

ATSC Standard: Content Identification and Labeling for ATSC Transport

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The Advanced Television Systems Committee, Inc., is an international, non-profit organization developing voluntary standards for digital television. The ATSC member organizations represent the broadcast, broadcast equipment, motion picture, consumer electronics, computer, cable, satellite, and semiconductor industries.

Specifically, ATSC is working to coordinate television standards among different communications media focusing on digital television, interactive systems, and broadband multimedia communications. ATSC is also developing digital television implementation strategies and presenting educational seminars on the ATSC standards.

ATSC was formed in 1982 by the member organizations of the Joint Committee on InterSociety Coordination (JCIC): the Electronic Industries Association (EIA), the Institute of Electrical and Electronic Engineers (IEEE), the National Association of Broadcasters (NAB), the National Cable Television Association (NCTA), and the Society of Motion Picture and Television Engineers (SMPTE). Currently, there are approximately 160 members representing the broadcast, broadcast equipment, motion picture, consumer electronics, computer, cable, satellite, and semiconductor industries.

ATSC Digital TV Standards include digital high definition television (HDTV), standard definition television (SDTV), data broadcasting, multichannel surround-sound audio, and satellite direct-to-home broadcasting.

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1. PURPOSE AND SCOPE

1.1 Foreword

The Advanced Television System Committee (ATSC) Technology Group on Distribution (T3) prepared this Standard. The document was approved by the members of T3 on 12 March 2003 as a Proposed ATSC Standard. The document was approved by the Members of the ATSC on 1 July 2003. This Standard supercedes and replaces *A/57, Program/Episode/Version Identification*.

1.2 Scope

This document defines a means to uniquely identify content (an audiovisual work). This document also defines an MPEG-2 content identification descriptor for the carriage of this identifier. And, finally, this document defines the semantics of the use of the MPEG-2 content identification descriptor for labeling streaming audiovisual content in the ATSC Transport. The identifier may be one of several ID systems, including the International Standard Audiovisual Number (ISAN) as extended to include version information (V-ISAN). The V-ISAN identifier allows unique identification of a root program, episode, and version.

2. REFERENCES

2.1 Normative References

The following documents contain provisions that through reference in this text constitute provisions of this Standard. At the time of publication, the editions listed were valid. All standards are subject to revision, and parties to agreements based on this Standard are encouraged to investigate the possibility of applying the most recent edition of the standards indicated below.

- [1] ISO 15706:2002, Information and documentation — International Standard Audiovisual Number (ISAN).
- [2] ISO 20925-1:200x¹, Information and documentation — Identifier for versions of audiovisual works (V-ISAN) — Part 1: Format and use.
- [3] ATSC Standard A/65B (2003), “Program and System Information Protocol for Terrestrial Broadcast and Cable.”

2.2 Informative References

The following documents are informative and may be useful to the reader.

- [4] ISO/IEC 13818-1:2000, Information Technology – Generic Coding of Moving Picture and Associated Audio Information: Systems.

¹ Note that this document is a work in progress. Until ISO 20925-1 is published, A/57A will be posted on the ATSC Web site as an Approved Proposed Standard. Upon publication of ISO 20925-1, A/57A will be modified editorially as necessary and posted as an ATSC Standard.

3. DEFINITIONS

Terms, abbreviations, or units are defined in the cited normative references, or are described in Section 3.4 of this document.

3.1 Compliance Notation

As used in this document, “shall” denotes a mandatory provision of the Standard. “Should” denotes a provision that is recommended but not mandatory. “May” denotes a feature whose presence or absence does not preclude compliance, which may or may not be present at the option of the implementer.

3.2 Treatment of Syntactic Elements

This document contains symbolic references to syntactic elements used in transport coding subsystems. These references are typographically distinguished by the use of the underscore (e.g. `TS_program_map_section`) and may consist of character strings that are not English words (e.g. `uimsbf`).

3.3 Terms

ATSC transport The ATSC MPEG-2 Transport Stream as defined in ATSC A/53B.

audiovisual work A sequence of related images, with or without accompanying sound, which is intended to be made visible as a moving image through the use of devices, regardless of the medium of initial or subsequent fixation.

bslbf Bit string, left bit first, where “left” is the order in which the bit strings are written in the Standard. Bits strings are written as strings of 1s and 0s within single quotation marks, e.g. ‘1000 1001’. Blanks within a bit string are for ease of reading and have no significance.

content An audiovisual work.

uimsbf Unsigned integer, most significant bit first.

work A version of an audiovisual work.

