80 Years of Service and Still Growing

We are told that digital advanced television (ATV) service means 150 channels to the home. There is even one technology under development that promises 1500 channels to the home via fiber. (How we will navigate our way through a 1500-channel service is another question.) The business of providing these services requires that each program or commercial work be uniquely identified. Unique identification of a work in the ATV world allows for automatic verification of delivery of the work and could be used to support audience testing, automated program selection and recording, and protection of intellectual property rights.

A Problem Identified

The Advanced Television Systems Committee (ATSC) and digital video broadcasting (DVB) ATV standards are based on the MPEG-2 standard. The Moving Pictures Experts Group (MPEG) standard provides a 13-bit packet identification (PID) field, which can be used to identify a program and the component parts (video data, audio data, and informational data) of the program.

A 13-bit number limits us to 8192 unique values. Further, there is no restriction on how numbers may be assigned and reassigned by original producers and/or the end service providers. In fact, proper system operation requires that a single video broadcast service assign the same PID number to all segments (programs, commercials, and promos) provided as part of a single program service stream to assure undisturbed continuity of display at the receiver. This results in a strong probability that different program content provided by different producers and service providers (broadcasters, cablecasters, etc.) will be distributed having the same value. So the MPEG PID doesn't solve the problem for us.

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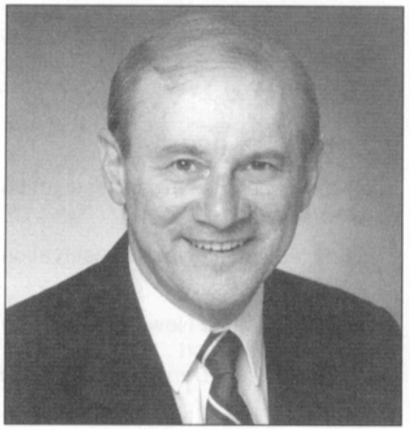

Stanley N. Baron

A Solution Found

The MPEG standard provides a program map table (PMT) to be assigned to each program bit stream. The table provides additional descriptive information of each component contained in the program bit stream or to pointers to data packets that contain additional information.

The ATSC T3 committee, in its meeting of July 11, adopted a standard that inserts a unique program or commercial identification number (one of literally billions) in a specific data packet having a constant PID value. In this way the data packet PID remains constant for each program stream but the data packet's contents can be changed to identify the different component works (programs and commercials) that constitute the program stream.

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SMPTE to the Rescue

To make this process work, there needs to be a registration authority that assigns the identification numbers or assigns blocks of numbers to entities that need immediate ID assignment (such as providers of news services). The ATSC standard stipulates SMPTE as the registration authority.

SMPTE was selected as the registration authority for the unique identifier numbers, since it is an international organization comprised of individual members in 72 countries. SMPTE has been serving the international community since 1916 and has an established presence. SMPTE members represent a broad range of disciplines from the film, terrestrial broadcasting, cablecasting, direct broadcast, and common carrier industries. SMPTE was seen, therefore, as being both industry and politically neutral and possessing the necessary expertise.

How It Works

The descriptor provided for in the standard allows for the unique identification of each version of an episode or program or production using a 64-bit code. The code is divided into three fields, consisting of a 16-bit provider index, a 24-bit program event ID, and a 24-bit episode and version identifier.

The 16-bit provider index allows for 65,536 different blocks of 24-bit program event ID numbers. The 24-bit program event ID field, combined with the 16-bit provider index, uniquely identifies the program or product. The 24-bit field allows up to 16,777,216 unique programs per

provider index block for a total of greater than 1.099×10^{12}.

The third field is an optional field of 24 bits that can be used to indicate either the date of the first presentation of the program or production (as might be desirable for use with news programming), or which can be used to indicate an episode and/or a version of the production. The field allows up to 4095 episodes of the program or production to be identified with up to 4095 different versions of each episode or production.

The 40-bit unique identification number (provider index + program event ID) can be assigned to the production or program either at the inception of the production, at the completion of the production, just prior to distribution, or at such time as the rights holder or the rights holder's agent deems appropriate.

The production or program carries that unique number throughout its life regardless of change of rights holder, distribution mechanism, or the creation of different versions. In summary, once a unique identification number is assigned to a production, it does not change even if there is a change in ownership. The intention is to never to reuse the 40-bit unique identification number, at least within the first 150 years of use.

The episode number identifies the episode number of the production (1 to 4095 inclusive). The version number identifies the version of the production or episode (1 to 4095 inclusive). Different versions of the program/production may be assigned for different language, program lengths, different titles for the same program/product, etc.

For instance, a film product may be released as a 120-minute version in English for North American theatrical release, a 180-minute version in French for European theatrical release, and a 110-minute release in English and French for use on Canadian television. The standard suggests that the packets containing the unique identification number appear at regular intervals on the order of once every 30 seconds to 2 minutes to accommodate the channel surfers.

However, in the case of commercials and other program streams containing promotional materials, the standard suggests that the packets containing the unique identification number appear in the data stream toward the end of the work, starting at 2 or 3 seconds from the end. This is to deter commercial-zappers. There are other practices that will make automatic commercial-zapping very unreliable.

There is nothing in the standard that requires consumer equipment to address the program ID packets or to decode the packets. However, consumer equipment that provides a transport packet data port should pass the program identifier stream through the port with the remainder of the program (video, audio, and data) information. Since the program identifier stream provides unique identification of the work, recording of the program should include the unique identifier.

SMPTE will provide an active listing via the Internet of the 16-bit provider index numbers and a link from the provider index numbers to the individual program event ID listings. For each work assigned a program event ID, the hyperlink accessible listing would cross-reference the name of the work, episode number, version information, and any other descriptive material found in an associated 40-character program ID string. The program ID string is a "human-readable" description of the program or commercial.

The standard also provides an optional field that may be used to cross-reference the International Standard Audio/visual Number (ISAN) number for the program when one exists. ISAN is an identification system used for certain audio/visual properties.

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SMPTE's Mission

SMPTE's role is to help its individual and corporate members to cope with the ever-changing world of technology. SMPTE continues to assess how it can best serve those members. The Society's Standards and Recommended Practices ensure interchange, which in turn provides the opportunity to reach a mass audience. The Society's educational activities help its individual and corporate members to stay current with changes in the technologies that impact their lives. A new role has been added, as a registration authority, and the Society has shown that it can grow to provide new services to the industries it serves. Eighty years of service and still growing....