



Tab Butler

MLB Network

Director Media Management & Post Production

Hitting It Out Of The Park:



**FujiFilm 6th Annual
Global IT Executive Summit**



“If you build it, they will come...”



MLB Network’s Studio 3 & Studio 42





MLB Network Facts



- Largest debut in cable TV history by nearly 2X
- 50 Million Households on Launch – January 2009
- 65 Million Households – September 2011
- Over 70 Million Households – July 2013



MLB Network Facts



- June 2008 - Start Building MLB Network
- Jan. 1st, 2009 – On Air in 50 Million Households
- Network Infrastructure Built in 2 Months
- Early Adopter- HD Video “File Based” Production
- ‘DIAMOND’- Leader in Video Asset Management
- BallParkCam – Connects 30 Ballparks to MLBN



MLB Network History – 2008

Early Adopter

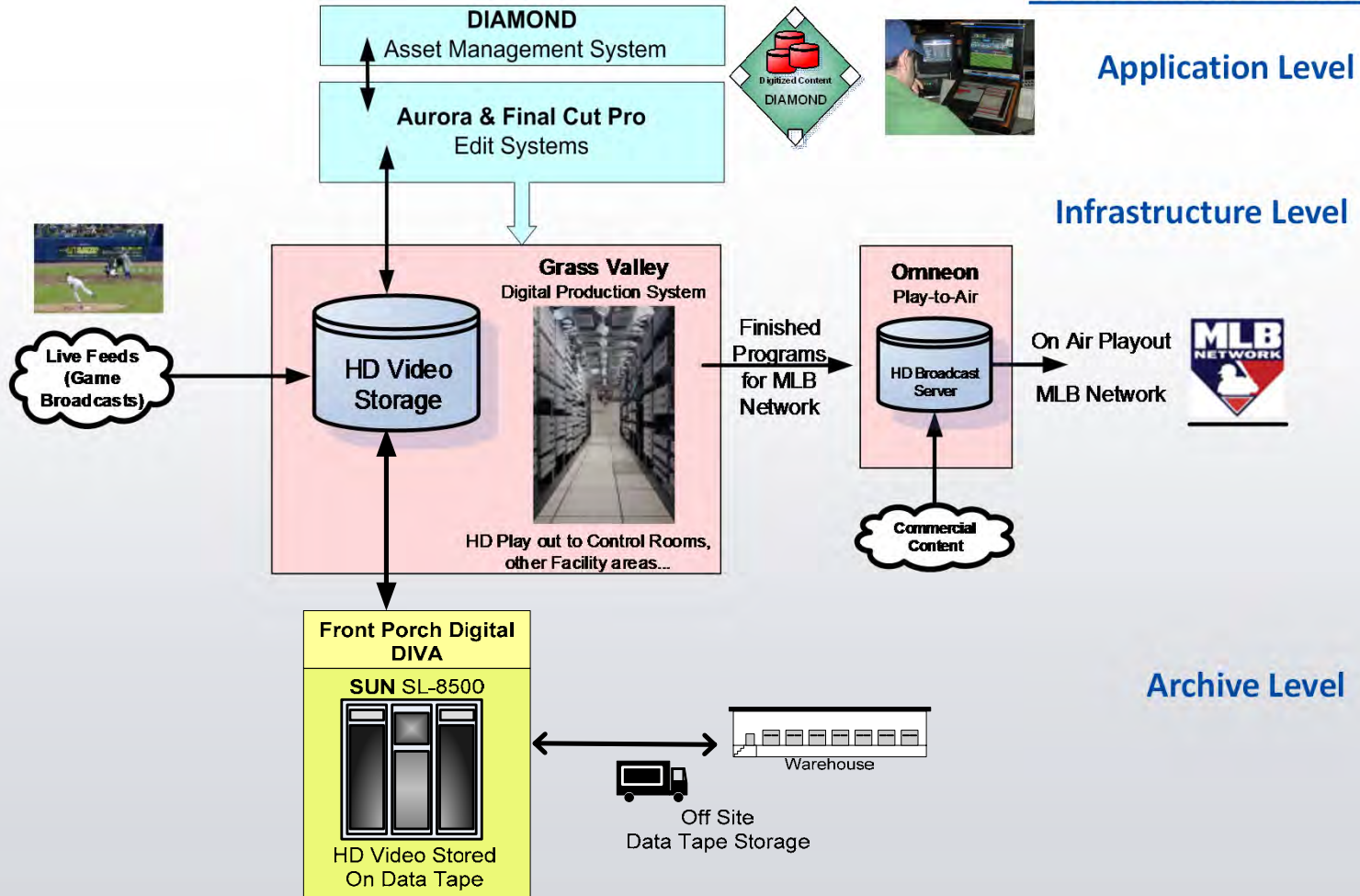
“File Based” Production System

- 2008 – Grass Valley Aurora Newsroom System
 - Built Upon Standard IT Hardware
 - Windows Based Operating Systems
 - SAN Storage Pools
 - No Video Tape in TV Content Production
 - All Content Digital File Based
 - Archive on IT Data Tape – LTO-4



