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AV/C Stream Format Information Specification 1.0

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Abstract:
This document provides the method for obtaining the status of the specified isochronous plug related to the specified stream format information.

Keywords:
format, stream.

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1. Overview

1.1 Purpose

The purpose of this specification is to provide a command set to obtain the status of the specified isochronous plug related to the specified stream format information.

1.2 Scope

This specification builds on the information provided by IEEE Std 1394-1995, *Standard for a High Performance Serial Bus* [R1], IEEE Std IEEE Std 1394a-2000, *Standard for High Performance Serial Bus-Amendment 1* [R2], and IEC 61883-1, *Consumer audio/video equipment – Digital Interface* [R3].

The commands defined in this document conform to the AV/C Digital Interface Command Set General Specification [R4].

2. 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*, August 30 1996.
- [R2] IEEE Std 1394a-2000, *Standard for High Performance Serial Bus – Amendment 1*.
- [R3] IEC 61883-1, *Consumer audio/video equipment – Digital Interface – Part1: General*.
- [R4] TA Document 2001012, *AV/C Digital Interface Command Set General Specification 4.1*.
- [R5] IEC 61883-2, *Consumer audio/video equipment – Digital Interface – Part2: SD-DVCR data transmission*.
- [R6] IEC 61883-3, *Consumer audio/video equipment – Digital Interface – Part3: HD-DVCR data transmission*.
- [R7] IEC 61883-5, *Consumer audio/video equipment – Digital Interface – Part5: SDL-DVCR data transmission*.
- [R8] TA Document 2001024, *Audio and Music Data Transmission Protocol, Version 2.1*.
- [R9] IEC 61883-6, *Consumer audio/video equipment – Digital Interface – Part6: Audio and Music data transmission protocol*.
- [R10] TA Document 1999015, *AV/C Command Set for Rate Control of Isochronous Data Flow, Version 1.0*, April 18, 2000.

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 AV/C unit: A consumer electronic device that throughputs Audio and/or Video data, *e.g.*, a camcorder or a VCR, attached as a Serial Bus node. This document describes a command set that can be built into AV/C units to control other AV/C units with the same architecture.

3.2.2 AV/C subunit: A part of an AV/C unit that is uniquely defined and offers a subset of functions that belong to the unit.

3.2.3 AV/C: Audio/video control. The AV/C Digital Interface Command Set of which a part is specified by this and other AV/C documents.

3.2.4 Byte: Eight bits of data, used as a synonym for octet.

3.2.5 Controller: A device at a serial bus node that sends AV/C commands to control a remote AV/C target device.

3.2.6 CSR: A Control and Status Register within a node, as defined by IEEE Std 1394–1995.

3.2.7 IEEE: The Institute of Electrical and Electronics Engineers, Inc.

3.2.8 Isochronous: iso – “same” chronous – “time”. Isochronous is an adjective used to describe data block transfers that occur at regular intervals. Isochronous transfers are used for time sensitive data such as audio and video.

3.2.9 PCR: Plug Control Register, as defined by IEC 61883, Digital Interface for Consumer Electronic Audio/Video Equipment.

3.2.10 iPCR: Input plug control register for controlling isochronous data streams, as defined by IEC 61883.

3.2.11 oPCR: Output plug control register for controlling isochronous data streams, as defined by IEC 61883.

3.2.12 Plug: A physical or virtual end-point of connection implemented by an AV/C unit or subunit that may receive or transmit isochronous, asynchronous, or other external or internal data. Plugs may be Serial Bus plugs, accessible through the PCRs; they may be external, physical plugs on the AV/C unit; or they may be internal virtual plugs implemented by the AV/C subunits.

3.2.13 Quadlet: Four bytes of data.

3.2.14 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 the use of these values for the field.

3.2.15 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 the use of these fields.

3.2.16 Stream: A continuous flow of data originating from one source and terminating at zero or more destinations. A stream may be isochronous or asynchronous.

3.2.17 Target: A device at a serial bus node that receives and responds to AV/C commands from remote controller device.

3.3 Acronyms and Abbreviations

AV/C Audio Video Control

CSR A Control and Status Register within a node, as defined by IEEE Std 1394–1995.

PCR Plug control register

iPCR Input plug control register

oPCR Output plug control register

lsb least significant bit

msb most significant bit

4. Scenarios

This chapter describes the scenarios that can be realized by using this specification. The outline of scenarios realized with this specification are described as below:

1. To display devices which can input/output in the specified format on the selection list.
2. To have a source device output in the format acceptable to a sink device when the source device supports several formats.

Next section describes the detailed scenarios of these two.

4.1 Scenario 1

Scenario 1 contains two types of device selections: source devices selection and sink devices selection.

4.1.1 Source devices selection

When a user presses “Source device select” button on the sink device (e.g. TV), a sink device displays only the source devices (e.g. Cam) which can output in the specified format on the selection list (Figure 4.1).

