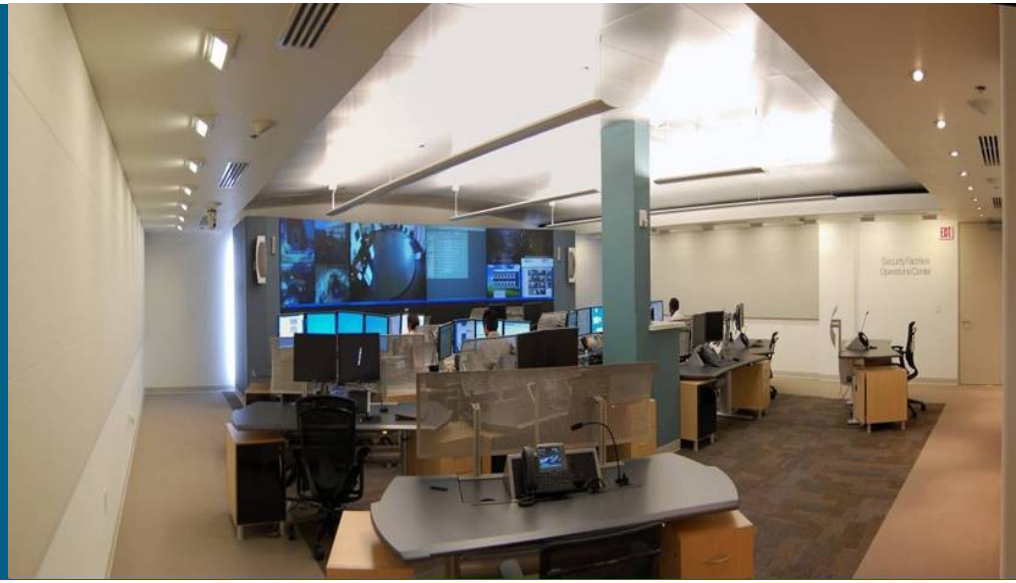
Cisco Physical Security
IP Video Surveillance



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Consulting Systems Engineer

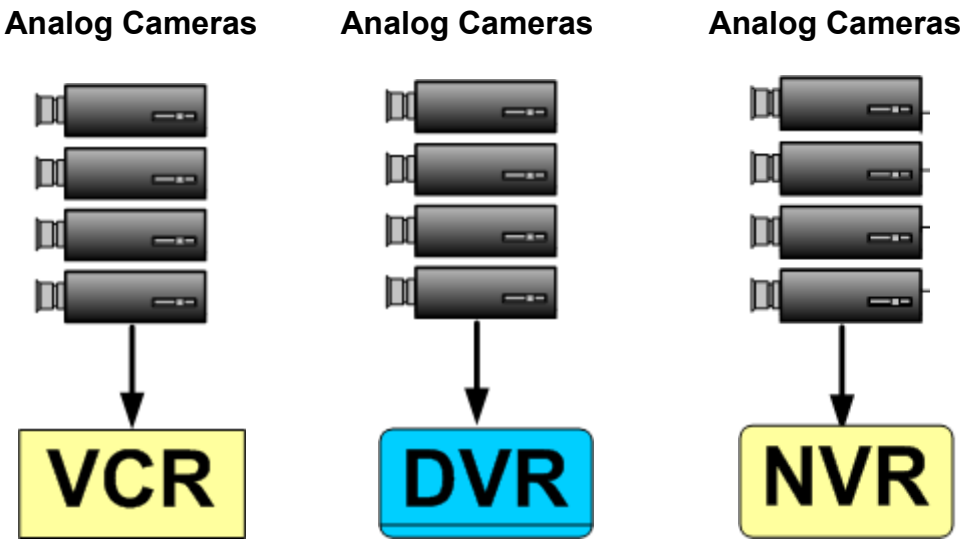
Emerging Technology Group

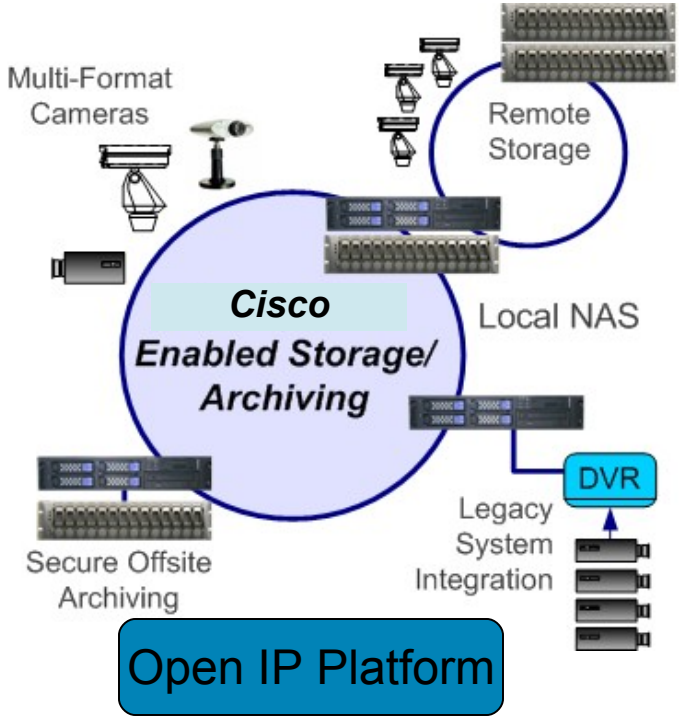
Agenda

- Trends and Evolution
- Cisco's Solution
- Deployment Models
- Design Issues:
  - Digital Video and VS Operations
  - VS Storage Example

Trends and Evolution

Video Evolution





VCR & Analog
- Standalone box
- Poor image
- Hard to search
- No remote access

DVR
- Easier to search
- Consistent Quality

NVR
- DVR benefits
- More storage options
- Limited network connection

Cisco Video Surveillance Platform
- Secure viewing from anywhere
- Fail-safe redundant storage
- Easy integration with other systems
- Enterprise class storage and support

Commitment to Open Standards

Support of new IP Media Device API specification introduced by the PSIA to standardize how devices communicate with the network

- Defines uniform methods for how devices communicate with the network
  - Discovery and Configuration
  - Command and Control
- Ensures Systems Integrators can focus on value added capabilities rather than writing new device drivers
- Provides physical security and IT with cost effective options to evolve and customize solutions

Resolution, Features, Network/storage Flexibility

The initial Physical Security Interoperability Alliance (PSIA) specification is endorsed by the following industry leaders: Adesta LLC, ADT Security Services, Cisco, CSC, DVTel, GE Security, Honeywell, IBM, IQinVision, Johnson Controls, March Networks, ObjectVideo, Orsus, Panasonic, Pelco, Santa Clara Consulting Group, Texas Instruments, Verint and Vidyo.

