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Working Draft:
ATSC Parameterized Services Standard

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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 140 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. SCOPE

This supplementary standard defines a general purpose method to enable announcement of the technical attributes of program elements that must be supported in a receiving device to render the programming on a particular virtual channel.

It is not a replacement for fully-defined and optimized combinations of program elements defined for a particular service type, such as those established by A/53 and A/97.

1.1 Introduction and Background

This standard establishes a tool intended to help manage technological change and reduce the impact of evolutionary changes to the ATSC Digital Television Standard. As time goes on, broadcast service providers may desire to introduce new structures and formats of program elements. Some may be alternative methods for compressing audio or video, others that are less central to the broadcast service may include such things as providing for secure use of broadcast content within a home, or the signaling of IPTV-related services.

In contrast, the base set of standards provides an enumerated set of standardized techniques with detailed constraints agreed-upon and established prior to the deployment of receiving devices.

The particular technological element of control that is relevant to the signaling of the structure of service offerings is the service_type, which is a construct to explicitly define the exact match of transmit and receive capabilities required for successful rendering of digital content found on the virtual channel associated with the given service_type value. For collections of program elements that are to be presented in a specific predetermined and predictable manner, especially for mass-market optimized products, well known sets of enumerated characteristics are valuable.

Traditionally, a change is made to the base set (defined by specific values of service_type) when the need arises to make a major improvement in delivery formats. Special-purpose combinations that need to be unknown to the consumer also have justified the establishment of new service_type values.

This standard introduces a different approach designed to establish, for products supporting it, a uniform and controlled way to enable new components to be transmitted without impacting legacy devices and products that are unable to support the identified codecs or program elements. This approach is similar to the device discovery and control profiles in the Digital Living Network Alliance (DLNA) guidelines [5].

The fundamental element of the new approach is a descriptor that specifies characteristics of the critical parameters for each service element of a particular virtual channel. The descriptor is placed in the VCT and lists the stream_type and other details describing capabilities that need to be supported in the receiver to render all content in the associated virtual channel.

1.2 Organization

This document is organized as follows:

- Section 1 – Outlines the scope of this document and provides a general introduction.
- Section 2 – Lists references and applicable documents.
- Section 3 – Provides a definition of terms, acronyms, and abbreviations for this document.

- Section 4 – Component List Descriptor specification (normative).

2. REFERENCES

At the time of publication, the editions indicated below were valid. All standards are subject to revision, and parties to agreement based on this standard are encouraged to investigate the possibility of applying the most recent editions of the documents listed below.

2.1 Normative References

The following documents contain provisions which, through reference in this text, constitute provisions of this standard.

[1] IEEE/ASTM SI 10-2002, "Use of the International Systems of Units (SI): The Modern Metric System", Institute of Electrical and Electronics Engineers, New York, N.Y.

[2] ATSC: "ATSC Digital Television Standard, Revision E, with Amendment No. 1" Doc. A/53E, Advanced Television Systems Committee, Washington, D.C., 27 December 2005 (Amendment No. 1 dated 18 April 2006).

[3] ATSC: "Program and System Information Protocol for Terrestrial Broadcast and Cable, Revision C, with Amendment No. 1," Doc. A/65C, Advanced Television Systems Committee, Washington, D.C., 2 January 2006 (Amendment No. 1 dated 9 May 2006).

2.2 Informative References

[4] ISO/IEC IS 13818-1:2000 (E), International Standard, Information technology – Generic coding of moving pictures and associated audio information: systems.

[5] Digital Living Network Alliance: DLNA Networked Device Interoperability Guidelines expanded: March 2006.

3. DEFINITION OF TERMS

With respect to definition of terms, abbreviations, and units, the practice of the Institute of Electrical and Electronics Engineers (IEEE) as outlined in the Institute's published standards [1] shall be used. Where an abbreviation is not covered by IEEE practice or industry practice differs from IEEE practice, the abbreviation in question will be described in Section 3.3 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 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 the audio, video, and transport coding subsystems. These references are typographically distinguished by the use of a different font (e.g., restricted), may contain the underscore character (e.g., sequence_end_code) and may consist of character strings that are not English words (e.g., dynrng).

3.3 Acronyms and Abbreviation

The following acronyms and abbreviations are used within this specification.

ATSC Advanced Television Systems Committee

CVCT Cable Virtual Channel Table
DLNA Digital Living Network Alliance
IEC International Electrotechnical Commission
IEEE Institute of Electrical and Electronics Engineers
IPTV Internet Protocol television
ISO International Standards Organization
MPEG Moving Picture Experts Group
TVCT Terrestrial Virtual Channel Table
VCT Virtual Channel Table

4. COMPONENT LIST DESCRIPTOR (NORMATIVE)

The component_list_descriptor() is used in the TVCT and/or the CVCT to signal the combination of components (stream types, etc.) associated with a particular virtual channel. Each instance of the component_list_descriptor() shall identify the set of stream types that, if supported in a receiving device, allow that device to properly render and present all programming on the channel. Some or all of the identified stream types may be absent at any given time. The component_list_descriptor() shall be present in the descriptor loop following the descriptors_length field of any terrestrial_virtual_channel_table_section() or cable_virtual_channel_table_section() in which the value of the service_type field is 0x07 in the enclosing "for" loop. Receiving devices can use the combination of parameterized services and the Component List Descriptor to identify and discard channels for which processing support for all identified components is not available.

Up to two instances of the Component List Descriptor may appear in the TVCT/CVCT descriptor loop, a "primary" and an "alternate." A second instance is appropriate when content carried within a particular program element is simulcast on a second program element, where the simulcast stream is encoded using a different codec. This situation reflects the case that support in the receiver for either of two different sets of stream types is sufficient to guarantee support for encoding formats for the content on the channel.

