

PANASONIC CONNECT EUROPE WHITEPAPER

MAKING AVOIP A REALITY

SDM the gateway to AVoIP



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Foreword

In today's rapidly evolving digital landscape, organizations are seeking new and innovative ways to enhance their communication and collaboration capabilities.



AVOIP OPENS UP A WORLD OF OPPORTUNITIES BY INTEGRATING AV TECHNOLOGY WITH IP NETWORKS, ALLOWING SEAMLESS TRANSMISSION AND MANAGEMENT OF AUDIO-VISUAL CONTENT.

While the benefits of AVoIP are tantalising, it is not without its challenges. The lack of universal standards and the multitude of protocols available can make the transition to AVoIP a daunting prospect.

This whitepaper sheds light on the potential and advantages of AVoIP, while also addressing the most straightforward route to its adoption. We hope you will gain a comprehensive understanding of the challenges and opportunities presented by AVoIP. Whether you are an IT professional, AV specialist, or an organisational leader, this information will equip you with the knowledge and insights needed to make informed decisions about implementing AVoIP in your organisation.

By embracing this innovative technology, you can unleash the full potential of your communication infrastructure, improve collaboration, and embrace the exciting possibilities of modern audio-visual experiences.

Happy Reading!

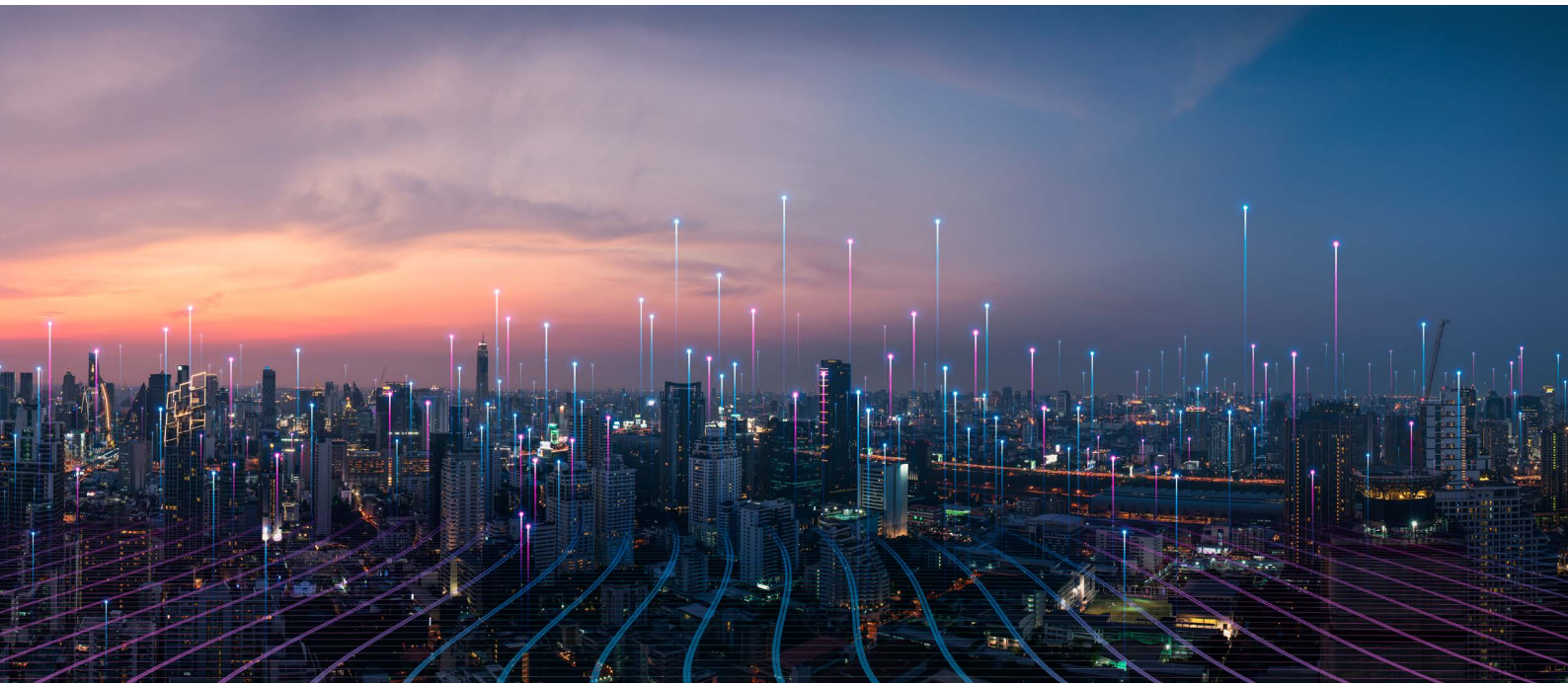
Marco Schulz,

*Head of Visual Sales Engineering,
at Panasonic Connect Europe*

What is AVoIP?

