Digital HDTV Grand Alliance

AT&T

General Instrument

MIT

PHILIPS

Sarnoff

THOMSON

ZENITH

NEWS RELEASE **FOR IMMEDIATE RELEASE**

DIGITAL HDTV GRAND ALLIANCE KICKS OFF NAB WITH PROGRESS REPORT

Significant Progress Builds Momentum for HDTV Standard

LAS VEGAS, March 20, 1994 -- Delivering a comprehensive status report on the development of the Digital HDTV Grand Alliance system, representatives of the high-definition television alliance reported significant progress today at the National Association of Broadcasters convention.

Teams of engineers and researchers from the Grand Alliance are building the subsystems that will be integrated into the complete HDTV prototype system for testing later this year. Members of those teams, representing each of the Grand Alliance member companies, presented a detailed explanation of the subsystems and discussed interoperability issues during a technical session.

The subsystems -- scanning formats, digital video compression, packetized data, audio and modulation -- have all been approved by the Federal Communications Commission's Advisory Committee on Advanced Television Service and incorporate modifications agreed upon with the Advisory Committee's Technical Subgroup.

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Development of the system prototype is on schedule for laboratory testing to start in the fall. Grand Alliance members highlighted the key system elements in their NAB presentations:

- The Grand Alliance HDTV system supports two fundamental arrays of pixels (picture elements): 1920 x 1080 (the number of active pixels per line by the number of active lines) and 1280 x 720. Each of these pixel formats has a wide-screen, 16:9 aspect ratio and provide square pixels important for computer interoperability.

  Frame rates of 60-, 30- and 24-Hertz (or frames per second) are supported, yielding a total of six different possible scanning formats -- two different pixel arrays, each having three frame rates. The 60- and 30-Hz frame rates are important for video source material, 24- and 30-Hz for film.

  A key feature of the system is the Grand Alliance's commitment to using progessive scanning, also widely used in computer displays. Entertainment television has traditionally used interlaced scanning, which is efficient, but subject to flicker when material with sharp horizontal edges is displayed.

  In five of the six video formats, progressive scanning is used: in all three 720-line formats and in the 30- and 24-Hz 1080-line formats. The sixth video format is a 60-Hz 1080 line format. It is neither technically or economically feasible to provide this as a progressive format today, though achieving this is a longer-term goal for the Grand Alliance. The 1080-line, 60-Hz format is handled in the initial standard by using interlaced rather than progressive scanning.

- Video compression, utilizing the MPEG-2 (Moving Picture Experts Group) proposed international standard will allow HDTV receivers to interoperate with MPEG-2 and MPEG-1 computer, multimedia and other media applications.

- The system's packetized data transport, also based on MPEG-2, will provide the flexible transmission of virtually any combination of video, audio and data.

- Compact disc-quality digital audio will be provided in the form of the 5.1-channel Dolby AC-3 surround sound system.

- The modulation technique for transmission, 8-VSB (8-level vestigial sideband), provides maximum coverage area for terrestrial digital broadcasting.

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The system's core technologies all reflect the Grand Alliance's commitment to system excellence and responsiveness to the needs and concerns of consumers, broadcasters, cable operators, computer interests, and the telecommunications industry.

Because of the Grand Alliance system's interoperability between entertainment television and computer and telecommunications technologies, the HDTV standard is expected to play a major role in the National Information Infrastructure (NII). Digital HDTV will be the engine that drives the NII by advancing the development of receivers with high-resolution displays and creating a high-data-rate path to the home for a multitude of entertainment, education and information services.

The Grand Alliance HDTV system employs principles that make it a highly interoperable system. It is designed with a layered digital system architecture that is compatible with the international Open Systems Interconnect (OSI) model of data communications that forms the basis of virtually all modern digital systems. This compatibility allows the system to interface with other systems at any layer, and means that many different applications can make use of various layers of the HDTV architecture. Each individual layer of the system is designed to be interoperable with other systems at corresponding layers.

Since the Digital Grand Alliance was formed in May 1993, the seven organizations involved have evaluated technologies and selected the key elements that will be at the heart of the "best of the best" HDTV system.

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Members of the Grand Alliance are: AT&T, David Sarnoff Research Center, General Instrument Corporation, Massachusetts Institute of Technology, Philips Consumer Electronics, Thomson Consumer Electronics and Zenith Electronics Corporation.

The Digital HDTV Grand Alliance is a sponsor of the 1994 NAB convention.

