



# TA Document 1999004

## AV/C Tuner Broadcast System Specification - Rec. ITU-R BO. 1294 System B

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**Abstract:**

This specification defines the detailed specifications for Rec. ITU-R BO. 1294 System B data structures which are used by an AV/C tuner subunit that supports Rec. ITU-R BO. 1294 System B. The AV/C tuner defines a model and command set for analog and digital tuners operating over IEEE 1394-1995. The command set makes use of the Function Control Protocol (FCP) defined by IEC 61883, Digital Interface for Consumer Electric Audio/Video Equipment standard, for the transport of audio/video command requests and responses. The audio/video devices are implemented as a common unit architecture within 1394-1995.

**Keywords:**

1394, AV/C, Tuner, Rec. ITU-R BO. 1294 System B.

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## 1. Overview

### 1.1 Purpose

Rec. ITU-R BO. 1294 System B is one of the broadcast systems supported by AV/C Tuner Subunit.

This document defines the AV/C Tuner broadcast system specific information of the Rec. ITU-R BO. 1294 System B, that implements the AV/C Descriptor Mechanism as described in references [R3] and [R4], and the AV/C Tuner Descriptor Mechanism described in reference [R5] and [R6].

### 1.2 Scope

This document defines the AV/C Tuner broadcast system specific information of the Rec. ITU-R BO. 1294 System B. The definitions of general fields of the AV/C Tuner Subunit can be found in references [R3], [R4], [R5], and [R6].

## 2. References

The following standards contain provisions, which through reference in this document, constitute provisions of this standard. All the standards listed are normative references. At the time of publication, the editions indicated were valid. All standards are subject to revision, and parties to agreements based on this standard are encouraged to investigate the possibility of applying the most recent editions of the standards indicated below.

- [R1] IEEE Std 1394-1995, Standard for a High Performance Serial Bus.
- [R2] IEC 61883-1, Consumer audio/video equipment – Digital interface – Part 1: General.
- [R3] AV/C Digital Interface Command Set General Specification, Version 3.0. TA document number 1998003.
- [R4] Enhancement to the AV/C General Specification 3.0, Version 1.0. TA document number 1998010.
- [R5] AV/C Tuner Model and command Set, Version 1.0. TA document number 1998004.
- [R6] AV/C Tuner Model and command Set, Version 2.0. TA document number 1999035.
- [R7] ATSC A/65: Program and System Information Protocol for Terrestrial Broadcast and Cable.
- [R8] Rec. ITU-R BO.1294:1997, Common functional requirements for the reception of digital multiprogramme television emissions by satellite operating in the 11/12 GHz frequency range
- [R9] ISO/IEC 13818-1:1996(E), Information Technology - Generic Coding of Moving Pictures and Associated Audio Information: Systems
- [R10] ISO 639:1988, Code for the representation of names of languages
- [R11] ISO 639-2:1998, Codes for the representation of names of languages – Part2: Alpha-3 code

## 3. Definitions

### 3.1 Conformance Levels

**3.1.1 expected:** A key word used to describe the behavior of the hardware or software in the design models *assumed* by this Specification. Other hardware and software design models may also be implemented.

**3.1.2 may:** A key word that indicates flexibility of choice with *no implied preference*.

**3.1.3 shall:** A key word indicating a mandatory requirement. Designers are *required* to implement all such mandatory requirements.

**3.1.4 should:** A key word indicating flexibility of choice with a strongly preferred alternative. Equivalent to the phrase *is recommended*.

**3.1.5 reserved fields:** A set of bits within a data structure that are defined in this specification as reserved, and are not otherwise used. Implementations of this specification shall zero these fields. Future revisions of this specification, however, may define their usage.

**3.1.6 reserved values:** A set of values for a field that are defined in this specification as reserved, and are not otherwise used. Implementations of this specification shall not generate these values for the field. Future revisions of this specification, however, may define their usage.

NOTE —The IEEE is investigating whether the “may, shall, should” and possibly “expected” terms will be formally defined by IEEE. If and when this occurs, draft editors should obtain their conformance definitions from the latest IEEE style document.

### 3.2 Glossary of Terms

**3.2.1 byte:** Eight bits of data, used as a synonym for octet.

**3.2.2 CSR Architecture:** A convenient abbreviation of the following reference (see clause 2): ISO/IEC 13213 : 1994 [ANSI/IEEE Std 1212, 1994 Edition], Information Technology—Microprocessor systems—Control and Status Register (CSR) Architecture for Microcomputer Buses.

