

Combining KVM Switching & Video Wall Management

Seamless Visualization Experience Between KVM Operators and the Video Wall



This white paper is written for both integrators and end users that design, configure, install, manage, or use video wall solutions in operations control center in the government, defense, public safety, transportation, or security industry. It will help readers understand the value in combining the use of KVM systems with display walls easily and confidently through a single integrated control interface, giving operators easy control at their fingertips.

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Introduction

Typically, in a control room, the video wall has been more of an AV implementation while KVM has traditionally been an IT implementation. But as these two worlds converge, interoperability between KVM systems and video wall control systems is becoming more frequently required. Today, many operators expect to have more control of the video wall rather than just using the video wall as a passive visualization tool. The convergence of AV and IT has resulted in video walls becoming a more dynamic tool for the operators in control rooms, making video walls an extension of their desks. In some cases, operators work directly on the video wall, turning it into a large collaboration surface between the operators. This tendency, the merge of the control room and the collaboration room, has instigated more designs of smaller, more dedicated and focused control rooms.

In tandem with the convergence of AV and IT, the availability and efficiency of AV over IP distribution is also contributing to the evolution of the control room ecosystem with more, smaller, focused video walls rather than one single large wall. And, with the ubiquity of sources, it's easier to create smaller, more specialized control rooms.

To do so effectively, it is important to:

1. Understand all the components involved, and more importantly
2. Understand how to ensure a smooth interoperability between those components

Challenges

In summary, here are the main challenges addressed in this white paper:

- Deploying a single unified video wall control system for two subsystems (KVM switches & video wall control systems) that are typically on air-gapped networks.
- Increasing efficiency for operators by simplifying the control of their visualization experience ad-hoc, from a single easy-to-use interface, so they can focus on their job.

Understanding the Components

This section explores 3 important components:

1. KVM Matrix Switches

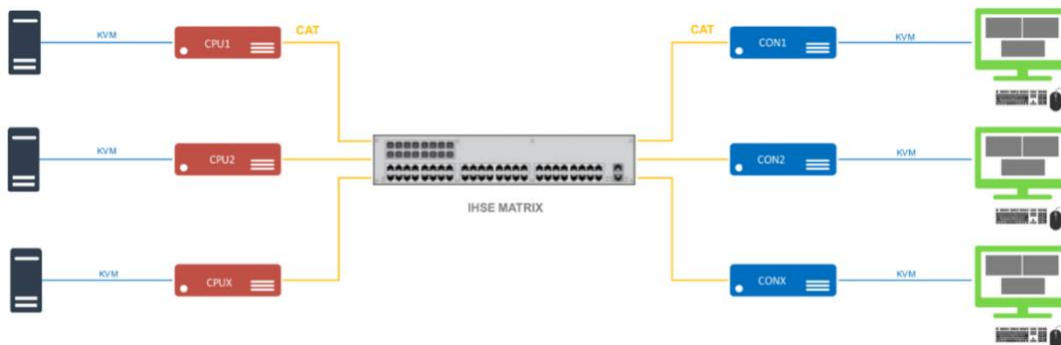
2. Video Wall Control Systems

3. The Ecosystem

KVM Matrix Switches

KVM matrix switches allow operators to access multiple computers and extend the distance between computers and peripherals (keyboard, video, mouse) for more convenient and efficient workflows. They make it possible to protect critical CPUs and servers from dirt, moisture and unauthorized access, while improving the operators' work conditions as they are free from heat and noise. The operators' desks simply require peripherals and pointing devices.

Below is an IHSE Matrix Switch example. The setup consists of IHSE CPU devices which are placed at the sources. Via an IHSE Matrix Switch they are connected to the IHSE CON devices (the receivers) which in turn are connected to the displays and keyboard/mouse devices.



Example: IHSE Setup with CPU and CON Devices

Components of a typical KVM Matrix System:

1. **Transmitter KVM extender: (CPU or TX unit)** allows connection of a single computer video graphics card and USB ports to the device and provides long distance extension of these signals over a single fiber or copper cable to a receiver unit or KVM matrix switch
2. **Receiver KVM extender: (CON or RX unit)** allows connection of a keyboard, mouse and display at the operators desktop to provide long distance reach to a transmitter unit or KVM matrix switch over a single fiber or copper cable.
3. **KVM Matrix Switch: (also called a crosspoint switch)** A hardware device that controls multiple user access to multiple computers in a non-blocking environment. Connectivity is accomplished via fiber optic cable or CATx copper connections to distribute signals from any computer source to any operator's console.