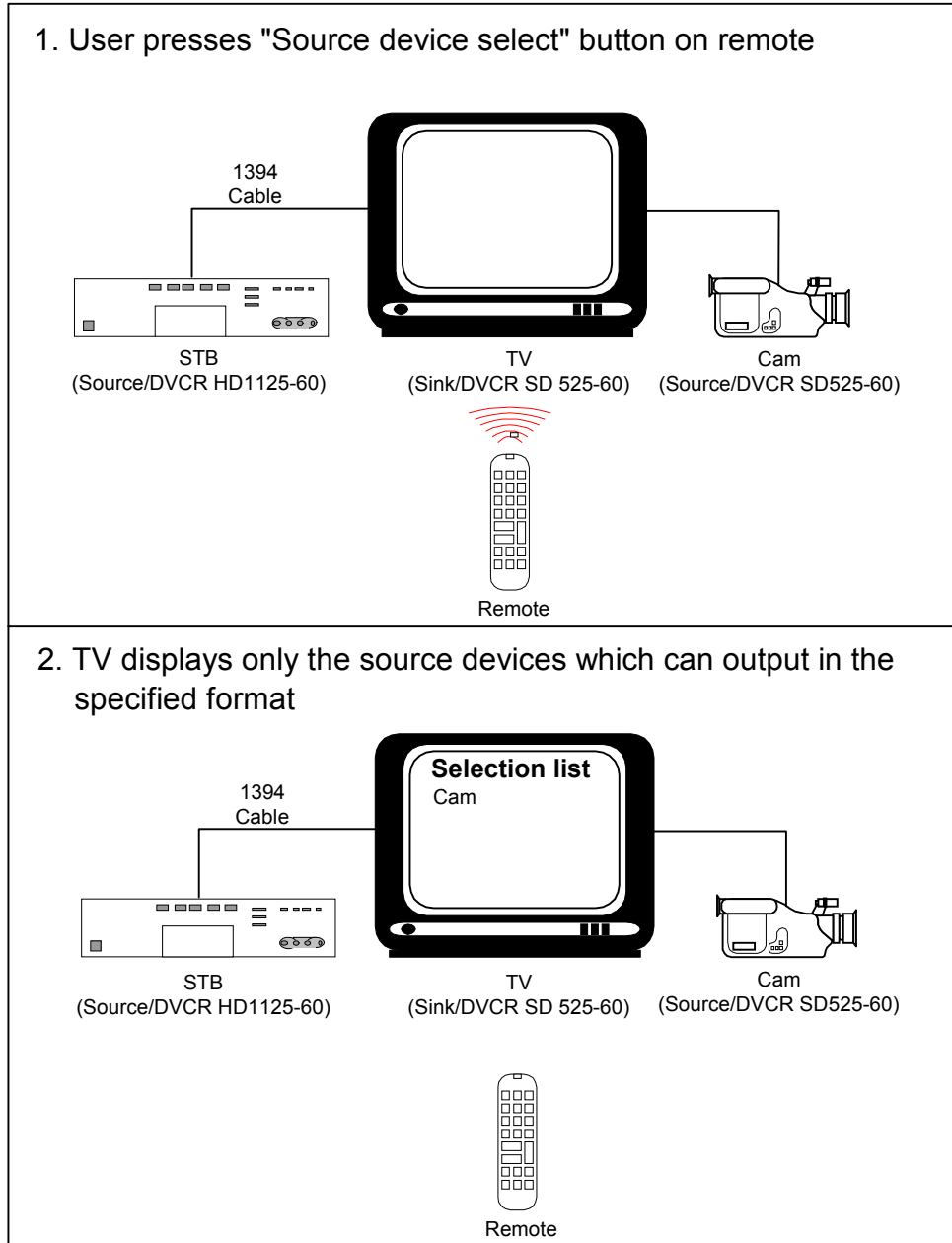


Figure 4.1 – Source devices selection

4.1.2 Sink devices selection

When a user presses “Sink device select” button on the source device (e.g. TV), a source device displays only the sink devices (e.g. Disc recorder) which can input in the specified format on the selection list (Figure 4.2).

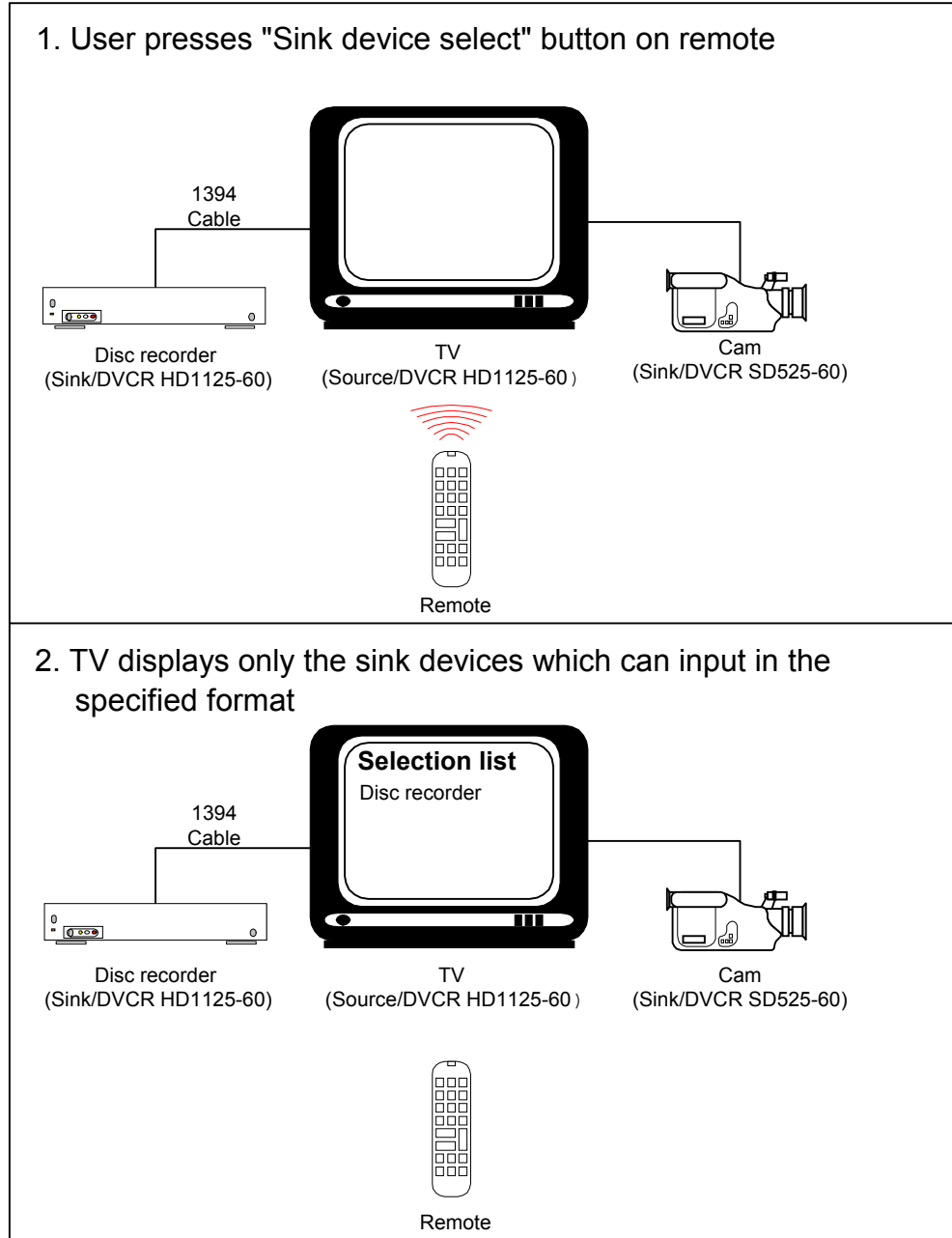


Figure 4.2 – Sink devices selection

4.1.3 Realization method

The scenarios described in section 4.1.1 and 4.1.2 can be realized by using the command set described in chapter 6.

4.2 Scenario 2

4.2.1 Output in the appropriate format

In this scenario, when a source device supports several formats (e.g. AC3, Linear PCM) as shown in Figure 4.3, the source device outputs in the format acceptable to the sink device (e.g. AC3).

