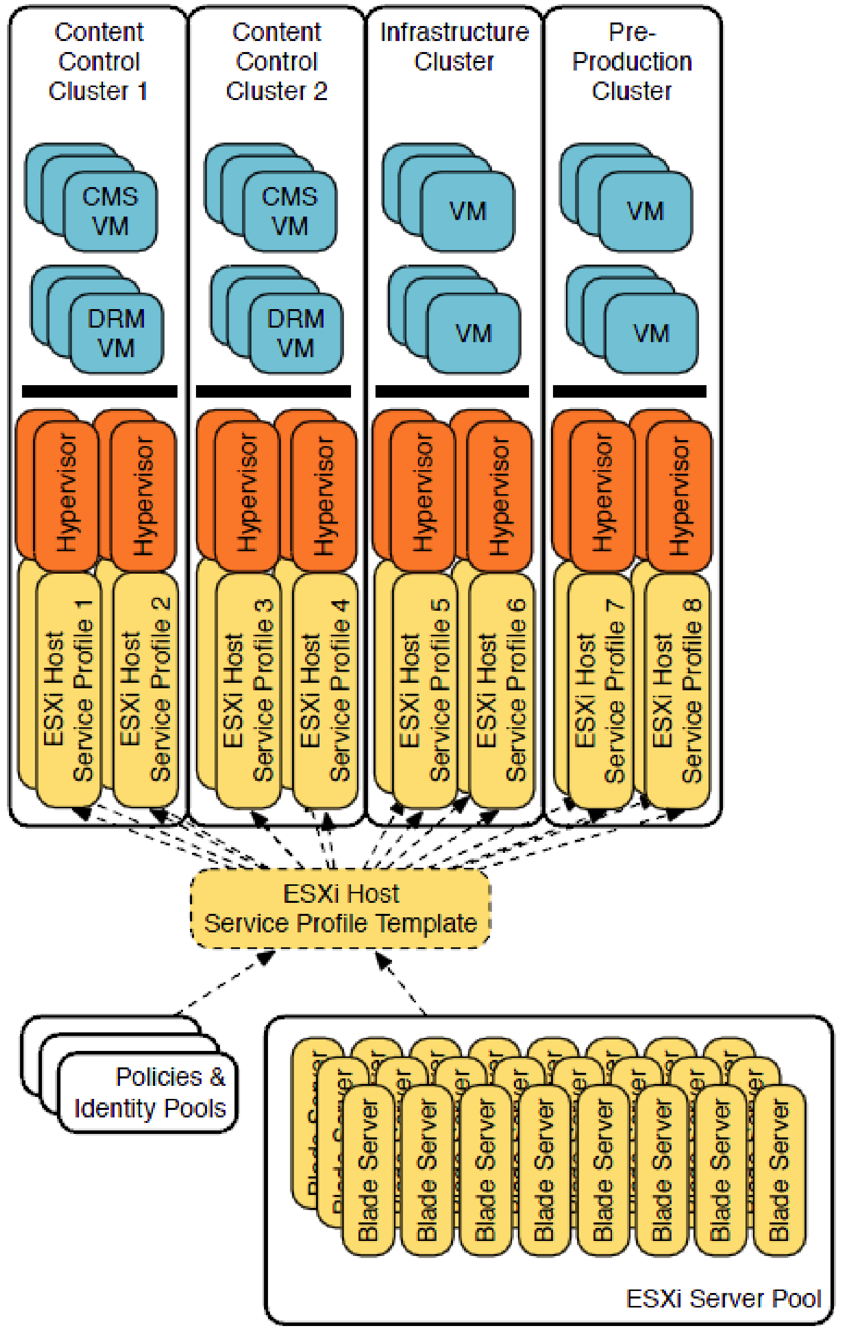
Define Application Resource Pools

"Resource Pools" will partition production workloads and infrastructure management

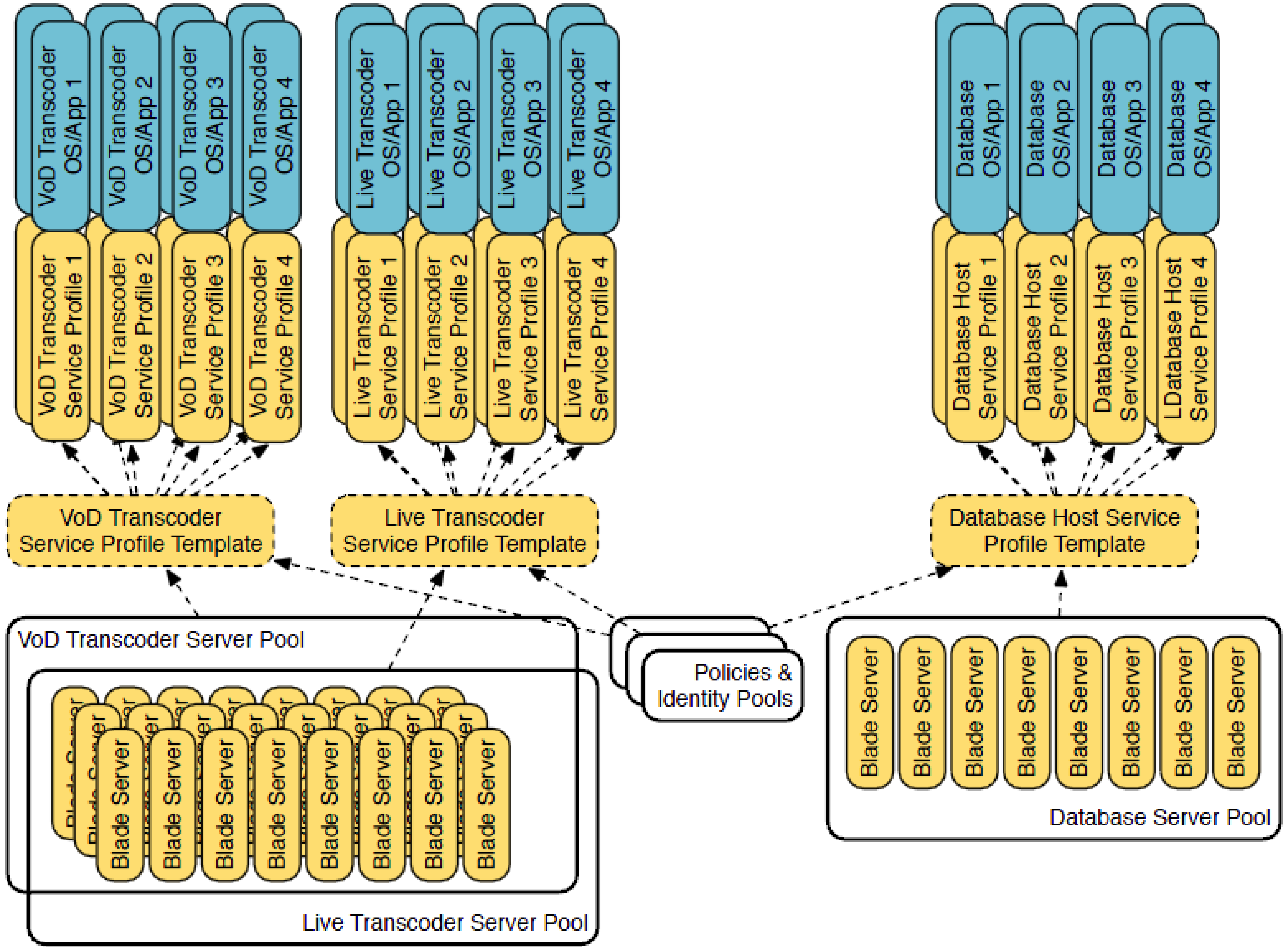


Rapidly Deploy Media Apps using Service Profiles and Templates

Virtual Applications are Mapped to Blades in the ESXi Server Pool



Bare Metal Applications are Mapped to Blades in the Bare Metal Server Pools



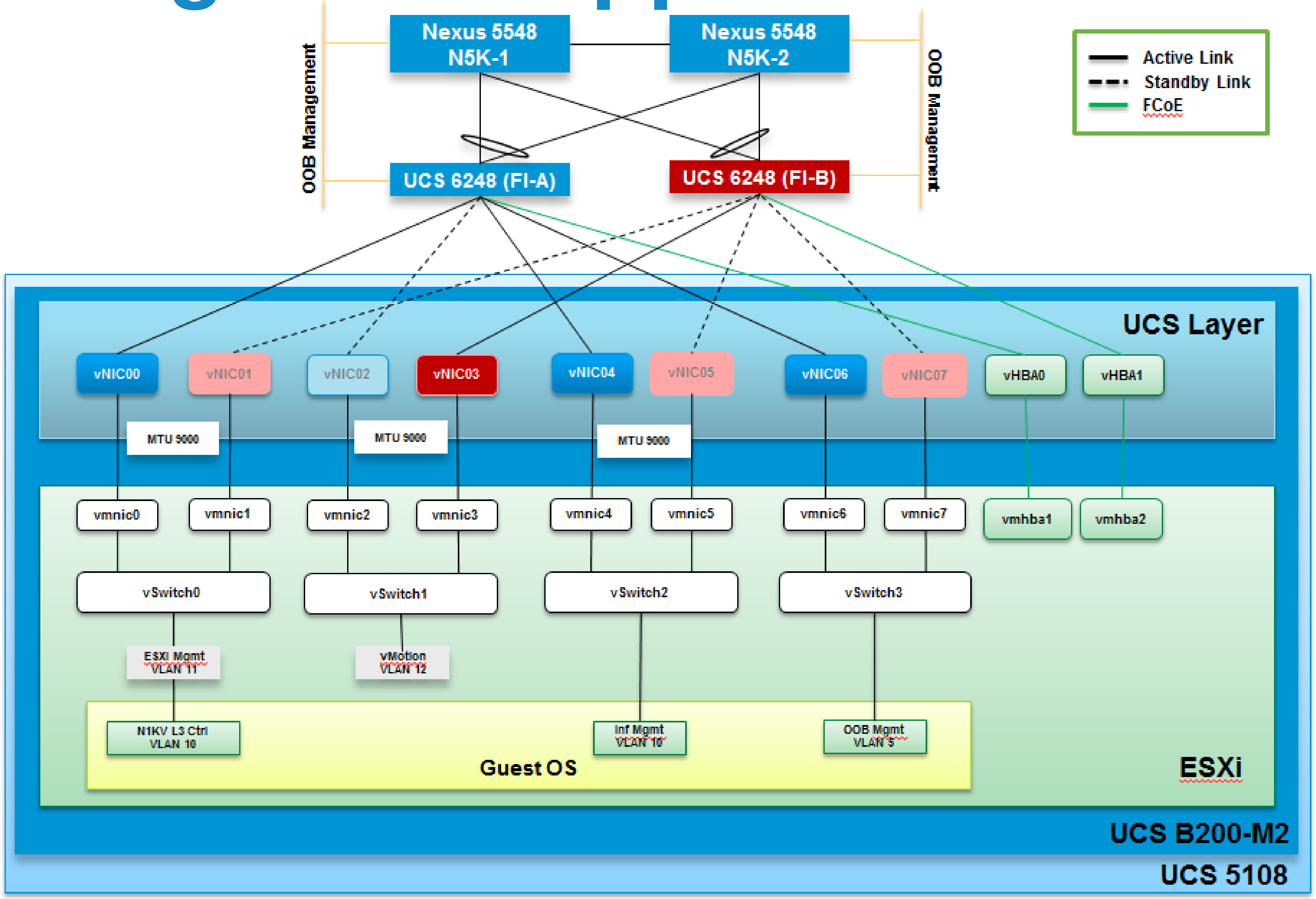
UCS Design: Infrastructure Management Apps