**3.2.3 quadlet:** Four bytes of data.

### 3.3 Acronyms and Abbreviations

AV/C Audio Video Control

SID Subunit Identifier Descriptor



## 4. Rec. ITU-R BO. 1294 System B Broadcast System Specific Fields

### 4.1 Rec. ITU-R BO. 1294 System B Text Field Encoding

Rec. ITU-R BO. 1294 System B uses ISO 8859-1 character code in its text fields, with English as the base. Regional variations allow the manufacturers to set the default to other languages, such as French, German, or Spanish, etc.

### 4.2 Rec. ITU-R BO. 1294 System B *system\_id*

The *system\_id* field for a Rec. ITU-R BO. 1294 System B tuner subunit shall be set to 23<sub>16</sub>.

### 4.3 Rec. ITU-R BO. 1294 System B *implementation\_profile\_id* Assignments

The *implementation\_profile\_id* assignments are described in details in Section 5.

### 4.4 Rec. ITU-R BO. 1294 System B SID:*selection\_attribute\_range\_specification*

Currently, there is no *selection\_attribute\_range\_specification* defined for the Rec. ITU-R BO. 1294 System B tuner subunit identifier descriptor.

### 4.5 Rec. ITU-R BO. 1294 System B SID:*system\_specific\_information*

The *system\_specific\_information* field of the Rec. ITU-R BO. 1294 System B Tuner Subunit Identifier Descriptor is specified in the following figure:

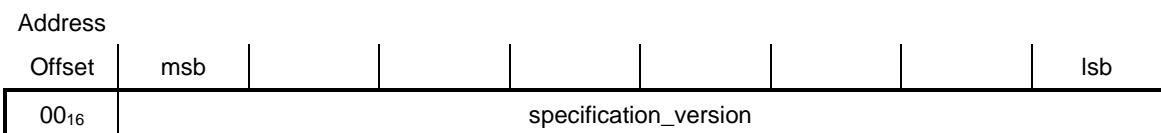


Figure 4.1 – Rec. ITU-R BO. 1294 System B *system\_specific\_information* field

The *specification\_version* currently has the following values defined:

Table 4.1 – *specification\_version* values

value	meaning
10 <sub>16</sub>	Implementation conforms to the AV/C Tuner Broadcast System - Rec. ITU-R BO. 1294 System B, version 1.0 specification
all others	reserved for future specifications

If the *specification\_version* field does not exist (indicated by *system\_specific\_information\_length* = 0), the controller shall assume the implementation conforms to version 1.0.

#### 4.6 Rec. ITU-R BO. 1294 System B Tuner Status Descriptor - *antenna\_general\_system\_info*

Currently, there is no *antenna\_general\_system\_info* defined for the Rec. ITU-R BO. 1294 System B tuner subunit identifier descriptor.

#### 4.7 Rec. ITU-R BO. 1294 System B Tuner Status Descriptor - *demux\_general\_system\_info*

Currently, there is no *demux\_general\_system\_info* specified for the Rec. ITU-R BO. 1294 System B tuner subunit.

#### 4.8 Rec. ITU-R BO. 1294 System B Multiplex Selection and Information Fields

The Rec. ITU-R BO. 1294 System B *system\_specific\_multiplex\_selection* field is specified in the following figure, with the mandatory attributes in **BOLD**:

Address								
Offset	msb							lsb
system_specific_multiplex_attributes_valid_flags								
02 <sub>16</sub>	reserved_fields	network_id	freq_index	0	0	0	0	0
03 <sub>16</sub>	0	0	0	0	0	0	0	0
system_specific_multiplex_selection_attributes								
04 <sub>16</sub>	currently_available	selected	reserved					
05 <sub>16</sub>	<b>network_id</b>							
06 <sub>16</sub>								
07 <sub>16</sub>	<b>frequency_index</b>							

**Figure 4.2 – Rec. ITU-R BO. 1294 System B *system\_specific\_multiplex\_selection* Field**

The *network\_id* field contains the identifier of the network that is currently broadcasting the Multiplexes. It is unique within the Rec. ITU-R BO. 1294 System B broadcast system and is used to identify the satellite and its associated informations, such as east\_west, orbital\_position, etc.

The *frequency\_index* field is used to refer indirectly to the frequency used by this Multiplex. The index is unique within the network. Used together with the *network\_id* field, they uniquely identify a Rec. ITU-R BO. 1294 System B Multiplex.

All other fields are defined in reference [R6].