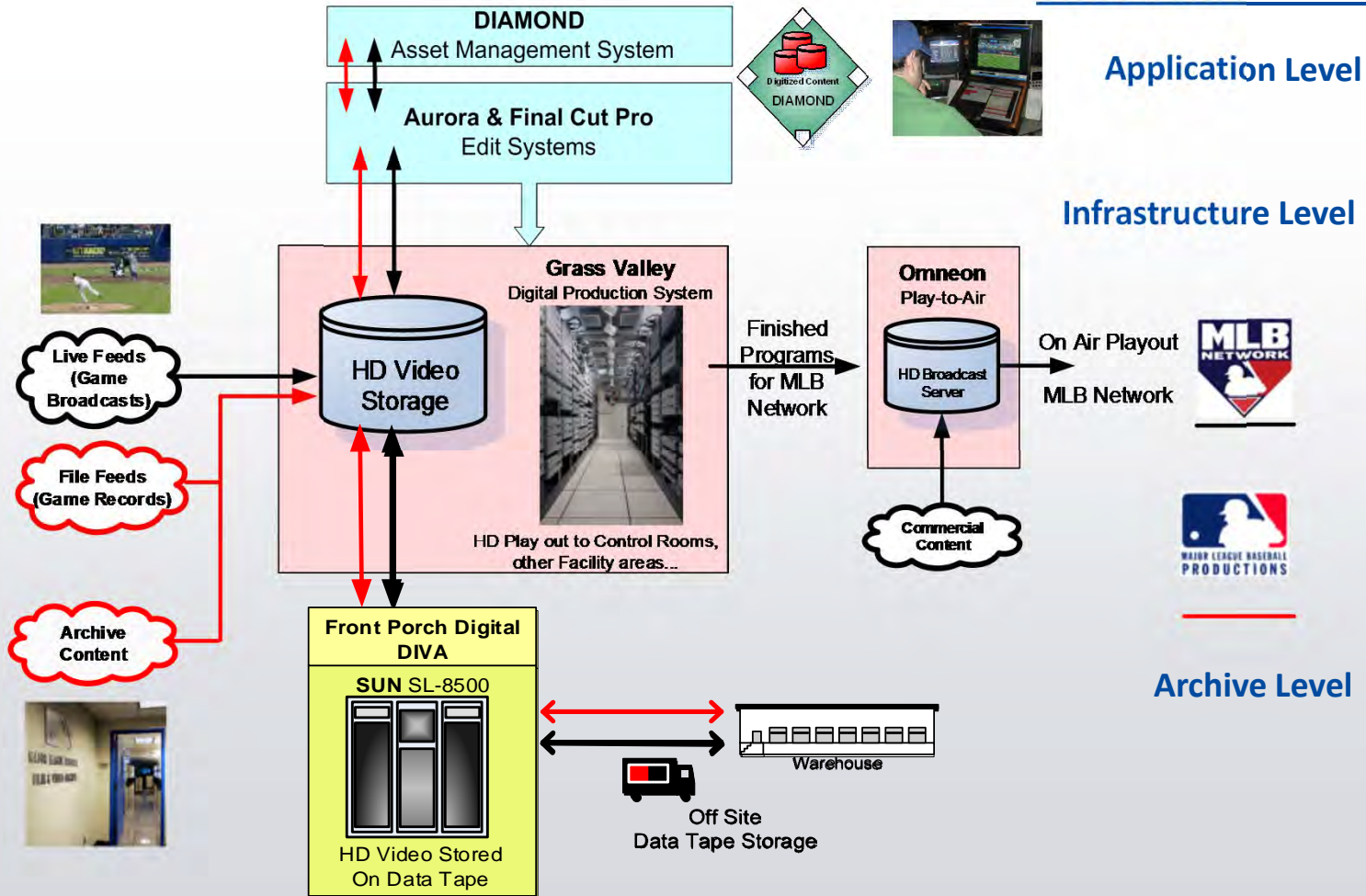
MEDIA MANAGEMENT – THE WORKFLOW

The Architecture

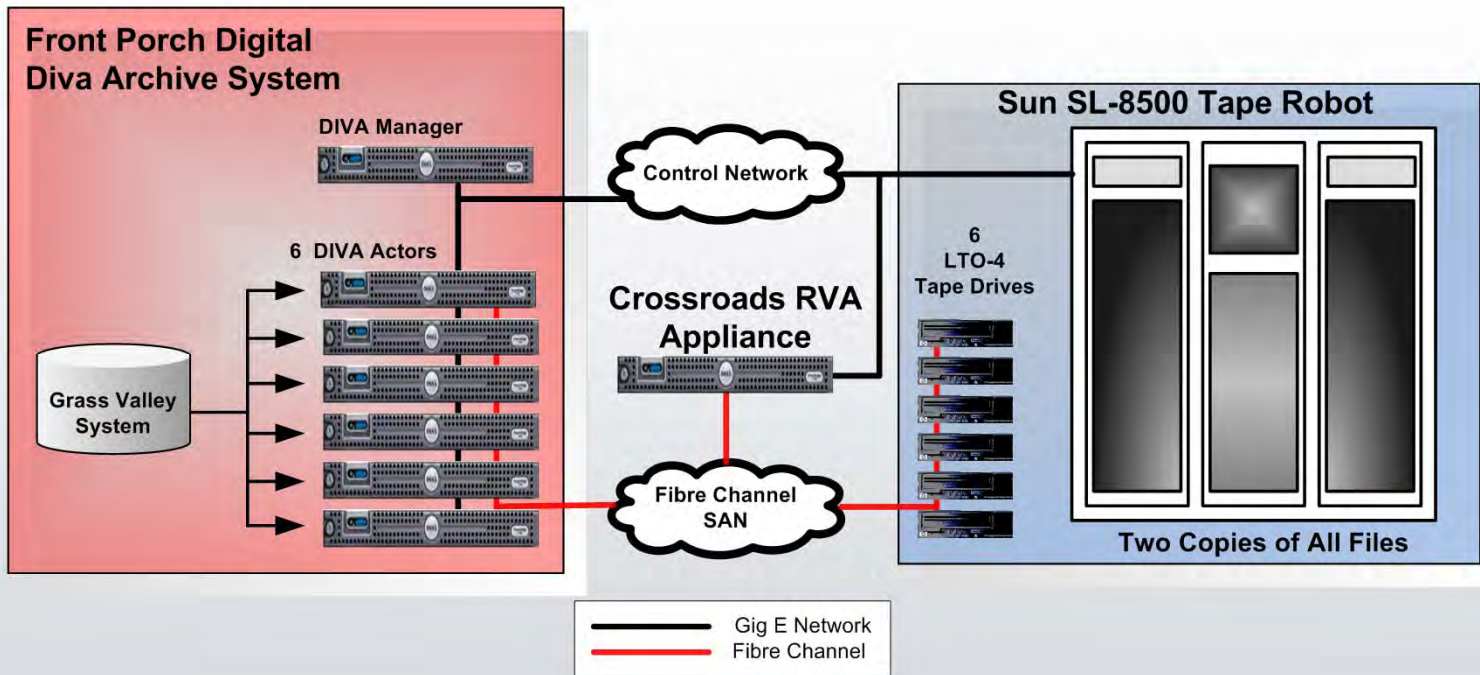


MEDIA MANAGEMENT – THE WORKFLOW

The Architecture



The "Content Wave" Statistics 2009 Season



The "Content Wave" Statistics 2009 Season

A Typical Week

Chart 7: Drive Performance for 10-1-2009 through 10-7-2009

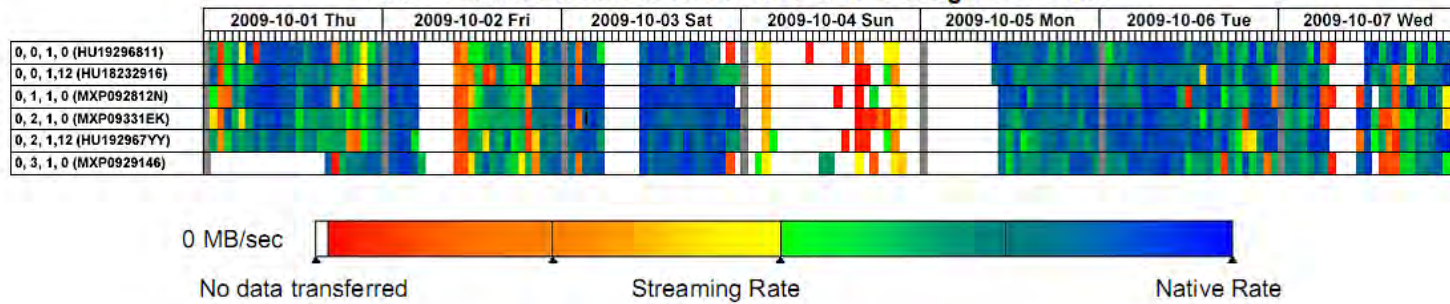
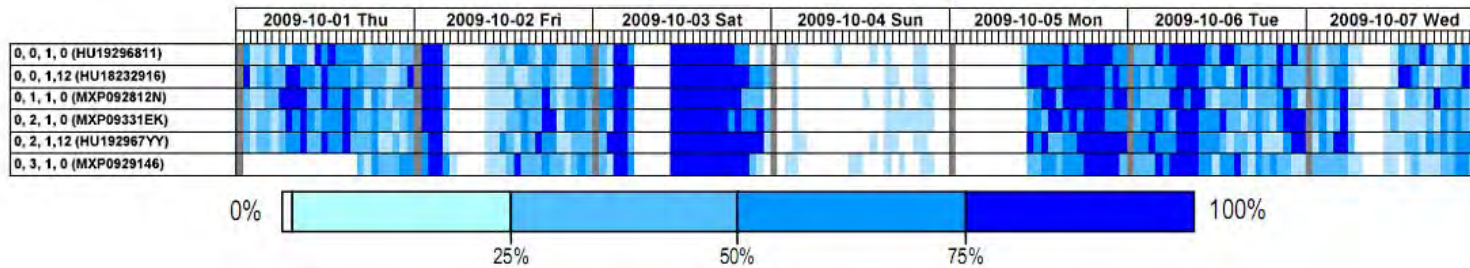
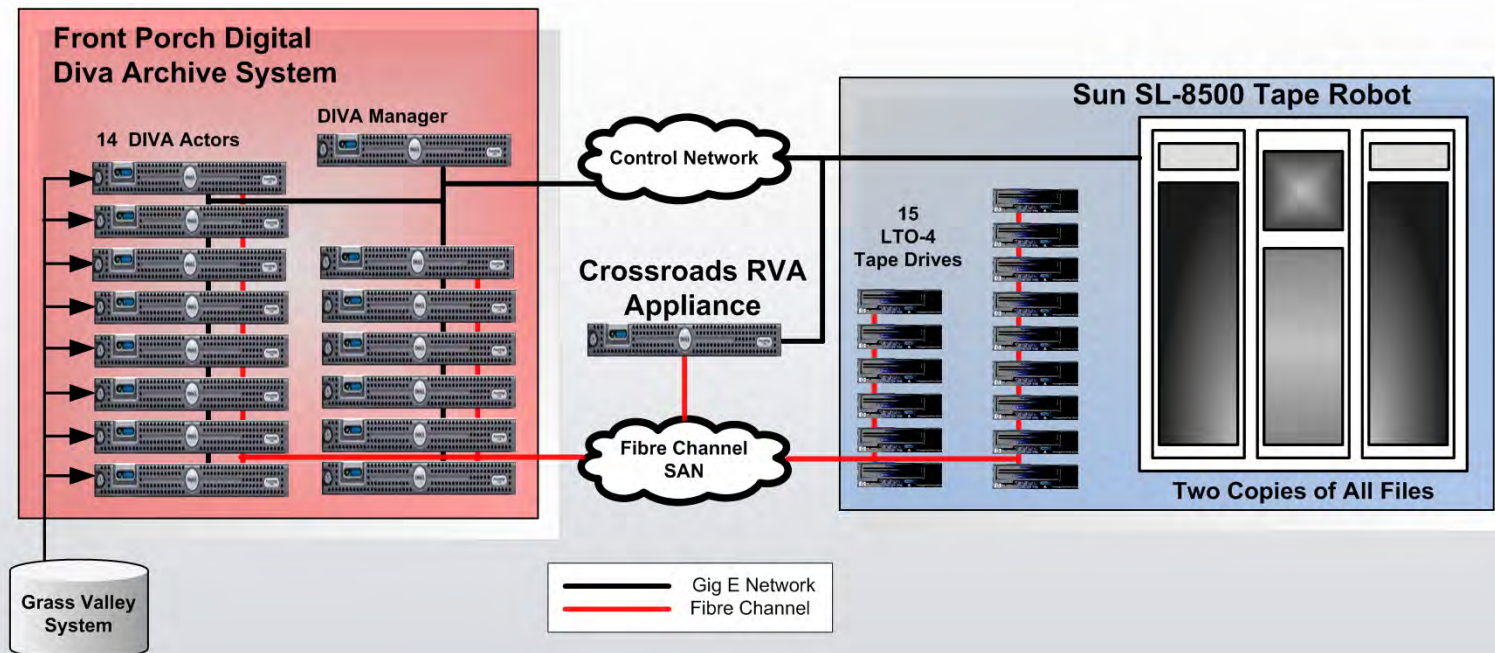


