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JUN 6 1994

FEDERAL COMMUNICATIONS COMMISSION
OFFICE OF SECRETARY

FROM: Roger Holberg

TO: MM Docket No. 87-268

SUBJECT: Ex Parte Contact

DATE: June 3, 1994

On April 22, 1994, representatives of the "Grand Alliance" companies met with Mass Media Bureau staff. Present at the meeting were:

Wayne C. Luplow	Zenith Electronics Corporation
D. Joseph Donahue	Thomson Consumer Electronics, Inc.
Dr. C.A.A.J. Greebe	Philips Laboratories
Robert K. Graves	AT&T
Robert M. Rast	General Instrument
William Hassinger	FCC
Karl Kensinger	FCC
Gordon Godfrey	FCC
Robert Eckert	FCC
Roger Holberg	FCC

The Grand Alliance representatives informed the Commission representatives that they had met with Chairman Hundt the afternoon of April 19, 1994, the day of the meeting of the Technical Subgroup of the Advisory Committee on Advanced Television Service. They reported that the Chairman indicated that High Definition Television was among his priorities and that he was interested in how HDTV might fit in with the National Information Infrastructure.

Additionally, the Grand Alliance representatives and Commission staff discussed prospects for further Commission action by September 1994 to: 1) focus attention on HDTV and 2) provide sufficient lead time to permit coverage of the 1996 Summer Olympics with HDTV. Grand Alliance representatives were asked by Bill Hassinger to identify those major system elements for which

it would be useful to seek public review and comment. In response Robert Rast submitted the attached memorandum on May 5, 1994.

Attachment

General Instrument Communications

May 5, 1994

3 Page(s)

FAX TO:	William Hassinger/FCC Mass Media Bureau	**FAX #:**	202/632-0158
cc:	Carlo Basile/Philips	**FAX #:**	914/945-6556
	Wayne Luplow/Zenith	**FAX #:**	708/391-7345
FROM:	Bob Rast 619/535-2532	Fax:	619/535-2486
SUBJECT:	Grand Alliance System Elements		

At our meeting with you on April 22, we agreed to provide suggested system elements/specifications amenable for early standardization. We understand that you wish to address the matter only at a high level. We decided it would be appropriate to initiate consideration by sharing the Executive Summary from the Grand Alliance HDTV System Specification recently accepted by the ACATS Technical Subgroup.

We would be pleased to assist in refining the summary, based on your feedback.

Hope this helps.

SCOPE OF DOCUMENT

This document details the System Specification of the Grand Alliance HDTV System, and is intended to form the basis for the documentation of the proposed standard. It is comprised of the documents that have evolved from the work of the Grand Alliance Specialist Groups with the guidance and cooperation of the Advisory Committee on Advanced Television Services (ACATS) Experts Groups. This system specification document also details the prototype hardware, currently under construction. This prototype implementation will be delivered to the Advanced Television Test Center (ATTC) for verification of the performance of the proposed Grand Alliance HDTV system standard.

Executive Summary

Layered System Architecture with Header/Descriptors

The Grand Alliance HDTV System is a layered digital system architecture that uses headers/descriptors to provide flexible operating characteristics. The layers of the GA HDTV System, and some of their most important capabilities, are:

- the Picture layer provides multiple picture formats and frame rates
- the Compression layer uses MPEG-2 video compression and Dolby AC-3 audio compression
- the Transport layer is a packet format based on MPEG-2 transport, that provides the flexibility to deliver a wide variety of picture, sound and data services
- the Transmission layer is a Vestigial Sideband signal that delivers a net data rate of over 19 Mbps in the 6 MHz simulcast channel

While all of the GA HDTV system's layers operate in unison as an effective simulcast system, each layer has also been designed to have outstanding interoperability. The GA HDTV system's layered digital system approach with header/descriptors will create interoperability among a wide variety of consumer electronics, telecommunications, and computing equipment.

Picture Layer

The picture layer consists of raw pixel data, organized as pixels, scan lines and frames. The GA HDTV system provides for multiple formats and frame rates, *all of which will be decoded by any GA HDTV receiver*. This approach allows program producers and application developers to make their own tradeoffs among resolution, frame rate, compression artifacts and interlace artifacts, and to choose the format that is best for their particular use. The formats are:

Spatial Format (X x Y active pixels)	Temporal rate
1280 x 720 (square pixels)	23.976/24 Hz progressive scan
	29.97/30 Hz progressive scan
	59.94/60 Hz progressive scan
1920 x 1080 (square pixels)	23.976/24 Hz progressive scan
	29.97/30 Hz progressive scan
	59.94/60 Hz interlaced scan

Compression Layer

The compression layer transforms the raw video and audio samples into a coded bit stream -- essentially a set of computer instructions and data that are executed by the receiver to recreate the pictures and sound. The compression layer of the Grand Alliance HDTV system:

- uses video compression syntax that conforms to the ISO-MPEG (International Standards Organization — Moving Picture Experts Group) MPEG-2 video data compression draft standard, at a nominal data rate of approximately 18.9 Mbps.

- uses Dolby AC-3 audio compression to provide 5.1 channel surround-sound at a nominal data rate of 384 kbps.

Transport Layer

The transport layer separately packetizes video, audio and auxiliary data and allows their mix to vary dynamically, providing the flexibility needed to innovate new services and new kinds of programming. The transport layer of the Grand Alliance HDTV system:

- uses a packet format that is a subset of the MPEG-2 transport protocol.
- provides basic service capabilities that include video, five-channel surround-sound audio and an auxiliary data capacity.
- offers great flexibility in the mix of video, audio and data services that can be provided to appropriately-featured receivers. It separately packages each type of data (e.g., video, audio, etc.) in its own set of transmission packets. Each packet has a *Packet ID* header that identifies the content of the data stream. This capability enables the creation of new services, ranging from many stereo channels of audio, to broadcast distribution of computer software, to the transmission of very high resolution still images to computers.
- allows the mix of services to be dynamically allocated. This capability will allow rapid burst-mode addressing of receivers. It will also enable broadcasters to send multiple "streams" of video, audio and data programming to their audience, all complementing or enhancing the basic program content. This capability can fundamentally change the nature of television programming, since it enables software to be broadcast to "smart receivers" that can operate in conjunction with the HDTV picture and sound. With this capability, HDTV will likely become a more interactive medium than today's television, enabling new forms of educational and entertainment programming and games.
- provides important extensibility, since a Grand Alliance HDTV receiver will disregard any packet with a PID header that it does not recognize or cannot process. This will eliminate future "backward-compatibility" problems in the installed base of receivers, removing a crucial constraint from the introduction of new services.

Transmission Layer

The transmission layer modulates a serial bit stream into a signal that can be transmitted over a 6 MHz analog channel. The transmission layer of the Grand Alliance HDTV system:

- uses a trellis-coded 8-VSB modulation technique to deliver approximately 19.3 Mbps in the 6 MHz terrestrial simulcast channel
- provides a pilot tone that facilitates rapid signal acquisition and increases pull-in range.
- provides a training signal that facilitates channel equalization for removing multipath distortion.
- provides a related 16-VSB modulation technique to deliver two 19.3 Mbps data streams in a 6 MHz cable television channel

Summary

The GA HDTV system has the flexible operating characteristics that allow it to provide broad interoperability needed to form the basis for new and innovative services and applications of HDTV in many industries.