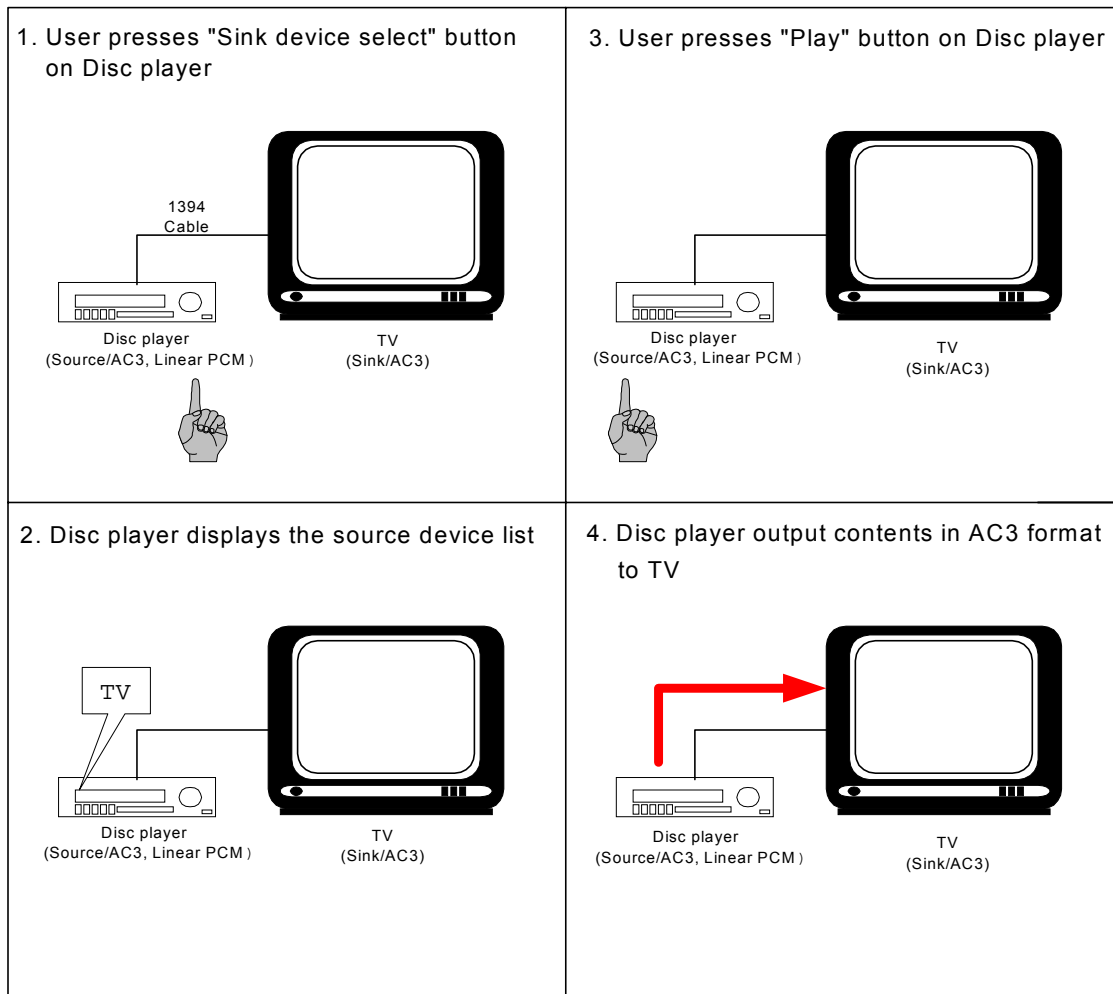


Figure 4.3 – Output in the appropriate format

4.2.2 Model

The above scenario is realized by using the following model.

- Source device inquires the stream format of a sink device and decides the format to output

- Sink device automatically configures itself according to a receiving format

Under the scenario above, when a user presses "Play" button on the Disc player, or before a user presses "Play" button on the Disc player (e.g. device discovery), the Disc player inquires and decides the format to output (in this case, AC3), and output contents in the appropriate format to TV, and TV automatically configures itself according to a receiving format. But the policy to decide the format to output is the outside of the scope in this specification, because there are various ways to decide the format to output (e.g. set by a user, automatically set by an application, etc.).

Note that the selection of contents, the establishment of peripheral connections, and the establishment of internal path are the outside of the scope in this specification.

4.2.3 Realization Method

Based on the model in section 4.2.2, the scenario can be realized by using the command set described in chapter 6.

5. Stream format hierarchy information

This chapter describes the stream format information. In the next chapter, the commands that utilize this stream format information are defined.

The stream format information forms a hierarchical structure, where stream format information in the hierarchy is a subset of stream format information higher up in the hierarchy. In this specification, the stream format hierarchy has *levels*, where each level branches the hierarchy into distinct subsets of the previous *level*. The start of the hierarchy is called the *root level*.

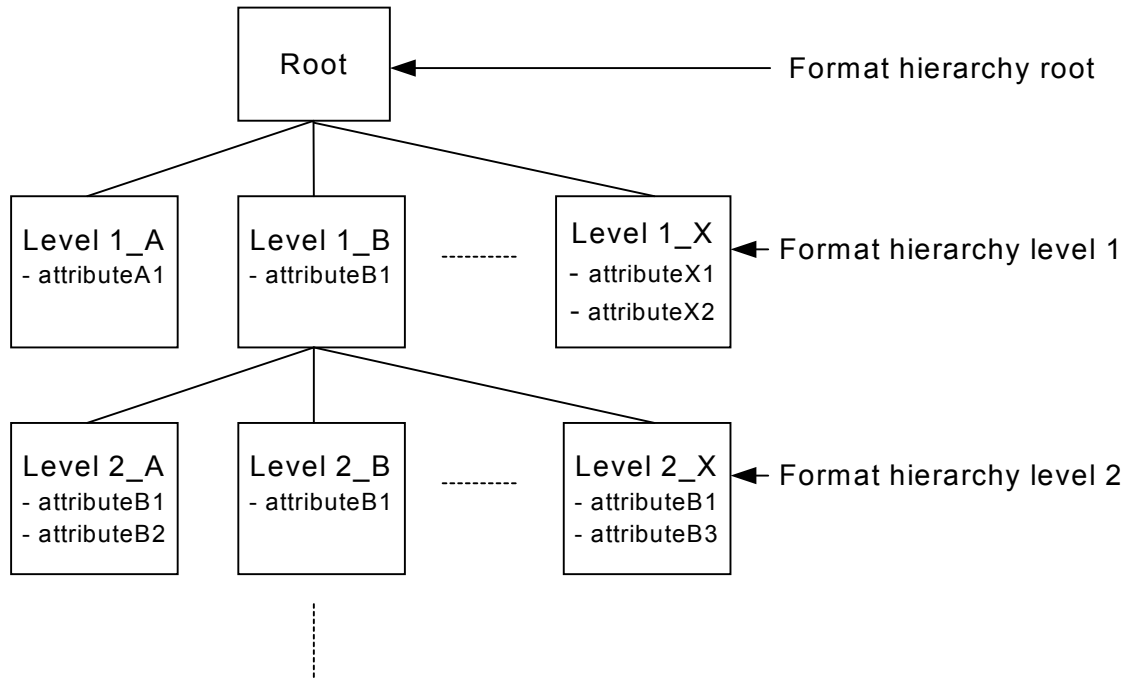


Figure 5.1 – Stream format hierarchy

The Stream format information may have the attribute information associated with them, and inherits the attribute information of formats higher in the format hierarchy. For example, the attribute information “attributeB1” associated with Format hierarchy level 1 “Level 1_B” is inherited to the lower hierarchy (e.g. Format hierarchy level 2 “Level2_A”, “Level2_B”,..., and “Level2_X”) as shown in Figure 5.1.

5.1 Format hierarchy root

This section describes the stream format information located at the top of Stream format hierarchy. Format hierarchy root has the stream format information as shown in Table 5.1.

Table 5.1 – Format hierarchy root

Format	Value	Attributes	Lower Hierarchy
DVCR	80 ₁₆	–	Refer to section 5.2.1
Audio & Music	90 ₁₆	–	Refer to section 5.2.2
Invalid	FF ₁₆	–	–
Reserved	all others	–	–

"DVCR" indicates DVCR stream specified in [R5][R6][R7]. For the lower hierarchy, refer to section 5.2.1.

"Audio & Music" indicates Audio & Music stream specified in [R8][R9]. For the lower hierarchy, refer to section 5.2.2.

5.2 Format hierarchy level 1

This section describes the stream format information in Format hierarchy level 1.

5.2.1 DVCR

If "DVCR" is specified as Format hierarchy root, the stream format information in Format hierarchy level 1 is described in the table below.

Table 5.2 – Format hierarchy level 1 for DVCR

Upper Hierarchy	Format	Value	Attributes	Lower Hierarchy
DVCR	SD 525-60	00 ₁₆	Refer to section 5.2.1.1	–
	SDL 525-60	04 ₁₆	Refer to section 5.2.1.1	–
	HD 1125-60	08 ₁₆	Refer to section 5.2.1.1	–
	SD 625-50	80 ₁₆	Refer to section 5.2.1.1	–
	SDL 625-50	84 ₁₆	Refer to section 5.2.1.1	–
	HD 1250-50	88 ₁₆	Refer to section 5.2.1.1	–
	Don't care	FF ₁₆	–	–
	Reserved	all others	–	–

For the "SD 525-60", "SDL525-60", "HD1125-60", "SD625-50", "SDL625-50", and "HD1250-50", the attribute information is defined in section 5.2.1.1.

