

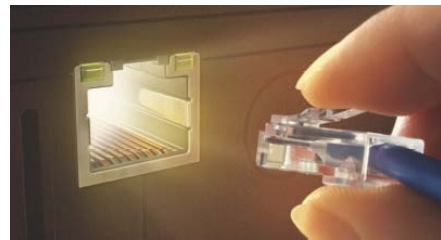
# Security and Surveillance for Gaming

## Solution Brief

### Executive Summary

Security and surveillance for Gaming are among the most demanding applications for CCTV technology. With super-fine resolutions, real-time frame rates, retention times anywhere from a week to four weeks and instant access to recorded video it challenges the technology. Combined with the strictest quality and uncompromising reliability features enforced by the various State and Federal Gaming Commissions, there is little room for error. Bosch has a long history in Gaming security and surveillance and has developed two compatible solutions.

The first involves the ever-reliable Allegiant™ matrix switcher as the heart of the system. The second, addressed in this Solution Brief, is a digital solution, which uses an IP network as the switch as well as or instead of the analog matrix switch. It is both reliable and flexible, compact yet expandable. It brings in the latest in IT technology to solve the challenges of security and surveillance, and with this change comes many options not previously available.



### Overview

An uncompromising digital video recording solution for Gaming must satisfy the reliability, performance and usability requirements below.

Feature	Description	Bosch Solution
Live Reliability	For this mission-critical application, live viewing performance must remain totally independent of the recording solution.	✓
Recording Reliability	Video must be recorded regardless of whether the network is operational or not – this is the concept of Recording at the Edge	✓
CCTV Keyboard interface	The solution must support a classic CCTV keyboard interface, which is robust, simple, back-lit and easy to learn	✓
Export Evidence	Must be able to export video for use as evidence in court, and it must have tamper-detection	✓
Video Quality	25/30 FPS at 4CIF without any drop in frame rate for any reason	✓
PC Interface	The solution must support a PC user, with a regular PC keyboard, monitor and mouse	✓
Maps	For complex security environments, the interface must be able to be driven by high resolution graphical maps	✓

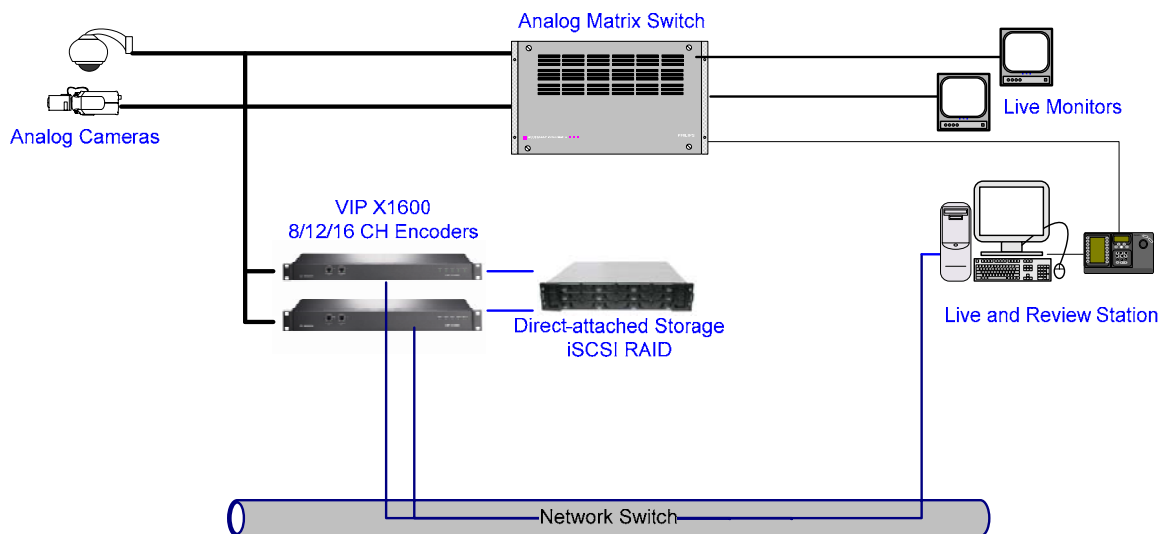
## The Solution

The solution below shows how the existing analog matrix switch is completely untouched by the addition of the Bosch CCTV for Gaming recording solution. For live video, operators use their existing matrix CCTV keyboard, switching and controlling cameras on multiple analog monitors.