3.4 Abbreviations

ISAN International Standard Audiovisual Number

V-ISAN Version of an International Standard Audiovisual Number

4. IDENTIFICATION OF CONTENT (INFORMATIVE)

ISO 15706 [1] defines a voluntary standard numbering system for the unique and international identification of audiovisual works. An audiovisual work is²: “*a sequence of related images, with or without accompanying sound, which is intended to be made visible as a moving image through the use of devices, regardless of the medium of initial or subsequent fixation*”. The term, audiovisual work, is used interchangeably with the term “work” and “content”.

³*Some examples of audiovisual works to which an ISAN may be issued are:*

- *motion pictures (e.g., a feature film);*
- *short films;*
- *trailers (i.e., previews);*

² Quoted from ISO 15706 [1], Section 3.1.

³ Quoted from ISO 15706[1], Annex A.

- *productions for television or other means of delivery, including individual episodes of serial audiovisual works such as television series;*
- *industrial, educational and training films;*
- *commercials;*
- *broadcasts and recordings of live events such as sports events and newscasts;*
- *composite and multimedia works if they contain a significant audiovisual component, including non –linear (e.g. interactive) audiovisual components.*

Some examples of works to which an ISAN is not issued are:

- *any non-audiovisual element of an audiovisual work (e.g. the soundtrack, the screenplay, or a single image from an audiovisual work);*
- *sound recordings;*
- *still photographs, slide sets and similar static images;*
- *multimedia works that do not contain a significant audiovisual component.*

⁴*Versions of an audiovisual work may be identified as such by using a supplementary identifier or code in conjunction with the ISAN for the audiovisual work. This is a V-ISAN as defined in ISO 20925 [2]. Some examples of versions and other kinds of changes for which [a] new ISAN is not assigned are:*

- *different language versions whether subtitled or dubbed;*
- *a change in the rights or ownership of an audiovisual work;*
- *different formats or resolution (e.g. analogue or digital; wide screen or "pan & scan");*
- *editing for the purposes of television broadcast;*
- *changes in the physical carrier(s) for an audiovisual work.*

A V-ISAN consists of three parts: a root segment, an episode, and a version, consisting of 6, 2, and 4 bytes respectively for a total of 12 bytes, or 96 bits. Whenever a V-ISAN is represented in human readable form, it is displayed as sequence of hexadecimal digits (0-9, A-F) and alphanumeric (for the check digits) as follows:

V-ISAN RRRR-RRRR-RRRR-EEEE-X-VVVV-VVVV-Y

Where R represents the root segment, E represents the episode and V represents the version. X and Y are alphanumeric check digits computed over parts of the number as described more fully in [1] and [4].

See Annex A for more information on the background of V-ISAN.

5. USE OF CONTENT IDENTIFIER IN THE ATSC TRANSPORT (NORMATIVE)

Audiovisual works that employ a means to uniquely identify content within the ATSC transport shall use the ID system defined in Section 6.

6. CONTENT IDENTIFIER STRUCTURE (NORMATIVE)

Content identification in the ATSC transport shall use the content ID structure as defined in Table 6.1.

⁴ Quoted from ISO 20925-1 [2].

Table 6.1 Content ID Structure

Syntax	No. of Bits	Format
content_ID_structure() {		
ID_system	8	bslbf
ID_length	8	bslbf
content_identifier	var	bslbf
}		

ID_system – This 8 bit field specifies the kind of identifier as listed in Table 6.2.

Table 6.2 ID_system Values

Value	Meaning
0x00	ISAN (ISO 15706[1])
0x01	V-ISAN (ISO 20925-1[2])
0x02-0xFE	ATSC Reserved – see ATSC Code Point Registry.
0xFF	ATSC Reserved.

ID_length – This 8 bit field is the length of the content_identifier field that follows.

content_identifier – This variable length field shall be set to the value of the identifier according to the system indicated by the ID_system field and also is formatted according to that system.

7. CONTENT IDENTIFIER DESCRIPTOR SYNTAX (NORMATIVE)

The syntax of the Content Identifier Descriptor to carry a content identifier is defined in Table 7.1.

