



Enhancements to the AV/C Tuner Broadcast System Specification – Digital Video Broadcast (DVB), Version 1.0

Version 1.0

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Abstract: This specification defines Enhancements to the AV/C Tuner Broadcast System Specification – Digital Video Broadcast (DVB), Version 1.0. The AV/C Tuner Broadcast System Specification (DVB) defines the detailed specifications for Digital Video Broadcast (DVB) data structures which are used by an AV/C tuner subunit which supports DVB.

Keywords: Audio, Video, 1394, Digital, Interface, Tuner, DVB

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1. Preface

This document describes enhancements to the AV/C Tuner Broadcast System Specification – Digital Video Broadcast (DVB), Version 1.0 [3].

1.1 Purpose and Scope

This document describes enhancements to the specification in these areas.

DVB Multiplex Descriptor

The AV/C Tuner Broadcast System Specification for DVB Version 1.0 as it stands accommodates the satellite and cable delivery systems, but not terrestrial. It is necessary to provide for terrestrial delivery systems.

DVB Service Descriptor

In the DVB system, several different types of service can be transmitted and documented in the Service Information (SI). Each service is designated a service_type code. Examples are digital TV, digital audio, data service, etc. In the current AV/C specification for DVB there is no reflection of these service types. This leads to a severe deficit in information for a controller accessing the DVB tuner device.

DVB Component Descriptor

It is possible to select components by PID with the Direct Select Information Type Command. There are two methods to obtain the value of PID. The one is to decode SIT in the partial TS to obtain the stream that contains the value of PID. The other is to obtain object list down to the component level to open the decoded information in a tuner.

In order to select components without using these two methods, selection using component tag is considered.

The component tag is defined in DVB-SI to label component streams of a service so that they can be differentiated.

This 8bit field can be assigned beforehand such as Audio[0]=00(hex), Audio[1]=01(hex).

A service provider may assign in its way.

Therefore, modification to the DVB Component Descriptor is needed in order to select components not only by PID but component tag as well. This

modification provides easy component selection without using the preceding two methods.

DVB Tuner Subunit Identifier Descriptor

It is required to know the version of DVB specification.

Profiles

Due to the size and versatility of the AV/C CTS Tuner model, profiles are defined in order to characterize various types of tuner device, which vary in their capacity to implement the AV/C Tuner Model.

Each profile defines a subset of the AV/C tuner model descriptors and commands; each profile specified is intended to represent a useful and feasible AV/C tuner implementation.

The profiles appear in order of complexity of implementation, starting with the most limited profile. This paper initially proposes two such tuner profiles for the AV/C Tuner Model and Command Set Broadcast System Specification for DVB.

1.2 Overview

DVB Multiplex Descriptor

New description for the terrestrial is defined in the Multiplex Descriptor in Section 4.3 in AV/C Tuner DVB Specification version 1.0 to address terrestrial delivery systems, in addition to satellite and cable. (The descriptor for satellite and cable has not changed.)

DVB Service Descriptor

The Service_type field is added to the Service Descriptor in Section 4.4 in AV/C Tuner DVB Specification version 1.0. Modified Descriptor is backwardly compatible with the existing definition.

DVB Component Descriptor

Modification of the Component Descriptor in Section 4.5 in AV/C Tuner DVB Specification version 1.0 enables the selection of components for the purpose described above.

These fields are modified:

PID, *PID valid flag*, *component_tag*, and *component_tag valid flag*, which are in the DSIT command, the tuner status descriptor, and the Component Object descriptor.

Modified descriptor is backwardly compatible with the existing definition and is able to select components by either PID or component_tag.

DVB Tuner Subunit Identifier Descriptor

There is no system specific information defined for the DVB tuner subunit identifier descriptor in Section 4.9 of AV/C Tuner Broadcast Specification for DVB version 1.0. The DVB specification version is newly defined in the system_specific_information.

If the system_specific_information field does not exist (system_specific_information_length=0), the implementation conforms to Version 1.0, which is backward compatible.

Profiles

Section 5 is added for profiles in AV/C Tuner DVB Specification version 1.0.

Two profiles are defined as follows.

The profile_id in Tuner Subunit Identifier Descriptor for each profile are assigned as follows.

1) The Simplest Tuner Without Lists and Selection by DSIT

profile_id = 10₁₆

The tuner must maintain the tuner subunit identifier descriptor, and the tuner status descriptor.