Standard vSwitch Implementation

- Each vSwitch contains two vmnics
- Each Port Group contains two vmnics
- One vmnic is marked as Active, while the other is marked as Standby
- ESX Management, VM Management NICs, N1K Control go out Fabric A (Low Latency Traffic)
- ESX Storage, VM Storage and vMotion go out Fabric B (High Bandwidth Traffic)
- QoS Traffic marking in vNICs for Infrastructure Mgt Apps

VMware Vswitch Description

VMware vmNIC	Description
vmnic0/1	ESXi Management
vmnic2/3	vMotion
vmnic4/5	Infrastructure Management
vmnic6/7	OOB Management - not implemented in this release

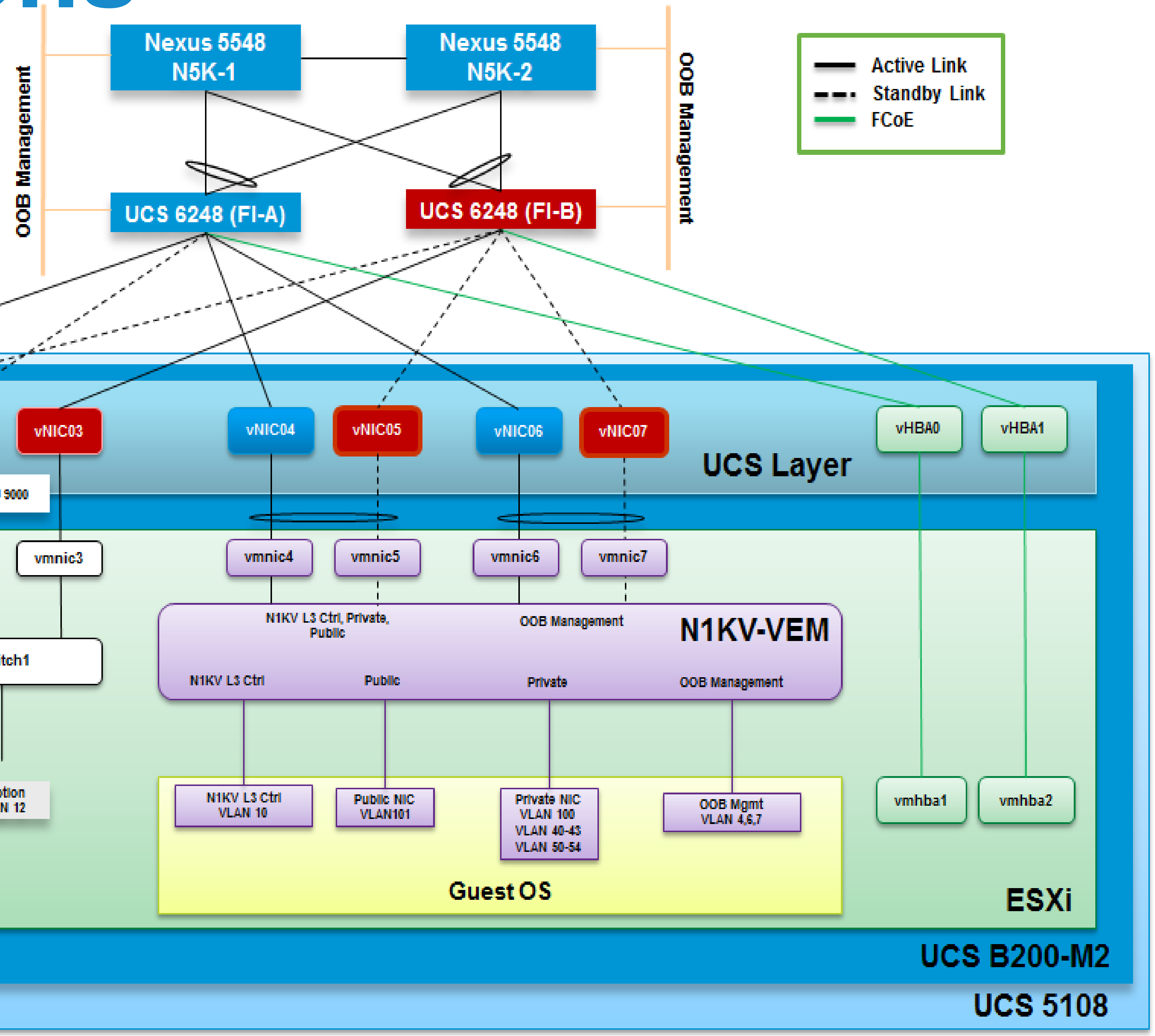


Media Data Centre Release 2.0 Design

UCS Design: Virtual Media Applications

Nexus 1000V Distributed vSwitch

- Using Standard vSwitch for Management, vMotion and Storage
- Use Port Profiles
- Each Port Profile contains two vmnics
- One vmnic is marked as Active, while the other is marked as Standby
- ESX Management, VM Management NICs, N1K Control go out Fabric A (Low Latency)
- ESX Storage, VM Storage and vMotion go out Fabric B (High Bandwidth)
- QoS Traffic marking in N1K for Production Apps
- QoS Traffic marking for Infrastructure Mgt Apps in vNICs



VMware vmNIC Description

VMware vmNIC	Description
vmnic0/1	ESXi Management
vmnic2/3	vMotion
vmnic4/5	Cisco Nexus 1000v Uplinks
vmnic6/7	Cisco Nexus 1000v Uplinks for OOB Management VLANs - not implemented in this release

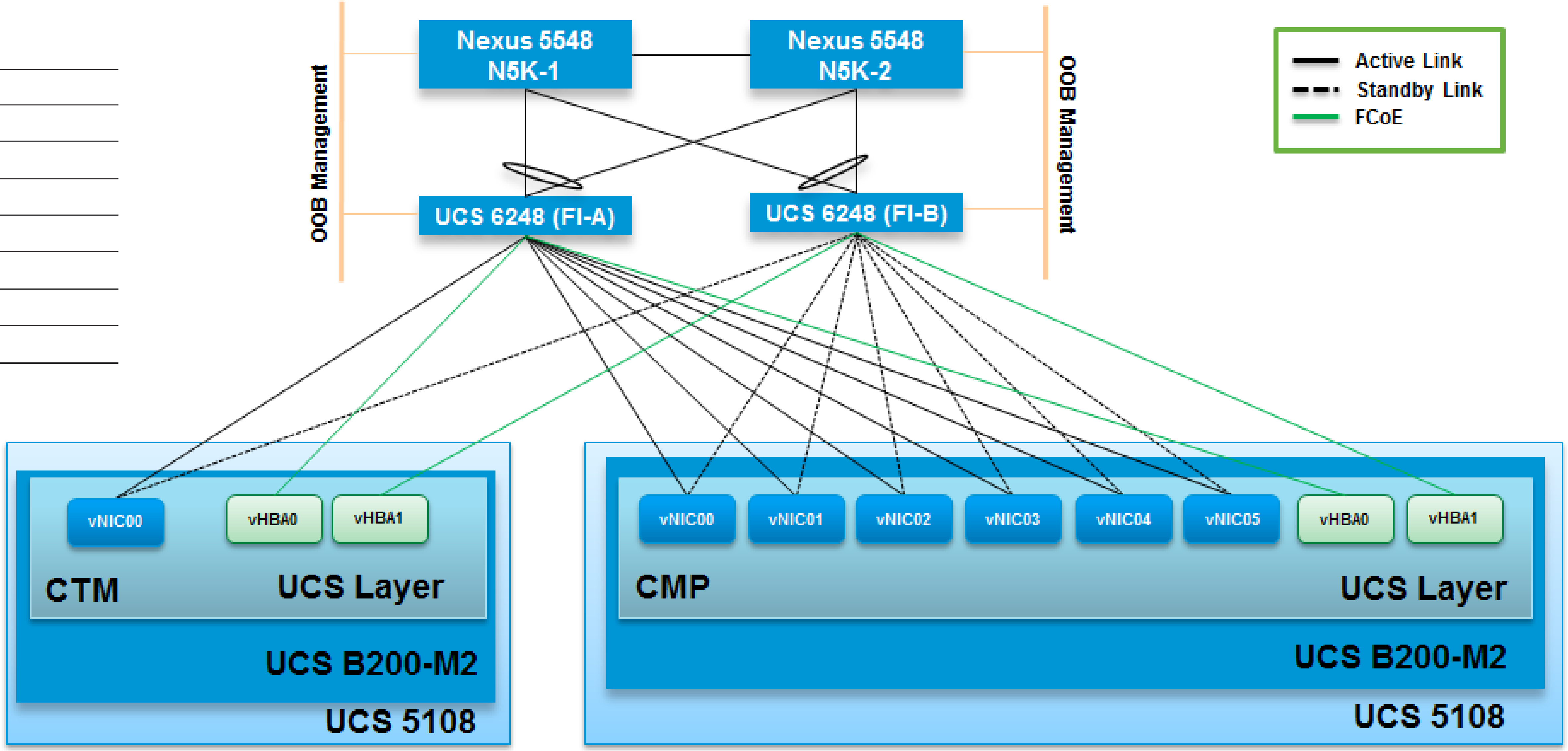
Media Data Centre Release 2.0 Design

UCS Design:
Example “Bare Metal” Media Applications

- Cisco Transcode Manager (CTM) – ABR VoD FLows
- Cisco Media Processor (CMP) – ABR Live Flows
- Blades load-balanced across Fabric Interconnects
- Active / Standby Links GE Links
- SAN Boot over FCoE