Chart 8: Drive Utilization for 10-1-2009 through 10-7-2009



The "Content Wave" Statistics 2010 Season



MLB Network History – 2011

Migrated Critical On-Air Production Systems to VMware

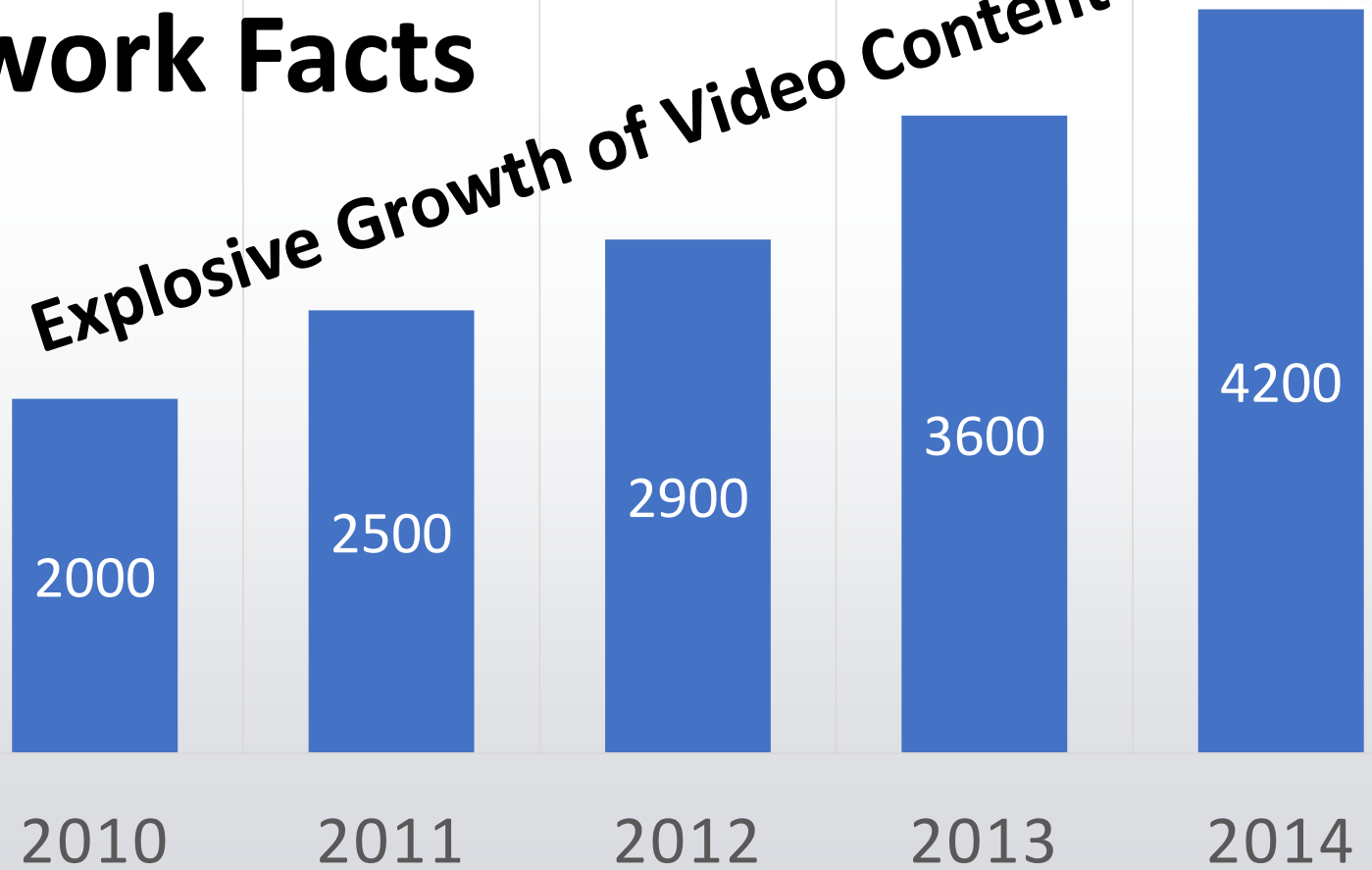
- **First Grass Valley Production System on VMware**
- **15:1 Server Consolidation for Aurora Browse**
- **Asset Management for 50 Edit Rooms**
- **Grass Valley Ingest Control of 80 Record Channels**
- **Development / Testing Environment**





