TA Document 1999034
AV/C Tuner Broadcast System Specification - Analog Audio 1.1

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Abstract:
This specification defines the detailed specifications for Analog Audio Broadcast data structures which are used by an AV/C tuner subunit which supports analog audio broadcast systems. 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:
Audio, Video, 1394, Digital, Interface.
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   Regency Plaza Suite 350
   2350 Mission College Blvd.
   Santa Clara, Calif. 95054, USA

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1. Overview

1.1 Purpose

This document defines the Analog Audio system specification for AV/C Tuner subunits. This specification applies to 1394 devices that receive analog audio broadcast signals such as AM and FM.

1.2 Scope

This document defines the broadcast system specific information that applies to analog audio. All general fields are defined and described in AV/C Tuner Model and Command Set specification Version 1.0, TA document number 1998004, referenced below. A good understanding of the reference is mandatory before reading this document.
2. References

The following documents may be useful to the reader interested in learning about the full AV/C protocol and related technologies. All standards are subject to revision; the reader is encouraged to investigate the possibility of applying the most recent editions of the documents listed below.

This document is designed to be used in conjunction with the General AV/C and AV/C Tuner Subunit documents referenced below.


[R2] AV/C Tuner Model and Command Set, Version 1.0


2.1 Resources

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 Association of Radio Industries and Business (ARIB)

Nittochi Bld. 14F  1-4-1 Kasumigaseki Chiyoda-ku Tokyo 100-0013 Japan
Phone: +81-3-5510-8590
Fax: +81-3-3592-1103

2.1.3 Advanced Television Systems Committee (ATSC)

Documents from the ATSC can be located on the following WWW site: http://www.atsc.org

2.1.4 European Telecommunications Standards Institute (ETSI)

ETSI Secretariat
Postal Address:  F-06921 Sophia Antipolis Cedex – FRANCE
Office Address:  650 Route des Lucioles - Sophia Antipolis
                Valbonne – FRANCE
Phone: +33-4-92-94-42-00
Fax: +33-4-93-65-47-16
Internet: secretariat@etsi.fr
          http://www.etsi.fr
2.1.5 International Electrotechnical Commission (IEC) (contact in the United States)

U.S. National Committee of the IEC ANSI  
11, West 42nd Street, 13th floor  
New York, NY 10036  
Phone: +1-212-642-4900  
+1-212-642-4980 (sales)  
Fax: +1-212-398-0023  
Internet: http://www.ansi.org  
Documents can be ordered from:  
http://www.iec.ch/cs1ord-e.htm  
http://www.iec.ch/cs1oi-e.htm

2.1.6 The Institute of Electrical and Electronics Engineers, Inc. (IEEE)

The IEEE can be contacted via their WWW home page: http://www.ieee.org

2.1.7 International Telecommunication Union (ITU)

The ITU can be contacted via their WWW home page: http://www.itu.int
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 codes: A set of codes for a reserved field that are defined in this specification, but not otherwise used. Future specifications may implement the use of these codes. A product implementing this specification shall not generate these codes.

3.1.6 reserved fields: A set of bits for a reserved field that are defined in this specification, but are not otherwise used. Products that implement this specification shall zero these fields. Products that implement future revisions of this specification may set these codes as defined by the specification.

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.


3.2.3 quadlet: Four bytes of data.

3.3 Acronyms and Abbreviations

AV/C Audio Video Controller
4. General Broadcast System Specifications

This section contains a review of the general structures used by all tuner subunits to represent broadcast objects - multiplex, service, component.

4.1 Text Field Encoding

The format of all text fields in the various read-only broadcast system descriptors which are maintained by the tuner subunit shall be defined according to the particular broadcast system being represented. The exception is for regional variations which are based on a given broadcast system. For example, the Japanese digital broadcast system is based on the European DVB system, but the Japanese system specifies two-byte character codes which are not in the European DVB specification. The appropriate references are provided.

4.2 Multiplex Descriptors

For convenience when reading all of the system-specific structures below, the basic format of the tuner subunit multiplex descriptor is presented here. The multiplex descriptors for each broadcast system will share this same format:
The system_id field identifies the type of system (e.g. DVB, analog video) described by this tuner object. The values are defined in the table of system_id values presented in the AV/C Tuner Model and Command Set, Version 1.0 [R2].