Audio-visual over Internet Protocol (AVoIP) refers to the transmission of audio and video signals via network infrastructure.

This technology extends the capabilities of traditional AV systems, enabling easy, scalable, and flexible communication across devices and networks. AVoIP replaces proprietary solutions with standardized protocols, increasing interoperability, brings benefits in maintenance and opens up opportunities for AV system analysis.



The Need for AVoIP

In recent years there has been much talk about the convergence of the worlds of AV technology and Computer-based Internet Protocol (IP) technologies. But this is so much more than a technical conversation. The drive for this convergence is coming from organisations themselves as they strive to deal with a number of challenging circumstances.

As technology becomes ever more critical to the operation of businesses, education and public sector organisations, the complexity of solutions grows. As well as reliable and sustainable technologies, these organisations need an infrastructure that can be easily managed and most importantly, one that is flexible - to take advantage of new opportunities as they arise.

They want the benefit of a secure, integrated and easily scalable IP network to connect all their technologies.

IT IS THEREFORE EVEN MORE IMPORTANT FOR UPCOMING INVESTMENTS IN AV EQUIPMENT TO LOOK AT IT FROM THE POINT OF VIEW OF AVOIP INTEGRATION, BECAUSE AVOIP OFFERS THIS FUTURE.

— The move from an AV to IT World —

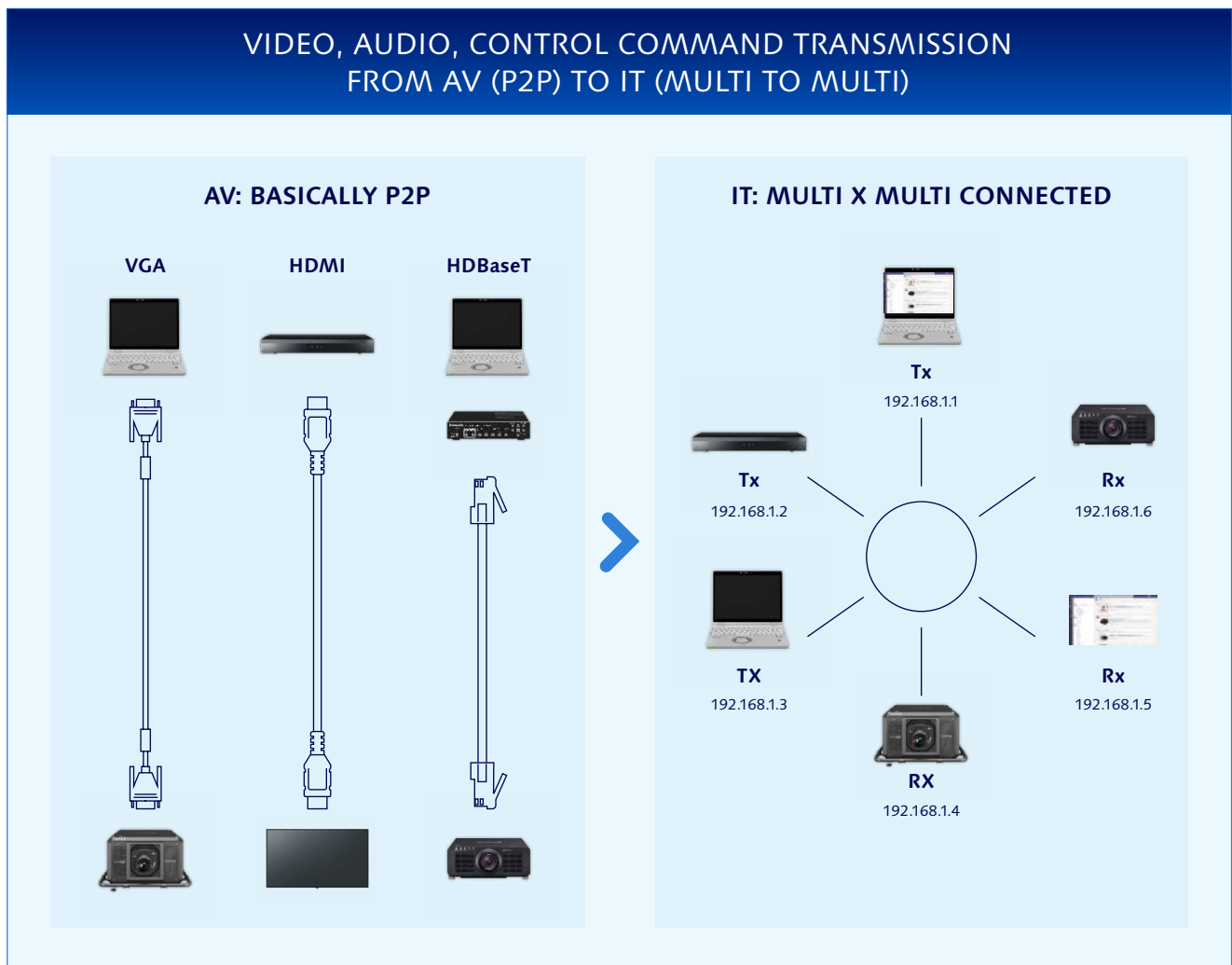
The advantages of moving from traditional AV networking to the IT world are plain to see. AV has been built on point-to-point connections. If you want to send an image from source A to B, then you run a cable to connect the devices. If you want to replicate the image from B to A - you will need another cable. If you want the same picture on two display devices? Then we need to add a splitting device. If those two displays are at a different resolution? Then we need an EDID Manager. Finally, if the two devices are at different sides of a large venue? Then you will need an extender.