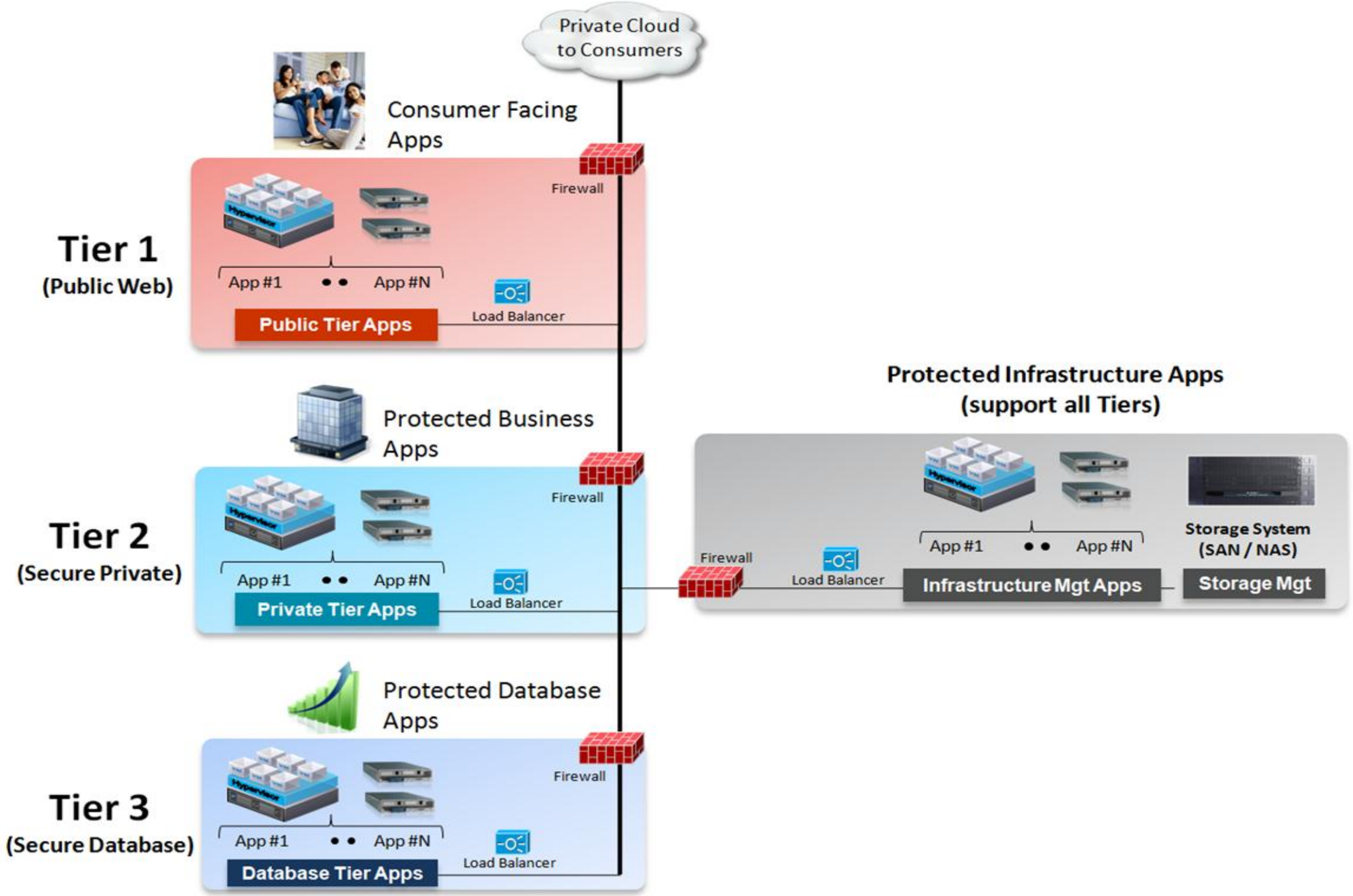
UCS vNIC Description

UCS vNIC	Description
vNIC0	CTM Data
vNIC0	CMP Management
vNIC1	CMP AUX
vNIC2	CMP INPUT1
vNIC3	CMP INPUT2
vNIC4	CMP OUTPUT1
vNIC5	CMP OUTPUT2



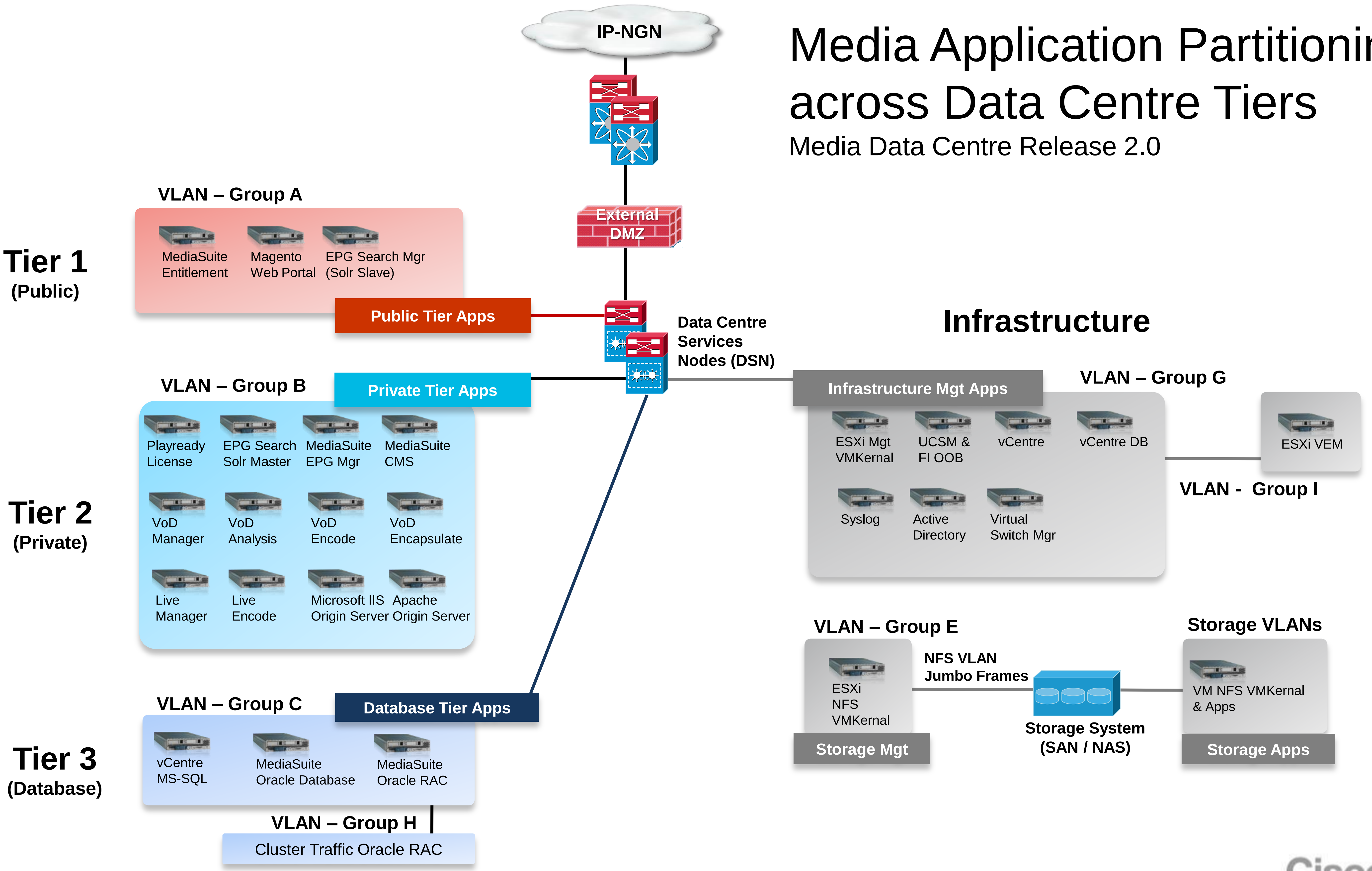
Network QoS and Management for Media Applications

