

Sun™ Reference Architecture for Video Surveillance

Scalable digital video monitoring

Highlights

- The Sun Reference Architecture for Video Surveillance provides one of the most advanced and scalable video surveillance solutions available, at a cost considerably lower than other solutions.
- ipConfigure's Enterprise Surveillance Manager (ESM) provides enterprise-class video surveillance management to support an unlimited number of cameras, locations, and users on a scalable distributed infrastructure with HTML access.
- The Sun Fire™ X4500 server provides massive storage density and high throughput, allowing longer retention of both medium and high resolution surveillance video — and support for more cameras per server.
- A wide range of new and existing IP and analog cameras are supported, including professional network cameras from Axis Communications and others.



Video monitoring, surveillance, and analysis technology is undergoing rapid change as physical security and IT converge. Increasing numbers of both wired and wireless digital IP based cameras are replacing analog cameras and dedicated cabling, as the industry transitions away from proprietary closed-circuit television (CCTV) configurations.

Applying innovative software and systems architecture, the Sun™ Reference Architecture for Video Surveillance takes advantage of digital technology advances, making it easier for organizations to deploy scalable and flexible video monitoring where and when they need it.

Scalable digital video monitoring

Managing ever-increasing security and financial risks is driving the need for digital video monitoring and surveillance across a wide range of industries, from manufacturing and transportation to energy and security. The growing need to monitor more people, places, and things is coupled with a need to extract more useful information from video surveillance data. Motivations for video monitoring are compelling and diverse, including:

- Complying with security mandates
- Mitigating theft and assault in both public and private spaces
- Defending against frivolous lawsuits
- Monitoring energy and other critical installations
- Providing an increased sense of safety and security in public places

These uses for surveillance technology are also resulting in the opportunity to capture new types of information and evidence, with new demands placed on surveillance solutions as a result. Higher quality surveillance video is required to give organizations the opportunity to do more with the video data they capture. Innovative applications include facial recognition, motion tracking, and event monitoring. Large numbers of cameras are being deployed, and more video must be retained and archived longer for later analysis, yielding demand for very large amounts of storage along with effective indexing and searching.

Traditional analog video monitoring approaches simply cannot keep pace with these new demands. Limited scalability and bandwidth, unpredictable costs, and scattered and inaccessible data make analog solutions largely untenable. Traditional digital approaches can also impose arbitrary limitations on the numbers of cameras per server due to storage capacity and I/O throughput constraints.

The Sun Reference Architecture for Video Surveillance addresses these issues by replacing digital video recording (DVR) with effective and centralized or distributed IP based network video recording (NVR). The result is a scalable and robust video surveillance architecture that can support any number of cameras with quick and easy accessibility — at a very attractive cost.

Organizations deploying the Reference Architecture get a fully integrated, scalable, and flexible digital monitoring solution. Configurations are tailored to individual needs and are easy to deploy, use, and maintain. The Reference Architecture combines industry-leading video monitoring software from ipConfigure with one or more Sun Fire™ X4500 servers acting as video surveillance appliances. Full-featured network cameras from Axis Communications offer superior image quality and simple installation.

Sun Reference Architecture for Video Surveillance

Sun Reference Architectures have been designed, tested, tuned, and documented so that customers can accelerate time-to-revenue as well as help reduce the complexity, costs, and risks of deploying new technology in the enterprise. Sun Reference Architectures include:

- A documented multitiered architecture
- Recommended technology products from Sun and other vendors
- Technical documents that guide architecture, sizing, and implementation

Before choosing to implement the Sun Reference Architecture for Video Surveillance, organizations can also run a proof-of-concept at any of a number of Sun Solution Centers. For more information on Sun Reference Architectures, see sun.com/service/refarch.

Addressing key enterprise requirements

Surveillance cameras increasingly provide perspective where manpower is either impractical or impossible. Digital surveillance is also generating new types of information. Beyond merely capturing video, the Sun Reference Architecture for Video Surveillance lets organizations:

- Capture more useful video data and retain it for longer periods of time at higher quality
- Control user access to system features and privileges for the right business reasons
- View video either in real-time or after the fact through archives and search tools
- Provide sustainable total cost of ownership and effective infrastructure management
- Experience rapid and affordable deployment with massive scalability

Architecture design

Throughout the process of designing the Sun Reference Architecture for Video Surveillance, certain requirements such as reliability, high-availability, resiliency, cost-effectiveness, a

high degree of scalability, and use of best-in-class products were emphasized. By adhering to these fundamental criteria and investing extensive effort in development, integration, testing, and tuning the architecture, Sun technologists have produced an effective and scalable video monitoring architecture that is well suited for enterprise applications.

Reference architecture components

In the Reference Architecture, ipConfigure's Enterprise Surveillance Manager (ESM) application software is used to capture, store, access, and manage video surveillance content. ipConfigure's ESM provides a three-tiered application model, running as independent services under Microsoft Windows 2003 server or the Solaris™ Operating System (Solaris OS). ipConfigure's ESM software components include:

- A video recording and playback engine
- A database
- A Web server
- An archiving service

The Reference Architecture distributes these components across multiple servers, making the application highly scalable as well as robust and secure. Functional components of

the Reference Architecture are illustrated in Figure 1, and are described in the sections that follow.

