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The re-launch of DAB in Switzerland



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Digital Audio Broadcasting (DAB) has been something of a sleeping beauty in Switzerland since 2000. However, the public service broadcaster – SRG SSR idée suisse – has just given the go-ahead for the reorganisation and expansion of DAB. This decision was prompted by the realisation that FM can no longer offer additional capacity without a loss of quality. Furthermore, the DAB bandwagon is beginning to roll again, starting out in the UK, and non-ionising radiation requirements in Switzerland now demand new distribution technologies that produce less electromagnetic radiation. The availability of DAB receivers was an additional factor supporting SRG SSR's move.

The first phase (1999/2000)

SRG SSR idée suisse, the Swiss public service broadcaster, introduced digital audio broadcasting (DAB) in 1999. In the initial stage, four transmitters were set up in the southern part of French-speaking Switzerland and eight in the central plateau and the Bernese Oberland in German-speaking Switzerland. The Swiss-German network was extended in 2000 with the addition of three transmitters in the Basel region. Public acceptance of DAB was very low, however – one of the reasons being that DAB receivers were very expensive compared with FM receivers. The range of models was limited and covered only car radios and hi-fi tuners. Another reason was that the services available via DAB were largely made up of material from stations already broadcasting on FM.

Statistics showed that over 60% of radio listening was via portable and hand-held receivers – a type that was not available for DAB at all in 2000. DAB therefore had no prospect of Europe-wide success at that time. Considering the faltering market launch of DAB throughout Europe, the Executive Board of *SRG SSR idée suisse* thus decided to suspend the expansion of the transmitter network and to make any further investment conditional upon the success of DAB in neighbouring countries.

Transmissions nonetheless continued, and a small number of listeners have since been enjoying the undisputed benefits of DAB, especially for mobile reception.

The status quo (2003)

Following the moratorium of 2000, mobile-reception coverage of the two DAB networks in Switzerland – one of them (on channel 12 C) covering the German-speaking area, the other (12 B) in the French-speaking part – is shown in *Fig. 1*.



Figure 1
Mobile coverage of DAB networks in German- and French-speaking Switzerland (year 2000)

According to the CEPT treaty signed in Wiesbaden in 1995, Switzerland is permitted to use only channel 12 of Band III for DAB. The presence of other services means that this channel is subject to additional restrictions with regard to the maximum transmission powers that can be used. Consequently, the channel is suitable only for a DAB network for mobile outdoor reception. The quality of the current DAB networks is not sufficient to provide for good portable outdoor and indoor reception – which the radio audience also demands.

The re-launch of DAB in Switzerland

In September 2003, the Executive Board of *SRG SSR idée suisse* decided to resume the expansion of the DAB network. There were several reasons for this new strategy, notably the following:

1) FM is exhausted

An in-depth analysis of the possibilities for FM – conducted by an expert working group, headed by the Federal Office of Communications (OFCOM) – concluded that the FM transmission network cannot be expanded further in Switzerland without a significant loss of quality. The addition of any new FM transmitters would inevitably impair the reception quality offered to existing listeners. *SRG SSR idée suisse* has therefore decided to complement the FM networks by expanding the DAB networks.

2) DAB receivers are available

In the UK, enormous efforts on the part of the BBC, commercial radio broadcasters and the receiver industry have enabled DAB to gain a foothold among the population. An impressive range of receivers is now available on the market, especially in the preferred portable receiver segment. Prices, too, have come down to acceptable levels – thanks to greater integration density in microprocessor chips. To date, more than 350,000 DAB receivers have been sold in the UK and the industry is struggling to keep up with demand.

SRG SSR *idée suisse* believes that these DAB receivers can also be sold in lucrative volumes in Switzerland – provided the expansion of the DAB network is accompanied by an attractive variety of services. Furthermore, leading manufacturers have announced the launch in 2004 of new receiver models that are not aimed solely at the British market.

