**Jonquil Ritter, Director, Planning and Licensing and Fred Gengaroli, Director, Engineering attended the IBC Conference in Amsterdam from 10–14 September. Some observations on the conference are set out in this brief article. The one-day tutorial which preceded the conference introduced the three systems for digital television. The tutorial featured the on-going debate between ATSC (the American system) and Sinclair Broadcasting, the American broadcaster who appears to be pushing for America to drop the ATSC standard in favour of the DVB-T standard.**

# IBC99

The keynote address by Tony Ball, British Sky Broadcasting UK, was considered controversial as it promoted his company's commercial interests. He was critical of other bodies with views or commercial interests different to BSkyB or which he saw as not sufficiently supporting BSkyB's interests. In his view, multi-programming rather than high definition television (HDTV) is the way to go.

### Interactivity

Watching television passively, as we do now, will soon be a thing of the past. No longer will the broadcaster just be conveying programs. The viewer will also be an active participant, able to select views from various angles, demand instant replays, obtain information, banking or products on demand.

A number of companies specialise in this field (e.g. Lysis) and are positioning themselves to be ready to deliver just such interactive services. Interactive services such as banking are already operating in Europe, with an initial favourable response reported.


### HDTV versus multi-programming

By far the biggest debate at IBC this year was HDTV versus multi-programming. In fact this debate seems to have replaced the one about ATSC versus DVB-T. First of all there is recognition that different countries have different needs. In the USA there are already many television channels available and therefore it is thought that digital needs an injection of something new and special like HDTV to entice the viewing public to migrate to it. In Europe, by contrast, it was considered that more channels were needed, so multi-programming is the preferred option. In the UK, for example, before digital television there were only four free-to-air analog services available. The six digital multiplexers can now deliver 24 additional services of which four are the analog channels simulcasting in digital.

Despite these arguments there is an opinion in many camps that Europe has 'missed the HDTV boat' and that the legacy of standard definition television (SDTV) set top boxes will make it almost impossible to implement HDTV at a later stage if desired.

In Australia, the choice of HDTV, from a technical perspective, seems the correct one. It is clearly advisable to ensure that the set top boxes used in Australia are able to decode both HDTV and SDTV. This way, if HDTV takes off, we will have no legacy problems to contend with. On the other hand, if HDTV does not prove to be a winner, then SDTV transmissions can easily continue.

Set top box manufacturers like Sagem SA and chip manufacturers like C-Cube Microsystems indicated that silicon chips, which decode both HDTV and SDTV, would be available early next year.

### TV anywhere/anytime

The viewer decides *what* to watch and *when*. This will be possible because of the on-going developments in hard disk memory capacity. Currently, a US$100 hard disk will store four hours of viewing time. By 2005, this is expected to increase to 40 hours, and by 2010 to 400 hours (all for approximately the same price). Companies like TiVo have made good progress in this field and are already providing some services in the USA. This ability to store large amounts of viewing data could even remove the need for video-on-demand, thus liberating bandwidth for other applications.

The hard disk would become almost like a personal channel in which the viewer can store many hours of favourite programs and then be able to view them at their convenience. It was considered that for this service to be successful there would need to be a single standard, preferably an open system.

There is of course concern about what this might mean for commercials and commercial operations. It was generally agreed that new business models would be needed for the future.

### Technical papers

There were many papers of interest from the Australian perspective, including:

#### SFN tests

The Spanish paper on single frequency network (SFN) tests may provide some good information for the Australian planning environment.

The tests were carried out by Retevision (a Spanish manufacturer) in its experimental DVB-T SFN, in the Madrid area. The paper discusses measurements obtained during the different tests, paying special attention to the minimum field strength requirements for good

reception and field strength variations obtained in urban, suburban and rural environments. In addition, those results are analysed and contrasted with the ones previously obtained for multi frequency networks.

The paper also addresses a general approach to the expected possibilities for mobile reception (of lesser interest to Australia, at least for the moment) in a wide-area SFN, which is the main network configuration that has been deployed in Spain since June 1999.