Currently, no information attributes of the Rec. ITU-R BO. 1294 System B *system\_specific\_multiplex\_information* field are defined, as shown in the following figure:

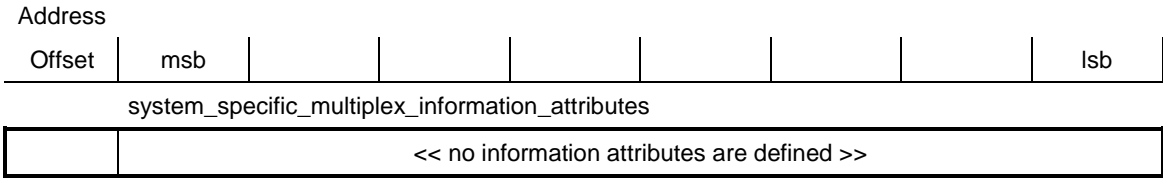


Figure 4.3 – Rec. ITU-R BO. 1294 System B *system\_specific\_mux\_information* Field

### 4.9 Rec. ITU-R BO. 1294 System B Service Selection and Information Fields

The Rec. ITU-R BO. 1294 System B *system\_specific\_service\_selection* field is specified in the following figure, with the mandatory attributes in **BOLD**:

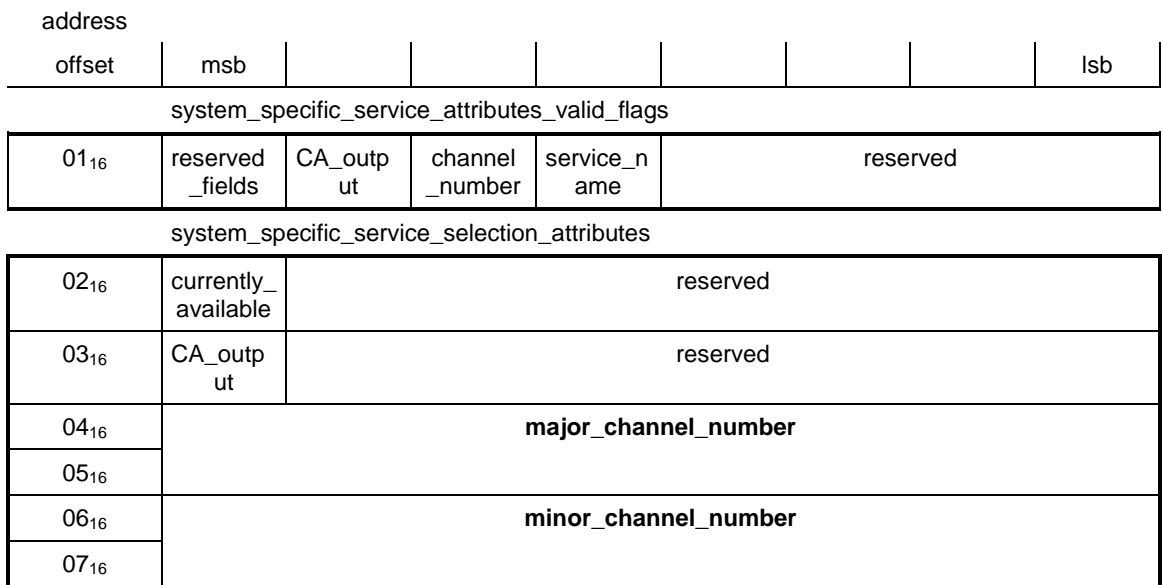


Figure 4.4 – Rec. ITU-R BO. 1294 System B *system\_specific\_service\_selection* Field

The *CA\_output* field indicates whether this Service is currently being output to the source plug as a scrambled (= 1) or not scrambled signal (= 0). **THIS FIELD IS VALID ONLY FOR SELECTION PURPOSES.** This field is only a placeholder in the descriptor structure, and shall be ignored when reading the descriptor.

The *major\_channel\_number* and *minor\_channel\_number* fields uniquely identify a Service within the network.

All other fields are defined in reference [R6].

The Rec. ITU-R BO. 1294 System B *system\_specific\_service\_information* field is specified in the following figure:

address							
offset	msb						lsb
system_specific_service_information_attributes							
08 <sub>16</sub>	service_name_length						
09 <sub>16</sub>	service_name						
:							
:							

**Figure 4.5 – Rec. ITU-R BO. 1294 System B system\_specific\_service\_information Field**

The *service\_name\_length* field indicates the number of bytes used for the following *service\_name* field.

The *service\_name* field contains the text of the Service name as it is derived from the air. If the name cannot be derived from the air, then the tuner shall set the *service\_name\_length* field to zero and there shall be no *service\_name* field.