Open IP Components

- Infrastructure:
  - Network
  - Storage

- Video Encoders/IP Cameras

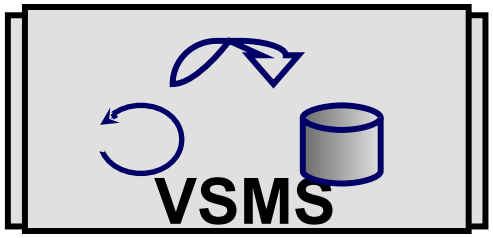
- Client Stations

- Video and Application Servers

Cisco’s Solution

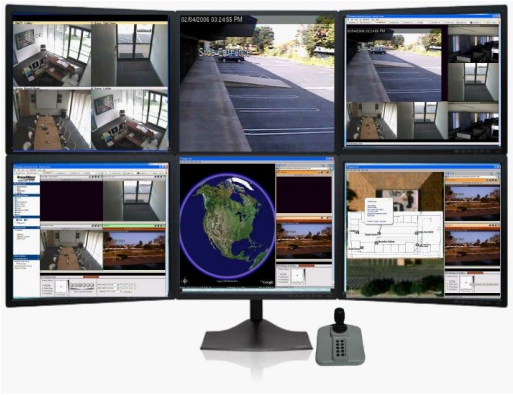
Video Surveillance Manager (VSM)

Video Surveillance Media Server



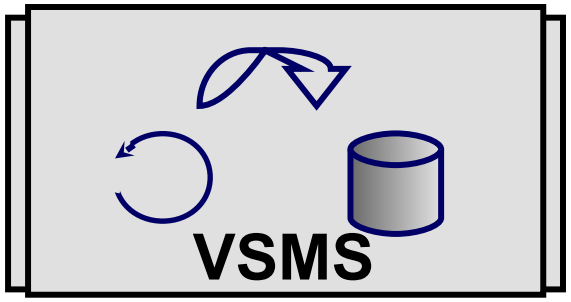
Video Surveillance Operations Manager

Video Surveillance Virtual Matrix



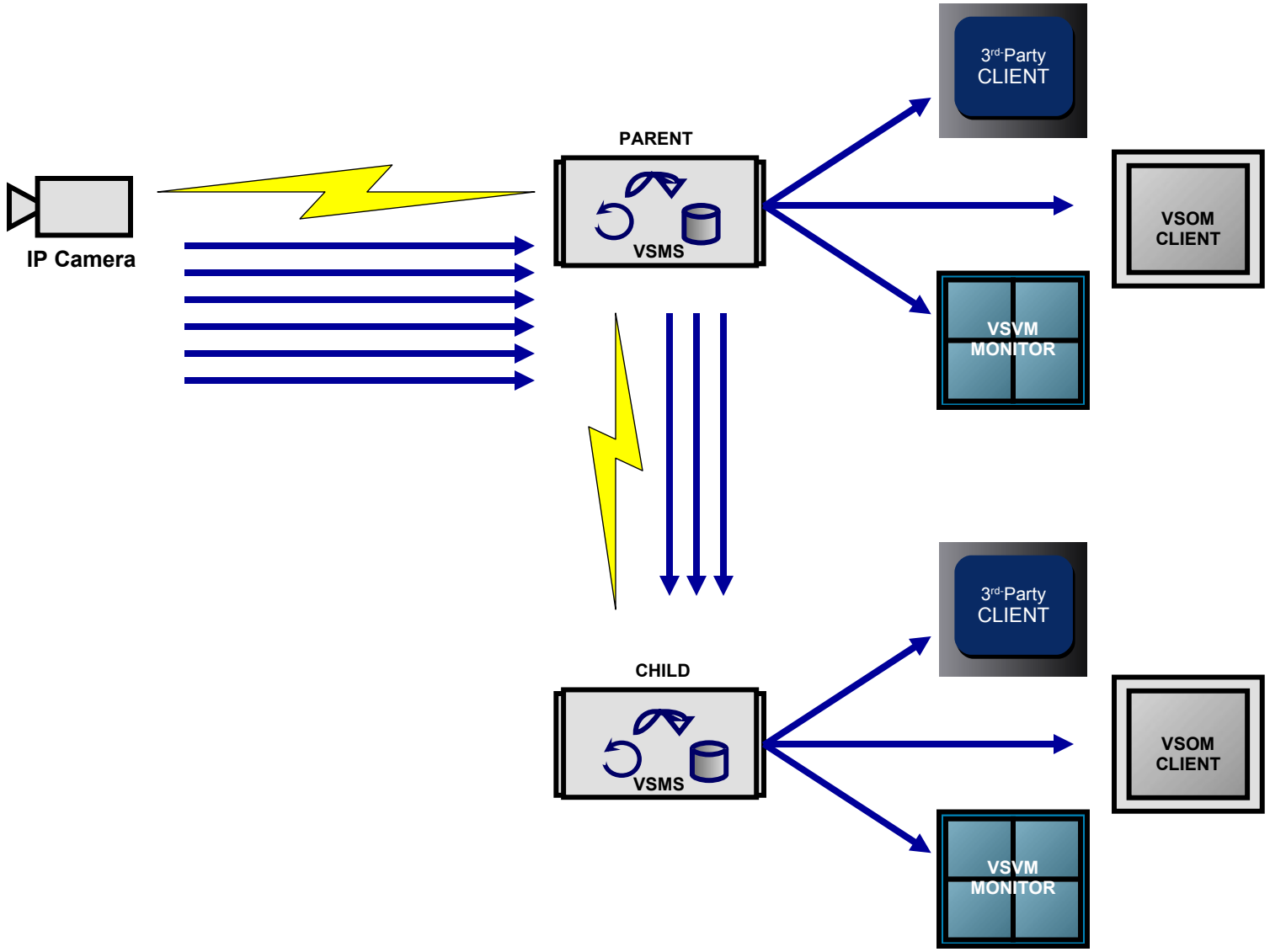
Video Surveillance Media Server (VSMS)

