

# **Audiovisual Works Identification for the Motion Picture Studio:**

## **Conceptual, Operational, and Technical**



Motion Picture Association of America, Inc.  
[www.filmratings.com](http://www.filmratings.com) [www.mpaa.org](http://www.mpaa.org)

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## Foreword

ISAN is a voluntary numbering system for the identification of audiovisual (AV) content, including works and versions of works. It was developed within an ISO (International Organization for Standardization) working group. ISO spent over seven years developing this standard with contributions and feedback from dozens of media companies, collecting societies and broadcast standards organizations. The standardization project was administered by AGICOA (Association of International Collective Management of Audiovisual Works), CISAC (International Confederation of Societies of Authors and Composers) and FIAPF (International Federation of Film Producers Associations). Together these groups represent many international and national organizations involved with AV content production.

The International Standard that forms the foundation of the ISAN system was published in 2002 as ISO 15706, “Information and documentation—International Standard Audiovisual Number (ISAN).” In 2006, the ISAN standard was extended to support version identification with ISO 15706-2. Both parts of the standard are available for purchase from [www.iso.org](http://www.iso.org)<sup>1</sup>. Together, they describe a complete AV content identification system.

Nearing the completion of this standard in 2002, the ISAN International Agency (ISAN-IA) was established as a non-profit Swiss association based in Geneva. ISAN-IA was singularly chartered by ISO to deploy and manage the integrity of the standard and viability of the system. In January 2004, the web site [www.isan.org](http://www.isan.org) was launched and the central repository followed shortly thereafter in June 2004. ISAN-IA has since established a network of international Registration Agencies (RAs) and Registration Offices (ROs) to service ISAN registrants in regional markets while ISAN-IA remains focused on the back-end infrastructure and global growth. Today ISAN-IA reviews metadata services applications, evaluates franchisee operations and manages the technical framework for media asset registration and identification. As of November 7, 2006, over 400,000 records are registered with a worldwide growth rate of 20,000 records per month.

Some of these business practices assume the availability of automated electronic data interfaces between you, the registrant, and your registration agency that may or may not yet be deployed. Data integrity can be a very labor intensive operation if not properly designed and managed so we encourage the automation of data input processes to the highest degree possible.

Television news, sports, magazine formats and live programming, while appropriate for ISAN assignment, are outside the scope of this best practice recommendation and will be addressed in a future document.

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<sup>1</sup> <http://www.iso.org/iso/en/CombinedQueryResult.CombinedQueryResult?queryString=15706>

## Document Scope

This document contains a collection of best practices for the adoption, operationalization, and general use of audiovisual (AV) content identification and description schemes, with a particular focus on ISAN as a works and version identifier. Its perspective ranges from a very high, conceptual level to a very low, detailed/technical level. At the same time, it covers a number of topics based on the varied interests and concerns of the media conglomerate that is the modern motion picture studio.

The authors encourage users to extract sections of this document as the need arises and merge them with other materials to create company or implementation-specific proposals, tutorials, policies, and procedures.

There are a number of recommended practices suggested in this document. They are specifically related to Studio filmed entertainment. The recommendations do not specifically address broadcasters, image archivists, and others who may desire to identify audiovisual works and adopt consistent practices to enhance interoperability.

## ISAN Overview<sup>2</sup>

ISAN stands for International Standard Audiovisual Number. It was designed for archivists, authors, broadcasters, collection societies, listing companies, producers, rights holders, software developers, systems integrators and many others in the audiovisual (AV) value chain.

ISAN is a voluntary numbering and metadata system for the globally unique identification of audiovisual content. It provides a unique, internationally recognized and permanent reference number for each work and related derivatives identifying works throughout their entire life cycle; it is independent of any physical form in which the work exists or could be distributed. Its core strength lies in its universal benefits and long-term stability.

The ISAN is a 96-bit number comprised of three segments: a root, an episode or part, and a version. A root is assigned to a core work. Subsequent film parts or television episodes that relate to the root work can have the same root, but a different "episode or part" component. (If a core work does not have associated parts or episodes, then the episode segment is filled with zeros.) Works (and their episodes or parts) that have been modified in some way — for example, dubbing or subtitling the work into other languages — can have different versions.<sup>3</sup> When the 96-bit ISAN is represented in hexadecimal form it has 24 digits (made up of the numbers 0-9 and the letters A-F):

*00000000D07A009000000000*

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<sup>2</sup> This section discusses the full scope of the ISAN system, which covers aspects of the audiovisual industry beyond the scope of these recommendations.

<sup>3</sup> When first issued, all ISANs have zeros in the version segment. If the version segment is left off the ISAN, or filled with zeros, it is assumed to be a reference to the work in general including all its incarnations. Thus, ISAN 0000-0000-D07A-0090-Q and ISAN 0000-0000-D07A-0090-Q-0000-0000-X are completely synonymous representations of a work identifier without respect to a specific version of the work. If the version segment contains something other than zeros, then it identifies a specific version of the work, work part, or episode.



However, a printed ISAN designed for human reading always begins with the ISAN label, appears with hyphens to separate the number into more manageable groups of digits, and adds two check characters (made up of the letters A-Z)<sup>4</sup> to help identify transcription errors. The resulting number appears as follows:

*ISAN 0000-0000-D07A-0090-Q-0000-0000-X*

An ISAN is a centrally registered and permanently assigned reference number. The work it references is identified by a metadata set. Your Registration Agency and ISAN-IA in Geneva work together to prevent duplicate assignments of ISANs with the same metadata set. This descriptive information includes the title, director, type, duration and dozens of other fields related to the work. This metadata applies to all types of audiovisual works, including versions of feature films, documentaries, television programs, videos, games, trailers, advertising, and live broadcasts. (Advertising, in this case, refers only to audiovisual material and not print media.)

ISAN identifiers may be incorporated in digital, analog, and physical media such as theatrical release prints, DVDs, and other means of distributing audiovisual material. The identifier may also be used in licensing contracts for reference.

The root and episode segments of an ISAN (the first 64 bits or 16 hexadecimal characters) remain the same for an AV work, irrespective of any changes in ownership and across all distribution formats, including film, tape, optical disc, hard disk, broadcast or Internet Protocol (IP). The version segment is different whenever it is necessary to distinguish one version of a work from another. But once fixed, remains the same regardless of ownership changes. The ISAN identifier is incorporated in many standards and specifications from organizations such as MPEG, SMPTE, AACs, DCI, DVB, and ATSC to name a few.<sup>5</sup>

ISANs are issued by appointed Registration Agencies (RAs) and Registration Offices (ROs) via the ISAN system following agreed upon guidelines to ensure data consistency and system integrity. Registrants are free to use any authorized registration agent, and conversely, registration agents are not obligated to serve all registrants.

The adoption of ISAN will likely have two distinct phases.

- Registration of a large preexisting catalog
- Ongoing registration

ISAN identifiers have already been assigned to a large backstock of audiovisual works. ISAN registration during this phase is typically done digitally and involves the simultaneous registration of multiple works using the bulk-load process. During this period ISAN-IA along with its Registration

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<sup>4</sup> Further details on check character calculation can be found in the ISAN User Guide available from ISAN-IA at [http://www.isan.org/docs/isan\\_user\\_guide.pdf](http://www.isan.org/docs/isan_user_guide.pdf).

<sup>5</sup> Metadata standardization among ISAN and these other standards is an ongoing process.



Agencies have embarked on an on-going effort to resolve any issues related to duplications and potential disputes between registrants. Although this effort has much less impact going forward, an appropriate method is being implemented to resolve all duplicate issues. Currently the bulk load involves vetting XML data packets against the ISAN-IA central repository.

For the ongoing registration of individual or a limited number of works the submission process can be initiated through Web forms or other formats such as spreadsheets. In addition, the deployment of Web services by ISAN-IA and certain Registration Agencies enables real-time registration and metadata updates by Registrants. After data redundancy and quality checks are performed, most requests are quickly approved and registered. Once an ISAN is assigned it cannot be deleted—only modified by the registrant, the registrant’s designated Registration Agency, or the ISAN-IA.<sup>6</sup>

Initial ISAN-IA funding was provided by AGICOA and CISAC. Now it operates on a cost recovery basis from a portion of the registration fees collected worldwide. The appointed ISAN Registration Agencies in the United States are Microsoft Studios and Secure Path Technology,<sup>7</sup> who are collaborating to develop business processes around ISAN registration, updates and search with ISAN-IA, and the network of registration agencies and offices worldwide.

