



Seamless Switch™ Technology: Delivering the Fastest Professional AV Content Experience

*How ATEN's Seamless Switch™ Allows for Near-zero Latency While Always
Transmitting Signals at the Correct Resolution and Aspect Ratio*



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1. Introduction

An array of screens is before you, or perhaps there's just two, but in either case you expect to be able to switch between them without delay. Or perhaps you're installing digital signage in an airport, shopping center, or a sports arena. The signs you set up need to change video feeds constantly to transmit the right message, and any errors could leave you with egg on your face.

What's more, the video images being projected need to be high quality, in many cases now up to 4K, and displayed across a variety of screen sizes, distances, and resolutions in a zero-latency environment. Doing so can lead to an increase in sales and engagement across the board. More than [40% of shoppers](#) surveyed, for example, say digital signage presenting relevant information close to the point of purchase can affect what they buy. In fact, [80% of customers](#) surveyed have entered a store simply because they saw digital signage that caught their eye. To top it all off, the digital signage industry is set to grow rapidly from now until The bar has clearly been set high, and delivering will be a challenge, but not one that you can't meet head on.



VM5808H HDMI Matrix with Scaler



2. What is Seamless Switch™ Technology?

ATEN's Seamless Switch™ technology is an engine that enables, quite literally, seamless switching between video sources by utilizing ATEN's FPGA-based scaler technology to unify video formats and thus provide a continuous signal. This stable signal allows for instantaneous video switching up to 4K video by scaling inputs and outputs for the best possible resolution through EDID and HDCP handshakes simultaneously at both source and output ends. Seamless Switch™ guarantees the fastest possible output thanks to output clock timing and frame buffering.

In order for displays to always display correctly, and at the highest resolution, Seamless Switch makes use of EDID and HDCP handshakes simultaneously for both the source and monitor in order to display the proper resolution each and every time. Without the scaler technology with FPGA used in Seamless Switch, switching a video can cause the monitor that the source is sending to possibly not properly lock the signal and cause the signal to become broken. This results in delays in displaying the image, which can manifest as a blank screen instead of the content viewers were expecting to see. Using the ATEN Modular Matrix Switch series, VM1600A/VM3200, which features Seamless Switch, allows for routing of multiple video sources to multiple monitors or displays, at different resolutions, and for the video transmitted to be switched and displayed properly and continuously in real time. Even if the aspect ratio of the monitor is different from the source's, Seamless Switch can pick up on this and adjust to the proper aspect ratio on the fly, leaving you with one less thing to worry about.

ATEN's Seamless Engine processes and transmits audio and video signals by executing HDCP handshakes at the source and display ports to support HDCP-encrypted content. Meanwhile, the scaler is responsible for scaling up or down video content to ensure they're compatible with commonly used output formats. The internal clock generator ensures continuous pixel clocking. Lastly, garbage data is filtered out during port switching by only using content stored in frame buffers.

Seamless Engine

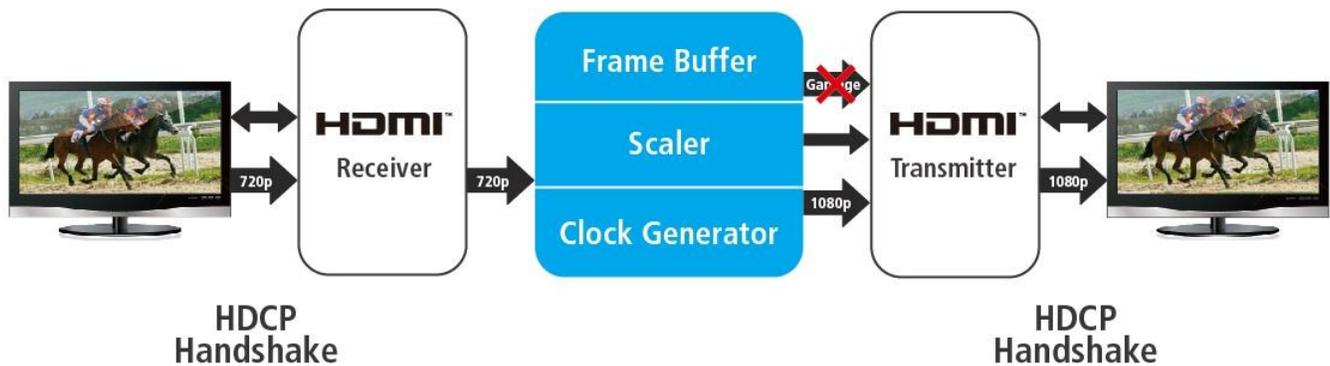


Fig.1: The above diagram shows how the Seamless Engine works.