The figure shows how live video from the existing analog matrix switch is looped-thru to a slim 16 channel encoder, called the VIP X1600. The analog video is encoded into MPEG-4 digital video and immediately stored on a directly attached iSCSI RAID disk array using a 'cross-over' network cable ***without any dependence*** on the network. This eliminates a common concern with classic IP video that you are at the mercy of the network.

For reviews, operators use the PC keyboard or IntuiKey keyboard to search/replay video from the appropriate iSCSI RAID unit and display it on the PC monitor.

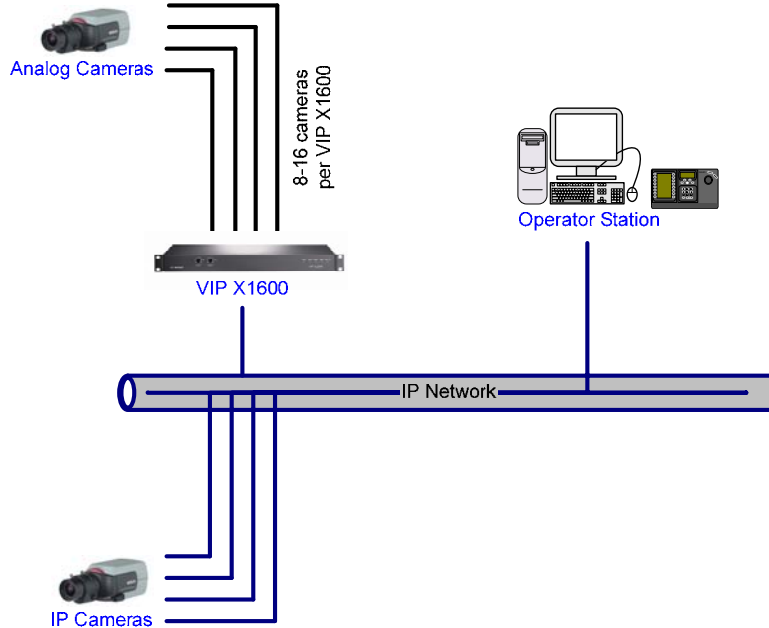
This simple architecture scales simply. For more cameras add more VIP X1600 units, for more storage add more iSCSI RAIDs and for more operators add more review stations.



*Schematic of a typical Video over IP (blue lines) solution showing options for capturing digital video (upper-left), recording it (bottom) and viewing it (right)*

## Capturing Digital Video

Digital video is needed for an IP-based solution. IP cameras such as Bosch's AutoDome Modular Cameras, Dinion and FlexiDome Cameras connect directly to the IP network, so that their digital video, which is already IP video, can be both recorded as well as viewed.



*Schematic showing how either IP cameras or analog cameras with an encoder deliver the same IP video, viewable on a workstation. The encoder reuses an existing analog infrastructure, whereas IP cameras are preferred for new systems.*

