



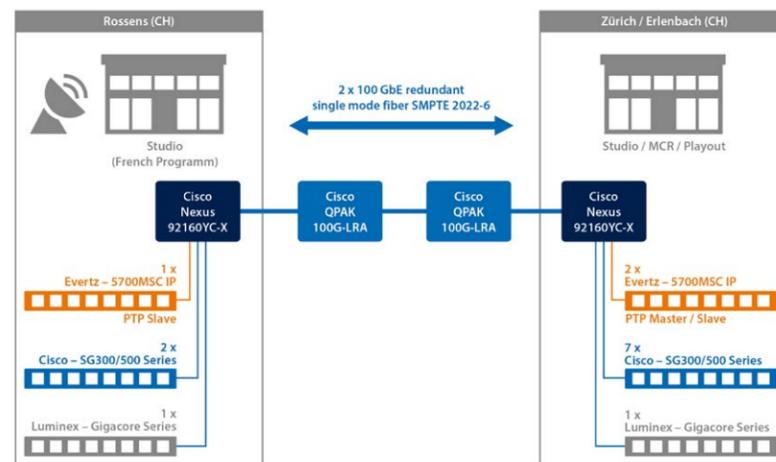
NEP SWITZERLAND PIONEERS 4K/UHD AND IP-BASED REMOTE PRODUCTION

Swiss broadcasting service provider NEP Switzerland mobilises two 4K/UHD OB trucks and IP-based remote studio production

Changing production requirements have seen broadcast service provider NEP Switzerland significantly expand its production facilities. Two 4K/UHD trucks have joined its fleet to serve the MySports TV channel, and a new studio and playout complex has been established in Erlenbach/Zurich, with a satellite studio opened in Rossens for coverage MySports' coverage of the Swiss ice hockey National League among other programming. As a direct result of this investment, NEP Switzerland now operates the most modern IP-based 4K/UHD remote production studio in Switzerland. System integrator Broadcast Solutions was responsible for the planning and execution of all of the projects.

Streamline OB truck UHD-41 and UHD-42

The move saw NEP Switzerland double its mobile 4K/UHD production facilities just in time for the start of the 2017/2018 season of the Swiss Raiffeisen Super League (RSL) broadcast on Teleclub – all league games are now produced in 4K/UHD. Commissioned 2017, the UHD-42 4K/UHD truck is an example of Broadcast Solutions' Streamline OB van family, and is equipped with two control panels to support productions requiring up to 10 cam-



eras. A year prior, Broadcast Solutions had supplied NEP Switzerland with its UHD-41, a 4K/UHD OB truck that is also primarily used in the production of the Swiss RSL. NEP Switzerland currently produces 144 RSL games in 4K/UHD, and 180 Brack.ch Challenge League games in HD for Teleclub Sport each season.

The setup uses Swisscom's 10GigE fibre infrastructure, with which all RSL stadiums are connected. Via this dedicated line, signals are sent to the Teleclub broadcasting and production centre in Volketswil. The production of the RSL 2018 season opening game from Bern's Stade de Suisse exemplified the flexibility of both UHD-42 and UHD-41.

UHD-42 operates using the Two-Sample Interleave format (4x 3G/HD/SDI), which has advantages in production of the RFL because the HD-signals is always included. Intercom signals are on HD-feeds, as the trilingual production requires many channels of the UHD-feed to be used for commentary – the OB truck sends two

UHD feeds and four HD feeds into the network, and receives a single UHD-feed and two HD-feeds from the other games. The connection to the fibre-optic network is made using via a Nimbra fibre stagebox from Swisscom Broadcast. In order to use this setup, the 2SI signals are converted into the Square Division format and sent to the stagebox via four conventional BNC cables per UHD-feed. The stagebox system – transported to every match by NEP Switzerland – converts the signal to JPEG 2000 with 4x 400Mbit. The setup ensures consistent cable lengths on the BNC side and offers tremendous cost advantages on the infrastructure side. It has been used in the production of all matches since its introduction.