MLB Network Facts

Explosive Growth of Video Content

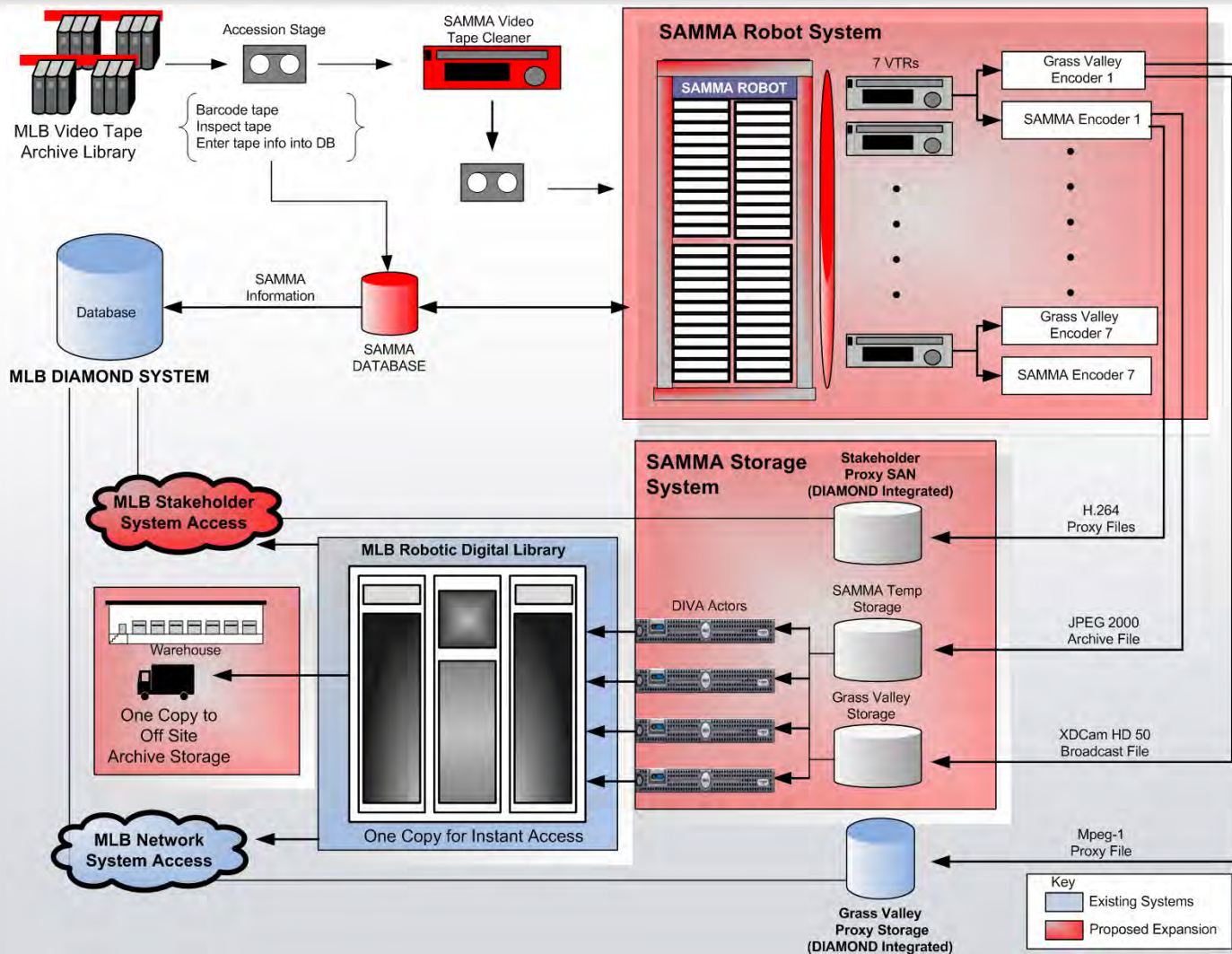


Content Hours Recorded Per Week

MLB Productions - Archive Digitization Project



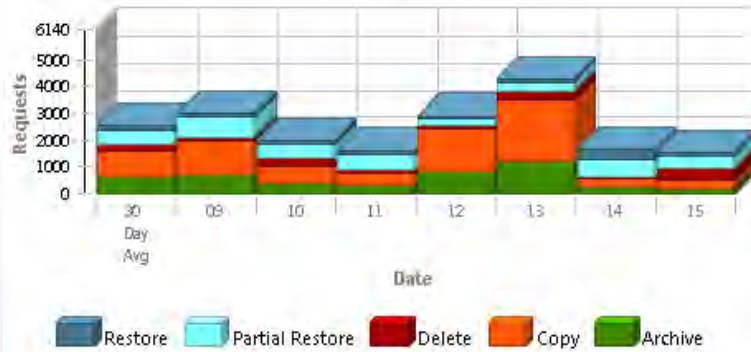
MLB Productions - Archive Digitization Project