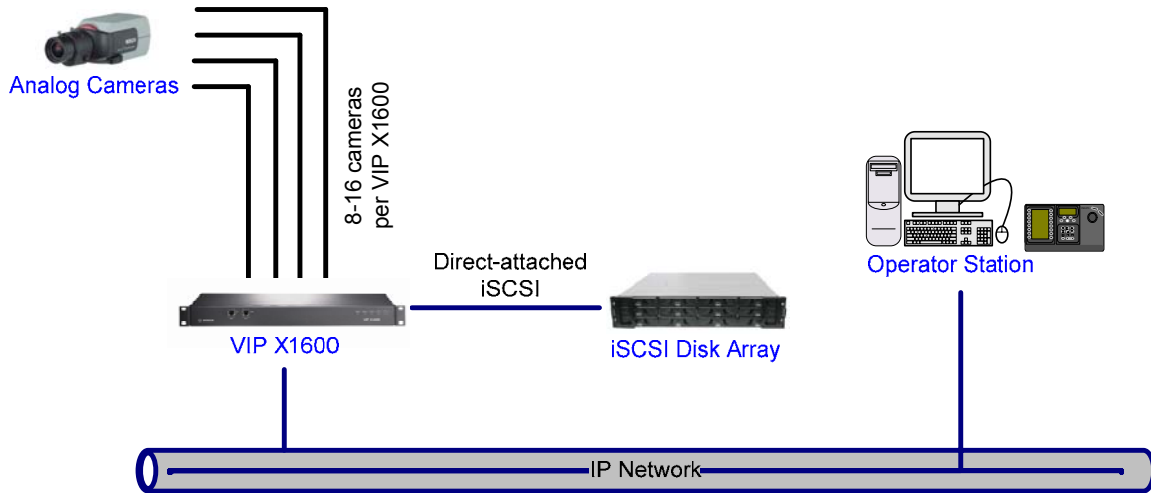


*Award-winning Bosch IP cameras – AutoDome Modular, FlexiDome and Dinion IP cameras*

An alternative to IP cameras, which is not better nor worse – just different, is the use of analog cameras and converters, called IP encoders (also known as video servers), which produce exactly the same IP video as IP cameras. They have certain advantages including the fact that they allow you to reuse your existing analog camera and cabling infrastructure investment. And because they use analog cameras, the system can run alongside an analog Allegiant matrix switcher.

## Recording Digital Video

Bosch's VIDOS-based IP video solution uses the concept of Direct-to-iSCSI to store video. This eliminates the need for NVRs, and gives the architecture all the benefits of DVRs as well as IP video. DVRs record independently of the network bandwidth and stability. IP video allows video to be shared by multiple people and recorded at extremely high quality on external IT-grade RAID disk arrays. And the VIP X1600 has no moving parts (except a fan) – there is no internal hard disk and no operating system, making it completely different from an all-in-one DVR.

