

Case Study



SiA – Jupiler and Proximus League



**IP REMOTE PRODUCTION OF
BELGIUM'S FIRST- AND SECOND-
DIVISION FOOTBALL**



*How many operators do you need to cover two soccer matches in Belgium?
—Just over half.*

LAWO MATERIAL INVOLVED IN THIS PROJECT:

IP CORE INFRASTRUCTURE

- V__matrix software-defined routing, processing & multiviewing platform
- 20x V__matrix C100 processing blades
- Various virtual modules (VMs) for the V__matrix C100
- V__remote4 all-in-one remote production interface
- V__link4 all-in-one video-over-IP stagebox

IP STAGEBOXES

- A__mic8 Audio-to-IP interfaces
- V__remote4 all-in-one remote production interface

MULTIVIEWER

- V__matrix with vm_mv24-4 virtual multiviewer modules

CONTROL

- VSM IP broadcast control system

AUDIO

- 2x mc²56 IP audio production consoles
- 2x Nova73 compact IP audio aggregation & processing cores

This is what SiA in Belgium found and has been applying to second-division soccer coverage for more than two years. For first-division matches, SiA creates its own side production and contributes to the IBC feed. Even in this scenario, substantial amounts are saved by producing “at home.”

This case study will present two clever approaches that have allowed SiA to produce more content with the same budget—thanks to remote IP production.

About SiA

SiA (Skynet iMotion Activities), a member of the Proximus group, Belgium's leading telecoms provider, was set up in 2005 as the entity in charge of creating, producing, purchasing and leveraging audiovisual content under the Proximus TV moniker.

Proximus TV has an extensive video-on-demand (VOD) catalog of recent and classic movies as well as documentaries, concerts, sports clips/trailers and TV programs.

Located in Evre, in Belgium's Brussels-Capital region, SiA is the TV and media factory of Proximus TV's video-on-demand catalog. Its activities consist of video encoding, editing, mastering, subtitling and quality control of several thousand media items a year.

In addition, SiA produces over 700 live programs a year—in two languages: French and Dutch.

Its most popular channel, “Proximus 11”, produces and airs eight live matches of Belgium's Jupiler Pro League (1st division) and four games of the Proximus League (2nd division) each week—again in two languages. Besides the matches proper, studio programs are produced by two professional studios. Next to Proximus 11, the football channel “Proximus 11+”, broadcasts Champions League matches.



Background

Proximus currently holds the rights to the “Belgian First Division B” (officially known as Proximus League), i.e. the second division whose season is based on two separate competitions in which eight teams play each other twice.

SiA adopted **two approaches** for airing the matches it covers, because it needed to address two different needs. While SiA controls the entire production process for the second division, it decided to use IP even for the first division, albeit in a non-disruptive way, as it has to coexist with other companies.

The most important consideration for going IP was budget control and leveraging the advantages of IP remote productions to save cost in a number of areas.

Rodrigo Sternberg, the Executive Manager Technology Media Operations of SiA, puts it like this: “Our production has almost doubled over the last three years, but our budget is still the same.”



Light-bulb Moment

SiA's decision to dive into IP remote production was taken in June 2016, following the demonstrable success of Lawo's technology at the [European Soccer Championship in France](#).

The novel aspect was that the international broadcast center (IBC) in [Paris](#) was able to monitor and receive the signals from all 12 stadiums via IP rather than satellite uplinks, and to control every detail of the production while being hundreds of miles away from the device whose settings were tweaked.

All signals coming from the cameras and ambience microphones were fed into Lawo [V_remote4](#) and [A_mic8](#) units, which were connected to a network switch that transmitted audio and video streams to the IBC via two separate IP paths—main and backup—using private fiber-optic lines (2x 90Gbit/s).

The IBC formed a gigantic network that included all 12 stadiums and where any signal could be routed to any destination bidirectionally, i.e. from and to the IBC.

Proximus had just acquired the rights to Belgium's 2nd soccer league and was invited by UEFA (Union of European Football Associations) to visit the setup in France. After watching the test—and even before the opening match of the European Championship—the Proximus team decided to implement a similar system in Belgium.

