



CASE STUDY

Simple, robust and cost effective
solution for multiplexing
audio programs for IP
transport over satellite



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RCF RADIO CASE STUDY

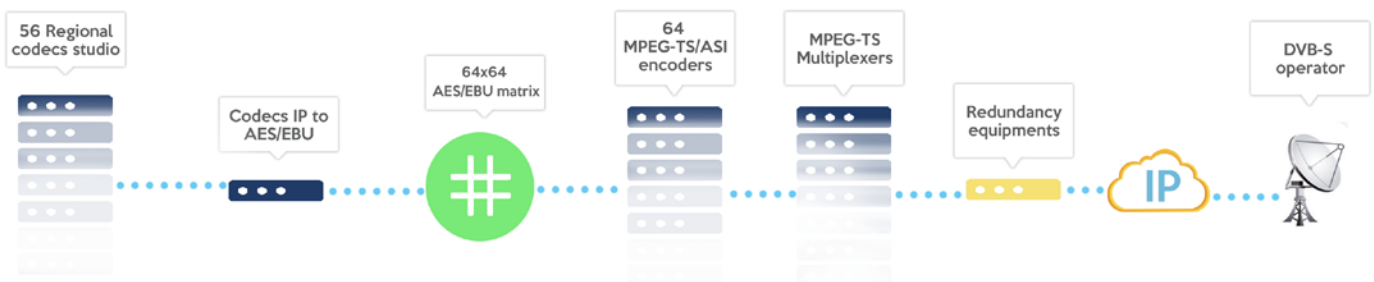
DVB Audio multiplex generation for RCF radio

i RCF is a network of Christian associative radios, which includes 64 stations in France and Belgium, followed by 630,000 listeners every day. It is the 1st independent generalist radio network of proximity in France. RCF offers local and national programs, implemented by 300 employees and 3000 volunteers, and is available in 5 broadcasting modes (FM, Mobile, Internet, Podcast and DAB +). The national structure, based in Lyon, generates the national program (20h of program / day) and the local radios broadcast 4h of their own program, according to a schedule common to all the radios.

RCF needs

RCF needed to renew its multiplex generation solution because it was based on obsolete products, which took up a lot of space in technical bays, and which did not allow the density of programs in the multiplex to be increased.

The following diagram shows this solution:



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The expected solution therefore had to meet the following requirements:

- Generate a TS-MPTS stream from 23 regional IP streams
- Possibility of gradually integrating additional regional programs, up to a capacity of 64 programs
- Source routing capacity (national and regional programs), allowing the audio content of multiplex programs to be changed on the fly, without audio discontinuity
- Rescue possibilities in the event of loss or silence detected for each source regional flow
- Ability to switch from MPEG Layer 2 audio format to AAC format
- Ability to upgrade to stereo programs (programs are currently in mono).
- Easy management of alarms and configuration
- 1 + 1 hot redundancy to ensure program continuity
- Renewal of codecs in regional studios, with support for analog audio sources, AES / EBU, and Livewire.
- Reduction of the space taken in technical bays

Redundant IQOYA *LINK/LE encoders & IQOYA *SERV/LINK transcoders

Digigram proposed a solution based on the use of the IQOYA SERV / LINK multichannel audio codec on IP in its version dedicated to transcoding streams, associated with the IQOYA LINK / LE codecs in regional studios.

IQOYA SERV / LINK TC is an audio IP transcoder in 1U format, with redundant hot-swappable power supply, capable of managing up to 128 audio channels in input extracted from IP streams of UDP, RTP type (with or without MPEG encapsulation -TS), and Icecast / Shoutcast. These audio channels can be transcoded and integrated into UDP, RTP (with or without MPEG-TS encapsulation), Icecast / Shoutcast, and HLS streams. Supported audio formats for input and output are PCM, Opus, G711, G722, MPEG Layer 2 and 3, AAC Fraunhofer (AAC-LC, AAC-LD, AAC-ELD, HeAACv1 and HeAACv2), and Qualcomm aptX™.

Two network ports with the possibility of declaring multiple VLANs allow physical and logical separation of the various IP traffics (input flow, output flow, control and supervision), and a level of network quality of service (QoS) can be affected for each stream sent. Finally, different FEC schemes as well as the redundant streaming mode on two networks are proposed in encoding and decoding of flows to compensate for the possible loss of packets during transport over IP.