The system_id for an analog audio tuner shall be 11_{16}.

All reserved fields shall be treated as specified on page 8 of reference [R2].

The input field indicates which input, either the antenna or demux destination plug, the subunit should use to get the requested service(s). The following table illustrates the values defined for this field:
Table 4.1 – Input Field Bit Allocation

<table>
<thead>
<tr>
<th>Value for input</th>
<th>Meaning</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>Take input from the antenna destination plug.</td>
</tr>
<tr>
<td>1</td>
<td>Take input from the demux destination plug.</td>
</tr>
</tbody>
</table>

The *antenna_number* field is the index of an antenna specifier for the subunit, as described in the subunit identifier descriptor data structure. This is a zero-based value. If the demux destination plug is selected, then the *antenna_number* field has no meaning in the object descriptor and the selection specifier (when used for making a selection).

The *system_specific_multiplex_attributes_valid_flags* are defined per system, and indicate the validity of the entries in both of the following fields (selection and information attributes). They are detailed in the sections that follow.

While the *system_specific_multiplex_attributes_valid_flags* are defined per *system_id*, all system definitions share one common flag as shown here:

Table 4.2 – system_specific_multiplex_attributes_valid_flags Field Bit Allocation

<table>
<thead>
<tr>
<th>flags</th>
<th>meaning</th>
</tr>
</thead>
<tbody>
<tr>
<td>1xxx xxxx</td>
<td>The most significant bit of the multiplex attributes valid flags indicates whether the reserved fields are present or not. When this flag is 1, then the fields exist in both the selection and information attributes fields. If the flag is 0, then they do not exist.</td>
</tr>
<tr>
<td>(MSB)</td>
<td></td>
</tr>
<tr>
<td>xxxx xxxx</td>
<td>All other flags are defined per system_id.</td>
</tr>
<tr>
<td>(LSB)</td>
<td></td>
</tr>
</tbody>
</table>

The *selected* flag indicates whether this multiplex is currently selected or not. The value 1 means it is selected. When a selection is being performed, the *selected* flag will be ignored.

The *currently_available* flag indicates whether this multiplex is actually available at this time. In some situations it is possible that the multiplex (or a certain part of it, such as a service) may not be available even though it is selected. If this bit is set to 1, then it is available. When a selection is being performed, the *currently_available* flag will be ignored.

The *broadcast_system_specific_multiplex_selection_attributes* field will contain the various attributes that specify a multiplex in the given *system_id*. These attributes are used for selection purposes. If the input is via the demux destination plug of the tuner subunit, then this field shall be empty.

The *system_specific_multiplex_information_attributes* field will contain the various attributes that provide useful information about a multiplex in the given *system_id*. These attributes are NOT used for selection purposes.

The *reserved_field_length* and *reserved_field* fields only exist in the structure if defined by the valid flag described above.
4.3 Service Descriptors

The service descriptors for each broadcast system will also share a common format, but this format is slightly different from that of the multiplex descriptor:

<table>
<thead>
<tr>
<th>offset</th>
<th>msb</th>
<th></th>
<th></th>
<th></th>
<th></th>
<th>lsb</th>
</tr>
</thead>
<tbody>
<tr>
<td>00_16</td>
<td>system_id</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**system_specific_service_attributes_valid_flags**

| 01_16 | system_specific_service_attributes_valid_flags |

<table>
<thead>
<tr>
<th>:</th>
<th>:</th>
</tr>
</thead>
<tbody>
<tr>
<td>:</td>
<td>:</td>
</tr>
<tr>
<td>:</td>
<td>:</td>
</tr>
</tbody>
</table>

**system_specific_service_selection_attributes**

| : | currently_available | reserved |
| : | : | |

| : | : |
| : | broadcast_system_specific_service_selection_attributes |

| : | reserved_field_length (if specified by reserved_field bit of service attributes valid flags) |
| : | |

| : | reserved_field (if specified by reserved_field bit of service attributes valid flags) |

| : | : |
| : | system_specific_service_information_attributes |

| : | system_specific_service_information_attributes |

| : | reserved_field_length (if specified by reserved_field bit of service attributes valid flags) |
| : | |

| : | reserved_field (if specified by reserved_field bit of service attributes valid flags) |

| : | : |

**Figure 4.2 – Service Descriptors**

The fields for this common structure are all the same as defined for the multiplex descriptor above, but service descriptors do not have (or need) the input and antenna field. The reason for this is that the selection process for a given type of object (multiplex, service or component) requires the specification of the appropriate objects higher in the hierarchy.