Features include:

- Independent EDID handshake: the system provides a default / customized EDID to the source and reads real display EDID for scaler processing.
- Independent HDCP handshaking: Instead of HDCP handshaking between source and display, the system will execute HDCP handshaking between source and receiver, and display and transmitter.
- Scaling up or down video content from the source to fit the video format of the display.
- Providing continuous pixel clock from the internal clock generator for display.
- Preventing garbage content during port switching by using stored content in frame buffer.
- Seamless Switch™ is integrated into ATEN's HDMI Matrix Switches to provide the best possible video and audio switching, regardless of the industry use or application.



3. What Problems does Seamless Switch™ Solve?

Imagine you've won the contract to set up a video wall at a luxury car dealership to play videos for prospective customers. The client wants a large wall consisting of 8 x 8 video screens that will switch between several different 4K videos to showcase their latest car models.

The day arrives for you to install the video wall and begin playing it for the dealership manager, employees, and even customers on hand. Everything fire's up well, but when the videos are meant to switch there's a problem: some of the monitors didn't switch in time and lagged severely. Worse yet, other screens remained pitch black. What was meant to be an impressive video display is now botched, and it all could have been avoided by using ATEN's Seamless Switch™ technology. What the manager would have seen, had Seamless Switch™ been used, would be a smooth, close-to-zero second switching on every screen from video to video in real time, a feature that would no doubt help win over more car customers.

In addition to needing near-flawless switching between pre-programmed content, systems integrators are quickly finding that their digital signage might incorporate more [responsive content](#). That is, digital signage is now showing more content based on external triggers; for example, if the weather outside is hotter and sunnier today, signs might switch and prioritize advertisements for ice cream or sun block. Not to mention the constant updates needed for traffic conditions or to display flight information in an airport. Rapidly changing information flows require quick, no-latency digital signage switching. In fact, as display quality is reaching levels of 4K across the board, and with 8K adoption likely to be slow, [the real development](#) in digital signage for the foreseeable future will be in responsiveness, personalization, and interactivity, all of which require the least latency possible, at the highest Full HD resolutions possible.

In the above case, the hypothetical systems integrator would have found the ATEN VM6809H to be supremely useful. With its ability to handle 4K video sources, VM6809H is capable of delivering 4x more clarity on a Full HD video wall as each display shares 4x the amount of pixels compared to displaying a FHD video source. Thus, even if your video wall is built with FHD displays, the wall can provide sharper images.

4. Scenarios in Which Seamless Switch™ is Useful

4.1 Surveillance

Much like in broadcasting situations, surveillance room staff also need a large video wall to keep an eye on the safety of customers, building employees, merchandise and the population at large. Being able to quickly switch between cameras, or see images in the highest clarity possible in real time, isn't just a nice-to-have: it's a necessity that, in some cases, can mean the difference between helping to solve a crime, or even life and death. Footage picked up by surveillance cameras can be invaluable to investigators, or to help surveillance staff quickly alert paramedics and other authorities in case of an emergency situation. Losing a video feed during switching could severely compromise their ability to help relevant agencies act in time. In addition, surveillance rooms monitor store merchandise and help to mitigate theft at brick-and-mortar stores.



4.2 Broadcasting

Commercial broadcasters need to monitor an array of screens as they switch between video feeds. Displaying video on large video walls in sports arenas and stadiums, for example, requires fast, flawless switching between the right cameras to deliver the right signal in real-time to fans. Cameras are connected to a control room where operators make quick decisions about showing replays, or the action as it happens. Fans in the venue might often rely on the large screens inside to get a better view of the action, and expect the video feed to work perfectly every time so that they get their money's worth.