Table 7.1 Content Identifier Descriptor

Syntax	No. of Bits	Format
content_identifier_descriptor() {		
descriptor_tag	8	0xB6
descriptor_length	8	bslbf
content_ID_structure()	var	bslbf
}		

descriptor_tag – This 8 bit field shall be set to 0xB6.

descriptor_length – This 8 bit field specifies the length of the remaining fields in this descriptor.

content_ID_structure() – This field is the content identifier structure defined in Section 6.

8. EVENT LABELLING SEMANTICS (NORMATIVE)

The use of the Content Identifier Descriptor in the ATSC transport is optional. However, when it is used, it shall be placed in the EIT event descriptor loop of the event that announces the content identified by the content_identifier as defined in A/65B [3]. Only one Content Identifier Descriptor shall be contained per loop.

When a V-ISAN is assigned to an audiovisual work, it should be used. If a V-ISAN is not available and an ISAN is available, it should be used. Other identifiers should only be used when neither the V-ISAN nor the ISAN is available.

If the content identifier descriptor is present for an event at any time, it shall be present in the event descriptor loop of each EIT-0 broadcast starting no later than one second after the beginning of the transmission of the essence of the event, and it shall remain present in the event descriptor loop of each EIT-0 broadcast throughout the broadcast of the essence.

9. V-ISAN OPERATION (INFORMATIVE)

Because the V-ISAN identifier is a globally unique identifier, it may be used as an index for linking elements within the ATSC transport that refer to a work. For example, any additional transport information, such as more advanced program guide data, would use the V-ISAN as the index between the EIT-k event and that additional information. The same would be true for external guide data available over an alternate channel. Thus, while a V-ISAN identifier is optional in general, it may be used for any such linkage.

Any instance of a work identified with a V-ISAN identifier may be announced by including the V-ISAN identifier as a descriptor in an event. This includes the current event and future events. Only one V-ISAN identifier is permitted per event. Since each event may comprise more than one work, the meaning of the V-ISAN identifier is changed when sent in an ATSC Transport. In this case, all material in the event will be identified with the single V-ISAN identifier chosen for that event. For example, the event containing a television series episode with commercials could have the unique V-ISAN identifier for the particular root segment, episode, and version, but the episode may be accompanied by different commercials when broadcast at different times or by different broadcasters. So, the receiver may not use this identifier to uniquely identify a particular event, but may use it to find all such events that are announced with the content identified by the V-ISAN. Note that the scope of uniqueness of the event_id is limited to the EIT-k in which it appears.

Because the V-ISAN identifier is unique to a work, it may be used as an index for linking other metadata to events, including private as well as other ATSC metadata. Simply labeling the additional metadata with the same V-ISAN identifier does this. When the receiver has a return channel, this might also include linkage to external metadata such as external program guide information.

Since the V-ISAN identifier is parseable into Root Program, Episode, and Version fields, a receiver can use it to unambiguously identify:

- All episodes and versions of a root segment
- All versions of root segment R, episode E
- A particular root segment R, episode E, and version V

The timing requirements placed on the EIT-0 for the current event bound the period of time that an event could be mislabeled to a well-known period. This “uncertainty period” is set to 1 second, and may involve any of the following event and channel transitions:

- Switching from one V-ISAN labeled event to a subsequent V-ISAN labeled event on the same Virtual Channel
- Switching from a V-ISAN labeled event to a non-V-ISAN labeled event on the same Virtual Channel
- Switching from a non-V-ISAN labeled event to a V-ISAN labeled event on the same Virtual Channel

- Switching from a V-ISAN labeled event on one virtual channel to a non-V-ISAN labeled event on a different Virtual Channel
- Switching from a non-V-ISAN labeled event on one virtual channel to a V-ISAN labeled event on a different Virtual Channel
- Switching from a V-ISAN labeled event on one virtual channel to a V-ISAN labeled event on a different Virtual Channel

In all cases, the receiver should assume that the last identifier received has a one second uncertainty. Note that the switching scenarios above are independent of how the switch occurs—whether by the viewer, the broadcaster (via a real time MPEG transport switcher, for example), or by Directed Channel Change (DCC see ATSC A/65 [2]). In the event that the receiver switches signal sources or has reason to know that such a switch occurred, it may elect to consider the new source to be non-V-ISAN-labeled for the duration of the uncertainty period. In addition, the timing of the uncertainty periods start over with every such switch or knowledge of a switch.