MySports Playout Centre - Remote IP-based production and playout

In mid-November 2017, MySports relocated its headquarters to a former factory in Erlenbach, near Zurich, to manage all of its programming. MySports' output is produced and broadcast with bilingual commentary, with the French-speaking editors, presenters, guests, commentators and using the satellite studio in Rossens 200km away. The two studios are linked via a "geo-redundant" fibre-optic connection, with the complex in Erlenbach remotely controlling the Rossens facility.

Occupying an area of around 1,000 square metres, the 4K/UHD studio and playout complex in Erlenbach has the capacity to handle 20 channels simultaneously, including two channels in UHD. Currently there are four 24/7 channels (Free-



TV and Pay-TV, each in German and French), as well as 14 event channels (seven Pay-TV, each in German and French), which can be used as required, e.g. be played with games taking place simultaneously. In addition to the UHD-capable studio, the complex contains four control rooms (including the Remote Studio) with joint video control, the MCR with separate audio MCR, the Playout Centre, three editing suites and six commentary rooms. In Rossens there are two further editing suites and six commentator rooms as well as the main studio.

The design of the video infrastructure included a conscious effort to adopt a hybrid solution based on baseband signals supplemented by IP-gateways wherever practical and needed. For example, in Erlenbach there is a Grass Valley NVision router for all video signals, but the connection between the Rossens' outdoor studio and all stadiums is exclusively via IP. On the audio side, the IP-based Ravenna network is used both within the site and across all sites, with their many intercom panels and a Riedel Bolero system connected via AES67. In this way, proven and reliable baseband technology is combined with the flexibility and expandability of newer IP technology.

All incoming feeds are first translated into "house format" using Riedel MediorNet MicroN network devices – this includes audio shuffling and de-embedding of the audio signals. The intercom signals, which are partly embedded in the feeds, can be routed via the Audio Core to the Riedel embedders. For outgoing signals, the MicroN units are used as audio embedders.

Central control of all components is via Lawo's Virtual Studio Manager (VSM). From the MCR all lines are switched, and ingest is controlled from here. The Audio MCR is responsible for the assignment of commentary booths and the routing of the intercom lines.

Two large and two small control rooms are available for studio productions. The large control rooms each have an outsourced audio control room and are assigned to the studios in Erlenbach and Rossens – although this assignment can be changed. The two smaller control rooms with integrated audio workstations can be used flexibly for other applications, e.g. for small interview situations. Recording and playback are via EVS XT4K servers, which are operated via EVS LSM Connect control panel and touchscreen. For the graphics, a Novo XL UHD system is used for both the live graphics and the LED wall.

Image control is housed in a separate room and handles control of all eight cameras, control of the two robots, and lighting control for both studios. A Phabrix UHD Rasterizer is used for full-resolution image control.

The audio control rooms are equipped with Lawo mc236 mixing consoles with 5.1-channel surround monitoring. These have access to the studio signals as well as to individual commentary booths.

The identically-equipped studios in Erlenbach and Rossens each have four Grass Valley LDX 86N cameras, one of which is mounted on an Areplus Robotics ARCAM camera robot with a 4 m track. The studio background





consists of a 21 m-wide LED back wall. In-ear monitoring and microphone operation is provided by Sennheiser wireless equipment, which is connected to the audio core via Lawo A_Line stageboxes.

The commentators' booths are designed to accommodate two commentators, and each is equipped with one Lawo Commentary Unit (LCU) which can be routed to any audio room or the MCR. One of the commentary booths also has the option of dubbing in any combination with one of the three UHD-capable editing suites.

For every German-language studio broadcast, a French version is simultaneously produced in Rossens – this requires a small number of local technical personnel, as most of the work takes place in Erlenbach. However, the French-speaking editors are on-site. Also, the French-language contribution is created in the two cutting rooms. The signals from the six commentator cabins in Rossens go directly to the audio router in Erlenbach, and are mixed there with the associated live signal for playout.