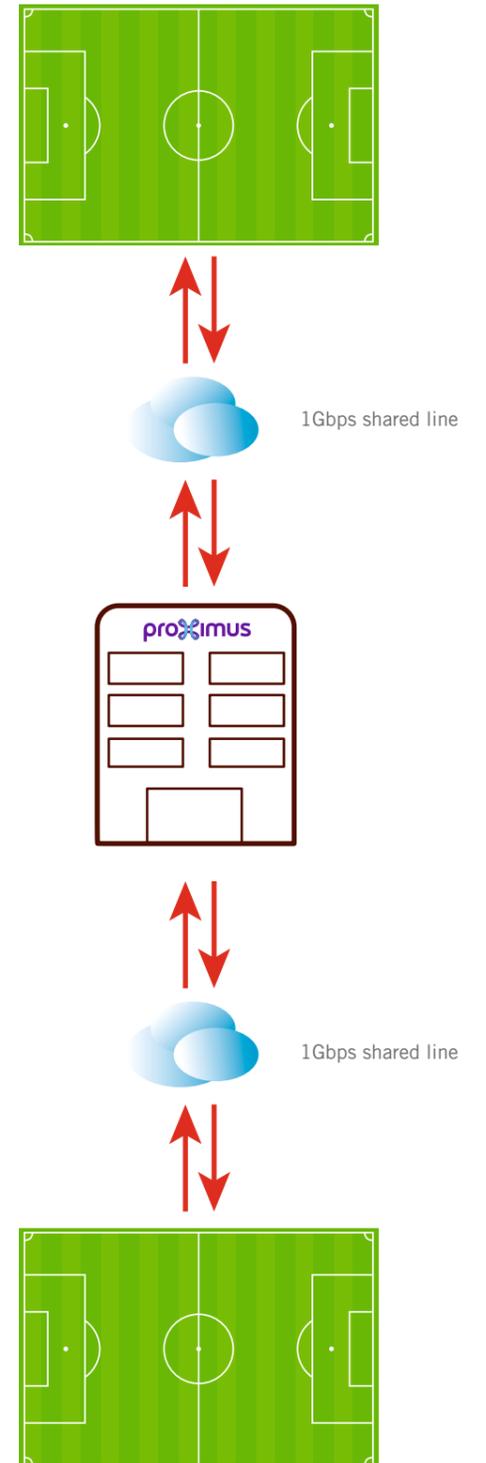
An e-mail was sent to info@lawo.com on June 12th, 2016. **Two days later**, Lawo's Dirk Sykora was already discussing the details of this project in Evere and scheduling a test: SiA wanted to be up and running by the start of the upcoming season on August 5th.

SiA already owned two fully equipped audio and two video control rooms (for Dutch and French) that were not utilized to their full extent, and they knew that operating large OB trucks with a 40+-strong team would cause production costs to skyrocket. They also saw the potential of leveraging their existing A/V equipment, which meant that they were looking for a solution to accommodate both SDI and IP signals.

For the Proximus League, Proximus participates in the calendar and has a say in the schedule 2nd-division matches follow. Where possible this is done to enable a single crew in the central site to produce 2 matches in succession. This allows SiA to realise savings in operational crews.

A van with a basic setup, the commentators (Dutch and French), six cameras and their operators, and two installation technicians on site were enough to cover the event.

LAWO'S INITIAL MISSION WAS “TO PROVIDE THE REQUIRED BOXES AT EITHER END OF THE IP LINE,” AS THE CLIENT AT FIRST ONLY WANTED TO LEVERAGE ITS EXISTING GEAR.