All *reserved* fields shall be treated as specified on page 8 of reference [R2].

The *system_specific_service_attributes_valid Flags* are defined per *system_id*, but all systems share one common definition:
### Table 4.3 – system_specific_service_attributes_valid_flags Field Bit Allocation

<table>
<thead>
<tr>
<th>flags</th>
<th>meaning</th>
</tr>
</thead>
<tbody>
<tr>
<td>1xxx xxxx</td>
<td>The most significant bit of the service attributes valid flags indicates whether the reserved fields are present or not. When this flag is 1, then the fields exist in both the selection and information attributes fields. If the flag is 0, then they do not exist.</td>
</tr>
</tbody>
</table>

The `reserved_field_length` and `reserved_field` fields only exist in the structure if defined by the valid flag described above.

### 4.4 Component Descriptors

The component descriptors for each broadcast system will also share a common format, which is similar to that of the service descriptor:

<table>
<thead>
<tr>
<th>address</th>
<th>offset</th>
<th>msb</th>
<th>lsb</th>
</tr>
</thead>
<tbody>
<tr>
<td>address</td>
<td>00_{16}</td>
<td>system_id</td>
<td></td>
</tr>
</tbody>
</table>

- `system_specific_component_attributes_valid_flags`

<table>
<thead>
<tr>
<th>address</th>
<th>offset</th>
<th>msb</th>
<th>lsb</th>
</tr>
</thead>
<tbody>
<tr>
<td>address</td>
<td>01_{16}</td>
<td>system_specific_component_attributes_valid_flags</td>
<td></td>
</tr>
</tbody>
</table>

- `system_specific_component_selection_attributes`
  - `currently_available`
  - `reserved_field_length`
  - `reserved_field`

- `system_specific_component_information_attributes`
  - `system_specific_component_information_attributes`
  - `reserved_field_length`
  - `reserved_field`
The fields for this common structure are all the same as defined for the service descriptor above.

All reserved fields shall be treated as specified on page 8 of reference [R2].

The `system_specific_component_attributes_valid_flags` are defined per `system_id`, but all systems share one common definition:

<table>
<thead>
<tr>
<th>flags</th>
<th>meaning</th>
</tr>
</thead>
<tbody>
<tr>
<td>1xxx xxxx</td>
<td>The most significant bit of the component attributes valid flags indicates whether the reserved fields are present or not. When this flag is 1, then the fields exist in both the selection and information attributes fields. If the flag is 0, then they do not exist.</td>
</tr>
</tbody>
</table>

The `reserved_field_length` and `reserved_field` fields only exist in the structure if defined by the valid flag described above.
5. Analog Audio Broadcast System Specification

This section contains information about the Analog Audio broadcast system. This includes the details of system-dependent information fields for all of the descriptors used in the tuner model, object descriptors and lists, etc.

Some of the data structures defined in this section are used by the tuner subunit to indicate the information types which are currently available in the air, or the status of the tuner subunit and its plugs. Some of these structures may also be used by controllers when performing selection operations, such as DIRECT SELECT INFORMATION TYPE or DIRECT SELECT DATA.

The descriptions of the data structures will indicate how the controller should treat the information when it is provided by the tuner subunit for status reporting, or when it is provided by the controller as operands in commands being sent to the tuner subunit.

5.1 Analog Audio system_id

The system_id field for an analog audio tuner subunit shall be set to 1116.

5.2 Analog Audio Profile ID Assignments

Currently, there are no profiles defined for the analog audio tuner subunit.