## ISAN Benefits

- **Unique ID:** The purpose of each ISAN is to act as a unique international identifier of each audiovisual (AV) work linked to its descriptive information (metadata), hosted in a centrally managed ISAN repository
- **Work Identifier:** Each AV work (including all its components and versions) has one unique ISAN. Each ISAN identifies only one AV work. ISAN is a permanent identifier for an AV work and is never reused or changed.
- **Version Identifier:** Each version of an AV work can have a unique ISAN. That ISAN cannot be used to identify any other version of that or any other work. (The root and episode segments of the ISAN will be the same for all versions of that work, only the version segment changes.)
- **Representative of the Industry:** ISAN has been defined by the commercial AV industry.
- **Highly Available:** ISAN and its related descriptive information are accessible through the Web at all times by authorized registrants and readers.

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<sup>6</sup> In the rare case when a single work has been inadvertently assigned two ISANs (for example, when both parties to a co-production register the work using different metadata only to discover later that both numbers actually reference the same work), both ISANs will continue to exist but the first ISAN issued will be the official identifier for the work. Any references to the second ISAN will be redirected to the first ISAN and further generation of version numbers will be limited to the first ISAN. This same rule does not apply to versions of works since the same version can have more than one version identifier (likely assigned by different parties for different purposes), but the rule of one work per ISAN and one ISAN per work is strictly enforced.

<sup>7</sup> ISAN IFTA also operates in the US, but only provides service to IFTA members.



- **Highly Reliable:** ISANs and their related descriptive information are hosted in secure and highly available data centers. Disaster recovery and failover plans will meet or exceed common industry best practices for security and reliability.
- **Data Integrity:** Each AV work has one unique ISAN. Each ISAN identifies only one AV work. ISAN is a permanent identifier for an AV work and is never reused.
- **Asset Management:** ISAN helps registrants and other users of ISAN with efficient inventory management, particularly in a digital environment.
- **Usage Reporting:** By embedding an ISAN in broadcast logs required by various international broadcasting standards, asset and use tracking are facilitated. In digital distribution, the ISAN is integrated into the work itself, typically within the file or stream header.
- **Collection Management:** When filing for administration through collection management, works identification and rights registration is more efficient, providing potential savings in time and cost. This enables quicker, more reliable and efficient distributions by collection societies and speeds the velocity of trade payments to all parties.
- **Database Interoperability:** If a studio chooses, ISANs can facilitate electronic information exchange between different commercial- and consumer-focused database systems such as a studio's financial system, or a theater chain's Digital Cinema distribution tracking database.
- **Digital Merchandising Potential:** ISAN can be used in the digital commerce environment to enable, promote and cross-promote related merchandise. Examples here include desktop wallpaper related to a film release, songs, ring tones, or other audio-visual works one may wish to associate with the overall property.

## The ISAN International Agency

The entity authorized by International Organization for Standardization (ISO) to develop the ISAN-IA database infrastructure is the ISAN International Agency (ISAN-IA) located in Geneva, Switzerland. More information about ISAN-IA can be found at <http://www.isan.org>. ISAN-IA evaluates and authorizes a diverse set of geographically distributed Registration Agencies (RAs). These RAs cover most major selected regions and markets. They are the “front office” to the ISAN system and process registration applications and support queries by users.

The established RAs and their target markets are:

- Agence Française ISAN (France)
- Aribsan (Spain and Latin America)



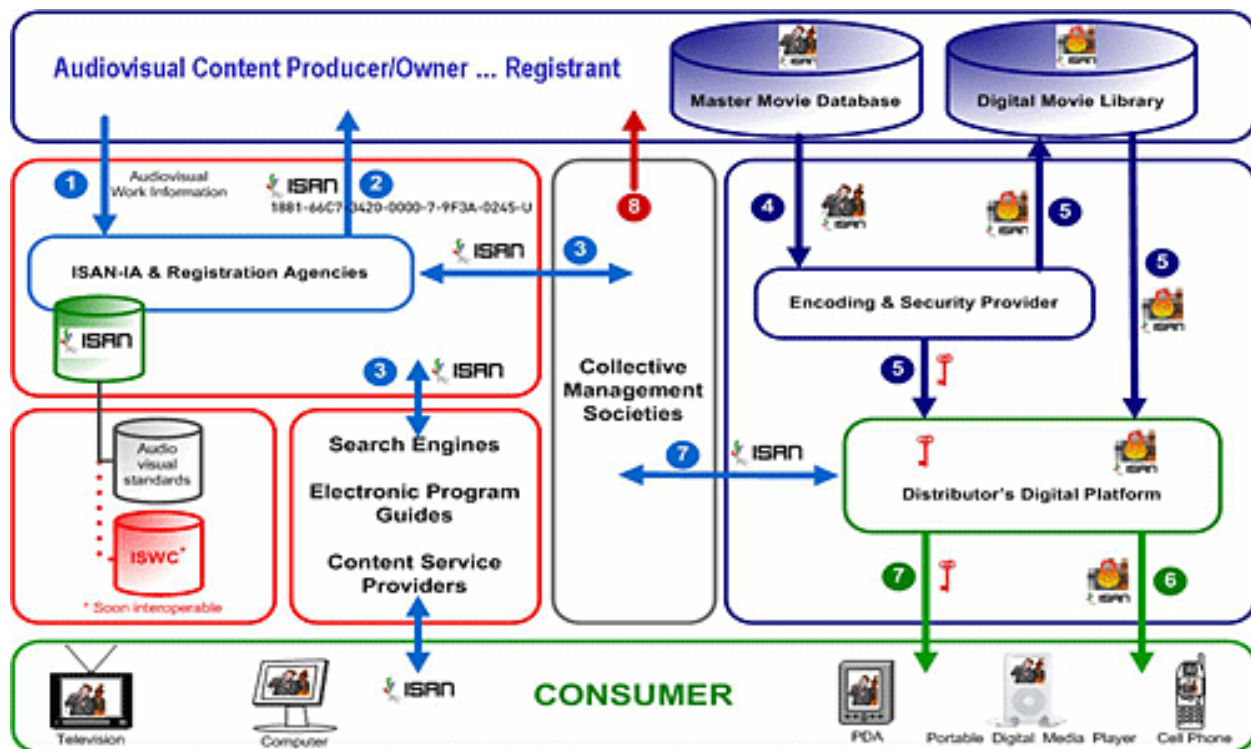


- ISAN Australasia (Australia and New Zealand)
- ISAN Berne (Switzerland and neighboring countries)
- ISAN IFTA (IFTA members)
- ISAN NL (Netherlands)
- ISAN RA Deutschland (Germany)
- Microsoft Studios (U.S.)
- Secure Path (U.S.)
- ISAN U.K. (United Kingdom)
- ISAN Sverige (Sweden)
- ISAN PL (Poland)

RAs and ROs are being planned in additional markets, including Austria, Belgium, Brazil, Canada, Czech Republic, Hong Kong, Iran, Italy, Japan, and Mexico

## **ISAN's Value to the Media Industry**

An ISAN provides the foundation for electronic exchange of information for audiovisual (AV) works, such as feature films, television movies and episodic productions, web content, and games. It is the key identifier for commerce surrounding finished AV works. Applications include basic archive identification, rights management, royalty management, electronic program guides, and audience measurement. Having a global unique identifier for an audiovisual work enables multiple ancillary benefits including traditional rights management, anti-piracy, digital rights management, royalty collection and disbursement. An example includes cooperation with AGICOA. This can also aid in the development of consistent taxonomy which in turn enable powerful search capabilities. It's important to note that ISAN does not indicate ownership but rather serves as a canonical identifier, i.e., a common and accepted unique identifier enabling integration and sustainable cross-referencing ability between trading partners and other stakeholders.