5.2.1.1 Attribute information

This section describes the attribute information associated with the stream format information defined in Table 5.2. The attribute information includes the Nominal sampling frequency.

5.2.1.1.1 Nominal sampling frequency

The sampling frequency for audio signal of "SD 525-60", "SDL 525-60", "HD1125-60", "SD625-60", "SDL625-60", and "HD1250-50" are shown in Table 5.3.

Table 5.3 – Sampling frequency for DVCR

Sampling Frequency	Value
48kHz	00 ₁₆
44.1kHz	01 ₁₆
32kHz	02 ₁₆
Don't care	FF ₁₆
Reserved	all others

5.2.2 Audio & Music

If “Audio & Music” is specified as Format hierarchy root, the stream format information in Format hierarchy level 1 is described as the table below.

Table 5.4 – Format hierarchy level 1 for Audio & Music

Upper Hierarchy	Format	Value	Attributes	Lower Hierarchy
Audio & Music	AM824	00 ₁₆	–	Refer to section 5.3.1
	24bit*4 Audio Pack	01 ₁₆	–	–
	32bit Floating Point Data	02 ₁₆	–	–
	Reserved	03 ₁₆ – FE ₁₆	–	–
	Don't care	FF ₁₆	–	–

For the "AM824", the lower hierarchy is defined in section 5.3.1.

5.3 Format hierarchy level 2

This section describes the stream format information in Format hierarchy level 2.

5.3.1 AM824

If “AM824” is specified as Format hierarchy level 1, the stream format information in Format hierarchy level 2 is described as the table below.

Table 5.5 – Format hierarchy level 2 for AM824

Upper Hierarchy	Stream Format	Value	Attributes	Lower Hierarchy
AM824	IEC60958-3	00 ₁₆	Refer to section 5.3.1.1	–
	IEC61937-3	01 ₁₆	Refer to section 5.3.1.1	–
	IEC61937-4	02 ₁₆	Refer to section 5.3.1.1	–
	IEC61937-5	03 ₁₆	Refer to section 5.3.1.1	–
	IEC61937-6	04 ₁₆	Refer to section 5.3.1.1	–
	IEC61937-7	05 ₁₆	Refer to section 5.3.1.1	–
	Multi Bit Linear Audio (Raw)	06 ₁₆	Refer to section 5.3.1.1	–
	Multi Bit Linear Audio (DVD-Audio)	07 ₁₆	Refer to section 5.3.1.1	–
	One Bit Audio (Plain) Raw	08 ₁₆	Refer to section 5.3.1.1	–
	One Bit Audio (Plain) SACD	09 ₁₆	Refer to section 5.3.1.1	–
	One Bit Audio (Encoded) Raw	0A ₁₆	Refer to section 5.3.1.1	–
	One Bit Audio (Encoded) SACD	0B ₁₆	Refer to section 5.3.1.1	–
	High Precision Multi-bit Linear Audio	0C ₁₆	Refer to section 5.3.1.1	–
	MIDI Conformant	0D ₁₆	–	–
	Reserved	0E ₁₆ – FE ₁₆	–	–
Don't care	FF ₁₆	–	–	

For the “IEC60958-3”, “IEC61937-3”, “IEC61937-4”, “IEC61937-5”, “IEC61937-6”, “IEC61937-7”, “Multi Bit Linear Audio (Raw)”, “Multi Bit Linear Audio (DVD-Audio)”, “One Bit Audio (Plain) Raw”, “One Bit Audio (Plain) SACD”, “One Bit Audio (Encoded) Raw”, “One Bit Audio (Encoded) SACD”, and “High Precision Multi-bit Linear Audio”, the attribute information is defined in section 5.3.1.1.

5.3.1.1 Attribute information

This section describes the attribute information associated with the stream format information for Format hierarchy level 2 defined in Table 5.5. The attribute information includes the Nominal sampling frequency and the Command-based rate control; both information are the attribute information located at Format hierarchy level 2.

5.3.1.1.1 Nominal sampling frequency

The Nominal sampling frequency includes the sampling frequency information for Multi-bit Audio (“IEC60958-3”, “IEC61937-3”, “IEC61937-4”, “IEC61937-5”, “IEC61937-6”, “IEC61937-7”, “Multi Bit Linear Audio (Raw)”, “Multi Bit Linear Audio (DVD-Audio)”, and “High Precision Multi-bit Linear Audio”) and the sampling frequency information for One Bit Audio (“One Bit Audio (Plain) Raw”, “One Bit Audio (Plain) SACD”, “One Bit Audio (Encoded) Raw”, and “One Bit Audio (Encoded) SACD”).

The sampling frequency for Multi-bit Audio is shown in Table 5.6.

Table 5.6 – Sampling frequency for Multi-bit Audio

Sampling Frequency	Value
22.05kHz	0 ₁₆
24kHz	1 ₁₆
32kHz	2 ₁₆
44.1kHz	3 ₁₆
48kHz	4 ₁₆
96kHz	5 ₁₆
176.4kHz	6 ₁₆
192kHz	7 ₁₆
Reserved	8 ₁₆ – E ₁₆
Don't care	F ₁₆

The sampling frequency for One Bit Audio is shown in Table 5.7.

Table 5.7 – Sampling frequency for One Bit Audio

Sampling Frequency	Value
2.048MHz	0 ₁₆
2.8224MHz	1 ₁₆
3.072MHz	2 ₁₆
5.6448MHz	3 ₁₆
6.144MHz	4 ₁₆
11.2896MHz	5 ₁₆
12.288MHz	6 ₁₆
Reserved	7 ₁₆ – E ₁₆
Don't care	F ₁₆

5.3.1.1.2 Command-based rate control

The attribute information for the Command-based rate control includes the information on whether the associated stream format information supports “Command-based rate control” defined in AV/C Command Set for Rate Control of Isochronous Data Flow [R10].

Table 5.8 – Command-based rate control

Description	Value
Supported	0 ₂
Don't care	1 ₂

6. Commands

The commands defined for this specification are shown below.

Table 6.1 – Unit commands

Opcode	Value	Support level (by ctype)			Comments
		C	S	N	
STREAM FORMAT SUPPORT	Unit	–	O	–	Inquire the status of isochronous plug related to the stream format information

The STREAM FORMAT SUPPORT command has only status command type.

6.1 STREAM FORMAT SUPPORT command

6.1.1 STREAM FORMAT SUPPORT status command

The STREAM FORMAT SUPPORT status command is used to inquire the status of the specified isochronous plug related to the three specified stream formats.

The stream format information is defined in chapter 5. The detailed stream format such as Audio&Music-AM824-IEC60958-3 with 32kHz sampling frequency and Command-based rate control support or the ambiguous stream format such as only DVCR can be specified in this command.

The STREAM FORMAT SUPPORT status command frame is defined below.

	length	ck	msb						lsb
Opcode	1	√		STREAM FORMAT SUPPORT (2F ₁₆)					
Operand[0]	1	√		subfunction					
Operand[1]	1	√		plug					
Operand[2]	1	√		FF ₁₆					
Operand[3]	6	–		format_information[0]					
Operand[4]									
Operand[5]									
Operand[6]									
Operand[7]									
Operand[8]									
Operand[9]	1	√		FF ₁₆					
Operand[10]	6	–		format_information[1]					
Operand[11]									
Operand[12]									
Operand[13]									
Operand[14]									
Operand[15]									
Operand[16]	1	√		FF ₁₆					
Operand[17]	6	–		format_information[2]					
Operand[18]									
Operand[19]									
Operand[20]									
Operand[21]									
Operand[22]									

Figure 6.1 – STREAM FORMAT SUPPORT status command frame

6.1.1.1 Field definitions

subfunction:

The *subfunction* field determines the operation performed by the target, as defined by table below.

