Digital Audio Broadcasting

Personal reflections on the CEPT T-DAB Planning Conference
Wiesbaden, 3 - 21 July 1995

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Before terrestrial Digital Audio Broadcasting (T-DAB) services can be introduced, it is vital that suitable frequency blocks are allotted to each country, paying due regard to the possible interference that such services may receive from, or cause to, other existing services. In Europe, this planning task is the responsibility of the European Conference of Postal and Telecommunications Administrations (CEPT).

A CEPT T-DAB Planning Conference was held in Wiesbaden, Germany, from 3 to 21 July 1995. In this brief article, the author offers his personal reflections on what was achieved at this conference.

To summarize the recent CEPT T-DAB Planning Conference is really quite easy: *"It took place in Wiesbaden from 3 to 21 July 1995 and was a great success"*. However, such a summary may not be enough.

1. Introduction

A full review of this conference will take some time to complete, as it will have to include a better analysis of the detailed results than has been possible so far. The reason for this is that a very important part of the real value of the results is hidden in the small print – a fact that is well known to those readers who have taken part in previous planning conferences or who have had to (try to) interpret the results (arguably more difficult than actually taking part but undoubtedly much less stressful). On this occasion, the small print includes a relatively large number of formal agreements between administrations, and probably some informal international agreements. In addition, there was almost certainly a significant number of agreements between different users in the same country; this type of agreement does not even get into the small print and may thus be impossible to analyze completely.

This brief article is therefore only a personal reflection on the conference. It is expected that a more complete article with a factual analysis of the

Original language: English
Manuscript received 14/9/95.

conference results will appear in a later issue of the **EBU Technical Review** and that this will have several authors rather than presenting only a single viewpoint.

2. Work before the conference

Of course, no planning conference takes place without a great deal of preparation and this conference was no exception to that general rule. However, there was one significant difference when it is compared with earlier conferences. Because DAB uses a new system, there was no completely-relevant prior knowledge on which to base the definitions of a set of planning and coverage calculation methods and rules. At other conferences, considerable effort is expended to ensure that there are no ambiguities in the rules; everyone can feel that they have been treated fairly or, as is the more normal result, can feel that they have been treated as equally unfairly as everyone else.

In the preparations for the T-DAB planning conference, there was little information available with regard to coverage planning or interference assessment, few practical results and virtually no information at all about the transmitter sites or radiation characteristics which would be used to provide T-DAB coverage. It could have been argued, indeed it could still be argued, that normal people would have abandoned the conference preparations, temporarily, in order to go away and obtain a significant amount of the information necessary, if not all of it. This is usually known as the "sensible approach". This was clearly not a sufficient challenge for the people involved, so they went ahead with the preparations and simultaneously invented the concepts, their impact, the set of planning methods and the rules intended to avoid ambiguities. (Of course, this failure to adopt the sensible approach should not be taken to imply that planners are not normal people).

In fact, the invention of the planning methods went on and even became a part of the process of writing the computer programmes which were supposed to implement them!

Figure 1
Front cover of "Information for Participants".

There was one obvious disadvantage to the process described above and that is that a certain amount of re-invention was found to be necessary, as the impact of earlier decisions was more fully evaluated. This can perhaps be illustrated best by the fact that, only three weeks before the start of the conference, all of the protection ratio values (a key element in assessing the mutual interference between T-DAB services and the services already occupying the bands in which T-DAB would be implemented) were being reviewed, and a significant number were being revised.

A less obvious disadvantage, but one which caused major problems during the conference was that some of the existing services which would (or might) be affected by the introduction of T-DAB were not identified until very late. Under those

circumstances, it was very difficult to ensure that the planning methods to be used could ensure protection of all of the existing services or, at least, could identify any potential interference – which is not necessarily the same thing.

3. Wiesbaden

As noted earlier, the CEPT T-DAB planning conference took place in Wiesbaden from the 3rd to the 21st July, 1995. (Strictly speaking, it really only finished on the 21st because the clock stopped at midnight. In that respect, at least, this was a normal planning conference.) The conference was hosted by the German Administration which also provided the conference chairman, Mr. E. George. The venue for the conference was the Kurhaus – a carefully-restored, elegant (opulent might be a better word), turn-of-the-century building, presumably built to reflect Wiesbaden's importance as a regional centre and major spa. The Kurhaus comes complete with its own built-in casino and an excellent, though expensive, restaurant. This venue sets new standards in conference accommodation and thus poses a major problem in the choice of location for the next planning conference (unless of course Wiesbaden happens to be available!).

Put very briefly, and incompletely, the aim of the conference was to provide sufficient frequency block allotments to each CEPT administration to ensure that two DAB coverages could be provided for each country. Because each DAB block (about 1.5 MHz wide) can provide six programme channels, this means that twelve programmes can be provided in (virtually) all areas. In principle, in any one area, one block would be used to provide a set of national service programmes and the other block would be used to provide regional programmes.

