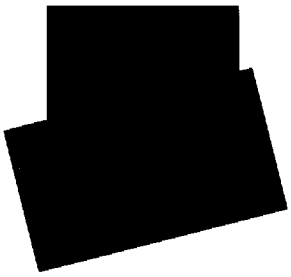


ADVANCED
TELEVISION
RESEARCH
CONSORTIUM

NEW U.S. DIGITAL HDTV SYSTEM
RECEIVES CERTIFICATION FOR TESTING

NEW YORK, January 31, 1992 -- An innovative approach to high definition television based on digital technology has been unveiled for the first time, culminating an intensive, multi-laboratory research and development effort.

"Advanced Digital HDTV" was developed jointly by the David Sarnoff Research Center in Princeton, New Jersey, developer of today's color TV and the basic NTSC standard, and by Philips Laboratories in Briarcliff, New York. Sarnoff and Philips, the two leading video R&D labs in the United States, are members of the Advanced Television Research Consortium (ATRC), one of several groups seeking to develop the official U.S. standard for HDTV.

Other members of the ATRC include the National Broadcasting Company; Thomson Consumer Electronics Inc., headquartered in Indianapolis, Indiana; Philips Consumer Electronics in Knoxville, Tennessee; and Compression Labs Inc. of San Jose, California.

Officials of the consortium disclosed in detail the technical aspects of Advanced Digital HDTV with a Federal Communications Commission Advisory Committee Working Group in Washington yesterday. The working group then certified the ATRC system for official testing, now due to begin in late March at the Advanced Television Test Center in Alexandria, Virginia. The testing of all proposed U.S. HDTV systems is taking place under the auspices of the FCC, which is scheduled to select a HDTV broadcast standard by mid-1993.

"We strongly believe that Advanced Digital HDTV is the best choice for America," said Dr. James E. Carnes, President of the Sarnoff Research Center. "Its creative combination of new technology, coupled with emerging standards, allows for outstanding HDTV picture and sound quality, freedom from interference, and a reliable and robust broadcast signal under virtually all transmission conditions."

In addition, Carnes said, "Our system offers the most flexibility and can truly change the nature of television from a passive experience to a more interactive medium. And our consortium has the U.S. manufacturing and broadcasting presence to implement the standard and turn HDTV into a household reality as quickly as possible."

AN INNOVATIVE SYSTEM

Among the numerous engineering innovations at the heart of Advanced Digital HDTV is its signal design, which includes a unique "spectral notch" whose power characteristics enable the system to avoid interference problems both to and from NTSC signals.

The notch is designed to transmit HDTV signals in portions of the spectrum that are isolated from NTSC signal carriers. It does so through a two-tiered spectrally-shaped QAM data transmission signal where the most important bits receive more power. The signal is also designed to operate with much lower power than an NTSC station, substantially eliminating interference even with co-channel separation needed to accommodate most broadcasters with a simulcast channel.

"Our system has a unique signal which permits broadcasters to simulcast with a low degree of interference with NTSC broadcasts, while offering reliable and true HDTV service to a coverage area, equal to or greater than NTSC," said Dr. J. Peter Bingham, President of Philips Laboratories.

FLEXIBILITY AND WORLDWIDE COMPATIBILITY

Another engineering innovation lies in the system's packaging of data transmissions.

By packeting the data and using a service type of byte to identify the packet's contents, Advanced Digital HDTV offers a multi-media ready capability that achieves total flexibility in the mix of video, audio and data services that can be provided. The mix of services can be changed instantaneously, allowing broadcasters to transmit variable streams of video, audio and data programming to their audience.

"It is this innovation that can make HDTV a more interactive medium than today's television," Dr. Bingham said. "Our data packaging will allow for new forms of educational and entertainment programming as well as extraordinary interactive use of the home TV set."

"The needs of television production and computer applications are both met by flexibly accommodating interlaced scan as well as progressive scan with square pixels," Carnes said.

In addition, the ATRC's data packaging uses the same video data compression principles adopted by MPEG (the International Standards Organization's Moving Picture Experts Group). Thus, the ATRC system includes interoperability characteristics which make it multi-media ready and compatible with the digital video, consumer electronics, telecommunications and computer industries around the world.

"To our knowledge, no other proposed U.S. HDTV system is directly compatible with MPEG," Bingham said. "We believe our unique and flexible packaging of data transmissions is a state-of-the-art feature that is vital to the successful development of HDTV in America."

RAPID IMPLEMENTATION, U.S. JOBS

The consortium's HDTV development program is backed by a rapidly emerging implementation program. Thomson and Philips are the two leading TV manufacturers in the United States both in terms of U.S. jobs and TV sets produced. The television operations of the two companies employ more than 15,000 workers at ten plants in six states. Their brands (Thomson: RCA, GE, ProScan; Philips: Magnavox, Sylvania, Philco, Philips) account for more than one-third of all television receivers purchased by American consumers.

