

INTERNATIONAL STANDARD

NORME INTERNATIONALE

Consumer audio/video equipment – Digital interface –
Part 1: General

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Matériel audio/vidéo grand public – Interface numérique –
Partie 1: Généralités

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CONTENTS

FOREWORD.....	5
1 Scope and object.....	7
2 Normative references	7
3 Abbreviations	7
4 High-performance serial bus layers	8
4.1 Cable physical layer	8
4.2 Link layer	8
4.3 Transaction layer.....	8
5 Minimum node capabilities	8
5.1 Serial bus management.....	8
5.2 Command and status registers	8
5.2.1 CSR core registers	8
5.2.2 Serial bus node registers	9
5.2.3 Configuration ROM requirements.....	9
6 Real time data transmission protocol	12
6.1 Common isochronous packet (CIP) format.....	12
6.1.1 Isochronous packet structure	12
6.1.2 Packet header structure.....	12
6.1.3 CIP header structure	13
6.2 Transmission of fixed length source packet	13
6.2.1 Two-quadlet CIP header (form_0=0, form_1=0)	14
6.2.2 Isochronous packet transmission	17
7 Isochronous data flow management.....	17
7.1 General	17
7.2 Plugs and plug control registers	18
7.3 Connections	19
7.4 Plug states	20
7.5 OUTPUT_MASTER_PLUG register definition	22
7.6 INPUT_MASTER_PLUG register definition	23
7.7 OUTPUT_PLUG_CONTROL register definition	23
7.8 INPUT_PLUG_CONTROL register definition.....	25
7.9 Plug control register modification rules	26
7.10 Bus reset.....	27
7.11 Plug control register access rules	27
8 Connection management procedures (CMP).....	28
8.1 Introduction	28
8.2 Managing point-to-point connections	29
8.2.1 Procedure for establishing a point-to-point connection.....	29
8.2.2 Procedure for overlaying a point-to-point connection	30
8.2.3 Procedure for breaking a point-to-point connection	31
8.3 Managing broadcast-out connections	32
8.3.1 Procedure for establishing a broadcast-out connection	32
8.3.2 Procedure for overlaying a broadcast-out connection.....	33
8.3.3 Procedure for breaking a broadcast-out connection	33
8.4 Managing broadcast-in connections.....	34

8.4.1	Procedure for establishing a broadcast-in connection	34
8.4.2	Procedure for overlaying a broadcast-in connection.....	35
8.4.3	Procedure for breaking a broadcast-in connection	35
8.5	Managing connections after a bus reset	36
8.5.1	Procedure for restoring a point-to-point connection after a bus reset	36
8.5.2	Procedure for restoring a broadcast-out connection after a bus reset	37
8.5.3	Procedure for restoring a broadcast-in connection after a bus reset	38
9	Function control protocol (FCP)	38
9.1	Introduction	38
9.2	Asynchronous packet structure.....	39
9.3	FCP frame structure	40
9.3.1	Vendor unique command/transaction set	41
9.3.2	Extended command/transaction set	42
Figure 1	– Configuration ROM	10
Figure 2	– Isochronous packet.....	12
Figure 3	– CIP header.....	13
Figure 4	– Model of transmission of source packets	14
Figure 5	– Two quadlets CIP header (Form_0, Form_1=0).....	14
Figure 6	– Source packet header format	15
Figure 7	– Plug and PR usage	19
Figure 8	– Connections	20
Figure 9	– Plug state diagram	21
Figure 10	– oMPR format	22
Figure 11	– iMPR format	23
Figure 12	– oPCR format	24
Figure 13	– iPCR format	26
Figure 14	– PCR address map	27
Figure 15	– Point-to-point and broadcast connection counter modifications	29
Figure 16	– Establishing a point-to-point connection	30
Figure 17	– Overlaying a point-to-point connection	31
Figure 18	– Breaking a point-to-point connection	32
Figure 19	– Establishing a broadcast-out connection	33
Figure 20	– Overlaying a broadcast-out connection.....	33
Figure 21	– Breaking a broadcast-out connection	34
Figure 22	– Establishing a broadcast-in connection	35
Figure 23	– Overlaying a broadcast-in connection.....	35
Figure 24	– Breaking a broadcast-in connection.....	36
Figure 25	– Time chart of connection management and PCR activities	36
Figure 26	– Restoring a point-to-point connection	37
Figure 27	– Restoring a broadcast-out connection	38
Figure 28	– Restoring a broadcast-in connection	38
Figure 29	– Command register and response register	39
Figure 30	– Write request for data block packet of IEEE 1394.....	40
Figure 31	– Write request for data quadlet packet of IEEE 1394	40

Figure 32 – FCP frame structure 41

Figure 33 – Vendor unique frame format 42

Table 1 – Unit_SW_Version code assignment 11

Table 2 – Code allocation of FN 15

Table 3 – Time stamp field of source packet header 16

Table 4 – Placing of data block sequence 16

Table 5 – Code allocation of FMT 16

Table 6 – Time stamp of SYT field 17

Table 7 – oMPR/iMPR/oPCR speed encoding *spd* and extended speed encoding *xspd* 22

Table 8 – oPCR overhead ID encoding 25

Table 9 – CTS: Command/transaction set encoding 41

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International Standard IEC 61883-1 has been prepared by technical area 4, Digital system interfaces and protocols, of IEC technical committee 100: Audio, video and multimedia systems and equipment.