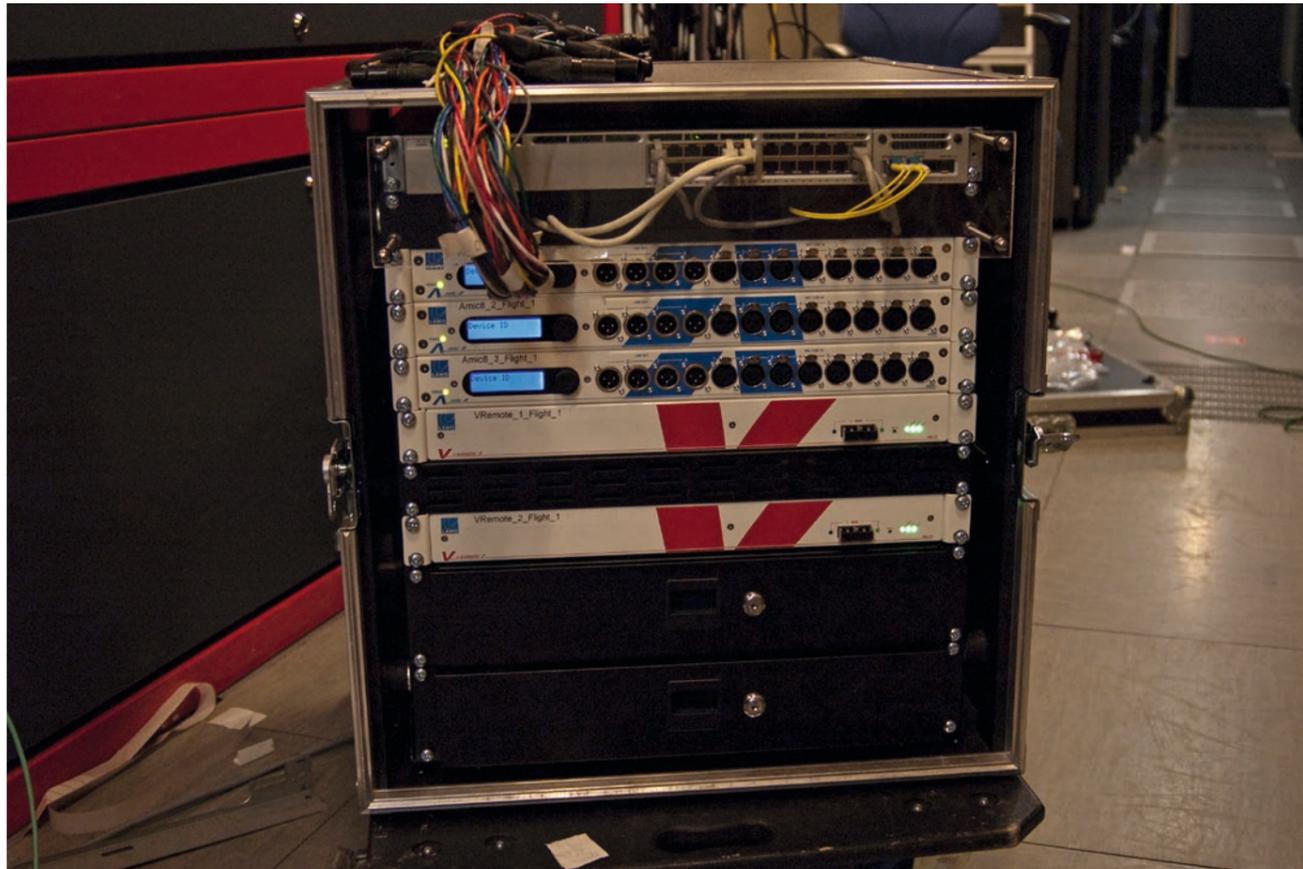
Proximus League—Making IP Ends Meet

Given the available infrastructure at SiA and the decision to keep working with the camera crews and technicians of the outside broadcast service providers NEP and Videohouse, Lawo was asked how