

## **Candidate Standard**

# **Amendment No. 1 to ATSC Standard: Program and System Information Protocol for Terrestrial Broadcast and Cable (Doc. A/65B)**

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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.

#### **About the Candidate Standard**

This specification is being put forth as a Candidate Standard by the T3/S8 Specialist Group on Data Multiplex and Transport. ATSC members and non-members are encouraged to review and implement this specification and return comments to [cs\\_amend1\\_editor@atsc.org](mailto:cs_amend1_editor@atsc.org). ATSC Members can also send comments directly to the T3/S8 Specialist Group. The ATSC believes this specification is stable. It is expected to progress to Proposed Standard after a period of time ending 10 February 2005.

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## Candidate Standard: Amendment No. 1 to ATSC A/65B

This document contains proposed changes to A/65B to add PSIP support for delivery of data per Amendment 1 to A/53C, Annex D (Enhanced VSB). Change instructions are given in *italics*. New text is shown in blue underline. Deleted text is shown in ~~red strikethrough~~.

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### 1. Section 3.2, Add New Acronyms

*Add the following acronyms into Section 3.2:*

EIT-E Event Information Table in the TS-E

ETT-E Event Text Table in the TS-E

MGT-E Master Guide Table in the TS-E

PSIP-E Program and System Information in the TS-E

STT-E System Time Table in the TS-E

TVCT-E Terrestrial Virtual Channel Table in the TS-E

TS-E The collection of packets delivered by enhanced VSB

TS-Ea The collection of packets delivered using one-half rate coding per Amendment 1 to A/53C (Annex D)

TS-Eb The collection of packets delivered using one-quarter rate coding per Amendment 1 to A/53C (Annex D)

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### 2. Revise Text in Section 4.3 to Allow Certain Use of a New PID to Identify Certain Packets

*Revise text in Section 4.3 to read (note new footnote):*

Certain fields in this Standard are defined to include “user private” ranges:

- table\_ID values in the range 0x40 through 0xBF
- MGT table\_type values in the range 0x0400 through 0x0FFF

Table sections with table\_ID values in the user private range (0x40 through 0xBF) shall not appear in transport packets identified with the base\_PID PID value (0x1FFB), the base PID-E PID value (0x1FF9)<sup>1</sup>, or the STT PID E value (0x1FF8). The MGT and the MGT-E may refer to private table sections with any value of table\_ID including values in the user private range. Refer to Section 6.2 for a discussion of the use of the MPEG-2 Registration Descriptor in the MGT. Refer to Section 6.11.1 for discussion and constraints that apply to the MGT-E.

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### 3. Add Requirements for E-VSB Support:

*1. Add the following paragraph below Requirement 4 in Section 5.1 (note new footnote):*

**Requirement 4E:** When there is a service of service type 0x02, service type 0x03, or service type 0x06 in the digital Transport Stream delivered via E-VSB (per Amendment No. 1 to A/53C,

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<sup>1</sup> Other restrictions on use of PID values exist in [1] (A/53).

[Annex D](#)) the transmission shall include the STT-E, TVCT-E, the MGT-E, and should include the first Event Information Table (EIT-0-E)<sup>2</sup>.

2. Add the following paragraph below Requirement 5 in Section 5:

**Requirement 5E:** [The PSIP-E tables shall describe all services of service type 0x02, service type 0x03, or service type 0x06 delivered via E-VSB \(per Amendment No. 1 to A/53C, Annex D\).](#)

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#### 4. Section 2, Update References

Update the reference to A/53 and add certain sections to the normatively referenced sections (the expected revised version of A/53) to make normative TS, TS-E, and the reference receiver model section.

[1] ATSC Standard A/53C [as modified by Amendments No. 1, 2 and 3 \(2004\)](#), “ATSC Digital Television Standard, Revision C”; Annex C, [Section 3, Section 5.7.5, Section 6.8.5, and Section 8 \(normative\)](#).