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BACKGROUNDER **SPRING 1994**

THE HDTV GRAND ALLIANCE

Toward a New Era of Television in North America

OVERVIEW

On May 24, 1993, the three groups that had developed world-leading digital high-definition television (HDTV) systems agreed to produce a single, best-of-the-best system to propose as the standard for the next generation of TV technology.

The three groups -- AT&T and Zenith Electronics Corporation, General Instrument Corporation and the Massachusetts Institute of Technology, and a consortium of Philips Consumer Electronics, Thomson Consumer Electronics and the David Sarnoff Research Center -- are now all working together as the Digital HDTV Grand Alliance.

An exciting new model for industry-government cooperation, the Grand Alliance creates a collaborative effort with a pool of technical talent and financial resources that should assure that digital HDTV is deployed first in North America.

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While, previously, the process of formulating an HDTV standard had concentrated on selecting the best system from among those proposed, under the Grand Alliance, the best features of all the systems are now being combined to produce a system superior to that of any one of the individual proponents.

The Grand Alliance approach is good news for everyone -- consumers; broadcasters; cable operators; and the computer, consumer electronics and telecommunications industries; as well as for North American workers. The proposal addresses the needs of these key constituencies and incorporates capabilities that are useful to each of them. For instance, the system incorporates progressive scan transmission capability and square pixel capability, two attributes that are extremely important for promoting interoperability with computers and telecommunications. Likewise, concerns expressed by many broadcasters have been addressed by including interlaced scan transmission in the initial deployment.

The proposal will allow North America to maintain the worldwide technological lead it has established. The rapid adoption of an all-digital HDTV system in the United States, Canada and the rest of North America, will promote the creation and maintenance of high-skilled jobs in the design and manufacture of HDTV receivers, displays, studio and transmission equipment, peripheral equipment, programming and software development, and especially in semiconductor products.

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Because of the Grand Alliance system's interoperability between entertainment television and computer and telecommunications technologies, the HDTV standard is expected to play a major role in the establishment of the National Information Infrastructure (NII).

Digital HDTV can be an engine that helps drive deployment of the NII by advancing the development of receivers with high-resolution displays and creating a high-data-rate path to the home for a multitude of entertainment, education and information services.

In the end, consumers will reap the benefits of the best technical minds collaborating to bring noise-free, theater-quality pictures and sound to American homes, as well as a host of new applications in home entertainment, education, computer and medical imaging, factory automation, publishing -- all stimulated by the early adoption of this technology.

THE PROCESS

The HDTV standard-setting process has been and will continue to be a public, open process. The Grand Alliance is working closely with the FCC's Advisory Committee to complete the standard and launch HDTV. Here is an update on that process:

- The Advisory Committee assigned its Technical Subgroup to evaluate the Grand Alliance proposal in detail. The Technical Subgroup approved most of the key system elements -- video compression, transport, scanning formats and the audio subsystem -- in October 1993. The final element, the modulation subsystem, was approved by the Technical Subgroup in February 1994.

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- Now that the Advisory Committee's Technical Subgroup has approved the basic concepts of the combined system, the Grand Alliance members are working together to construct the system. In the fall of 1994, the Advisory Committee will conduct extensive laboratory tests in the U.S. and Canada to verify that the system meets its expectations. The Advisory Committee could then recommend the system to the FCC and simultaneously begin final field test verification of the system's performance.

- The FCC, in turn, would consider the Committee's recommendation in a rulemaking proceeding which should be concluded in 1995. In accordance with FCC requirements, the technology will be licensed to anyone on reasonable terms.

- It is anticipated that our Canadian and Mexican neighbors will simultaneously initiate similar, appropriate procedures to assure rapid adoption throughout North America. Moreover, because of early North American implementation, it is hoped that the rest of the world will adopt many of the elements of the North American HDTV standard.

Speed is of the essence. The Grand Alliance system, if ultimately accepted by the Advisory Committee and the FCC, will maintain and enhance the U.S. leadership position in digital television technology and in HDTV in particular.

Delays in the process to evaluate any additional proposals for which neither hardware nor software has been implemented should not be tolerated. Such delays threaten our lead in HDTV technology.

HISTORICAL PERSPECTIVE

The television we watch today uses the NTSC (National Television Systems Committee) standard, finalized in the late 1940s. While that standard has been improved, most notably by the incorporation of color in the 1950s, today's television is based on the same fundamental resolution parameters as the original

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service, including 525 horizontal lines and interlace scanning. The introduction of color television, approximately 40 years ago, was the last major advancement in the NTSC standard. The North American standardization activities were subsequently emulated throughout the world.