best to link the cameras and microphones in the stadiums to the control rooms in Evere over IP.

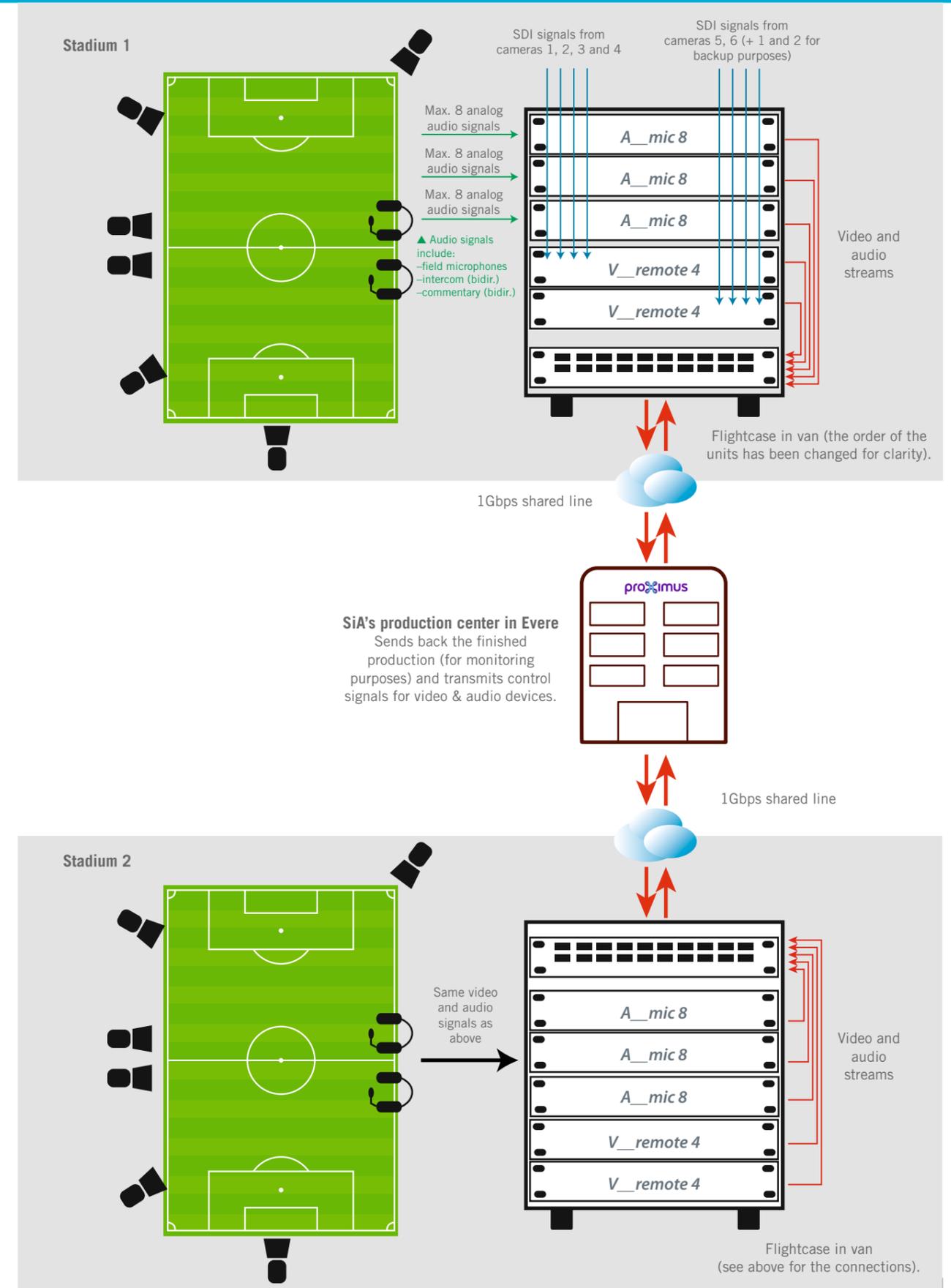
For the second-division Proximus League, SiA decided to use a single 1Gbps connection to a shared IP line—without a redundant line.