Media Applications are Partitioned across Secure Data Center Tiers



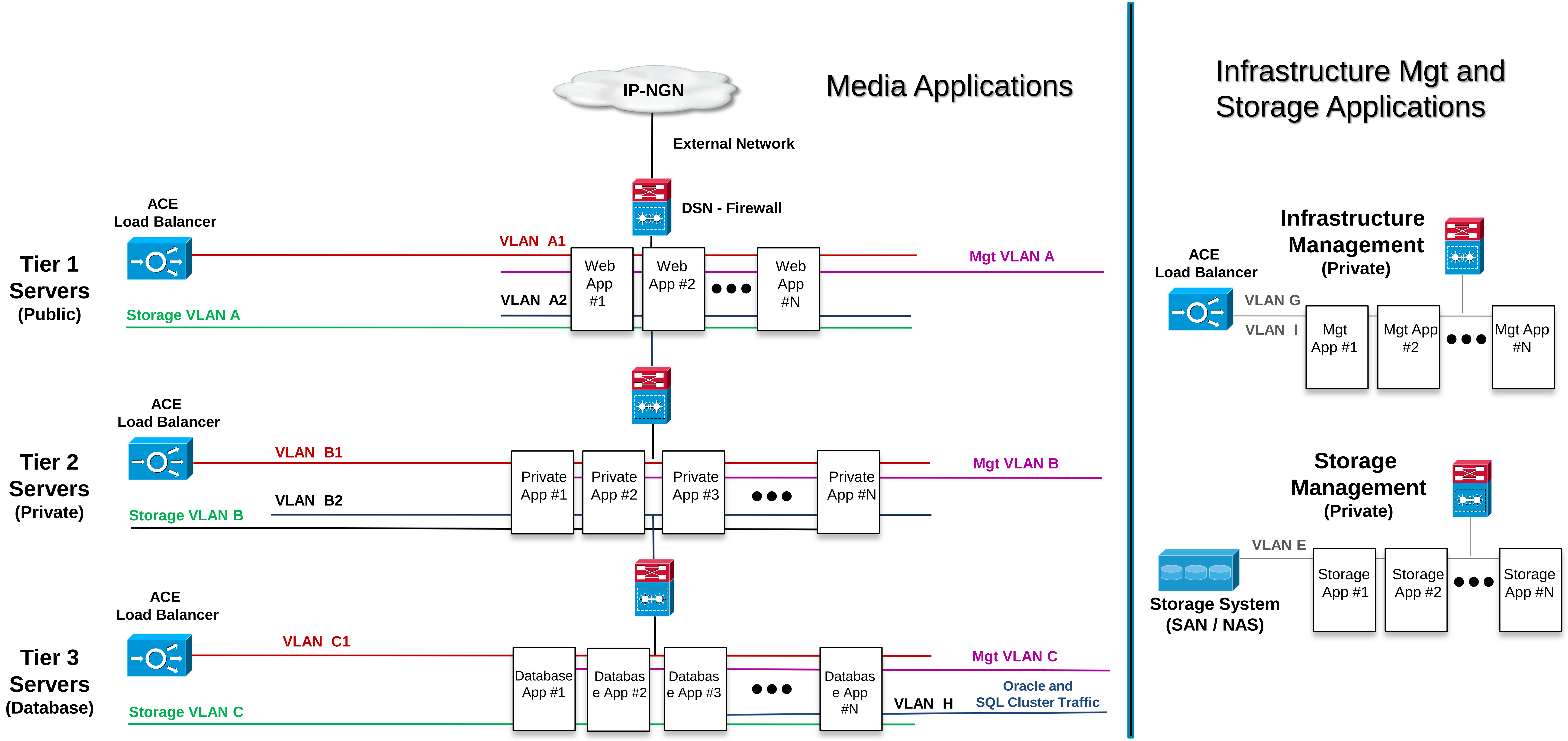
Media Application Partitioning across Data Centre Tiers

Media Data Centre Release 2.0



Multi-Tier Data Centre Design

Security, Load Balancing, and Bandwidth Mgt critical for Media Applications



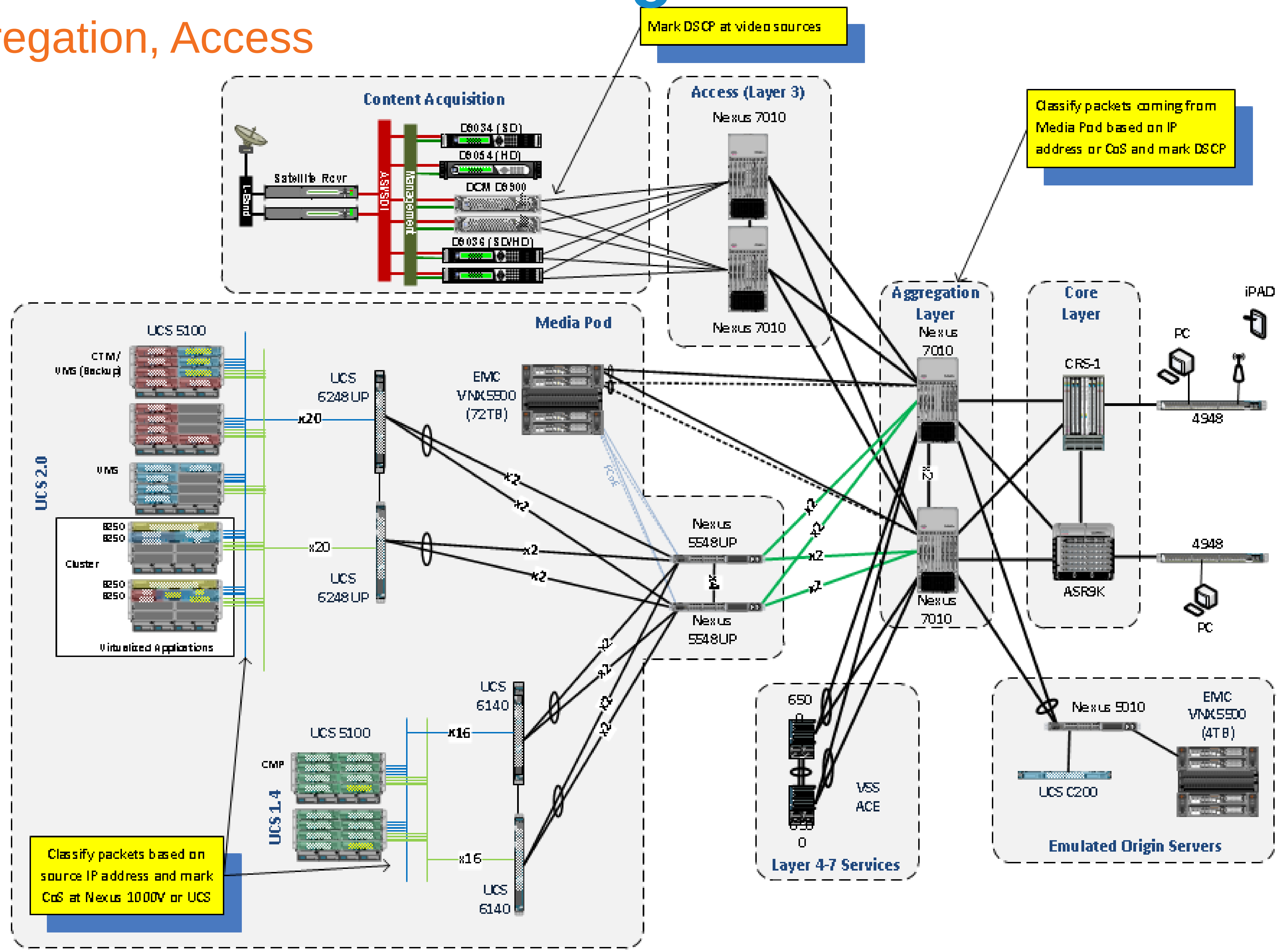
Traffic Classification and Marking

Across Data Core, Aggregation, Access

- Packets originating in the Content Acquisition are classified and marked by the Cisco DCM.

- Packets originating in the Media PoD are classified and marked by the UCS or the Nexus 1000V.

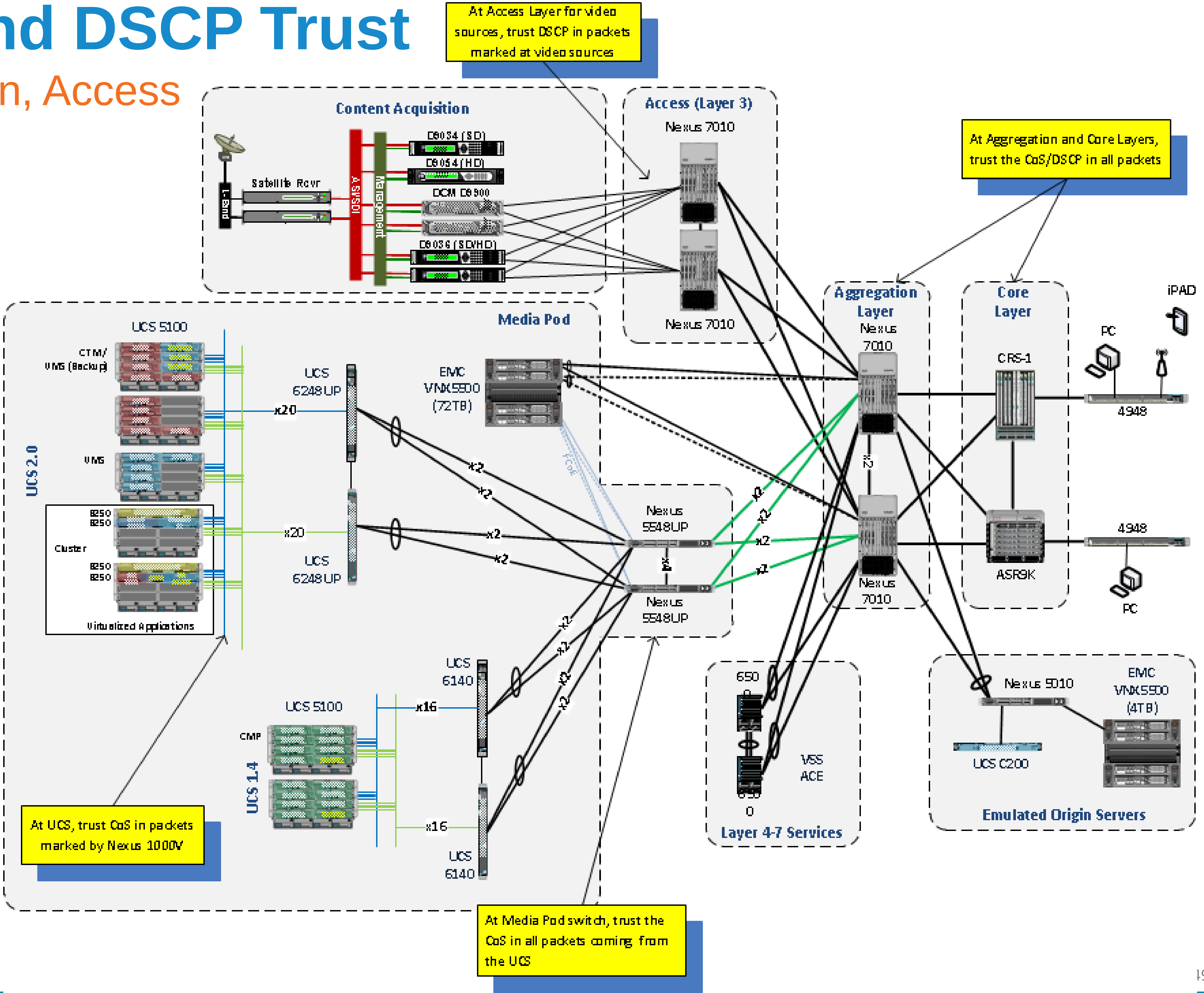
- Packets exiting the Media PoD are classified and marked by the Nexus 7000 in the aggregation layer.



Overview of COS and DSCP Trust

Across Data Core, Aggregation, Access

- Packets classified and marked by the Cisco DCM in the content acquisition layer are trusted in the L3 access, aggregation, and core layers.
- Packets classified and marked by the UCS or the Nexus 1000V in the Media PoD are trusted by the Nexus 5548UP at the Media PoD edge.
- Packets classified and marked by the Nexus 7000 in the aggregation layer are trusted by the routers in the core layer.