Figure 2
The main entrance to the Kurhaus in Wiesbaden.

The interpretation of this very general concept varied widely. In some cases, in order to provide the national services, a single frequency block was requested for a whole country. In other cases, the national services were to be provided by means of a set of (non-overlapping) areas, each with its own frequency block. The result is that if some hypothetical, independent outsider had examined the set of T-DAB requirements, he or she would probably have had considerable difficulty in deducing the set of rules which had led to them. Indeed, even the concept of "national" was subject to considerable variation from one administration to another! Although their total number varied from time to time during the conference, the end result was that 751 requirements were allotted frequency blocks in one of the three bands actually being planned and a further six were agreed for later accommodation in other bands.

The relatively modest number of 751 T-DAB requirements is in marked contrast to the number of other service requirements which needed to be considered for protection. Again the total number varied from time to time but was usually around 50 000, of which several thousand could, in practice, be discarded because they used frequencies sufficiently removed from the nearest possible T-DAB block frequency to ensure that interference was impossible. These other services covered a wide range of applications including television (which meant that in some cases the broadcasters had to decide whether they wanted television or T-DAB as they clearly could not have both in the same area at the same time), fixed and mobile services and even aeronautical services. As the latter often required an operational height of 10,000 metres to be taken into account (this implies that line-of-sight conditions and potential interference problems can occur at ranges of about 500 km), protecting them against interference was a major problem. Even more of a problem was created because some such services were added about halfway though the conference. (That certainly created a degree of excitement!)

It is worth recording that there were some 300 delegates to the T-DAB conference and they represented all of the CEPT countries. Even though some countries did not send their own representatives, arrangements were made for a special group to generate broadcasting requirements which would, hopefully, cover their needs. Of course, it was not possible in such cases to take much account of their other service requirements. In some ways, this was a good thing. The number of other service requirements was already very large and the only way in which their protection requirements could even be considered was by use of computers. Any additional requirements created longer computer run times and, even worse, the need to consider how to deal with the results that were generated.

4. Overall results

Those readers who are familiar with planning and interference problems, but who were not in Wiesbaden, may wonder how any result could be obtained in view of the number of T-DAB requirements to be accommodated, the number of other services to be protected and the relatively restricted amounts of spectrum involved (in practice, almost all of the T-DAB requirements were accommodated in the sub-bands 223 to 240 MHz and 1452 to 1467 MHz). The answer – again this is not uncommon in frequency planning conferences – is that a mixture of common sense and compromise (a very large amount in this case) were used to "massage" the results of calculations.

In practice, this means that many of the T-DAB requirements will need to be coordinated before they can be implemented fully; in addition, there are many requirements which cannot be implemented in the near future. The percentage that are subject to coordination or time-scale constraints cannot be readily evaluated at present. This matter should not, generally, cause undue concern as there are many countries who do not wish to implement T-DAB services in the near future; by the time they do wish to implement them, it is to be expected that there will be fewer problems.

Possibly of more concern, at least in some cases, will be the fact that the frequency block allotment process was based upon (so-called) "representative" T-DAB networks. These were artificial concepts designed to permit the planning process to proceed. In general, perhaps in all cases, they do not reflect realistic network configurations, especially at the frequencies below 240 MHz. These allotments can be converted to the set of assignments necessary to implement a real single-frequency network without further coordination, only if the interference generated by the assignments is not significantly greater than that calculated for the representative network.

The representative networks made use of nominal transmitting locations, situated on or near national or regional boundaries, and involved only low power being radiated "outwards" from the area to be covered. Real networks usually involve transmitter sites that are "inwards" from the boundaries and which radiate significant power towards those boundaries and thus outwards. This clearly gives scope for interference towards neighbouring countries which is greater from the real network than from the representative one. To ensure that this potential problem does not create real problems – of interference or of T-DAB implementation delay – requires calculations and a set of rules. The detailed rules which will govern how these calculations are to be made have not yet been drawn up. Because of the implications that these rules could have, it seems probable that the process of agreeing them could be very interesting.

5. Postscript

In view of the apparent reservations expressed in the previous few paragraphs, the reader may be tempted to doubt the remark made in the opening paragraph that the T-DAB conference was a great success. Such a doubt would not be justified. It must be emphasized that planning conferences are not held in order to provide instant access to spectrum, especially when that spectrum is already occupied by other services. Rather, they are an investment for the future. In this case, it can be argued that it was an investment for the future of sound broadcasting. Without a new system that is capable of providing high quality reception and without the spectrum to enable such a system to be implemented, there would be doubts about the ability of radio to maintain audiences in the future, in view of the competition from media such as CD. The T-DAB conference in Wiesbaden laid down the framework for a successful future. Frequency planners face a challenge to ensure that the implementation of T-DAB services can be successful. In turn, programme makers face the challenge of attracting an audience to the new medium and, in the longer term, of keeping that audience.