Direct Select Information Type command is required to control the tuner.

2) Tuner Supporting Service Lists and Selection by DSIT and ONS

profile_id = 30₁₆

The tuner must maintain the tuner subunit identifier descriptor, the tuner status descriptor, the multiplex object list, and Service list.

Direct Select Information Type command and Object Number Select command are required to control the tuner.

1.3 Abbreviations

DVB: Digital Video Broadcast
PID: Packet IDentifier
SIT: Selection Information Table
TS: Transport Stream

DSIT: Direct Select Information Type
ONS: Object Number Select

2. References

2.1 Contact Information

The documents referenced herein may be obtained from the following organizations:

2.1.1 1394 Trade Association (1394 TA)

The 1394 Trade Association can be contacted via the references provided on the cover page of this and all AV/C specification documents.

2.1.2 European Telecommunications Standards Institute (ETSI)

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2.2 1394 Trade Association Specifications

- [1] AV/C Digital Interface Command Set General Specification, Version 3.0
- [2] AV/C Tuner Model and Command Set, Version 1.0
- [3] AV/C Tuner Broadcast System Specification –Digital Video Broadcast (DVB), Version 1.0

2.3 Related Technical Specifications

- [4] Digital Video Broadcasting (DVB); Specification for Service Information (SI) in DVB Systems
ETSI
EN 300 468 V1.3.1 (1998-02)

3. Change History

There are no change notes for version 1.0 of the document.

4. DVB Multiplex Descriptor

4.1 Satellite Delivery System and Cable Delivery System

If the transport field in the antenna specification in the tuner subunit identifier descriptor is set to satellite (value 001₂) or cable (value 010₂), please refer to multiplex descriptor in section 4.3 in AV/C Tuner DVB Specification version 1.0 [3].

4.2 Terrestrial Delivery System

If the transport field in the antenna specification in the tuner subunit identifier descriptor is set to terrestrial (value 011₂), the following syntax shall be implemented in the multiplex descriptor.
All of the multiplex attribute fields are in exactly the same format as in the terrestrial_delivery_system_descriptor of EN 300468 [4].

The mandatory attributes are in **BOLD**:

Object entry Address offset	msb								lsb
System_specific_multiplex_attributes_valid_flags:									
02 ₁₆	Reserved fields	Center_Frequency	Bandwidth	Constellation	Hierarchy_info	Code_rate-HP_stream	Code_rate-LP_stream	Guard_interval	
03 ₁₆	Network_id	Transmission_mode	Other_frequency_flag	reserved					
Multiplex_selection_attributes:									
04 ₁₆	currently_available	Selected	reserved						
05 ₁₆	center_frequency								
06 ₁₆									
07 ₁₆									
08 ₁₆									
09 ₁₆	Bandwidth			reserved					
0A ₁₆	Constellation		Hierarchy_info			Code_rate-HP_stream			
0B ₁₆	Code_rate-LP_stream			Guard_interval		Transmission_mode		Other_frequency_flag	
0C ₁₆	network_id								
0D ₁₆									

Figure 4-1 DVB Multiplex Descriptor

The contents in the preceding table is based on Digital Video Broadcasting (DVB); Specification for Service Information (SI) in DVB systems [4].

center_frequency:

The center_frequency is a 32-bit uimsbf field giving the binary coded frequency value in multiples of 10Hz. The coding range is from minimum 10Hz (0x00000001) up to a maximum of 42 949 672 950 Hz (0xFFFFFFFF).

bandwidth:

This is a 3-bit field specifying what is the bandwidth in use.

constellation:

This is a 2-bit field. It specifies the constellation pattern used on a terrestrial delivery system according to the following table.

Table 4-1 constellation

constellation	constellation characteristics
00	QPSK
01	16-QAM
10	64-QAM
11	reserved for future use

hierarchy_information:

The hierarchy_information specifies whether the transmission is hierarchical and, if so, what the alfa value is.

Table 4-2 hierarchy_information

hierarchy_informat ion	alfa value
000	non-hierarchical
001	alfa=1
010	alfa=2
011	alfa=4
100 to 111	reserved for future use

code_rate:

The `code_rate` is a 3-bit field specifying the inner FEC scheme used according to the following table. Non-hierarchical channel coding and modulation requires signalling of one code rate. In this case, 3 bits specifying `code_rate` according to the following table are followed by another 3 bits of value '000'. Two different code rates may be applied to two different levels of modulation with the aim of achieving hierarchy. Transmission then starts with the code rate for the HP level of the modulation and ends with the one for the LP level.