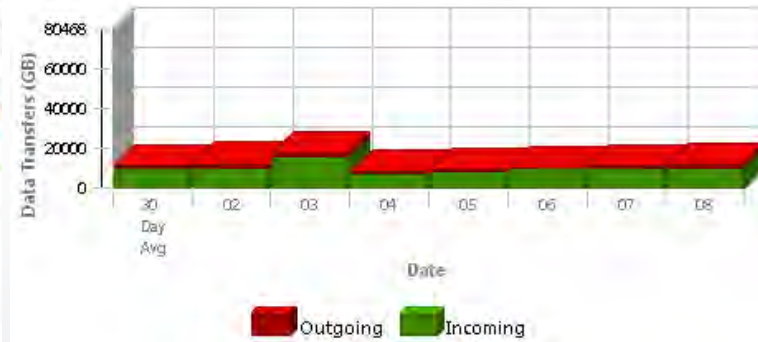
The "Content Wave" Statistics

July, 2014

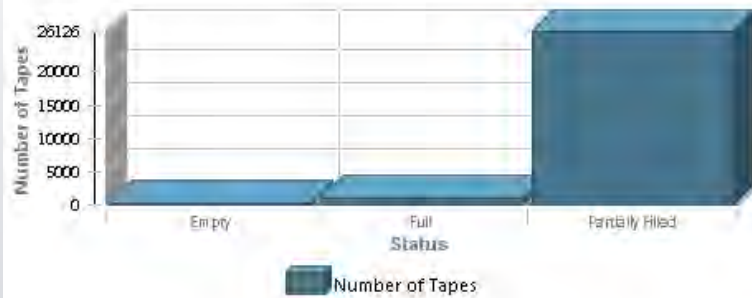
DIVArchive Daily Operations



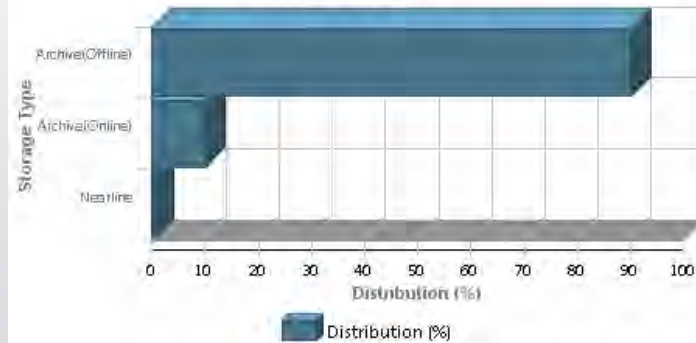
DIVArchive Daily Data Transfers



DIVArchive Tape Status



DIVArchive Storage Distribution



**July 2014 over 28,000 LTO-4 Tapes in Archive
Over 500,000 Hours of Content**



Digitized
Industry
Assets
Managed
Optimally
for
Networked
Distribution

DIAMOND
Asset Management System

Mining the MLB Archives



DIAMOND – Emmy-Nominated for Outstanding Sports Technology - 2011 Season