- VSMS is the core component enabling distribution, archiving and management of video feeds.
- Customizable, Open and distributed
  - Add custom UIs
  - Integrate with other systems



- Video Middleware and Abstraction Layer
  - Use best-of-breed codec: Motion JPEG, MPEG-2, MPEG-4
  - Highly Scalable – Cameras, Clients, Storage
  - Expand system as needed
- Proxy and stream live feeds

Media Server Proxy Feature



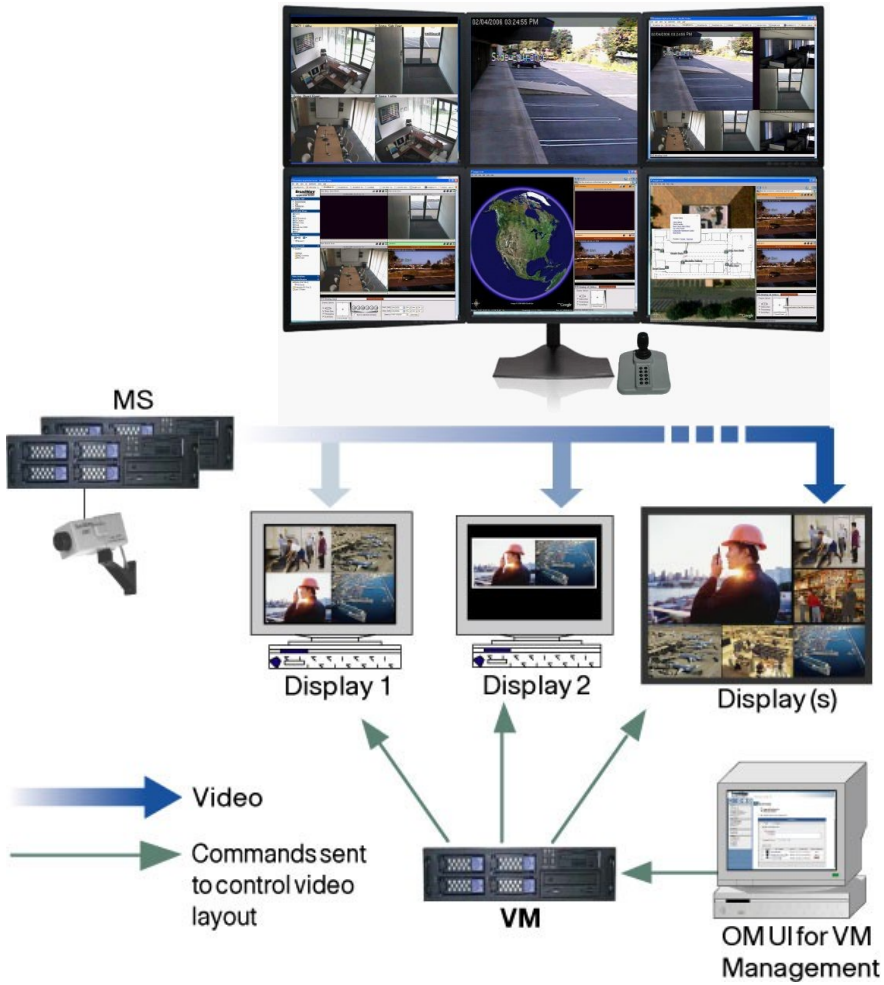
Video Surveillance Operations Manager (VSOM)

- Enterprise solution
- Highly configurable to effectively manage complex video applications
- Browser-based UI
- Multiple web-based consoles to configure, manage, display, and control video throughout a customer's IP network.
- Unlimited cameras, storage, viewers

Video Surveillance Virtual Matrix (VM)

- Controls an infinite number of video displays on network
- Easily integrates with other systems
- Flexible delivery of live & archived video
- Distributes to Video Wall
- Controls multiple video displays from a single station
- Event/Action

  Push video to remote screens



Cisco IPVS Hardware Platforms

- Leading Multiservice and IP Network capabilities
- Industry standard hardware
- Cost Effective, flexible for distributed systems

Analog Video Encoding Module

Video Management and Storage System

Cisco 3200

Mobile Solution

Cisco 2821

Cisco 2851

Multiple Services

Extended Modular Connectivity

Cisco 3825

Cisco 3845

High-Density Services

Modularity with Performance Optimized for "All-in-one" Solution

1RU

Up to 4TB

2RU

Modular storage
Up to 12TB

4RU

Modular storage
Up to 24TB
Resilient

Multi- Services Platform

Enterprise Branch Office

Enterprise Campus

Scalability, Resiliency, Serviceability

Multi-Services Platform (MSP)

Integrated Services Router (ISR) Video Surveillance Modules

EVM-IPVS-16A: Analog Video Encoding Module

NME-VMSS: Video Management and Storage System

Cisco IP Video Surveillance Solution

Cisco 2821

Cisco 2851

Multiple Services

Extended Modular Connectivity (EVM, NM, AIM, WIC/VIC)

Cisco 3825

Cisco 3845

High-Density Services

Modularity with Performance Optimized for "All-in-one" Solution (HSDM, NM, EVM, AIM, WIC/VIC)