## Primary Users

There are two major types of ISAN users: commercial concerns and end-users. The initial major users include MPAA members for library management, optical media identification and Digital Cinema distribution projects. Other users include digital broadcast, cable and many other value chain participants, including:

- Those interested in the licensing of audiovisual (AV) works and in the management of permissions and payments for use of these works, including rights holders, producers, writers, directors, actors and composers;
- Parties involved in the administration of rights for AV works, such as collection societies to assist in the allocation of royalties;
- Those releasing or exhibiting different versions of works to an audience, such as television broadcasters;
- Those who manage databases about AV works and/or rely on electronic exchange of data, such as television listing services;
- Those who track and report on the use of versions of AV works such as audience measurement and ratings companies; for example, the ability to tell the difference between language version, director's cut and so forth;
- Those managing the cataloguing and/or preservation of audiovisual collections and works, such as archivists;
- Organizations involved with engineering and encoding standards for the television, motion picture and broadcasting industries; and

- Those who need to exchange accurate data about specific versions of AV works such as parties involved in anti-piracy measures, customs officials and Interpol.

## Recommended Time of ISAN Registration

- Register for an ISAN as early as possible—when a project is green lit, if not beforehand. Early registration is cost-effective and allows future efficiencies for distribution both internally and externally.
- Based on the foregoing, when a season of an episodic work is green lit, register all ordered episodes with best available data. Update the metadata as it becomes available.<sup>8</sup>
- It is recommended that acquisition and licensing contracts signed should have provisions to require completed ISAN registration prior to licensing because doing so enables large catalogs of assets to change hands without the laborious process of manually looking up titles.
- Studios with large-scale version registration needs may wish to buy a large block of codes in advance and work directly with their RA to use specialized data entry tools to ensure high-quality data (as book publishers do with the ISBN and ISSN numbering systems).<sup>9</sup>

## Metadata Workflows for ISAN in Digital Content

This section provides an overview of the associated ISAN metadata for digital audiovisual (AV) distribution.

Embedding an ISAN alone is not sufficient when identifying digital works. Metadata is needed to accompany the ISAN registration in order to fully realize the potential of a universal international identifier. This requires the entry of metadata in a standardized manner.

The foundation of audiovisual identification is based on the ISO standards 15706 and 15706-2 which serve as the backbone for metadata definitions. The ISAN-IA registration authority has developed a suite of policies and procedures to support reliable exchange of digital content through XML Web services that links reliably to the ISAN central repository. The overall registration processes, rules and procedures related to the standard and its use are maintained and enforced by ISAN-IA. All XML schemas and ISAN Web Services are also defined by ISAN-IA. Further, all metadata submitted during the registration process will be retained by ISAN-IA on behalf of ISO and may also be retained by the Registration Agency according to its terms of use with the Registrant.

The intention of the ISAN Work and Version Metadata Set (described below) is to provide a standard guide for manual and automated population of metadata when registering for an ISAN. At

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<sup>8</sup> If all ISAN-required metadata is not available at the time of registration, then the ISAN will be declared “In Development” (or “InDev”). The work can be registered and the ISAN will be issued, but the associated metadata will not be available through an ISAN-IA search until all required fields have been completed. At that point, the ISAN registration can be converted from InDev status.

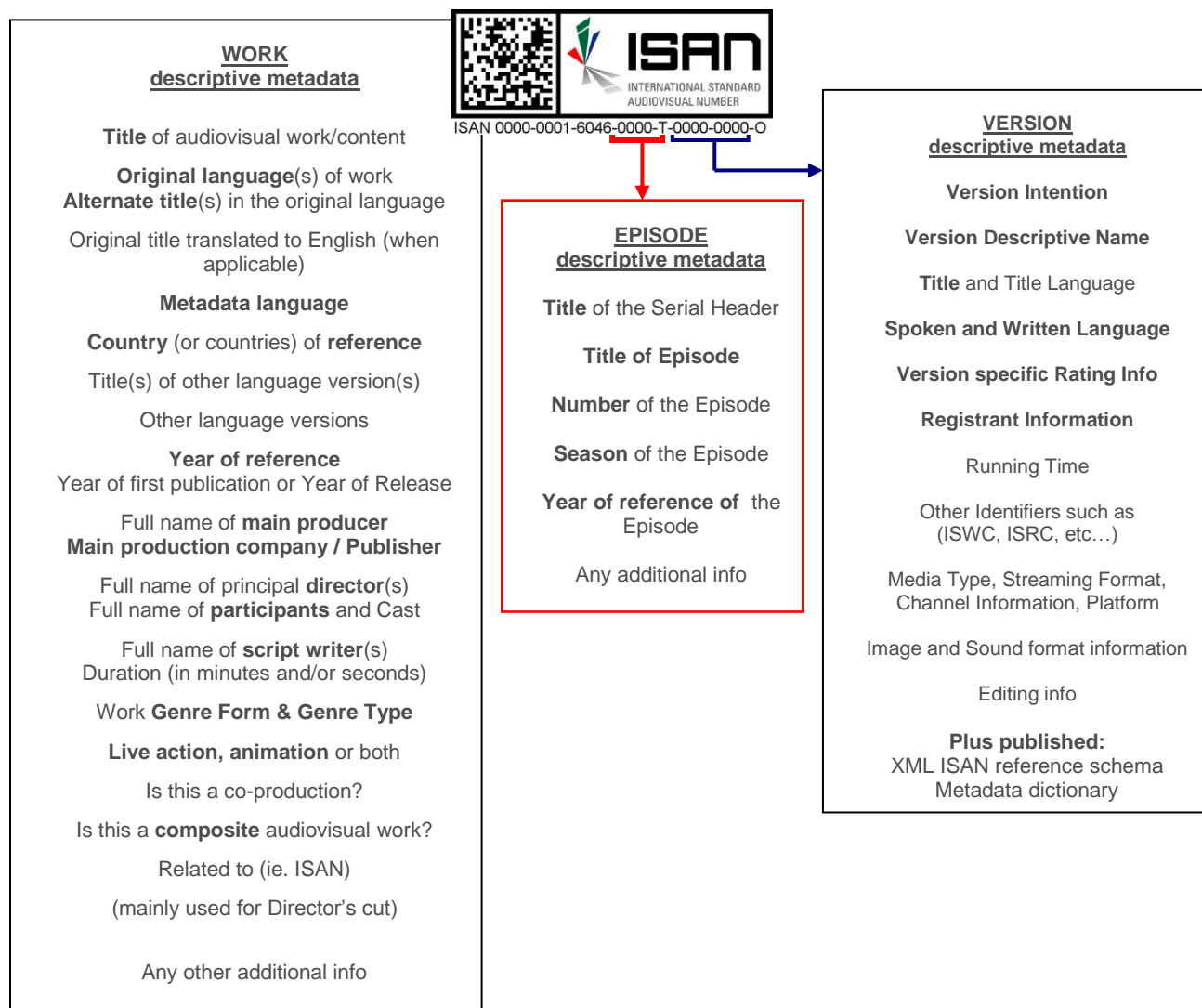
<sup>9</sup> However, this should only be attempted if the registrant has the ability to maintain the associated metadata in the ISAN system as it becomes available over time (as each version number is applied to a specific version of a work). This process will be greatly facilitated by automated system-to-system interfaces between the ISAN registration agencies and their large volume version registration customers.



this stage, an automated Web service system is unavailable, although plans are underway for its deployment by Secure Path in early 2007.

## The ISAN Work and Version Metadata Set

Currently, there are two ISAN metadata sets in development: the ISAN Work Metadata (covering both individual works and episodes of a series), and the ISAN Version Metadata.<sup>10</sup> Both ISAN metadata sets are registered and stored in the ISAN-IA central repository. It is vital to the integrity of the ISAN system to have the most complete and accurate metadata as possible. If information changes or becomes available after the initial registration, an immediate update is recommended.



<sup>10</sup> A full description of the current ISAN metadata can be found in the ISAN User Guide available from ISAN-IA at [http://www.isan.org/docs/isan\\_user\\_guide.pdf](http://www.isan.org/docs/isan_user_guide.pdf).