Table 6.2 – subfunction field

Subfunction	value	Support_level	Comment
INPUT	00 ₁₆	M ¹	Inquire the status of the specified isochronous input plug related to the specified stream format information
OUTPUT	01 ₁₆	M ²	Inquire whether the specified isochronous output plug supports the specified stream format information
–	all others	–	Reserved for future specification

¹ A sink device, which conforms to this optional specification, shall support this subfunction

² A source device, which conforms to this optional specification, shall support this subfunction

A) INPUT subfunction

The INPUT subfunction is used to inquire the status of the specified isochronous input plug related to the specified stream format.

B) OUTPUT subfunction

The OUTPUT subfunction is used to inquire whether the specified isochronous output plug supports the specified stream format.

plug:

When the INPUT subfunction is specified as the *subfunction* field, the *plug* field specifies the isochronous input plug of the target and is defined below:

Table 6.3 – plug field for INPUT subfunction

Plug	Value
Serial bus iPCR[0] - iPCR[30]	0 – 1E ₁₆
Any of iPCRs	7F ₁₆
Reserved	All others

The value 0 to 1E₁₆ is used to specify serial bus iPCR[0] to iPCR[30] of the target. The value 7F₁₆ is used to specify any of iPCRs of the target without specifying an isochronous plug number. If the target supports iPCR[0], iPCR[1] and external input plug 0, this value indicates iPCR[0] and iPCR[1].

When the OUTPUT subfunction is specified as the *subfunction* field, the *plug* field specifies the isochronous output plug of the target and is defined below:

Table 6.4 – plug field for OUTPUT subfunction

Plug	Value
Serial bus oPCR[0] - oPCR[30]	0 – 1E ₁₆
Any of oPCRs	7F ₁₆
Reserved	All others

The value 0 to 1E₁₆ is used to specify serial bus oPCR[0] to oPCR[30] of the target. The value 7F₁₆ is used to specify any of oPCRs of the target without specifying an isochronous plug number. If the target supports oPCR[0], oPCR[1] and external output plug 0, this value indicates oPCR[0] and oPCR[1].

format_informtion:

The *format_information* field specifies the stream format to inquire and is defined below.

Offset	length	msb						lsb
0	1	format_hierarchy_root						
1	5	format_hierarchy_root_dependent						
2								
3								
4								
5								

Figure 6.2 – format_information field

The *format_hierarchy_root* field is defined in Table 5.1. The structure of *format_hierarchy_root_dependent* field depends on the *format_hierarchy_root* field.

- A If “DVCR” is specified as the *format_hierarchy_root* field, the *format_hierarchy_root_dependent* field is shown in the figure below.

Offset	length	msb						lsb
0	1	format_hierarchy_level1						
1	3	reserved						
2								
3								
4	1	attribute						

Figure 6.3 – format_hierarchy_root_dependent field for DVCR

For the *format_hierarchy_level1* field, refer to Table 5.2.

A.1. If “SD525-60”, “SDL525-60”, “HD1125-60”, “SD625-50”, “SD625-60” or “HD1250-50” is specified as the *format_hierarchy_level1* field, the *attribute* field is shown in the figure below.

Offset	length	msb						lsb
4	1	sampling_frequency						

Figure 6.4 – attribute field type 1 for DVCR

For the *sampling_frequency* field, refer to section 5.2.1.1.1.

A.2. If “Don’t care” is specified as the *format_hierarchy_level1* field, the *attribute* field is shown in the figure below.

Offset	length	msb						lsb
4	1	reserved						

Figure 6.5 – attribute field type 2 for DVCR

B. If “Audio & Music” is specified as the *format_hierarchy_root* field, the *format_hierarchy_root_dependent* field is shown in the figure below.

Offset	length	msb						lsb
0	1	format_hierarchy_level1						
1	1	format_hierarchy_level2						
2	1	reserved						
3	2	attribute						
4								

Figure 6.6 – format_hierarchy_root_dependent field for Audio & Music

The *format_hierarchy_level1* field is defined in Table 5.4, and the *format_hierarchy_level2* field is defined in Table 5.5.

The *attribute* field is dependent on the *format_hierarchy_level1* field and the *format_hierarchy_level2* field.

B.1. If “AM824” is specified as the *format_hierarchy_level1* field and “IEC60958-3”, “IEC61937-3”, “IEC61937-4”, “IEC61937-5”, “IEC61937-6”, “IEC61937-7”, “Multi Bit Linear Audio (Raw)”, “Multi Bit Linear Audio (DVD-Audio)”, “One Bit Audio (Plain) Raw”, “One Bit Audio (Plain) SACD”, “One Bit Audio (Encoded) Raw”, “One Bit Audio (Encoded) SACD” or “High Precision Multi-bit Linear Audio” is specified as the *format_hierarchy_level2* field, the *attribute* field is shown as below.

Offset	length	msb					lsb
3	1	sampling_frequency			reserved		rate
4	1	reserved					

Figure 6.7 – attribute field type 1 for Audio & Music

For the *sampling_frequency* field, refer to section 5.3.1.1.1. For the *rate* (Command-based rate control) field, refer to section 5.3.1.1.2.

B.2. If the values other than the above which are shown in B.1 are specified as the *format_hierarchy_level1* field and *format_hierarchy_level2* field, the *attribute* field is shown as below.

Offset	length	msb					lsb
3	2	Reserved					
4							

Figure 6.8 – attribute field type 2 for Audio & Music

C If “Invalid” is specified as the *format_hierarchy_root* field, it means that no stream format information is specified, and all FF₁₆ are specified as the *format_hierarchy_root_dependent* field.

6.1.1.2 STREAM FORMAT SUPPORT status command responses

The format of STREAM FORMAT SUPPORT status response frame is defined below:

	length	msb					lsb
Opcode	1	STREAM FORMAT SUPPORT (2F ₁₆)					
Operand[0]	1	subfunction					
Operand[1]	1	plug					
Operand[2]	1	support_status[0]					
Operand[3]	6	format_information[0]					
Operand[4]							
Operand[5]							
Operand[6]							
Operand[7]							
Operand[8]							
Operand[9]	1	support_status[1]					
Operand[10]	6	format_informatin[1]					
Operand[11]							
Operand[12]							
Operand[13]							
Operand[14]							
Operand[15]							
Operand[16]	1	support_status[2]					
Operand[17]	6	format_information[2]					
Operand[18]							
Operand[19]							
Operand[20]							
Operand[21]							
Operand[22]							

Figure 6.9 – STREAM FORMAT SUPPORT status response frame

6.1.1.2.1 Field definitions

subfunction:

The *subfunction* field is the same as the status command.

plug:

The *plug* field is the same as the status command.

format_information:

The *format_information* field is the same as the status command.

support_status:

When the INPUT subfunction is specified as the *subfunction* field, the *support_status* field indicates the status of the *plug* field related to the *format_information* field. Its encoding is shown in the table below.