Enterprise Branch Office

IP Video Surveillance Encoders

Cisco IPVS Fixed Box Cameras

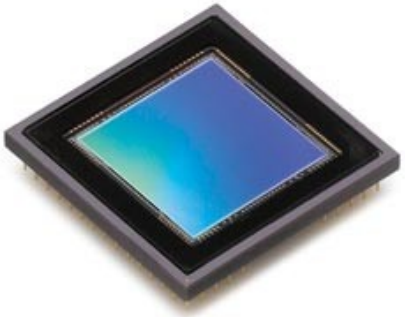
Cisco IPVS Fixed Dome Cameras

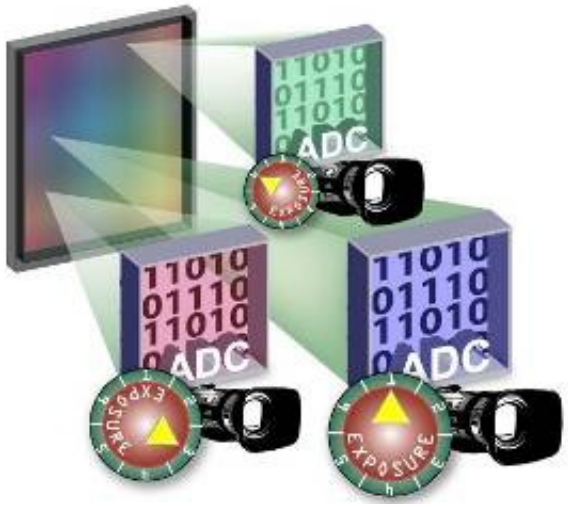
Excellent Image Quality in Variable Lighting Conditions

- Same core Cisco IP Camera as the Standard Definition (SD) wired version
- Fixed Dome Form Factor
- Power Over Ethernet (Indoor)
- Multiple Options
  - Indoor Flush Mount, Surface Mount
  - Indoor Vandal Resistant
  - Outdoor Vandal Resistant
- API for interfacing with third party vendors

Cisco SD IP Cameras
Wide Dynamic Range (WDR) Imaging

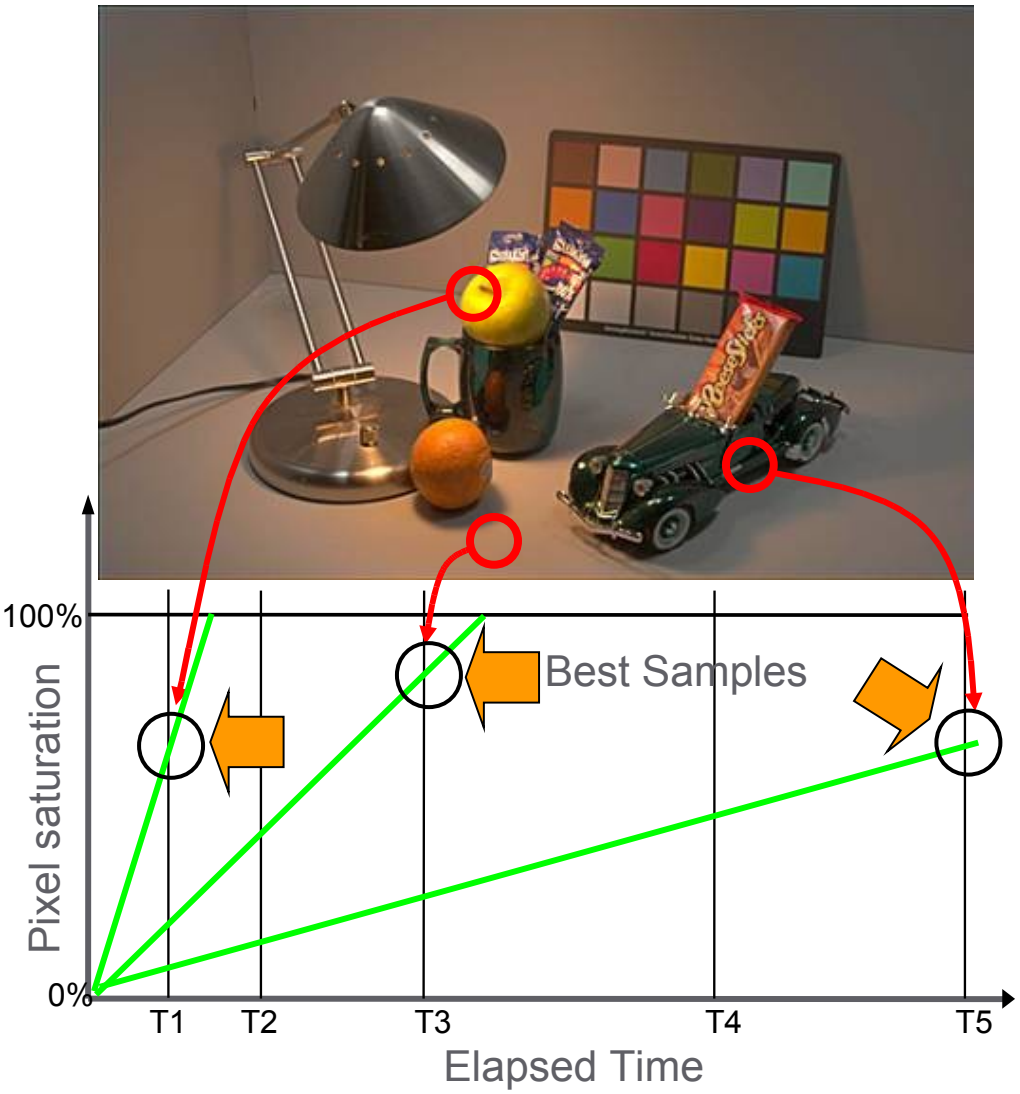
- CMOS based digital imager and dedicated co-processor that replaces traditional CCD technology
- Every pixel has its own dedicated Analog to Digital Converter (ADC) vs. CCD with only 1 ADC for an entire array
- Pixel-independent shutter speed
- Pixel-independent exposure