5.3 Analog Audio Multiplex Descriptor and Mandatory Attributes

The multiplex descriptor for analog audio has the following system specific fields in a multiplex object structure. The mandatory attributes are in BOLD:
NOTE*: The valid flag of the orbital_position also specify the varifity of west_east field.

NOTE**: The mandatory attributes marked with (***) have the following rules:
1. For satellite antennas, the polarization attribute is mandatory
2. For movable antennas, the west_east and orbital_position attributes are mandatory

**Figure 5.1 – Analog Audio Multiplex Descriptor**

The system_specific_multiplex_attributes_valid_flags have the same meaning as described for the general multiplex layout described above.

For a detailed explanation of the polarization field, refer to the DVB Service Information specification ETS 300 468 [R4], section 6.2.6. The definition for analog audio broadcast is the same as for DVB.

A detailed explanation of the west_east field can be also be found in DVB SI [R4], section 6.2.6. This data is not valid when the orb_pos valid flag is set to value 0.

For details of the orbital_position, refer to DVB SI [R4], section 6.2.6.

The main_frequency field is a 24 bit value composed of the raster_frequency and RF_frequency fields. This field is encoded as defined in the AV/C Tuner Broadcast System Specification –Digital Video Broadcast (DVB), Version 1.0 [R3].

The audio_system field has the following structure:
### Table 5.1 – audio_system Field Bit Allocation for FM

<table>
<thead>
<tr>
<th>Bit</th>
<th>Meaning</th>
</tr>
</thead>
<tbody>
<tr>
<td>bit 7 (msb)</td>
<td>1 = FM</td>
</tr>
<tr>
<td>bit 6</td>
<td>1 = stereo, 0 = mono</td>
</tr>
<tr>
<td>bit 5</td>
<td>1 = low speed data channel present</td>
</tr>
<tr>
<td>bit 4</td>
<td>1 = high speed data channel present</td>
</tr>
<tr>
<td>bit 3-2</td>
<td>low speed data system</td>
</tr>
<tr>
<td></td>
<td>00 = ARI system, 01 = reserved, 10 = RDS, 11 = reserved</td>
</tr>
<tr>
<td>bit 1-0</td>
<td>high speed data system</td>
</tr>
<tr>
<td></td>
<td>00 = HSDS, 01 = DARC, 10 = reserved, 11 = reserved</td>
</tr>
</tbody>
</table>

### Table 5.2 – audio_system Field Bit Allocation for AM

<table>
<thead>
<tr>
<th>Bit</th>
<th>Meaning</th>
</tr>
</thead>
<tbody>
<tr>
<td>bit 7 (msb)</td>
<td>0 = AM</td>
</tr>
<tr>
<td>bit 6</td>
<td>1 = stereo, 0 = mono</td>
</tr>
<tr>
<td>bit 5</td>
<td>1 = data channel present</td>
</tr>
<tr>
<td>bit 4</td>
<td>1 = DSB (double side band modulation), 0 = SSB (single side band modulation)</td>
</tr>
<tr>
<td>bit 3-2</td>
<td>low speed data system</td>
</tr>
<tr>
<td></td>
<td>00 = to be defined, 01 = reserved, 10 = reserved, 11 = reserved</td>
</tr>
<tr>
<td>bit 1-0</td>
<td>reserved</td>
</tr>
</tbody>
</table>

### 5.4 Analog Audio Service Descriptor and Mandatory Attributes

The analog audio service descriptor is defined as follows. The mandatory attributes are in **BOLD**: 
The `system_specific_service_attributes_valid_flags` fields have the same meaning as described above for the general service descriptor layout described above.

The `service_name_length` field contains the number of bytes used for the following `service_name` field.

The `service_name` field holds 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.

For analog audio broadcasting, services are not multiplexed together on a transponder; each transponder carries exactly one service. As defined for analog video, we describe an analog audio “multiplex” as consisting of a single service. So, a service and a multiplex are essentially the same in this case. A controller wishing to select an analog audio service should just select the multiplex.

However, this does not mean that there are no service lists and objects in the analog case. They do exist, because analog services do have components, and therefore component lists, associated with them.