You can see that as technology and requirements become more sophisticated, the systems become more complex, with potentially many more points of failure.

Compare this to the AV over IP world, where you can flexibly connect sources and display devices. You can easily switch the signals within the network from A to B, from B to A or one to many. In addition, you can rely on an existing network infrastructure to transport the information. Finally transport via IP ultimately enables limitless transmission of image, sound and other signal elements at any time and any place. Bringing AV equipment onto that IP network makes a lot of sense.

In simple words:
**A LIMITED AV MATRIX BECOMES A
 MUCH MORE FLEXIBLE IT SWITCH WITH
 FAR MORE ADVANTAGES.**

AV TO IT WORLD



What's holding back AVoIP?

DIFFERING STANDARDS

So, if the move to AVoIP is so obvious, why is it taking so long? One challenge is the lack of agreement on one universal standard. A number of protocols already exist that ensure images are delivered with good visual quality and limited latency but they each have their pros and cons.

For example, the SMPTE [ST2110](#) standard for uncompressed signal transmission offers the very best picture quality in terms of lossless image playback with zero latency. However, it requires a very expensive and heavy duty bandwidth connection of currently up to 25 Gigabits in a 100, 200 and even higher Gigabit switch infrastructure without touching 8K resolution. Even though ST2110 also offers a compressed version, the need from broadcasters is currently limited to very demanding applications. Multicast is a basic prerequisite and therefore higher IP skills are also required.

In addition, the number of variants of AVoIP solutions and systems is very dynamic and diverse. This can lead to a cer-

tain degree of uncertainty when choosing the right AVoIP solution. Let's take a look at those that are becoming increasingly established in the market. Each can be relevant depending on the conditions of use.

Beside the already mentioned ST2110 we have an emerging IPMX (Internet Protocol Media Experience) platform, an open standard with specifications created by AIMS (Alliance for IP Media Solutions) to provide a consistent and interoperable way to transport AV over IP.

An already established format in the market is SDVoE (Software Defined Video over Ethernet). SDVoE uses the proprietary BlueRiver® chipsets from SEMTECH and offers uncompressed quality (for higher resolutions with small compression) for 10GB networks only, whereas IMPX can also run from 1G to 25G networks and above. To achieve less bandwidth requirements IPMX compresses the signal with JPEG-XS developed by IntoPIX and Fraunhofer IIS and standardized under ISO/IEC 21122.

Both are a good compromise between picture quality and reasonable cost and those are the formats of choice for areas as medical, higher education and entertainment applications, where high picture quality is required.

Manufacturers have formed alliances around both formats in order to demonstrate interoperability and to establish the format itself.

The large number of AVoIP solutions currently still focuses on compatibility with networks with a low bandwidth of less than 1 Gigabit throughput such as license based formats as Newtek's NDI/NDI-HX and Audinate's [Dante AV](#).

These compete with the purely proprietary 'closed' systems such as [Crestron's NVX](#), Extron's NAV and some others. 'Closed' because they are not compatible with other hardware vendors. All of the listed 1G solutions are used wherever the customer has an existing, less powerful network, such as smaller corporate conferencing areas, universities or campuses, where an adequate picture quality can still be delivered to projectors or displays within the existing infrastructure. Of course compression and latency becomes higher and resulting artifacts and delay are more visible.

The user has to decide whether to use a self-contained system, i.e. only stay with one manufacturer such as Crestron,

Extron, Lightware etc., or whether he is aiming for a more open AVoIP solution in which he can vary independently between several manufacturers that promises compatibility e.g. Dante AV or NDI (Network Device Interface).

Within these latter formats it must be mentioned that there are certain incompatibilities because there are variants of them available (Dante AV-Ultra, AV-A, AV-H as well as NDI and NDI-HX). NDI/NDI-HX also has still the unique advantage that it is directly recognized as a source by conference codecs such as Microsoft Teams, Zoom and others which enables the bridge to video conferencing systems.