- *Recording server* — Surveillance video is captured directly from available network cameras to one or more recording servers. Each recording server consists of a Sun Fire X4500 server with two-sockets for AMD Opteron™ processors and up to 24 TB of storage capacity. In the Reference Architecture, the ipConfigure *archiving service* runs on the recording server under Microsoft Windows 2003 Server.
- *Management server* — Based on the Sun Fire X4100 server, the management server provides a central point of access and control for the entire video surveillance system. The management server runs ipConfigure's *Web server* and *database* components.
- *IP cameras* — An extensive set of IP cameras are supported by the Reference Architecture, including network cameras from Axis Communications. Axis provides a broad product line — with cameras designed for professional video surveillance applications where superior image quality and advanced features are required.

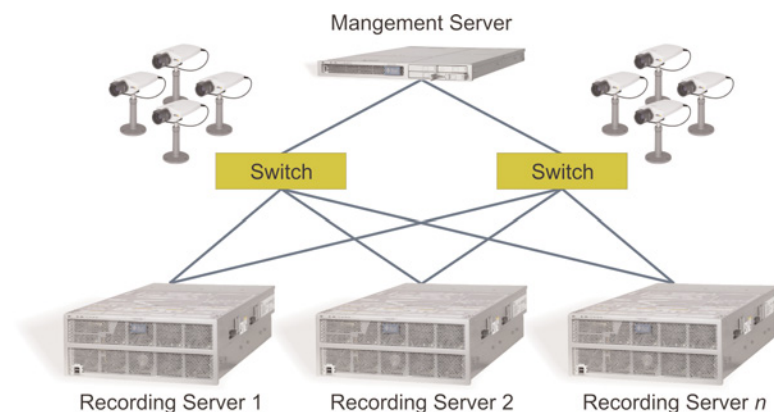


Figure 1: The Sun Reference Architecture for Video Surveillance is implemented in a distributed architecture that scales to easily support an unlimited number of cameras

Software and systems

Though comprised of multiple discrete systems, the Sun Reference Architecture for Video Surveillance operates as a unified whole. Best-in-class components are integrated to work seamlessly together.

ipConfigure's Enterprise Surveillance Manager

ipConfigure's Enterprise Surveillance Manager (ESM) represents an enterprise-class IP video surveillance application. ESM 4.0 utilizes an HTML based client interface, while running a service-based architecture at the core of the application. ESM can support an unlimited number of cameras, locations, and users across a distributed infrastructure while maintaining hardware independence and performance.

As an HTML based application, ESM 4.0 removes the need to install client software. Accessing live and archived video across the enterprise is intuitive and seamless through the advanced map navigation, archive search histograms, synchronized multi-camera playback, and alarm monitoring interfaces. Features of ESM 4.0 include:

- *Advanced mapping* — By fusing imagery, terrain, facility mapping and video, the advanced mapping feature lets users focus on their tasks at hand, no matter the size of the system.
- *Search histogram* — ipConfigure offers the only database driven search histogram that displays recorded video events by the minute, simplifying the search for motion based video recordings.
- *Multicamera playback* — Multicamera playback (Figure 2) is just one of the many rich features in ESM 4.0. With this functionality, it is now possible to observe objects moving from one location to another without losing sight of them on camera.
- *Camera push motion detection* — The addition of camera-based motion detection support increases the number of cameras a

single server can support, helping to minimize camera network traffic until motion is detected.

- *Web application with broad OS support* — The Web-based application is popular due to the ubiquity of the HTML client interface. This approach provides simple access, ease of use, and the ability to update and maintain the application without installing software on potentially thousands of computers.
- *Service-based application* — Unlike most IP video applications, ESM 4.0 runs as a background service in the operating system and does not require the application to be left open on the desktop. If the server should reboot for any reason, the ESM 4.0 application will restart without user intervention.
- *Alarm monitoring client* — The alarm monitor client is a central communications and monitoring application for system components connected to ESM 4.0. When an event occurs, the application displays the event on the user interface in real-time, while facilitating live playback and reporting functions.
- *Unlimited users* — ESM 4.0 provides a powerful Web server that offers a highly reliable, manageable, and scalable Web-based application. The application has the capability to support unlimited users simultaneously.

The Sun Fire™ X4500 server as a surveillance appliance

The Sun Fire X4500 server is key to the Sun Reference Architecture for Video Surveillance, offering compact low-cost video storage. In contrast to traditional system and storage architectures, the Sun Fire X4500 server defines an approach that consolidates the server, storage, host bus adapters, switching and multiple disk arrays into a single high-density system. In the Sun Reference Architecture for Video Surveillance, each Sun Fire X4500 server is configured for use as a surveillance appliance.