Mining the MLB Archives

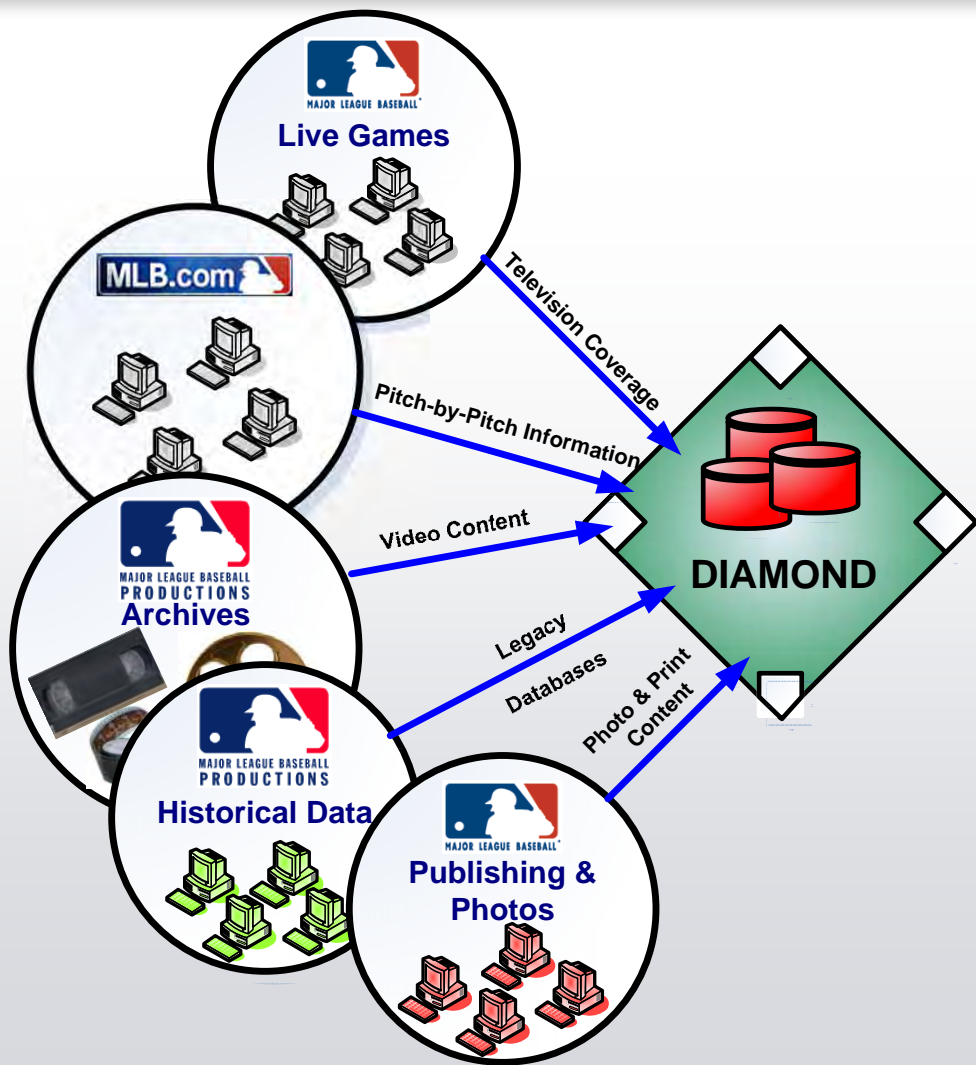


The Statistics of DIAMOND

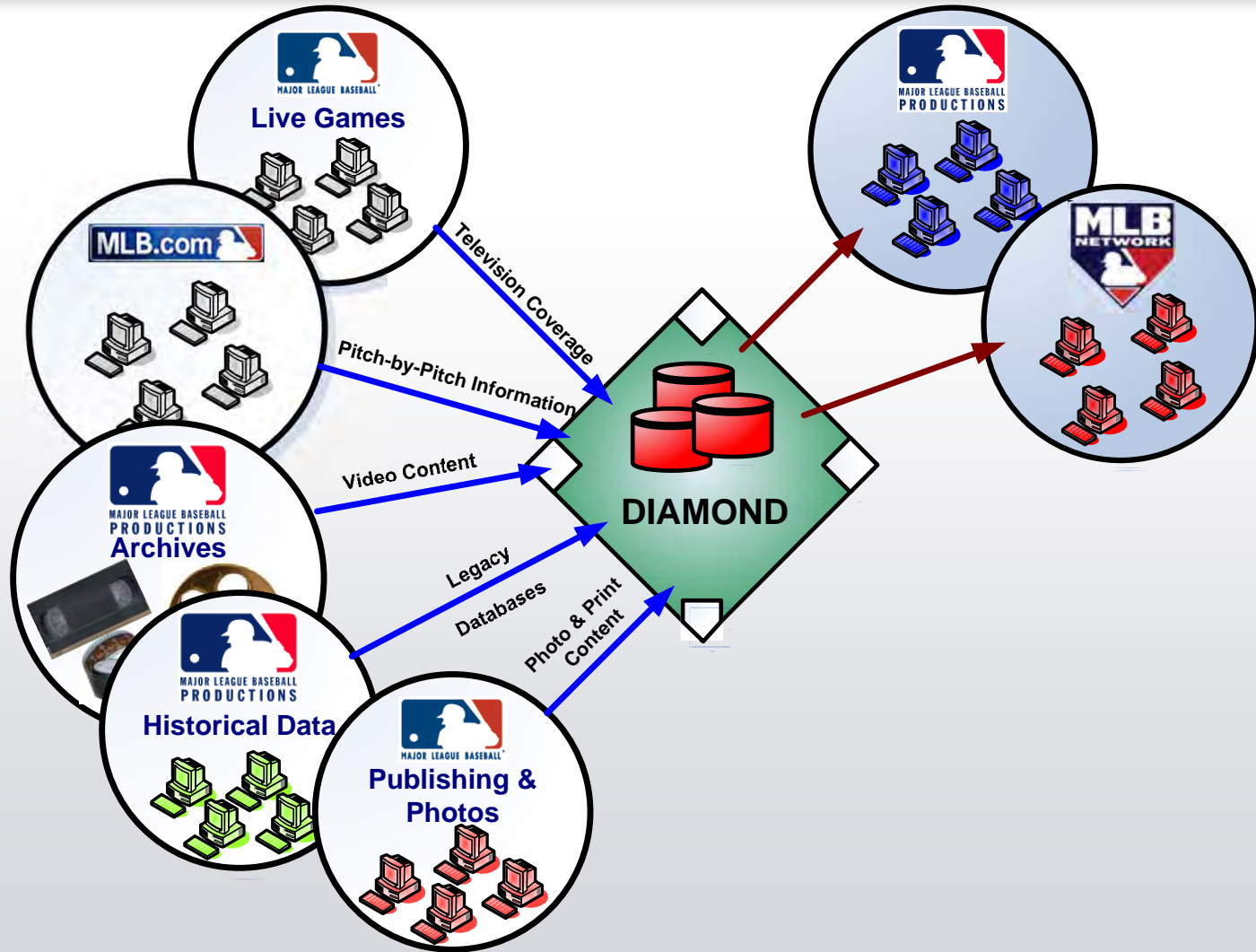
As of August 7th, 2014

❖ Total Assets (Video Tapes & File Records)	240,000
❖ Total Hours of Content Logged (Approx.)	500,000
❖ Total Individual Categorizations Cataloged	26,200,000
❖ Total Individual 'People' Identifiers	10,500,000
❖ Total Metadata Tags	36,700,000

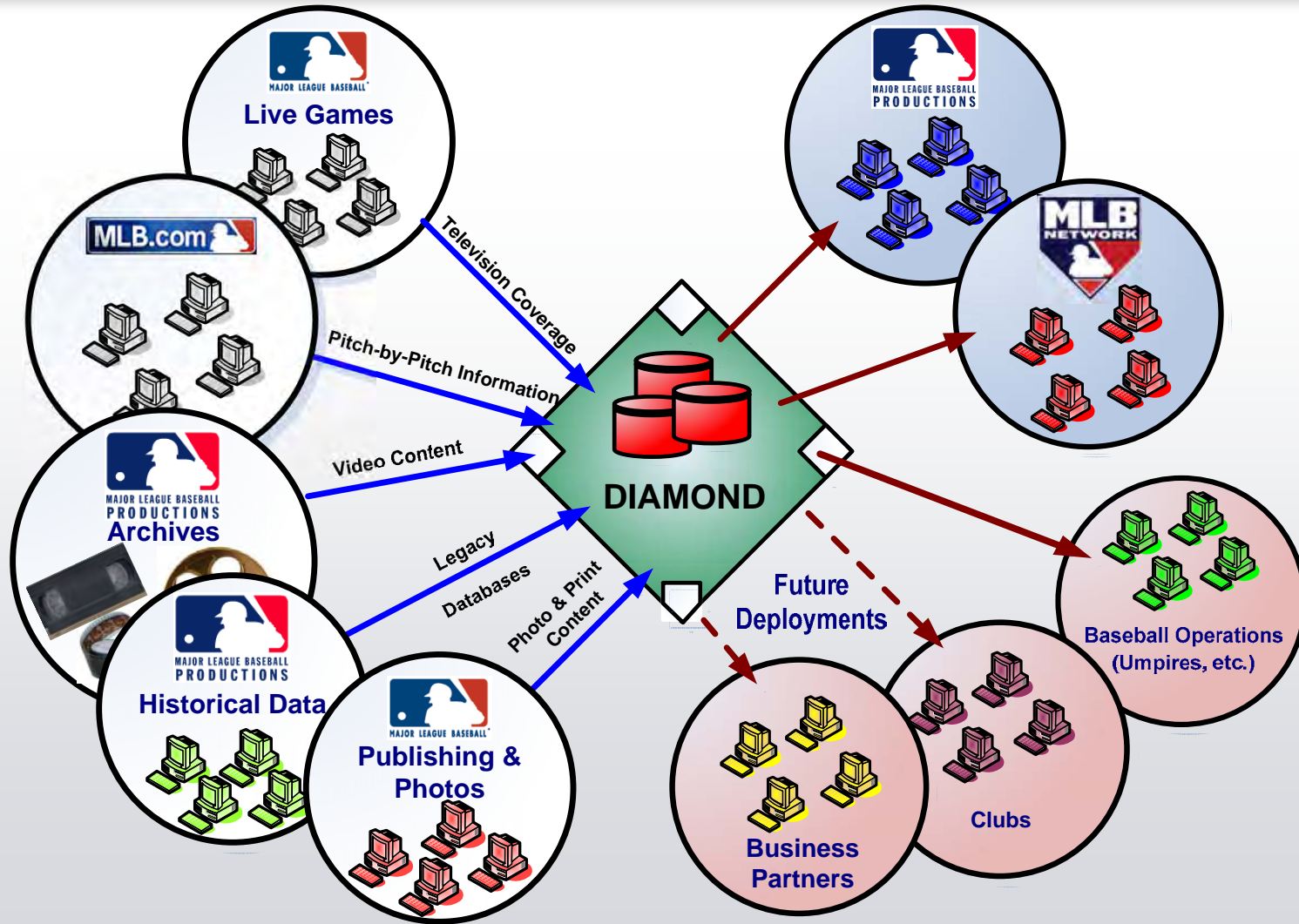
DIAMOND INPUT SOURCES



DIAMOND STAKEHOLDERS



DIAMOND STAKEHOLDERS



Breaking Through to



THE FUTURE...

