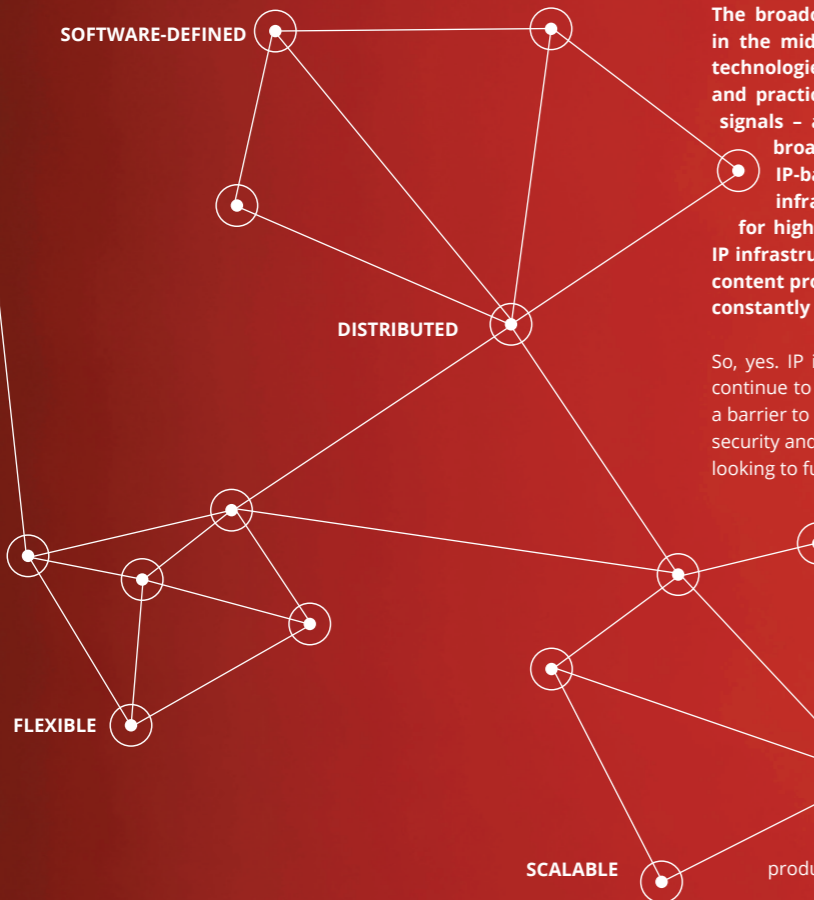# THE MEDIORNET FAMILY
DISTRIBUTED VIDEO NETWORKS

MEDIORNET

DISTRIBUTED VIDEO INFRASTRUCTURES FOR ROUTING, MULTIVIEWING & PROCESSING

IP HYBRID SDI/TDM

MILLIONS OF VIDEO I/OS DEPLOYED
MORE THAN 100 IP VIDEO DEPLOYMENTS
JT-NM TESTED

SOFTWARE-DEFINED
DISTRIBUTED
FLEXIBLE
SCALABLE

The broadcast media and entertainment industries find themselves in the midst of a massive and disruptive transition from SDI to IP technologies. Over the past decades, SDI has proven to be a reliable and practical standard for the distribution of video, audio and data signals – and it will continue to be an important building block in broadcast facilities and production in the next years. However, IP-based systems have emerged to form a powerful and flexible infrastructure that can accommodate the increasing demands for higher-resolution video and better connectivity. Consequently, IP infrastructures promise a solution for the ever-growing demand for content production, as well as the capacity and flexibility to handle constantly evolving media formats.

So, yes. IP is the future! But we're not entirely there yet. Until then, we'll continue to live in a world built from SDI bricks. These may be perceived as a barrier to technological progress, but also a solid foundation that provides security and reliance. And this is where Riedel solutions come in: Businesses looking to future-proof their operations are able to choose a progressive approach to the implementation of IP technology that allows them to build on their SDI foundation and overcome the obstacles of the IP transition, at the right time and at the right cost.

If you are standing at the SDI-IP crossroads, you may ask yourself: Which technology will get me the right solution, at what cost and at what point in time? Does it have to be full IP right now? What would a transitional period or hybrid solution look like? And, most importantly, who has the skill set to cope with my unique migration requirements? Riedel is here to help you answer all these questions. Our team will design a tailored solution that fits your requirements perfectly, one that can usher your production facility into the future.