AV1 and its successor AV2 can also be mentioned here as an open video codec, but this plays more of a role in streaming platforms than in our classic AV installation area. Similar to AVB (Audio Video Bridging) which is also a license-free standard, but it has become much quieter and has lost market importance.

In summary, the reality is that there is no one format that supersedes all the other standards. Customers must decide, based on their use-case, picture quality and specification requirements, which network size and protocol are best for them - dependent on budget.

LISTING OF SOME IMPORTANT AVOIP FORMATS IN HIGH

	ST2110-20	SDVoE	IPMX (ST2110-22)	NDI / NDI-HX	CRESTRON NVX	DANTE AV
VENDOR / ALLIANCE	Open Standard / SMPTE, AMWA	SEMTECH / SDVoE Alliance	Open Standard / AIMS / AMWA	Newtek	Crestron	Audinate
ETHERNET CABLE FORMAT	25Gb and more (CAT8 and later)	10Gb (CAT6A and later)	25Gb / 10Gb / 1Gb	1Gb (CAT5e)	1Gb (CAT5e)	1Gb (CAT5e)
UNCOMPRESSED / COMPRESSED	Uncompressed	Uncompressed & Compressed	Uncompressed & Compressed	Compressed	Compressed	Compressed
CODEC	Uncompressed	BlueRiver® chipsets	JPEG-XS	NDI: DCT NDI-HX: H.264	IntoPIX FlinQ	JPEG 2000
HDCP COMPATIBILITY	No	Yes	Yes	No	Yes	Yes (AV Ultra, AV-A) No (AV-H)

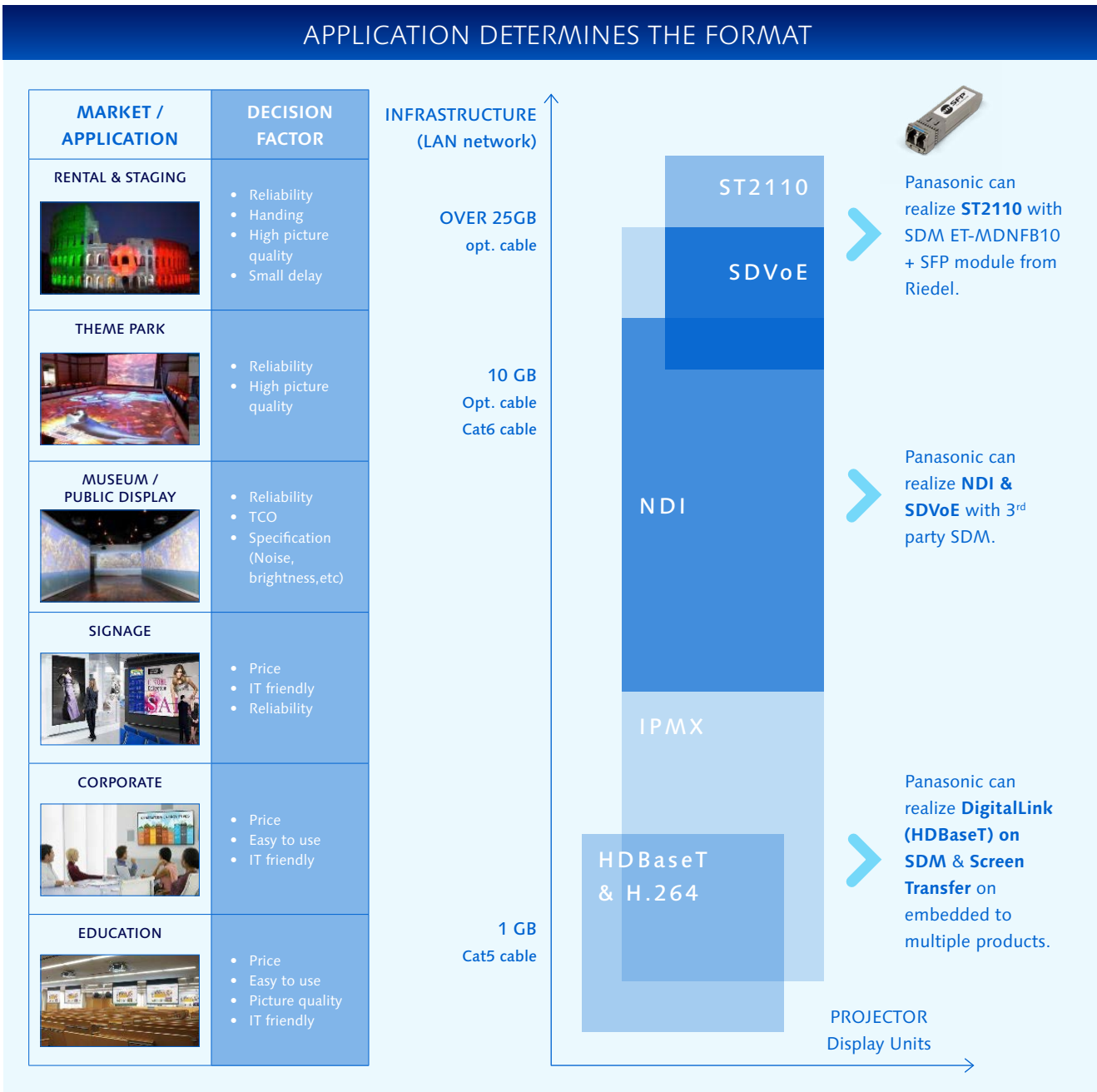
OUR SUGGESTION:

