

Unifying Live Sports Production Using IP Technology

WHAT MAKES MEDIA LINKS DIFFERENT?

Innovative:

- Early leader in a rapidly expanding and critical technology space

Decades of Experience:

- Video & network technologies expertise in a continuously transitioning content environment

Industry Standards:

- Active involvement in industry standard setting

Scalable Solutions:

- Scalable network architecture for limitless bandwidth possibilities

Multi-Service Solutions:

- Supports traditional Broadcast architectures, as well as IP/Ethernet-based leased network infrastructures

Customer Focused:

- To help you efficiently operate, scale, and grow

Superior Support:

- Outstanding engineering, project management, service, pre-, during and post-sales support

A live broadcast covering a sporting event is one of the most technically challenging assignments for any production crew. Large, demanding global audiences (like those viewing the Olympics and World Cup events) with ever increasing quality expectations create even more pressure to produce a well-choreographed, real-time production. Multiple signals in a wide variety of formats need to be transmitted around the sporting venue, as well as being seamlessly integrated with feeds from a studio or other locations to form a complete broadcast stream.

Increasingly, broadcasters are turning to IP technology in order to simplify their networks by consolidating all their media traffic on a common platform, and to take advantage of the increasing array of video devices that natively support IP.

Managing all of the different signal types and locations can be a daunting task without advanced transport technology. Most media signals need to be encapsulated or adapted to work efficiently over a backbone that carries multiple signals. The Media Links MD8000 IP-based platform has proven itself as an ultra-reliable, high-performance transport system for all types of signals used in live sports or any other form of media networking.

To understand the magnitude of the challenge facing live sports production teams, consider the types of services that need to be provided by a signal transport system, including:

- **Live video and audio feeds that capture the actual competition.** Today these signals are commonly 720p and 1080i that run at 1.5 Gbps, as well as 1080p that uses 3 Gbps. For major events, 4K/UHD cameras running at 12 Gbps or higher are increasingly being used as the market for delivering this content to subscribers grows. The number of video, audio, as well as data feeds typically transmitted from a venue has also been increasing. Broadcasters are adding more cameras and producing more website content, while simultaneously relocating production from expensive venue-based personnel and equipment towards centralized, less costly studio-based production teams.

- **Live video and audio feeds from announcers/reporters/analysts located at the sports venue.**

These feeds are often (but not always) delivered in the same format as the event feeds, but may require special configuration to minimize round-trip delay to permit conversations and interviews to be conducted between studio and venue personnel.

- **Live data feeds that carry statistics, results and other information about the event.**

These data feeds can include scores, details about specific plays and players, in-game statistics, and a host of other pertinent information. Such data are becoming increasingly valuable to broadcasters and sports leagues, because they can be used to enhance viewer engagement and also to produce alternative offerings to consumers such as mobile data feeds and statistical archives that create additional revenue streams.

- **Two-way voice intercom/telephone system that provides communications among the production team members.**

These links can be used for many functions, not the least of which is allowing a director to talk with camera operators to create the shots used in the live production.

- **Data links using multiple formats and bit rates are deployed for many different production equipment control and monitoring functions.**

These can include camera shading controls, tally lights, camera PTZ control links, lighting control systems, etc. In addition, many other data connections are used to support broadcast operations and communications, including file transfers for graphics, animations and video clips; live-to-file recording systems, employee e-mail and internet access, social media feeds from venue-based commentators, and other functions.

In the past, many of these signals required separate, specialized transport networks. HD and SD video signals flowed as SDI signals over coaxial cables and were switched via video routers. Compressed versions of these signals commonly used DVB/ASI links which also used one-way SDI circuits within both production facilities and over long-haul terrestrial and satellite networks. Analog program audio and digital audio signals that were not embedded into SDI signals were transported over shielded cables inside the production facility and via T1/E1 telephone circuits for long-haul connections. Data signals were often sent as separate serial links using protocols such as RS-232, RS-422, and contact closures; in some cases multiplexing devices could be used to combine them over a single telecom circuit or data connection. Intercom and voice circuits require two-way audio connections, which were often transported between facilities using multiple circuits leased from telephone service providers.

Large files associated with graphics, animations or library clips often required physical media such as tapes or disk drives, although more recently the trend has been to install high-bandwidth IP networks and utilize advanced file acceleration applications to transport these as digital files. With all these different signal types and network configurations, broadcasters would often need days before each event to install, configure and test a diverse array of communication circuits.



