

Case Study

DPG Media in Belgium



**FULL-TIME
REMOTE OPERATION**

Executive Summary

DPG Media and Lawo designed a system that allows operators in one city (Antwerp) to leverage the hardware stationed in another (Vilvoorde).

News City in Antwerp was outfitted with a news studio and a small control room connected to the hardware—among them an SDI video router purchased only two years earlier—in Vilvoorde over IP. Antwerp and Vilvoorde are 40km (±24.8 miles) apart.

DPG Media also wanted to include the possibility to migrate its entire setup to IP in a gradual process, whereby existing baseband components will be replaced by IP solutions.

In addition, DPG Media got interested in the remote production possibilities that IP offered and wanted to leverage them not just for the News project, but also for its Entertainment division.

Lawo's VSM broadcast control system had already been running for a while and was to be kept and expanded.

**About DPG Media**

DPG Media in Belgium is the perfect example of a print media group that realized the importance of venturing into broadcast and online media early on. This is why De Persgroep's owner, Christian Van Thillo, co-founded the Vlaamse Mediamaatschappij (later "Medialaan") joint venture together with Roularta, another Belgian publisher, in the early 1990s.

Today, its 35 media brands reach over 80% of the Dutch-speaking population in Belgium.

Despite De Persgroep's media assets in Belgium, Denmark, and the Netherlands, and its 50% stake in Medialaan, it was obvious that agility was key in the face of the changing media landscape, and so De Persgroep acquired Roularta's stake in Medialaan in 2018.

As a result, Medialaan was merged with De Persgroep's newspaper and magazine publishing holdings in Belgium, and the company changed its name to "DPG Media" (May 2019).

In late 2019, the group's HQ relocated from Kobbegem (near Brussels) to Antwerp. And this is where our case study begins...



Preparations for the project under review started when Lawo was contacted in 2016 by Medialaan in Vilvoorde, to the North of Brussels, for the installation of two additional control rooms for Medialaan's News department (in Vilvoorde). The original intention was to install the control rooms together with an all-new equipment room.

Lawo won the contract for Medialaan's new audio infrastructure—hence the presence of mc²56 mixing consoles, Nova 73 routers, etc., in Vilvoorde. The SDI-based video equipment was supplied by other vendors.

At the time, MADI-based audio connections were preferred for practical considerations, which is why most audio links in Vilvoorde still run over MADI. Only recently did DPG Media switch to RAVENNA/AES67-based Audio-over-IP for subsequent add-ons.

All Lawo equipment for the initial project was installed on Medialaan's premises in Vilvoorde. That was indeed where the newscasts of Medialaan's flagship TV station, VTM, were produced.

After the acquisition of the remaining 50% in Medialaan—and following a competition for a new office building in Antwerp, which DPG Media won—it was decided to move the news desks of all papers, and the registered office, to [Antwerp](#).

The newsrooms of DPG Media's TV (VTM) and radio stations (Qmusic, Joe, Willy) were to relocate, too, to leverage the synergy effects expected from bundling all news activities under one roof.

The [News City](#) building in Antwerp had not really been designed for both printed press office space and radio/TV studios. Neither was there space for an equipment room to go with it. In addition, DPG Media's infrastructure in Vilvoorde was still fairly new, and replacing it was not an option. Besides, DPG Media's Entertainment arm was to remain in Vilvoorde anyway.

LAWO PRODUCTS DEPLOYED:

See page 9.

IP = Investment Protection?

The taskforce in charge of solving the “two locations, one system” riddle was headed by Chris Verhoeven who was well aware of the possibilities afforded by audio and video over IP and the resulting remote production benefits that could be reaped.

Aware of the audio-over-WAN-IP capability of the Lawo audio equipment they already owned, DPG Media needed an equally potent **Video-over-IP** system: having purchased new SAM, Grass Valley and Sony video equipment only recently, the IP taskforce was looking for a way of operating DPG Media’s video infrastructure—hosted in Vilvoorde—from Antwerp. The basic **tender** specification for the News project focused on a **40km long connection** between Antwerp, where the “remote controls” (vision mixer, graphics stations, etc.) for the **News** division were going to be hosted, and the machine room in Vilvoorde.

Intended Usage and Deployment

Further to the decision not to replace its existing video setup, the initial idea at DPG Media was to request proposals for so-called gateway devices, i.e. units at either end of the fiber-optic line that translate audio and SDI video signals into IP data packets, and back for further processing where necessary.

Today, the audio and video ingested by the microphones and cameras in Antwerp travel to Vilvoorde in a raw, unprocessed—and uncompressed—state.

“The Lawo Benelux team clearly knew what they were doing and did not have to rely on experts flown in for the occasion.”

—Edwin Huybrechts, Unit Manager
Actua, DPG Media

The link between Vilvoorde and Antwerp is a redundant “dark fiber”, leased line with a bandwidth of 400Gbps per line. This bandwidth is split in two: 200Gbps is reserved for “office traffic”, and the remaining 200Gbps for broadcast applications, i.e. audio, video and control data. (“Redundant” means that identical data streams are sent over two separate links to ensure that at least one of them arrives safely at the required destinations.)

Proof of Concept

DPG Media organized proof-of-concept (PoC) sessions to verify the feasibility and to identify the vendor that met all its criteria at the best price. The distance between Vilvoorde and Antwerp was simulated (in Vilvoorde) by means of giant reels with 40km worth of optical fiber.

Lawo Benelux managed to establish a working, broadcast-grade connection consisting of its V__matrix platform, mc² Micro Core, mxGUI, A__mic8, a SMART demo and a VSM broadcast control system with clean switching, by the end of the first day.

The **C100** blades housed in the **V__matrix** units were programmed to function as gateways (vm_streaming software module). In the course of Lawo’s PoC session, the DPG Media taskforce

nevertheless became curious about what else the **software-definable** C100 blades could do...