With the introduction of MediorNet more than a decade ago, Riedel has pioneered the distributed approach to video infrastructures by combining signal transport, routing, processing, and conversion in a redundant real-time network. Since then, MediorNet has grown to be the market's most versatile and reliable AV networking backbone. To this day, MediorNet remains the only system that offers all the advantages of distributed, software-defined hardware.

The story of MediorNet's success is a story of continuous evolution. In the past years, the MediorNet family has grown dramatically on both the hardware and software sides, greatly expanding its capabilities and its areas of application. With its great versatility and flexibility, the distributed system excels in event or sports venues, broadcast centers or outside broadcast fleets, and corporate or governmental facilities. That's why today there are millions of MediorNet SDI and IP I/Os deployed in different verticals all around the globe – from small installations to large and complex infrastructures.

MediorNet's futureproof modular structure and innovative app concept enable it to adapt easily to changes in the market: As the industry's standards and expectations evolve, MediorNet evolves with them. Riedel's most recent answer to the challenges arising from the IP transformation is a range of innovative SFP-based technologies to complement MediorNet's MicroN UHD, MicroN, and Compact intelligent signal interfaces and the MetroN core switch. Boasting the highest density on the market, the processing modules and processing hubs MuoN, FusioN and VirtU round out the Riedel video portfolio with full IP solutions. All these versatile devices can serve a wide range of different functions and applications, but are united by two key qualities that have been at the foundation of our philosophy for media infrastructures for years: They're distributed, and they're software- defined.

Distributed video infrastructures bring several benefits to productions on both the operational and system levels. For one, they enable routing of any type of signal from any point to any other without requiring staff to reconfigure any cables. Single points of failure are reduced and operational efficiencies result from the placement of physical I/Os closer to where they are needed. At the same time, distributed topologies allow for a high degree of flexibility on a system architecture scale: With MediorNet, you can easily add single devices to your system or even scale the entire system up from a small to a complex installation. Through this flexibility and scalability, Riedel's video infrastructures are highly customizable to meet virtually any production requirement.

Software-defined hardware devices like MicroNs or MuoNs can be swiftly reconfigured to fulfill a vast range of functions, reducing the need for single-purpose peripheral devices and thus saving critical rack space and associated costs. Operation is easy and flexible – with just a few clicks, you can switch between apps, turning your device from a simple router to an advanced signal processor or multiviewer. Furthermore, app-based platforms like MuoN allow you to grow I/Os in a very linear and organic manner, supporting a gradual move to IP workflows without radical hardware changes in your equipment room. At the same time, our FPGA-based devices will keep evolving with your demands. With a software-defined MediorNet device, you buy not only what the product is capable of today, but also what it will evolve to in the future.

Within the extended MediorNet family, you'll find all the tools you need for your production – whether it's SDI-centric, IP-centric, or anything in between. Riedel is just the right partner to guide you through this challenging time, providing you with a perfect transition path from legacy SDI to full IP, at your own pace and within your budget constraints.

OUR VISION

"Distributed video and audio infrastructures are going to shape the future of the media and entertainment industry. With the extended MediorNet family, Riedel brings together more than 10 years of innovation, knowhow and experience in this area. Our software-defined hardware approach enables MediorNet to evolve with industry demands, making any MediorNet system a future-proof investment – no matter if SDI, hybrid or full IP."

Thomas Riedel
CEO and Founder
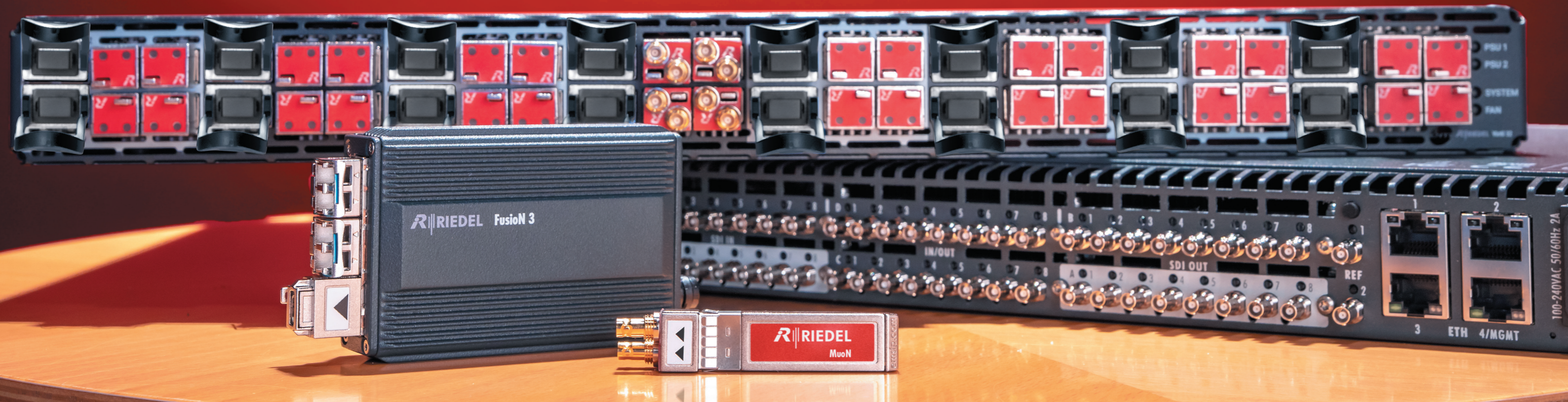
Distributed Routing

