

**AMENDMENT No. 1**  
**To ATSC STANDARD:**  
**PROGRAM AND SYSTEM INFORMATION PROTOCOL**  
**FOR TERRESTRIAL BROADCAST AND CABLE**  
**Doc. A/65 (23 DEC 97)**

**(AMENDMENT)**

## Introduction

This Technical Amendment contains changes to A/65, as modified by A/66, which provide a mechanism for correctly dealing with currently inactive channels.

## Statement of Problem

Programming services may not be broadcast on a continuous basis. For example, due to lack of bandwidth, a standard-definition channel may go off the air when another channel on the multiplex is broadcasting in HD format. A program schedule for that channel would show “off air” for a portion of the broadcast day.

The current PSIP design offers programmers at least two ways to manage such changes to the channel map. They can choose to keep a channel in the channel map by providing a low-bandwidth replacement service, such as a static “off-air” banner display, perhaps accompanied by music. Alternatively, they can delete the channel from the VCT when it is off-air.

The first approach may be objectionable due to its usage of bandwidth. With the second approach, viewers browsing the electronic program guide may not be able to see the channels that are not currently broadcast, and may not be able to look at scheduled programming for them.

Technical Corrigendum No. 1 to A/65 addresses this problem by adding to section D3.2 of A/65 the paragraph:

“It is recommended that the broadcaster insert into the VCT any major-minor channel that would be used to carry any program announced in the EIT. This means if no current program was using 7-7, and if a program 16 days from now was going to use 7-7, that 7-7 would be in the VCT. This would enable receivers to include the channel number in a program guide presented to the consumer. If a program is announced in the EIT and the source ID for that program is not found in the VCT, the receiver cannot determine which ‘channel’ to display for that program.”

However, the Corrigendum does not recommend any means for distinguishing such currently inactive channels in the VCT from the currently active ones. Thus, receivers will not be able to recognize inactive channels, and may attempt to tune to them.

This Technical Amendment provides a means for distinguishing whether a channel in the VCT is currently active or inactive. It also specifies how the program number, Service Location Descriptor, and other channel parameters should be handled for inactive channels.

## Benefits of Proposed Solution

The PSIP extension proposed here has the following benefits:

1. A method is defined to identify channels that are *inactive* (not currently on the air).
2. Inactive channels may appear in the program guide.
3. Inactive channels may be skipped when channel surfing or when accessed by direct channel entry.
4. The definition of an inactive channel in the VCT may include descriptors, as appropriate, just as active channels do. As an example, the `extended_channel_name_descriptor()` could be used with an inactive channel.

5. Inactive channels use no bandwidth in the Transport Stream except for the bits they use to describe themselves in the channel map and program guide.
6. The proposal is believed to be backwards compatible with existing PSIP implementations.

Two provisions are contained in this Amendment:

1. Define a “**hide\_guide**” bit in the channel loop of the VCT, which can be used in conjunction with the “hidden” bit to identify channels which are not currently being broadcast.
2. Recommend how to handle the fields and descriptors in the channel loop of the VCT for channels which are not currently being broadcast.

## 1) SECTION 6.3

### Modify Table 6.4 Bit Stream Syntax for the Terrestrial Virtual Channel Table

Change the 27th line in Table 6.4 from:

**reserved 6 '111111'**

To:

**reserved 2 '11'**

In Table 6.4, add a new line "**hide\_guide 1 bslbf**" immediately below the 27th line, and add another new line "**reserved 3 111**" immediately below this one.

### Modify Table 6.4 Bit Stream Syntax for the Cable Virtual Channel Table

Change the 29th line in Table 6.8 from:

**reserved 4 '1111'**

To:

**reserved 3 '111'**

In Table 6.8 add a new line "**hide\_guide 1 bslbf**" immediately above the 29th line.

The revised Table 6.4 is shown below.