Lawo eventually won the contract in May 2019, not least because “The Lawo Benelux team clearly

News Production Control Room at News City (Antwerp): the processing resources are 40km away.

knew what they were doing and did not have to rely on experts flown in for the occasion,” comments Edwin Huybrechts, Unit Manager Actua, DPG Media.

“DPG Media were early adopters, eager to embrace Lawo’s cutting-edge developments,” says Rudi Antonissen, Sales Manager Benelux at Lawo. In the end, all audio, video and control solutions were supplied by a single vendor, Lawo, because the Rastatt-based company managed to convince DPG Media that its business operation was solid enough to warrant flawless and speedy support for years to come.

The **road map** was to install the **News** hardware in Antwerp in October 2019 and to run a series of tests in November and December. The News studio went live on **3 February 2020**.

The new **Entertainment** section in Vilvoorde (a second project presented on page 15), on the other hand, needed to be up and running in late October 2019.

Instant Remote

For the TV news shows produced in Antwerp, all multiviewer mosaics are created at the **data center in Vilvoorde**, based on raw streams received from Antwerp—and sent back to Antwerp over a **dark-fiber** IP line. Still, all actions related to newscasts are performed exclusively by operators in Antwerp—no additional operators are involved in Vilvoorde.



Much smaller than the two control rooms in Vilvoorde, the **production gallery in Antwerp** is equipped with a compact, dual-fader **mc² 56** audio production console. It is located in the same room that also houses the video gear.

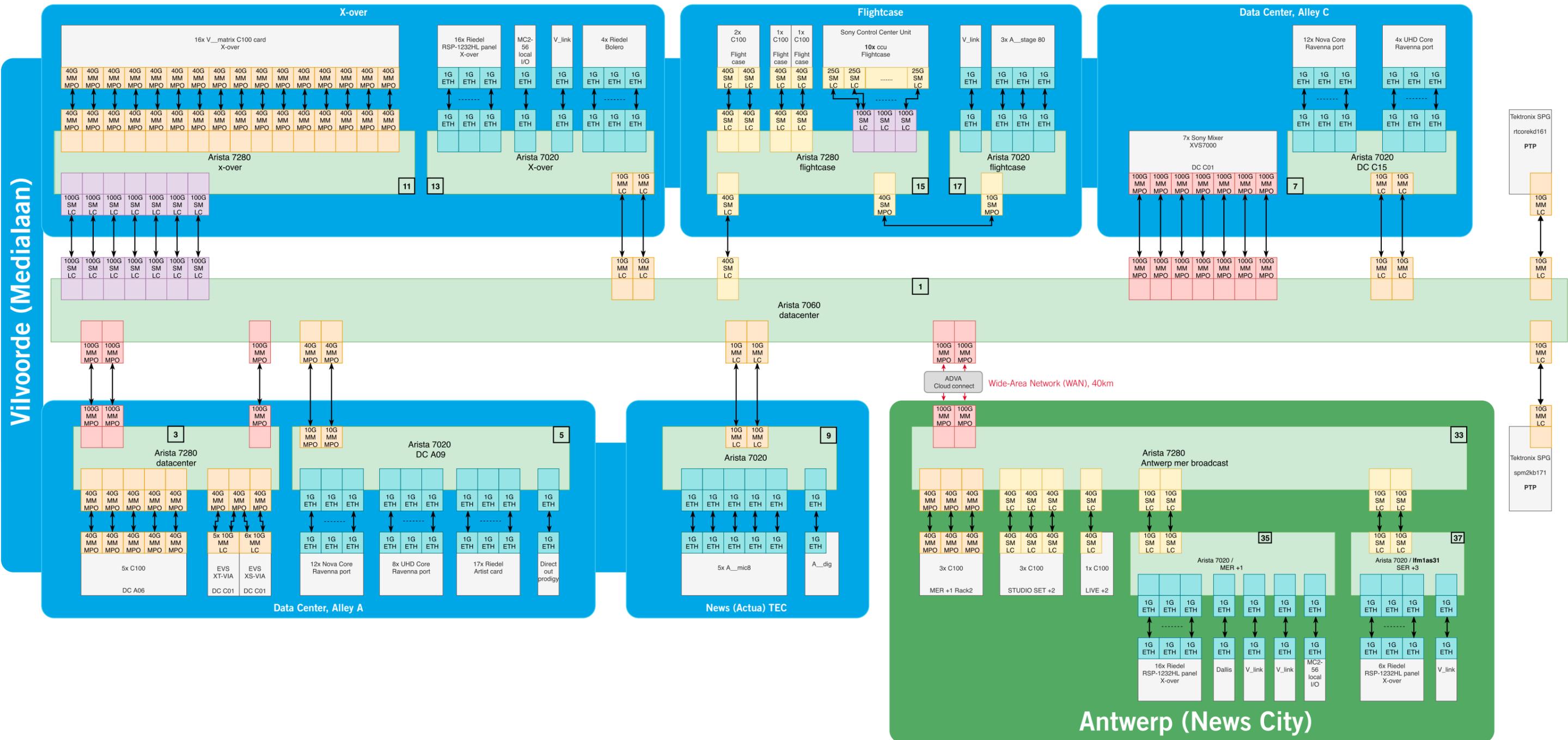
This was a conscious choice: DPG Media intends to **automate** as much as possible and to work with a crew of five.

For news telecasts, **Antwerp remotely takes over** one of the two control rooms in Vilvoorde and controls its processing hardware. Nothing (neither audio, nor video) is processed in Antwerp—ingested signals are transmitted as raw data.

All processing happens in Vilvoorde, which also sends multiviewer and processed signals back to Antwerp for monitoring purposes. Concurrently, the final program signals are handed over to the **master control room**, which is also in Vilvoorde.

In effect, everything that can be monitored in Antwerp is a “copy” of what can also be viewed and listened to in the remotely operated control room in Vilvoorde. The time lag for this Antwerp (ingest)–Vilvoorde (processing)–Antwerp (multiviewing) **roundtrip** is a **mere five frames** (two of which are caused by inevitable SDI/IP GenLock steps and one by multiviewer processing).