Table 6.5 – support_status field for INPUT subfunction

Value	Support_status
00 ₁₆	supported and configured
01 ₁₆	supported and has not been configured
02 ₁₆	supported and ready to configure
03 ₁₆	supported and not configured
04 ₁₆	not supported
05 ₁₆ – FE ₁₆	reserved
FF ₁₆	no information

The “supported and configured” *support_status* means that the specified plug supports the specified stream format and is configured to receive data in the specified stream format, and the target can process the data in the specified stream format within the unit. This value is returned even though no isochronous connection exists on the specified plug.

NOTE – When the specified plug is connected to multiple plugs within the unit, if the target decides that it can process data in the specified stream format within the unit (even though some destinations have not been completed a setup) and the target configured the specified plug to receive the data in the specified stream format, “supported and configured” is specified. For example, when the specified plug is connected to a DISC subunit and a Audio subunit within the unit, and the destination plug of the DISC subunit has completed a setup while the destination plug of the Audio subunit has not been completed a setup, if the target decides that it can process data in the specified stream format within the unit and the target configured the specified plug to receive the data in the specified stream format, this value is returned.

The “supported and has not been configured” *support_status* means that the specified plug supports the specified stream format and is not configured to receive data in the specified stream format, and the target is going to configure the specified plug in the specified stream format, but has not been completed yet.

NOTE – When the specified plug is connected to multiple plugs within the unit, if the target decides that it is going to configure the specified plug to receive data in the specified stream format (e.g. some destinations have not been completed a setup), this value is returned.

The “supported and ready to configure” *support_status* means that the specified plug supports the specified stream format and is not configured to receive data in the specified stream format now. But if the target receives the data in the specified stream format, the target is able to start to configure the specified plug in the specified stream format.

The “supported and not configured” *support_status* means that the specified plug supports the specified format and is not configured to receive data in the specified format now. Even though the target receives the data in the specified stream format, the target is not able to start to configure the specified plug in the specified stream format unless some kinds of triggers are invoked within the unit. For example, some MDs are not able to start to configure the specified plug in the specified format unless some triggers which makes MD to record (e.g. press “Record” button on the MD) are invoked within the unit.

The “not supported” *support_status* means that the specified plug does not support the specified stream format.

The “no information” *support_status* is returned when All FF₁₆ are specified as the *format_information* field in the command frame.

When “Any of iPCRs” is specified as the *plug* field, the target that implements several iPCRs may have different support status according to each iPCR. In this case, the *support_status* field is specified based on the priority shown as below.

“supported and configured” > “supported and has not been configured” > “supported and ready to configure” > “supported and not configured” > “not supported”

When the specified plug is connected to multiple plugs within the unit, some destinations may have different support status. In this case, the *support_status* field is specified based on the priority shown as below.

“supported and configured” > “supported and has not been configured” > “supported and ready to configure” > “supported and not configured”

When the OUTPUT subfunction is specified as the *subfunction* field in the command frame, the *support_status* field indicates whether the specified plug supports the specified format. Its encoding is shown in the table below.

Table 6.6 – support_status field for OUTPUT subfunction

Value	Support_status
00 ₁₆	supported
01 ₁₆ – 03 ₁₆	not used
04 ₁₆	not supported
05 ₁₆ – FE ₁₆	reserved
FF ₁₆	no information

The “supported” *support_status* means that the specified plug supports the specified stream format.

The “not supported” *support_status* means that the specified plug does not support the specified stream format.

The “no information” *support_status* is returned when All FF₁₆ are specified as the *format_information* field in the command frame.

When “Any of oPCRs” is specified as the *plug* field, if at least the status of an isochronous output plug is “supported”, “supported” is specified as the *support_status* field.

6.1.1.3 STREAM FORMAT SUPPORT status command and response field values

The following table shows the field values in the STREAM FORMAT SUPPORT status command with INPUT subfunction and response frames.

Table 6.7 – Field values in the STREAM FORMAT SUPPORT status command with INPUT subfunction: REJECTED and STABLE response frames

Fields	Command	Response	
		REJECTED	STABLE
subfunction	00 ₁₆	←	←
plug	0 – 1E ₁₆ , 7F ₁₆	←	←
support_status[0,1,2]	FF ₁₆	←	00 ₁₆ – 04 ₁₆ , FF ₁₆
format_information[0,1,2]	format_information ¹	←	←

¹ Refer to section 6.1.1.1.

← means “same as the command frame”.

The IN TRANSITION response frame does not apply to the STREAM FORMAT SUPPORT status command with INPUT subfunction.

The following table shows the field values in the STREAM FORMAT SUPPORT status command with OUTPUT subfunction and response frames.

Table 6.8 – Field values in the STREAM FORMAT SUPPORT status command with OUTPUT subfunction: REJECTED and STABLE response frames

Fields	Command	Response	
		REJECTED	STABLE
subfunction	01 ₁₆	←	←
plug	0 – 1E ₁₆ , 7F ₁₆	←	←
support_status[0,1,2]	FF ₁₆	←	00 ₁₆ , 04 ₁₆ , FF ₁₆
format_information[0,1,2]	format_information ¹	←	←

¹ Refer to section 6.1.1.1.

← means “same as the command frame”.

The IN TRANSITION response frame does not apply to the STREAM FORMAT SUPPORT status command with OUTPUT subfunction.

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Annexes

Annex A: Usage (Informative)

This chapter describes the usage of the command specified in this specification using the scenario described in section 4.1.1 “Source devices selection” and section 4.2 “Output in the appropriate format”.

A.1 Example 1

In the scenario “Source devices selection”, TV executes the following sequence that is shown in Figure A-1 in order to show the source devices that TV is able to input on the selection list. TV will execute this sequence when a user presses “Source device select” button on the remote control, or before a user presses “Source device select” button on the remote control (e.g. device discovery). *Step* is described in Figure A-1, and the detailed processing for each *Step* is described as below.

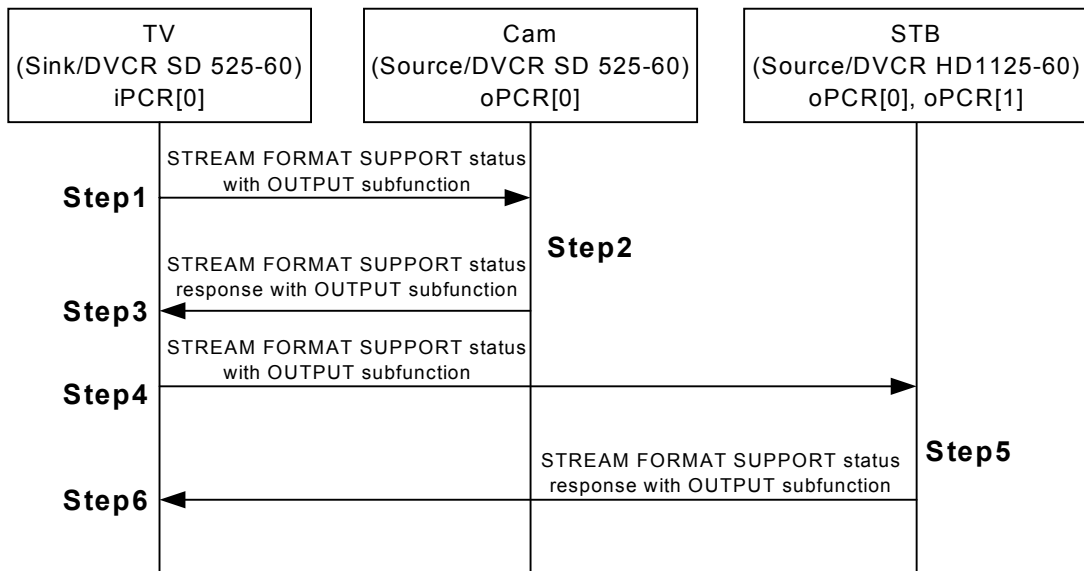


Figure A.1 – AV/C sequence chart for example 1

Step1:

TV needs to determine whether Cam is able to output in DVCR SD525-60 format. Hence, TV sends the STREAM FORMAT SUPPORT status command with OUTPUT subfunction that is shown in Figure A-2 to Cam.