#### 4.10 Rec. ITU-R BO. 1294 System B Component Selection and Information Fields

The Rec. ITU-R BO. 1294 System B *system\_specific\_component\_selection* field is specified in the following figure, with the mandatory attributes in **BOLD**:

Address							
Offset	msb						lsb
system_specific_component_attributes_valid_flags							
01 <sub>16</sub>	reserved_fields	SCID	stream_type	iso_639_language_code	component_name	reserved	
system_specific_component_selection_attributes							
02 <sub>16</sub>	currently_available	reserved					
03 <sub>16</sub>	<b>SCID</b>						
04 <sub>16</sub>							

**Figure 4.6 – Rec. ITU-R BO. 1294 System B system\_specific\_component\_selection Field**

The *SCID* (Service Channel ID) field indicates the SCID value for this Component and is unique within the Multiplex. It is described in detail in reference [R8].

All other fields are defined in reference [R6].

The Rec. ITU-R BO. 1294 System B *system\_specific\_component\_information* field is specified in the following figure:

Address	
Offset	msb
system_specific_component_information_attributes	
05 <sub>16</sub>	stream_type
06 <sub>16</sub>	iso_639_language_code
07 <sub>16</sub>	
08 <sub>16</sub>	
09 <sub>16</sub>	component_name_length
0A <sub>16</sub>	component_name
:	
:	

**Figure 4.7 – Rec. ITU-R BO. 1294 System B *system\_specific\_component\_selection* Field**

The *stream\_type* field specifies the type of stream (video, audio, EBU\_data, etc.) as defined in reference [R7]. In addition, many of the stream types are also defined in reference [R9].

The *iso\_639\_language\_code* field identifies the language associated with this Component. Some Components are language dependent, such as Audio or Text. Some Components, such as Video, have nothing to do with the language. In cases that the language of the Component is not available or the Component is not language dependent, the *iso\_639\_lang\_code* flag in the *system\_specific\_component\_attributes\_valid\_flags* field shall be set to 0, indicating the *iso\_639\_language\_code* field is not valid. The 3-byte values of language codes are defined in references [R10] and [R11].

The *component\_name\_length* field specifies the number of bytes used for the following *component\_name* field.

The *component\_name* field contains text of the Component name, if it is available from the air. If it is not available, then the length field shall be zero and there shall be no *component\_name* field.

#### **4.11 Rec. ITU-R BO. 1294 System B Object ID Size and Assignment Rules**

The size of object IDs for the Tuner Subunit is declared in the *size\_of\_object\_ID* field of the Tuner Subunit Identifier Descriptor.

When the tuner subunit creates Rec. ITU-R BO. 1294 System B objects (Multiplex, Service, and Component), it shall follow these rules for assigning object ID's:

	msb						lsb
object entry type	object ID assignment rule						
multiplex							
	<< implementation dependent >>						
	(must be 6 bytes in length)						
service	network_id (MSB)						
	network_id (LSB)						
	major_channel_number (MSB)						
	major_channel_number (LSB)						
	minor_channel_number (MSB)						
	minor_channel_number (LSB)						
component							
	<< implementation dependent >>						
	(must be 6 bytes in length)						

**Figure 4.8 – Rec. ITU-R BO. 1294 System B Object ID Assignment Rules**

The format of the *Multiplex* and *Component* object ID values for Rec. ITU-R BO. 1294 System B will depend on the tuner subunit implementation.

The format of the *Service* object ID values for all Rec. ITU-R BO. 1294 System B tuners shall be specified as above.

The following table lists one of the preferred assignments of Rec. ITU-R BO. 1294 System B object IDs:

	msb							lsb
object entry type	object ID assignment rule							
multiplex	network_id (MSB)							
	network_id (LSB)							
	frequency_index							
	0							
	0							
	0							
service	network_id (MSB)							
	network_id (LSB)							
	major_channel_number (MSB)							
	major_channel_number (LSB)							
	minor_channel_number (MSB)							
	minor_channel_number (LSB)							
component	network_id (MSB)							
	network_id (LSB)							
	frequency_index							
	0							
	SCID (MSB)							
	SCID (LSB)							

Figure 4.9 – Preferred Rec. ITU-R BO. 1294 System B Object ID Assignments

#### 4.12 Rec. ITU-R BO. 1294 System B DSIT command *system\_specific\_search\_flag*

The *system\_specific\_search\_flag* used in the DSIT control command for a Rec. ITU-R BO. 1294 System B selection are defined as follows:

address	offset	msb						lsb
	00 <sub>16</sub>	0	channel_number_up	channel_number_down	0	0	0	0

Figure 4.10 – DSIT Search Flags

The *channel\_number\_up* and *channel\_number\_down* search flags allow a controller to initiate a search of the next channel, based on the current channel number selection in the DSIT command, in either the up or down direction.