MLB Network – Rebuilding the Infrastructure



- **Broadcast Facility – Original Deployment 2008**
 - **Equipment Rooms are Fully Utilized**
 - **Power and Cooling are Fully Subscribed**



- **Post Production Environment – Aging from 2008**
 - **Original Hardware – No Longer Supported**
 - **Original Software – No Longer Supported**
 - **Continuous Growth – Need to Scale Annually**

MLB Network History – 2013

Rebuild Post Production Environment

- Design 'Open Architecture' Model
- Deploy '10% Model' as Lab Test System
- Deploy VMware on Cisco UCS Platform
- SimpliVity Environment for DIAMOND Development
- Establish Software Development Environment
- 240 TB of Raw NetApp E-Series Storage



MLB Network History – 2013

Rebuild Post Production Environment

- Design 'File Based' Production Environment on Cutting Edge IT Technology
- Plan for 7 Year ROI Model
- Open Systems Architecture
- Expand the Role and Scope of DIAMOND
- Flexibility in Workflows
- Dynamic and Low Cost in Growth / Scale



MLB Network – Rebuilding the Infrastructure



Key Technology Enablers...

- **VMware Infrastructure & Scalability**
- **Cisco UCS Scalability & Performance**
- **Optical Router for Switching of Dark Fiber Paths – Providing Failover Paths**
- **Highly Responsive Keyboard, Dual Video Displays, & Mouse (KVM) Over Extremely Long Distances (3 Kilometers) on a Single Dark Fiber**
- **Open API's & Data Virtualization for 'Best of Breed' Interoperability**



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The Vision...

**Expanding
to the Data Center**



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Why Expanding...?

Current Space and Power Limitations



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What moves to the data center...?



Record Systems
Storage Systems
Edit Workstations
Proxy Storage Systems
DIAMOND Infrastructure

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What stays at the
MLB Network facilities ?



Studio Playback Systems
Archive Library Systems
Edit Manpower
50 HD Edit Work Spaces
250 Proxy Desktop Edit Work Spaces





MLB Network – Fiber Interconnect

Between The Two Facilities

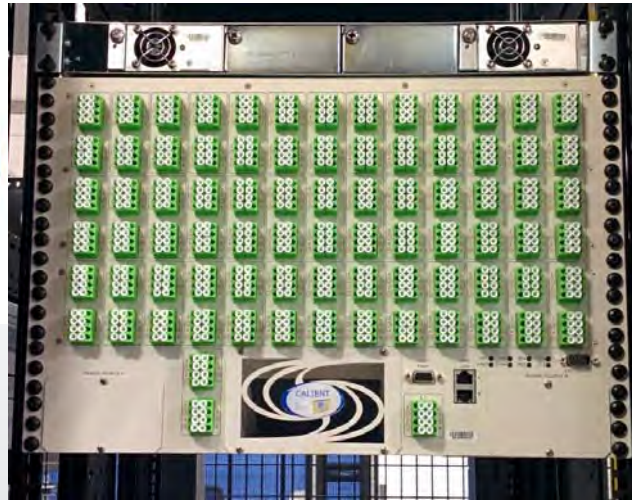


2 Redundant Fiber Paths
192 Dark Fibers Per Path
1.9 Mile Cable Run



MLB Network – Fiber Optic Switching

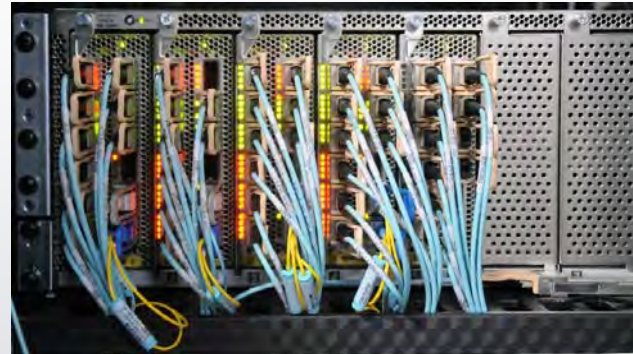
Two (2) 320 Duplex Optical Port Routers for Fiber Optic Switching Between Facilities



**CALIENT
Fiber Optic
Router**

MLB Network – IP Topology

320 Gb/s IP Backbone Between Facilities



**10 GigE Server Infrastructure
within Each Rack**

8 Gbps Fiber Channel Fabric

**Cisco Nexus
Network
Infrastructure**



MLB Network – CoreSite Cage



23

**Equipment
Racks**

MLB Network – Video Ingest Farm



**40 Grass Valley
HD Video
Servers
Under
Stratus Control**



MLB Network – Video Ingest Farm



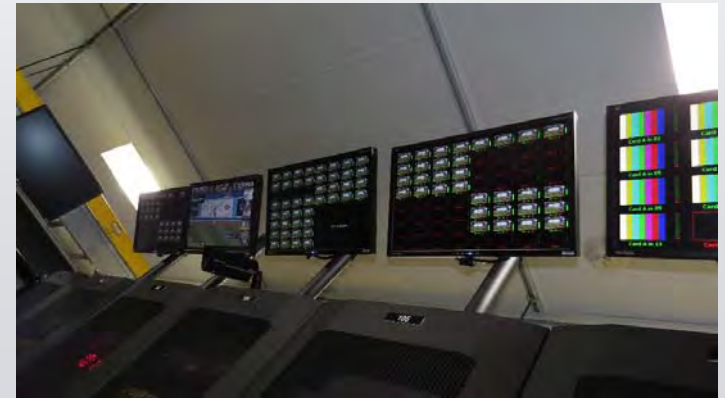
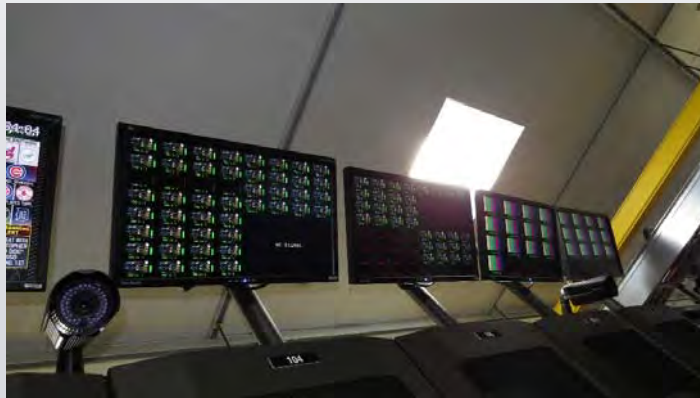
**136 Inbound
HD Video
Record
Channels**



