A FLEXIBLE SPECTRUM EFFICIENT TRANSMISSION SYSTEM FOR DIGITAL CABLE AUDIO

ABSTRACT ONLY

The ICT digital music system will deliver "CD" quality stereo music to TVROs and cable subscribers using an extremely robust and bandwidth efficient transmission scheme. Nine channels of stereo audio programming will be produced at the origination facility. All programming material will be generated from compact disks or digital audio tapes. The digital outputs of the players will be fed to a digital mixing board. All fading and mixing of the audio programs will be performed in the digital domain. This avoids introducing any distortion through a digital to analog to digital conversion process.

The nine stereo audio channels will be combined with sixty-four data channels to form a single 12 Mbs stream. This bit stream is encoded onto a 4.2 Mhz baseband PAM signal which closely resembles video. This allows the DM signal to be transmitted using standard satellite, cable TV, and microwave equipment.

The sound quality of consumer "CD" digital audio was adopted as the goal for audio reproduction fidelity. Transmitting the required audio and control data in the allocated channel while preserving the integrity of both the music and the data requires the implementation of sophisticated error checking and compression schemes. Satisfying the bandwidth constraints of the overall data channel requires that the audio data be compressed by roughly 30%. The fundamental technical challenge of the system was to achieve this compression without reducing the perceived sound quality of the music delivered.

The data is compressed using a variation of block floating point compression. The variant makes use of the non-random nature of the audio source material to minimize the quantization error, which can result in an increased noise level across the audio spectrum. The expanded signal is identical to the input audio data (16 bits per left and right channel, sampled at 44.1 KHz) with the exception of the minimal quantization error. Noise shaping techniques are used to reduce the perceptibility of this induced noise. Digital filters concentrate the noise at frequencies to which the human ear is least sensitive. These measures provide a signal to noise ratio of "CD" quality for CD or DAT music sources.

The signal format will be used to transmit the DM programming to cable system headends and TVROs. TVRO owners who subscribe to the service will have a tuner which can extract any one of the audio programs and convert it to analog audio for connection to a stereo amplifier. Cable systems will have a choice of transmitting the entire DM signal over a single television channel, or to demultiplex the signal and apply the data for each of the stereo channels on a 600 Khz bandwidth channel of the cable. The narrow band approach will allow DM to be marketed on systems which do not have full channel available.

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