### 5.5 Analog Audio Component Descriptor and Mandatory Attributes

The analog audio component descriptor has the following format. The mandatory attributes are in **BOLD**: 

<table>
<thead>
<tr>
<th>Address</th>
<th>Offset</th>
<th>msb</th>
<th>lsb</th>
<th>System Specific Service Attributes Valid Flags</th>
</tr>
</thead>
<tbody>
<tr>
<td><code>01_{16}</code></td>
<td>reserved _fields</td>
<td>reserved</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Address</th>
<th>Offset</th>
<th>System Specific Service Selection Attributes</th>
</tr>
</thead>
<tbody>
<tr>
<td><code>02_{16}</code></td>
<td>currently _available</td>
<td>reserved</td>
</tr>
<tr>
<td></td>
<td>&lt;&lt; no broadcast system specific service selection attributes are defined &gt;&gt;</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Address</th>
<th>Offset</th>
<th>System Specific Service Information Attributes</th>
</tr>
</thead>
<tbody>
<tr>
<td><code>03_{16}</code></td>
<td>service_name_length</td>
<td></td>
</tr>
<tr>
<td><code>04_{16}</code></td>
<td>service_name</td>
<td></td>
</tr>
</tbody>
</table>

**Figure 5.2 – Analog Audio Service Descriptor**

The `system_specific_service_attributes_valid_flags` fields have the same meaning as described above for the general service descriptor layout described above.

The `service_name_length` field contains the number of bytes used for the following `service_name` field.

The `service_name` field holds 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.

For analog audio broadcasting, services are not multiplexed together on a transponder; each transponder carries exactly one service. As defined for analog video, we describe an analog audio “multiplex” as consisting of a single service. So, a service and a multiplex are essentially the same in this case. A controller wishing to select an analog audio service should just select the multiplex.

However, this does not mean that there are no service lists and objects in the analog case. They do exist, because analog services do have components, and therefore component lists, associated with them.

**5.5 Analog Audio Component Descriptor and Mandatory Attributes**

The analog audio component descriptor has the following format. The mandatory attributes are in **BOLD**: 

<table>
<thead>
<tr>
<th>Address</th>
<th>Offset</th>
<th>System Specific Service Attributes Valid Flags</th>
</tr>
</thead>
<tbody>
<tr>
<td><code>01_{16}</code></td>
<td>reserved _fields</td>
<td>reserved</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Address</th>
<th>Offset</th>
<th>System Specific Service Selection Attributes</th>
</tr>
</thead>
<tbody>
<tr>
<td><code>02_{16}</code></td>
<td>currently _available</td>
<td>reserved</td>
</tr>
<tr>
<td></td>
<td>&lt;&lt; no broadcast system specific service selection attributes are defined &gt;&gt;</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Address</th>
<th>Offset</th>
<th>System Specific Service Information Attributes</th>
</tr>
</thead>
<tbody>
<tr>
<td><code>03_{16}</code></td>
<td>service_name_length</td>
<td></td>
</tr>
<tr>
<td><code>04_{16}</code></td>
<td>service_name</td>
<td></td>
</tr>
</tbody>
</table>

**Figure 5.2 – Analog Audio Service Descriptor**

The `system_specific_service_attributes_valid_flags` fields have the same meaning as described above for the general service descriptor layout described above.

The `service_name_length` field contains the number of bytes used for the following `service_name` field.

The `service_name` field holds 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.

For analog audio broadcasting, services are not multiplexed together on a transponder; each transponder carries exactly one service. As defined for analog video, we describe an analog audio “multiplex” as consisting of a single service. So, a service and a multiplex are essentially the same in this case. A controller wishing to select an analog audio service should just select the multiplex.

However, this does not mean that there are no service lists and objects in the analog case. They do exist, because analog services do have components, and therefore component lists, associated with them.
The `system_specific_component_attributes_valid_flags` for the component have the same meaning as defined for the general component descriptor described above.