Plug field can be specified either as “oPCR[0] (00₁₆)” or “Any of oPCRs (7F₁₆)” shown in Table 6.3. *Format_hierarchy_root* field and *Format_hierarchy_level1* field is specified as “DVCR SD525-60 (80₁₆00₁₆)” (refer to Table 5.1 and Table 5.2). *Sampling_frequency* field is specified as “Don’t care (FF₁₆)”. The remaining fields are specified as all FF₁₆.

	length	ck	msb						lsb
Opcode	1	√		STREAM FORMAT SUPPORT (2F ₁₆)					
Operand[0]	1	√		OUTPUT (01 ₁₆)					
Operand[1]	1	√		oPCR[0] (00 ₁₆)					
Operand[2]	1	√		FF ₁₆					
Operand[3]	6	-		DVCR (80 ₁₆)					
Operand[4]				SD 525-60 (00 ₁₆)					
Operand[5]				reserved (00 ₁₆)					
Operand[6]				reserved (00 ₁₆)					
Operand[7]				reserved (00 ₁₆)					
Operand[8]				Don't care (FF ₁₆)					
Operand[9]	1	√		FF ₁₆					
Operand[10]	6	-		Invalid (FF ₁₆)					
Operand[11]				FF ₁₆					
Operand[12]				FF ₁₆					
Operand[13]				FF ₁₆					
Operand[14]				FF ₁₆					
Operand[15]				FF ₁₆					
Operand[16]	1	√		FF ₁₆					
Operand[17]	6	-		Invalid (FF ₁₆)					
Operand[18]				FF ₁₆					
Operand[19]				FF ₁₆					
Operand[20]				FF ₁₆					
Operand[21]				FF ₁₆					
Operand[22]				FF ₁₆					

Figure A.2 – STREAM FORMAT SUPPORT status command with OUTPUT subfunction (Step1)

Step2:

Cam receives the STREAM FORMAT SUPPORT status command with OUTPUT subfunction, and validates the command according to [R4] and this specification. In this case, the command conforms to [R4] and this specification. Cam is able to output in DVCR SD525-60 format through oPCR[0], hence Cam sends the STREAM FORMAT SUPPORT status response which is specified as “supported (00₁₆)” in the *support_status[0]* field (Figure A-3).

	length	msb							Lsb
Opcode	1	STREAM FORMAT SUPPORT (2F ₁₆)							
Operand[0]	1	OUTPUT (01 ₁₆)							
Operand[1]	1	oPCR[0] (00 ₁₆)							
Operand[2]	1	supported (00 ₁₆)							
Operand[3]	6	DVCR (80 ₁₆)							
Operand[4]		SD 525-60(00 ₁₆)							
Operand[5]		reserved(00 ₁₆)							
Operand[6]		reserved(00 ₁₆)							
Operand[7]		reserved(00 ₁₆)							
Operand[8]		Don't care (FF ₁₆)							
Operand[9]	1	no information (FF ₁₆)							
Operand[10]	6	Invalid (FF ₁₆)							
Operand[11]		FF ₁₆							
Operand[12]		FF ₁₆							
Operand[13]		FF ₁₆							
Operand[14]		FF ₁₆							
Operand[15]		FF ₁₆							
Operand[16]	1	no information (FF ₁₆)							
Operand[17]	6	Invalid (FF ₁₆)							
Operand[18]		FF ₁₆							
Operand[19]		FF ₁₆							
Operand[20]		FF ₁₆							
Operand[21]		FF ₁₆							
Operand[22]		FF ₁₆							

Figure A.3 – STREAM FORMAT SUPPORT status response with OUTPUT subfunction (Step2)

Step3:

TV receives the STREAM FORMAT SUPPORT status response with OUTPUT subfunction that is shown in Figure A-3 from Cam. TV validates whether the response without *support_status[0]* field is the same as the command which is shown in Figure A-2. If the response without *support_status[0]* field is the same as the command, TV determines that Cam is able to output in DVCR SD525-60 format from the *support_status[0]* field.

Step4:

TV needs to determine whether STB is able to output in DVCR SD525-60 format. Hence, TV sends the STREAM FORMAT SUPPORT status command with OUTPUT subfunction that is shown in Figure A-4 to STB.

Plug field is specified as “Any of oPCRs (7F₁₆)” shown in Table 6.3. *Format_hierarchy_root* field and *Format_hierarchy_level1* field is specified as “DVCR SD525-60 (80₁₆00₁₆)”(refer to Table 5.1 and Table 5.2). *Sampling_frequeuncy* filed is specified as “Don't care (FF₁₆)”. The remaining fields are specified as all FF₁₆.

	length	ck	msb						lsb
Opcode	1	√		STREAM FORMAT SUPPORT (2F ₁₆)					
Operand[0]	1	√		OUTPUT (01 ₁₆)					
Operand[1]	1	√		Any of oPCRs (7F ₁₆)					
Operand[2]	1	√		FF ₁₆					
Operand[3]	6	-		DVCR (80 ₁₆)					
Operand[4]				SD 525-60 (00 ₁₆)					
Operand[5]				reserved (00 ₁₆)					
Operand[6]				reserved (00 ₁₆)					
Operand[7]				reserved (00 ₁₆)					
Operand[8]				Don't care (FF ₁₆)					
Operand[9]	1	√		FF ₁₆					
Operand[10]	6	-		Invalid (FF ₁₆)					
Operand[11]				FF ₁₆					
Operand[12]				FF ₁₆					
Operand[13]				FF ₁₆					
Operand[14]				FF ₁₆					
Operand[15]				FF ₁₆					
Operand[16]	1	√		FF ₁₆					
Operand[17]	6	-		Invalid (FF ₁₆)					
Operand[18]				FF ₁₆					
Operand[19]				FF ₁₆					
Operand[20]				FF ₁₆					
Operand[21]				FF ₁₆					
Operand[22]				FF ₁₆					

Figure A.4 – STREAM FORMAT SUPPORT status command with OUTPUT subfunction (Step4)

Step5:

STB receives the STREAM FORMAT SUPPORT status command with OUTPUT subfunction, and validates the command according to [R4] and this specification. In this case, the command conforms to [R4] and this specification. STB is not able to output in DVCR SD525-60 format through either oPCR[0] or oPCR[1], hence STB sends the STREAM FORMAT SUPPORT status response with OUTPUT subfunction which is specified as “not supported (04₁₆)” in the *support_status[0]* field (Figure A-5).

	length	msb						lsb
Opcode	1	STREAM FORMAT SUPPORT (2F ₁₆)						
Operand[0]	1	OUTPUT (01 ₁₆)						
Operand[1]	1	Any of oPCRs (7F ₁₆)						
Operand[2]	1	not supported (04 ₁₆)						
Operand[3]	6	DVCR (80 ₁₆)						
Operand[4]		SD 525-60 (00 ₁₆)						
Operand[5]		reserved (00 ₁₆)						
Operand[6]		reserved (00 ₁₆)						
Operand[7]		reserved (00 ₁₆)						
Operand[8]		Don't care (FF ₁₆)						
Operand[9]	1	no information (FF ₁₆)						
Operand[10]	6	Invalid (FF ₁₆)						
Operand[11]		FF ₁₆						
Operand[12]		FF ₁₆						
Operand[13]		FF ₁₆						
Operand[14]		FF ₁₆						
Operand[15]		FF ₁₆						
Operand[16]	1	no information (FF ₁₆)						
Operand[17]	6	Invalid (FF ₁₆)						
Operand[18]		FF ₁₆						
Operand[19]		FF ₁₆						
Operand[20]		FF ₁₆						
Operand[21]		FF ₁₆						
Operand[22]		FF ₁₆						

Figure A.5 – STREAM FORMAT SUPPORT status response with OUTPUT subfunction (Step5)

Step6:

TV receives the STREAM FORMAT SUPPORT status response with OUTPUT subfunction that is shown in Figure A-5 from STB. TV validates whether the response without *support_status[0]* field is the same as the command which is shown in Figure A-4. If the response without *support_status[0]* field is the same as the command, TV determines that STB is not able to output in DVCR SD525-60 format from the *support_status[0]* field.

