

CBS breakthrough on HDTV compatibility

New system would make possible reception of high definition signals on conventional TV sets; it's designed for DBS, cable, MDS, not for terrestrial broadcasting; development may answer many, if not all, of industry reservations to medium

A giant step toward compatibility between high definition and conventional television was announced last week by CBS, whose Technology Center has developed a 1050-line system that could be used for direct broadcast satellites, cable, MDS and other transmission media that do not use the standard VHF or UHF spectrums.

In keeping with the definition of HDTV adopted by the Advanced Television Systems Committee, the industry's standard-setting group, the CBS system features 1050 lines of vertical resolution, increased horizontal bandwidth, a five-to-three aspect ratio and stereophonic sound.

The system falls short of full compatibility with existing 525-line NTSC television receivers, however. Although the NTSC sets will be able to display improved 525-line pictures, they will have to be equipped with a special set-top converter to do so. And even with the converter, they will not be able to display the far edges of the HDTV pictures. Special HDTV sets, distinguished primarily by extra-wide screens, will be needed to display the HDTV picture in its entirety.

Despite the best efforts of CBS, the industry has been slow to accept HDTV because it requires extremely wide channels to transmit, regardless of the medium, and because of its perceived incompatibility with existing television receivers. CBS has ameliorated both problems by dividing the HDTV signal in two and transmitting it over two channels. The first channel would carry a 525-line signal with the four-to-three aspect ratio that could be displayed on NTSC sets with the help of the converter. A second channel or, as CBS calls it, an "augmentation channel," would carry an additional 525-line signal with the five-to-three aspect ratio. HDTV receivers would tune in simultaneously to both channels and combine them to create the HDTV display.

According to Renville McMann, one of the developers of the system, the video bandwidth of the 1050-line HDTV signal is 16 mhz. It could be divided and transmitted over two not-necessarily-contig-

uous DBS channels or over three adjacent 6 mhz cable channels. "We are putting up a DBS system to be competitive with cable systems," McMann said, "but we don't want to lose that audience that would receive this via cable."

The system is based on time multiplex component (TMC) video processing. "It's a system in which the luminance (brightness) and chrominance (color) is not mixed together, as is composite NTSC," said McMann, "but is sent in a time sequential form." The system, of which the British-developed MAC system is one variation, eliminates many of the imperfections in the pictures that result from mixing the chrominance and luminance.

It's the use of the TMC transmission scheme that requires the use of converters to display the 525-line picture. The converters transform the TMC signal to either an NTSC signal for display on conventional NTSC television sets or to a baseband NTSC signal or RGB signal for display on a component television monitor.

The need for a converter may not be the problem it seems as all DBS and cable subscribers have to have converters anyway to tune in nonbroadcast frequencies and, in most cases, descramble the signals. As a matter of fact, said McMann, the TMC processing provides a degree of scrambling. To assure that its system is compatible with all DBS converters, CBS is trying to convince

prospective DBS operators to employ a TMC transmission scheme. "It is hoped that a common standard for TMC DBS broadcasts can be established within the U.S. and preferably throughout North America," CBS said in a report announcing the development to the Institute of Electrical and Electronics Engineers in Washington last Thursday (Sept. 22).

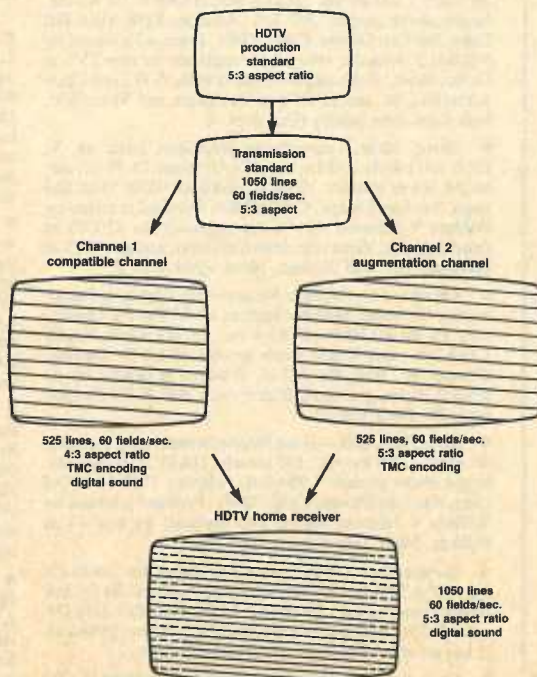
The system is not perfect. Because of the expanded aspect ratio, the edges of the HDTV picture, which account for 20% of the total picture, will have only 525 lines of vertical resolution. But the problem "is not as bad as it seems," McMann said. The HDTV system will be designed to interpolate another 525 lines from the 525 lines that are actually transmitted as part of the augmentation channel. "It doesn't get us back to [true 1050]," he said, "but it gives us a subjective improvement."

The other problem is that if a picture with a five-to-three aspect ratio is broadcast, a receiver with a four-to-three aspect ratio is going to clip off the edges. The loss is simply not great enough to bother most people, McMann said. "We have done some testing on that and our Broadcast Group people don't feel this is an important limitation." Although U.S. broadcasters usually "pan-and-scan" widescreen motion pictures for television to keep the action in the center of the picture, he said, most European broadcasters don't bother and it hasn't caused them many problems.

The CBS system is basically a transmission standard. "It should not be confused with a still-to-be-defined HDTV production standard, which it is hoped will be used throughout the world," the report said. "Major programs will be produced in the HDTV production format and converted to the proposed 1,050-line HDTV standard prior to broadcasting."

One of the key features of CBS's HDTV design is high-fidelity stereophonic sound. In the CBS system, the sound will be transmitted digitally in time sequence with the video. "The number of the sound channels is still to be determined, but may [end up being] as high as five."

Work on the system is continuing. The report noted that scientists at the Technology Center are building a prototype system that should be operational later this year. Once the system is completed, CBS technicians hope to test it on a "simulated DBS system with RF links." □



DBS HDTV 2-channel system