Media Links Media over IP Transport Platform Unifies all Signals

Today, IP technology implemented on the MD8000 system from Media Links allows all of the signals required for a live sports broadcast to be unified on a common transport platform. By using IP connections implemented over a high-reliability switched Ethernet fabric, all of the signals required for a modern sports broadcast can be delivered over a single backbone, greatly reducing system complexity, setup time and cost.

- Uncompressed video signals are converted from SDI into high-bandwidth IP packet streams, which can then be fed over the common backbone. Packetization allows FEC (Forward Error Correction) and hitless protection switching to be added to important (or all) streams to ensure high-quality video delivery even over networks that experience bit errors and packet loss. To reduce bandwidth consumption, the MD8000 can optionally provide industry standard JPEG2000 or H.264 compression functions for any or all video feeds. These low-delay, high-quality encoders and decoders can be installed at any point in the network to optimize picture quality for almost any available bandwidth.
- Compressed video signals can be transported in their native IP format if that is the output generated by the compression codec, or they can be converted into IP streams from DVB/ASI encoder outputs. In either case, these signals can be reliably delivered using the advanced routing and bandwidth reservation systems provided by the MD8000 system.
- Audio signals often require point-to-point and multicast delivery to multiple destinations for sports production. Uncompressed audio signals can be directly interfaced to the MD8000 system as AES audio signals using balanced connections, where they are converted into low-delay packet streams for transport over the IP backbone, and then back to AES at their destination. Multichannel audio such as 5.1 surround sound can also be directly interfaced, with the MD8000 ensuring phase-locked, equal latency paths for each signal to ensure accurate sound reproduction across the IP backbone. Audio signals can also be delivered simultaneously to multiple destinations within an MD8000 network to support multiple production and monitoring locations with impeccable quality.
- Voice signals used for intercom and telephone interconnect functions can be supported as baseband audio signals, as IP telephony (SIP phone) signals, or by using T1/E1 and STM-1/OC-3 native telephony interfaces, giving sports broadcasters the flexibility to directly interface the MD8000 to any type of intercom system.
- Data signals and file transfers can easily be supported using low-speed and high-speed IP interfaces, which can be configured as separate networks or combined into larger LAN architectures within the MD8000 network fabric. This versatility allows some data circuits to be configured as private links for high levels of security and to support unique addressing schemes, and other data circuits to be combined into larger fabrics to support shared access to valuable resource such as file servers and control/monitoring systems.
- Internet access is increasingly necessary for sports production, both for employee access to public web-based systems and for interaction with viewers using social media networks. The MD8000 natively supports IP connections between private and public networks, and can be configured to provide dedicated access on some connections as well as shared access for other interfaces.

Types of Signals that Need to be Provided by a Signal Transport Solution



Live video and audio feeds that capture the actual competition



Live video and audio feeds from announcers/reporters/analysts located at the sports venue.



Live data feeds that carry statistics, results and other information about the event.