The specific metadata that accompanies each registration will vary with its type. Types are general classifications such as Film, Television Entertainment, Sports Event, and Games.

## **ISAN and Other Media Identifiers**

ISAN was designed for works with moving pictures, or parts directly related to works with moving pictures (such as a full audio track of a feature film). ISAN can be used for exchange between potentially unrelated commercial entities. There are other related identifiers in use today in media, such as Advertising Digital Identifier (Ad-ID), International Standard Book Number (ISBN), Unique Material Identifier (UMID), etc. These identifiers, while all unique, do not have a central registry and the unique benefits that ISAN provides.

### **Ad-ID (superseding ISCI)**

The Advertising Digital Identifier (Ad-ID) is for all forms of advertising regardless of medium, and is the successor to the Industry Standard Coding Identification (ISCI), which is the broadcast television advertising identification system. It overlaps ISAN for some audiovisual (AV) works, but is constrained in practice to advertising works. An advertisement in AV form may have both an ISAN and an Ad-ID. For more information, please see [www.ad-id.org](http://www.ad-id.org).

### **CRID**

The Content Reference Identifier (CRID) was developed to support television electronic program guides (EPGs) and is used to identify a particular instance of a work. CRIDs are not globally unique or registered by a central authority. Instead, the first part of the identifier indicates the domain from which the number was assigned and where one must go to resolve the number. For more information, please see [www.tv-anytime.org](http://www.tv-anytime.org).

### **GTIC**

A Global Trade Identification Number (GTIC) is a product identifier that works within the hierarchical Global Product Classification (GPC) system (Segment-Family-Class-Brick) to place each item within a group of like products (Brick) and provide a means of obtaining metadata that identifies the specific attributes of the identified product. The GTIC is used within the Global Data Synchronisation Network (GDSN) to facilitate data exchange among international trading partners in a supply chain. For more information, please see [www.gs1.org/productssolutions/gdsn/gpc/training/basics.html](http://www.gs1.org/productssolutions/gdsn/gpc/training/basics.html).

### **ISBN**

The International Standard Book Number (ISBN) is used primarily for printed works, but its use has been extended in practice to be used as a universal product code for packaged products for retailers. Therefore, while a work will have an ISAN, its DVD packaging may also have an ISBN. For more information, please see [www.isbn.org](http://www.isbn.org).

### **ISRC**

The International Standard Recording Code (ISRC) is used primarily to identify sound recordings, such as CDs, rather than the works that appear in those recordings. However, it is also used for certain AV works such as music videos, which are also eligible for an ISAN. Because of this, a



music video may have both an ISAN and an ISRC. For more information, please see [www.ifpi.org/isrc](http://www.ifpi.org/isrc).

### **ISWC**

The International Standard music Work Code (ISWC) is used primarily to identify musical works, much as an ISAN identifies AV works, rather than a specific recording of a musical work (identified by an ISRC). For more information, please see [www.iswc.org](http://www.iswc.org).

### **UMID**

A Unique Material Identifier (UMID) is primarily for production and post-production work in process and typically used within a project's technical operations group to identify media and media streams. The final edited work would typically have a UMID assigned by the post-production workstation, so a published work may well have both an ISAN and a UMID, although the UMID would not be widely distributed or publicized. For more information, please see [www.smptra.org/s330mex.html](http://www.smptra.org/s330mex.html).

### **UPC**

The Universal Product Code (UPC) is a product identification number and bar code standard, initially adopted in the grocery industry but since expanded to include the entire commercial product space. EAN (European Article Numbering) and JAN (Japanese Article Numbering) standards are essentially similar, differing mainly in the number of digits each employs. For more information, please see [www.uc-council.org](http://www.uc-council.org).

### **House Numbers**

Each organization maintains its own internal, or house, numbering system—in some cases, a single organization may have more than one numbering system, each used for a different purpose. In general, these numbers have meaning only within the context of the organization that issued them and cannot be exchanged among business partners.

## **Audiovisual Hierarchy**

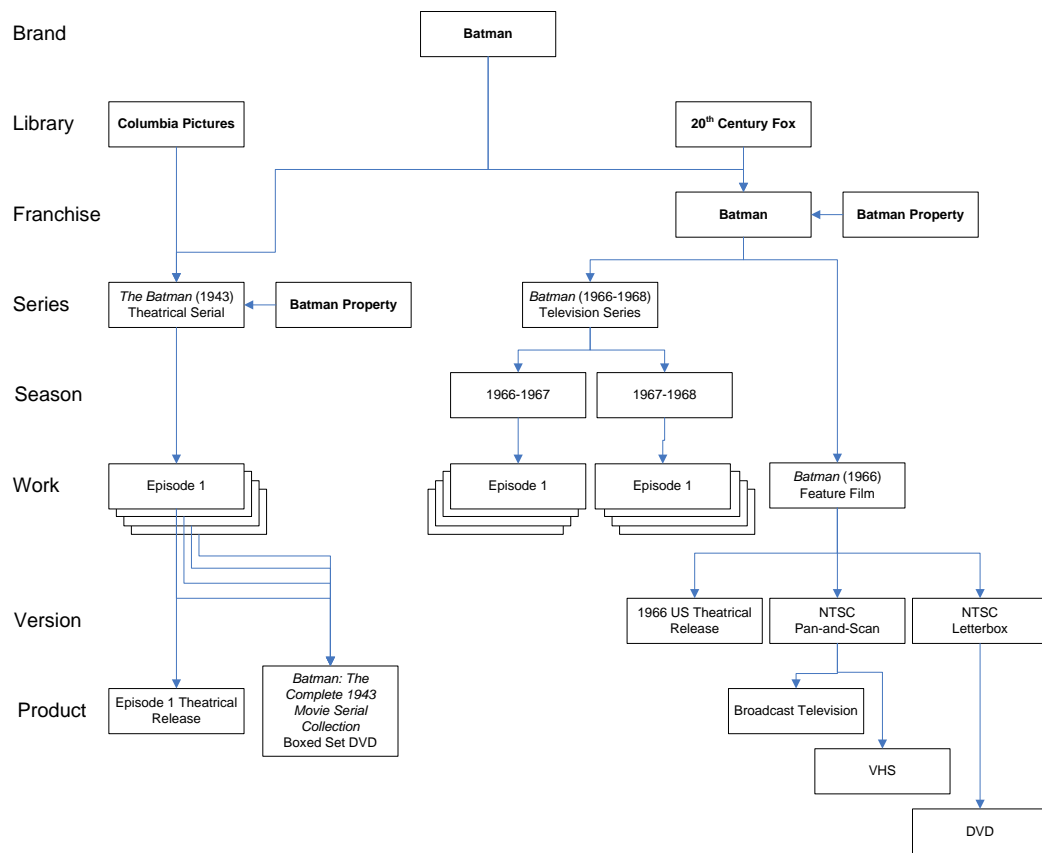
In order to better understand the concept of the ISAN Work and Version, it helps to view it within a larger whole. For example, in audiovisual (AV) works, several instantiations can derive from a single intellectual property or brand. The hierarchy, as pictured below, illustrates how the different expressions of a single concept can relate to one another regardless of their physical format. The Batman brand, in this example, can be followed to other conceptual derivatives across studios and owners through this structural hierarchy.

In this hierarchy, Work and Version are at the object level, which follows a path of ideology, or whole/part relationship to its top intellectual property or brand. ISAN-IA will not track brands or franchises, though Registration Agencies or others may choose to do so.