Lawo suggested the following: for each match, of which there are two on any given day, a van with two setup technicians drives to the stadium. This van is equipped with a flightcase that contains the following devices:

- 2x Lawo V__remote4 (for 6 cameras)
- 3x Lawo A__mic8 (for all field microphones, commentary and intercom connections)
- 1x switch



Spare flight case in Evere. The two vans (owned and operated by NEP and Videohouse) each contain an identical setup.



Van connected to stadium via cable loom



STADIUM

The **audio setup technician** installs the ambience microphones, sets up two analog commentary stations (one for French, one for Dutch) and prepares the intercom lines. All audio signals go to the **A__mic8** units via standard XLR cables. Up to 24 microphones can be accommodated.

The **A__mic8** units convert incoming analog audio to audio streams transmitted to, and received from, Evere.

The **camera operators** install the six cameras on the soccer field and connect them to the two Lawo **V__remote4** units as follows:

- 1st V__remote4: Cameras 1, 2, 3 and 4
- 2nd V__remote4: Cameras 5, 6 and 1, 2

This system was chosen to ensure that at least four camera signals are available if one of the V__remote4 units is accidentally disconnected. Standard triax cables are used for connecting the cameras to the CCUs (SDI).

One single cable loom links the van's flightcase to the connection boxes at the stadium (network cable, 6x triax camera cables, audio cabling to the field and to the commentary stations). Microphones are connected to an audio stagebox inside the stadium. Their signals are converted to IP by the **A__mic8** units.

The V__remote4 and A__mic8 units feed their streams to a **switch**, which is plugged into the Proximus network and transmits its data to Evere.

Unlike the V__link4, which is otherwise identical, the V__remote4 provides J2K and VC-2 signal compression, which is used to create **six 100Mbps J2K streams** of the camera signals (Full HD). This compression is removed in Evere using the two V__remote4 units that communicate with the stadium.

In this way, it is possible to handle the entire data traffic using a 1Gbps line (uncompressed video normally requires 1.5Gbps per camera). When asked about the impact of this approach on quality, Rodrigo Sternberg replies that viewers at home enjoy the same quality, because the compression is invisible to them.

At the same time, the flightcase at the stadium also **receives** monitor and intercom signals from the production team in Evere. Plus, all devices (camera shading, audio settings, etc.) are remotely controlled from Evere.

PRODUCTION CENTER IN EVERE

The video streams arriving in Evere are decoded by two V__remote4 units per stadium, converted to **SDI where necessary** and transmitted to the video control room (video mixer, multi-viewer, screens, LSM slow-motion machines, etc.).

The audio stream is converted to **MADI** and transmitted to the audio mixing consoles. **All signals mentioned so far are available separately** and can be processed in any way the engineers and operators see fit.