**Table 6.4 Bit Stream Syntax for the Terrestrial Virtual Channel Table**

Syntax	Bits	Format
terrestrial_virtual_channel_table_section () {		
<b>table_id</b>	8	0xC8
<b>section_syntax_indicator</b>	1	'1'
<b>private_indicator</b>	1	'1'
<b>reserved</b>	2	'11'
<b>section_length</b>	12	uimsbf
<b>transport_stream_id</b>	16	uimsbf
<b>reserved</b>	2	'11'
<b>version_number</b>	5	uimsbf
<b>current_next_indicator</b>	1	bslbf
<b>section_number</b>	8	uimsbf
<b>last_section_number</b>	8	uimsbf
<b>protocol_version</b>	8	uimsbf
<b>num_channels_in_section</b>	8	uimsbf
for(i=0; i<num_channels_in_section;i++) {		
<b>short_name</b>	7*16	unicode™BMP
<b>reserved</b>	4	'1111'
<b>major_channel_number</b>	10	uimsbf
<b>minor_channel_number</b>	10	uimsbf
<b>modulation_mode</b>	8	uimsbf
<b>carrier_frequency</b>	32	uimsbf
<b>channel_TSID</b>	16	uimsbf
<b>program_number</b>	16	uimsbf
<b>ETM_location</b>	2	uimsbf
<b>access_controlled</b>	1	bslbf
<b>hidden</b>	1	bslbf
<b>reserved</b>	2	'11'
<b>hide_guide</b>	1	bslbf
<b>reserved</b>	3	'111'
<b>service_type</b>	6	uimsbf
<b>source_id</b>	16	uimsbf
<b>reserved</b>	6	'111111'
<b>descriptors_length</b>	10	uimsbf
for (i=0;i<N;i++) {		
<b>descriptors()</b>		
}		
}		
<b>reserved</b>	6	'111111'
<b>additional_descriptors_length</b>	10	uimsbf
for(j=0; j<N;j++) {		
<b>additional_descriptors()</b>		
}		
<b>CRC_32</b>	32	rpchof
}		

The revised Table 6.8 is shown below.

**Table 6.8 Bit Stream Syntax for the Cable Virtual Channel Table**

Syntax	Bits	Format
<code>cable_virtual_channel_table_section () {</code>		
<b>table_id</b>	8	0xC9
<b>section_syntax_indicator</b>	1	'1'
<b>private_indicator</b>	1	'1'
<b>reserved</b>	2	'11'
<b>section_length</b>	12	uimsbf
<b>transport_stream_id</b>	16	uimsbf
<b>reserved</b>	2	'11'
<b>version_number</b>	5	uimsbf
<b>current_next_indicator</b>	1	bslbf
<b>section_number</b>	8	uimsbf
<b>last_section_number</b>	8	uimsbf
<b>protocol_version</b>	8	uimsbf
<b>num_channels_in_section</b>	8	uimsbf
for(i=0; i<num_channels_in_section;i++) {		
<b>short_name</b>	7*16	unicode™BMP
<b>reserved</b>	4	'1111'
<b>major_channel_number</b>	10	uimsbf
<b>minor_channel_number</b>	10	uimsbf
<b>modulation mode</b>	8	uimsbf
<b>carrier_frequency</b>	32	uimsbf
<b>channel_TSID</b>	16	uimsbf
<b>program_number</b>	16	uimsbf
<b>ETM_location</b>	2	uimsbf
<b>access_controlled</b>	1	bslbf
<b>hidden</b>	1	bslbf
<b>path_select</b>	1	bslbf
<b>out_of_band</b>	1	bslbf
<b>hide_guide</b>	1	bslbf
<b>reserved</b>	3	'111'
<b>service_type</b>	6	uimsbf
<b>source_id</b>	16	uimsbf
<b>reserved</b>	6	'111111'
<b>descriptors_length</b>	10	uimsbf
for (i=0;i<N;i++) {		
<b>descriptors()</b>		
}		
}		
<b>reserved</b>	6	'111111'
<b>additional_descriptors_length</b>	10	uimsbf
for(j=0; j<N;j++) {		
<b>additional_descriptors()</b>		
}		
<b>CRC_32</b>	32	rpchof
}		

## 2) SECTION 6.3.1 and SECTION 6.3.2:

Modify the following attribute descriptions for Table 6.4 and Table 6.8:

Add the following sentence at the end of the paragraph describing the “**hidden**” field:

Whether a hidden channel and its events may appear in EPG displays depends on the state of the `hide_guide` bit.

