

Case Study



SIC (Sociedade Independente de Comunicação) in Portugal



**EUROPE'S LARGEST
ST2110 FACILITY TO DATE**



About SIC (Sociedade Independente de Comunicação)

Impresa, the parent company of SIC (Sociedade Independente de Comunicação), is a Portuguese media conglomerate. Through hard work and following a number of bold decisions, SIC learned in late May 2019 that its channels had secured first place for all time slots (morning, noon, afternoon, prime time, late night), beating even Portugal's public broadcasters.

One bold decision was to lure away a popular female presenter from another station. Another was to migrate towards SMPTE2110-based IP.

Built in 2005 and expanded for SIC's ST2110 project, the campus at Paço de Arcos, near Lisbon, is home to part of Impresa's remaining printing business and SIC, Portugal's leading private TV station. SIC operates nine channels, one of which is a 24/7 live news channel.

Among these nine channels is an international channel that can be viewed world-wide. In addition, SIC serves all Portuguese-speaking African countries. For its main domestic channel aired in Portugal, SIC holds the rights to Europa League-Free To Air distribution (soccer).

A Momentous Move

In 2017, the SIC joint technical team (IT and broadcast) collaborated on the definition of the general requirements for the new SIC TV and Multimedia Production Center. This led to the elaboration of a global request for proposals (RFP) by José Lopes, SIC's Director for Operations and Technologies.

The conceptual definition of the system architecture and the required components was prepared by the "technical broadcast team". Matching block diagrams were drafted by Carlos Ladeira, SIC's TV Systems and Equipment Integrator. The network administration team, for its part, studied the best options for the core network together with potential partners.

In late 2017/early 2018, SIC decided to split the RFP into several parts: A/V core (video processing core, control system, cameras, vision mixers and multiviewers); audio; intercom; ENG cameras; lenses; graphics and VR; studio set screens; lighting; wiring and equipment integration; networking; studio floor equipment (risers,

teleprompters); microphones and in-ear systems (studio and ENG); and a satellite reception/transmission platform.

In the light of the disruptive nature of a project whose outcome was difficult to predict, José Lopes and his team immediately saw the need for a systems integrator able to glue all sections and solutions together in an extremely tight time-frame.

Sony responded with a proposal for an A/V core comprising a Lawo VSM broadcast management system and V__matrix, Sony LSM, Sony cameras and Sony vision mixers. In addition, Sony was asked to submit a systems integration proposal based on a plausible network architecture and network configuration for the ST2110 IP core to ensure full interoperability among the components of the A/V core and all other components selected by SIC's technical broadcast team. To this end, Sony—the prime contractor—entered into a partnership with Telefónica.

SIC's IP project involves the following LAWO products:

IP Video

- 7x V__matrix frames
- 41x C100 processing blades divided over the above V__matrix units
- Various vm virtual modules for the C100 blades (including 23 multiviewers)

Control

- 1x VSM IP broadcast management system with 2 servers and over 30 hardware control panels



Future-Oriented by Nature

SIC prides itself on launching the first non-linear 24-hour news channel in Europe. About 80% of SIC's news content is produced on a PC by the journalists themselves, with little or no assistance from technical crew members. Nowadays, this is referred to as self-op. "In a way," says José Lopes, SIC's Director for Operations and Technologies, "we have been pioneers for most of the 27 years of our existence: we installed the first overall MAM (media asset manager) system in Portugal, the first centralized archive, the first multi-channel playout center based on video servers—and now ST2110-based IP."

This pioneering spirit has become part of SIC's DNA: the entire team has learned to think at least two steps ahead to anticipate future expectations from the management and the directors. 24-hour news operation, for instance, is rather demanding, and competition in Portugal is stiff (with roughly 10.2 million inhabitants, Portugal sports three 24-hour news channels). Flexibility is therefore of the essence.

"Groundbreaking technology shifts happen only once in most people's lives. And I was there when SIC migrated to IP!"

—Miguel Inácio, Coordinator Infrastructure Management, SIC

IP in 2017—And Today

By early 2017, open standards-based IP had become the buzzword in the broadcast world and was generally considered a future-proof investment. The SIC team knew that the promise of perfect flexibility was only realistic if all devices connected to the AV IP network were ST2110 compliant and thus able to deliver interoperability.