This is not a locked hierarchy. Paths can be traversed and entered at random and all levels do not have to be branched in the order presented. The advantage of the ISAN is that it is first and foremost, a number. This identifying number is attached to other attributes that further identify content. Like a

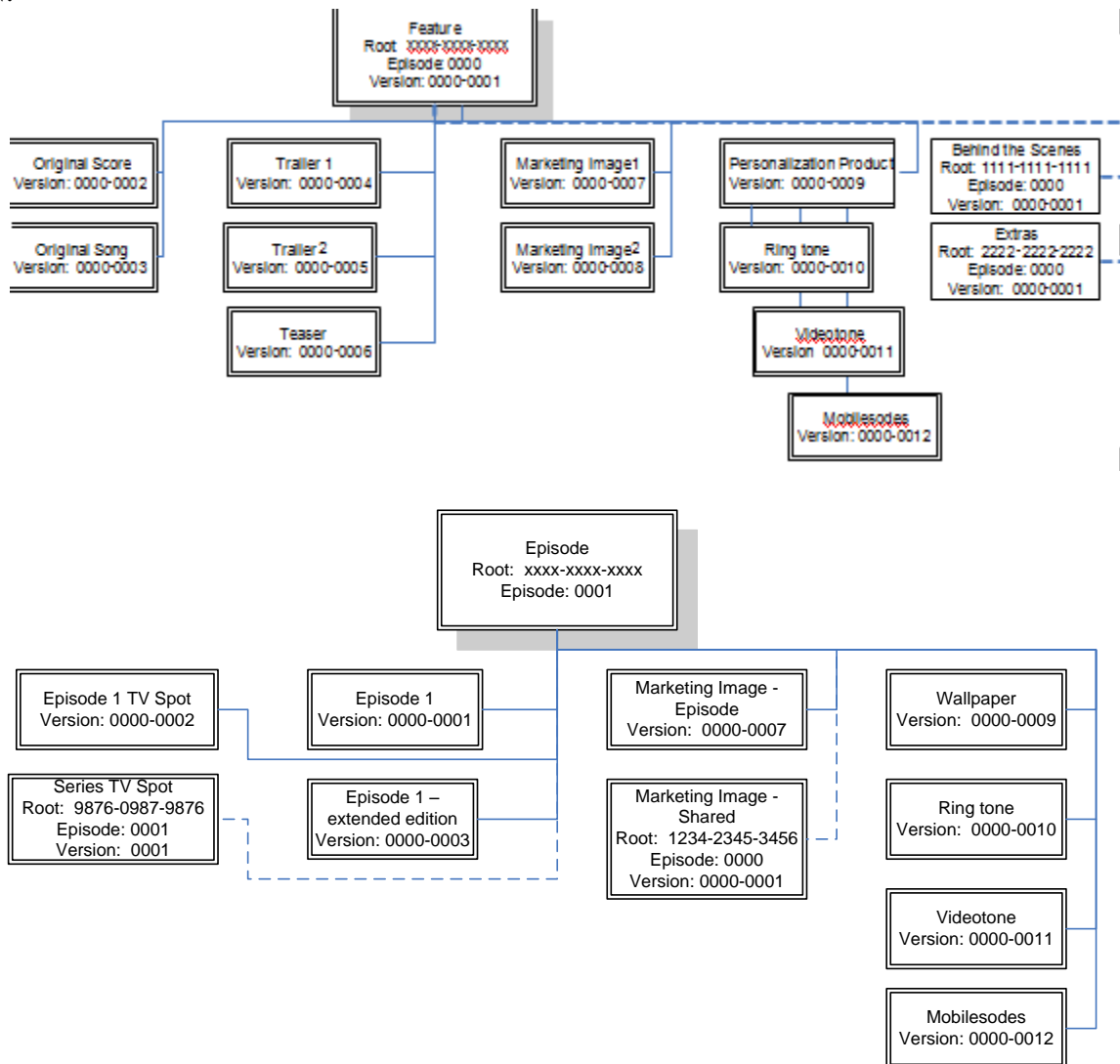


driver's license, each holds its own metadata that further describes its vital information. The hierarchy places it in context. Below is an example of a hierarchy from brand to product.



## Standard ISAN Work Structure

Typically, an ISAN will have dozens – even hundreds – of files with the same root and several versions based on the parent ISAN known as episodes, even if they are not in fact TV episodes. Digital merchandise of all types associated with the Feature (in the dotted line) can share the same ISAN.



## Compilation Hierarchy

### Composite versus Compilation

A composite work is a single work that contains elements from one or more prior works. For example, a television clip show with scenes from past episodes linked by new material. To record the source elements contained in a composite work with the ISAN system, each of the prior works



must have its own ISAN. Technically, any work that uses stock footage is a composite work, but we do not recommend tracking to that level of detail.

A compilation work is a collection of two or more separate works in a single distribution package, such as a DVD containing a feature film along with various bonus features, a theatrical feature with a trailer for another feature attached at its head, a home video boxed set of all episodes from a season of a series, etc.

### **Primary Work Compilation**

A compilation constructed mainly of a primary asset such as a feature film and including ancillary ISAN content like trailers, behind-the-scenes bonus materials, etc. will be assigned a new version ISAN that is derived from the ISAN of the main work (the feature film).

For example, a DVD release of *Rocky* may contain the feature motion picture, trailers for other features, interviews with the actors and a behind-the-scenes footage, each element having its own ISAN. The DVD, which is considered a compilation could be assigned a new ISAN, but when it is clearly the feature film *Rocky* that is the primary intended AV work being presented, the DVD will be designated a new version of the *Rocky* ISAN. This usage is meant to identify the DVD as a product, and it is recognized that often DVDs are a compilation of many products.

### **Compilation of Peer Works**

For content owners packaging a collection of works for distribution as a single unit, a new ISAN will be assigned to uniquely identify the compilation.

For example, if Paramount releases *The Godfather*, *The Godfather II* and *The Godfather III* in a boxed set on DVD, each feature will already have an ISAN. Since all three works are of equal importance and are generally given equal billing (even if referred to collectively as “The Godfather Trilogy”), a new ISAN will be assigned to the compilation as a whole, as a composite.

Mobisode (special versions of a work created for presentation on a cell phone or other mobile device) are not considered personalization products. If they are unique works, they are assigned ISANs as would the more traditional form of AV work they most closely resemble (episode of a series, short film, etc.). If they are derived from a prior AV work, such as a format conversion from a television episode or a marketing piece promoting a feature film, then they are treated like all other versions of the source work and assigned a version based on the ISAN of the original work, since these products are, in fact, a related subset of content from the original work.

## **Recommended Procedures for Special Cases**

The ISO ISAN standard and the ISAN-IA policies and procedures allow a certain amount of flexibility when registering works and versions and when determining how to fill in the associated metadata. This is necessary so that the standard can adapt and evolve along with the industry. There remain a number of special use cases that occur often enough to warrant special attention. By applying a common approach in these situations, the utility and interoperability of the ISAN system

will be greatly increased. To that end, we recommend the following procedures be adopted by those using ISAN to identify their creative works.

## PILOTS

- The first work in a series (generally, the pilot) is registered as an ISAN series episode when the registrant has the intent to produce a series of related works. The series header created when the first episode is registered becomes the umbrella under which all episodes of that series are housed. If only the one work is ever produced, or even if that one work never makes it to a consumable product, it is still an episode in that series (a series of one).
- If a work is produced as a stand-alone effort, and later becomes the inspiration for a series, the original work is not recast as an episode of the series. It remains a stand-alone work with its own ISAN and the episodes produced as part of the series have their own ISANs with a shared root number and individual episode numbers. If necessary, these related works can be grouped under a franchise or brand. (This grouping would be handled in private metadata extensions by the provider or Registration Agency.)
- If a second series pilot is produced with significant changes in creative personnel from the first pilot, then the second pilot (along with any subsequent episodes) is registered as part of a new series. The two pilots and their respective episodes can be grouped under a franchise or brand. (This grouping would be handled in private metadata extensions by the provider or Registration Agency.) A change in creative personnel within the run of a series does not justify the registration of a new ISAN series.
- Pilots are included as part of the first season (season 1).

## SEASON

- The individual seasons of a series are registered under the same ISAN root (all sharing the same series header information), and are identified through metadata. They are not registered as individual series, each with a unique ISAN root.
- When recording ISAN metadata for an episode of a series, record the season number in original air-date chronological order beginning with 1 and record the episode number in original air-date chronological order beginning with 1 for each season. If the metadata contains an intended ordering that is not later realized, then correct the numbering at the earliest opportunity
- When recording the original air date for an episode, include the country in which the airing took place. If the episode aired in more than one country on different dates record at least the first air-date and country. It is noted that historically this information may not be readily available.