MediorNet provides versatile distributed routing and gateway capacities for any TDM, IP, or hybrid production environment. Instead of a central router, MediorNet infrastructures are based on an array of decentralized network devices and intelligent nodes. This distributed system intelligence allows the free placement of physical I/Os, which increases the flexibility of any installation while significantly reducing cabling and set-up time. With MediorNet, you get one unified TDM or IP backbone for all your signals. Because MediorNet is not just about video... even audio, intercom, serial data or ethernet can be transported and routed effortlessly to and from any conceivable point.

MicroN UHD & MicroN Standard App
The Standard App provides high-density signal interfaces into the distributed MediorNet TDM ecosystem and allows to build highly scalable audio and video routing solutions. It enables 24/48 SDI video signal port (up to 12G SDI) and 2 MADI audio interfaces and provides 80G/400G backbone connectivity. All audio and video ports come with standard processing features like frame synchronizers, embedders/de-embedders and many more...

MicroN IP App
Delivering seamless gateway functionality, the IP App bridges between distributed SDI and ST 2110 IP networks. The gateway allows to convert video signal from MediorNet TDM to ST 2110-20 and vice versa and audio signals to ST 2110-30/-31 and vice versa. In addition to PTP sync, the MicroN IP App also supports NMOS IS-04 and IS-05 for device discovery, registration and connection management.

MuoN & FusioN Encapsulation/Decapsulation Apps
Offering the highest density on the market, these Apps provide highly scalable and flexible audio and video gateways into distributed IP networks. The broad selection of conversion applications enables conversion of various baseband signals to IP and vice versa, including SDI to ST 2110 or ST 2022-6. MuoN & FusioN video gateway applications also come with various add-on options for UHD support and frame synchronizers.

MuoN Audio Routing App
Allowing to re-route and re-format IP audio flows, the MuoN Audio Routing App enables management of different IP audio stream schemes and mappings. It comes with an internal 2048x2048 audio router to send and receive up to 64x ST 2110-30/-31 audio flows with up to 32 audio channels each.

Distributed Multiviewing

Multiviewing remains one of the most important processing and monitoring features in any video system – and distributing multiviewer capacities may considerably streamline all associated processes and workflows. For one, the integration into a distributed MediorNet ecosystem enables efficient monitoring of any signal and flexible routing of multiviewer heads to any physical output. For another, the various MultiViewer Apps available for MicroN UHD, MicroN, MuoN and FusioN provide unmatched scalability, flexibility and density, as well as support for 3rd party interfaces like Ember+, NMOS, and TSL, making them just the right choice for any production.

MicroN UHD & MicroN MultiViewer App
With access to all distributed MediorNet signals, the MicroN UHD & MicroN MultiViewer Apps make these available on one of four monitoring heads that can be routed to any given output. Both apps feature a rich set of widgets, as well as fully flexible scaling and positioning of elements on the screen. As MediorNet is distributed by nature, the MultiViewer Apps allow to use system-wide clocks, time codes and counters and easy configuration sharing. The MicroN UHD Multiviewer App includes all the powerful features of the MicroN Multiviewer App, while adding UHD support and increasing the input channel amount to 36 PiPs.

MuoN & FusioN MultiViewer Apps
The MuoN & FusioN MultiViewer Apps enable access to any IP video signal in the network to be monitored and fed back to any IP destination. Riedel's microservice approach makes all MuoN and FusioN multiviewers incredibly flexible: There are three different MultiViewer Apps (4x1, 9x1 or 16x1 PiPs) and various widgets and layouts available, allowing to tailor the solution to individual needs. In combination with the VirtU 32, these apps allow to build a highly dense multiviewer with up to 512 PiPs on 32 heads in 1RU.