Earlier this month, both companies displayed widescreen, 16x9 monitor/receivers with NTSC/HDTV capability at the industry's Winter Consumer Electronics Show in Las Vegas. Thomson recently announced plans to manufacture its widescreen receivers at the company's Bloomington, Indiana plant, the largest TV assembly plant in the world. Glass and picture tubes for the Thomson sets will be produced at its Circleville, Ohio and Marion, Indiana plants, which presently make conventional 4x3 aspect ratio products. Philips uses facilities in Greenville, Tennessee; Ottawa, Ohio; and Ann Arbor, Michigan for current production of TV receivers and picture tubes.

Compression Labs, the newest member of the consortium, is planning for the design and manufacture of transmission encoders for the ATRC system, while NBC, along with its 208 affiliate stations, is evaluating program production and transmission requirements for the broadcast networks as well as individual over-the-air stations.

"We are confident that Advanced Digital HDTV will excel in meeting all of the criteria established by the FCC for the selection of America's HDTV standard," said Dr. Carnes. "Our consortium's U.S. manufacturing plants ensure that if our system is selected, this will truly be a made-in-America product."

#

For further information:

Pam Golden
Golden Loder Associates
(908) 233-2040

Frank McCann
Thomson Consumer Electronics
(317) 267-6613

Cynthia Gray
David Sarnoff Research Center
(609) 734-3038

Advanced Digital HDTV Technical Backgrounder

Overview

Advanced Digital HDTV is a fully digital solution to the demanding requirements for delivering HDTV to viewers in the U.S. It provides high resolution pictures, CD-quality stereo audio and digital data all within a standard 6 mHz television channel. In addition, the system has been designed to be compatible with satellite, and cable transmission as well as for recording on consumer affordable VCRs and processing by computer-based multimedia systems.

Advanced Digital HDTV meets all of the important and difficult challenges facing an HDTV system:

*** Superior HDTV Picture and Sound Quality** - Advanced Digital HDTV offers picture resolution more than twice that of today's NTSC and sound quality rivaling CDs. This is made possible by the adoption of world-standard ISO-MPEG (International Standards Organization - Motion Picture Expert Group) video and MUSICAM audio compression systems in combination with a high 24 Mbps digital data rate.

Advanced Digital HDTV's advanced compression system uses a two-pass encoding scheme that allows bit allocation to be performed with perceptual weighing. This significantly reduces compression artifacts and improves picture quality.

The MPEG implementation in Advanced Digital HDTV even allows the broadcaster to upgrade his encoder as newer, more powerful versions are released resulting in better picture performance at the receiver - without the receiver needing to be changed at all!

*** Wide Coverage Area With Graceful Degradation** - Advanced Digital HDTV's unique dual carrier SS-QAM (Spectrally-Shaped Quadrature Amplitude Modulation) RF transmission approach addresses the particularly tough terrestrial broadcast interference environment. The shaped carrier system minimizes interference with neighboring area's NTSC programs on the same channel as well as avoiding interference FROM those same signals.

Additionally, Advanced Digital HDTV uses Prioritized Data Transport to provide high priority picture and sound information with a stronger carrier. This allows for more graceful degradation in fringe signal area performance than typical digital transmission systems have previously provided.

Advanced Digital HDTV robustness is so strong that it will provide greater, interference-free transmission coverage area than an NTSC transmitter with equal power.

*** Most Flexible Scope Of Services** - Advanced Digital HDTV's packetized data transport format separately packages video, audio and auxiliary data and allows their mix to vary dynamically. This allows nearly total flexibility for sending dozens of audio channels, large bursts of digital data for new interactive services or combinations of the above.

*** Greater Interoperability and Extensibility** - Advanced Digital HDTV uses a layered architecture approach which is well suited to data networks (such as B-ISDN telephone networks) and manipulation by computers. It incorporates multiple video format capability including computer-friendly "square pixel" modes.

The MPEG compression system is designed for prerecorded digital media such as future CD-I systems and can be adapted to magnetic recording systems (such as consumer VCRs and computer disks/drives) as well as prerecorded digital media such as future CD-I systems.

Additionally, Advanced Digital HDTV anticipates later video advances such as super-high resolution and even 3-D by having existing receivers "ignore" data which has unknown service labels. Future, compatible sets would recognize the enhanced service packets containing these advanced capabilities and display them appropriately.

*** Low Cost For Broadcasters, Media And Consumers** - Advanced Digital HDTV leverages the international MPEG standard to achieve the most powerful economy of all - a single compression standard for all consumer and computer delivery media which will eliminate the need for multiple decoder types and create economies of scale.

High volume production of MPEG video and audio ICs will help to cost-reduce the most complex electronics portions of receivers, resulting in accelerated receiver cost reductions and market penetration.