Video Wall Control & Management

Video wall control systems typically have 2 main components:

1. A video wall controller, often described as a “video wall processor” or a video wall node
2. A centralized video wall management platform

A video wall controller or node processes data from various sources to be displayed on a large surface composed of one or multiple monitors. Its software facilitates the arrangement of the content on the video wall.

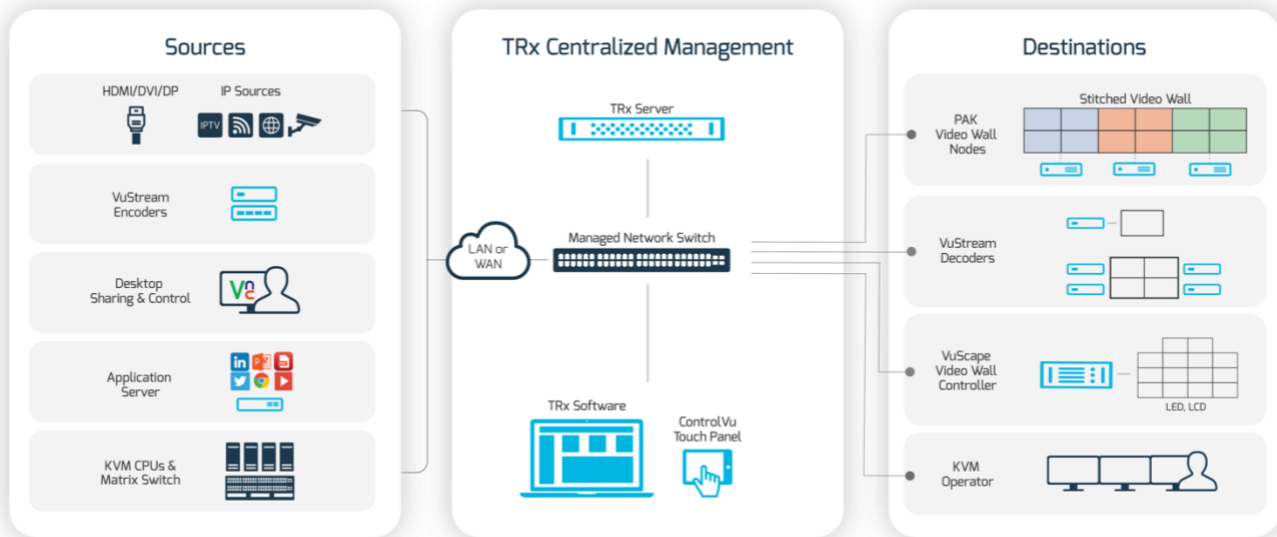
A centralized video wall management platform facilitates the configuration and management of all the devices in the video wall ecosystem and allows the control of multiple video walls throughout an organization from a single platform.

Until recent years, the concept of “source” to be displayed on a video wall was limited to a device (computer, tv tuner, media player, camera) that was directly connected to a video wall processor as a physical input. Managing those sources simply meant having the ability to display them on a video wall in a structured way. Today, with the increased number of source formats that need to be displayed, managing a video wall has become a lot more complex.

A centralized video wall management platform can access all those sources and control how they are distributed throughout the network with dynamic communications between matrix switches, IP devices (encoders and decoders) and even video management systems, while still being able to handle the traditional sources connected directly to the video wall processor. This is known as “hybrid” video wall control systems. With control rooms being more distributed and interconnected, there is an increasing need for a centralized management system that can control multiple video walls throughout organizations.

Example: VuWall Video Wall Ecosystem Workflow

The Ecosystem



In this paper, an ecosystem refers to a series of interconnected and interoperable devices, such as encoders, decoders, video wall controllers, displays, switches, etc. The interoperability between all the devices is key to a successful deployment and occurs at two levels:

- the signal itself
- the control of the signal

Signal Interoperability: This is ensured through industry standards (DVI, HDMI, H.264, MPEG4, SDVoE, NDI, etc.) and a series of conversion devices (video capture cards, converters, encoders, decoders, etc.). It ensures the integrity of the signal from the source to the destination.

Unlike most devices which are characterized by a single format, video walls need to display content from a multitude of formats simultaneously. Therefore, to avoid converters to bring all source signals into the same format, the best practice would be to use a hybrid video wall controller.