Distributed Signal Processing

Basic signal processing is integrated across all MediorNet gateway devices. These processing functions allow for seamless routing across the decentralized MediorNet network and across different formats. With a wide selection of apps, enhanced processing capabilities like up/down/cross conversion, color correction, or encoding/decoding, can be added to the system just where they are needed. As MediorNet solutions are software-defined and FPGA-based, you buy not only what the product is capable of today, but also what it will be capable of in the future.

MedsiorNet TDM Integrated Processing
With integrated processing features such as frame store/frame sync, embedders/de-embedders, test pattern generators and sample rate converters, MediorNet minimizes the need for external processing and glue equipment. Through these features, the system provides enormous efficiency gains in all production environments.

MicroN Processing App
The MicroN Processing App adds decentralized and powerful processing capabilities to every MediorNet infrastructure. This app is a virtual resource that enables on-board signal processing including 2 channel up/down/cross conversion, 4 channel color correction and a multiviewer with 9 PiPs and 2 screens. Each input signal can be routed to this virtual resource to be processed and played out at any output within the system.

MuoN Up/Down/Cross Conversion Apps
These SFP-based converter apps enable high-quality conversion to/from any HD/3G/UHD HD content. They can be used for incoming feed signal normalization or to provide down-converted HD versions of UHD signals for easy monitoring inside the facility. The MediorNet UDC converters provide pristine image quality scaling and de-interlacing motion adaption and directional interpolation. This App also includes color space conversion between BT.709 and BT.2020 as well as a full color converter.

MuoN & FusioN Encode/Decode Apps
The Encode/Decode Apps for MuoN and FusioN handle conversion to or from IP ST 2110 with JPEG encoding and decoding, while also providing SDI for your inputs and outputs. When used with MediorNet VirtU devices, they boast the highest density in the market with 64 encode/ decode channels within a single RU. Additional benefits of the powerful Encode/Decode Apps include low latency, support of HD-3G signals and configurable compression schemes & bitrates.

Remote and Distributed I/O

There are ever-larger distances to be covered between the various parts of modern production chains, e.g. between venue and production truck, between buildings on a campus, or between facilities in different parts of the city. The MediorNet family is fully suited to all those needs: For IP networks, it includes JPEG-2000 or JPEG-XS encode/decode solutions and the compact FusioN devices, which can be installed right at the signal sources and destinations to transfer the signals directly. And for both TDM and IP environments, there are powerful and efficient stagebox solutions to be implemented with MediorNet Compact or FusioN, or the MicroN Point-to-Point App.

MicroN Point-to-Point App
The MicroN Point-to-Point App enables all hardware ports on the device, but limits network size to two devices in one net, making it a cost-efficient solution to connect two devices located in your main production site and your remote facility. The app also enables the hardware to operate standalone: This way, a single MicroN can act as a 12x12 router and audio embedder/de-embedder with MADI and sync delay, while also providing video frame sync and delay.

Compact Standard App
MediorNet Compact is a fiber-based stagebox providing enough capacity for bi-directional transport of 16 HD-SDI signals, dozens of MADI streams or GBit-Ethernet signals and hundreds of audio channels or intercom ports – ideal for streamlining the infrastructure of any mobile, studio or live event application.

MuoN & FusioN Encode/Decode Apps
Signal compression is a key enabler to exchange feeds between remote sites through low bandwidth connectivity. The JPEG-2000 and JPEG-XS Encode/Decode Apps can be installed on MuoN SFPs or FusioN devices to provide an extremely dense and cost-effective solution. In addition to providing SDI I/Os with encode or decode signals into JPEG-2000 (JTNM TR01), the I/Os are also available as ST 2110. This solution is perfect for internal television station monitoring systems, signal contribution or remote production applications.

MEDIORNET FAMILY

MicroN UHD
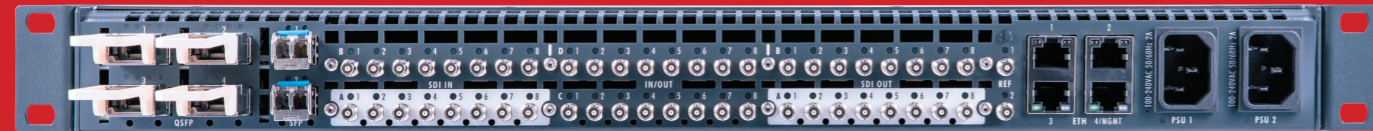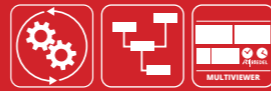
MicroN UHD is the next generation of MediorNet signal distribution and processing devices. Building on Riedel's distributed and software-defined concept, this new node adds more bandwidth, more I/O, higher resolutions, and more processing power to the MediorNet platform. The new addition to the MediorNet family provides 400G backbone connectivity for signal distribution over meshed architectures, includes 12G-SDI for native UHD (4k) workflows, and allows reliable operation due to link redundancy.