Table 4-3 `code_rate`

<code>code_rate</code>	description
000	1/2
001	2/3
010	3/4
011	5/6
100	7/8
101 to 111	reserved for future use

guard_interval:

The `guard_interval` is a 2-bit field specifying:

Table 4-4 `guard_interval`

<code>guard_interval</code>	<code>guard_interval_values</code>
00	1/32
01	1/16
10	1/8
11	1/4

transmission_mode:

This 2-bit field indicates the number of carriers in an OFDM frame.

Table 4-5 `transmission_mode`

<code>transmission_mode</code>	<code>guard_interval_values</code>
00	2k mode
01	8k mode
10 to 11	reserved for future use

other_frequency_flag:

This 1-bit flag indicates whether other frequencies are in use:

0: no other frequency in use.

1: one or more other frequencies in use.

4.3 Note

This note is added to the end of the section 4.3 of AV/C Tuner Broadcast System Specification – Digital Video Broadcast [3].

In section 5.1 of AV/C Tuner Model and Command Set, Version 1.0 [2], it is mentioned that “When the system_specific_multiplex_attributes_valid_flags are all zero, then the currently selected multiplex shall be used to get the specified data.”

However, even if the system_specific_multiplex_attributes_valid_flags are all zero, the multiplex may be changed if the preferred_selection_flags are used with the multiplex_preferred_selection_flags all set to zero.

5. DVB Service Descriptor

The service_type field and the service_type valid flag are added to the DVB service descriptor, in section 4.4 of the AV/C Tuner Broadcast Specification for DVB version 1.0 [3].

Address Offset	msb							lsb
----------------	-----	--	--	--	--	--	--	-----

system_specific_service_attributes_valid_flags

01 ₁₆	reserved_fields	CA_output	org_network	transport_id	service_id	bouquet_id	service_type	reserved
------------------	-----------------	-----------	-------------	--------------	------------	------------	--------------	----------

system_specific_service_information_attributes

0C ₁₆	service_name_length
0D ₁₆	service_name
:	
:	
:	bouquet_name_length
:	bouquet_name
:	
:	
:	service_type

Figure 5-1 DVB Service Descriptor

The contents in the preceding table is based on Digital Video Broadcastion (DVB); Specification for Service Information (SI) in DVB systems [4].

service_type:

This is an 8-bit field specifying the type of the service. It shall be coded according to the table in DVB-SI [4].

6. DVB Component Descriptor and Mandatory Attributes

The component_tag valid flag is added to the DVB service descriptor, in section 4.5 of the AV/C Tuner Broadcast Specification for DVB version 1.0 [3].

6.1 Application to the DSIT command and the Tuner Status Descriptor

The mandatory attributes are in **BOLD**:

address s offset	msb							lsb
system_specific_component_attributes_valid_flags								
01₁₆	reserved fields	PID=1	stream_c ontent	compo nt_type	iso_639_1 ang_code	compo nt_tag	reserved	
system_specific_component_selection_attributes								
02₁₆	currently _availabl e	reserved						
03₁₆	PID							
04₁₆								

Figure 6-1 DVB Component Descriptor -1-

address s offset	msb							lsb
system_specific_component_attributes_valid_flags								
01₁₆	reserved fields	PID=0	stream_c ontent	compo nt_type	iso_639_1 ang_code	compo nt_tag=1	reserved	
system_specific_component_selection_attributes								
02₁₆	currently _availabl e	reserved						
03₁₆	reserved							
04₁₆	component_tag							

Figure 6-2 DVB Component Descriptor -2-

The PID field indicates the PID value for this component. For more details on how PIDs are used, please refer to the DVB-SI specification [4].

The component_tag field indicates the component_tag value for this component.

The meaning of this field is defined in the DVB-SI specification [4].

6.1.1 Application to the DSIT command

In order to select components by PID, the PID valid flag shall be set to 1. The component_tag valid flag shall be ignored while the PID valid flag is set to 1. (See Figure 6-1.)

In order to select components by component_tag, the PID valid flag shall be set to 0 and the component_tag valid flag shall be set to 1. (See Figure 6-2.)