Proven interoperability was a prerogative, for without it, there was little point in migrating towards a novel format. "In all honesty," says José Lopes, "I had some reservations regarding IP technology, because I'm a broadcast veteran. But when I look at what we have accomplished, I'm happy to say that IP has made our life a lot easier."

Additional challenges for SIC's project were that the broadcasting arm had to move to a new facility and, at the same time, upgrade its picture format to HD.

In the absence of a system sufficiently similar to the one SIC had in mind, the team was unable to predict to what extent interoperability was already supported by vendors. SIC nevertheless thought of the future: "We decided to balance the challenges related to an altogether novel approach with the benefits the technology would afford." IP won hands down...



SIC's master control room

On Your Marks, Get Set

The installation of Sony (vision mixers, cameras, and more) and Lawo components (V_matrix, C100, vm-series virtual software modules, VSM) was led by Sony and Telefónica, with valuable help from Lawo.

Based on past experiences with Sony, SIC knew that it would be able to count on Sony Labs in Japan and, of course, on top-quality products.

Lawo came on board because SIC was well aware of Lawo's audio products and the power of its VSM virtual studio manager system. Plus, the V_matrix/C100 philosophy and implementation looked cut out for what SIC had in mind for its project.

And although SIC did not insist on using Cisco switches, the fact that this manufacturer was suggested by Sony Labs and Telefónica, plus SIC's long-standing experience with Cisco solutions made this decision another no brainer.

Project Scope

By December 2017, SIC had a shortlist regarding the vendors for its Television and Multimedia Production Center. This allowed it to launch a new round of RFPs.

After completing the technical drawings in early September 2018 the team decided to launch the installation phase on 9 November 2018. Europe's largest ST2110 installation to date was commissioned on 14 December 2018, after which acceptance tests were performed and the finishing touches were put to the system.

While the original timeline mentioned a 3-month rehearsal phase and going live on 15 March 2019, rehearsals were reduced to 3 weeks. SIC's new installation went on air on 27 January 2019, a day that was hailed as the "Sunday when information will change forever."

Today, SIC's signal transport from the cameras and microphones to the mixing consoles, CCUs and video switchers is performed over SMPTE2110-based IP as a reliable way of bridging several kilometers.

SIC uses **V_matrix** frames, **C100** processing blades, with the **vm_mv** multiviewer, **vm_gateway** and **vm_udx** up/down/cross conversion software modules. The reasons for choosing **V_matrix** were the system's flexibility and its vast capabilities. "When we made our choice, there were no solutions with a remotely comparable potential on the market." (Carlos Ladeira)

Living up to the Challenge...

As far as Carlos Ladeira is concerned, the challenge of SIC's ST2110 project was that some products were initially not up to the interoperability task. To a certain extent, SIC even had to assist certain manufacturers with making their products ST2110-compliant.

Quite a few incoming signals are converted to IP and transmitted as streams to the **production control rooms**, which are **fully IP-based**. Signals coming from satellite receivers and fiber optic connections, on the other hand, stay in the SDI domain. VSM controls both the IP and SDI sides (see also below).

Not all equipment has been replaced at SIC: the baseband SDI devices used for ingesting content are still there, as are other baseband solutions purchased a few years ago.



While some devices are located at 300 kilometers from Paço de Arcos, the cost of a dark fiber network was initially deemed too high, which explains the absence of WAN links between these two facilities. IP transfer for such streams is firmly on the roadmap, however.

There are also plans to establish an IP connection between Paço de Arcos and the **Portuguese parliament** in the near future. The current setup is definitely considered phase one of an ambitious long-term project, pending the availability of dark fiber in the areas where **uncompressed ST2110 remote (WAN) operation** is envisaged.

...but Diligently

Although SIC was originally planning to go all-out IP, the team quickly realized that not all equipment was ready for it. It was therefore decided to stay in the SDI domain for about 60% of the remaining SDI devices.