#### **4.13 Rec. ITU-R BO. 1294 System B DIRECT SELECT DATA *dsd\_selection\_specification***

Currently, the Rec. ITU-R BO. 1294 System B service provider is not planning to make the network programming guides available in their original data structure formats on the 1394 bus. This section shall be enhanced when the situation changes.

#### **4.14 Rec. ITU-R BO. 1294 System B TUNER STATUS notify command *system\_specific\_event***

Currently, there is no *system\_specific\_event* defined for the Rec. ITU-R BO. 1294 System B tuner subunit.



## 5. Rec. ITU-R BO. 1294 System B implementation\_profile\_id

The following table lists the currently defined Rec. ITU-R BO. 1294 System B *implementation\_profile\_id* values:

**Table 5.1 – Rec. ITU-R BO. 1294 System B *implementation\_profile\_id***

value	Functional Support Level	comments
10 <sub>16</sub>	Minimum	Simplest implementation, least support
30 <sub>16</sub>	Medium	Medium support

### 5.1 implementation\_profile\_id 10<sub>16</sub>

This profile defines the simplest AV/C tuner that supports no list descriptors or entry descriptors.

The *implementation\_profile\_id* in the *subunit\_dependent\_information* field of the Tuner Subunit Identifier Descriptor shall be 10<sub>16</sub> when using 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 or the Component is optional.

#### 5.1.1 Supported Descriptors

The tuner must maintain the tuner Subunit Identifier Descriptor and the tuner Status Descriptor.

#### 5.1.2 Supported AV/C Commands

AV/C commands are categorized into AV/C General Commands and AV/C Tuner Commands.

AV/C General Commands are described in reference [R3] and [R4]

AV/C Tuner Commands are described in reference [R5] and [R6].

##### 5.1.2.1 AV/C General Commands

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

A “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 5.2 – General AV/C Command Support Level - Simplest**

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

<sup>1</sup> Only subfunctions *open\_read* and *close* are required.

<sup>2</sup> Only support the accesses to Subunit Identifier Descriptor and Status Descriptor.

### 5.1.2.2 AV/C Tuner Commands

The following table shows the AV/C Tuner Commands required for this profile.

**Table 5.3 – AV/C Tuner Command Support Level - Simplest**

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

## 5.2 implementation\_profile\_id 30<sub>16</sub>

This profile defines the medium AV/C tuner that supports some list descriptors or entry descriptors.

The *implementation\_profile\_id* in the *subunit\_dependent\_information* field of the Tuner Subunit Identifier Descriptor shall be 30<sub>16</sub> when using this profile.

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

Selection is performed using the DIRECT SELECT INFORMATION TYPE command and the OBJECT NUMBER SELECT command.

### 5.2.1 Supported Descriptors

The tuner must maintain the tuner Subunit Identifier Descriptor and tuner Status Descriptor.

In addition, the tuner subunit must maintain a Multiplex List for this system, as defined in the tuner Subunit Identifier Descriptor. The Multiplex Entry Descriptor has as its children a Service List Descriptor for each Multiplex Entry Descriptor. The Component List is optional.

## 5.2.2 Supported AV/C Commands

AV/C commands are categorized into AV/C General Commands and AV/C Tuner Commands.

### 5.2.2.1 AV/C General Commands

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

A “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 5.4 – General AV/C Command Support Level – Service Level**

Command	Support Level			Comments
	Control	Status	Notify	
OPEN DESCRIPTOR	M	M	O	1, 2
READ DESCRIPTOR	M	-	-	
SEARCH DESCRIPTOR	O	-	-	
WRITE DESCRIPTOR	O	O	-	
OBJECT NUMBER SELECT	M	M	O	3, 4

<sup>1</sup> Only the subfunctions *open\_read* and *close* are required.

<sup>2</sup> Access is supported only to complete descriptors or object lists, i.e. only descriptor\_type 00<sub>16</sub>, 10<sub>16</sub>, 11<sub>16</sub> and 80<sub>16</sub> are supported in the descriptor\_identifier.

<sup>3</sup> The ONS command must use the “Don’t Care” ons\_selection\_specification (target\_depth = FF<sub>16</sub>).

<sup>4</sup> The list\_type field in the path\_specifier of the ONS command always refers to a Service list.

### 5.2.2.2 AV/C Tuner Commands

The following table shows the AV/C Tuner commands required for this profile.

**Table 5.5 – AV/C Tuner Command Support Level – Service Level**

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