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#### 5. Edit Semantics for minor\_channel\_number in Section 6.3.1

Edit as shown below:

**minor\_channel\_number** — A 10-bit number in the range 0 to 999 that represents the “minor” or “sub-“ channel number. This field, together with major\_channel\_number, performs as a two-part channel number, where minor\_channel\_number represents the second or right-hand part of the number. When the service\_type is analog television, minor\_channel\_number shall be set to 0. Services whose service\_type is either ATSC\_digital\_television, ATSC\_audio\_only, [or unassociated/small screen service](#) shall use minor numbers between 1 and 99. For other types of services, such as data broadcasting, valid minor virtual channel numbers are between 1 and 999.

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#### 6. Define service\_type value for Unassociated/Small Screen Service

1) Add footnote to first column (service\_type field) of Table 6.7:

“Other values may be defined in other ATSC standards; refer to the ATSC Code Point Registry.”

2) Define service\_type value 0x06 and add to Table 6.7 the following row:

[unassociated/small screen service](#) – [The virtual channel in the TVCT-E carries digital television program \(audio, video and optional associated data\) targeting receiving devices with smaller displays, as defined in Section 6.11.3.](#)

3) Delete the last row of Table 6.7, “0x05-0x3F [Reserved for future ATSC Use].”

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#### 7. Add New Section 6.11

Add new Section 6.11 and its sub sections as shown below:

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<sup>2</sup> Exception: information about test signals may or may not be included in EIT-E/ETT-E data.

## **6.11 Enhanced Service PSIP Signaling and Announcement (PSIP-E)**

This section describes the features of PSIP that shall be used when the optional E-VSB delivery means are used.

When there are services of service type 0x02 or of service type 0x03 in TS-E (per Annex C of [1]) the TS-E shall include the table sections that make up STT-E, TVCT-E, the MGT-E, and should include the first Event Information Table (EIT-0-E). When EIT-Es are sent they should contain valid information about the events.

Table sections of PSIP-E shall be carried in TS-E packets. Table sections that make up PSIP-E packets shall be present in TS-Eb<sup>3</sup> for all services in TS-Eb.

When a service element is in TS-Eb, all PSIP-E table sections that reference that element shall be in TS-Eb. Furthermore, the MGT-E and the TVCT-E shall be in TS-Eb if any service element is in TS-Eb.

Unless otherwise specified herein, placement and contents of each descriptor in PSIP-E table sections shall conform to usage defined for that descriptor in PSIP table sections. See Section 6.9.

### **6.11.1 Enhanced Service MGT (MGT-E)**

The MGT-E shall use the MGT table ID and shall meet all the mandatory specifications that apply to the MGT, except as explicitly stated in this section.

When services of service type 0x02 or service type 0x03 are sent using the TS-E (defined in Annex C of [1]), an Enhanced Master Guide Table (MGT-E) shall be present. The PID for the table sections that make up the MGT-E shall have the value 0x1FF9 (base PID E). The MGT-E shall only refer to tables that are in TS-E (per [1]).

### **6.11.2 System Time Table for Enhanced Modes (STT-E)**

The STT-E shall meet all the mandatory specifications of the STT (Section 6.1), except as explicitly stated in this section.

The PID for STT-E shall have the value 0x1FF8 (STT PID E).

The system time semantics when this field is in an STT-E are:

**system time** — This field shall have the same value and accuracy as system time in the STT except it is timed at the arrival at the output of the Reference Receiver of the Transport Stream-E packet carrying the last byte of the CRC (note the Reference Receiver has zero processing time). The STT-E system time should be set to the next second and sent approximately 2T milliseconds before the seconds count is due to increment, where T represents the average number of milliseconds between TS-E packets identified with STT PID E (0x1FF8). If one or more translators and/or repeaters are in the RF delivery path that introduce processing delays that impact the overall STT-E timing accuracy, the STT-E timing should be adjusted in the translated/repeated signal.

When sent, the STT-E shall be sent with this field set in precise synchronization to the value of the system time in the STT, but the STT-E may be sent as seldom as once a minute. Note that if the interval is increased, accuracy of random access to events may be decreased.

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<sup>3</sup> The most robust mode.

### **6.11.3 Virtual Channel Table for Enhanced Modes (TVCT-E)**

The TVCT-E shall meet all the mandatory specifications that apply to the TVCT, except as explicitly stated in this section.