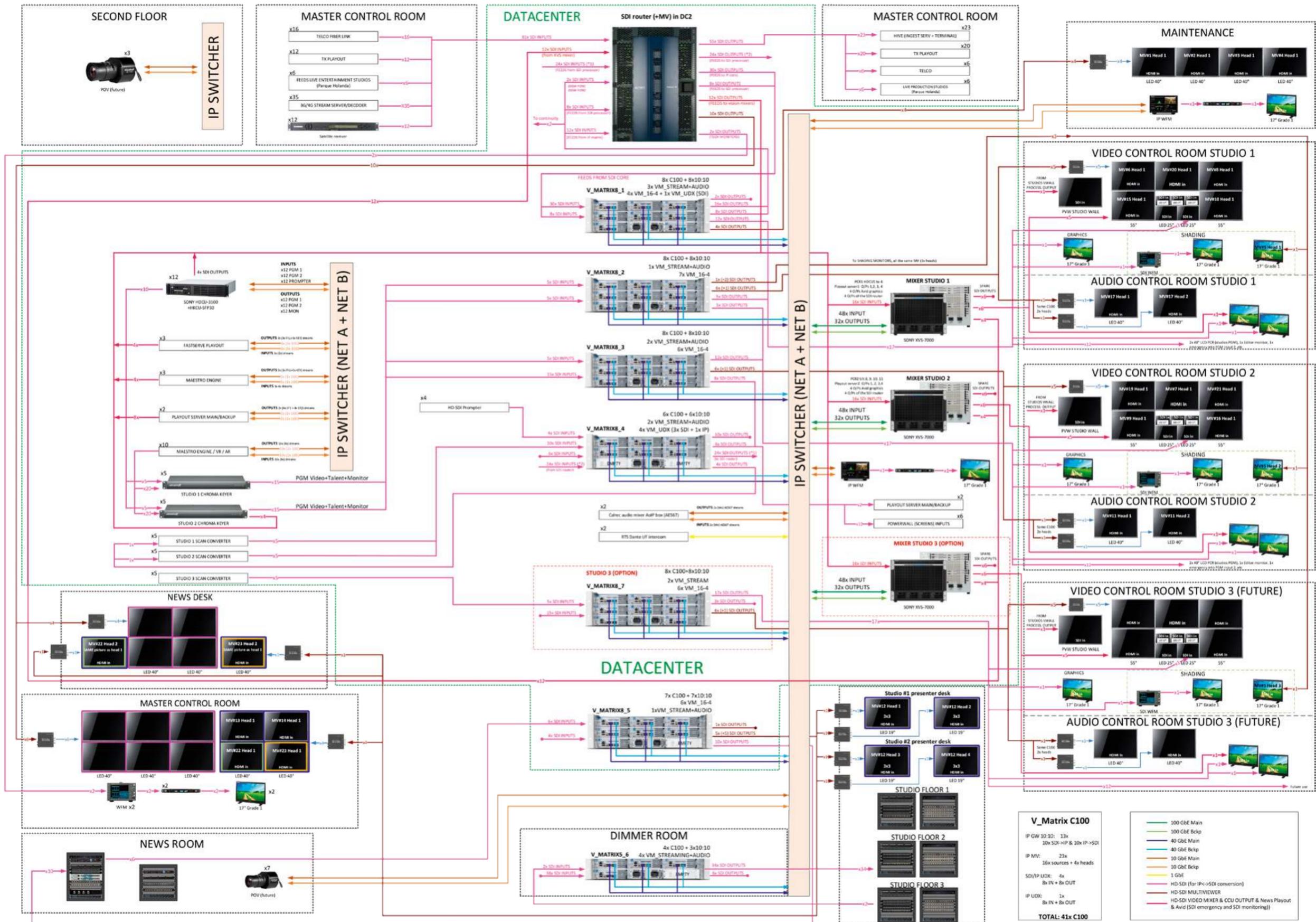
Besides, running the legacy SDI network alongside the IP network also serves as a safety measure for the unlikely event that the IP network should go down completely.

"My advice to users who are planning on migrating to IP is this: ensure that the system is ST2110 and ST2022-7 compliant, do a number of inter-op tests, perform a proof of concept and go for it. It certainly worked for SIC!"

—José Lopes, Director for Operations and Technologies, SIC

Where possible, all on-site IP data streams remain in the IP domain. Conversions from SDI and back (i.e. using IP merely as a convenient transport medium) are definitely not the rule at SIC.

SIC is already experiencing a whole range of **benefits** from its migration towards ST2110-based IP. The most obvious is a **massive flexibility boost** in situations where time is of the essence. During SIC's coverage of the election in Portugal in early May 2019, for instance, changing complex configuration settings was a matter of pressing a few buttons on VSM hardware control panels.



Laying the Groundwork

On the IT side, the network admin teams oversaw the installation and the recommended configuration of the IP core, which had been tested and approved by Sony Labs in Japan. It also managed the installation of IT servers, operating systems and data bases.