Control Interoperability: Signal control is the series of commands that will determine which signal should be sent where. In an AV deployment, there is typically a central control system that converts every action into a series of commands sent to different devices, respecting the API syntax of each of these devices. The implementation of the "control" interoperability is generally what takes the most programming effort in an AV deployment.

*Selecting components that are **interoperable** on both the signal and control level will facilitate the deployments of a control room, reducing both risk, cost, and on-site configuration time.*

Integrated KVM & Video Wall Management Systems

Examining the KVM and the video wall work environment in a control room

The KVM matrix switch is a perfect ecosystem of its own. It has sender modules connected to the PCs in the equipment room, the receiver modules located on the operators' desks, and the matrix switch in the middle with the control software. The format interoperability is ensured because only one format is involved (PC signal) from the source to the destination. The control interoperability is ensured as there is only one matrix switch with one control platform and one API.

The video wall is different since it must process multiple source formats simultaneously, including some of the PCs from the KVM switch. The format interoperability is managed through the capture cards embedded in the video wall controller. As for signal control, since all signals pass through the video wall controller, the video wall control software and API ensure that any source can be displayed anywhere on the video wall.

How would an operator control both the KVM switch and the video wall controller?

An intermediate control system is required. It would include control panels to send commands to the video wall and to the matrix switch. The integrator would need to build the commands for every deployment integrating API calls for both the KVM switch and the video wall controller, as well as for other components like audio and lighting controls. As equipment gets added to the control room, the number of combined commands dramatically increases the programming work required to ensure the interoperability of the ecosystem.

Any Implementation that can reduce the number of APIs to combine will have a significant impact on deployment costs. This was the objective behind the integration of the IHSE KVM switches and the VuWall TRx central management platform.

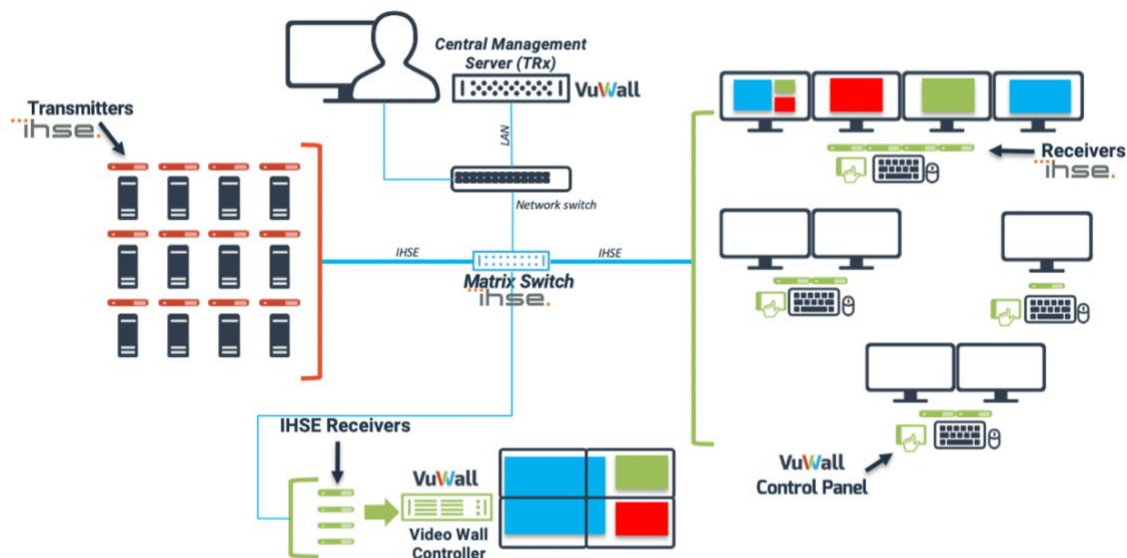
Use Case: Control Center with Video Wall & KVM Requirements

There are several operators in a control room that need to visualize data that is being gathered on multiple computers located in a nearby server room by easily switching from one computer to another. These operators also need to be able to share their visual experience on the main video wall with other operators.

Customer Requirements

- Operators have multi-screen personal video walls
- Operators require easy KVM control
- Operators need to easily launch pre-sets ad-hoc
- Operators and supervisors need a single unified management platform

Solution



Workflow Diagram

On the left: 12 computers that are outputting data.