WDR from Pixel Independent Multi-Sampling

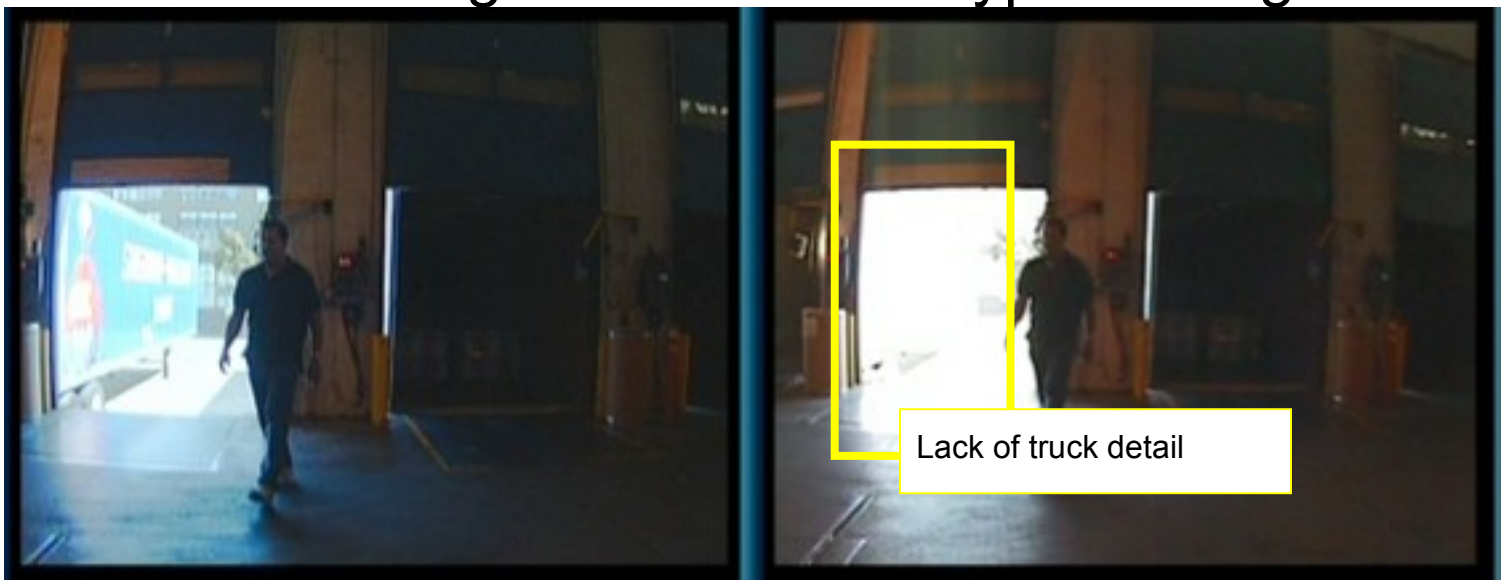
- Every pixel can be sampled multiple times per video field
- Exposure is computed for each pixel by calculating the slope of the light energy hitting it
- All pixels receive the optimal exposure with best Signal to Noise Ratio (SNR)
- Result – wide dynamic range & natural color; eliminating fixed pattern noise



Cisco SD IP Cameras Benefits
Optimal image in multiple lighting conditions

WDR Imager

Typical Imager



Cisco imager can pick up details in extreme lighting conditions a common in warehouse applications

Cisco SD IP Cameras Benefits
No Saturation with strong lighting

WDR Imager

Typical Imager

Cisco imager provides color detail even in extreme lighting with a manual iris lens, CCD technology is completely over-saturated

Cisco SD IP Cameras Benefits Improved Color Rendering

WDR Imager

Typical Imager

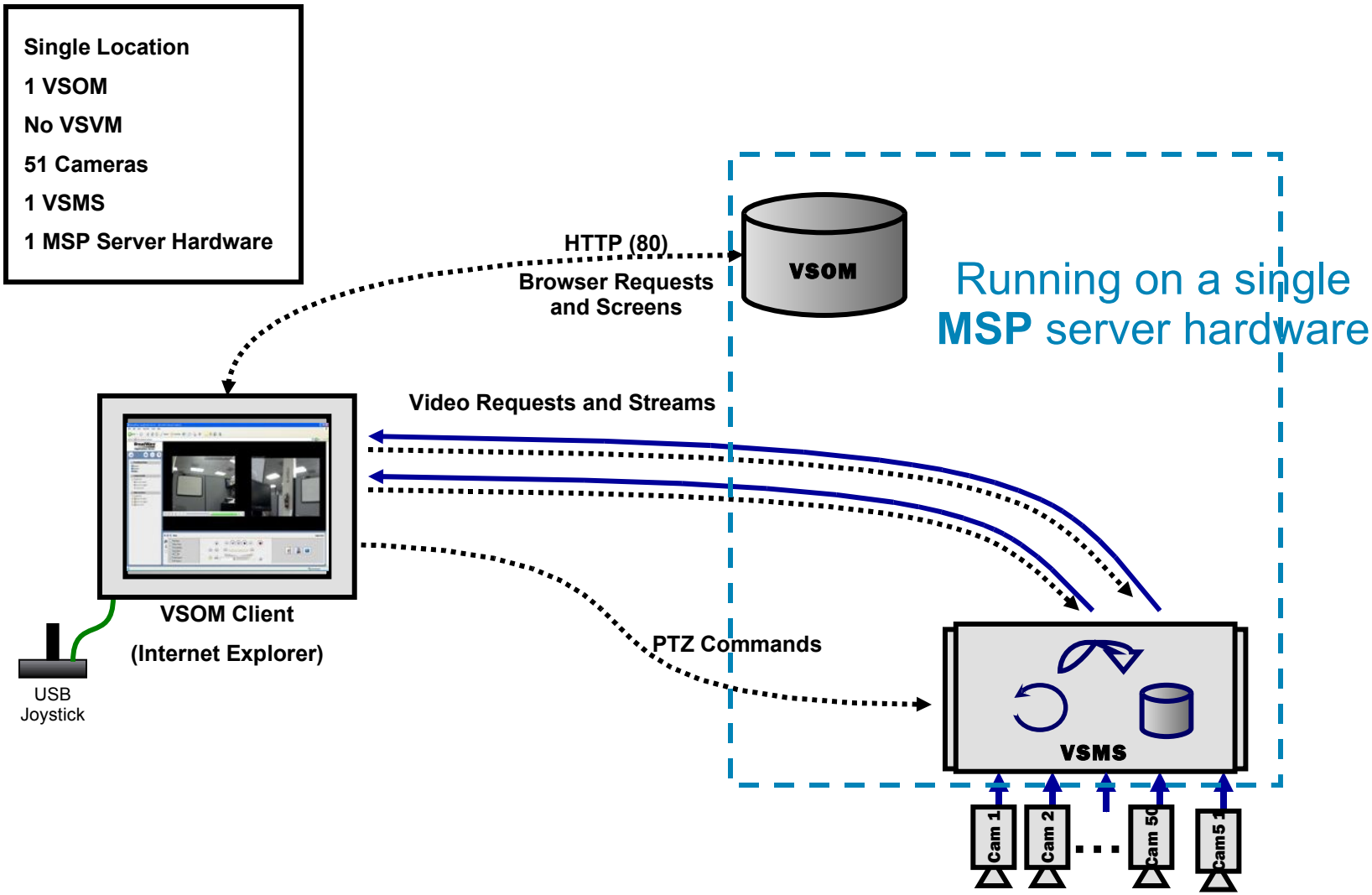
Cisco imager provides superior color rendering which can distinguish between chip colors, typical imager technology cannot

