



**Bob Greeney, Director Technology, and Fred Gengaroli, Director Engineering, attended NAB 2000 in the US during April. This brief report summarises some of the highlights.**

## NAB 2000 springs surprises on digital radio

**T**he major discussion point this year was the development in digital radio in the USA. For a number of years, broadcasters and regulators have been watching digital radio developments to see what might become a worldwide standard. However, initially, only the European Eureka-147 digital audio broadcasting (DAB) system seemed to be a practical choice. But, all along, a number of US companies continued their work on alternative digital technologies that used the existing FM bands, and had the possibility of also using the AM radio broadcasting bands.

At NAB'99, three proponents of the US-developed In-Band-On-Channel (IBOC) systems reported on their developments. The Federal Communications Commission (FCC) gave each until December 1999 to report on their test results to show that their proposed IBOC systems performed at least as well as the analog systems they were to replace. During the year, those three proponents became two when Digital Radio Express merged with USA Digital Radio; Lucent Digital radio continued with their specific developments. Both proponents reported to the FCC as required. However, neither addressed all of the parameters sought by the FCC. The FCC at the NAB2000 meetings gave USADR and LDR until 8 May 2000 to submit their Phase 2 test plans (this is reported to have happened). The FCC feels that its National Radio Standards Committee needs more information in order to determine whether or not the IBOC systems meet the requirement that they perform at least as well as the analog systems.

More importantly, the FCC has given Lucent and USADR until December 2000, to propose a recommendation for a single IBOC digital radio standard for the US.

Both Lucent and USADR operated their IBOC variants, which are not compatible with Eureka-147 nor with each other, during NAB 2000. Each operated their digital radio system on a host FM service in Las Vegas. The FM host services operate at around 75 kW effective radiated power, with the digital radio services operating at around 600 watts. Demonstrations showed that under the conditions existing in Las Vegas, where FM services are 1.6 MHz apart with a vacant FM slot between them, the digital service did not cause any interference to the host FM service nor to other FM services in the area. At one stage, the host FM system was transmitting a classical FM service while the IBOC system was transmitting a hard-rock program. Clearly, these test transmissions were very impressive.

Questions remain about the performance of these IBOC systems in more congested FM markets, where adjacent channel high power services operate only 800 kHz apart and where often there are lower power community radio services only 400 kHz away from each of the high power FM services. This was set to become a major issue in the USA with the FCC proposals for Low Power FM services there, operating at up to 1000 watts (the future of the US' LPFM services remains in doubt after the US Congress disallowed the FCC's proposals — that debate continues in the USA).

The full report of the attendance by Bob Greeney and Fred Gengaroli at NAB 2000 includes technical details of the IBOC systems and of the DVB transmissions. It may be downloaded from the ABA web site at <[www.aba.gov.au](http://www.aba.gov.au)>.



# Innovations

At this stage, assuming that USADR and Lucent can reach agreement on single IBOC standard for the USA, there must be strong optimism that the IBOC standard could become a practical option for Australian broadcasters. The issue then would be receiver availability, just as it is now with the Eureka-147 DAB system. American broadcasters are just as concerned as Australians are, about the future of IBOC if a single standard cannot be achieved. The fear is that IBOC could go the same way as did AM-stereo because of the lack of support for a single standard 20 or more years ago.

On the AM front, the IBOC proponents are working on developments that might prove to be practical. However, another system, developed by Digital Radio Mondiale (DRM) has emerged as a strong contender. This group includes more than forty companies from Europe and North America and Japan in a consortium dedicated to making their digital radio techniques a successful contender to replace existing

AM services operating at LF, MF (the AM Band) and HF frequencies. The DRM system has already been successfully demonstrated over long paths at HF and is undergoing trials at MF. USADR has joined this consortium so there are also prospects that DRM could emerge as a contender for the US as well as in other countries. DRM can deliver FM mono quality within a single AM channel (10 kHz in the USA, 9 kHz in other countries) and if two AM channels are used ('bundled' as it is called in DRM), a stereo service can be delivered. The digital service is much

more reliable than the analog services it replaces and suffered much less from fading – it is a significant improvement over the existing analog service. In order to secure sales, the DRM consortium has already included car manufacturers within its ranks and is aiming to have receivers available at about US\$30 more than currently available AM/FM car radios (US\$150).

Two new satellite delivered subscription digital radio services have been licensed to operate in the US. Sirius and XMI radio operate in the 2.6 GHz band using similar digital technology to that used in the Eureka-147 system. Both intend to rebroadcast their services from a large number

of terrestrial transmitters, 150 and 1700 transmitters respectively, to more than 100 cities in the US. These services would not be suitable in Australia because of the frequencies they use, the 2.6 GHz and is not available here, but proposals for Eureka-147 use a similar band at 1.5 GHz (which is not available for use in the US). Both of these US services are expected to start later this year (2000), providing up to 100 music and voice channels each.

## Digital television and datacasting

NAB 2000 was also an opportunity for delegates to catch up on developments in digital television and datacasting in the USA. Digital television is slowly gaining acceptance in the USA as broadcasters come to grips with transmission issues with the USA's digital television standard and as design improvements in consumer receivers are implemented. Many US broadcasters still feel

that they should have the option of operating the Digital Video Broadcasting (DVB) digital television standard, which has been adopted through out Europe, in Australia, New Zealand, Singapore, India and a number of other countries. The DVB system is reportedly preferred in China and is likely to be adopted in Brazil. To this end, US broadcasters are seeking amendments to their legislation to allow them to choose either the US standard or the DVB standard; the lobbying for DVB in the USA appears to be gaining strength based on its superior performance to date.

There was a demonstration of the DVB system at NAB 2000, using channel 29 transmitting from the Las

Vegas broadcasting site about 25 kilometres from the NAB Convention site. The test transmissions show the simultaneous transmission of standard definition (SD) and high definition (HD) television in a single 6 MHz channel (Australia uses 7 MHz channels) and included a local single frequency network (SFN) operation. Each program was independent of the other and neither suffered any impairment from the other. This demonstration was important to Australian broadcasters because of the requirement for them to transmit an SDTV program at all times in their digital television channel and to also transmit at least 20 hours of HDTV program per week, within the same digital television channel.