The `data_type_indicator` field specifies what kind of component this is:

**Table 5.3 – data_type_indicator Field Bit Allocation**

<table>
<thead>
<tr>
<th>data_type_indicator</th>
<th>type of component</th>
</tr>
</thead>
<tbody>
<tr>
<td>00&lt;sub&gt;16&lt;/sub&gt;</td>
<td>reserved</td>
</tr>
<tr>
<td>01&lt;sub&gt;16&lt;/sub&gt;</td>
<td>audio</td>
</tr>
<tr>
<td>02&lt;sub&gt;16&lt;/sub&gt;</td>
<td>data</td>
</tr>
<tr>
<td>03&lt;sub&gt;16&lt;/sub&gt;</td>
<td>reserved</td>
</tr>
</tbody>
</table>

The `data_type_dependent` field will have a format that depends on the `data_type_indicator`. The two formats are defined as follows:

**Figure 5.3 – Analog Audio Component Descriptor**

The `system_specific_component_attributes_valid_flags` for the component have the same meaning as defined for the general component descriptor described above.

The `data_type_dependent` field specifies what kind of component this is:

**Table 5.3 – data_type_dependent Field Bit Allocation**

<table>
<thead>
<tr>
<th>address</th>
<th>offset</th>
<th>msb</th>
<th>lsb</th>
</tr>
</thead>
<tbody>
<tr>
<td>01&lt;sub&gt;16&lt;/sub&gt;</td>
<td>reserved</td>
<td>data_type_indicator</td>
<td>data_type_dependent</td>
</tr>
<tr>
<td>02&lt;sub&gt;16&lt;/sub&gt;</td>
<td>currently_available</td>
<td>reserved</td>
<td></td>
</tr>
<tr>
<td>03&lt;sub&gt;16&lt;/sub&gt;</td>
<td>data_type_indicator</td>
<td>reserved</td>
<td></td>
</tr>
<tr>
<td>04&lt;sub&gt;16&lt;/sub&gt;</td>
<td>data_type_dependent</td>
<td></td>
<td></td>
</tr>
<tr>
<td>05&lt;sub&gt;16&lt;/sub&gt;</td>
<td>component_name_length</td>
<td></td>
<td></td>
</tr>
<tr>
<td>06&lt;sub&gt;16&lt;/sub&gt;</td>
<td>component_name</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**Figure 5.4 – data_type_dependent field for an analog audio, audio component**
In the case of an analog audio "audio component", there is no information in the data_type_dependent field; it shall be set to zero.

<table>
<thead>
<tr>
<th>address</th>
<th>offset</th>
<th>msb</th>
<th></th>
<th></th>
<th></th>
<th>lsb</th>
</tr>
</thead>
<tbody>
<tr>
<td>04₁₆</td>
<td>reserved</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Figure 5.5 – data_type_dependent field for an analog audio, data component

In the case of an analog audio "data component", there is no information in the data_type_dependent field; it shall be set to zero.

The component_name_length field contains the number of bytes used for the following component_name field.

The component_name fields hold the length and 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.

### 5.6 Analog Audio DIRECT SELECT INFORMATION TYPE Search Flags

The search flags used in the DSIT control command for an analog audio selection are defined as follows:

<table>
<thead>
<tr>
<th>address</th>
<th>offset</th>
<th>msb</th>
<th></th>
<th></th>
<th></th>
<th>lsb</th>
</tr>
</thead>
<tbody>
<tr>
<td>00₁₆</td>
<td>orb_pos</td>
<td>main_freq_up</td>
<td>main_freq_down</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
</tbody>
</table>

Figure 5.6 – Analog Audio DIRECT SELECT INFORMATION TYPE Search Flags

The main_freq_up and main_freq_down search flags allow a controller to initiate a search based on the frequency, in either the up or down direction. The orb_pos flag allows a search based on this criteria. Only one search flag may be set for any operation.

All other flags shall be treated as reserved, as specified in on page 8 of reference [R2].

### 5.7 Analog Audio DIRECT SELECT DATA dsd_selection_specification

Currently there is no dsd_selection_specification structure defined for the analog audio system.

### 5.8 Analog Audio Object ID Assignment Rules

When the tuner subunit creates analog audio objects (multiplex, service and component), it shall follow these rules for assigning object ID’s. The format of the service object ID depends on whether PI information is available in the signal:
The format of the multiplex and component object ID values for analog audio will depend on the tuner subunit implementation.

The format of the service object ID values for all analog audio tuners shall be as specified above.