Featuring a four rack unit (4U) form factor, the server provides up to 24 terabytes of internal storage through forty eight 3.5-inch hard disk drives. The Sun Fire X4500 server provides multiple advantages, including:

- Minimal cost per gigabyte utilizing SATA II storage and software RAID 5
- High performance from an industry-standard x64 server based on two AMD Opteron processors
- Up to 16 GB of memory (8 GB per processor)
- Redundant hot-pluggable disks, power supply units, fans, and I/O

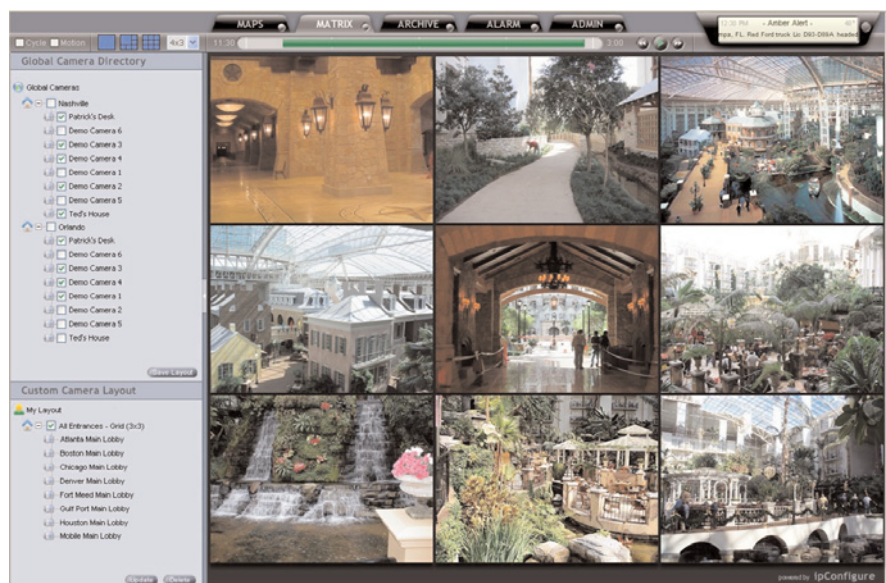


Figure 2: ipConfigure's ESM software allows simultaneous multicamera playback

Beyond its individual strengths, the innovative Sun Fire X4500 server lends considerable advantages to the Sun Reference Architecture for Video Surveillance, addressing key requirements for those deploying video monitoring infrastructure.

- **Affordable** — Sun's approach is extremely affordable, providing many times the density of traditional surveillance solutions at a fraction of their cost. Greater density helps reduce both server costs as well as operating costs. The integrated and cost-efficient design of the Sun Fire X4500 server provides a very high disk to CPU ratio.
- **Scalable** — With up to 24 TB of storage on each Sun Fire X4500 server, this Reference Architecture provides the essential storage capacity needed to help enable longer video retention. In addition, coupled with ipConfigure's software capabilities, the server removes arbitrary limitations on the number of cameras that can be deployed. Multiple Sun Fire X4500 servers can be configured or added as needed, supplying storage as well as computational performance and network-to-disk I/O.
- **Simple** — The Sun Fire X4500 server offers a single integrated system that combines server, storage, and surveillance archiving software. The system is simple to manage using Sun's Integrated Lights Out Management (ILOM) service processor. Serviceability is provided with key fault indicators as well as hot-swap disks, fans, and power supplies.
- **Open** — The Sun Reference Architecture for Video Surveillance provides an open solution, with support for open standards and IP networking. Integration of existing equip-

ment (such as existing cameras) is easily accomplished. Web-based interfaces to ipConfigure applications provide support for multiple operating systems.

Sun Fire X4100 servers

Based on powerful AMD Opteron processors, the Sun Fire X4100 server provides high performance, large memory support, and a balanced design to help ensure scalability and performance. In the Sun Reference Architecture for Video Surveillance, the Sun Fire X4100 server serves as a management server, hosting Web-server and database ipConfigure software components. Each 1U Sun Fire X4100 server provides:

- One or two AMD Opteron processors
- Up to 32 GB of memory
- Two PCI-X expansion slots

For more information on the Sun Fire X4100 and X4500 servers, please visit sun.com/x64.

Deploying the Sun Reference Architecture for Video Surveillance

Protecting people and assets with video monitoring and surveillance will continue to grow in importance. With the Sun Reference Architecture for Video Surveillance, Sun can help organizations deploy effective and scalable infrastructure more quickly and with less complexity, letting them concentrate on their core business activities. Coupled with innovative ESM software from ipConfigure and cameras from Axis Communications, this modular architecture helps provide an easy and cost-effective solution that suits a wide range of diverse monitoring and surveillance needs.

Learn More

To learn more about the Sun Video Surveillance Solution, visit sun.com/service/refarch or contact your Sun representative. For a prototype of this Reference Architecture, visit the Sun Solution Centers at sun.com/solutioncenters



Sun Microsystems, Inc. 4150 Network Circle, Santa Clara, CA 95054 USA Phone 1-650-960-1300 or 1-800-555-9SUN Web sun.com

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