In case that both the PID valid flag and the Component_tag valid flag are set to 0, the field address offset 03-04 is invalid.

6.1.2 Application to the Tuner Status Descriptor

Either PID or component_tag appears in the system_specific_component_selection_attributes.

The contents (PID or component_tag) of the field depends on implementation.

The PID field in the system_specific_component_selection_attributes appears when the PID valid flag is set to 1. The component_tag valid flag shall be ignored while the PID valid flag is set to 1. (See Figure 6-1.)

The component_tag field in the system_specific_component_selection_attributes appears when the PID valid flag is set to 0 and the component_tag valid flag is set to 1. (See Figure 6-2.)

In case that both the PID valid flag and the Component_tag valid flag are set to 0, the field address offset 03-04 is invalid.

6.1.3 Note

It is mentioned that PID is mandatory attributes in Figure 6-1, however tuner subunit which does not support selection by PID is allowed under following conditions.

- 1) Selection by component_tag is supported.
- 2) When receiving the DSIT command with PID, a tuner returns with NOT IMPLEMENTED.
- 3) Tuner Status Descriptor specifies component_tag in selection_attributes.

6.2 Application to the Component Object Descriptor

The mandatory attributes are in **BOLD**:

address offset	msb						lsb
system_specific_component_attributes_valid_flags							
01 ₁₆	reserved_fields	PID	stream_content	component_type	iso_639_language_code	component_tag	reserved
system_specific_component_selection_attributes							
02 ₁₆	currently_available	reserved					
03 ₁₆	PID						
04 ₁₆							
system_specific_component_information_attributes							
05 ₁₆	stream_content				reserved		
06 ₁₆	component_type						
07 ₁₆	iso_639_language_code						
08 ₁₆							
09 ₁₆							
0A ₁₆	component_name_length						
0B ₁₆	component_name						
:							
:							
:	component_tag						

Figure 6-3 DVB Component Descriptor -3-

The PID field indicates the PID value for this component. For more details on how PIDs are used, please refer to the DVB-SI specification [4].

The component_tag field indicates the component_tag value for this component. The meaning of this field is defined in the DVB-SI specification [4].

The PID field in the system_specific_component_selection_attributes is valid when the PID valid flag is set to 1. The Component_tag field in the system_specific_component_information_attributes is valid when the component_tag valid flag is set to 1.

7. DVB Tuner Subunit Identifier Descriptor

The DVB_specification_version field is defined in the system_specific_information in section 4.9, DVB Subunit Identifier Descriptor – System Specific Information of the AV/C Tuner Broadcast Specification for DVB version 1.0 [3].

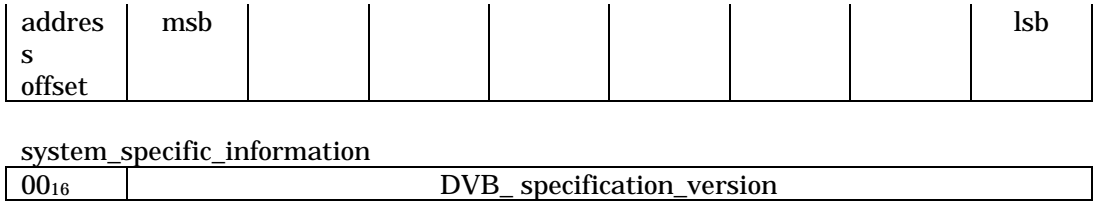


Figure 7-1 DVB Subunit Identifier Descriptor – System Specific Information

The DVB_specification_version field indicates the version number of DVB specification that this tuner subunit conforms to.

This field can have one of the following values:

Table 7-1 DVB_specification_version

DVB_specification_version values	DVB_specification_version meaning
1 ₁₆	Data structures and command sets as specified in the DVB Specification, Version 1.0 and the Enhancements to the DVB Specification, Version 1.0
all others	reserved for future specification

If the system_specific_information field does not exist (system_sepcific_information_length=0), the implementation conforms to Version 1.0.

8. Tuner Profiles

The definition of the service in these profiles is as follows:

If DSIT command called “complete service” is accepted, the service including all possible output of components shall be output when “complete service” can not be output.

In this case, the tuner status descriptor with service with specified component indicates exactly which component is being output.

8.1 Profile1: The Simplest Tuner Without Lists and Selection by DSIT

This profile defines the simplest AV/C tuner without lists.