## VERSION

- While a modified work may be eligible for its own ISAN, if the principal creative content remains the same then such modified works should be registered as versions of the prior work. For example, a conversion to a new digital encoding, a format conversion from NTSC to PAL, a pan-and-scan edit of a widescreen work, a colorized version of an originally black-and-white work, a localized version (edited to conform to community standards), burning



subtitles into the optical image, dubbing the work in a new language while retaining the essence of the original narrative, etc.

- People often think of audiovisual works as having an “original” version. Technically, every version has at least one version that preceded it back to the original idea that inspired the work. What one calls the original version is in reality the first finished version produced for public consumption – the first theatrical release, the first broadcast, etc.
- Not all modifications of a work must be identified from a different version number. The decision to assign a new identifier will depend on the registrant’s need to distinguish between the two instances of the work. For example a unique combination of picture and sound should be uniquely identified such as Director’s Cut or Black and White. But technical modifications that do not effect picture and sound (H 264 vs. MPEG vs. Windows Media) may be issued version numbers at the registrant’s discretion.
- A work distributed with multiple subtitles or dubbed languages (Digital Cinema, DVD, Blu-ray, HD-DVD, etc.) may have one ISAN version registration that encompasses all of the languages or a separate version registration for each combination of visual elements and language. In either case, the metadata for the version should reflect all language options available within that version of the work.
- The version of a work intended for US audiences should carry the MPAA and/or TV Guidelines ratings in the ISAN record in support of parental control systems and the like. A version intended for global audiences can be allocated a rating from any one of dozens of ratings systems offered within the ISAN system.

## **THEATRICAL SEQUELS AND OTHER WORKS CONVERTED TO SERIES FORM**

NOTE: ISAN provides a facility for converting a stand-alone work (one that was not originally registered as part of an episodic series) into an episodic work. For example, if a sequel is made to a feature film, the original feature and its sequel could be made part of a theatrical series.

- Similarly, if a stand-alone work becomes the inspiration for a television series, the original work could be re-cast as the pilot for the series with all of the works registered under the same root segment, each with different episode numbers.
- If a work is originally registered as a stand-alone item, and then related works are later produced, the original work should not be re-cast as being part of a series. It should remain a stand-alone work. One could use one of the higher-level concepts such as brand or franchise to link it to its sibling or descended works, but its ISAN registration should not be changed to a serial type.
- If a theatrical work is inspired by a television series, the new film should be registered as a stand-alone work, not part of the original television series.
- If a television movie or special carries on the principal creative elements of a television series (situation, characters, cast, etc.), but is not produced as part of the series, it should be registered under its own root segment (either as a stand-alone work or as a new series, depending on the intent of the producers).

## **MINI SERIES**



- If the intention was to play the mini-series as a serial work over several nights, then each installment should get an episode number derived from the same root ISAN.

## **SHORTS, THEATRICAL SERIALS AND OTHER WORKS**

- Assuming it's a serial work playing over several nights, each should get an episode number from the same root ISAN. Examples include; *Our Gang*, *Buck Rogers*, *Perils of Pauline*.
- Cartoons and individualized segments all get their own ISAN regardless of compilations.

## **DIRECTOR'S CUT, COLORIZED, REMASTERED, RESTORED, ETC.**

- A director's cut may or may not be considered a significant re-envisioning of the source material—it may include footage never before seen (and in some cases created for this purpose). A registrant, as such, may consider registering this as a new work separate from the original work with some differentiation such as the year of reference based on the release. (As a derivative work, the ISAN metadata should reference the ISAN of the original work.)

There may also be an incentive to retain Director's cuts under the same work identification to facilitate the aggregation of all related versions.

It is recommended that this decision be made by the registrant of the work and/or version.

- Colorizing a work (adding artificial color to what was originally a black-and-white work) is a major modification to the work, even though it does not necessarily affect the work's narrative. As such, colorized works may be registered as new works derived from their black-and-white originals with the year of reference based on the release of the colorized work. (As a derivative work, the ISAN metadata should reference the ISAN of the black-and-white original.) It is acknowledged that there may be differing views on this topic. It is suggested that a common practice has inherent value.
- Re-mastered or restored works do not attempt a significant creative change to the work, but rather seek to reverse the negative effects of the aging process or take advantage of technologies not available at the time of a work's creation. As such, they should be registered as versions of the original work, not as new works themselves.

## **DIGITAL MERCHANDISE**

Digital merchandise products are smaller AV works that tend to be highly perishable and, as such, tend to have a very short shelf life. Examples of these works include wallpapers, video ringtones, ringtones, ringbacks, mobile games, etc. Consumers use these works to individualize their personal electronic devices such as cell phones, PDAs, and home computers. Some personalization products are derived from longer audiovisual (AV) works (feature films, television series, etc.), while others are unique creations. A majority of these works (products) are in fact derivative, ancillary, merchandising works based on a feature or series work such as Spiderman, Batman, or The Little Mermaid. Since these products are highly perishable and are commonly related to a primary work, we recommend that Digital merchandise is registered as versions under the primary work. In the event no master work exists, register a new primary title for the digital merchandise. You can create additional versions under this primary work registration as necessary.



## How the ISAN Number Is Encoded

There are several standard ways an ISAN can be encoded: printed, binary, XML or URN. There are also many other possible forms.

### Printed Form

When an ISAN is printed, such as on paper, or when being input or output to a computer system by a human, it takes the alphanumeric form as follows:

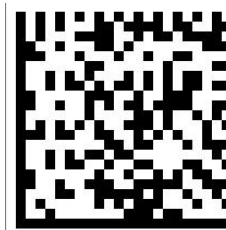
**ISAN *RRRR-RRRR-RRRR-EEEE-X-VVVV-VVVV-Y***

Where:

- "RRRR-RRRR-RRRR" represents a registered root (R) portion of ISAN.
- "EEEE" represents the episode or part.
- "VVVV-VVVV" represents the version portion.
- "X" and "Y" represent the check character for that ISAN, calculated in accordance with ISO 7064.

For more information on this encoding, see ISO 15706 and 15706-2.

ISAN-IA has also developed a recommended practice for encoding the ISAN in a two-dimensional barcode 96 pixels square (the barcode is made up of 22 columns and 22 rows of encoded data).



For more information on this barcode, see the ISAN 2-D Barcode section below or refer to the ISAN-IA Web site ([www.isan.org](http://www.isan.org)).

### Binary Form

Some uses of ISAN simply encode it as a 96-bit binary number. When this is done it is encoded left-to-right with respect to the printed form above. For more information, please see ISO 15706 and 15706-2.

### XML Form

XML has become a common data exchange format. ISAN has a schema snippet that defines how it should be encoded in XML. An example of the XML encoding is as follows:

**`<ISAN root="1881-66C7-3420" episodeOrPart="6541" version="9F3A-0245" />`**

For more information, please see ISO 15706 and 15706-2.

## URN Form

The URN form is a special case of the printed form where "URN:ISAN:" is pre-pended. "ISAN" is a registered Namespace Identifier (NID) with IETF and IANA. An example is:

*URN:ISAN:0000-0000-D07A-0090-Q-0000-0000-X*

For more information, please see IETF RFC 4246.

## Broadcast Television and Professional Video Distribution

Assigning a number that identifies a work is one thing. Attaching it to an instance of the work and maintaining that association throughout the pipeline from producer to consumer is another. For works that are encoded in MPEG-2 Transport Streams, there is a way to encode it with an ISAN as defined by ISO. For facilities that use SMPTE 292 Serial Digital Interfaces, there is also an encoding recommendation. For communication between television station control devices, there are two related standards.