In the early 1980s, Japan's NHK proposed its MUSE HDTV interlaced system, based on 1,125 horizontal scan lines, and proposed its worldwide adoption. MUSE made the world aware of the goal of "high definition television," with quality equivalent to motion pictures, including a wide-screen format. The MUSE system renewed concerns in the United States about the capabilities of American technology. Many feared that American companies would be shut out of a fundamental new technology.

In 1987, at the request of U.S. broadcasters, the FCC initiated its rulemaking on advanced television service and established a blue ribbon Advisory Committee on Advanced Television Service (ACATS) for the purpose of recommending a broadcast standard. Former FCC Chairman Richard E. Wiley was appointed as chairman of ACATS. Hundreds of companies and organizations have worked together within the numerous Subcommittees, Working Parties, Advisory Groups and Special Panels of ACATS during the past seven years. The ACATS process has become a model for international industry-government cooperation. There have been important accomplishments:

- ACATS developed a competitive process by which proponents of systems were required to build prototype hardware which would then be thoroughly tested. This process sparked innovation and an entrepreneurial response: initially there were 23 proposals for systems submitted to ACATS in September 1988. (Hardware was actually built and tested for six systems.)

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- The FCC made several key spectrum decisions that also helped spark innovation. The Commission decided in early 1990 that new ATV systems would share television bands with existing services and would utilize TV channels as presently defined. The Commission also decided that a "simulcast" approach, first proposed by Zenith, would be followed. This meant that the new HDTV signals would be broadcast on currently unusable channels and that broadcasters would be temporarily assigned a second channel during a transition period to HDTV.

- Although the FCC had said in the Spring of 1990 that it would determine if all-digital technology was yet feasible, most observers viewed it as at least 10 years in the future. That same year, General Instrument became the first to announce an all-digital system. Later, all-digital systems were announced by MIT, the Philips-Thomson-Sarnoff consortium and by Zenith-AT&T.

- The FCC anticipated the need for interoperability of the standard with other media. Initially, the focus was on interoperability with cable television and satellite delivery; both were crucial to any broadcast standard. But the value of interoperability with computer and telecommunications applications became increasingly apparent with the advent of all-digital systems.

- Proponents later incorporated packetized transmission, headers and descriptors, and composite-coded surround sound in their subsystems. (The Philips-Thomson-Sarnoff consortium was the first to do so.) These features maximize the interoperability of HDTV with computer and telecommunications systems. The introduction of all-digital systems had made such interoperability a reality.

- All-digital systems set the stage for another important step, which was taken in February 1992, when the Advanced Television Systems Committee ("ATSC") recommended that the new standard include a flexible, adaptive data allocation capability (and that the audio also be upgraded from stereo to surround sound).

Six systems (four of which were all-digital) underwent extensive testing in 1991 and 1992 at the Advanced Television Test Center ("ATTC"), in Alexandria, Va. Also participating in testing were Cable Television Laboratories Inc. (CableLabs) of Boulder, Colo., which tested systems over a cable television test bed at the ATTC, and the Advanced Television Evaluation Laboratory ("ATEL") in Ottawa, Ontario, Canada.

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Following testing, the Advisory Committee decided in February 1993 to limit further consideration to those that had built the four all-digital systems: two systems proposed by GI and MIT, one proposed by Zenith and AT&T, and one proposed by Sarnoff, Philips and Thomson. The Advisory Committee decided that while all of the digital systems provided impressive results, no single system could then be proposed to the FCC as the U.S. HDTV standard. The Committee ordered a round of supplementary tests to evaluate improvements of the individual systems.

At the February 1993 meeting the Advisory Committee also adopted a resolution encouraging the digital HDTV groups to try to find a way to merge the four remaining all-digital systems. The Committee recognized the merits of being able to combine the best features of those systems into a single "best of the best" system. With this encouragement, negotiations between the parties heated up, and on May 24, the seven companies involved announced formation of the Digital HDTV Grand Alliance.

SUMMARY

1993 was a year of substantial change in the HDTV standards setting process. On Jan. 1, there were five competing systems. On Dec. 31, there was a single Digital HDTV Grand Alliance. Now that the system has been defined and approval given by the Advisory Committee, 1994 will be spent building the system prototype and having that prototype tested by the Advisory Committee. The standard should be set in 1995 and HDTV service is likely to start as early as late 1996.

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