Day and Night Imaging

- Automatic IR Cut-Filters

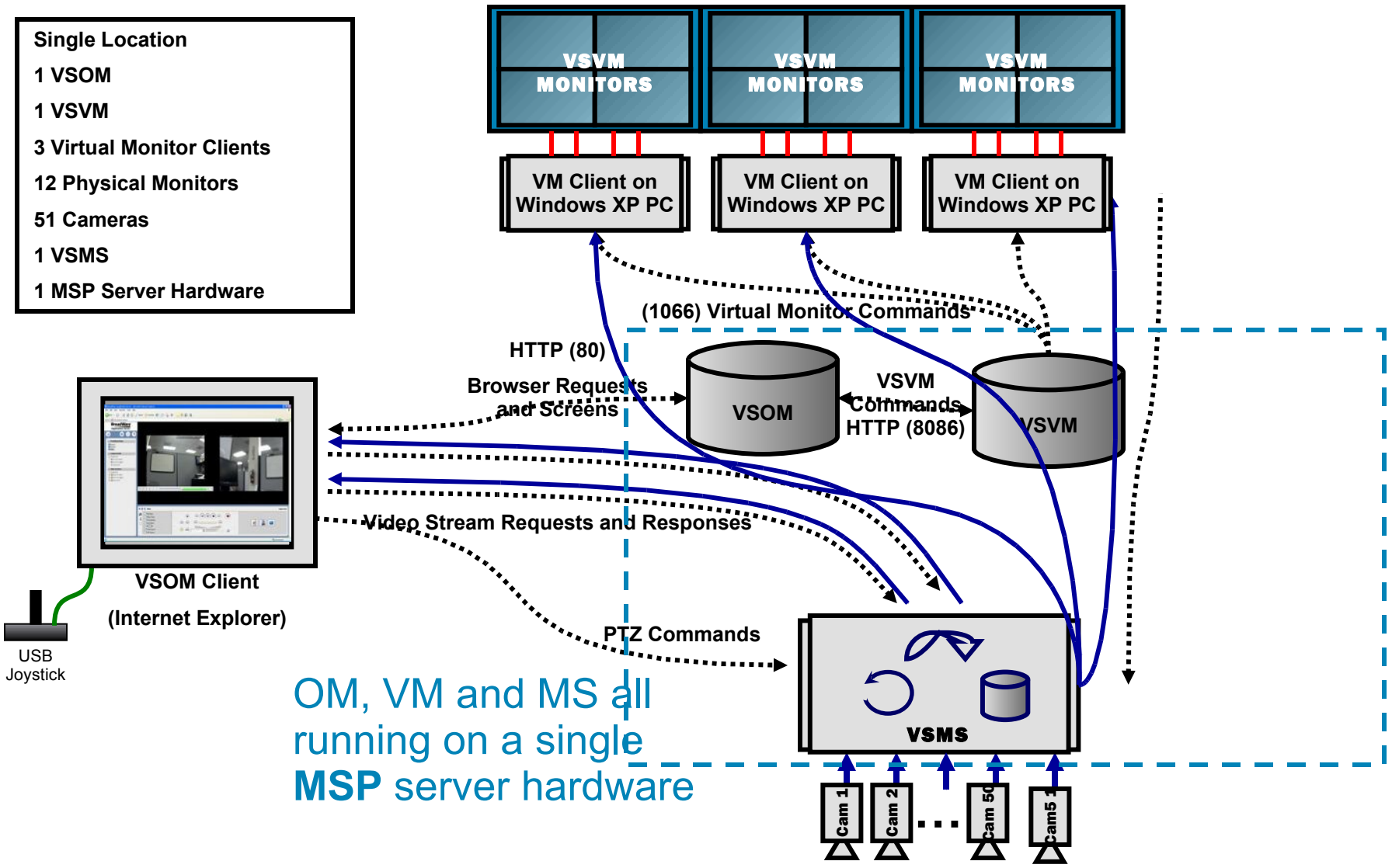
Deployment Models

Example1: Small Single Site System



Small Single Site System Example With Video Wall

Single Location
1 VSOM
1 VSVM
3 Virtual Monitor Clients
12 Physical Monitors
51 Cameras
1 VSMS
1 MSP Server Hardware