The ultimate Panasonic AVoIP comparison

Due to the large number of formats and possibilities for AVoIP solutions, we as Panasonic Connect Europe have installed a direct picture comparison of various AVoIP formats in our Business Solutions Center.

Interested people can form their own opinion here in a direct ultra-large-format image comparison, covering uncompressed and compressed signals in 1G to 25G network infrastructure.

CONTACT US



Universal AVoIP using Intel® SDM

So, as technology applications continue to progress at a pace, how do you ensure that your investment in AV can be future proofed for requirements and adaptable to the different IP protocols as they emerge?

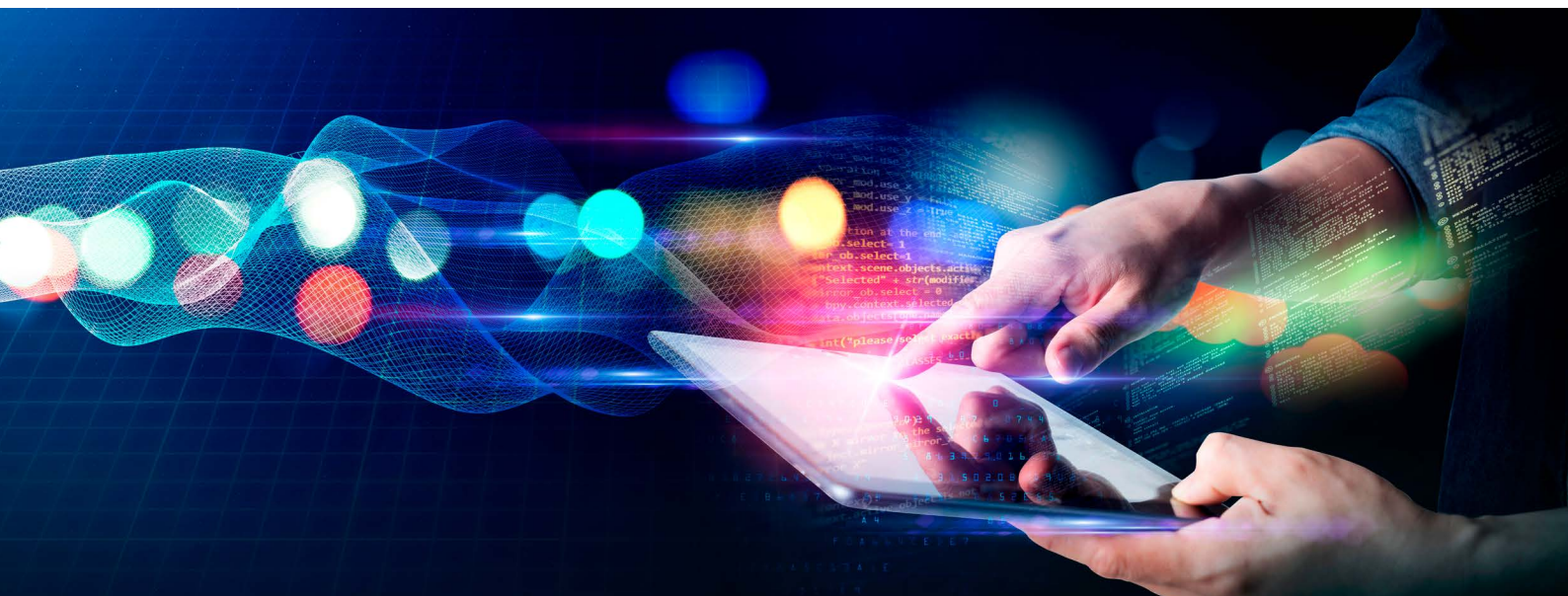
The answer is Intel® Smart Display Module (**SDM**). It's the gateway for organisations to AVoIP. With Intel® Smart Display Module technology, projectors and devices can leverage the power of AVoIP, enabling organisations to revolutionise their communication infrastructure.