DPG Media's network connections: except for video and audio ingestion, News City in Antwerp is basically a highly sophisticated remote control for the equipment in Vilvoorde.



Need for Speed and Control

The remote approach is orchestrated by Lawo's VSM broadcast control system. Among other tasks, VSM is in charge of connecting the control room in Antwerp to a free control room in Vilvoorde—in less than a minute.

In the light of the above, the equipment room in Antwerp is relatively small, and its five 19" racks are almost completely empty: they only contain two Arista leaf network switches, one V__matrix frame with gateway functionality, a few patch panels, and an Advantix dark fiber device. The rack's main purpose is, in fact, to provide space for possible future expansion.

The News studio in Antwerp is equipped with a DALLIS I/O frame for audio signal ingestion, two V__matrix Silent Frames serving as gateways, and a number of processors for the video walls.

No video compression is used between the two cities to achieve an immediate response: pressing a button in Antwerp not only triggers the intended action right away (in Vilvoorde), but also allows for the result of that action to be visible near-instantly (in Antwerp).

“Even though there is still a difference between PTZ and high-end cameras, we believe we have found an efficient way of putting one person in charge of the entire breaking-news production routine.”

—Jan Lemberechts, Head of Production Facilities, DPG Media.

Breaking-News Studio

The Breaking-News set in Antwerp is a highly intuitive, self-op setup developed by DPG Media's Technical Innovations team. It allows one person to produce automated news flashes. Via a custom-built touchscreen panel, presenters can establish all required connections, retrieve content, and go live within seconds.

The new Breaking-News studio is based on a Newtek TriCaster system and four fully automatic PTZ cameras that transmit SDI signals to a dedicated V__matrix Silent Frame, which converts them to IP and transports the resulting streams to Vilvoorde.

Two intelligent functions help the host to manage most production aspects. The first performs automated framing based on the information supplied by two auxiliary Kinect 3D cameras and a cube system to maintain focus on the person who needs to be visible.

The second is an automatic control function based on audio level thresholds to control which of the fixed-microphone channels ingested via a Lawo A__mic8 stagebox is activated.

The underlying routine was written by DPG Media programmers in the Lua scripting language. It communicates with the Lawo mc²56 mixing console via an EmberBridge script that sends Ember+ commands for audio channel selection on the console.

Camera cutting is based on which audio channel is activated. For this, a custom device built by Amptec in Belgium translates AES3 signal information into Lua to produce sensible camera cuts. By “sensible”, Edwin Huybrechts means that oscillating camera cuts are avoided by an algorithm with a built-in timer. The algorithm also controls the PTZ cameras (zoom in/out) whenever one person talks for a long time, to add more visual variation.

The Breaking-News set furthermore includes automated lighting, graphics and a Vizrt engine. By way of example, Jan Lemberechts explains that if the news anchor has guests, he/she can specify at which microphones they will be placed and input their names. After that, each time that person appears on screen, their name is automatically displayed in VTM's corporate graphic format. This custom-built automation system is linked to Lawo's VSM control system for easy inclusion of additional sources.

All Audio Roads lead to mc²56

While the TriCaster system for the Breaking-News set has a built-in audio mixer, DPG Media preferred to rely on Lawo audio solutions for reasons of quality and flexibility regarding signal exchange with their MCR. “Additionally, our mc²56 consoles allow us to leverage Lawo's sophisticated AutoMix algorithms and audio processing functions in a loudness-compliant format.” (Edwin Huybrechts)



mc²56 Audio Production Console in Antwerp. It has access to 256 DSP channels of an A__UHD Core unit in Vilvoorde.

Lawo Equipment used by DPG Media

Vilvoorde (News):

- Audio:
- 1x Nova 73 HD (with redundant router cards)
 - 3x Nova 73 Compact (with redundant router cards)
 - 9x Nova MAD1 cards
 - 10x Nova RAVENNA cards
 - 2x DALLIS frames (with redundant RAVENNA card)
 - 4x A__mic8
 - 1x A__digital8
 - 4x Virtual sound card driver
 - 2x mc²56 (48 faders, incl. RTW TM7)
 - 2x A__UHD Core

Video:

- 1x V__matrix5 frame
 - 5x C100 blades
- Control:
- 2x VSM Studio server
 - 2x VSM Gadget server
 - 13x LBP-series panels
 - 1x GPO64
 - 1x GPI64
 - 2x Smarthub244
 - VSM Software panels

Antwerp (News):

- Audio:
- 1x DALLIS frame (with redundant RAVENNA card)
 - 1x A__mic8
 - 1x mc²56 (32 faders, incl. RTW TM7)

Video:

- 1x V__matrix5 frame
- 3x V__matrix2 Silent Frames
- 7x C100 blades
- 3x V__link4

Control:

- 4x LBP-series panels
- 1x GPIO32
- VSM Software panels

Vilvoorde (Entertainment):

- Audio:
- 1x Nova 73 Compact (with redundant router cards)
 - 1x Nova MAD1 card
 - 6x Nova Ravenna cards
 - 1x mc²56 (64 faders, incl. RTW TM7)
 - 1x A__madi4
 - 2x A__UHD Core
 - 3x A__stage80

Video:

- 2x V__matrix8 frames
- 1x V__matrix5 frames
- 2x V__matrix2 Silent Frames
- 20x C100 blades
- 1x V__link4