Advanced Digital HDTV also has attributes which contribute to low cost for program producers, broadcasters and alternate delivery media:

> Advanced Digital HDTV's 59.94 field rate is identical to NTSC thus eliminating temporal artifacts and the need for frame synchronization in mixed HDTV/NTSC production environments.
>
> Advanced Digital HDTV's 1440 x 960 1050 line scanning format is cost effective in the production studio. It's 2:1 vertical ratio with 525-line NTSC video and 2:1 horizontal ratio with the CCIR 601 digital sampling standard used in 525-line D-1 VTRs offers economical transcoding.
>
> These attributes will be particularly imporant during the NTSC - HDTV transition period when broadcasters must deal with both formats.

For consumers, Advanced Digital HDTV's 2:1 vertical ratio with 525-line NTSC allows economical combination receivers. Additionally, the 1440 x 960 picture format is well matched to low-cost memory devices. Two 16Mbit DRAMs required in a receiver are predicted to cost only about $13 each in 1996.

Thus, in every important area, Advanced Digital HDTV's performance has been designed specifically to meet the specific needs of U.S. broadcasters, consumers and alternative delivery media. This results from the Advanced Television Research Consortium's extensive knowledge and expertise of U.S. requirements:

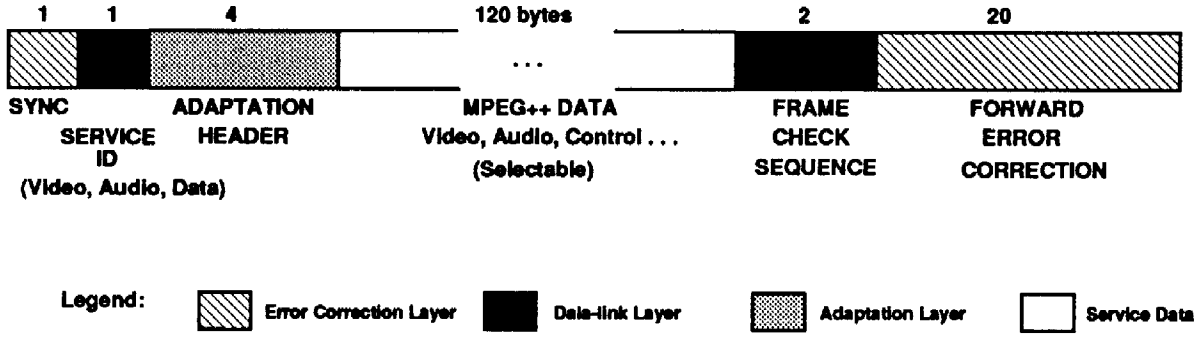
NBC, representing the broadcast community since the beginning of broadcasting. NBC pioneered every major television advance including color and stereo audio.

Philips Laboratories and David Sarnoff Research Center, the two largest Consumer Electronics research facilities in the U.S. with decades of knowledge and expertise in nearly every aspect of video technologies.

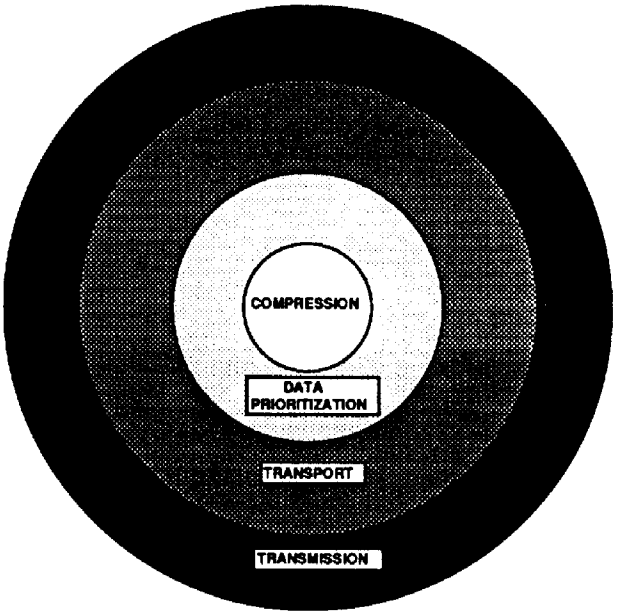
Philips Consumer Electronics and Thomson Consumer Electronics, the two largest U.S. consumer electronics companies with television related manufacturing facilities in Tennessee, Indiana. Ohio, Pennsylvania, North Carolina and television development engineering in Knoxville, TN and Indianapolis, Indiana.

Compression Labs, Inc., the country's largest developer and manufacturer of video teleconferencing equipment with extensive background in digital video compression systems.