The control rooms in Evere also send signals back to the stadium: the main program, audio mix, intercom feedback,

control signals and a stream that is used for synchronization purposes.

Operators in Evere can **monitor the status** of all critical parameters:

Power-supply status	Each Lawo unit has a main and a redundant power supply. Both are monitored.
Unit temperature	A warning is generated in case a Lawo device overheats.
Connection status	The production crew in Evere knows which devices are unavailable and can ask the setup technicians to solve the problem.

In addition, the setup transmits **tally signals** to the cameras, while the **shader** can correct camera settings to produce a more pleasing and uniform visual result.

To be even more time efficient, each of the stadiums is equipped with **fixed patch boxes to which the cameras, microphones and commentary stations are connected**.

Putting it all together

The technical crew arrive at the stadium four hours before the match. The first link to be established is the IP network connection between the flightcase in the small van and the control rooms in Evere. This allows the engineer in Evere to follow the connection status of all other devices and to take control of all aspects involved in the production.

While the setup technicians in the van have two screens they can watch, they do not adjust any settings. This is done remotely. The intercom panel in the van nevertheless allows



them to communicate with the camera crew and the control room in Evere. As stated above, all intercom signals also travel over the network.

SiA/Proximus owns a third, **spare**, flightcase with exactly the same V__remote4/A__mic8/switch configuration in case one of the vans gets stuck in traffic or cannot make it to the stadium for another reason. In a small country like Belgium, sending a spare rack remains an option.

VSM (Virtual Studio Manager) – IP Broadcast Control System

While the basic setup was put in place, Lawo suggested adding its [VSM IP broadcast control system](#) to the mix: switching between stadiums without this solution would be a manual process that takes in excess of two hours and is prone to human error. That time-frame and risk were unacceptable: Proximus wanted the second match to start only minutes after the first one finished.

All Lawo devices can be edited via their built-in web service. VSM takes over all available parameters, reconfigures the devices and routes all required signals to the correct destinations, hopping stadiums in the process. Thanks to VSM, rapid switches become a matter of clicking (or pressing) [one button](#) and take a little over one second.

VSM is a modular, GUI-driven software solution that is configured and customized for each client. SiA's graphical VSM interface shows the two control rooms, the on-site flightcases and their connection status of all equipment, regardless of the manufacturer.



WRAPPING IT UP

While Lawo's Dirk Sykora was available during the first productions, he was quickly able to scale down his presence once it became clear that SiA's remote production system was delivering on its promise. Since acquiring the rights to the Proximus League, SiA has been airing 120 matches a year (four per week) in two languages, with separate production teams for both languages that each cover two matches.

SiA requested a system where the selection of the other stadium is confirmed using a [Take] button. Doing so sets up the correct streams from that stadium to the video and audio mixers as well as all other production-related signals and devices in Evere. VSM supports touchscreens, point-and-click operation and convenient control via hardware panels, so that all operators can work [according to their preferred workflow](#).



With VSM, [any small IP connection van/flightcase](#) can be connected to [any control room](#). In addition, it controls tally signals, it runs the intercom from any relevant control room to the camera operators, it routes the audio signals to the correct mixing consoles and video signals to the multi-viewers, it assigns the cameras to the requested buttons on the video mixers, etc. Hundreds of operations are performed within a split second.

The Proximus League production approach is now well into its second season, and one important lesson learned is that the system is as good as the cable connections. Potential issues in this respect have been addressed, though.

The overall system works like a charm, and Christophe Anrys, SiA's Applications Manager, confirms: "The future belongs to IP remote productions."

Jupiler League—One For All

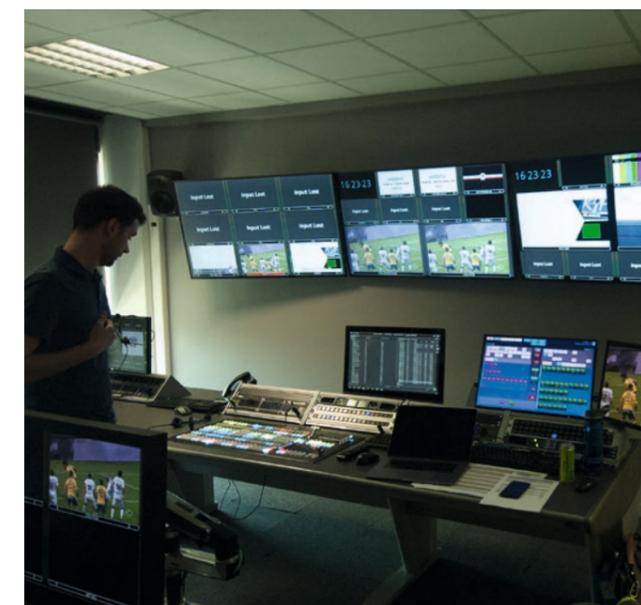
While SiA was able to capitalize on its existing infrastructure for the Proximus League, it decided to commission [all-new control rooms](#) and Lawo's IP technology to meet the new production requirements for Jupiter Pro League (first division) broadcasts.