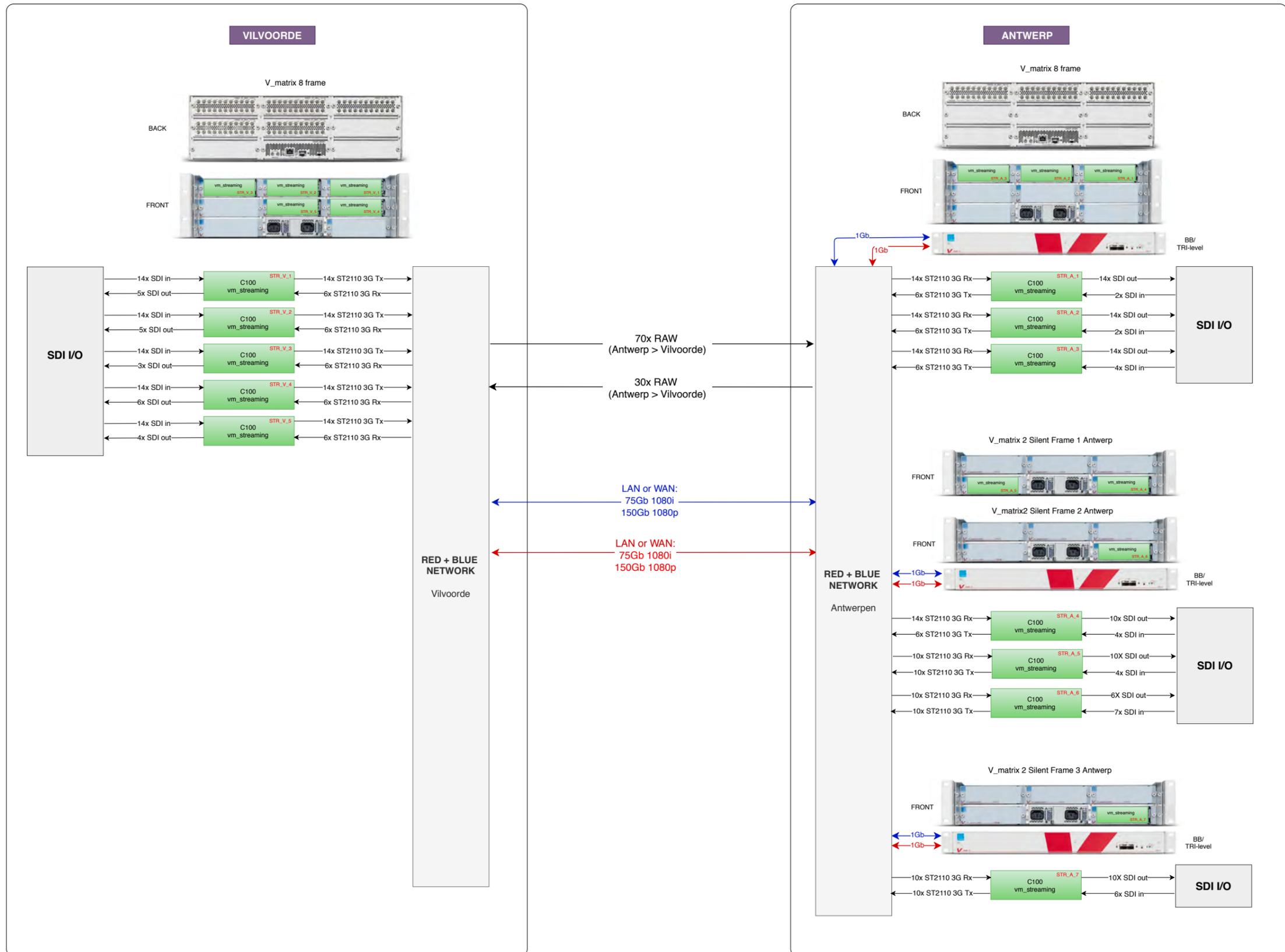
Control:

- 2x VSM Studio server
- 2x VSM Gadget server
- 15x LBP-series panels
- 2x GPIO32
- VSM software panels

Video links between Antwerp (right) and Vilvoorde (left)

The entire video infrastructure at the data center in Vilvoorde is still baseband/SDI-based: video switcher, multiviewers, cameras, etc.

The V_link4 units in Antwerp are used to generate Blackburst and Tri-level signals. Especially Blackburst is required for synchronizing all baseband/SDI devices and cameras. Even though the V_link4s are much more powerful than what they are used for, other Blackburst generators would have been more expensive.



Audio Network Spanning Two Cities

All sources can be pulled from any control room, because all audio stageboxes are connected to the central **Nova73 HD** router.