- Seamless integration into MediorNet TDM family
- 4x 100G highspeed links
- 8x 12G/3G/HD/SD – SDI In[1] & 8x 12G/3G/HD/SD SDI Out[2]
- 8x 3G/HD/SD-SDI In & 8x 3G/HD/SD-SDI Out
- 16x 3G/HD/SD-SDI In / Out (switchable)
- 2x SFP ports (for MADI)
- Sync reference In / Out (BB, Tri-Level, WC)
- Powerful integrated processing functions including sample rate conversion, frame synchronizers, test pattern generator and more

[1] Each 12G input disables 3× 3G/HD/SD inputs
[2] Each 12G output disables 3× 3G/HD/SD outputs

MetroN
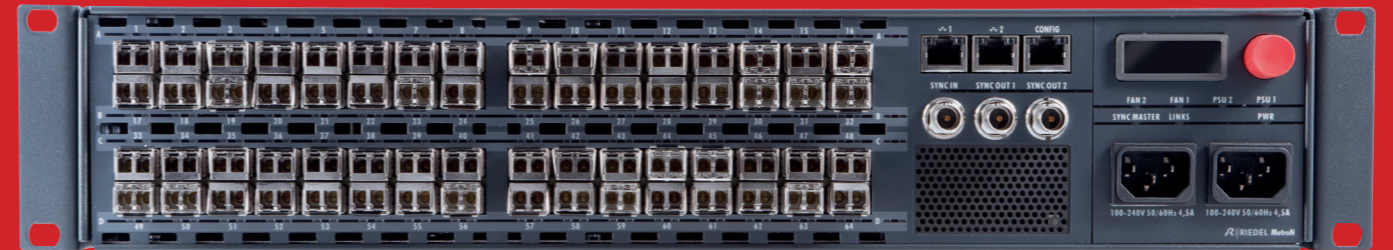
The MediorNet MetroN core router provides intense real-time signal-routing capacity (32x10G/32x4.25G ports) and offers non-blocking switching. The 2-RU device features switching delays of <40ms as well as high-speed re-routing that allows as many as 1,000 connections to be re-routed in less than a second.

- 64 auto-sensing ports (32x 10G / 32x 4.25G)
- 2 ethernet ports plus 1 config port
- 1 sync In / 2 sync Out
- Rack-mountable in various positions
- Redundant power supplies and fan modules
- <40ms switching delay

MicroN

MicroN is software-enabled, app-based hardware that can be many different things: It can be a throw-down signal processor, a simple point-to-point link for up to 12 bi-directional 3G signals, or part of a large de-centralized router – but it can even serve as a MultiViewer or a bridge between MediorNet networks and IP networks!

- Seamless integration into MediorNet TDM family
- 8x 10G highspeed links
- 12x 3G/HD/SD-SDI In & 12x 3G/HD/SD-SDI Out
- 2x SFP ports (for MADI)
- Sync reference In / Out (BB, Tri-Level, WC)
- Software-defined hardware, 5 applications available
- Powerful integrated processing functions including sample rate conversion, frame synchronizers, test pattern generator and more