Consequently, TV displays only Cam on the selection list.

A.2 Example 2

In the scenario “Output in the appropriate format”, Disc player executes the following sequence which is shown in Figure A-6 in order to output contents in the appropriate format to TV. Disc player will execute this sequence when a user presses “Play” button on the Disc player, or before a user presses “Play” button on the Disc player (e.g. device discovery). *Step* is described in Figure A-6, and the detailed processing for each *Step* is described as below.

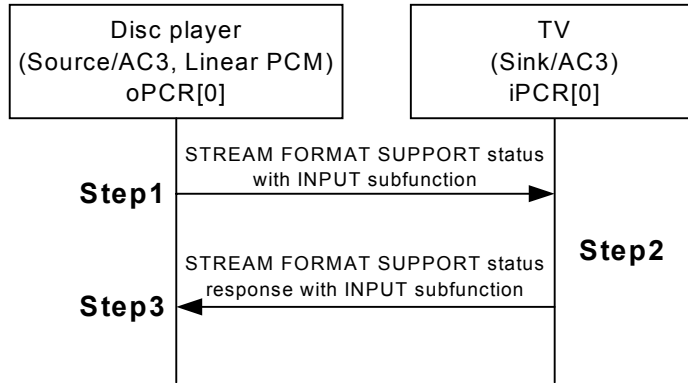


Figure A.6 – AV/C sequence chart for example 2

Step1:

Disc player needs to inquire of TV the status of iPCR[0] related to AC3 or Linear PCM format. Hence, Disc player sends the STREAM FORMAT SUPPORT status command with INPUT subfunction that is shown in Figure A-7 to TV. *Plug* field can be specified either as “iPCR[0] (00₁₆)” or “Any of iPCRs (7F₁₆)” shown in Table 6.3. *Format_information[0]* field is specified as “AC3 (90₁₆00₁₆01₁₆)”, and *Format_information[1]* field is specified as “Linear PCM (90₁₆00₁₆00₁₆)” (refer to Table 5.1, Table 5.4, and Table 5.5). Further, as the attribute information for the *Format_information[0]* field and the *format_information[1]* field, the *sampling_frequency* fields of the both are specified as “Don’t care (F₁₆)”, and the *rate* field of the both are specified as “Don’t care (1)” (refer to Table 5.6 and Table 5.8). The remaining fields are specified as all FF₁₆.

	length	ck	msb					lsb		
Opcode	1	√	STREAM FORMAT SUPPORT (2F ₁₆)							
Operand[0]	1	√	INPUT (00 ₁₆)							
Operand[1]	1	√	iPCR[0] (00 ₁₆)							
Operand[2]	1	√	FF ₁₆							
Operand[3]	6	-	Audio & Music (90 ₁₆)							
Operand[4]			AM824 (00 ₁₆)							
Operand[5]			IEC61937-3 (01 ₁₆)							
Operand[6]			reserved (00 ₁₆)							
Operand[7]			Don't care (F ₁₆)			reserved (0 ₁₆)		rate (1 ₂)		
Operand[8]			reserved (00 ₁₆)							
Operand[9]	1	√	FF ₁₆							
Operand[10]	6	-	Audio & Music (90 ₁₆)							
Operand[11]			AM824 (00 ₁₆)							
Operand[12]			IEC60958-3 (00 ₁₆)							
Operand[13]			reserved (00 ₁₆)							
Operand[14]			Don't care (F ₁₆)			reserved (0 ₁₆)		rate (1 ₂)		
Operand[15]			reserved (00 ₁₆)							
Operand[16]	1	√	FF ₁₆							
Operand[17]	6	-	Invalid (FF ₁₆)							
Operand[18]			FF ₁₆							
Operand[19]			FF ₁₆							
Operand[20]			FF ₁₆							
Operand[21]			FF ₁₆							
Operand[22]			FF ₁₆							

Figure A.7 – STREAM FORMAT SUPPORT status command with INPUT subfunction (Step1)

Step2:

TV receives the STREAM FORMAT SUPPORT status command with INPUT subfunction, and validates the command according to [R4] and this specification. In this case, the command conforms to [R4] and this specification, and TV does not support Linear PCM format but supports AC3 format and configured iPCR[0] to receive data in AC3 format. Hence TV sends the STREAM FORMAT SUPPORT status response with INPUT subfunction which is specified as “supported and configured (00₁₆)” in the *support_status[0]* field and is specified as “not supported (04₁₆)” in the *support_status[1]*.

	length	msb						Lsb	
Opcode	1	STREAM FORMAT SUPPORT (2F ₁₆)							
Operand[0]	1	INPUT (00 ₁₆)							
Operand[1]	1	iPCR[0] (00 ₁₆)							
Operand[2]	1	supported and configured (00 ₁₆)							
Operand[3]	6	Audio & Music (90 ₁₆)							
Operand[4]		AM824 (00 ₁₆)							
Operand[5]		IEC61937-3 (01 ₁₆)							
Operand[6]		reserved (00 ₁₆)							
Operand[7]		Don't care (F ₁₆)			reserved (0 ₁₆)			rate (1 ₂)	
Operand[8]		reserved (00 ₁₆)							
Operand[9]	1	not supported (04 ₁₆)							
Operand[10]	6	Audio & Music (90 ₁₆)							
Operand[11]		AM824 (00 ₁₆)							
Operand[12]		IEC60958-3 (00 ₁₆)							
Operand[13]		reserved (00 ₁₆)							
Operand[14]		Don't care (F ₁₆)			reserved (0 ₁₆)			rate (1 ₂)	
Operand[15]		reserved (00 ₁₆)							
Operand[16]	1	no information (FF ₁₆)							
Operand[17]	6	Invalid (FF ₁₆)							
Operand[18]		FF ₁₆							
Operand[19]		FF ₁₆							
Operand[20]		FF ₁₆							
Operand[21]		FF ₁₆							
Operand[22]		FF ₁₆							

Figure A.8 – STREAM FORMAT SUPPORT status response with INPUT subfunction (Step2)

Step3:

Disc player receives the STREAM FORMAT SUPPORT status response with INPUT subfunction that is shown in Figure A-8 from TV. Disc player validates whether the response without *support_status[0,1]* fields is the same as the command which is shown in Figure A-7. If the response without *support_status[0,1]* fields is the same as the command, Disc player determines that TV does not support Linear PCM format but supports AC3 format and configured iPCR[0] to receive data in AC3 format from the *support_status[0,1]* fields.

Consequently, Disc player is able to output in the appropriate format (in this case, AC3) to TV.