## ISO/MPEG

ISO has defined an international mechanism to carry ISAN in the MPEG-2 Transport Streams (such as ATSC, DVB and ARIB). This mechanism is documented in Amendment #4 to ISO/IEC 13818-1:2000, which also builds on Amendment #1. Amendment #1 defines a generic metadata descriptor, and Amendment #4 defines specific codes points for carrying ISAN. The resulting descriptor is as follows:

Syntax	No. of bits
<i>content_labeling_descriptor</i> () {	
<i>descriptor_tag</i> = 36	8
<i>descriptor_length</i> = 12	8
<i>metadata_application_format</i> = 0x0011	16
<i>content_reference_id_record_flag</i> = 1b	1
<i>content_time_base_indicator</i> = 0000b	4
<i>reserved</i> = 111b	3
<i>content_reference_id_record_length</i> = 8	8
for (i=0; i< <i>content_reference_id_record_length</i> ;i++){	
<i>content_reference_id_byte</i> = (ISAN binary)	8*8
}	
}	

Please note that there are some more optional fields. For more information, please see ISO/IEC 13818-1:2000, plus its Amendments #1 and #4.

## SMPTE/292/VANC

ISAN is an element in the SMPTE Metadata Dictionary, RP210, with the assigned Universal Label (UL) of:



## 06.0E.2B.34.01.01.01.01.01.11.01.00.00.00.00

For more information, please see SMPTE RP210. General encoding of dictionary items is defined in SMPTE 336, also known as KLV encoding. Any metadata dictionary element can be encoded in ancillary data space according to SMPTE RP214 and S291M. And, any 291 packet can be carried in the ancillary data space of HD SDI (SMPTE S292M).

### ATSC/PMCP

For communication of ATSC-specific metadata between facility devices, and in particular to an ATSC PSIP11 generator, ISAN can be conveyed as a PMCP XML message according to ATSC A/76. An example of an encoding is as follows:

```
<?xml version="1.0" encoding="UTF-8"?>
<PmcpMessage xmlns="http://www.atsc.org/pmcp/2004/2.0" id="4294967295" origin="Traffic"
originType="Traffic" dateTime="2003-12-17T09:30:47-05:00">
  <Show action="update">
    <ContentId>
      <Isan root="2B1A-FF17-3E20" episodeOrPart="6541" check1="7" version="48CD-78B1"
check2="B"/>
    </ContentId>
    <ShowData>
      <Name lang="eng" action="update">I Love Lucy</Name>
    </ShowData>
  </Show>
</PmcpMessage>
```

For more information, please see ATSC A/76. And, watch for a related command and control message system from SMPTE S22.

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<sup>11</sup> See ATSC A/65.



## Implementing ISAN in New Works

Many TV shows and commercial films have already been registered with ISANs – if you are working with previously published content, you may only need to register to receive a version or episode identifier. To check on the registration status of a work, simply contact your registration agency or visit the ISAN-IA web site ([www.isan.org](http://www.isan.org)) and use the online *Find an ISAN work* search engine to query the registry database. For example, search by title for *Cannery Row*, and the results will show that several language versions of this work have already been registered:

ISAN 0000-0000-0FBA-0000-U-0000-0000-L	
Title	Language
Cannery Row	English
Destinos sin rumbo	Spanish
Rua das ilusoes perdidas	Portuguese
Rue de la sardine	French
Strasse der Oelsardinen	German

However, when working with previously unregistered works, it is important to avoid (or at least approach with caution) the practice of assigning identifiers after encoding and compression has been completed. Given that there is a certain amount of administrative overhead required prior to submitting new ISAN requests, the temptation to do this can be fairly compelling, especially during periods of heavy production volume. The potential problems with this approach include maintaining accurately coordinated content and ensuring workflow efficiency.

For example, during the interim period between encoding and identifier assignment, the risk is always present that copies of unassigned media files will get ‘loose’ and subsequently be copied without embedded identifiers, or that errors may occur in matching identifiers to their correct media files.

In addition, the process of retrospective number assignment (as described below) requires several additional workflow steps which can be eliminated if the identifiers are generated and the metadata embedded with the content at the time of encoding.

## The ISAN Barcode

Registrants may use the barcode alone, may use the number alone or the entire graphic as displayed. We encourage you to use the complete graphic image as it appears below on all contracts, promotional material, and media labels.







OR

ISAN 0000-0000-E356-0000-Q-0000-0000-X

OR



ISAN 0000-0000-E356-0000-Q-0000-0000-X

## Automated ISAN Registration and Updating

For large volume ISAN registrants, it is vital that the initial registration process and the subsequent metadata update process be automated and integrated into their existing works tracking systems. To facilitate this, the two US registration agencies, Microsoft and Secure Path, are in the process of developing with ISAN-IA a common specification for integrating ISAN registrations and updates into third-party systems. For more information on this effort, please contact David Benson, Chief Technology Officer at Secure Path, [dbenson@secpath.com](mailto:dbenson@secpath.com).

## ISAN in Media Asset Management

While interest in adopting the ISAN is currently oriented toward exploiting its potential in commercial media content production and distribution, the long-term success of the standard also depends on its application in media archives, libraries, and asset management systems.

## For More Information



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## Appendix A: Glossary

**Ad-ID:** The Advertising Digital Identifier (Ad-ID) is for all forms of advertising regardless of medium, and is the successor to the Industry Standard Coding Identification (ISCI), which is the broadcast television advertising system. It overlaps ISAN for some audiovisual works, but is constrained in practice to advertising works. An advertisement in audiovisual form may have both an ISAN and an Ad-ID. For more information, please see [www.ad-id.org](http://www.ad-id.org).

**Brand:** An umbrella collection of intellectual properties (IP), audiovisual works, etc. with a common element. The same work or IP may belong to more than one brand. Brands may be thought of as multi-company franchises.

Such as *James Bond*; *Batman*; *John Wayne*; *etc.*

[ISAN-IA will not track brands, though Registration Agencies or others may choose to do so. Consumers follow and understand brands, though a particular company may only have interest in that portion of a brand that is under its direct control.]

**CRID:** The Content Reference Identifier (CRID) was developed to support television electronic program guides (EPGs) and is used to identify a particular instance of a work. CRIDs are not globally unique or registered by a central authority. Instead, the first part of the identifier indicates the domain from which the number was assigned and where one must go to resolve the number. For more information, please see [www.tv-anytime.org](http://www.tv-anytime.org).

**Franchise:** An audiovisual work or intellectual property (IP) whose situation, story, or characters lend themselves to the creation of a number of related works marketed collectively under the franchise's umbrella. The same work or IP may belong to more than one franchise.

Such as *Star Trek*; *The Lion King*; *Batman*; *The Disney Princesses*

[ISAN-IA will not track franchises, though Registration Agencies or others may choose to do so. Consumers will not generally distinguish between a brand and a franchise. Most companies will use franchise as their highest-level grouping, rather than brand.]

**GTIC:** A Global Trade Identification Number (GTIC) is a product identifier that works within the hierarchical Global Product Classification (GPC) system (Segment-Family-Class-Brick) to place each item within a group of like products (Brick) and provide a means of obtaining metadata that identifies the specific attributes of the identified product. The GTIC is used within the Global Data Synchronisation Network (GDSN) to facilitate data exchange among international trading partners in a supply chain. For more information, please see [www.gs1.org/productssolutions/gdsn/gpc/training/basics.html](http://www.gs1.org/productssolutions/gdsn/gpc/training/basics.html).

**House Numbers:** Each organization maintains its own internal, or house, numbering system—in some cases, a single organization may have more than one numbering system, each used for a different purpose. In general, these numbers have meaning only within the context of the organization that issued them and cannot be exchanged among business partners.

**ISBN** The International Standard Book Number (ISBN) is used primarily for printed works, but its use has been extended in practice to be used as a universal product code for packaged



products for retailers. Therefore, while a work will have an ISAN, its DVD packaging may also have an ISBN. For more information, please see [www.isbn.org](http://www.isbn.org).

**ISCI** See **Ad-ID**.

**ISRC** The International Standard Recording Code (ISRC) is used primarily to identify sound recordings, such as CDs, rather than the works that appear in those recordings. However, it is also used for certain audiovisual works such as music videos, which are also eligible for an ISAN. Because of this, a music video may have both an ISAN and an ISRC. For more information, please see [www.ifpi.org/isrc](http://www.ifpi.org/isrc).