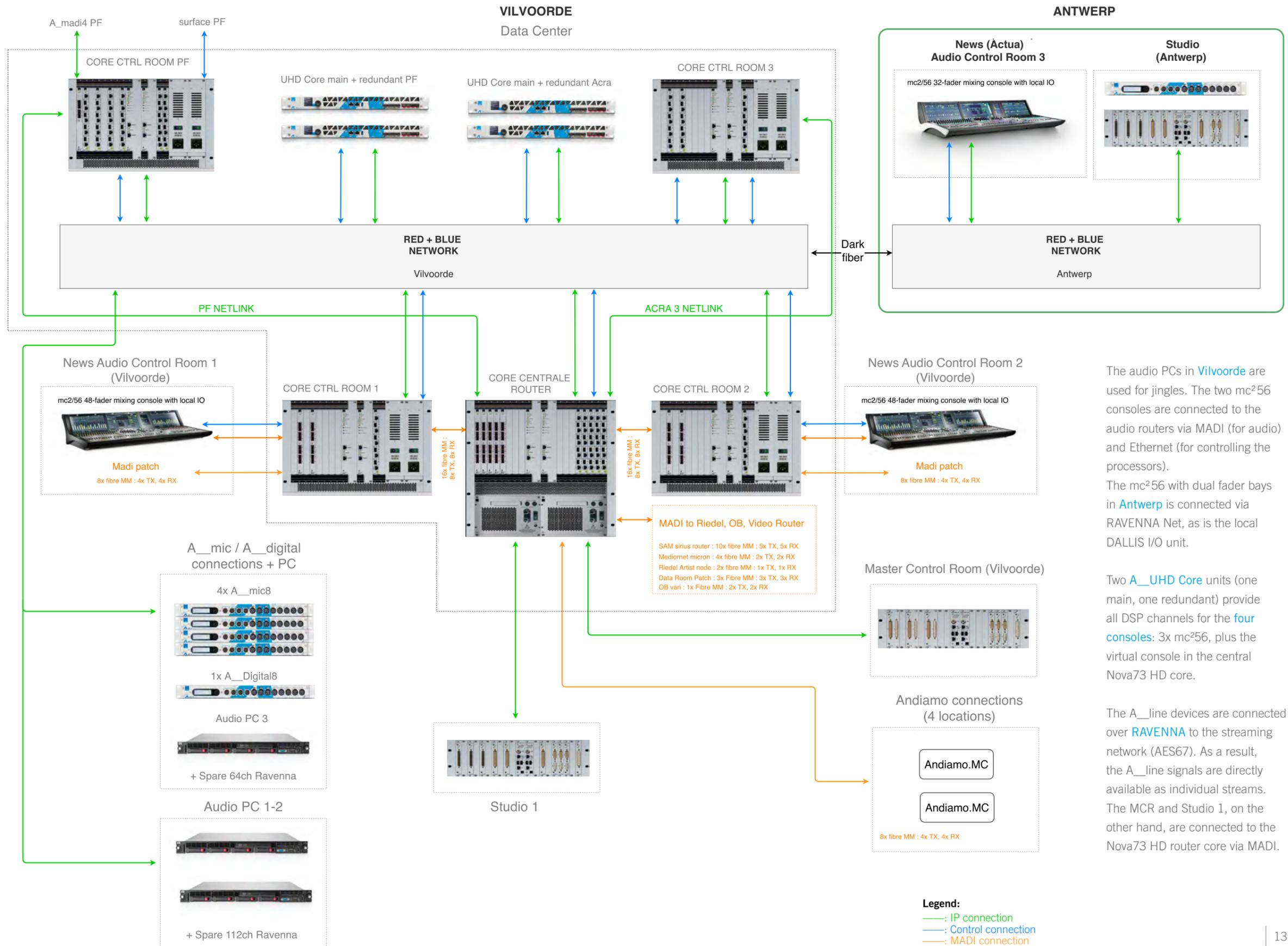
Each control room can “book” access rights to any available audio device. The MCR and the former news studios in Vilvoorde ingest audio signals via Lawo DALLIS frames.

A third existing DALLIS frame has been transferred from Vilvoorde to the new News studio in Antwerp. It is complemented with one **A__mic8** stagebox.

While the DALLIS frames in Vilvoorde are still connected to the central Nova core via **MADI**, the DALLIS stationed in Antwerp as well as the **A__mic8** and **A__digital8** units are connected via **RAVENNA IP**. The reason for this “dichotomy” is essentially that the former audio chief was a little uncomfortable with the then (2016) newish Audio-over-IP approach.

Audio for News: central router core (on which the Breaking-News studio runs via a **virtual console**), with separate Nova Compact routers for each control room in Vilvoorde and the production gallery in Antwerp.

All cores are connected to one another over MADI tielines to allow operators to share input resources in a flexible manner. They are also connected to the central Nova73 via RAVENNA links.



The audio PCs in **Vilvoorde** are used for jingles. The two mc²56 consoles are connected to the audio routers via MADI (for audio) and Ethernet (for controlling the processors). The mc²56 with dual fader bays in **Antwerp** is connected via RAVENNA Net, as is the local DALLIS I/O unit.

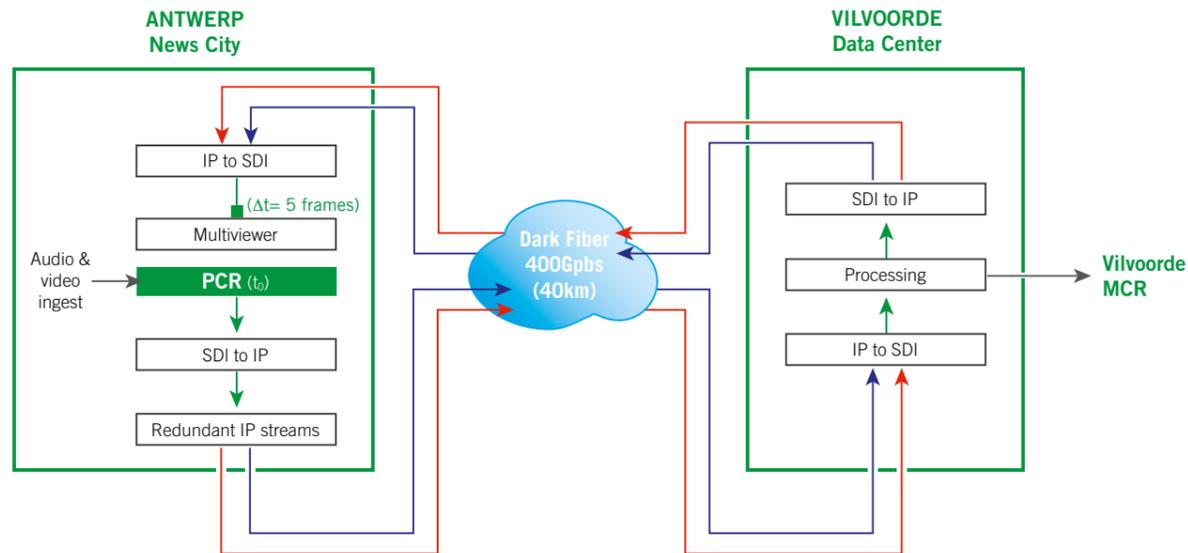
Two **A__UHD Core** units (one main, one redundant) provide all DSP channels for the **four consoles**: 3x mc²56, plus the virtual console in the central Nova73 HD core.