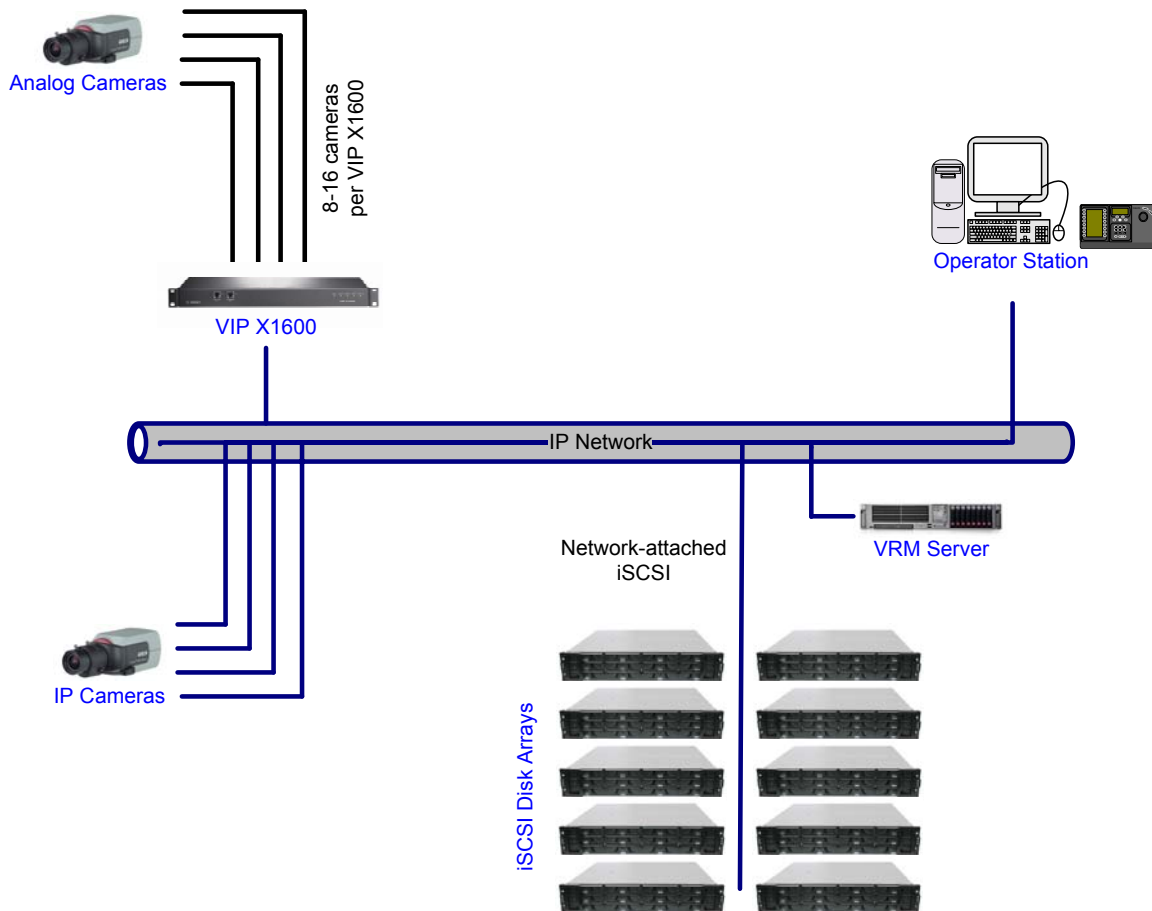


*Recording Direct-to-iSCSI and on a Direct-attached-iSCSI*

## Managing Stacks of iSCSI RAIDs

Bosch has taken the concept of direct-to-iSCSI one step further by introducing a management level to improve the utilization of all the available disk space, as well as provide automatic and instantaneous fail-over in case an iSCSI disk array fails.

This management software is called the Bosch Video Recording Manager (VRM) and is installed on one server on the network. Unlike an NVR which can typically only handle 20-30 cameras because it stands between the cameras and the storage, one VRM server can manage 2,000 cameras because it acts like a traffic cop, directing the video to the iSCSI disk arrays.



*Video Recording Manager (VRM), the ‘Traffic-Cop’ manages 2,000 camera streams per server. In this schematic the Allegiant is absent – it shows a Virtual Matrix*

In all current video recording systems they pre-allocate fixed disk space to each camera, which can only have one of three consequences. Firstly if the camera scene is unusually active or if there is a higher-than-usual degree of PTZ usage, then the disk space will be consumed too fast, which means that you will not achieve the retention time necessary to fulfill Commission requirements. Alternatively there might be less-than-usual activity in which case the camera will use less than its allocation, which means a longer retention time than necessary and wasted space. Finally, the camera can use exactly the space it was allocated, which in reality never happens.

Factors that affect disk utilization include video quality, scene activity, PTZ usage, lighting, camera vibration, carpet complexity, flashing lights, color saturation and others. It is no surprise that each camera consumes different amounts of disk space and it is impossible to predict with any degree of accuracy. Instead, the only option is to be conservative and always waste disk space because you cannot afford to get the required retention time.

VRM delivers optimized disk consumption and reliable fail-over. It does this by breaking up all the available storage into small 1 Gigabyte chunks of space, and dynamically allocates them to individual cameras as needed. By using this ‘on-demand’ approach 100% disk utilization is possible.

## Reliability

In the rare event that the VRM server fails, another can be brought online quickly and will rebuild itself. During this period all cameras continue to record without intervention for anywhere between another 64 and 128 GB depending on the configuration. In the absence of a VRM server a typical 3Mbps camera will continue to record for 1-2 days without interruption.

## Viewing Digital Video

The operator's view of an analog-based CCTV system is invariably one that includes a robust and easy-to-use CCTV keyboard with back-lighting for dark rooms, smooth PTZ joystick control and rapid camera and monitor call up controls. The video is viewed on a large wall of analog monitors, traditionally CRTs and more recently flat panels. Additionally a couple of large analog monitors are positioned immediately in front of each operator station for regular use. This analog matrix switcher-based solution is an effective and very reliable live-view solution. If the recording is still done on VCRs then VCR review stations exist for forensic analysis. If DVRs are providing digital recordings, then usually a PC is used to connect to the right DVR to engage playback.

When video is digitized it becomes data, and in the networked world it opens up possibilities previously unimaginable, including cabling simplicity, distances and redundancy. The important point to consider is that any new solution must be as usable and reliable, if not more so.

## Operator Workstation

This is the primary area of operation for most IP-based CCTV operators, and includes a PC with high-performance graphics which drives multiple PC monitors. Each monitor can be adjusted to show different views but commonly include live view, review, alarms and site maps. The PC has a Bosch Intuikey keyboard directly attached to the PC to enable camera call up and PTZ control without having to rely on the PC keyboard and mouse.