Implementing “TV Everywhere” Services

Adaptive Streaming Flavours

Most premium entertainment is delivered using one of these options

Apple

HTTP Live Streaming (HLS)

- H.264
- MPEG-2 TS files
- Transport segments

Sole format format for:

- iOS devices (iPhone, iPad, iTouch).

Microsoft

Smooth Streaming

(HSS)

- H.264 or VC-1
- Fragment MP4 files

Delivers to:

- Silverlight Player on a PC
- Windows Phone
- Xbox Device

Adobe

HTTP Dynamic Streaming (HDS), "Zeri"

- H.264
- Fragment in segments

Delivers to:

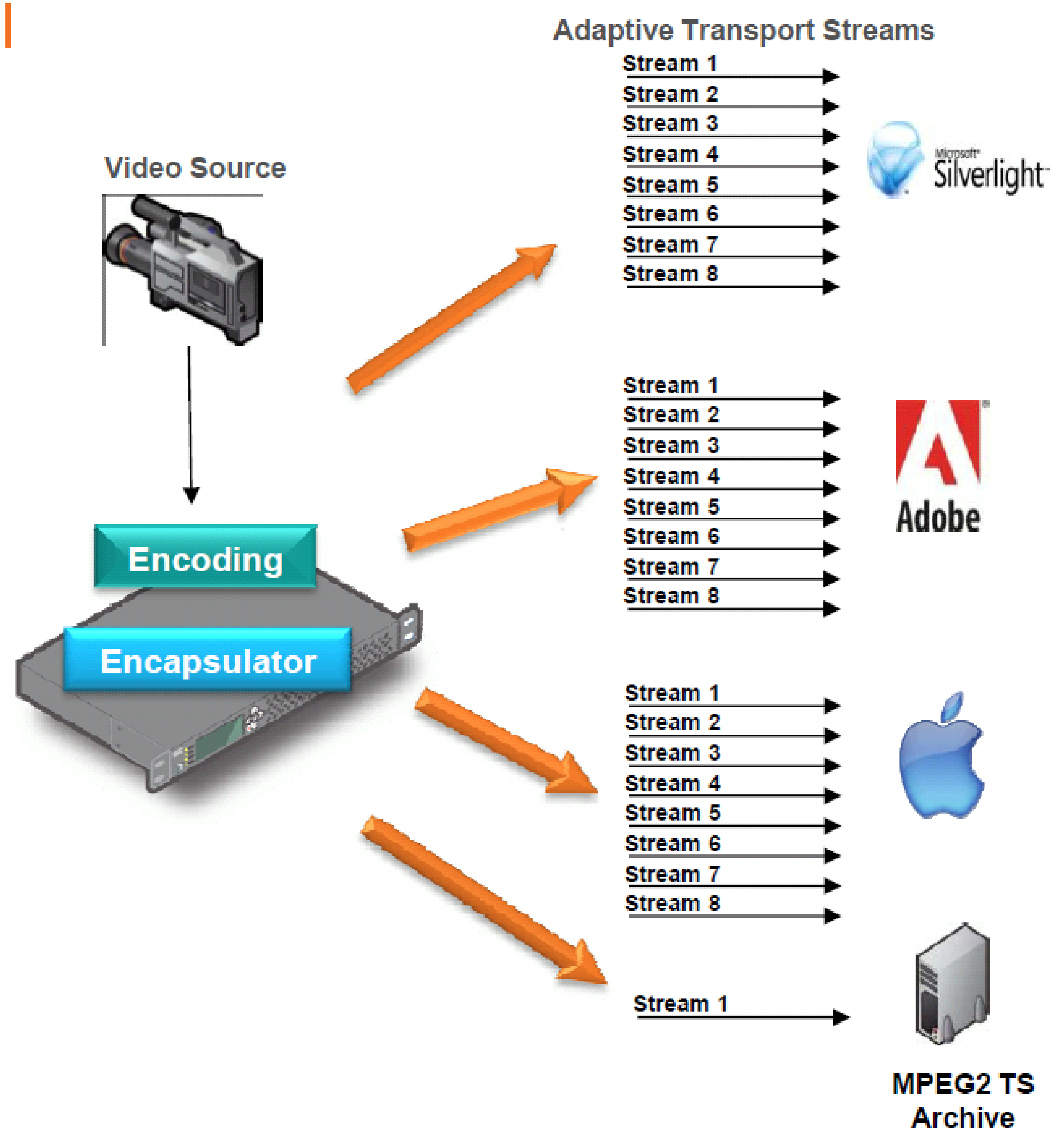
- Phones running Flash
- PCs running Flash

Adaptive Bit Rate Processing

Internet-like File based delivery Model

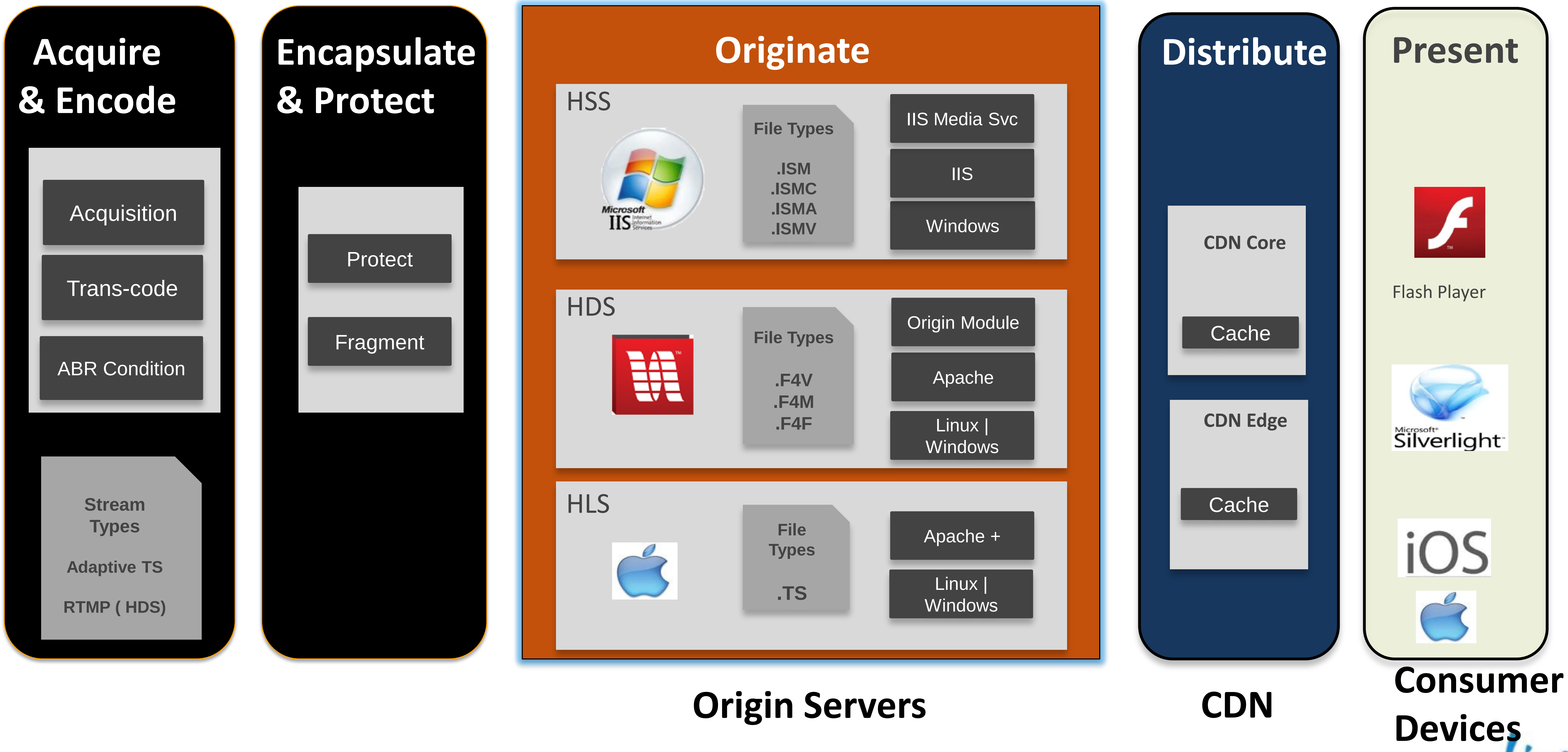
Feature Summary

- Encode once, encapsulate multiple times to multiple delivery formats for simultaneous output
- Enables increased density.
- Reach wide range of screens from one encoder.
- Quickly and economically expand your service offerings and content.



Zooming Out

The Origin Server is the interface between CDN and Ingest



On-boarding Media Applications to the Media Pod

Media PoD Uses Cases for Release 2.0

Validate Data Centre Infrastructure for Units of Capacity (Live and VoD ABR workflows)

VoD Workflow Requirements
(Media Pod Use Case)

100 HD VoD Assets Per Day

- Each asset is 60 minutes of HD content
- 14 Total Profiles, single AVC format
- 2 encoded output formats (Apple, Microsoft)
- Playready DRM
- 15 Mbps MPEG Input Format (HD 720/1080i)

H.264 HTTP Live Streaming (HLS) Profiles for: Apple iOS

	Bit Rate	Resolution	Device	HD/SD
Profile 1	3.0 Mbps	1280 x 720	iPad 2	HD
Profile 2	2.0 Mbps	960 x 640	iPad 2, iPad	HD
Profile 3	1.0 Mbps	640 x 360	iPad native, iPhone 4	HD
Profile 4	0.7 Mbps	400 x 224	iPhone native	HD
Profile 5	0.4 Mbps	400 x 224	iPhone native	HD
Profile 6	0.22 Mbps	400 x 224	iPhone native	HD

H.264 Smooth Streaming Profiles for: PC/Mac/STB

	Bit Rate	Resolution	Device	HD/SD
Profile 1	4.0 Mbps	1280 x 720	PC, Mac, STB	HD
Profile 2	3.2 Mbps	1024 x 576	PC, Mac, STB	HD
Profile 3	2.8 Mbps	960 x 540	PC, Mac	HD
Profile 4	2.0 Mbps	960 x 540	PC, Mac	HD
Profile 5	1.6 Mbps	700 x 394	PC, Mac	HD
Profile 6	1.2 Mbps	700 x 394	PC, Mac	HD
Profile 7	0.8 Mbps	512 x 288	PC, Mac	HD
Profile 8	0.4 Mbps	512 x 288	PC, Mac	HD