The **A__line** devices are connected over **RAVENNA** to the streaming network (AES67). As a result, the **A__line** signals are directly available as individual streams. The MCR and Studio 1, on the other hand, are connected to the Nova73 HD router core via MADI.

Network

DPG Media uses a single, **non-blocking network** spread over two cities. “When all is said and done, the leaf switches in Antwerp are connected to the spine switches in Vilvoorde using a 40km long cable.” (Rudi Antonissen, Lawo)

Even so, round-trip **video latency** (Antwerp–Vilvoorde–Antwerp) is limited to a mere five frames (of which the Lawo equipment induces only two, the others being added by GenLock synchronization and the multiviewer). The steps involved are as shown in the illustration:

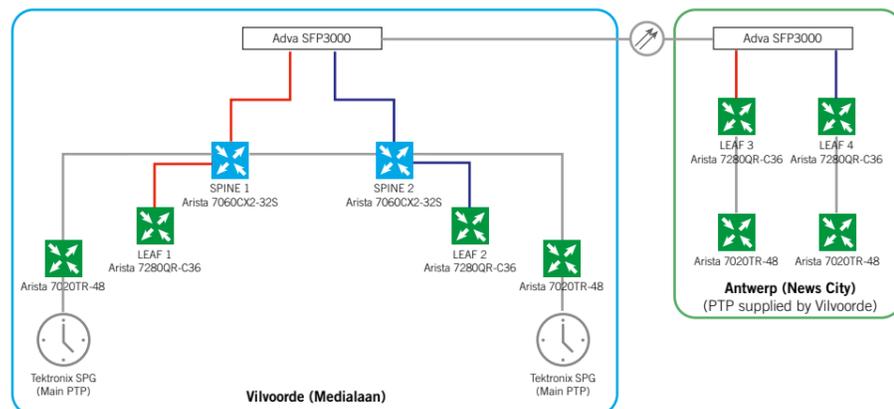


Audio latency, for its part, is only one or two milliseconds. Given the video’s longer delay—which is perfectly normal in the light of the various conversion and processing steps—**lip sync** has to be performed. This is handled by the mc²56, because that allows DPG Media to keep video and audio information separate end-to-end.

For remote productions involving external studios or on-location productions (Entertainment project, see next page), Lawo Benelux devised a **trick**: with the help of a V__remote4 unit, the entire remote rack is timed one frame backwards (the opposite of a look-ahead delay) and triggered with

a blackburst synchronization signal. This was done to make up for the latency induced by **VC-2 compression** encoding/decoding.

DPG Media’s switch configuration is as follows:



Entertainment Project

As stated earlier, Jan Lemberechts and his team were impressed by Lawo’s V__matrix platform during the PoC for the News project where the V__matrix C100 processing blades were only used as gateways between IP and SDI.

As the C100 blades are defined by the software that is installed on them (which is very similar to how a desktop computer works), demonstrating the **multiviewer**, **audio embedding/de-embedding** and **audio shuffling** functions as well as the **format conversion** options was relatively easy.

This triggered a **second order** for the new Entertainment production gallery in Vilvoorde and a so-called “remote rack”.

The processing functions mentioned above as well as the gateway functionality are provided by “stationary” V__matrix units at DPG Media’s data center. The equipment for the studio set (V__matrix Silent frames for SDI video cameras, A__stage80 I/O edge devices for audio ingestion), on the other hand, are mounted into 19” flightcases.

Despite their internal moniker, these “remote racks” are currently only used on-site (studio floor). If DPG Media decides to produce certain content in external studios, however, the racks can be carried to that location and used for contribution purposes.

Another possibility would be to use them for live on-location productions at some point in the future.

The idea is to connect the racks to an IP line and to stream all ingested data directly to the Entertainment production gallery in Vilvoorde—in a “mobile” **remote production scenario**.

Such a scenario inherently means that DPG Media needs to adapt to the remotely available bandwidth: it could be 10Gbps or as low as 1Gbps—a far cry from the 400Gbps leased line linking Antwerp to Vilvoorde.

It was therefore decided to outfit the V__matrix C100 blades in the remote racks with a **VC-2 compression** algorithm (4:1).



Entertainment Video Setup (Vilvoorde)

The V_link4 in the Entertainment control room is again used to generate Blackburst and Tri-Level synchronization signals.

