# Digital television—ABA to study single frequency networks

By Bob Greeney
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One of the major issues in planning and operating analog television broadcasting systems is their voracious appetite for frequencies. For instance, in virtually every Australian television licence area viewers cannot always get their favourite service from the main transmitter. Usually this is because of interference to that frequency or because they are in an area shielded from those main transmissions. In these cases, translators are used. Translators are additional, relatively low power, transmitters located so that they can provide a boosted signal into the area where reception of the main transmitter is poor.

Because state-of-the-art analog television receivers cannot distinguish between two transmissions on the same frequency, translators must use an alternative frequency for viewers to be served by the additional transmitter. In many cases, the main transmitter requires four, five or six of these 'gap-filler' transmitters to provide adequate coverage of the entire licence area. The transmitters usually use a discrete frequency each and are referred to as translators because they receive the signal on one frequency from the main transmitter and retransmit it on another.

In one case, on the Central Coast of NSW around Gosford, there are three translator sites providing eight services; this requires 24 discrete frequencies to be transmitted for the area, in addition to the frequencies used by the parent broadcasters in Sydney and in Newcastle.

In order for digital television services to be able to provide the same coverage of each licence area as they currently enjoy with their analog services, there needs to be sufficient frequencies for the necessary transmitters. However, the conversion of analog television services to digital transmissions requires all broadcasters to simulcast their analog and digital services for at least eight years before switching off their analog services; this presents a difficulty in the planning of sufficient frequencies for digital television.

This problem is not unique to Australia. Because digital television transmissions worldwide are to use the same frequency bands as the analog services, virtually every country, as it decides to convert to digital television, has to face the same issue. The digital transmissions must fit in between the existing analog services, sharing frequencies in the same bands.

The European DVB-T digital television standards adopted by Australia make provision for digital television 'gap-filler' transmitters to operate on the same frequency. This will be the same frequency as the main transmissions in many circumstances — at technique called a single frequency network (SFN). Use of SFNs gives television planners the opportunity to achieve

significant spectrum efficiencies compared with using television frequencies for analog services.

To date, because permanent digital television transmissions started only last year, experience with SFNs is relatively limited. The USA's 8VSB system adopted by the American Television Standards Committee does not make provision for SFNs, although work is now being done to see how SFNs might be implemented in that system. In the many countries that have now adopted DVB-T for their digital television systems, little use is made of SFNs at this stage.

Trial SFNs are operating in parts of Germany (in Berlin, Hanover and Munich) in Italy, Spain and in France. All are operating in the UHF bands; none operate in the VHF bands. However, there are plans to look at VHF implementation of SFNs in some of these cases. The UK, which is most advanced in its implementation of DVB-T services, is proposing some limited use of SFNs, but only for small coverage areas using UHF frequencies.

Because of the lack of practical experience in other countries in implementing SFNs, the ABA is to undertake an urgent study of the practicalities of implementing them. This project is to be done in close consultation with broadcasters, potential broadcasters and datacasters, equipment manufacturers, facilities providers and any other party wishing to participate.

**Anyone interested in assisting with this work, should contact Bob Greeney, Director Technology, by phone at (02) 6256 2899, fax: (02) 6253 3277 or by e-mail at bob.greeney@aba.gov.au**

### Scope of the SFN study

Some of the parameters to be studied are:

- what are the technical planning constraints, can SFNs be used in situations such as those at the Central Coast?
- how practical and under what circumstances can a local SFN 'gap filler' transmitter operate on the same frequency as an adjacent analog transmitter?
- what are the limitations of 'off-air' feeds? and
- how can we best maintain effective coverage with SFNs?

The ABA's studies will also consider the relative costs of SFN proposals compared with the cost of multi frequency networks, i.e. use of more than one frequency in a network of digital transmitters in the licence area of a service.

Trial SFN transmissions supported by participants in this study are expected to yield much information in relation to the questions to be addressed and to confirm many of the practicalities of implementing SFNs in Australia. Wherever possible, the SFN working group will liaise with and exchange information with overseas groups doing similar studies.

The SFN working group is to make appropriate recommendations to the ABA by the end of 1999.

Membership of the group will be drawn from this interested in broadcasting in the free-to-air environment, broadcasters, potential datacasters, transmission facility providers and representatives of the receiver industry. Anyone interested in assisting with this work should contact Bob Greeney, ABA Director Technology, by phone at (02) 6256 2899, fax: (02) 6253 3277 or by e-mail at bob.greeney@aba.gov.au

## ITU meetings on television and radio broadcasting

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### Digital television broadcasting developments

The meetings discussed developments in, particularly developments of an alternative system in Japan. Currently, two systems are accepted as international digital terrestrial television standards: the North American Digital Vestigial Sideband system known as 8VSB and the European Digital Video Broadcasting (DVB-T) system. The Japanese development is similar in many respects to the European DVB-T system and uses the same coding techniques, with a variation. The system called Integrated Services Digital Broadcasting for terrestrial broadcasting (ISDB-T) segments the digital data stream allowing for simultaneous transmissions of different modulations, providing television transmissions for home and mobile reception as well as capacity for digital radio transmissions. The claim is the ISDB system provides a superior mobile service to the alternative systems and a digital radio service at CD quality, similar to that provided by the European Eureka-147 Digital Audio Broadcasting (DAB) system.

The ISDB standard is now undergoing final development and refinement in Japan before being submitted to the Japanese authorities late this year, and then to the ITU for acceptance as an alternative standard for digital television and radio broadcasting.