Live Workflow Requirements
(Media Pod Use case)

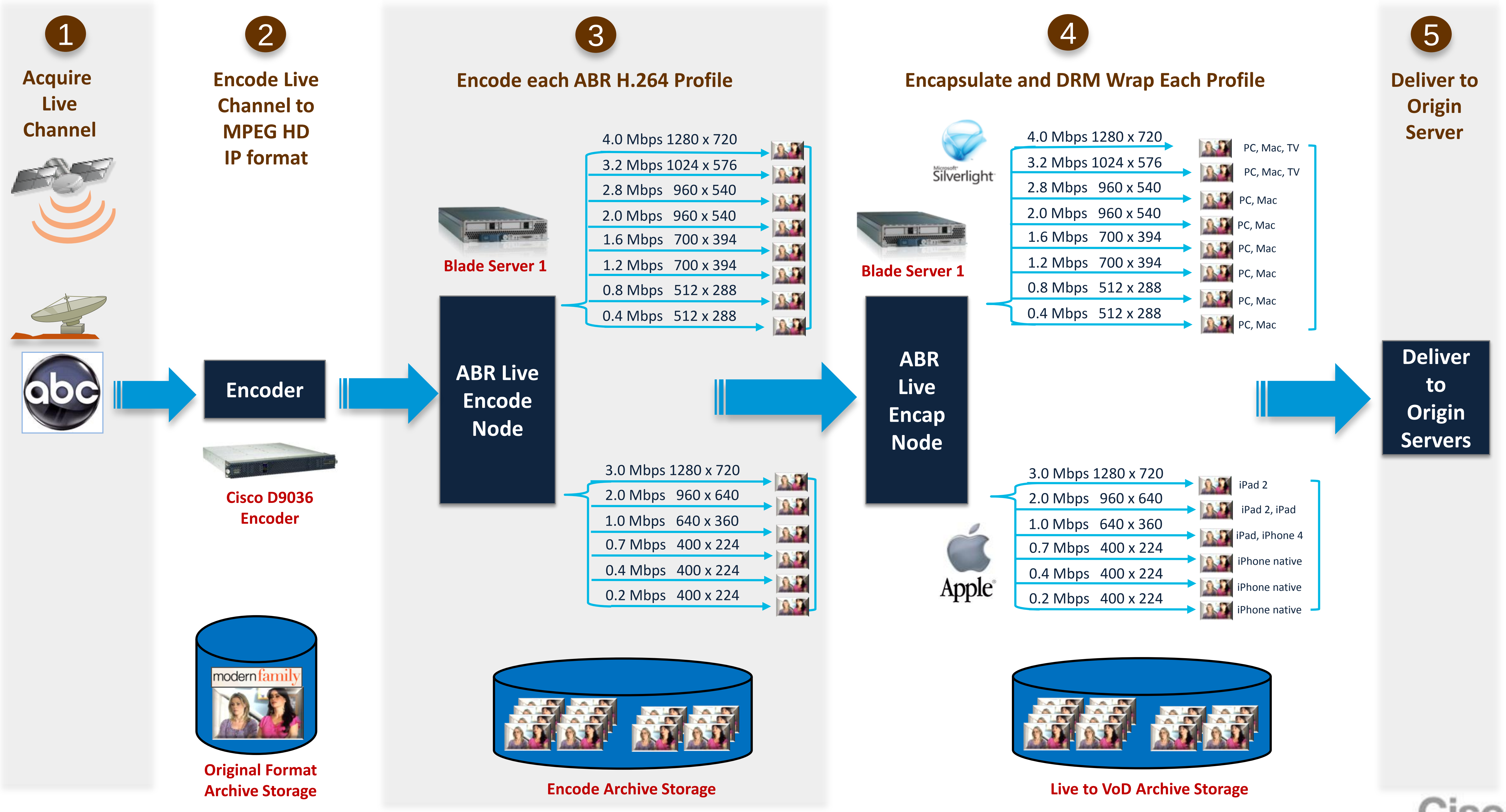
30 Live Concurrent HD Channels

- 14 Total Profiles, single AVC format
- 2 encoded output formats (Apple, Microsoft)
- Playready DRM
- 15 Mbps MPEG Input Format (HD 720/1080i)

- Validate these ABR Workflows across a Production-Ready Media Pod
- Demonstrate Increased Scale, Validate a 2x Capacity for ABR Live Workflows (60 Live Channels) on the Media Pod
- Highlight Cisco Data Centre competitive advantages across Media Pod elements (UCS, Nexus, storage, mgt, H/A)
- Generate a Validated BOM, develop a paper study providing guidance for larger scale (100 Live Channels,1000 VoD assets/Day)

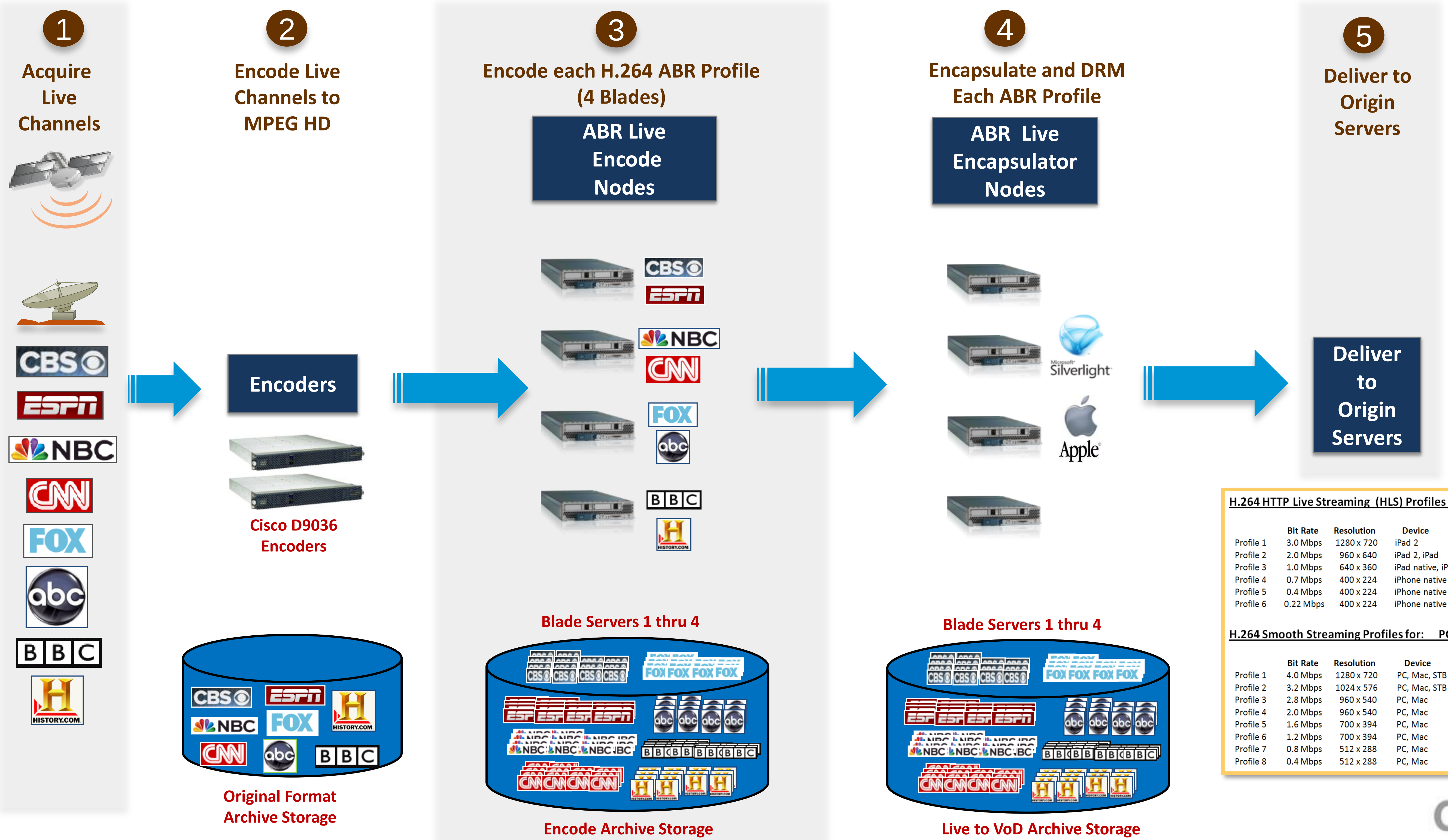
Mapping a Live ABR Workflow to Blade Servers