OM, VM and MS all running on a single **MSP** server hardware

Larger Single Site System Example With Video Wall

Single Location

1 VSOM

1 VSVM

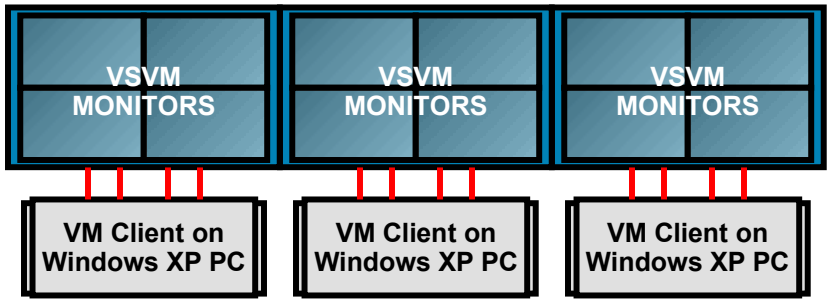
3 Virtual Monitor clients

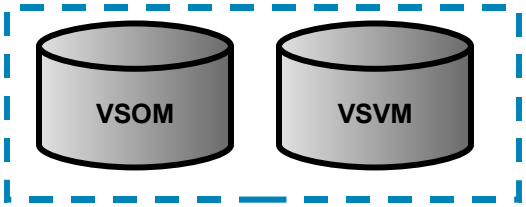
12 Physical Monitors

200 Cameras

4 VSMS

5 MSP Server Hardware





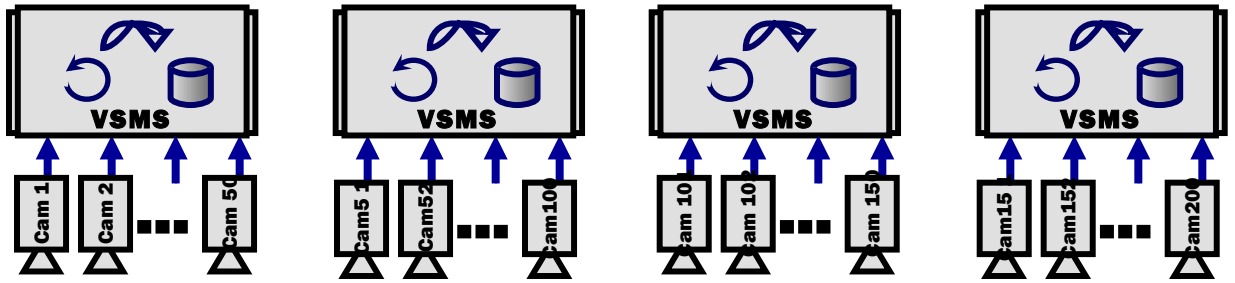
Operations Manager and Virtual Matrix Running on a single **MSP** server hardware

VSOM Client

(Internet Explorer)

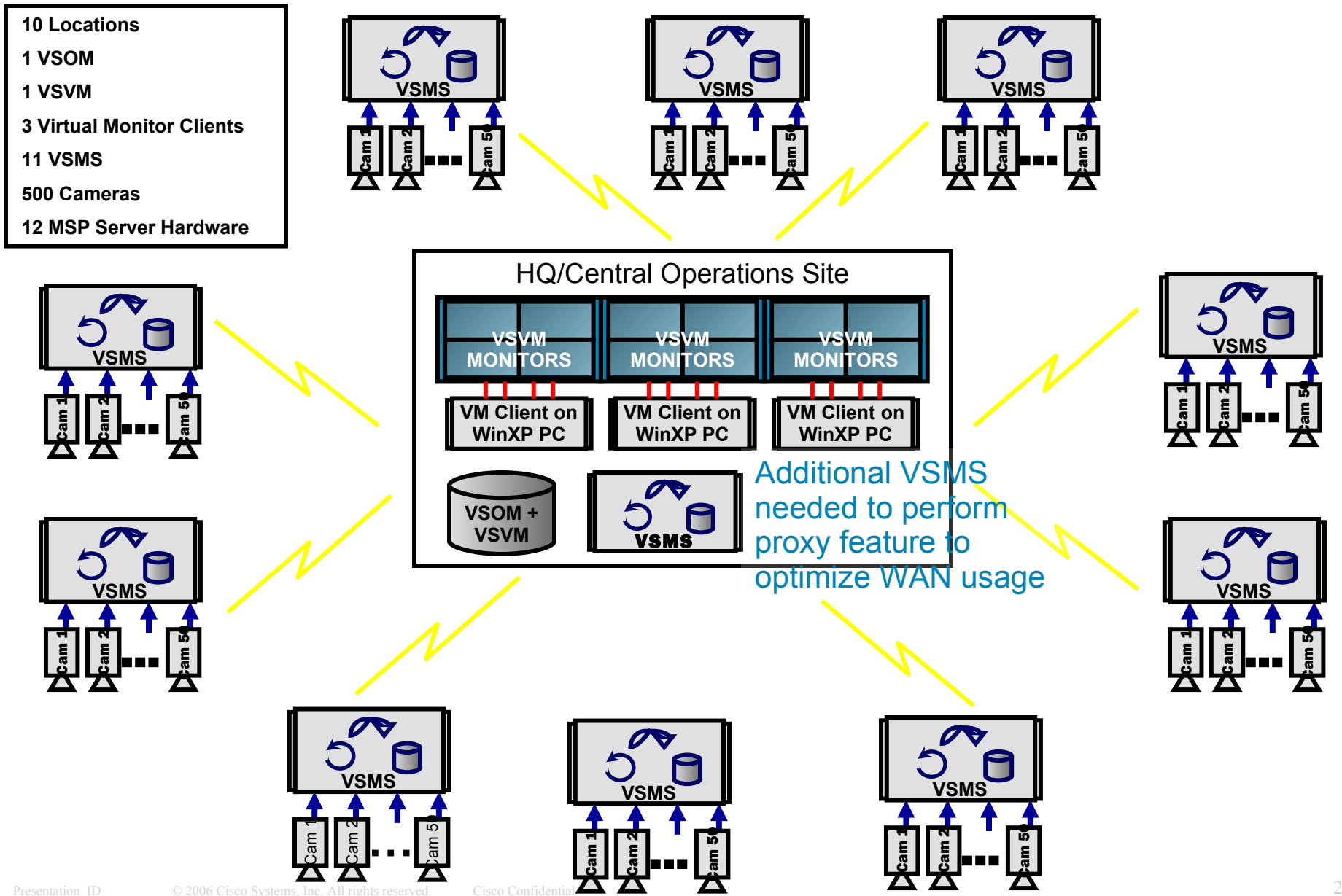
USB Joystick

One **MSP** per Media Server (VSMS)