— The Benefits of Intel® SDM Integration —

- SDM reduces installation costs due to less efforts for mounting and wiring external devices. This benefit is even double when dismantling is part of the total job e.g. in rental business.
- SDM eliminates number of components, because no more need for external power supplies and connection cables. This ensures improved operational reliability.
- SDM increases sustainability, flexibility and also provides investment security. The device and thus the project remain up-to-date and can be modernized in the future with more powerful SDM cards or AVoIP modules without having to replace the core unit. Because of the smaller form-factor and reduced materials as external devices, it requires less material resources as cabinets, connectors and other components.

- SDM offers new ways of operating concepts, so it has to be considered whether a decentralized media player concept might bring greater advantages versus a centralized system.
- SDM enables new innovative solutions to be developed. Depending on the application requirements, there are various performance classes of SDM-PC modules with individual component assembly available.



—○ The Benefits of Intel® SDM technology ○—

- **Enhanced Communication and Collaboration**
Integration of SDM into projectors, flat panels, LED walls and displays allows for seamless interaction between multiple endpoints across different locations. Users can engage in high-quality audio and video conferences, share content, and collaborate in real time.
- **Improved User Experiences**
Intel® SDM provides a user-friendly interface with intuitive controls, ensuring ease of use and reducing the learning curve. Interactive features, such as touchscreens and gesture recognition, further enhance user engagement and productivity.
- **Scalability and Flexibility**
AVoIP, powered by Intel® SDM, enables organisations to scale their communication infrastructure easily. It supports dynamic resource allocation, allowing for the addition or removal of endpoints without disrupting operations. This flexibility accommodates evolving business needs and enables seamless expansion.
- **Simplified Management**
Intel® SDM simplifies the management of projectors and displays by offering centralised control and monitoring capabilities. Administrators can efficiently configure, update, and troubleshoot devices from a single interface, reducing downtime and enhancing overall system management.
- **Cost Efficiency**
By leveraging standardized protocols, AVoIP minimises infrastructure costs associated with traditional AV systems. In addition, Intel® SDM optimises power consumption and reduces maintenance expenses, leading to long-term cost savings.



ELIMINATE FORMAT BREAKS

One clear advantage of conventional AV signal distribution is its ability to maintain a consistent video format throughout the signal chain. In traditional AV setups, signals, whether HDMI or SDI, can travel from source to destination without the need for conversion. This consistency is why, for decades, the input and output boards of servers and display devices have been of primary concern to integrators and system designers.

However, in today's ever-evolving landscape, this alone isn't enough. The increasing complexity of applications means that video playback occurs at multiple tiers. Consider a university setting: a lecture capture system might project camera sig-

nals onto screens within the same auditorium. Simultaneously, it needs to transmit to secondary locations, feed into a video recording and management system, or even go live for streaming. This multifaceted approach epitomizes today's blended learning environments.

Introducing format conversion into a system typically requires adding extra hardware converters. These converters must be configured, controlled, powered, and connected to a signal source. This not only increases the workload but also introduces potential points of failure. In addition, format conversion can introduce latencies, leading to challenges in synchronizing audio and video.

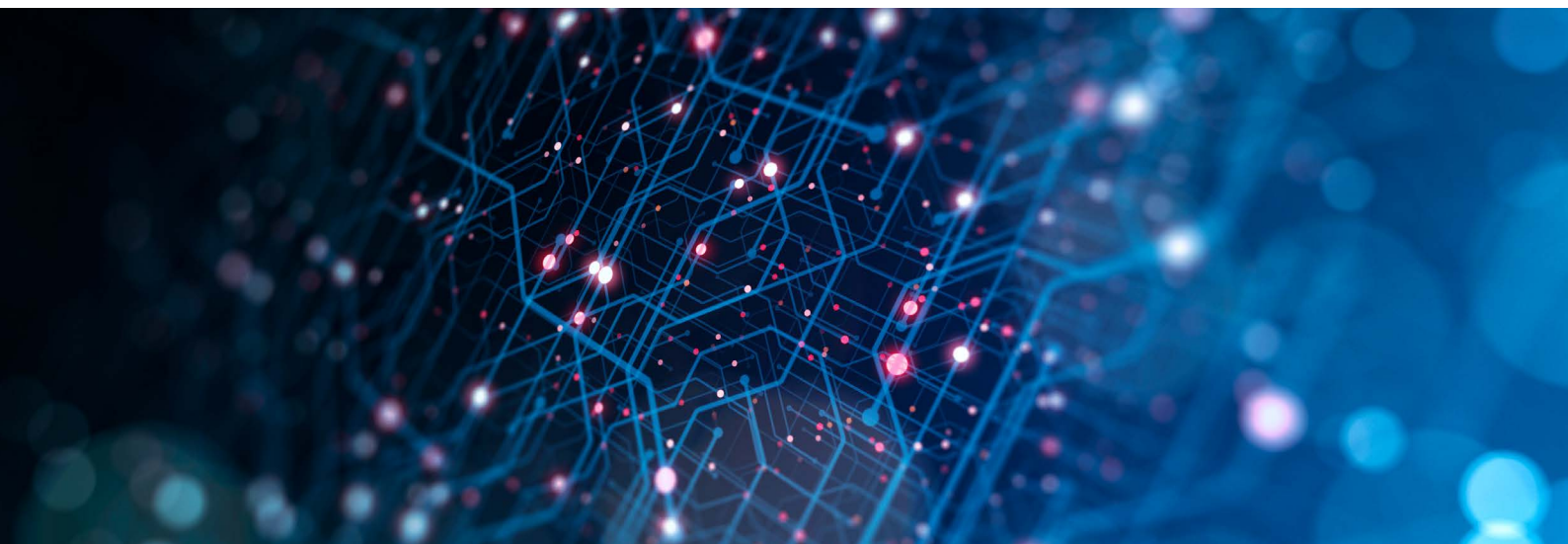
At Panasonic, our goal is to offer the necessary flexibility without burdening the customer with the cost of additional inputs and outputs on our device terminal boards.