ADVANCED DIGITAL HDTV
TRANSPORT CELL CONTENTS



"LAYERED" SYSTEM ARCHITECTURE

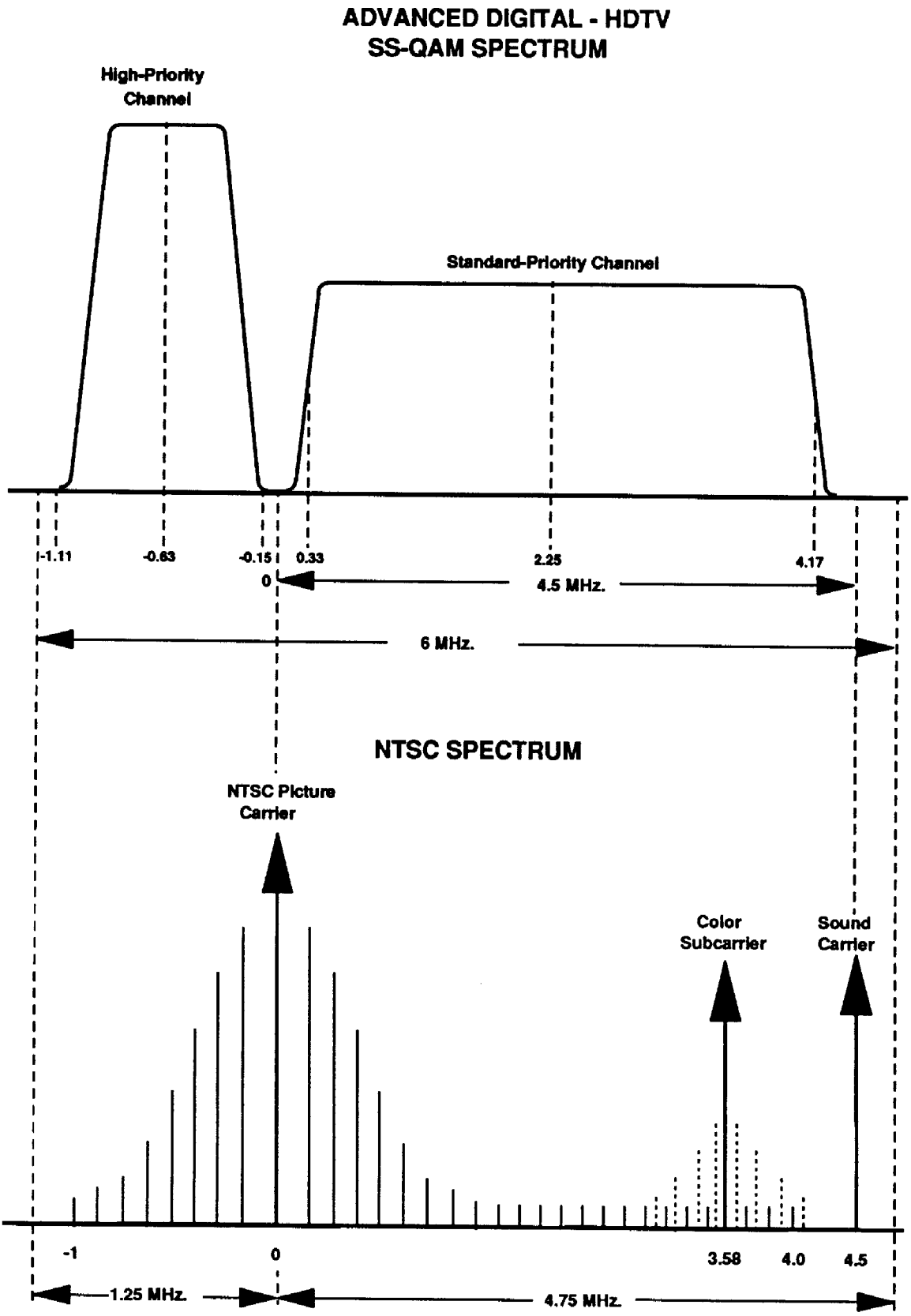


Compression Layer:
- Input/Output Processing
- Data Compression/Decompression

Prioritization Layer:
- Separation (Merging) of Data Into (From) Standard and High Priority Streams.

Transport Layer:
- Service Multiplexing/Demultiplexing
- Error Control
- Video-specific Adaptation Control

Transmission Layer
- Physical Level Modulation
- Adaptive Equalization
- Frequency Translation to/from R.F.


ADVANCED DIGITAL - HDTV
SS-QAM SPECTRUM
High-Priority Channel
Standard-Priority Channel
-1.11
-0.63
-0.15
0.33
0
2.25
4.17
4.5 MHz.
6 MHz.
NTSC SPECTRUM
NTSC Picture Carrier
Color Subcarrier
Sound Carrier
-1
0
3.58
4.0
4.5
1.25 MHz.
4.75 MHz.