For television broadcasts, control rooms require similar functions, with large video walls to display different camera feeds. In addition, the video wall's configuration might need to occasionally be changed, and to do so with full functionality as soon as possible. Once again, Seamless Switch™ would ensure that the proper video feed, at the desired resolutions and aspect ratios, would be rendered right away.





5. ATEN Seamless Switch™ Case Studies

ATEN's Seamless Switch™ technology doesn't just work on paper: it works in real life too. That's what a wide spectrum of adopters have discovered after implementing ATEN solutions that feature Seamless Switch™. The following are a few examples of cases in which Seamless Switch™ was used. (Links to the full, detailed case studies, where available, can be found under Further Resources below).

5.1 Broadcasting: Artear

The first example is at a broadcasting company in Argentina. As country's leading broadcaster, Artear was looking to create a new video wall for its new state-of-the-art newsroom. ATEN cooperated with our trusted partner in Argentina, ProShow, to successfully complete the project, which included the ATEN VM1600, featuring Seamless Switch™, paired with the ATEN VK2100 Control System. Artear was extremely satisfied with the both the results and service as it now has the ideal solution for quick, easy switching and transmissions over long distance.

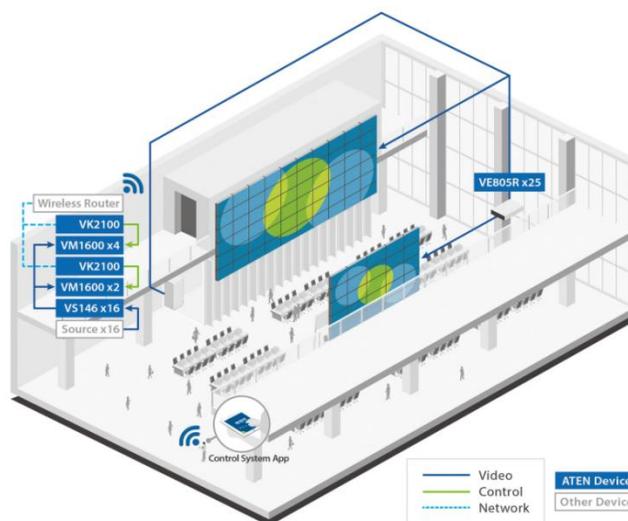


Fig. 2: Seamless Switch™ was the obvious choice for Artear's new state-of-the-art newsroom.



5.2 Corporate: Medytox

Founded in 2000, Medytox is fully integrated biopharmaceutical company and is the largest maker of botulinum toxin (botox) in South Korea. It also markets its products to more than 60 countries worldwide, including Japan, Thailand, Brazil, and Iran. As it faces fierce competition at home and abroad, Medytox wanted to strengthen its internal infrastructure, including its meeting spaces, demo rooms, and training facilities. It recently bought a new office building that needed to be outfitted for AV management and IT control. The ATEN solution included setting up a Modular Matrix Switch paired with sixteen HDMI HDBaseT-Lite Extenders and twelve HDMI Repeaters. Featuring Seamless Switch™, this setup allowed for effortless switching in Medytox's new lecture hall, presidential office, and meeting rooms.