3) Legislation on non-ionising radiation

In 2000, secondary legislation (the *Verordnung zur Nichtionisierenden Strahlung* (NIS) or Non-ionising Radiation Ordinance) was enacted in Switzerland. It lays down extremely strict benchmarks for permissible levels of RF radiation, with underlying limits that are around ten times stricter than those laid down by the European Union. This is why transmission facilities cannot be expanded further in certain areas and, in some cases, the output power of existing FM transmission facilities has had to be reduced. Compared with FM, DAB permits more programmes to be broadcast per transmission facility – at lower levels of non-ionising radiation. What is more, less transmission sites are necessary because DAB is ideally suited for the high amount of reflections caused by the Swiss topography (principally, its large mountains).

In early 2004, the authorities also drastically tightened the regulations that apply to the Beromünster medium-wave transmitting station. The output power had to be reduced immediately from 600 kW to 250 kW and operation from this site must cease entirely as of the end of 2008. As this AM transmitter carries the popular MW531 programme, it would no longer be available terrestrially after 2008. However, if it were to be broadcast nationwide via DAB, this would reinstate its terrestrial availability.

First steps in the re-launch

The first step was a plan to bring full coverage in 2005 to the major population centres in the Ticino area (see Fig. 1), in order to provide an alternative to FM reception (which is severely distorted by interference from nearby Italian transmitters).

The next step would be the expansion of the north-south axis, followed in subsequent stages by the creation of a full DAB network in eastern Switzerland, the Jura and the Grisons (see Fig. 1).

Increasing the appeal of services

For the re-launch of Digital Audio Broadcasting, SRG SSR *idée suisse* decided to add programmes to the existing ensembles for a prolonged period of time – thus enhancing the attractiveness of the DAB offer. As a consequence, this means that the audio quality will be decreased during this period. The reception quality however is not compromised and is far better in Switzerland than FM, especially for mobile reception.

By bringing forward the completion of the DAB network in German-speaking Switzerland, SRG SSR can also ensure that MW531 remains available terrestrially in that region.

The strategy went into effect in February 2004. The two ensembles (one French, the other German) were also enhanced by the programme *Swiss Classic*, while the programmes *La Première* and *Rete Uno* were added to the Swiss-German DAB ensemble in order to promote exchange between language regions.

This action has enriched the DAB ensembles with stations that are not available on FM, or are only available to a limited extent.

Abbreviations

CEPT	European Conference of Postal and Telecommunications Administrations	DVB-H	DVB - Handheld
DAB	Digital Audio Broadcasting (Eureka-147)	DVB-T	DVB - Terrestrial
DVB	Digital Video Broadcasting	ITU	International Telecommunication Union
		PAD	Programme-Associated Data

The status quo (2004)

The two current DAB ensembles in Switzerland are listed in *Tables 1 and 2*.

Table 1
DAB ensemble in German-speaking Switzerland

Programme	Mode	Bitrate (kbit/s)	Protection level	Capacity units	FM reception
DRS 1	J-Stereo	128	3	96	yes
DRS 2	Stereo	160	3	116	yes
DRS 3	J-Stereo	128	3	96	yes
MW 531	J-Stereo	128	3	96	no
VIRUS	J-Stereo	128	3	96	no
SWISS POP	J-Stereo	128	4	84	no
SWISS JAZZ	J-Stereo	112	4	70	no
SWISS CLASSIC	J-Stereo	128	4	84	no
RSR-1ERE	Mono	64	4	42	partly
RETE UNO	Mono	64	4	42	partly
RR SRG	Mono	64	4	42	no

Table 2
DAB ensemble in French-speaking Switzerland

Programme	Mode	Bitrate (kbit/s)	Protection level	Capacity units	FM reception
RSR-1ERE	J-Stereo	128	3	96	yes
ESPACE 2	Stereo	160	3	116	yes
COULEUR 3	J-Stereo	128	3	96	yes
OPT MUSIQUE	J-Stereo	128	3	96	partly
SWISS POP	J-Stereo	128	3	96	no
SWISS JAZZ	J-Stereo	112	3	84	no
SWISS CLASSIC	J-Stereo	128	3	96	no
DRS 1	Mono	64	4	42	partly
RETE UNO	Mono	64	4	42	partly
RR SRG	Mono	64	3	48	no

Audio quality

As can be seen from *Tables 1 and 2*, the inclusion of ten or eleven stations (programmes) in each ensemble stretches the DAB system to its limit. Nevertheless, the DAB transmission standards are complied with in full.