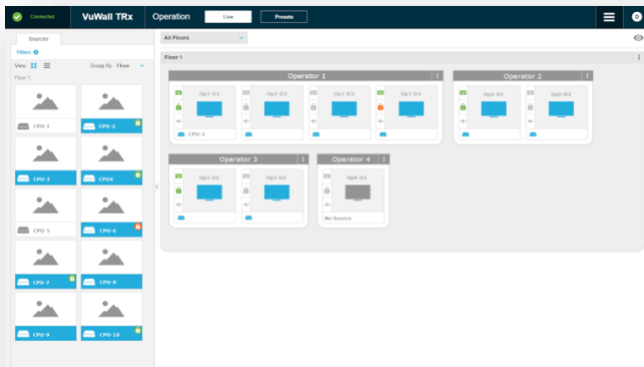
On the right: are 4 operator workstations:

- 1 x quad-screen
- 2 x dual-screens
- 1 x single screen

On the bottom: a 2x2 video wall + 4 receivers as inputs to the video wall processor. It is possible to show any of the 12 computers on the video wall, but up to 4 computers simultaneously because there are 4 receivers.

The connectivity of this setup is simple. The complexity lies in the management of the different sources and the usage priority on each source.

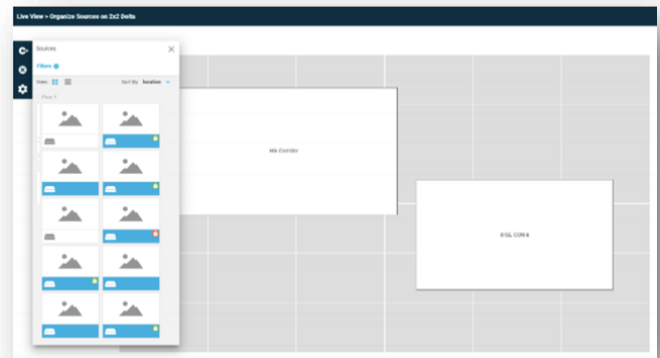
Source Management Features



- On the left, are the sources and on the right are the different operators' desks.
 - **Ease of use.** If an operator wants to see one of the sources on his desk, he simply has to drag-and-drop the source to the required surface.
 - **Private Mode.** He can then decide to take control of the keyboard and mouse of that source and if he will be doing sensitive operations, he can make the source private to prevent anyone else from seeing this source or accidentally taking over the control.
- **User Profile Management.** Operators should also be able to bring any source to any display and determine who would be allowed to manipulate the content based on a granular user profile management, giving operators more flexibility in the configuration of their emergency protocols.

Video Wall Management with Multi-View Interface

With drag-and-drop, the sources on the left can be displayed on the video wall surface to arrange them into an endless combination of layouts.



Benefits

This typical use case brings many valuable benefits to customers, both integrators and end users.

Ease of Use	Easy drag-and-drop operations used for allocating sources to displays.
Fully Integrated	Matrix Switch KVM solution with Video Wall Control System (video wall controllers, centralized management platform and control touch panels)
Single Platform	Single platform for KVM and video wall control
Custom Control	Dedicated control panel per user
Security	TLS secured communication
End User Autonomy	Without any programming required, end user have complete autonomy to configure control panels and IP devices

The Interoperable Combined Solution

VuWall TRx Centralized Management Platform

[TRx](#) is a unique centralized management platform, ideal for managing and distributing visual content between sources and display surfaces such as video walls, projection screens or single monitors. A central TRx server can manage the entire ecosystem, facilitating deployments with a large number of devices. Via its intuitive web interface, users can maintain and control the system from anywhere on the network.



In a control room with one or multiple video walls and KVM operator desks, TRx handles the following with simple drag-and-drop operations:

- Management of the content on each video wall
- Switching of the KVM system for each operator station
- Processing content from the KVM operators' desks to the video walls as needed

TRx simplifies the configuration of different layouts and pre-sets and simplifies the operation through its control panel designer, allowing the design of as many custom control panels as needed without any programming. TRx provides operators with all the critical information they need right at their fingertips from a single user interface. TRx also allows the control of many other third-party devices thanks to its scripting tool, making it easy to implement room controls such as switching displays on and off and also offers an extensive API for 3rd party control systems.