Copying and pasting the IP setup and approach of the Proximus League proved impossible, because the Jupiler League had chosen to keep control of the production.

Also, the two other telecoms partners wanted to create their own programs based on the international footage they received from SiA. The Belgian Football Association therefore decided to work with a full-blown production team on site and to stick to the IP transmission approach. A large OB truck with a 40-strong crew

therefore acts as host broadcaster, creating the footage and ambient audio track. General Production supplies [two generic production feeds](#) to the MCR in Evere, where the necessary graphics are added for the Jupiler League program's. SiA passes those signals on as is to Telenet and Voo.

Does this mean that SiA's production crew in Evere is not needed for Jupiler Pro League matches? No: soccer coverage as we know it today involves a lot more than just the game itself. Broadcasts are spiced up with interviews, comments and analyses. In SiA's case, this means working in two languages, adding graphics, slow-mo and other effects. This additional content is called "habillage" (pimping up) in French.

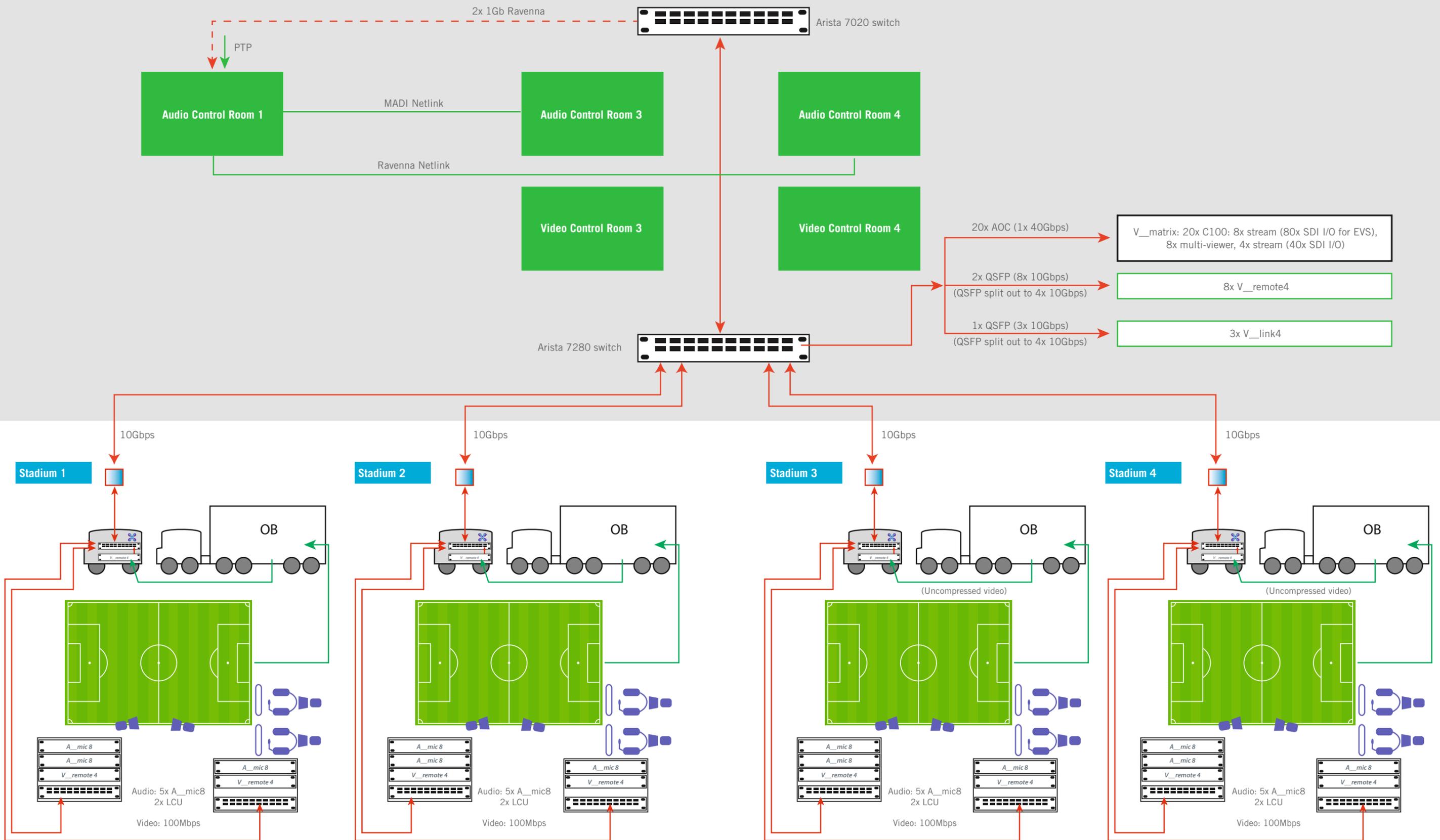


Implementation

Before showing how the system is implemented, let us quickly look at the strategy developed for the Jupiler Pro League:

All 16 first-division stadiums in Belgium are equipped with [private 10Gbps fiber-optic links](#) to the Proximus backbone. The OB truck transmits its "international/host" production (four versions) in the SDI format to a small van stationed at the stadium.

The van is connected to a private fiber-optic line and sends the international signal streams to Evere where they are passed on to Telenet and Voo in their "raw" state.



The on-site NEP or Videohouse team adds a few field-of-play (FOP) cameras at the stadium, two commentary stations, the infrastructure for interviews, etc., for SiA's own production. These are connected to separate V__remote4 and A__mic8 units and then transmitted to SiA's van. The van contains a single V__remote4 unit and a network switch to which the fiber-optic cables coming from the stadium are connected.

Belgium's first-division stadiums have been equipped with flightcases containing V__remote4 and A__mic8 units: one FOP flightcase to which SiA's cameras, A__mic8s, intercom and in-ear monitors are connected, plus one flightcase close to the commentary stations and robot cameras for the commentators on site. (SiA's policy is to work with on-site commentators for a more lively and involved program.)

Up to four vans are available for as many concurrent matches. They transmit and receive data streams—the system is bidirectional, allowing the production team in Evere to communicate with the crew on site and to remotely control its gear.

SiA's own video signals are again compressed to 100Mbit/s (J2K)—like for the Proximus League. Lawo's V__remote4 indeed allows to activate compression for each input separately.

All signals are distributed as multicast streams.



SYNCHRONIZATION

Unlike the shared line used for the Proximus League, the 10Gbit/s fiber-optic line is perfectly able to distribute PTP (Precision Time Protocol) signals throughout the entire network.

For the Jupiler Pro League, synchronization is therefore handled via PTP clocking. This works as follows: a clock signal is generated as BlackBurst video clock by a sync pulse generator in Evere. That signal is converted to PTP by two V__link4s (one main, one backup) and sent out to all devices on the network by the Arista switches. The V__remote4s at the stadium convert the PTP signal to BlackBurst for the cameras on site. Dirk Sykora: "I like to call our V__remote4 a **Swiss army knife**: it is used for encoding/decoding, embedding/de-embedding, compression, clock distribution and synchronization as well as PTP translation from and into BlackBurst."

Meanwhile, back in Evere...

In Evere, video control rooms 3 and 4 receive the footage. They are IP-controlled and part of the overall network. In addition, there are two audio control rooms with Lawo mc²56 mixing consoles, which are also part of the network.