The \textit{id\_format} flag bit indicates whether the service object ID is specified as PI code (= 0) or as a frequency (= 1).

\subsection*{5.9 Analog Audio Subunit Identifier Descriptor - System Specific Information}

\begin{table}[h]
\centering
\begin{tabular}{|c|c|}
\hline
object entry type & ID assignment rule \\
\hline
multiplex & \textit{<< implementation dependent >>} \\
&(must be 4 bytes in length) \\
\hline
service (by PI code) & \textit{id\_format} \textit{reserved} \\
00 & PI (MSB) \\
& PI (LSB) \\
\hline
service (by frequency) & \textit{id\_format} \textit{reserved} \\
Frequency (MSB) & \\
Frequency & \\
Frequency (LSB) & \\
\hline
component & \textit{<< implementation dependent >>} \\
&(must be 4 bytes in length) \\
\hline
\end{tabular}
\end{table}

\begin{figure}
\centering
\includegraphics[width=\textwidth]{figure5.7}
\caption{Analog Audio Object ID assignment rule}
\end{figure}

The format of the multiplex and component object ID values for analog audio will depend on the tuner subunit implementation.

The format of the service object ID values for all analog audio tuners shall be as specified above.

The \textit{id\_format} flag bit indicates whether the service object ID is specified as PI code (= 0) or as a frequency (= 1).

\begin{table}[h]
\centering
\begin{tabular}{|c|c|}
\hline
address & \textit{Analog\_Audio\_specification\_version} \\
00 & \\
\hline
\end{tabular}
\end{table}

\begin{figure}
\centering
\includegraphics[width=\textwidth]{figure5.8}
\caption{Analog Audio Subunit Identifier Descriptor - System Specific Information}
\end{figure}

The \textit{Analog\_Audio\_specification\_version} field indicates the version number of Analog Audio specification that this tuner subunit conforms to.

This field can have one of the following values:
Table 5.4 – Analog Audio specification version

<table>
<thead>
<tr>
<th>AA_specification_version values</th>
<th>AA_specification_version meaning</th>
</tr>
</thead>
<tbody>
<tr>
<td>11_16</td>
<td>Data structures and command sets as specified in the AA Specification, Version 1.1</td>
</tr>
<tr>
<td>all others</td>
<td>reserved for future specification</td>
</tr>
</tbody>
</table>

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

5.10 Analog Audio Subunit Identifier Descriptor

selection_attribute_range_specification definitions

The analog audio tuner model specifies that the following selection attributes have range specifications. This list is presented in the order in which the selection_attribute_range_specification structures are packed into the system_specific_antenna_range_specification structure:

<table>
<thead>
<tr>
<th>attribute</th>
<th>msb</th>
<th>reserved</th>
<th>lsb</th>
</tr>
</thead>
<tbody>
<tr>
<td>A polarization</td>
<td>polarization</td>
<td>reserved</td>
<td></td>
</tr>
<tr>
<td>B position</td>
<td>west_east</td>
<td>reserved</td>
<td>orbital_position (MSB)</td>
</tr>
<tr>
<td></td>
<td>orbital_position (LSB)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>C main frequency</td>
<td>raster_frequency</td>
<td>frequency (MS bits)</td>
<td></td>
</tr>
<tr>
<td></td>
<td>frequency</td>
<td>frequency (LSB)</td>
<td></td>
</tr>
<tr>
<td>D audio system</td>
<td>audio_system</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Figure 5.9 – analog audio selection attributes with range specifications

The size_of_attribute for each of the selection attributes indicated above can be derived from the number of rows used to specify the attribute. For example, the position attribute is 3 bytes, composed of the west_east bit flag, a reserved field, and 2 bytes for the orbital_position field.

5.11 Analog Audio Tuner Status Descriptor -
antenna_general_system_info Field Specification

The format of the antenna_general_system_info field of a tuner subunit which supports the analog audio system appears as follows:
5.12 Analog Audio Tuner Status Descriptor - demux_general_system_info Field Specification

There is no demux_general_system_info specified for the analog audio tuner subunit.

5.13 Analog Audio Tuner Status Notification - Event Specifications

Currently there are no system specific events defined for the analog audio tuner subunit.