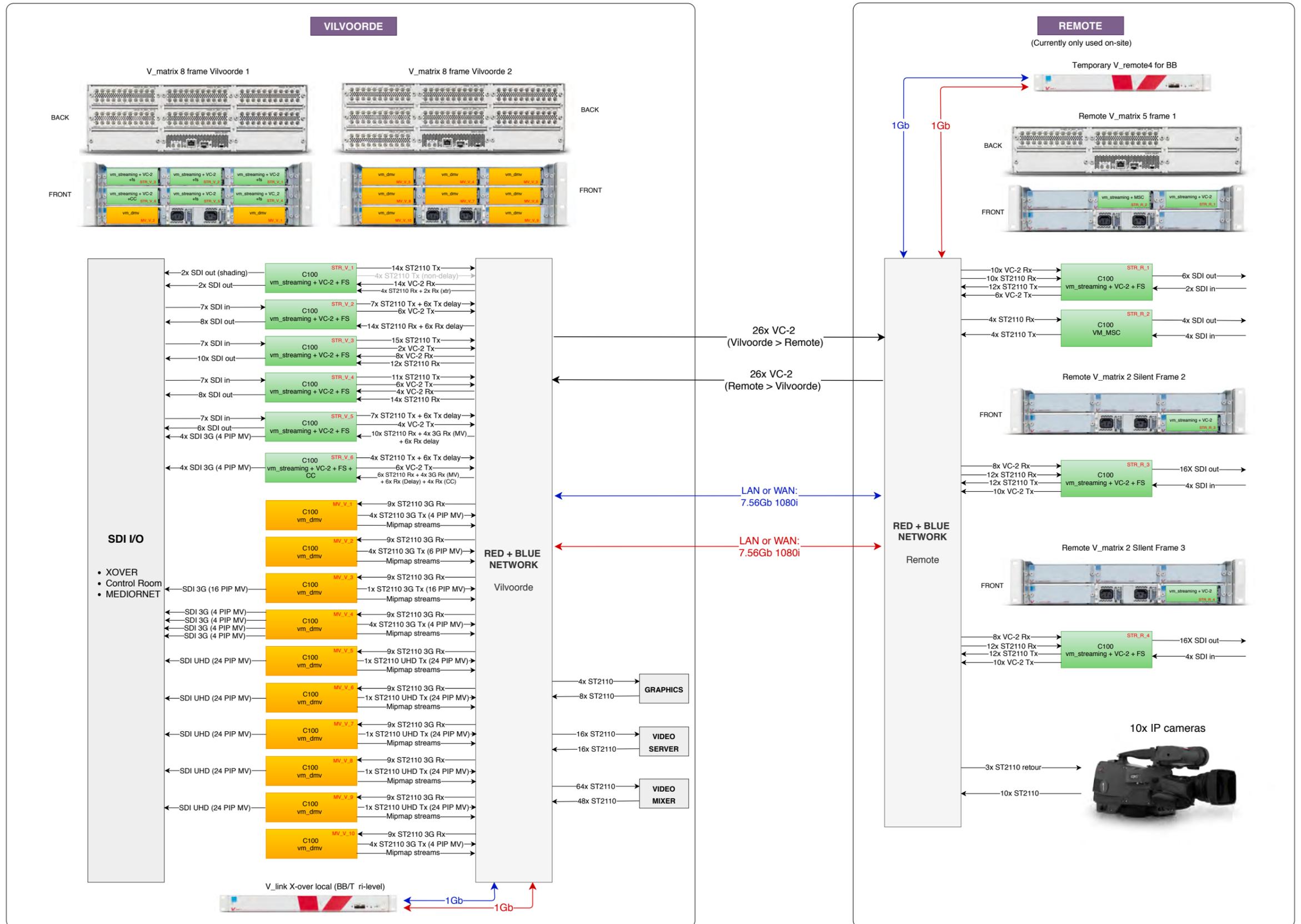
The two V_matrix Silent Frames on the remote side are used as stageboxes on the studio set.

For full-blown remote operation, DPG Media will use one flightcase containing all CCUs, one with the required network switches and V_matrix units, and two flightcases that can be stationed on the studio set.

All other devices remain either at the data center or in the equipment room in Vilvoorde.

The orange C100 frames are used for the generation of Lawo vm_mv multiviewers. They are slated for replacement by vm_dmv distributed multiviewers.

The Entertainment division uses 10 Sony IP cameras and 4 SDI cameras.



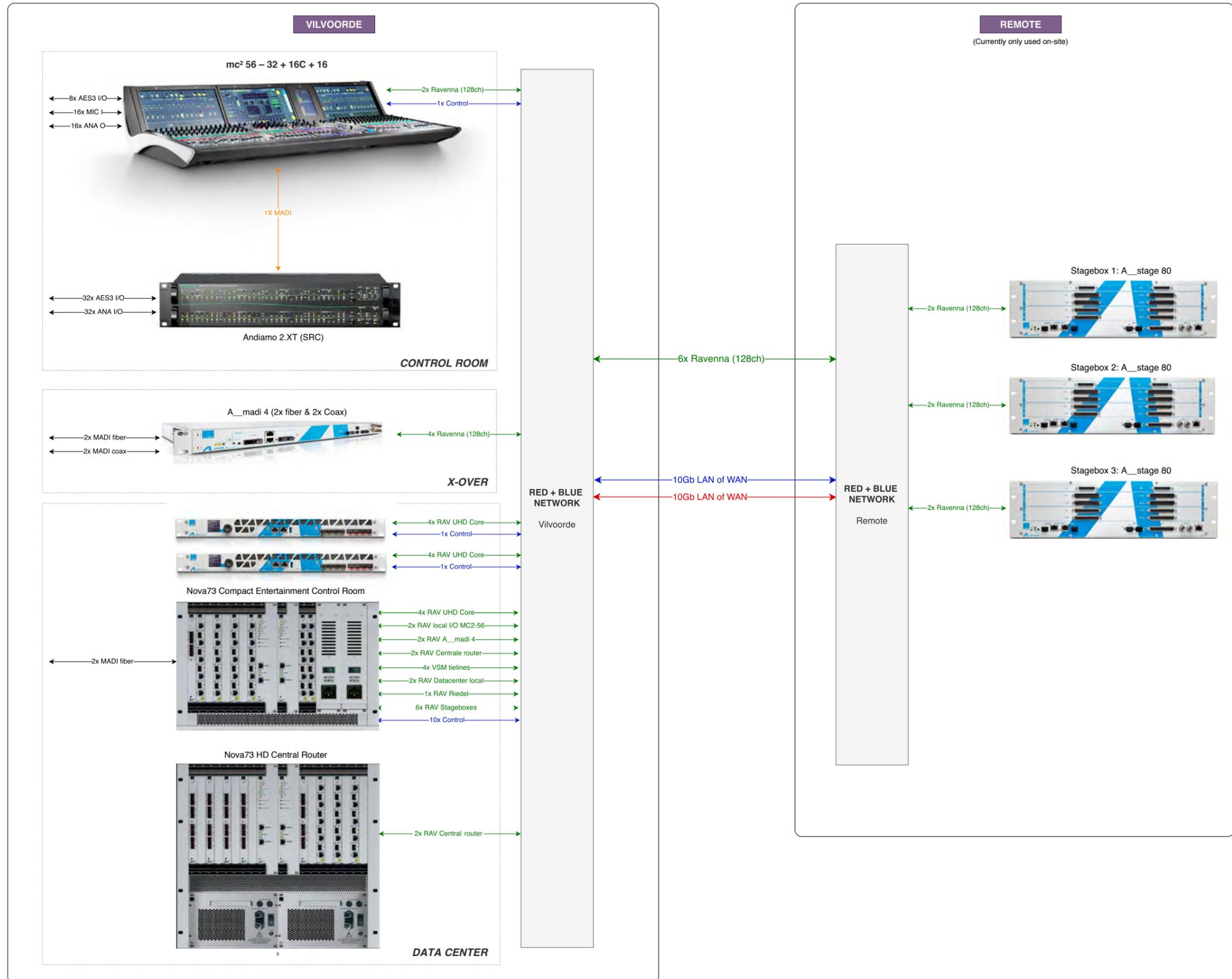
Entertainment Audio Setup (Vilvoorde)