Next, the AV IP core had to be set up, multicast addresses had to be defined, VLAN definitions needed to be implemented, etc. This part of the project involved a lot of overtime work and the presence of almost the entire team during countless weekends between late August and December 2018.

Miguel Inácio, who supervised the installation of the IP core and networking components, is extremely grateful for the help he received from his team, some of whom are certified by Cisco.

Two persons on Inácio's team oversaw all aspects related to transporting SDI sources over IP. They took care of configuring all servers and virtualizations. The entire IT aspect was handled by only three persons who even set up the graphics and new newsroom software.

Inácio's most delicate task was to get the various components to talk to one another. This went more smoothly than anticipated. "Our strategy for this project was to build the network in the same way that children assemble Lego® bricks to build houses and other

objects. This proved a very effective approach: we managed to complete the project three months ahead of schedule."

According to Miguel Inácio, the most important benefit of migrating to IP is the flexibility this brings to the broadcast table: moving physical equipment around becomes a lot easier, and remotely controlling solutions located at several kilometers from the controller (a mixer, say) becomes a breeze. The network switches and routers are off-the-shelf devices that cost only a fraction of dedicated, purpose-built broadcast solutions.

Another advantage of the IP technology installed at SIC, says Inácio, is that the network was designed and built by IT network specialists with no particular broadcast background.

A lot of aspects changed during SIC's migration towards IP, including the software used in the newsroom, the tracking and graphics systems, and most aspects of SIC's workflow.

SIC proceeded as follows:

- Installation of the network core;
- Setting up the VSM Virtual Studio Manager system;
- Installation of Sony's and Lawo's networked solutions (multiviewers, etc.).

"VSM's power became obvious during our recent coverage of the Portuguese election. We used two studios and a third set with cameras, a tracking system, and augmented reality. We had to mix and match CCUs with RCPs and cameras, and we managed to do so without changing a single cable connection."

Convenience and Speed with VSM

In the past, several operators had to be on hand to physically repatch a whole bunch of cables for complex configuration changes. This was not only time-consuming but also error prone.

Lawo's Virtual Studio Manager VSM is used to route all video and tally signals to the desired destinations. All RCP assignments to the CCUs are performed without the slightest change to the physical connections. VSM is brand- and format-agnostic and works equally well on the SDI and IP levels.



"Our first real-world test of VSM took place during the election. The flexibility and speed this new approach provides is simply stunning," explains José Lopes.

SIC uses VSM for the following:

- Campus-wide video routing (IP and SDI) via several hardware panels;
- Assigning CCUs and RCPs to the desired production control rooms;
- Routing audio signals;
- Configuring multiviewer layouts (source assignments, etc.).

An additional advantage of the VSM broadcast management system is that operators no longer need to know which CCU is assigned to which camera or RCP.

SIC's on-screen VSM panel (see left) is rather comprehensive. It comprises the following sections:

- Monitoring of all supported devices. Red flags alert operators to events that require some attention. For the time being, warnings are only shown on the screen in one of the machine rooms. They do not trigger alerts that appear on the screens in the production control rooms (PCRs), nor are they forwarded via text messaging or e-mail (which is perfectly possible).
- Monitoring of Cisco spine and leaf switches. Most warnings displayed in this section are related to missing SFP/fiber connections. This pane also displays temperature information, labels, and fan status information.
- Monitoring of the fiber optic and control switches.
- Status monitoring of the Lawo C100 blades, including their network connections.
- Monitoring of other boards.
- Monitoring of the audio mixing consoles.
- Monitoring of satellite receivers.
- Monitoring of sync pulse generators.
- Monitoring of SIC's 2 VSM servers.

- Video IP routing (all configured destinations, all sources and cross points).
- Video SDI routing (destinations and sources on SDI routers).
- Camera-to-PCR assignments. SIC owns 12 Sony cameras and CCUs, which can be connected to any of the two (soon three) PCRs instantly, so that any given camera can easily be shared among production control rooms (single-point assignments). Switching is performed by a select team to avoid camera snatching when a program is live. At the moment, SIC uses only one on-screen touch panel for VSM control. All other control operations are performed via hardware panels.
- SIC has a number of spare inputs and outputs for which it uses the labeling function built into VSM. Newly assigned names automatically appear on the UMDs of the multiviewers and on the Sony vision mixers. All changes take effect immediately.
- Audio routing is handled in much the same way as video routing.
- SIC's 23 multiviewers can also be configured via VSM. Operators can select from several preset layouts using theWALL. Where necessary, SIC can also edit layouts or create new ones in VSM to assign the desired streams to the heads. No tablets are used to operate theWALL. (As a rule, SIC only uses one or two heads of each multiviewer.)
- Control of the RTS intercom system. This is only a backup strategy, because Carlos Ladeira usually performs intercom-related changes right in the intercom system's software.
- Internal crossbar routing for each C100 blade (including the number of SDI channels to output) and monitoring of a long list of parameters.
- Equipment control of most other devices (Sony, etc.).