Compact
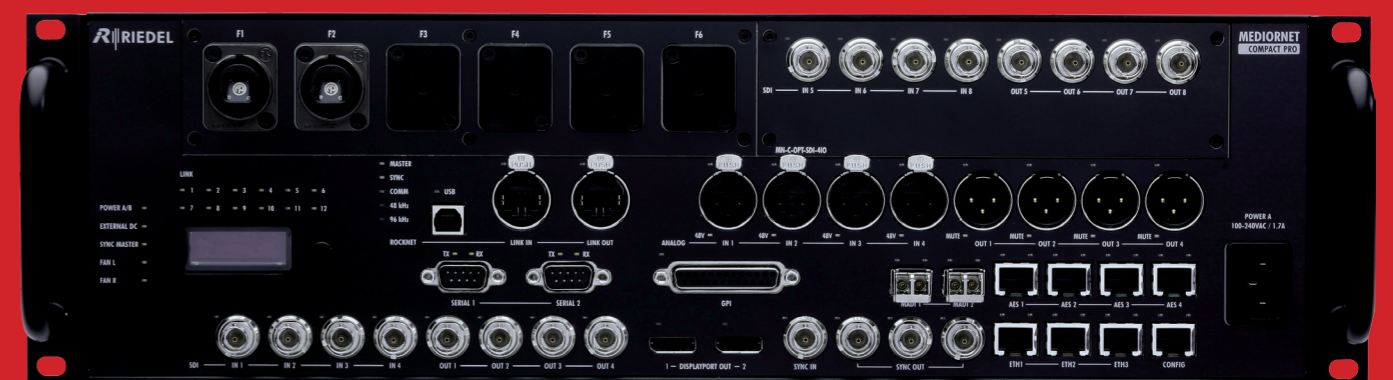
MediorNet Compact is the cost-effective and easy-to-use entry to the world of MediorNet. With a network bandwidth of 50 Gbit/s, MediorNet Compact provides enough capacity for bi-directional transport of 16 HD-SDI signal, dozens of MADI streams or GBit-Ethernet signals and hundreds of audio channels or intercom ports.
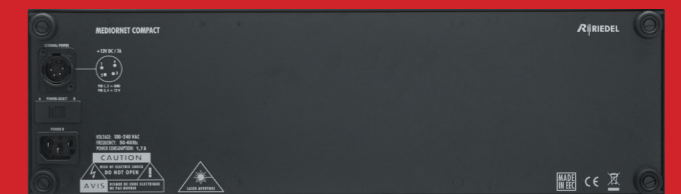
- Wide array of I/Os, capacity for 16 HD-SDI signals, dozens of MADI streams or GBit-Ethernet signals and hundreds of audio channels or intercom ports
- Powerful integrated processing functions including sample rate conversion, frame synchronizers, test pattern generator and more

MEET THE
MEDIORNET FAMILY

embrionix INSIDE

MuoN

MuoN A10

MuoN B10

MuoN B25

MuoN SFPs are pluggable gateway and processing devices that can be used inside the VirtU frames or inside COTS IP switches (Muon A series). The software-defined hardware is available with a range of different input and output configurations, including BNC, fiber, or HDMI (1.4 and 2.0). MuoN SFPs can be configured with a wide range of different apps: A simple change of the software license turns the device into an up/down/cross converter, JPEG-2000/XS encoder or decoder, an audio router, or even a 16x1 multiviewer.

- Software-defined platform with up to 3 app spaces per Muon SFP
- Available with different I/O port configs or as an IP-to-IP SFP without external connectors
- Powerful processing apps, including Gateway, UDX, Multiviewing, or Encode/Decode Apps with optional Frame Sync and Clean Switching Add-Ons
- Extremely compact, low weight, low power consumption
- Field upgradable

FusioN

FusioN 3

FusioN 6

The FusioN series of compact standalone I/O and processing devices can be configured with a range of software apps to act as IP gateways, encoders/de-encoders, or as IP multiviewers. Due to their small form factor and low power consumption, the devices can be placed close to signal sources or destinations, creating powerful efficiencies in any production environment.

- Miniature processing frame with 3 or 6 SFP slots supporting 2x fiber links for ST2022-7 hitless redundancy
- Auto-sensing for HD and UHD formats
- Mountable to the back of a standard monitor or installed into 2RU bracket housing up to 9/18 frames
- Powerful processing apps, including Gateway, UDX, Multiviewing, or Encode/Decode Apps with optional UHD, Frame Sync, and Clean Switching Add-Ons

VirtU

VirtU 32

The VirtU IP infrastructure platform can host an extremely dense array of Riedel MuoN SFP processors in just 1RU. The frame can be used as a bulk gateway, as a very dense processing unit or for any combination of gateway and processing. This modular platform allows users to gradually build their key advanced gateway and processing power as their needs grow!

- 8 independent clusters of 4x MuoN SFP connecting to a dual set of 40G/100G uplinks for ST2022-7 hitless redundancy
- Allows any mix of MuoN SFPs (per cluster host data rate must be the same)
- Very high reliability: fully passive signal path from QSFPs to SFPs, redundant power supply

THE WORLD OF MEDIORNET

MediorNet is all about the perfect production environment. Whether in broadcast centers, OB vans, convention centers, houses of worship, cruise ships, concert halls or stadia, MediorNet provides the necessary flexibility and efficiency for you to realize the best possible productions. Its highly modular concept of distributed video infrastructures and software-defined hardware allows us to offer a solution that not only reflects our customers' current needs, but a steady stream of advances to meet their future expectations.

Below you will find two typical setups. While live events still mostly rely on SDI infrastructures and broadcast urges towards IP technology, both technologies are, of course, very suitable to either production. Whatever your application and your legacy equipment, MediorNet can be tailored to meet your requirements, resulting in relieved operators, happy clients, and satisfied investors.