Audio processing is handled via a central Nova73 HD router and a Nova73 Compact. The Novas are chiefly equipped with RAVENNA cards, although some MADI functionality has been provided to accommodate a number of legacy units.

Apart from that, the audio side is **entirely IP-based**. The two A__UHD Cores for the Entertainment division were almost added as an afterthought but have now become critically important: "All DSP processing at DPG Media runs exclusively on Lawo's A__UHD Core." (Rudi Antonissen)

The A__madi4 at the Entertainment division is used for signal exchanges with the data center (via MADI). The mc²56 is a full-option console that also provides **Waves audio plug-in host integration**.

DPG Media uses three A__stage80 stageboxes for remote/on-set audio ingestion.



VSM Control: Boxing

Lawo's Virtual Studio Manager has been the main orchestration and control tool for quite some time at DPG Media. The Entertainment and News divisions use [separate VSM systems](#). This was a conscious decision: it allows to perform maintenance tasks on either division's VSM system without impacting the other.

In addition, large parts of the Entertainment operation have been outsourced, and there was a need to ensure that freelancers could not tamper with control/orchestration settings that are not relevant to them.

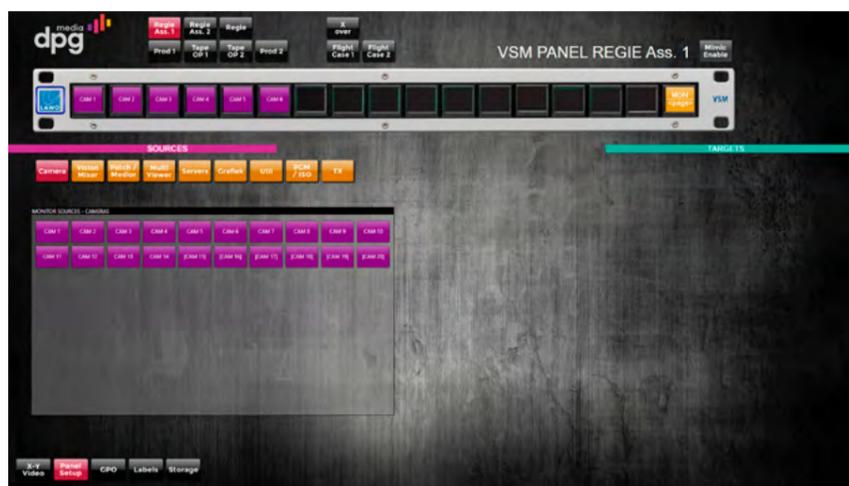
In the Entertainment division's case, VSM also handles [full orchestration](#): assigning raw or VC-2 (compression) operation to the receivers and transmitters on any given C100 blade, managing the video delay and color correction pools, etc.

The VSM control system for the Entertainment division provides an ["Engineering View"](#) (see top illustration) that shows the signal paths through all relevant blades, which is convenient for troubleshooting applications. While signal flow is straightforward for raw (uncompressed) data, VSM automatically orchestrates separate C100 blades for VC-2 compression. DPG Media requested a visualization of all C100 blades involved in data streams, including those in charge of VC-2 signal compression, where applicable.

A different panel (see right) allows chief operators to quickly ["assemble"](#) the required functions for a given hardware panel.



VSM software panel of the "Engineering View" in the top row: all C100 blades involved in a process are shown in the correct sequence.



VSM "Assembly" software panel.

Going Both Ways

Lawo is famous for listening to its customers. Quite a few products and features are the result of user feedback and requests. In DPG Media's case, the development of the following features has been accelerated:

- A__stage edge devices:** DPG Media was immediately sold to the announced capabilities of the new A__stage series, which, in turn, encouraged Lawo to drive the development of the units' FPGA capabilities.
- V__matrix Silent Frame:** A second important boost linked to this project was the release of Lawo's V__matrix Silent Frame. It was deemed crucial, because DPG Media wanted to station its stagebox rack in Antwerp on the studio set, which required a silent solution. Another implementation for the Silent Frame was the intention to use V__matrix as a stagebox by the Entertainment department in Vilvoorde.
- A__UHD Core:** Being early IP adopters, the DPG Media team wanted to access A__UHD Cores from all control rooms so as to share their resources among the [four available mc² 56-type consoles](#), which had never been done at that point. "DSP resource pooling based on one A__UHD Core for four mc² consoles [one of which is a virtual console] has been working flawlessly for several months now," reports Rudi Antonissen.
- vm_dmv Distributed Multiviewer:** Although still in the works when DPG Media placed its order, this virtual module for V__matrix C100 blades became available in the nick of time and was duly included. It will be activated alongside the envisaged migration towards 1080p.



One Tip (for the road)

Here is something DPG Media and Lawo would like to share with other users. When several streaming ports of Lawo's A__UHD Core are connected to the same Arista 7020TR switch on the same VLAN, be sure to add the following line to the switch's configuration script:

```
platform sand multicast replication default ingress-egress
```

Otherwise, multicast packets on combined switch ports are rejected, causing audio drop-outs on DSP channels. Adding this instruction solves the packet loss issue and restores the A__UHD Core's unrivaled sound quality.

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