MLB Network – Video Ingest Farm



**Displays for
Monitoring
Live Video
Feeds**



MLB Network – Shared Storage Pools



American League
SAN (X-SAN) &
National League
SAN (Y-SAN)

1.44 PB of Raw
Disk Storage Per
SAN

45,000 Hours of
Storage Per SAN

HD Broadcast
Quality
Video Storage
50 Mb/s



MLB Network – Shared Storage Pools

Quantum

StorNext

File Systems

Create

Multi-SAN

Environment

across

High Res & Proxy

Storage



**American League
SAN (X-SAN) &
National League
SAN (Y-SAN)**

**1.44 PB of Raw
Disk Storage Per
SAN**

**45,000 Hours of
Storage Per SAN**

MLB Network – Shared Storage Pools

Quantum[®]

**Proxy Video
SAN Pool**

**Disk Storage
Backed By
AEL-500**

**LTO-6 Tape
HSM System**



**500 TB of
Proxy Disk
Storage**

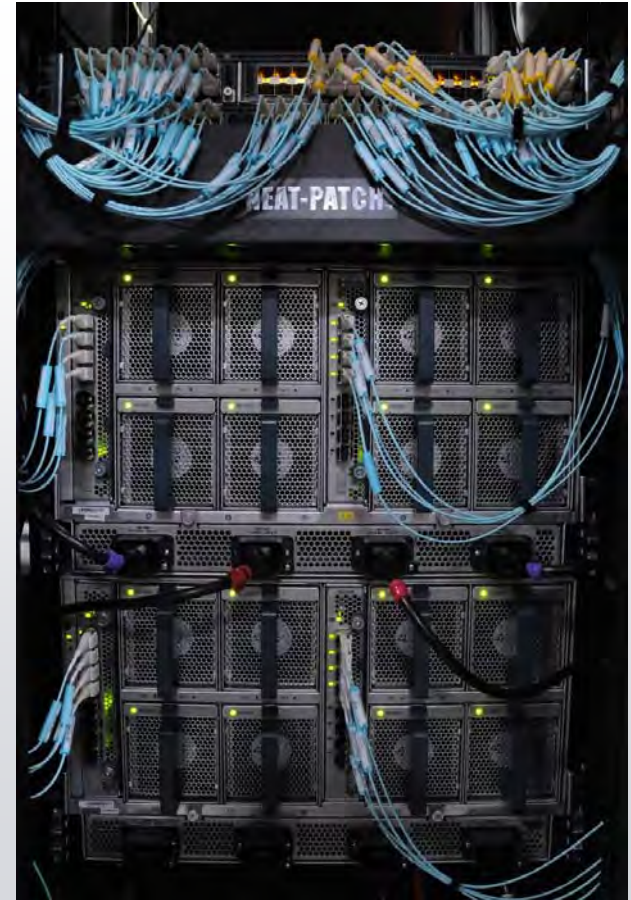
**Over 1 PB of
Storage in the
LTO-6 Tape
Archive.**



MLB Network – Compute Environment



**32 Cisco
UCS Blade
Servers**



MLB Network – Compute Environment



**VMware
on Blade
Servers**



**vSphere 5.5
Enterprise Plus
Running on Cisco B200
M3 Blades**

**Multiple Operating Systems
Highly Scalable
High Availability**

MLB Network – Compute Environment



**VMware
on Blade
Servers**



**Over 60 Production
VM's Running in a
4 Host Cluster.**

**Four node HA Cluster with
Fully Automated DRS
Distributed vSwitch, VAAI
In Use**

MLB Network – Compute Environment



**50 Cisco
UCS C-240
Servers**

**32 Blade Servers
&
50 C-240 Workstations
All Managed Under
UCS Manager.**

**C-240 Workstations
16 CPU Cores Per Server
64 GB of RAM
nVidia Tesla K20M GPU
nVidia K2200 Display Card**

MLB Network – Compute Environment



Deployed behind Cisco UCS Environment

Boot Environment for 80+ Physical Servers
and
60+ Virtual VMware Servers

Data Reduction / Deduplication

Tegile Systems

Intelligent Flash Arrays



MLB Network – Compute Environment



Specialty High Performance External Storage

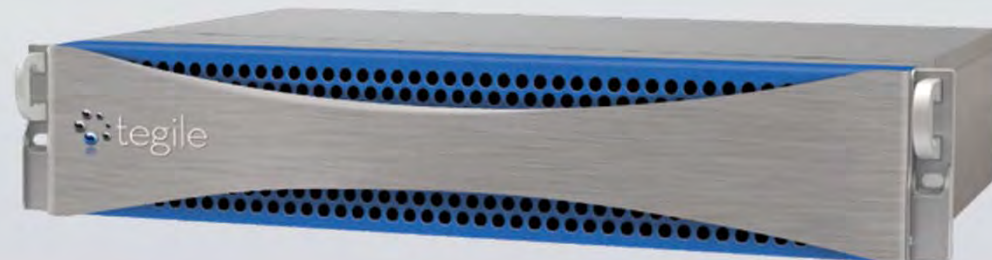
Multi-Protocol – Simultaneous Fiber-Channel & NFS

Hosts 'User' Adobe CC Edit Environments

Data Protection / Thin Snaps, Thin Clones

Tegile Systems

Intelligent Flash Arrays



MLB Network – Compute Environment

DIAMOND Compute Server Environments



Development Environment
OmniCube CN-2000 Cluster in Lab

Production Environment
OmniCube CN-3000 Cluster

SimpliVity
OmniCube



MLB Network – Compute Environment

DIAMOND Compute Server Environment



VM Centricity - VMware Management
Hyper Converged Compute, Storage, Networking
Data Virtualization Platform

SimpliVity OmniCube



MLB Network – Compute Environment

DIAMOND Compute Server Environment



Interconnects to Cloud Hosted Environments

Global Unified Management

Global Deduplication and Compression

**SimpliVity
OmniCube**



MLBN – Post Production Facility



The C-240 Workstations are Connected via Multi-Dyne KVM over a Single Dark Fiber as Edit Workstations... Running Adobe Creative Cloud for Content Editing.

Editing with
Adobe
Creative
Cloud





MLBN – Post Production Facility



DIAMOND
Tightly
integrated
with Premiere
Pro CC



DIAMOND provides the Production Asset Management Layer within the Adobe Premiere Pro CC application, enabling access to over 500,000 hours of searchable video content within the MLB Archives.

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The Next Steps...



**Expanding
the Archive System**



MLB Network – Phase Two – Q1 2016

Add 2nd Archive Robot...



- Considering Enterprise Class Tape
- Size New Archive Slot Count so ALL On-Site Content is housed within Robot
- Use existing Robot for Off-Site Tapes

- Migrate all LTO-4 Content (over 20,000 tapes) to Enterprise Class drives and reduce cartridge count by a 10:1 factor or better
- Front Porch Digital's Storage Plan Manager for Content Migration



Questions ?

Thank You !
The MLB Network