> „MediorNet's decentralized approach provides massive benefits including redundancy, flexibility, and the ability to scale the system as our needs dictate. For those reasons, MediorNet was the perfect choice to meet our complex media distribution and communications requirements."
> Christian Castelli, Audiovisual System Engineer, French National Assembly

> „Riedel technology allows us to future-proof our IP investments and streamline costs while reducing our footprint and energy consumption. Their uniquely dense SFP solutions enable us to optimize space, consume less energy, curtail equipment purchases and facilitate integration into large-scale systems."
> Francois Legrand, Senior Director, Core Systems Engineering, CBC/Radio-Canada

STADIA
CORPORATIONS
OUTSIDE BROADCAST
STUDIOS

SPORTS
LIVE EVENTS
CONFERENCE CENTERS
CRUISE SHIPS

SDI SOLUTIONS FOR LIVE EVENTS
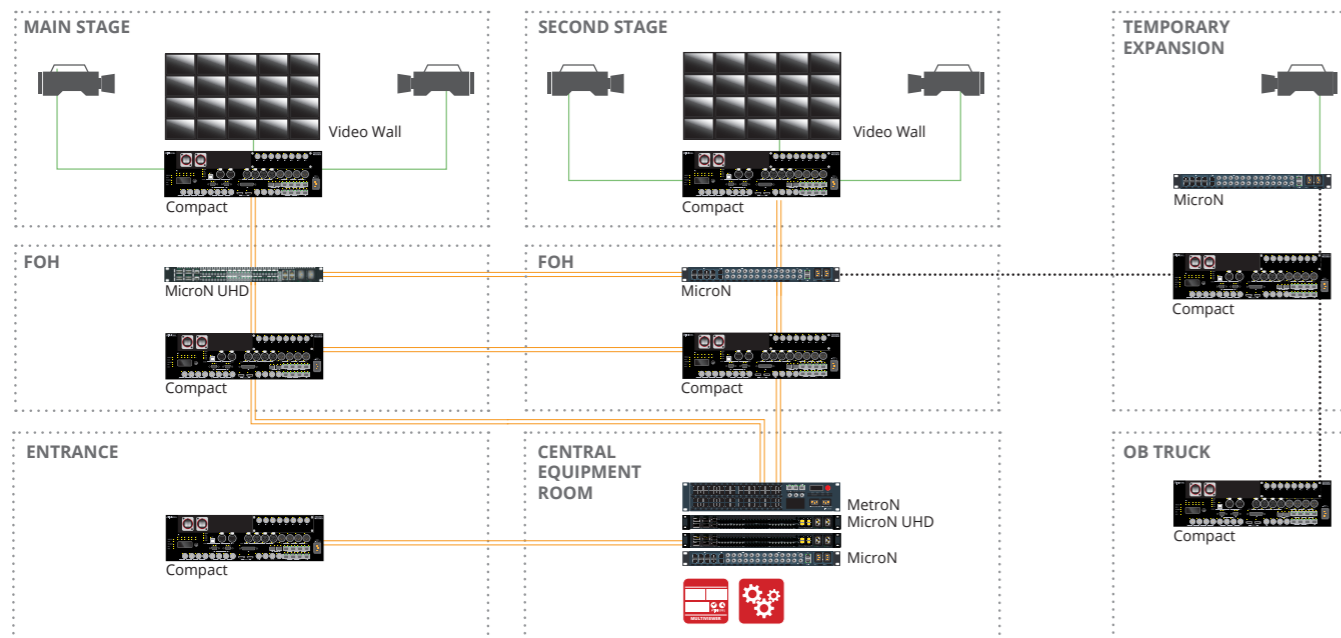
Riedel's robust MediorNet TDM devices are built for the rigors of live events. With its distributed, flexible topology and its innovative app concept, the system is highly adaptable to rapidly changing production needs. This is particularly useful in dynamic environments like festivals, where MediorNet allows to add more devices and apps on the fly and with minimal effort. Need additional video capacity at side stage 2? Just add a MicroN or Compact Pro node, connect it to the network and off you go!

In any live event scenario, MediorNet shines as a legitimate plug & play solution with very short setup times, fast and intuitive configuration, as well as integrated processing and multiviewing capabilities. And whenever you need even greater processing power, the flexible MicroN Apps make advanced processing or multiviewing available just where they are needed.

As an all-round event backbone, MediorNet incorporates various infrastructures in one network and provides an ethernet tunnel for systems including CCTV, internet access, weather monitoring, cashless payment, lighting control and of course intercom.