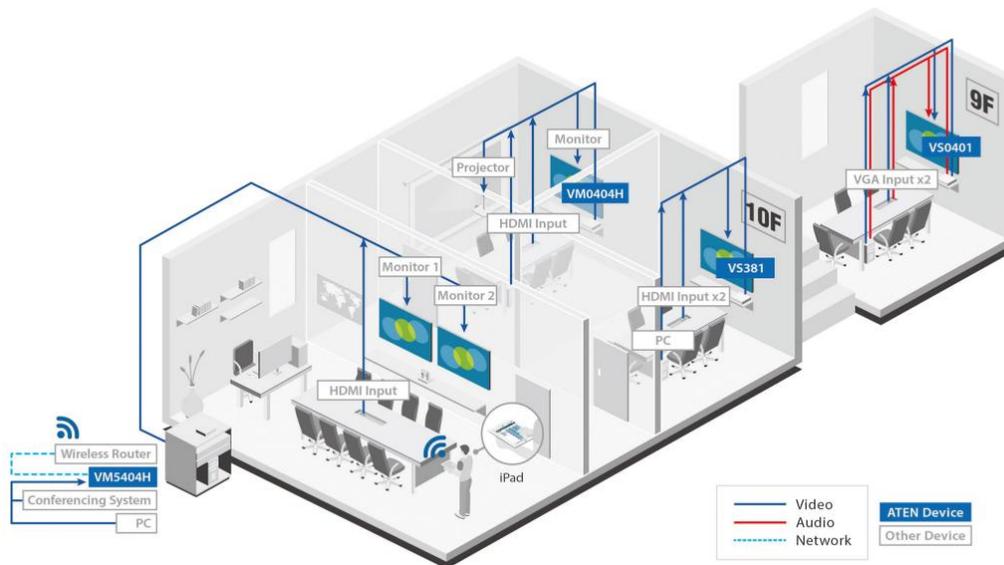


Fig. 3: Seamless Switch™ provided needed latency-free switching for Medytox's new office building.



5.3 Hospitality: Elevens Bar & Grill

A sports bar partnership between Wales and Real Madrid footballer Gareth Bale, Elevens Bar & Grill was looking for a 4K control/distribution system for 20 screens on two floors. In order to meet the challenge, the ATEN solution included the VM3200 32x32 Modular Matrix Switch, VK2100 Control Box, and our HDBaseT products. The solution allowed for staff to select sources to each screen via a set of iPads, which meant screen switching had to be easy and just work, which it did thanks to Seamless Switch™.

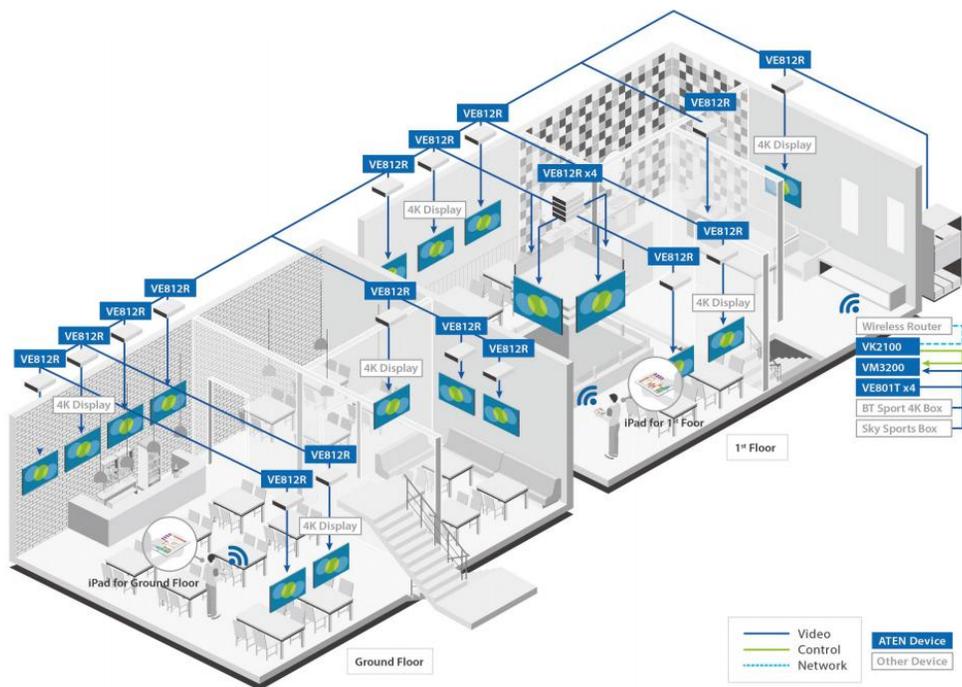


Fig. 4: ATEN's Seamless Switch™ allows for flawless video switching in Elevens Bar & Grill.

5.4 Government: State Police, Turin, Italy

The State Police in Turin, Italy, required a new public surveillance control room to monitor crowd behavior and detect incidents during large public events. With the help of ErreElle Net, an industry specialist, several video walls and flexible workstations were set up using ATEN's KVM and AV signal distribution hardware. The ability to change video wall configuration, and switch feeds, with near-zero latency was accomplished with the help of Seamless Switch™ technology.