Multi-Site with Central Operations

- 10 Locations
- 1 VSOM
- 1 VSVM
- 3 Virtual Monitor Clients
- 11 VSMS
- 500 Cameras
- 12 MSP Server Hardware



Design Considerations

Common Digital Video Attributes

- Compression: MPEG-4, MPEG-2, H.264, MJPEG
  Good Average: MPEG-4
- Frame Rate: 3.75 - 30 fps (frames per second)
  Good Average: 15 fps
- Resolution: CIF, 2CIF, 4CIF, D1, HD720, HD1080
  Good Average: D1/4CIF

Video Resolution

Dimensions	Resolution
VGA	640 x 480
SVGA	800 x 600
XGA	1024 x 768
QCIF	176 x 144
CIF	352 x 288
2 CIF	704 x 288
4 CIF	704 x 576
D1	720 x 576
HD 720	1280x720
HD 1080	1920x1080

Resolution Comparison

CIF [VCD] Resolution (352x240) vs. 1080 (1920x1080)

Resolution Comparison

4CIF/D1 [SDTV] Resolution (720x480) vs.1080 (1920x1080)

Resolution Comparison

1080 (1920x1080)

High Definition IPVS Cameras, 4000 Series

- 1080p (1920 x 1080) 30 FPS
- 720p (1280 x 720) 60 FPS
- H.264, MJPEG Compression
- USB Memory Card
- IPv6 Capable
- Dedicated Digital Signal Processor (DSP) for Video Analytics
- 4 Models:
  - CIVS-IPC-4500 (DSP)
  - CIVS-IPC-4500W (DSP)
  - CIVS-IPC-4300W
  - CIVS-IPC-4300

VS Storage Example

Example Storage Calculations

Initial System Requirements:

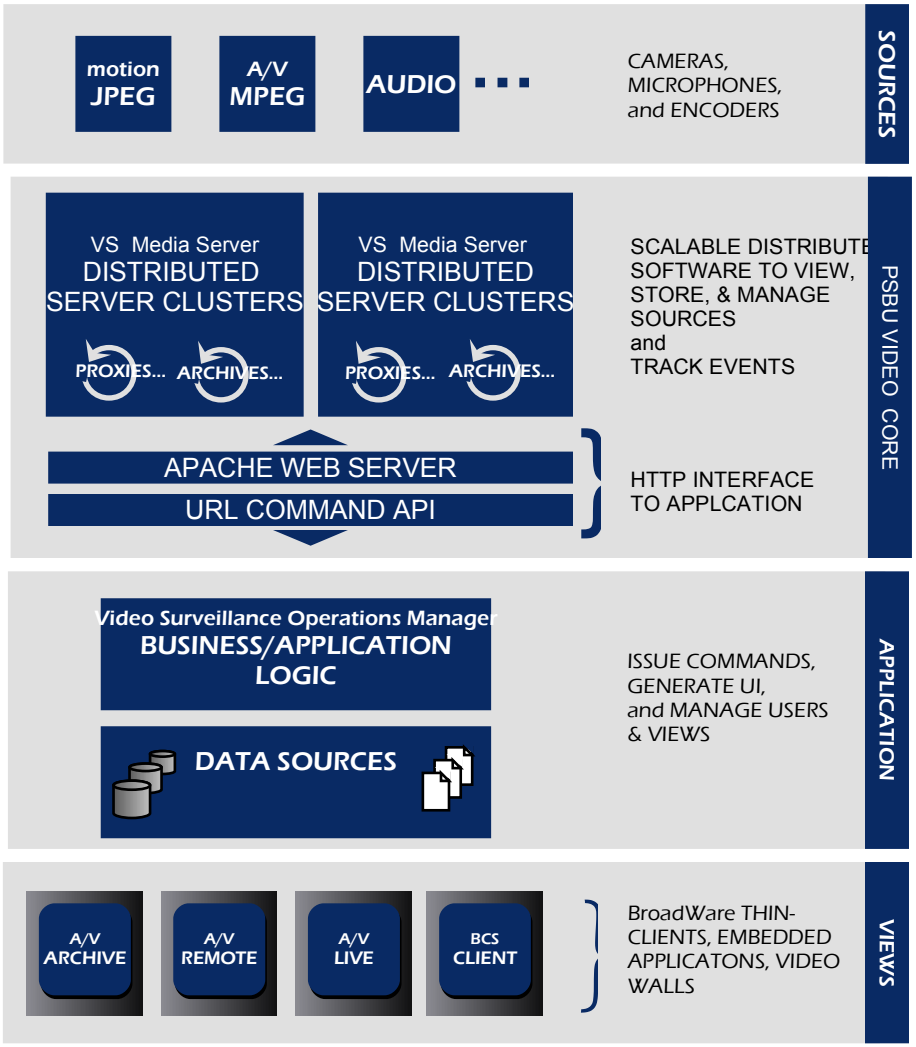
Compression: MPEG4
Resolution: 4CIF
Frame Rate: 15fps
Archive Period: 30 Days
No. of Cameras: 500

Results:

- Data Rate: MPEG4, 4CIF, 15fps = **1.5 Mbps**
- Daily storage/Camera: 1.5 x 3600x24/8 = **16 GB/day**
- Daily Storage for 500 Cameras: 500x16 = **8 TB/day**
- 30 Day Storage for 500 Cameras: 30x8 = **240 TB**

Summary

Platform for Video Systems



- **Multiple formats and devices supported for video and audio sources**

Video Surveillance Media Server (VSMS)

- **support multiple simultaneous viewers with low latency**
- **support any required storage capacity**
- **HTTP command interface integrates easily with other applications**

Video Surveillance Operations Manager (VSOM)

- **Applications created using any standard development environment**
- **Open interfaces for database, image analytics, and other functionality**

Video Surveillance Virtual Matrix (VSVM)
Interactive Media Clients (IMC)

- **Thin-clients provide a broad range of viewing options**

For More info:

- **The Web** cisco.com/go/physicalsecurity
- **Email Me** dosary@cisco.com