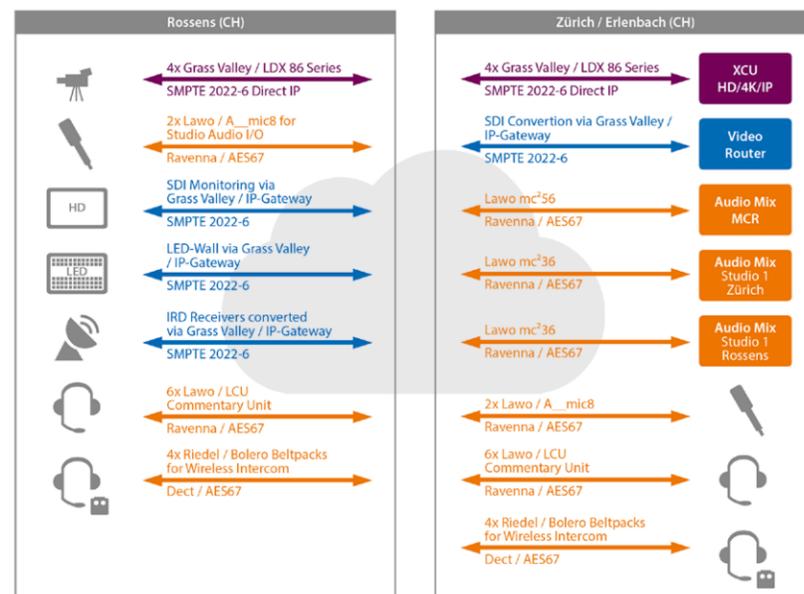
The UHD cameras are powered by Grass Valley Direct IP technology, with both CCUs and RCPs located in Erlenbach. This setup allows the cameras in both studios to be controlled from a central image control room. The studio lighting can also be controlled from Erlenbach by DMX control signals relayed via IP to Rossens where they are there converted back to DMX (DMX-over-IP).

The ARCAM system combines a six-axis motion control arm with a 4 m-long rail, with complete control is via IP, so that individual camera movements can be driven directly via the video mixing panel in the production control. For all video signals exchanged between sites, an SDI-IP conversion is performed by Grass Valley Densité IP Gateways.

On the audio side, the Ravenna network, built in the playout centre, will be expanded via the WAN and the studio stageboxes will be directly connected. The LCU commentator units are also in the Ravenna/AES67 network and can be addressed directly from the audio rooms. The wireless intercom system is based on Riedel's Bolero. For this purpose, several DECT base stations are connected to the intercom matrix via AES67.

The second location is also used for backup and disaster recovery. All storage is duplicated in Rossens and kept permanently in sync so that – in case of a major failure of the primary storage servers – all content is held here. Two backup playout servers are also located here, having access to the storage content. The playout servers output a backup version of the 24/7 channels and signals are transmitted to Erlenbach via the IP-Gateway. In the event of a failure of a 24/7 playout server in Erlenbach, the on-air signal automatic moves to the backup playout from Rossens.

Two motorised downlink antennas are installed in Rossens to provide MySports with up to six downlink channels. The antennas themselves and the IRDs are remotely controlled via IP, and the output signals transmitted to Erlenbach via the IP-Gateway.



To ensure smooth data transfer between the two sites, they are connected via a 100Gbit network with very low latency. The two fibre-optic routes take different paths through Switzerland for geo-redundancy. Both sites have Cisco Nexus switches with 100Gbit uplink and 10Gbit downlink ports. Cisco SG-300 switches are used to connect less bandwidth-hungry devices. Clean synchronisation in the network is essential, and provided through the PTP protocol. The PTPv2 Grandmaster clocking uses an Evertz MSC5700 SPG located in Erlenbach, which distributes sync over the Nexus switches as a boundary clock. Two additional SPGs are available as backup – one in Zurich, one in Rossens.

The full connectivity of the production via IP offers NEP the ability to integrate further remote productions very simply, as was the case in the production of a recent Formula E race in Zurich. There, a remote set with four cameras, Lawo stageboxes and LCU unit was installed on-site and connected via IP to the Playout Centre. As a result, it was possible to manage production from the control room as usual.

MySports' implementation of state-of-the-art broadcast and IT technology, as well as the connection of its two studio locations via a high-performance network and their capacity for remote production, are unique in Swiss broadcasting.