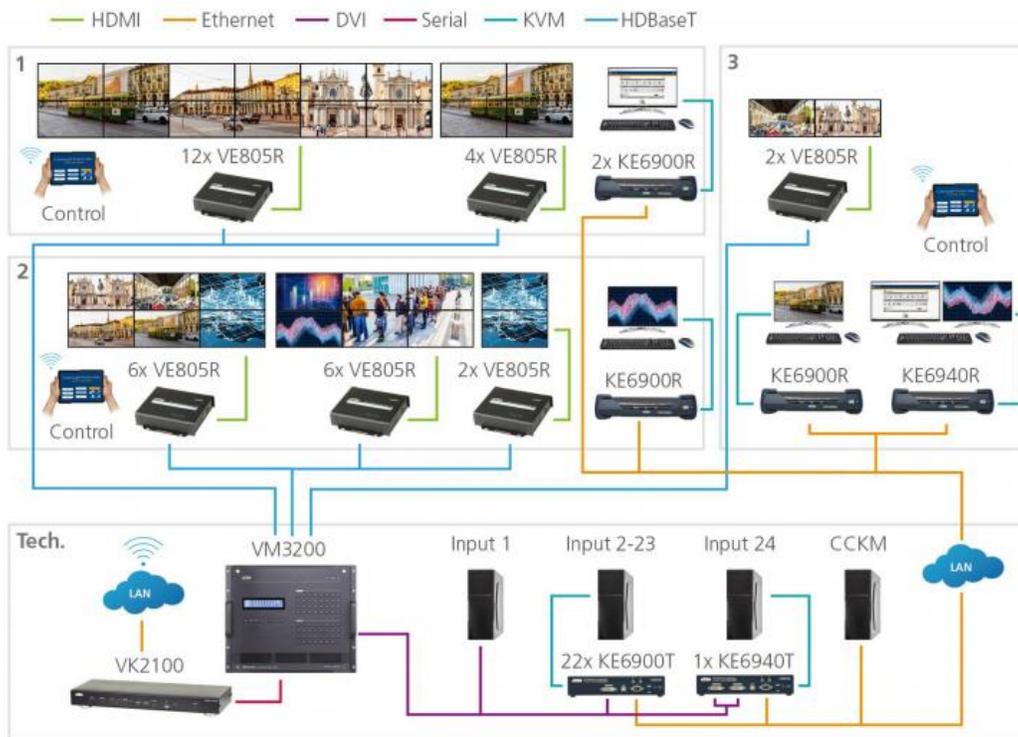


Fig. 5: State Police in Turin, Italy make use of Seamless Switch™ in their control room.



6. ATEN Products that feature Seamless Switch™

ATEN Video Matrix and Modular Matrix solutions both feature the innovative Seamless Switch™ technology.

The ATEN Modular Matrix Solution Series comprises the VM1600A/VM3200 Modular Matrix Switch in tandem with a range of hot-swappable I/O boards. The solution offers real-time control and advanced access to manage 16/32 video sources and 16/32 displays simultaneously, through modular I/O boards in a single chassis. Empowered by ATEN Seamless Switch™ technology, the VM1600A/VM3200 video matrix switches incorporate a speed-progressive video switching function and a unique scaler that integrates seamlessly with video wall systems.

7. Conclusion

Pro AV continues to grow in application and scope, from sports bars to stadiums, train stations, and surveillance systems. More screens with high resolution transmissions, now many in 4K, that need to be switched means processing power and technology must keep up. Switching between diverse video feeds at near-zero-second speeds at optimal resolution and proper aspect ratio is no small task.

ATEN's Seamless Switch™ technology, however, is up to the task and can support a broad range of applications, from entertainment to the truly critical and life-saving, with no compromise in performance or reliability.

Employing ATEN's Video Matrix and Modular Matrix solutions with Seamless Switch™ guarantees a flexible, easy-to-use yet powerful solution to support business-critical operations for a fast, smooth, scalable solution.

8. Further Resources

- ATEN Video Matrix Solutions:
<https://www.aten.com/global/en/products/professional-audiovideo/video-matrix-switches/>
- ATEN Modular Matrix Solutions:
<https://www.aten.com/us/en/products/professional-audiovideo/modular-matrix-switches/>
- ATEN Success Stories
<https://www.aten.com/global/en/market-and-solutions/success-stories/>