VuWall VuScope Video Wall Controller

[VuScope](#) is VuWall's high-performance video wall controller is designed for video wall deployments of all sizes. It is used to easily control and distribute all types of content sources to any display with the utmost flexibility and full-featured management software. A single VuScope can power up to 96 displays, distribute up to 40x 4k sources, mix baseband & IP sources, and stream up to 160 HD IP streams simultaneously.



VuScope can also be used as a TRx endpoint, playing the role of a multi-video wall processor in order to display all sources connected to IHSE endpoints live on a video wall. In addition, other sources from other systems like IP streams, applications, RSS feeds and websites can also be easily displayed on the video wall. Multiple sources can be switched and displayed simultaneously. To operate with IHSE's Draco console modules, the IHSE Matrix is connected to the VuScope system and its outputs feed the inputs of the VuScope video wall controller. The number of sources we want to display simultaneously on the wall determine how many IHSE Draco CON devices and inputs are required.

VuWall Control Touch Panels

VuScope and TRx include a control panel designer, where users can build their own personalized interfaces in just a few minutes, without any programming. It's fast and easy.

Users can select various functions from the simple switching of a local console to the full control of the video wall. All TRx functions can be mapped into an easy-to-use button structure. Logos and images can be inserted, various colors, layouts and designs can be selected, to give every operator a customized user experience.



The VuWall [ControlVu](#) PoE touch panel can be used as an extension of the operator's keyboards. Each user can easily interact with the matrix to switch their consoles or to control the video wall from a single interface with all matrix sources.

IHSE KVM Matrix Switch

[Draco tera compact KVM Matrix – fixed port systems](#)

Designed for smaller and mid-sized KVM requirements using the same technology as the larger Draco tera enterprise matrix systems, the Draco tera compact is based on a small footprint package with a cost-effective frame and can be used with all of the Draco extender modules creating the world's widest selection of KVM solutions. It is a simple operation to set up and configure the matrix with the On-Screen Display (OSD) or through the feature enhanced Draco tera Tool. Port sizes range from 8 ports to 80 ports.



[Draco tera enterprise secure – modular systems](#) The perfect high performance, modular routing system for complete in-band signal distribution of HD video, audio, and data over Cat X, multi-mode or single-mode fiber optic cable supporting up to 576 I/O ports in a single frame. Designed with performance and flexibility in mind, the Draco tera enterprise offers tremendous scalability with cost-effective features. Each port can be configured as an input or an output scalable from one CPU to multiple workstations or with multiple CPUs managed by a single workstation console. Ideal for mission-critical

installations, its multi-level redundancy concept offers the highest level of reliability for 24/7 operation. Each chassis supports fully redundant power and hot swappable modules for full service and field upgrades without interrupting signal flow. The Draco tera enterprise is compatible with all IHSE extenders.

IHSE and VuWall

IHSE and VuWall bring system integrators and video wall operators the perfect complementary technology with **seamless integration** between IHSE's Draco tera KVM matrix and VuWall's VuScape video wall processor, TRX management system and the ControlVu PoE touch panel.

The IHSE/VuWall combination provides **pristine picture quality** for immediate access to all analytical data and visual communications. Operators can scale their KVM outputs to display walls easily and confidently through a single integrated control interface.



The integrated solution is already deployed within multiple mission-critical and demanding environments globally. IHSE and VuWall **simplify complex video deployments** that require a large number of devices, while maintaining and controlling systems from anywhere on the network. Users get latency-free extension and switching of keyboard and mouse along with video signals at the highest levels of image quality.

IHSE and VuWall Features & Benefits

Features	Benefits
Visualization	Control and visualization of all sources from the IHSE matrix switch, along with other source types, on the video wall. Switch and display multiple sources simultaneously.
Unified Platform	Operators can quickly and easily manage and share all critical information from a single user interface.
Interoperability	Manage content from other systems like IP streams, third party applications and websites.
User Friendly	Intuitive, easy-to-use interface for: resizing and making layouts and pre-sets of all windows across the complete input range of the matrix, accessing multiple sources from the matrix and other devices or apps.
Touch Panel Control	Extend local operator keyboards, where each user can easily interact with the matrix to switch sources directly on their consoles and control the video wall from a single interface.
Non-blocking accessibility	Command and control operations demand 100% guaranteed non-blocking connectivity during situational awareness actions and the KVM matrix technology allows full cross point switching for seamless and instantaneously access to all sources.
Expandability	Add connections and change inputs/outputs as your enterprise needs evolve. Systems can be cascaded with multiple switch systems as the number of ports expand.

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