Annex A

ISAN and V-ISAN Guide and Practice (Informative)

1. INTRODUCTION

Future television operations must be more efficient than current operations because they will be required to carry far more content, of far greater variety, from a far greater number of sources than they do now, and they must do so with fewer personnel.

The television and film industry has many places where it is critically important that a particular movie, series episode, commercial, or other material (and their many versions) be succinctly and uniquely identified. These places include just about all aspects of production, post-production, network and broadcast operations:

Advertising sales	Production
Scheduling	Content Storage Management
Program guide management	Broadcasting
Audience measurement	Quality control
Asset management	Automation

In the future, different program versions will be created by combining different data with the same audio and video. Each such version must be properly identified.

Currently, different aspects of operations and different types of content each have their own identification schemes. Converting between these schemes is tedious, error-prone, and wasteful. A V-ISAN scheme meets this need and enables the integration of operations.

2. REQUIREMENTS USED TO DESIGN THE V-ISAN STRUCTURE

The core function is to provide a unique identifier that will be referred to as the V-ISAN for a single selected piece of completed content. For example, each combination of episode and each version of that episode of a specific program would have an associated V-ISAN identifier. The V-ISAN identifier is intended to be applied after post-production, which differentiates it from a Universal Material Identifier (UMID)—a numbering system developed specifically for production and post-production use.

A V-ISAN identifier may be used for a variety of purposes and transported in a number of ways. It will serve as the key to index a variety of databases that reference the content that it identifies. Further examples are within program guide information to distinguish integrated programs and within non-public identification information to distinguish program continuity elements or interstitials.

A V-ISAN identifier can be associated with any complete program, commercial, promotional announcement, or other finished content.

Preferably, a V-ISAN identifier is assigned shortly before creation of the content, but after it is certain that the creation will take place. This timing allows all related systems and parties to prepare for the distribution of the new content. However, a V-ISAN identifier may also be assigned during or after creation.

3. V-ISAN ELEMENTS

The three elements described below are collectively referred to as a “V-ISAN identifier,” which together identify a unique piece of content. Each element is a binary number. When presented in human readable form, they are presented in a compact, consistent, and easily readable manner.

To the extent possible, the methods provided for identification of episodes and versions do not waste the number space.

The first two elements also comprise the ISAN identifier, which identifies the work as a whole and does not vary with the version. As such, it is not appropriate for broadcast identification purposes, as it is always the case that a particular version is broadcast. The ISAN is defined in ISO 15076 and the V-ISAN in ISO 20925.

3.1 Root Identifier

A binary number assigned to a piece of content. Closely related content is distinguished by version and episode. For example, an episodic program will have a common root identifier for all episodes and versions.

The Root Identifier is assigned by the registration system after a system user provides the mandatory descriptive data.

3.2 Episode Identifier

A binary number assigned by the registration system after the content owner provides the registration system with adequate episode descriptive information. All episodes of a series should have the same Root Identifier.

Programs that do not have episodes (e.g., movies), use an episode identifier of zero.

3.3 Version Identifier

A binary number assigned by the registration system after the content owner provides adequate version descriptive information. All versions that are editorially related to the original content have the same Root Identifier and if episodic have the same episode identifier. All versions are uniquely distinguished by their having different version numbers. Assignment of different version identifiers may be based on language, aspect ratio, subtitling, or other similar characteristics.

Each editorially-significant variation in the content receives a different version identifier.

4. ISAN AND V-ISAN IDENTIFIER SPACE

The basic ISAN identifier can be represented in 16 hexadecimal digits. The divisions are presented in Tables A.1 and A.2. Note that the term “digits” means *hexadecimal* digits.

Table A.1 ISAN and V-ISAN Divisions by Number of Digits

V-ISAN		
ISAN		
Digits of Root	Digits of Episode	Digits of Version
12	4	8

Table A.2 ISAN and V-ISAN Divisions by Count

V-ISAN		
ISAN		
Number of Root Identifiers	Number of Episode Identifiers	Number of Versions
281,474,976,710,660	65,536	4,294,967,296