Not only suitable for large festivals, MediorNet offers a host of advantages to smaller events and venues. These benefit from devices like MediorNet Compact Pro and MicroN providing integrated signal processing at the cost of simple multiplexing point-to-point products.

IP & HYBRID SOLUTIONS FOR TV STUDIOS
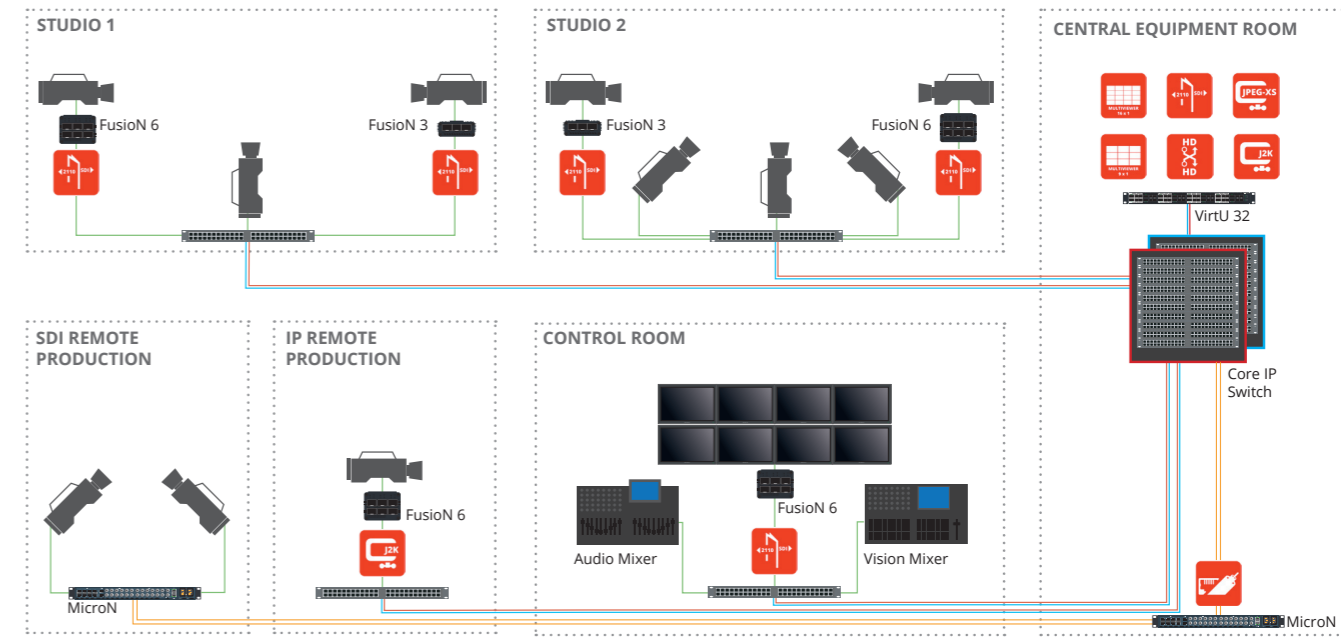
Planning to go full IP in your TV studios? The MediorNet family is just the kind of company you've been looking for. Our full IP solutions are scalable, simple, and both space and cost-efficient, offering a wide range of processing functionality. Their flexible and scalable distributed architecture lets you swiftly add not just single devices but entire subsystems like backup glue.

Boasting 64 (UHD) processing channels per rack unit, MediorNet provides the highest density available and, with each channel consuming only a few Watts, is by far the most economical system in the market. Besides its fully open, standards-based and proven interoperability, it easily integrates in Ember+/NMOS-based orchestration and control. And since it is software-defined hardware, you can have multiviewing, processing, and routing in one system with a minimum number of devices but maximum flexibility.

Or are you looking to make a first step towards IP but don't want to abandon all your trusted legacy SDI equipment? Thanks to MediorNet, you won't have to! Our flexible systems allow for hybrid solutions that combine the best of both worlds and support a smooth, incremental transition to IP workflows. The MediorNet IP bridge creates high-speed IP pipes between your SDI infrastructure and your IP network, while the MuoN IP-based SFPs allow you to gradually grow your IP-based routing, multiviewing and processing capabilities.

So the options are varied and versatile. Thanks to its flexibility, MediorNet is the perfect infrastructure for your future-proof studio – whether as a hybrid IP solution based on your legacy SDI equipment, or as your cutting-edge full IP non-proprietary production environment.

R‖RIEDEL