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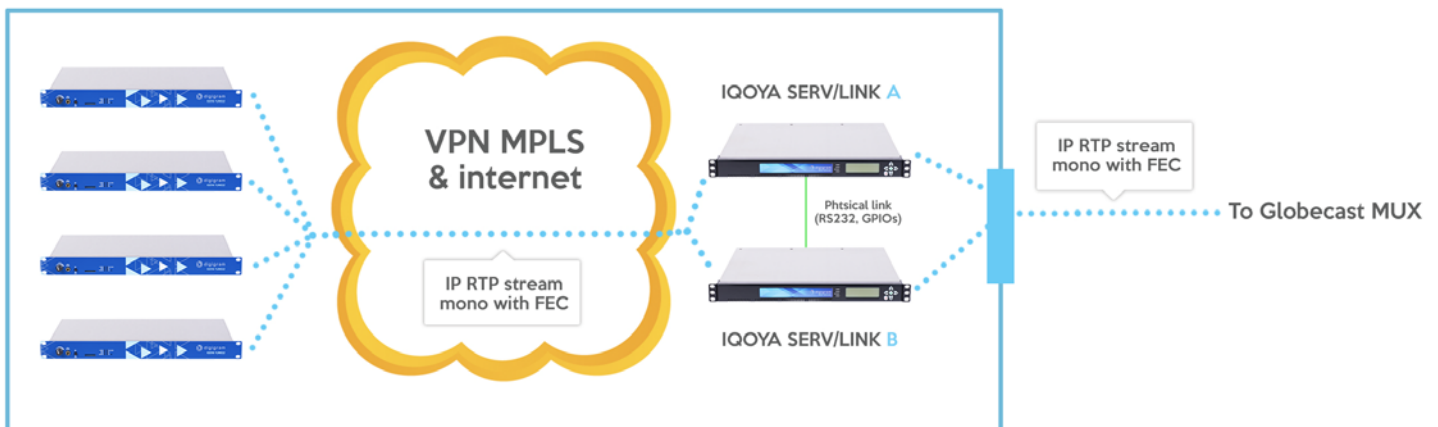
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IQOYA LINK / LE is a stereo IP audio codec, which supports the same audio formats as IQOYA SERV / LINK, and which supports a stereo or mono program available in analog, or AES3, or Livewire. It incorporates the same FEC and redundant streaming mechanisms, which ensures optimal transport reliability between regional studios and RCF's national studio in Lyon.

IQOYA codecs can be configured and "monitored" via their WEB pages, and via SNMP. Their supervision can therefore be carried out with any supervision software based on the SNMP protocol.

Solution adopted by RCF

The following diagram shows the principle of the installed solution:



Generation of regional flows

Each regional studio is equipped with an IQOYA LINK / LE which supports the mono program in AES3 or in Livewire, then the encoding and the "stream" in unicast mode towards the national studio via an MPLS network.

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MPEG-TS MPTS multiplex stream generation with 1 + 1 redundancy



At the RCF center in Lyon, two IQOYA SERV / LINK TCs operating in 1 + 1 redundancy mode with the sharing of the same virtual IP address, are responsible for transcoding regional flows. A lifeline directly connects these two SERV / LINK through one of their network ports, allowing the SERV / LINK which has the passive role to monitor the one which has the active role. The life signal sent by the active SERV / LINK is linked to the generation process of the output MPEG-TS MPTS stream. In the absence of this life signal, the passive SERV / LINK then preempts the virtual IP address to receive the regional streams and then becomes active to continue generating the output MPEG-TS MPTS stream. The service which manages 1 + 1 redundancy ensures that the passive SERV / LINK receives the same configuration as the active SERV / LINK.

Backup of regional IP flows

On SERV / LINK TCs, the backups configured for each regional flow are as follows:

Priority n ° 1: regional stream sent by an IQOYA LINK / LE in the studio (mono)

Priority n ° 2: WEB radio stereo stream, decoded in mono left + right

Priority n ° 3: national mono program on audio input AES / EBU

This national program is configured to back up all regional flows. To do this, the IP stream of the national program is decoded on an AES3 output which is looped back to an AES3 input on SERV / LINK. This AES3 entry is therefore the last aid for all regional programs.

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Supervision and configuration changes

Automatic switching from one priority to the other is executed when it notices a loss of the stream to be decoded, and on detection of silence in this received stream. SNMP traps (alarms) are generated on each occurrence of flow loss and silence detection, thus allowing technical teams to intervene in the event of a program interruption.

The 1 + 1 redundancy service allows you to apply a configuration change to the SERV / LINK which has the active role. This new configuration will be automatically applied to the SERV / LINK which has the passive role.

Finally, IQOYA SERV / LINK also offers the possibility to change the audio content of a program (PID) on the fly in the MPEG-TS stream. This is done via an SNMP command which makes it possible to select at any time a source among those defined at the input of SERV / LINK.

Why did RCF choose Digigram?

Digigram has the resources and capabilities to develop simplified solutions to complex problems. RCF chose Digigram primarily because of the company's dedication towards understanding RCF's needs. Digigram worked very closely with RCF to ensure that all their main pain points were addressed.

Digigram's superior after-sales support team and their unmatched responsiveness is well known in the broadcast industry. This added a lot of value to RCF as there is a sense of security and reliability that comes with Digigram's products and team.

Finally, Digigram is committed towards actively assisting RCF when they decide to expand or transform their systems in the future. This was a top priority for RCF, as technology is constantly evolving.