The profile_id in Tuner Subunit Identifier shall be 10₁₆ when using this profile.

With this profile, the controller is required to have system-specific knowledge of the physical parameters of the tuner. It must have this knowledge from elsewhere, as the tuner does not provide this information.

Selection is performed using the Direct Select Information Type command. Selection of the service is required. Selection of the multiplex and the component is optional.

8.1.1 Descriptors

The tuner must maintain the tuner subunit identifier descriptor, and the tuner status descriptor.

8.1.2 Commands

This section defines the required commands for this profile. Commands are divided into general AV/C commands and tuner subunit commands.

General AV/C commands are described in AV/C Digital Interface Command Set General Specification [1].

Tuner subunit commands are described in AV/C Tuner Model and Command Set [2].

8.1.2.1 General AV/C Commands

The following table shows which of the optional general AV/C commands are required for this profile.

An “M” means that the command is required for this profile, An “O” means that the command is not required for this profile, a “-” means that the command is not applicable according to the AV/C specification.

Table 8-1 Support Level for profile 1 (General AV/C Commands)

Command	Support Level			Comments
	Control	Status	Notify	
OPEN DESCRIPTOR	M	M	O	1
READ DESCRIPTOR	M	-	-	
SEARCH DESCRIPTOR	O	-	-	
WRITE DESCRIPTOR	O	O	-	
OBJECT NUMBER SELECT	O	O	O	

1. Only the subfunctions *open_read* and *close* are required.

8.1.2.2 AV/C Tuner Commands

The following table shows the subset of the tuner subunit AV/C commands required for this profile.

Table 8-2 Support Level for profile 1 (AV/C Tuner Commands)

Command	Support Level			Comments
	Control	Status	Notify	
DIRECT SELECT INFORMATION TYPE	M	-	-	1
DIRECT SELECT DATA	O	-	-	
CA ENABLE	O	O	O	
TUNER STATUS	-	-	O	

1. Only the subfunction *replace* is required.

8.2 Profile2: Tuner Supporting Service Lists and Selection by DSIT and ONS

This profile defines an AV/C tuner that maintains lists at least down to the service level, and supports service selection via the Direct Select Information Type command and the Object Number Select command.

The profile_id in Tuner Subunit Identifier shall be 30₁₆ when using this profile.

The controller is thus not required to have system-specific knowledge of the physical parameters of the tuner.

8.2.1 Descriptors

The tuner must maintain the tuner subunit identifier descriptor and the tuner status descriptor.

The tuner must maintain a multiplex list for each system present, as defined in the tuner subunit identifier descriptor. The multiplex object list has as its children a service list for each multiplex entry. The component list is optional.

8.2.2 Commands

This section defines the required commands for this profile. Commands are divided into general AV/C commands and tuner subunit commands.

General AV/C commands are described in AV/C Digital Interface Command Set General Specification [1].

Tuner subunit commands are described in AV/C Tuner Model and Command Set [2].

8.2.2.1 General AV/C Commands

The following table shows which of the optional general AV/C commands are required for this profile.

An “M” means that the command is required for this profile, An “O” means that the command is not required for this profile, a “-“ means that the command is not applicable according to the AV/C specification.

Table 8-3 Support Level for profile 2 (General AV/C Commands)

Command	Support Level			Comments
	Control	Status	Notify	
OPEN DESCRIPTOR	M	M	O	1
READ DESCRIPTOR	M	-	-	
SEARCH DESCRIPTOR	O	-	-	
WRITE DESCRIPTOR	O	O	-	
OBJECT NUMBER SELECT	M	M	O	2, 3

1. Only the subfunctions *open_read* and *close* are required.
2. The ONS command must use the “Don’t Care” ONS_selection_specification (target_depth = FF₁₆).
3. The list_type field in the path_specifier of the ONS command always refers to a service list.

8.2.2.2 AV/C Tuner Commands

The following table shows the subset of the tuner subunit AV/C commands required for this profile.

Table 8-4 Support Level for profile 2 (AV/C Tuner Commands)

Command	Support Level			Comments
	Control	Status	Notify	
DIRECT SELECT INFORMATION TYPE	M	-	-	1
DIRECT SELECT DATA	O	-	-	
CA ENABLE	O	O	O	
TUNER STATUS	-	-	O	

1. Only the subfunction *replace* is required.