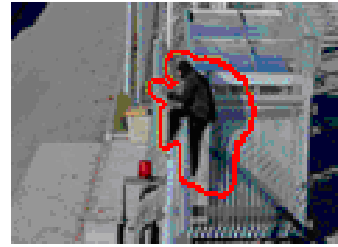
## Analog Monitors

A bank of analog monitors providing a broader view of general activity throughout the facility is still possible by using small single or rack-mounted multi-channel decoders that convert IP video back into an analog signal. These VIP-XD decoders can either generate a full-screen view or a quad-view.



## Video Content Analysis

With more cameras than is humanly possible to keep an eye on, Bosch has moved intelligence to the camera so that it can do far more than just motion detection – it now detects *behavior*. With Bosch's Intelligent Video Analysis (IVA) the camera can also detect the classic perimeter and mainly empty corridor scenarios of baggage left behind, loitering and object removed. Although never intended for use in crowded areas such embedded video content analysis technology can be used to economically keep an eye on the hundreds of general security cameras including corridors, parking areas and loading docks.



## Scalability

This architecture scales simply. For more cameras add more VIP X1600 units or IP cameras. For more storage add more iSCSI RAIDs. For more operators add more review stations, and optionally more analog monitors for the analog wall of monitors.

## Surveillance and Security

**Surveillance.** In the *surveillance* configuration you need 30 FPS at 4CIF for every camera. All Bosch IP cameras are ready for this level of performance. To use the VIP X1600 in surveillance mode use every other input on a 16CH VIP X1600, which means you get 8 cameras at 30 FPS at full 4CIF.

**Security.** In the *security* configuration you typically have the flexibility to drop the frame rate a little, typically 10FPS. You might retain the 4CIF resolution or you may find 2CIF acceptable. Alternatively you can choose Bosch's  $\frac{2}{3}$ D1 as a perfect compromise. To be clear,  $\frac{2}{3}$ D1 means 30-40% less storage than 4CIF. To use the VIP X1600 in security mode use every input on a 16CH VIP X1600, which means you get 16 cameras at 10 FPS at you selected resolution. Since this mode is less demanding than the Surveillance mode, all Bosch's IP cameras are ready for this level of performance.



*VIP X1600 multi-channel encoder*

## Summary

The solution is elegant because it has the option to start with a pure IP system or reuse the existing analog infrastructure, is resilient against network outages or fluctuations, offers multiple interfaces including PCs, CCTV keyboards, analog and PC monitors. The Bosch CCTV solution for Gaming is the perfect blend of cutting edge digital and IP-based technology, and old-world familiarity and reliability.

For more information on the Bosch Video over IP CCTV portfolio, visit [www.boschsecurity.us/ip](http://www.boschsecurity.us/ip) or contact Bosch at (800) 289-0096.

## Ordering Information

### Image Capture

VG4-1xx	Analog/IP AutoDome Modular Camera: 100 Series. Fixed Dome
VG4-2xx	Analog/IP AutoDome Modular Camera: 200 Series. General Purpose PTZ
VG4-3xx	Analog/IP AutoDome Modular Camera: 300 Series. Day/Night PTZ
VG4-5xx	Analog/IP AutoDome Modular Camera: 500i Series. Intelligent PTZ
NWD-495	Analog/IP FlexiDome Day/Night
NWC-495	Analog/IP Dinion Day/Night
VIP-X1600-B	Base system with four module slots, Gigabit Ethernet backplane, dual redundant power inputs (power supply <b>not</b> included)
VIPX1600M4S	4-channel, hot-swappable video module, serial port, 4 alarm in, relay
VIPX1600M4SA	4-channel hot-swappable video module, serial port, 4 alarm in, relay, audio
VIPX1600PS	Stand-alone power supply for VIP X1600
xxx-xxx-FS3	Intelligent Video Analysis, Video Content Analysis. Actual license part number varies by the exact IP camera or encoder it is to be installed on

### Recording

iSCSI-RAID	iSCSI storage that directly attaches to the network (9TB)
VRM	Video Recording Manager software
MHW-SM4M1-US	VRM Server

### Viewing

VIDOS	VIDOS Video Management System software
VIDOSAPEXPT	Archive Player and Exporter
MVC-FAPFS	Forensic Search
VIDOSKBD	Intuikey interface license for VIDOS
MHW-WQ67M4-EE	Operator workstation PC
VIP-XD	Single-channel, quad-view decoder