Multiviewers

Wherever possible, SIC works with Lawo multiviewers connected via IP, even though the pre-existing Ross multiviewers are still used for some SDI sources. More often than not, SIC only uses two of the four available heads of each V__matrix-based vm-mv16-4 multiviewer.

Virtualization

Like most broadcasters, SIC virtualizes all tasks that do not require dedicated, physical machines. The decision to virtualize its equipment actually predates the migration towards IP: the process started ten years ago.

Until further notice, this virtualization endeavor does not mean that operators can select just about any workplace they like. This was a conscious decision in order to keep the television and IT networks separate.

Besides, some television equipment is difficult to virtualize. In some instances, this is due to the certification provided by the vendors, while other solutions require special cards. But they have already come a long way.

“Our IP system has been stable for over five months. Our 24-hour news channel's studio and production control room are running almost 24/7. I guess this is the ultimate proof of stability.”

—Carlos Ladeira, TV Systems and Equipment Integrator, SIC



One of SIC's two control production rooms, with Lawo multiviewers and extensive VSM control

Twin Production Control Rooms

SIC operates two production control rooms in a twin configuration, i.e. with exactly the same layout and equipment. The multiviewers in these two PCRs are generated by Lawo vm_mv16-4 software modules running on C100 processing blades inside V__matrix frames.

In a small technical room adjacent to the studios, camera signals are routed to the CCUs in SIC's data center. There are 12 CCUs for as many cameras and four Sony vision mixers, which are shared between the two production control rooms.

The technical room also houses several V__matrix units, which are used as gateways for the distribution of signal combinations to several wall boxes in the studios.

SIC's Data center and Network

The data center is equipped with:

- Several V__matrix frames;
- The graphics processors that are accessed from the control rooms;
- Storage and graphics rendering servers, scan converters for Skype interfaces and footage stored on computers;
- Deltacaster graphic soccer analysis tools.

SIC uses a redundant spine/leaf network topology consisting of spine A (with its leaves) and spine B (with its own leaves). All devices supporting ST2022-7 are connected to both spines. When SIC had an issue with a few LC cables connecting some spines to their leaves, the team was able to verify that their hitless merge strategy was working.

One of the leaves is connected to the internet, another one distributes all Lawo streams, the CCU control data, vision mixers and the streams coming from other IP devices. A dedicated control network is used for the VSM panels.

As always, synchronization is achieved via PTP (precision time protocol).

At the moment, SIC's network covers the premises in Paço de Arcos, with fiber optic IP and SDI connections to the facility in Porto (studio, production control room; only one program per day). These connections are not used for transferring video data – only control data are sent to and fro at the moment. Apart from that, the main use for these fiber optic connections is to store the data generated in Porto on SIC's storage system in Paço de Arcos.

Help us Help Ourselves...

Lawo and Sony assisted SIC with the configuration of VSM and provided initial training. The goal for SIC was to become autonomous as soon as possible. Despite the excellent relationship with all partners involved (Sony, Lawo, Cisco, Telefónica), SIC preferred not to depend on them.

The entire team is nevertheless highly satisfied with the dedication of its partners throughout this project.



Closing Remarks

With 2022-7 network redundancy, SIC feels safer than ever before. In combination with the VSM control system, the stability and flexibility of IP technology by far outweighs other benefits, which are not even on SIC's roadmap at the moment, like the ability to go 4K or implementing what other broadcasters are doing to increase their TV ratings.

What really counted for SIC was that its new infrastructure would be ready for future additions and allow SIC to venture into IP-based remote production, share its technical resources more effectively among the various sites, and reconfigure complex setups on the fly. "From our experience, we can confirm that—at the very least—IP brings a momentous flexibility boost to a broadcaster's operation." (José Lopes)

And did we mention that there is also a financial benefit to SIC's migration towards IP? The team is beginning to realize that substantial sums are saved thanks to the ease with which the system can be reconfigured.



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