**Antenna diversity**

This paper summarises some of the work in implementing antenna diversity techniques within DVB-T receivers. Theoretical analysis of antenna diversity shows that efficiently implementing this technique in a DVB-T receiver will only require minor changes in the architecture of present-day DVB-T receivers and no change in the DVB-T current environment. It claims that diversity could be made available with limited additional development and with only a reasonable additional cost.

A simulation of a complete DVB-T transmission link demonstrates what large performance gains to expect when using antenna space or polarisation diversity, especially in difficult portable and mobile reception conditions. Antenna diversity is already implemented in some digital cellular phones and in luxury cars (for analog radio reception) and high hopes rely on its use at the base station in digital cellular networks.

Although obviously introducing additional costs to consumers, these techniques could prove useful in areas of difficult coverage.

**MATV**

In the UK, as in Australia, viewers in hotels and apartment blocks receive their television services via MATV systems. Nearly a year ahead of the start of services in late 1998, the UK's Digital Television Group (DTG) set up a Reception Task Group to investigate difficulties that might be encountered generally in reception of digital terrestrial television signals. Much of its work has been devoted to carrying digital terrestrial television signals in MATV systems. This has resulted in the development of guidelines for both upgrading old systems and designing new ones. This paper describes some of the findings and recommendations.

**DVB-T hierarchical modulation**

The European DVB-T standard includes a large number of transmission modes able to adapt the COFDM signal to a wide variety of broadcasting services. Among them, the hierarchical modulation mode separates the RF channel into two virtual channels, each able to carry transport streams (MPEG-TS) with a dedicated protection.

In a first approach, this DVB-T capability has been viewed as a way to define two distinct coverage areas for a given transmitter. Accordingly, no direct application has been seen for it. However today, broadcasters intend to use the DVB-T standard to cover a great variety of services including the delivery of HDTV and SDTV and mobile receivers, in public transport.

Due to the lack of frequencies available, the DVB-T's hierarchical modulation becomes an interesting way to make a single RF channel able to address two categories of receivers and, as a consequence, two market segments.

The paper details the technical trade-off the broadcaster has to make to broadcast the DVB-T hierarchical modulation.

**Digital on-channel repeaters**

Although intended for UHF bands, developments in this area could be useful to Australia in some situations.

The Advanced Television Technology Center (ATTC) in the USA successfully developed and demonstrated an on-channel repeater for digital television. The demonstration repeated WETA-HD's primary digital television signal over the Blue Ridge Mountains into Charles Town, West Virginia. The system used the same channel for retransmission as the primary transmitter.

A large number of frequency translator channels in the USA have been reallocated to digital television primary channels. The DOCR provides local broadcasters with a means to replicate or extend their current analog coverage while having no impact on the digital television allocation table. The DOCR allows rebroadcast of a digital television signal, without frequency shifting, into an area previously unable to receive the originally transmitted signal. The DOCR can replace the traditional frequency translator as the tool to overcome terrain obstructions and to extend coverage into areas with weak coverage or significant multipath interference. The paper describes the subsequent field test of the ATTC digital television on-channel repeater.

**In-band trunking with L-Band DAB**

L-Band digital audio broadcasting (DAB) is currently deployed in many countries using distributed emission systems such as synchronous single frequency networks and on-channel repeaters.

Synchronous single frequency networks are an efficient way of distributing the signal but the high implementation cost diminishes their interest for broadcasters. On the other hand, off-air on-channel repeaters are simple but limited in application due to their inability to compensate for the propagation delay between the emitted RF signal from the main transmitter and the repeater.

The in-band trunking technique is proposed as a complementary solution that is more flexible than simple on-channel repeaters and is less expensive than the synchronous single frequency networks. Such a technique is well suited for extending the coverage of high-power transmitters.

The paper presents the basics of in-band trunking as a new and promising technique applicable to DAB distributed emission systems. The paper also reports on coverage simulations done to analyse and compare this technique with other approaches such as synchronous single frequency networks and on-channel repeaters.

Some terms used in this article:

DAB: digital audio broadcasting

MATV: monochannel amplifier system (for television)

In-band trunking: a way of increasing service productivity using the same amount of spectrum

L-Band: the 1.5 GHz band used for digital audio broadcasting

DVB-T: digital video broadcasting—terrestrial (the standard for Australian digital television services)

SDMA: space division multiple access (a form of modulation used in communications services)