**ISWC** The International Standard Musical Work Code (ISWC) is used primarily to identify musical works, much as an ISAN identifies audiovisual works, rather than a specific recording of a musical work (identified by an ISRC). For more information, please see [www.iswc.org](http://www.iswc.org).

**Library:** The collected works, franchises, intellectual properties, etc. held by a particular organization.

Such as *Walt Disney Company*, *UCLA Film and Television Archive*, *BBC*

[ISAN-IA will not track libraries.]

**Product:** A work, or collection of works, in a form that may be released to the public and consumed. Equivalent to a SKU.

Such as *The Da Vinci Code Wal-Mart edition DVD*, *Da Vinci Code DCDM for digital theatrical distribution*.

[ISAN-IA does not track products, though the ISAN can be used to identify the work(s) or work version(s) contained within a product. ISAN can be used to identify the complex composite work represented by the unique collection of materials included on a DVD, but is not intended to identify differences in external packaging.]

**Property:** Short for intellectual property; an intellectual or artistic creation; a character, concept, work, etc. that can be licensed to a 3<sup>rd</sup> party or from which marketable products may be derived.

Such as *The Lion King*; *Who Wants To Be a Millionaire*; *James Bond*

[Property is conceptual, rather than physical, and is closely tied to rights ownership. As such, it is outside the scope of the ISAN system.]

**Season:** A sub-division of a series where episodes are grouped according to the timeframe in which they originally aired. The division into seasons is a consideration of both production and distribution schedules and may span calendar years (much like a fiscal year).

Such as *Year 1*; *Season 1*; *2004/2005*

[The season in an optional metadata field within the ISAN registration record. ISAN-IA recommends that it be included with all episodic registrations to facilitate duplicate detection and ISAN allocation.]



**Series:** A collection of related works known by a common name and presented one at a time, most often as television programs. Series may be episodic, anthologies, news programs, etc. The individual works that make up a series are often called episodes (even when the series is not episodic in nature).

Such as *Good Morning America*; *Friends*; *House*; *The 5:00 News*; etc.

[ISANs are not assigned to a series, only to the episodes that make up a series. Still, since the ISAN itself is partitioned, the series can be identified by using only the first 12 hexadecimal digits (48 bits) of the ISAN.]

**UMID** A Unique Material Identifier (UMID) is primarily for production and post-production work in process and typically used within a project's technical operations group to identify media and media streams. The final edited work would typically have a UMID assigned by the post-production workstation, so a published work may well have both an ISAN and a UMID, although the UMID would not be widely distributed or publicized. For more information, please see [www.smp-te-ra.org/s330mex.html](http://www.smp-te-ra.org/s330mex.html).

**UPC** The Universal Product Code (UPC) is a product identification number and bar code standard, initially adopted in the grocery industry but since expanded to include the entire commercial product space. EAN (European Article Numbering) and JAN (Japanese Article Numbering) standards are essentially similar, differing mainly in the number of digits each employs. For more information, please see [www.uc-council.org](http://www.uc-council.org).

**Version:** A distinct variation of a work, modified sufficiently to distinguish it from other variations but not so modified that it is no longer identifiable as the same work.

Such as *The 2002 US theatrical release of "The Bourne Identity"*; *The April 2, 2006 episode of "Desperate Housewives"*

[ISAN-IA issues unique numbers to the versions of ISAN-registered works (expressed in the final 8 hexadecimal digits (32 bits) of the ISAN, exclusive of the check character). Not all versions need have a different version number if the user does not distinguish between them. Conversely, the same version may have more than one version number, particularly if they have been applied by different parties.]

**Work:** An expression or manifestation of creative effort produced with the intention of being consumed. Audiovisual works are commonly known as titles (though this can be confused with the title, or name, of the work itself). This includes feature films, series episodes, video games, etc.

Such as *"The Lion King 1 ½"*; *Episode 005/"Truth Be Told"*; *"The Cure for Insomnia"*

[Unique ISANs are issued to each different work-IA records the season in an optional metadata field within the registration record.]

## Appendix B: ISAN and Games

Microsoft adopted ISAN and appointed Microsoft Studios (the company's internal video production facility) to provide registration services for the corporation. Particular attention is being given to using ISAN for Xbox and Xbox 360 game titles. Working in partnership with Microsoft Studios and the Xbox teams, ISAN International Agency (ISAN-IA) has just released an extended ISAN metadata schema specification for games content. The following illustration is an excerpt from the new games schema. Game trailers, like film trailers, are version of the game's root ISAN.

For game titles we recommend uploads begin with the v2 schema scheduled to be available through RAs in June. For mobile and online digital merchandise, it is the registrant's discretion whether you register it as a video work or game work.

ISAN Field Name	Field Values		Scope
	Code	Authorized Values	
User Experience Features		Edit Tools	
		HDTV 480p	
		HDTV 720p	
		HDTV 1080i	
		Rumble Effects (Vibration)	
		Split-Screen Play	
		Storage Device	
Online Experience Features		Downloadable Content	
		Online Safeguards (Friends)	
		Multiplayer Scoreboard	
		Rumble Effects (Vibration)	
		Voice/Chat Enabled	
Supported Players		Single Player	
		1-2 Players	
		1-4 Players	
		2-4 Players (Systems Linked)	
		2-8 Players (Systems Linked)	
		2-4 Players (Online)	
		2-8 Players (Online)	
		2-16 Players (Online)	
		2-24 Players (Online)	
ESRB Rating	EC	Early Childhood	
	E	Everyone	
	E10+	Everyone over 10 years	
	T	Teen	
	M	Mature	
	AO	Adults Only	
	RP	Rating Pending	
		Alcohol Reference	
		Animated Blood	
		Blood	

## References

Ad-ID Web site (<http://www.ad-id.org>).

ATSC A/65, "ATSC Standard: Program and System Information Protocol for Terrestrial Broadcast and Cable" ([http://www.atsc.org/standards/a\\_65c.pdf](http://www.atsc.org/standards/a_65c.pdf)).

ATSC A/76, "ATSC Standard: Programming Metadata Communication Protocol Standard" ([http://www.atsc.org/standards/a\\_76.pdf](http://www.atsc.org/standards/a_76.pdf)).

IETF RFC 4246, "International Standard Audiovisual Number (ISAN) URN Definition" (<http://www.ietf.org/rfc/rfc4246.txt>).

ISAN-IA (<http://www.isan.org>).

ISO 7064:1983, "Data processing—Check character systems" (<http://www.iso.ch>).

ISO 15706:2002, "Information and documentation—International Standard Audiovisual Number (ISAN)" (<http://www.iso.ch>).

ISO 15706-2:2006, "Information and documentation—International Standard Audiovisual Number (ISAN)—Part 2: Version identifier." (<http://www.iso.ch>)

ISO/IEC 13818-1:2000, "Information technology—Generic coding of moving pictures and associated audio information: Systems" (<http://www.iso.ch>).

ISO/IEC 13818-1:2000, Amendment #1, "Carriage of metadata over ITU-T Rec H.222 | ISO/IEC 13818-1 streams" (<http://www.iso.ch>).

ISO/IEC 13818-1:2000, Amendment #4, "ISAN and V-ISAN use in the content labeling descriptor" (<http://www.iso.ch>).

MPAA (<http://www.mpaa.org>).

RIAA (<http://www.riaa.org>).

SMPTE RP210, "SMPTE Metadata Dictionary" (<http://www.smpte.org>).

SMPTE RP214, "SMPTE RECOMMENDED PRACTICE—Packing KLV Encoded Metadata and Data Essence into SMPTE 291M Ancillary Data Packets" (<http://www.smpte.org>).

SMPTE s291M, "SMPTE STANDARD for Television—Ancillary Data Packet and Space Formatting" (<http://www.smpte.org>).



SMPTE s292M, "SMPTE STANDARD for Television—Bit-Serial Digital Interface for High-Definition Television Systems" (<http://www.smpte.org>).

SMPTE s336M, "SMPTE STANDARD for Television—Data Encoding Protocol using Key-Length-Value" (<http://www.smpte.org>).

SMPTE s421M, "SMPTE STANDARD—VC-1 Compressed Video Bitstream Format and Decoding Process" (<http://www.smpte.org>).