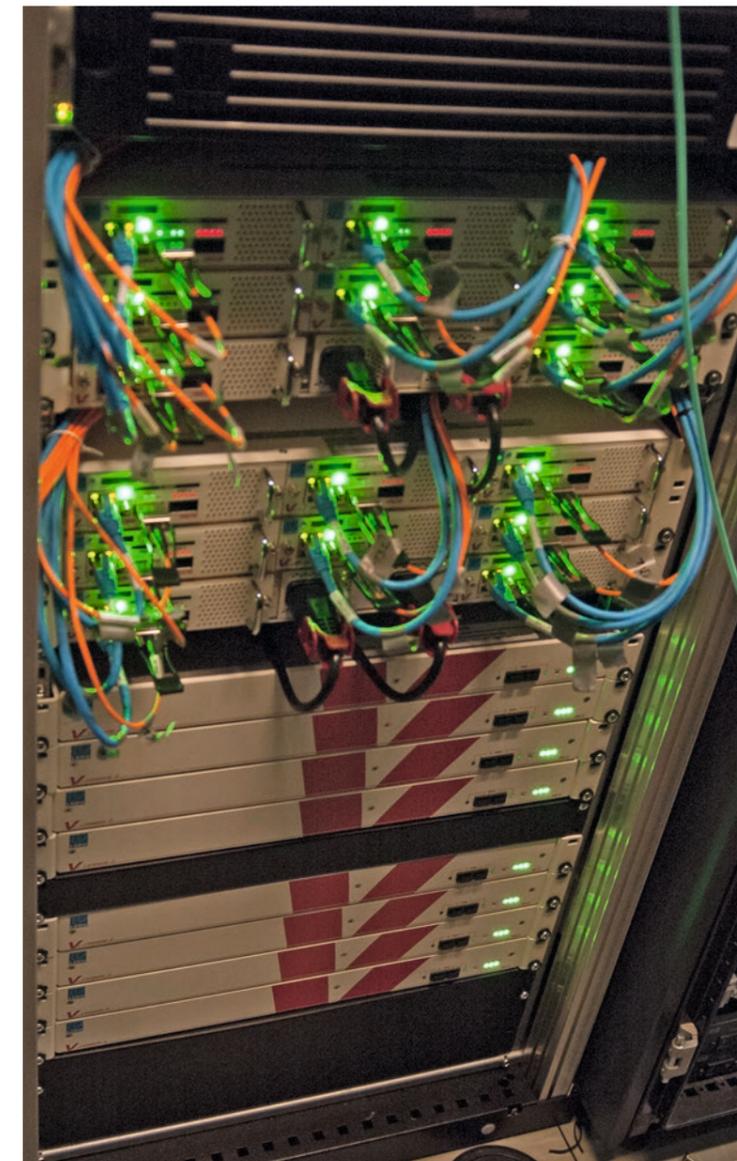
An Arista 7280 network switch (72 ports, 40Gbit each) receives all streams from the stadiums and transmits them to a V__matrix unit equipped with 20x C100 software-defined processing blades. The V__matrix blades have two network connectors on the front panel (40Gbit per connector), and provide SDI outputs on the rear for Telenet and Voo that receive the signals over an existing, legacy line, as do Belgium's national broadcasters, and other parties.

The program is created by SiA in video control rooms 3 and 4 where all video signals are available. All views are created by C100 processing cards in the V__matrix: some cards are used to convert IP streams into SDI, others to build multi-views, doing away with the need for additional equipment, while still others take care of embedding/de-embedding and video synchronization. The number of cards that can be installed in a V__matrix installation is only limited by the number of ports provided by the switch in use. Each blade uses a separate port.

Eight of the C100 blades are loaded with vm_mv24-4 virtual multiviewer modules, each creating 4 multi-viewer heads (for a total of 32 heads generated in only 3RU), while the remaining blades deliver SDI signals for slow-mo, the video mixer, etc. Each C100 blade can handle 10 SDI inputs and as many outputs.

The entire setup (stadiums and production facilities in Evere) is a wide-area network offering remote control of all functions from the audio console, for instance.

While the Ravenna/AES67 protocol is used for audio, control signals for preamp control, etc., are handled via Ember+. Camera shading can also be performed remotely.



Rack with the V__matrix (top), Lawo's unrivaled Software-defined IP Routing & Processing Platform

VSM

Again, VSM plays a vital part in this scenario, thanks to its simplicity and the possibility to instantly redirect signal streams to any desired destination. See also page 10.

One VSM screen shows which vans and devices are connected, and VSM can access all parameters in every V__remote4 on location.

VSM panels are available for most stations at SiA in Evere. Other operators use the customized GUI programmed by Lawo.

Going Live

Dieter Backx, the IP Chef, checks with the stadium whether all connections are in place. Today's match, Ghent vs. Charleroi, is a "model A" match, with one additional camera per language for the commentators. "Model B" matches involve two additional cameras on the field for live interviews and analyses.

The IP connection is established about 5 hours ahead of the game, after all optical levels have been checked. One thing SiA has learned is that optical connectors need to be in pristine condition to ensure that all signals arrive in Evere.

A little later, the OB truck comes online. And then, all other equipment is added. About 3.5 hours before the game, an official test is carried out by the Pro League to check whether everything is in place.

Once the entire system is up and running, the crew members arrive and do their bit to turn tonight's match into an event no soccer fan would want to miss...

Reliability

"So far, dirt has been our main challenge. If signals cannot get from A to B, there is nothing you can do—not even communicate over intercom," says Dieter Backx. The team addresses such issues by means of active monitoring and a written troubleshooting guide prepared by Lawo's Dirk Sykora.

Rodrigo Sternberg adds: "We pay a lot of money for the rights and the production, and we cannot allow anything to go wrong. That is why we chose Lawo."



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*—Rodrigo Sternberg, Executive Manager
Technology Media Operations*

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