In order that the relevant target audience can judge the audio quality as “good” or even “very good”, the programme-associated data (PAD) capacity had to be reduced significantly in several cases. For some types of station, it became impossible to continue offering additional multimedia data. This is because the PAD data rate reduces the net audio data rate by a corresponding amount. In addition, modulation processing must be adjusted cleanly where the data rate is a very low 112 kbit/s for joint stereo (J-Stereo) and 64 kbit/s for mono. It goes without saying that, at such data rates, the audio quality may be highly sensitive to the number of coding cascades in the production process.

And what about the future?

Reception capability must be increased

Latest studies reveal that the field strength for DAB, at the point of reception, must be raised by 10 dB above the level agreed in Wiesbaden – to ensure good mobile outdoor and portable indoor reception. This is not possible with channel 12 in Switzerland for the reasons given above. It is therefore planned that the DAB network in German-speaking Switzerland will be migrated immediately after the ITU Regional Radio Conference, RRC 04/06, to channel 11 which offers greater power capacity. The required power for DAB in this new channel will still be less than it would be for FM. Furthermore, the way in which signals are reflected by the landscape, and the positive effect of this on the DAB system, mean that fewer transmitter locations will be required.

Band III is the first choice for DAB

L-band is not ideal for DAB in Switzerland, as the high network density and power levels required for an acceptable broadcast coverage (at local and regional levels) runs counter to the public broadcaster’s target of low operating costs, not to mention the Federal Government’s *Non-Ionising Radiation Ordinance*. **SRG SSR idée suisse is therefore calling for Band III to be devoted entirely to DAB services in Switzerland.** In any event, Band III is largely unsuitable for DVB-T, which is sensitive to impulsive noise – unlike the DAB system which has been developed precisely to handle this type of interference.

Band III alone provides sufficient capacity for DAB **radio-only** services. However, L-band might be suitable at a later date for **data-heavy** DAB services or even for DVB-H (DVB transmissions to handheld devices).

Conclusions

The landscape has changed considerably since Switzerland launched its first DAB services in 1999/2000. The subsequent success of DAB in the UK has brought a huge variety of affordable DAB receivers to the UK marketplace: manufacturers are now keen to make their products also available in other countries where DAB is being expanded.

In Switzerland, recent legislation has severely curtailed the transmitter powers that can be used on the FM networks – they can no longer be expanded to improve coverage or the programme offering. In addition, an important AM transmitter in the German-speaking part of Switzerland must be switched off by the end of 2008, which will deprive listeners of the terrestrial version of this service.

With these factors in mind, *SRG SSR idée suisse* decided in 2003 to resume the expansion of its DAB networks. With up to eleven different programmes in its current two DAB ensembles, the Swiss public broadcaster has now embarked on a network rollout which should ensure **X%** national coverage by the end of 2005 and **Y%** by the end of 2008. By then, the Swiss shops should be full of the types of DAB radios that are currently being introduced into the UK and some other countries.



Thomas Saner received his engineering degree from the Engineering School of Basel in Muttetz, Switzerland and his Bachelor of Business Administration degree from the Graduate School of Business Administration in Zürich, Switzerland.

After his engineering studies, Mr Saner started his professional career in the digital audio team of Studer Audio in Regensdorf, Switzerland. In 1988, he joined *SRG SSR idée suisse*, the public service broadcaster in Switzerland. He was responsible for many projects to introduce digital audio in the radio and TV broadcast chain. From 1995 until 1997, he was head of engineering in the technical department at the broadcaster's headquarters.

In 1997, Thomas Saner took over the management of Media Services Distribution – the service centre responsible for the distribution of all programmes of *SRG SSR idée suisse*. In 2003, he became the technology manager in the department of Technology and Information.

At the spectrum level, L-band is not suitable for DAB in Switzerland so *SRG SSR idée suisse* is calling for Band III to be devoted entirely to DAB radio-only services.