Add the following paragraphs immediately before the description of the “**service\_type**” field.

**hide\_guide** – A Boolean flag that indicates, when set to 0 for a hidden channel, that the virtual channel and its events may appear in EPG displays. This bit shall be ignored for channels which do not have the `hidden` bit set, so that non-hidden channels and their events may always be included in EPG displays regardless of the state of the `hide_guide` bit. Typical applications for hidden channels with the `hide_guide` bit set to 1 are test signals and services accessible through application-level pointers.

An *inactive channel* is defined as a channel that has program guide data available, but the channel is not currently on the air. Inactive channels are represented as hidden channels with the `hide_guide` bit set to 0. The Transport Stream shall not carry a Program Map Table representing an inactive channel.

Add the following sentence at the end of the paragraph describing the “**modulation\_mode**” field:

The `modulation_mode` field shall be disregarded for inactive channels.

Add the following sentence at the end of the paragraph describing the “**carrier\_frequency**” field:

The `carrier_frequency` field shall be disregarded for inactive channels.

Modify the paragraph describing the “**channel\_TSID**” field as follows:

**channel\_TSID** — A 16-bit unsigned integer field in the range 0x0000 to 0xFFFF that represents the MPEG-2 Transport Stream ID associated with the Transport Stream carrying the MPEG-2 program referenced by this virtual channel. For inactive channels, channel\_TSID represents the ID of the Transport Stream that will carry the service when it becomes active. The receiver may use the `channel_TSID` to verify that a Transport Stream acquired at the referenced carrier frequency is actually the desired multiplex. Analog signals may have a TSID provided that it is different from any DTV Transport Stream identifier; that is, it shall be truly unique if present. A value of 0xFFFF for `channel_TSID` shall be specified for analog channels that do not have a valid TSID.

Add the following sentence at the end of the paragraph describing the “**program\_number**” field:

For inactive channels (those not currently present in the Transport Stream), **program\_number** shall be set to zero. This number shall **not** be interpreted as pointing to a Program Map Table entry.

Add the following new paragraph at the end of section 6.3.1:

For inactive channels, the **short\_name**, **major\_channel\_number**, and **minor\_channel\_number** fields reflect the name and channel number of the inactive channel, and may be used in construction of the program guide. The **source\_ID** for inactive channels is used, as it is for active channels, to link the virtual channel to the program guide data. The **ETM\_location** indicates, as it does for active channels, the location of text related to the virtual channel. The **service\_type** field and attribute flags including **access\_controlled** and **out\_of\_band** reflect the characteristics of the channel that will be valid when it is active.

### 3) Section 6.7.6

Modify section 6.7.6 as indicated below:

#### 6.7.6 Service Location Descriptor

This descriptor specifies the stream types, PID and language code for each elementary stream. An instance of this descriptor shall appear in the TVCT for each **active** channel. A **service\_location\_descriptor()** shall not be present for any inactive channel. When present, the **service\_location\_descriptor()** must be valid for the current event in the corresponding virtual channel.

### 4) New section 6.7.10

Add the following new subsection:

#### 6.7.10 Descriptors for Inactive Channels

The **service\_location\_descriptor()** shall not be present for inactive channels. Any other descriptors, if present, shall provide valid information about the inactive channel. The **extended\_channel\_name\_descriptor()**, for example, can be used to provide the long-form channel name of the inactive channel.

### 5) Section D3.2

Add the following two paragraphs and the following table to the end of section D3.2, after the paragraph added there by Technical Corrigendum No. 1:

Any channels in the VCT which are not currently active shall have the hidden attribute set to 1 and the **hide\_guide** attribute set to 0.

The following table shows DTV behavior for the various combinations of the hidden and hide\_guide attributes. In the table the “x” entry indicates “don’t care.” A check in the “surf” column indicates the channel is available by channel surfing and via direct channel number entry. A check in the “guide” column indicates that the channel may appear in the program guide listing.

**Table D.4 Receiver Behavior with Hidden and Hide Guide Attributes**

hidden	hide_guide	Receiver Behavior		Description
		Surf	Guide	
0	x	✓	✓	Normal channel
1	1			Special access only
1	0		✓	Inactive channel