This is why KAIROS provides configurable outputs. Simultaneously, SDM empowers integrators to tailor the input of projectors or displays to precisely match the format best suited for the intended application.

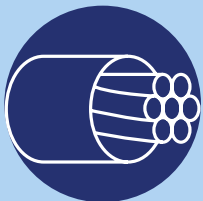
Unlimited opportunities

A wide range of SDM boards are already available to meet organisations' needs. To provide further technology leadership and meet stricter standardizations, Intel® SDM was launched in 2018 with the SDM-L (SDM

Large) and SDM-S (SDM Small) specifications, on Intel products and platforms. [Intel® SDM provides](#) interoperability and scalability to the market, especially to the ecosystem partners.



THE SDM UNIVERSE - TODAY



CONNECTIVITY

3G SDI
12G SDI
HDBaseT

Panasonic CONNECT



STREAMING

NDI
SDVoE

BirdDog
APANTAC
Panasonic CONNECT



SIGNAGE

Wireless
(PressIT & Cynap Pure)

SPINETIX
FRAMR.
WOLFVISION
Panasonic CONNECT



MEDIA SERVER

HIVE
Onlyview

onlyview
Panasonic CONNECT



PC BOARD

Giada
AXIOMTEK
others

As applications and requirements change, it is easy to introduce different SDM Boards to meet emerging needs.

Use Cases: AVoIP in Action

USE CASE: PRESENTATION SETUP



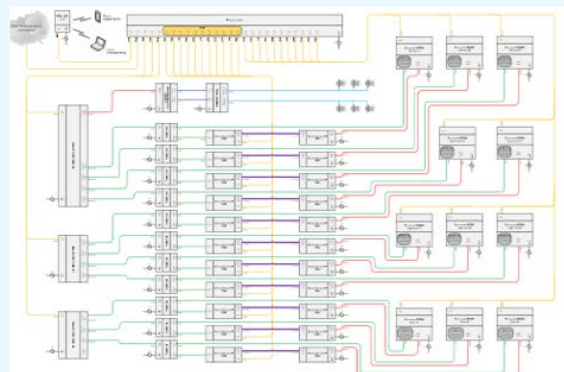
BEFORE

- Multiple format breaks / conversions
- Extensive use of converters
- Potential point of failure
- Building up latencies
- Double product load for back-up systems

AFTER

- True glass-to-glass production
- No format conversions
- Minimum cabling with off-the-shelf components

USE CASE: IMMERSIVE EXPERIENCE



BEFORE

- Dedicated server room
- Heavy 19" rack type server equipment
- Long distance cabling, extensive use of extenders, encoder and decoder boxes

AFTER

- Deployed layout system
- Lean infrastructure
- Minimum cabling with off-the-shelf components

A TECH DOUBLE-TAKE:

Two technology solutions used to bring Frameless to ISE 2023

State-of-the-art AV and the latest fully IP-based and synchronized solution on a 10GB fibre network brings the immersive art sensation to life on the road.



Replicating some of the incredible immersive galleries from Frameless, the UK's largest digital immersive art experience, at the Panasonic stand at ISE 2023 in Barcelona may have seemed a daunting challenge to some. But the same team of partners that created the UK visitor sensation did not stop there.