UCS Blades will Encode, Encapsulate, and DRM Wrap each Live Channel



Scaling Live ABR Workflows across Blade Servers

Blade Density and Storage IOPS Matter…Drive More Workflows with Fewer Blades



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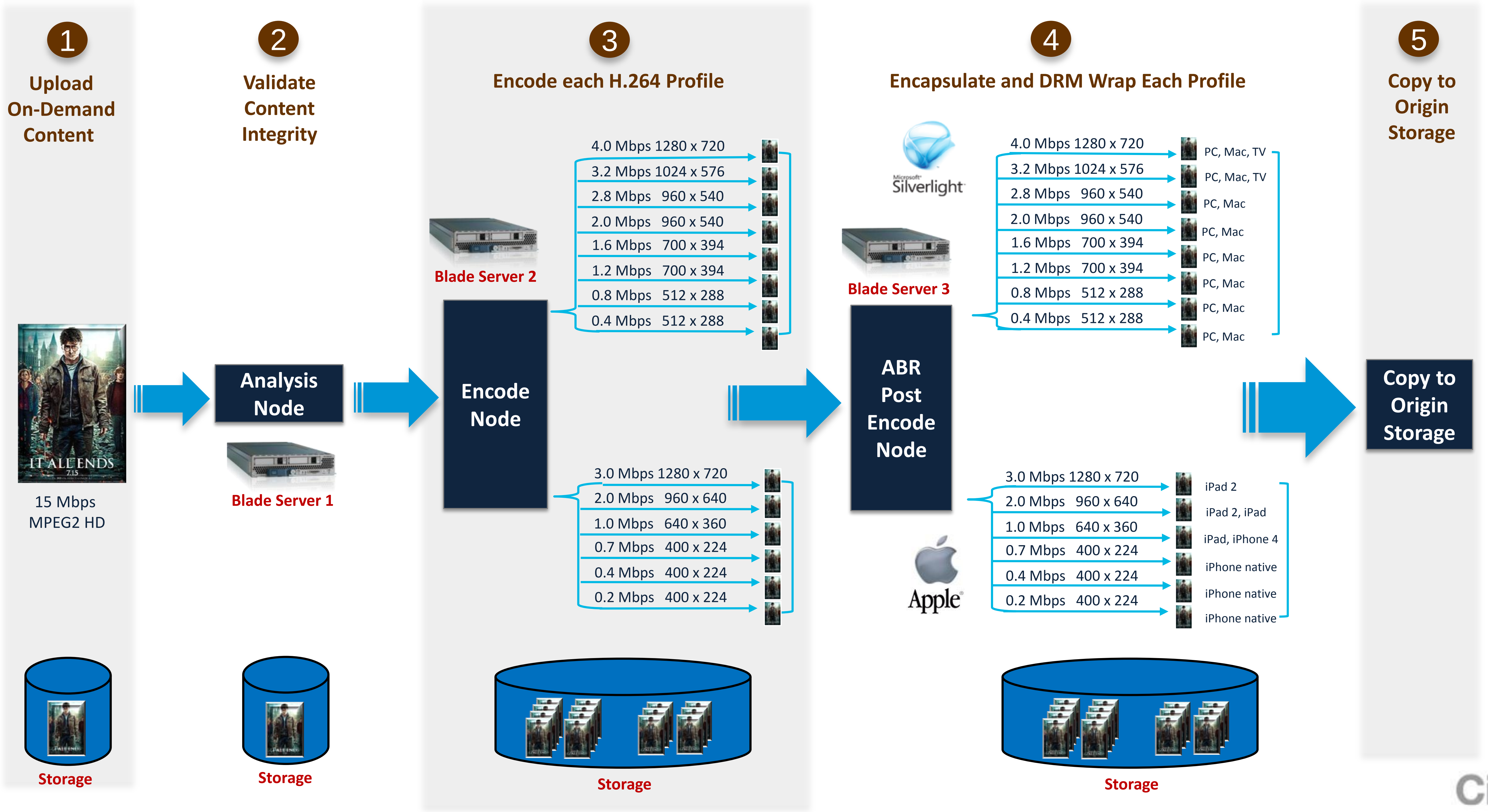
Profile 8	0.4 Mbps	512 x 288	PC, Mac	HD

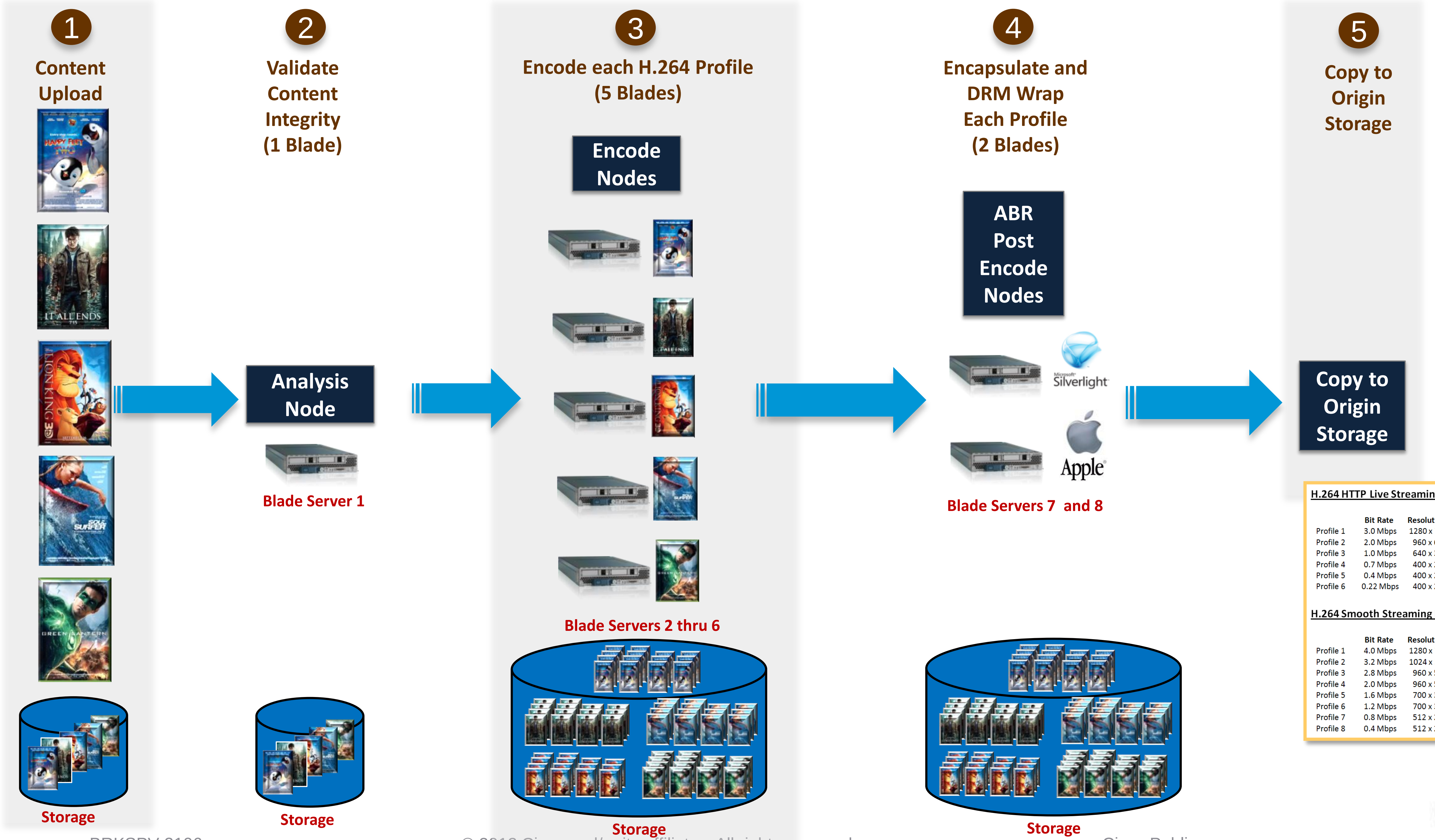
Mapping a VoD ABR Workflow to Blade Servers

UCS Blades will Analyse, Encode, Encapsulate, and DRM Wrap each VoD Asset



Scaling VoD ABR Workflows across Blade Servers

Blade Density and Storage IOPS Matter…Drive More Workflows with Fewer Blades



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Apple

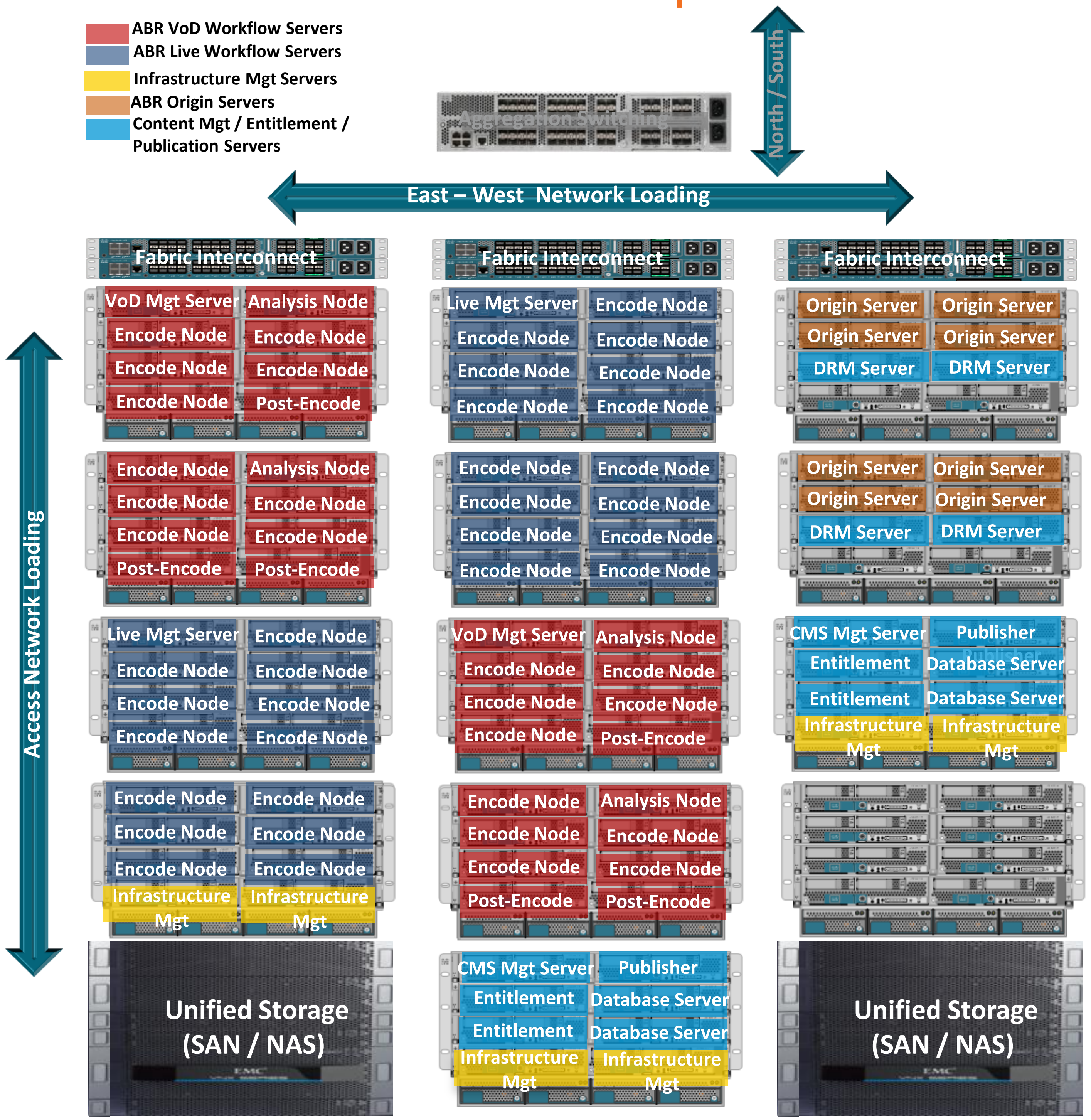
Silverlight

On-Boarding Media Applications to a Cloud Data Centre

Start with Pre-Built Media Pods, On-board Media Applications

Media Applications Consume Data Centre Resources

Demonstrate UCS / Nexus competitive benefits across key video applications



PoD Optimised for Media Applications

UCS Compute Server
- Application Mapping to UCS, sockets, cores
- Blades offer multiple computing classes
- Support Virtual apps, “bare-metal”, and appliances
- Server Resource Pools, Service Profiles/Templates
- Rapid Service Deployment thru “Stateless Servers”