This standard establishes no constraints or relaxations on the contents of the TVCT or CVCT other than those explicitly stated herein.

The bit-stream syntax for the component_list_descriptor() shall be as shown in Table 4.1.

Table 4.1 Bit Stream Syntax for the Component List Descriptor

Syntax	No. of Bits	Mnemonic
component_list_descriptor() {		
descriptor_tag	8	uimsbf
descriptor_length	8	uimsbf
alternate	1	bslbf
component_count	7	uimsbf
for (i=0; i<component_count; i++) {		
stream_type	8	uimsbf
format_identifier	32	uimsbf
length_of_details	8	uimsbf
stream_info_details()	var	
}		
}		

descriptor_tag – This 8-bit unsigned integer shall have the value TBD, identifying this descriptor as component_list_descriptor().

descriptor_length – This 8-bit unsigned integer specifies the length (in bytes) immediately following this field up to the end of this descriptor. The maximum value shall be 253.

alternate – A flag that indicates, when set to '1', that this instance of the component_list_descriptor() is a second, "alternate" description of streams associated with the virtual channel. When the flag is clear, the set of stream types in the instance of the descriptor is the "primary" or "preferred" set. If only one component_list_descriptor() appears in the descriptor loop, the value of the alternate flag shall be set to zero.

component_count – This 7-bit unsigned integer shall specify the number of components specified in the "for" loop to follow. The value shall be in the range of 1 to 126.

stream_type – This 8-bit unsigned integer field shall indicate the stream_type associated with the component described in this iteration of the "for" loop. Stream types in the range 0xC4 to 0xFF identify stream types defined privately (not described by ATSC Standards).

> *Informative note*: The values for each defined stream_type with values less than 0xC4 are found in the ATSC Code Point Registry, which coordinates such values among cooperating standards development organizations.

format_identifier — This 32-bit unsigned integer shall correspond to the format_identifier in the MPEG-2 Registration Descriptor defined in ISO/IEC 13818-1 [4] Section 2.6.9 and shall identify the entity providing the stream_type value. The value of format_identifier shall be 0x4741 3934 ("GA94" in ASCII) unless the applicable ATSC standard specifies a different value, in which case that value shall be used. The stream_type values defined in ISO/IEC 13818-1 [4] and whose use is not standardized by ATSC Standards shall use value 0x00000000 for format_identifier.

length_of_details – This 8-bit unsigned integer shall specify the length, in bytes, of the defined length of the stream_info_details() field to follow. The value of length_of_details shall be set to the length of the stream_info_details() field that has been defined for the associated stream_type value. The value shall be in the range of 1 to 250.

stream_info_details() – This field shall provide further information pertaining to the component identified by the value in the preceding stream_type field. The meaning and structure of the

bits contained in stream_info_details() shall be as specified in the standard defining the meaning of the value in the stream_type field when used in an ATSC transport stream. If ATSC standards define a stream_info_details() structure for a given value of stream_type, the ATSC definition shall take precedence over any definition originating from any other standards developing organization.

4.1.1 Additional Constraints

A given value of stream_type may appear at most one time in any given component_list_descriptor(). At most two instances of the component_list_descriptor() shall appear in the descriptor loop following the descriptors_length field of any terrestrial_virtual_channel_table_section() or cable_virtual_channel_table_section(). If two instances of the component_list_descriptor() appear in a given descriptor loop, one shall have the alternate flag set to '0' and the other shall have the alternate flag set to '1'.

Annex A: Example of Stream Information Details (Informative)

A.1 NEW CODEC PROFILE

The example below describes how a standards body might use this tool to set the parameters for announcement of an arbitrary codec called the "NIH" codec.

While the word "shall" is used in several places in this example in the context of this Parameterized Service Standard to which this annex is attached, they are not actual conformance key words.

Start of Example Section from "NIH" Codec Standard

4.7 STRUCTURE OF THE NIH STREAM INFO DETAILS FIELD

ATSC [*A/TBD Parameterized Service Standard*] establishes the requirements for announcement of a new (previously undocumented) stream_type as a component of a virtual channel. Those requirements include use of the component_list_descriptor(). The component_list_descriptor() contains the stream_info_details() field, the semantics of which are codec-specific. A/*TBD* requires the definition of the semantics and contents of the stream_info_details() field in order to use component_list_descriptor() to announce the characteristics of the content using the identified stream type. This section defines the syntax and semantics of the stream_info_details() field for stream_type 0xTBD.

The contents of the stream_info_details() for stream_type 0xTBD shall be structured as shown in Table 4.5.

Table 4.5 Stream Information Details Syntax for stream_type Value 0xTBD

Syntax	No. of Bits	Format
stream_info_details() {		
profile	2	uimsbf
level	3	uimsbf
reserved	3	'111'
}		

profile — This is a two-bit unsigned integer field. Values shall be as defined in Table 4.3 in Section 4.2: '01' = low; '10' = medium and '11' = high. As specified in Section 4.2, all receiving devices that support a higher binary-numbered profile must support all lower numbered profiles. The highest profile that will be used for the virtual channel associated with the component_list_descriptor() carrying this stream_info_details() shall be sent.

level — This is a three-bit unsigned integer field. Values shall be as defined in Table 4.4 in Section 4.2: '001' = tiny; '010' = small; '011' = intermediate; '100' = big; '101' = large; '110' = huge. As specified in Section 4.2, all receiving devices that support a higher binary-numbered level must also support a lower numbered level. The highest level that will be used for the virtual channel associated with the component_list_descriptor() carrying this stream_info_details() shall be sent.

End of Example

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