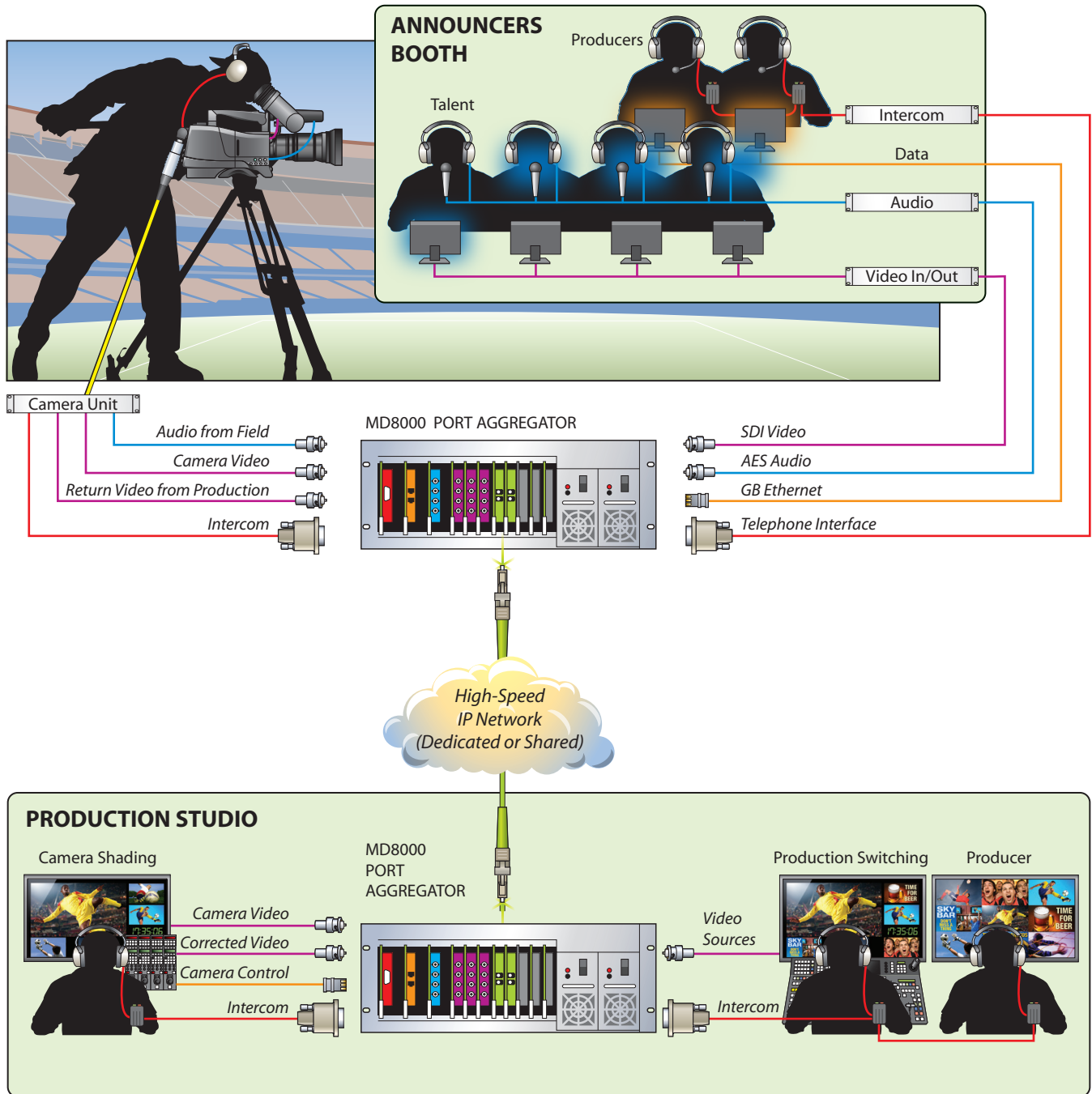


Two-way voice intercom/telephone system that provides communications among the production team members.



Data links using multiple formats and bit rates are deployed for many different production equipment control and monitoring functions.

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MD8000 Media over IP Solution Provides Many Advanced Features

Overall, the MD8000 provides many advanced features that are ideally suited for sports applications, including:

- **High-capacity, flexible MD8000 networks allow, broadcasters to reduce their need to rent expensive on-site production trucks by bringing high-quality camera feeds back to a centralized production facility.**

In many cases, the need for remote productions staff headcounts can be lowered through the use of multichannel video, audio and data links directly from the remote sites. This can also improve the productivity of studio personnel who can work on multiple events in succession without having to spend time travelling between venues.



- **Unlike most commercial datacom networking products, the MD8000 has a switching fabric and control system that has been specifically designed for media signals.**

This includes the ability to precisely configure the routing of high-bandwidth video signals that must be delivered with extremely tight clock tolerances and low delay. Advanced scheduling and connection management tools in the MD8000 control system can be used to rapidly reconfigure connections as service requirements change during the broadcast day, while also ensuring that each service has dedicated bandwidth allocations that allow unhindered transmission and that prevent backbone network links from becoming overloaded.



- **Media Links was a pioneer in the development, deployment and standardization of hitless protection switching, a powerful error correction technique available in the MD8000 that allows high-value signal to be simultaneously transmitted over two separate links.**

At the receiver, the two streams are combined to produce a single, robust output signal that will keep performing even in the event of a lengthy outage in either one of the transport streams, delivering an unmatched level of reliability to mission critical media feeds. This technology has been deployed by numerous broadcasters for over a decade to support broadcasts such as the FIFA World Cup and the Olympics.



- **The MD8000 provides seamless scalability to allow changes to be made to the network and user connections without disturbing ongoing transmissions.** Individual media links can be added or removed as new services are enabled or when maintenance actions must be performed as networks evolve.
- **Several chassis types are available** for configuration flexibility.
- **The MD8000 incorporates “Technical Emmy Award® winning” technology** that helps set the standards for the industry.