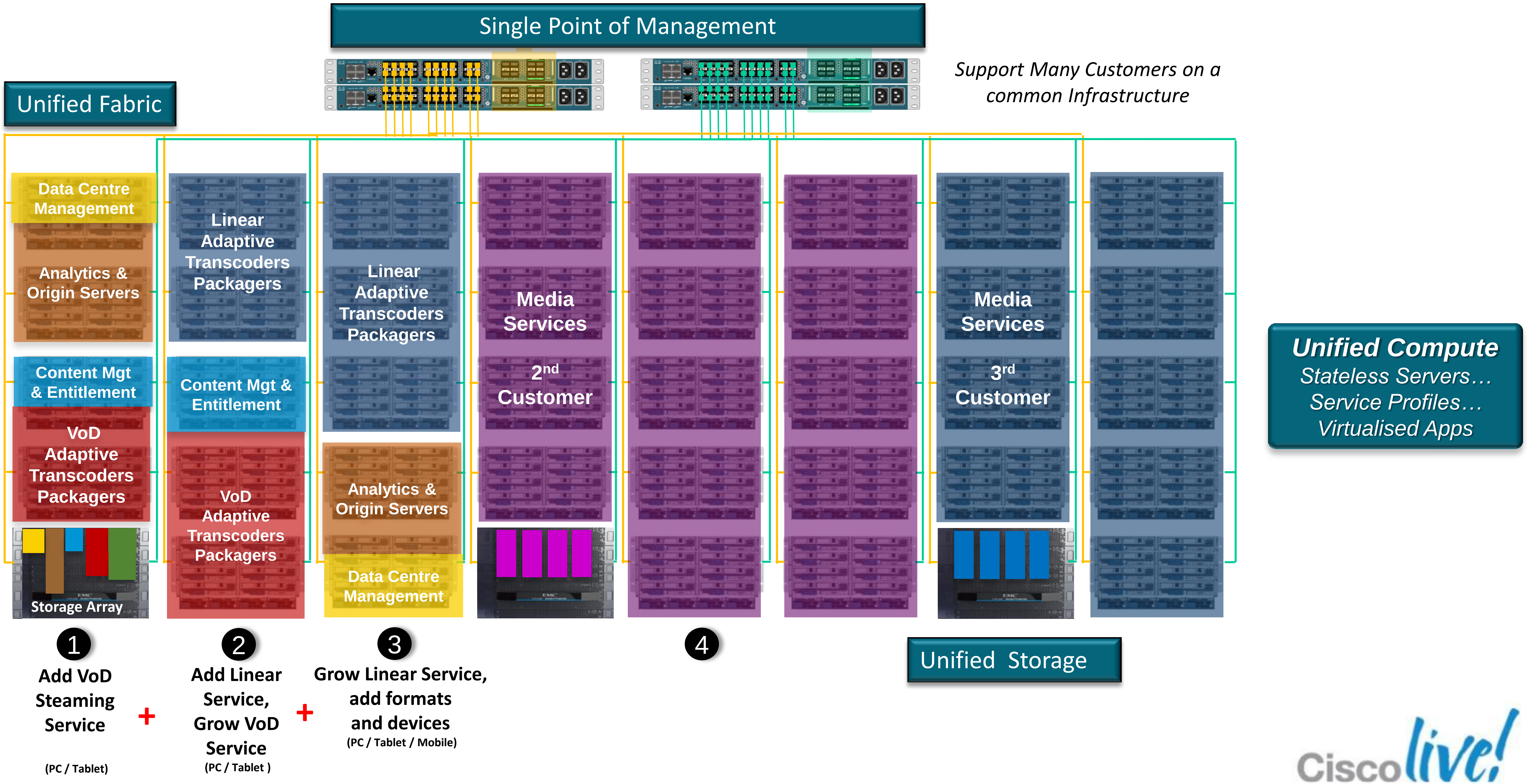
Network Loading and Adapter Definitions
- Unified Fabric and FEX – massive cable reduction
- 10G and FCoE offer “wire-once” at different scales
- Network loading / QoS for video applications

Consolidated Storage Definition
- Unified Storage System (combined SAN/NAS)
- Secure partitioning, LUNs, Zones, RAID, arrays
- FCoE and 10G Storage I/O reduces network cost
- Virtual Storage containers for VM applications

Video Operations and Mgt Definition
- Data Centre Services (load balancing, security)
- Application Performance, Net Boot, Analytics
- Virtualisation, Scaling, and Redundancy
- Cloud-ready Multi-tenant Design

The Media Pod "Scales Out" with New Media Services

Rapid Expansion of Media Services with "Stateless Servers" and Unified Fabric



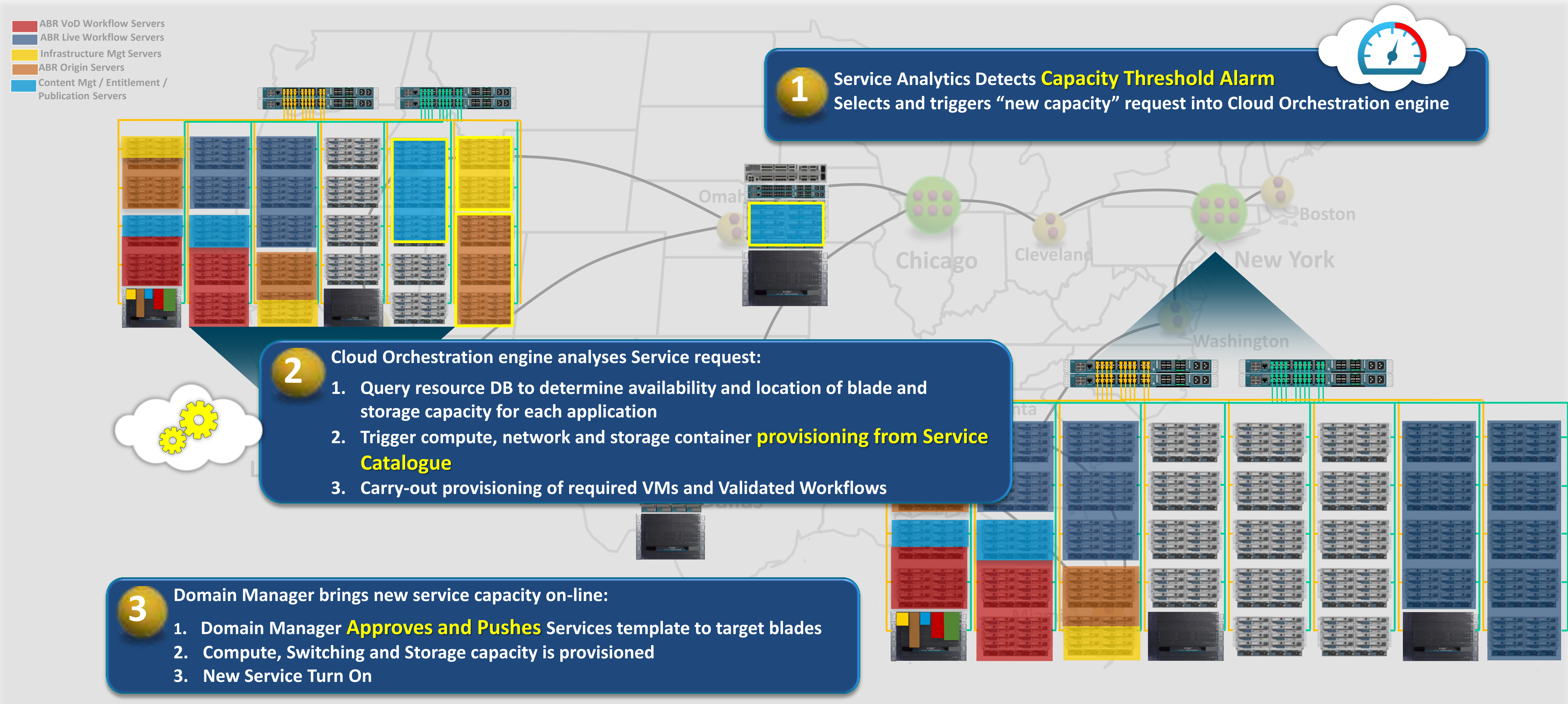
Summary and Conclusions

Benefits of a Cloud-ready Media Infrastructure

- **Organisational Flexibility**…driven by changing service models, diverse Media Applications and Vendors, and the need to deliver more with less
- **Reduced Cost of Media Infrastructure**…based on operational efficiencies, proven across large scale Enterprise Cloud deployments
- **Agile Data Centre Infrastructure**…that supports many application vendors and unique Media requirements
- **Rapid Service Deployment**…using automated provisioning, virtual resources, and Modular building blocks (Media Pods and Integrated Compute Stacks)
- **Distributed Media Data Centres**…supporting geographically diverse workflows, improved availability, disaster recovery, and elastic Media workloads
- **Cloud-Ready Media Network**…supporting Service Orchestration of Media workloads, Multi-tenancy, Service Containers, and validated Public/Private Cloud designs

The Media Cloud Service Provisioning (Futures)

Media Cloud Orchestration Example – Consumer Demand triggers Service Expansion



1 Service Analytics Detects **Capacity Threshold Alarm**
Selects and triggers “new capacity” request into Cloud Orchestration engine

2 Cloud Orchestration engine analyses Service request:

1. Query resource DB to determine availability and location of blade and storage capacity for each application
2. Trigger compute, network and storage container **provisioning from Service Catalogue**
3. Carry-out provisioning of required VMs and Validated Workflows

3 Domain Manager brings new service capacity on-line:

1. Domain Manager **Approves and Pushes** Services template to target blades
2. Compute, Switching and Storage capacity is provisioned
3. New Service Turn On

Q & A

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