When present, the TVCT-E shall be transmitted at a rate of no less than once per minute. The TVCT-E shall include virtual channels in which some or all program elements are transmitted in TS-Ea or TS-Eb packets, and only those (it shall not include virtual channels composed only of program elements transmitted using the main 8-VSB mode).

The Service Location Descriptor in TVCT-E in the TS-Ea shall list only program elements delivered in the TS-Ea.

The Service Location Descriptor in TVCT-E in the TS-Eb shall list only program elements delivered in the TS-Ea or TS-Eb.

The service type field value 0x06 shall be used in the TVCT-E if and only if the programming identified by the PSIP-E table sections is different from the programming identified by the PSIP table sections.

For virtual channels that are based on the same video and/or audio content as that carried in TS-M, or that identify components that are also Linked components per [1], Section 5.7.5, the contents of the fields shall have the following constraints:

major channel number — The value shall be the same as the corresponding 10-bit number in the TVCT.

minor channel number — The value shall be the same as the corresponding 10-bit number in the TVCT.

carrier frequency — These 32 bits shall be set to zero.

program number — The value shall be the same as the corresponding 16-bit number in the TVCT.

source id — The value shall be the same as the corresponding 16-bit number in the TVCT.

### **6.11.4 Event Information Table for Enhanced Modes (EIT-E)**

The first Event Information Table (EIT-0-E) should be transmitted. All instances of EIT-E should contain content describing the programming.

For events associated with a virtual channel that has a service type 0x02 or 0x03, when sent, EIT-E table sections shall have the same contents as the corresponding EIT table sections.

For events associated with a virtual channel that has a service type 0x06, EIT-E table sections may exist.

### **6.11.5 Event Text Table for Enhanced Modes (ETT-E)**

ETT-Es may be present in the TS-E. The text in an ETT-E may be an abbreviated version of corresponding text for a Program described in an ETT.

### **6.11.6 Directed Channel Change for Enhanced Modes**

This standard does not define how to use directed channel change in or with the TS-E.

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## **8. Section 7.1, New Timings for PSIP-E Tables**

*1. Add the following text and new Table 7.3 after Table 7.2 as shown below:*

[Table 7.3 lists the maximum cycle time for those PSIP-E tables that have such.](#)

**[Table 7.3 Maximum Cycle Time for the STT-E, MGT-E, VCT-E, and RRT-E](#)**

<a href="#">Table</a>	<a href="#">STT-E</a>	<a href="#">MGT-E</a>	<a href="#">TVCT-E</a>	<a href="#">EIT-0-E</a>	<a href="#">RRT-E</a>
<a href="#">Cycle time (ms)</a>	<a href="#">60.000</a>	<a href="#">10.000</a>	<a href="#">30.000</a>	<a href="#">60.000</a>	<a href="#">43.200.000</a>

2. Add the following text and new Table 7.3 after Table 7.2 as shown below:

[Table 7.4 lists the maximum transmission rate for PSIP-E packet streams according to their PIDs.](#)

**[Table 7.4 Maximum Rate for Each PSIP Packet Stream](#)**

<a href="#">PID</a>	<a href="#">base PID E</a>	<a href="#">EIT-E PID</a>	<a href="#">ETT-E PID</a>
<a href="#">Rate (bps)</a>	<a href="#">250.000</a>	<a href="#">250.000</a>	<a href="#">250.000</a>

3. Revise the current paragraph below Table 7.2 in Section 7.1 to be after Table 7.4 and to read:

For terrestrial broadcast applications the following constraints apply:

- In terrestrial broadcast applications, the PSIP elementary streams identified by Transport Stream packets with PID 0x1FFB (base\_PID), [PID 0x1FF9 \(base PID E\)](#), EIT PIDs, [EIT-E PIDs](#), ~~and~~ ETT PIDs, [and ETT-E PIDs](#) shall adhere to an STD model with the following parameters:
- sb\_leak\_rate shall be 625 (indicating a leak rate of 250,000 bps)
- sb\_size shall be 1024 (indicating a smoothing buffer size of 1024 bytes)

– End of Document –