They decided to use the opportunity to show how these cutting-edge immersive experiences could be delivered in two different technological ways: one in a state-of-art AV connection executed in the most sophisticated way and the second demonstrating the latest fully IP based and synchronised solution on a 10GB fibre network infrastructure.

To achieve their goal, Panasonic Connect Europe teamed-up with [Hive Media Control](#), [Apantac LLC](#) and [Matrox Video](#). To recreate the Frameless UK experience, Panasonic used three RQ35 and eight RQ25 3-Chip DLP projectors to create the images on the floors and walls respectively. The projectors were fed content from the HIVE media players using SDI, just as in the original installation in London's Marble Arch. To directly feed SDI to the projectors, Apantac provided Smart Display Module (SDM) input cards for a cleaner set-up requiring less hardware installation. These smart SDM cards are compact and integrated directly into a display or projector, eliminating external signal conversion devices, reducing cabling, and saving space and power.

Showing the potential of IP Streaming

To show the potential of IP streaming technology for immersive installations, Matrox provided an IPMX encoder and decoder as an alternative connection for a fully IT fibre-based solution.

"We wanted to show the different opportunities for Location Based Entertainment when it comes to bringing incredible immersive productions to their audiences, whether its fixed installations at muse-

ums or travelling art exhibitions," explained Hartmut Kulesa, European Marketing Manager at Panasonic Visual System Solutions. "We used the regular AV solution that has become common over the past decade, with redundant playout systems created by simply doubling up the servers. But we also wanted to show the potential of AVoIP streaming which can run across multiple sites and can be delivered with a lighter and easier to manage infrastructure."



SDM future-proofs

The use of the SDM cards in its projectors was also an innovative solution that Panasonic was keen to show at ISE to demonstrate its flexible and future-proofed approach. Hartmut explained: "Our strategy is to future-proof our products by enabling customers to use SDM cards to retrofit the projector or display for different uses; for example, with existing standards like NDI or IPMX as well as future standards to come one of the leading developers of slot-in computing. We are working closely with them to create a variety of SDM cards for our displays and projectors to enable them to be customised for future application needs."

Panasonic's ultimate objective was to demonstrate that award winning, fixed installation and cutting edge immersive content like Frameless can be recreated to a high level experience in temporary, new build and traditional infrastructure existing buildings. "It doesn't always require high budgets, new infrastructure and dedicated buildings," concluded Hartmut. "We have demonstrated that you can use different approaches and the flexibility of the different technology solutions creates some exciting opportunities."

**I think we can call that
MISSION ACCOMPLISHED.**

Conclusion

Integrating Intel® SDM technology in projectors, flat panels, LED walls and displays presents significant advantages for organisations seeking to leverage AVoIP solutions.



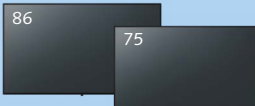



By embracing this technology, organisations can transform their communication and collaboration capabilities, elevate user experiences, achieve scalability and flexibility, simplify management, and optimise costs.



The Panasonic Edge

Panasonic Connect Europe is the first Projector and Display manufacturer to incorporate Intel® SDM across a range of devices to help customers unlock the full potential of AVoIP. It enables organisations to stay connected, productive, and innovative in today's digital landscape.

Intel® SDM COMPATIBLE PRODUCTS

 <p>EQ2 DISPLAYS 43", 50", 55", 65", 75", 86"; 500 cd/m²; USB Loop Through; 18/7</p>	 <p>SQE2 DISPLAYS 43", 49", 55", 65", 75", 86", 98"; 500 cd/m²; 24/7</p>	<div style="text-align: right;">NEW</div>  <p>SQ2H DISPLAYS 43", 50", 55", 65", 75", 86", 98"; 700 cd/m²; 24/7</p>
 <p>PT-RQ25 SERIES 16k - 20k lm projectors</p>	<div style="text-align: right;">NEW</div>  <p>PT-RQ7 SERIES 6.5-7.5k lm projector</p>	<div style="text-align: right;">NEW</div>  <p>PT-REQ15 SERIES 8-15klm projector</p>



True Glass-to-Glass Production

The addition of SDM technology to Panasonic Connect products is the final piece in the jigsaw to enable true glass-to-glass production - from video capture and production to distribution and display. Add Version of Glass-to-Glass image below.



For more
information about
Panasonic:



Projectors

<https://eu.connect.panasonic.com/gb/en/product-groups/visual-system-solutions-projectors>

Displays

<https://eu.connect.panasonic.com/gb/en/product-groups/visual-system-solutions-professional-displays>

Facebook:

<https://www.facebook.com/PanasonicVisualSolutionsEU>

Instagram:

<https://www.instagram.com/panasonicvisual>

LinkedIn:

<https://www.linkedin.com/company/panasonic-connect-europe>

Youtube:

<https://www.youtube.com/user/PanasonicBusiness>

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