This third edition of IEC 61883-1 cancels and replaces the second edition, published in 2003, of which it constitutes a technical revision.

The significant technical changes with respect to the second edition are as follows:

- allocation of a new FMT code for the 1394 Trade Association specification '601 over 1394';
- Clarification of the meaning of FMT code;
- harmonization of IEC 61883-1 with IEEE 1394.1 for speeds over S400.

This bilingual version (2012-08) corresponds to the monolingual English version, published in 2008-02.

The text of this standard is based on the following documents:

CDV	Report on voting
100/1236/CDV	100/1336/RVC

Full information on the voting for the approval of this standard can be found in the report on voting indicated in the above table.

The French version of this standard has not been voted upon.

This publication has been drafted in accordance with the ISO/IEC Directives, Part 2.

A list of all parts of the IEC 61883 series, under the general title *Consumer audio/video equipment – Digital interface*, can be found on the IEC website.

The committee has decided that the contents of this publication will remain unchanged until the maintenance result date indicated on the IEC web site under "<http://webstore.iec.ch>" in the data related to the specific publication. At this date, the publication will be

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CONSUMER AUDIO/VIDEO EQUIPMENT – DIGITAL INTERFACE –

Part 1: General

1 Scope and object

This part of IEC 61883 specifies a digital interface for consumer electronic audio/video equipment using IEEE 1394. It describes the general packet format, data flow management and connection management for audio-visual data, and also the general transmission rules for control commands.

The object of this standard is to define a transmission protocol for audio-visual data and control commands which provides for the interconnection of digital audio and video equipment, using IEEE 1394.

2 Normative references

The following referenced documents are indispensable for the application of this document. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

IEEE 212:2001, *Standard for a Control and Status Registers (CSR) – Architecture for microcomputer buses*

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IEEE 1394:1995, *Standard for a High Performance Serial Bus*

IEEE 1394a:2000, *Standard for a High Performance Serial Bus – Amendment 1*

NOTE Throughout this document, the term “IEEE 1394” indicates a reference to the standard that is the result of the editorial combination of IEEE 1394:1995 and IEEE 1394a:2000. Devices conforming solely to IEEE 1394:1995 may conform to IEC 61883. Devices conforming to IEC 61883 should conform to IEEE 1394a:2000.

3 Abbreviations

For the purpose of this document, the following abbreviations apply.

AV/C	Audio Video Control
CHF	CIP Header Field
CIP	Common Isochronous Packet
CMP	Connection Management Procedures
CSR	Command and Status Register
CTS	Command/Transaction Set
CRC	Cyclic Redundancy Check Code
DVCR	Digital Video Cassette Recorder
EOH	End of CIP Header
FCP	Function Control Protocol
iPCR	Input Plug Control Register
iMPR	Input Master Plug Register
MPEG	Motion Picture Experts Group
oPCR	Output Plug Control Register

<i>oMPR</i>	Output Master Plug Register
<i>ROM</i>	Read Only Memory
<i>spd</i>	Speed Encoding
<i>xspd</i>	Extended Speed Encoding

For clarity, field names are shown in italics in this standard.

4 High-performance serial bus layers

4.1 Cable physical layer

All cable physical layer implementations conforming to this standard shall meet the performance criteria specified by IEEE 1394. Either the cable and connector defined in IEEE 1394:1995, or the cables and connector defined in IEEE 1394a:2000, shall be used.

When necessary for an AV device to generate a bus reset, it shall follow the requirements of IEEE 1394a:2000, 8.2.1. An AV device that initiates a bus reset should generate an arbitrated (short) bus reset, as specified by IEEE 1394a:2000, in preference to the long bus reset defined by IEEE 1394:1995.

4.2 Link layer

All link layer implementations conforming to this standard shall meet the specifications of IEEE 1394.

4.3 Transaction layer

All transaction layer implementations conforming to this standard shall meet the specifications of IEEE 1394.

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5 Minimum node capabilities

A node shall conform to the following requirements.

- A node shall be cycle master capable. This is because every node has the possibility to be assigned as a root.
- A node shall be isochronous resource manager capable, as specified by IEEE 1394:1995, and shall implement the additional isochronous resource manager facilities and responsibilities specified by IEEE 1394a:2000 in 8.3.1.5, 8.3.2.3.8, 8.3.2.3.11, 8.4.2.3 and 8.4.2.6A.
- A node which transmits or receives isochronous packets shall have plug control registers (see 7.2).

5.1 Serial bus management

Bus manager capability is optional for AV devices, but, if implemented by devices conforming to this standard, shall conform to IEEE 1394.

5.2 Command and status registers

5.2.1 CSR core registers

This standard conforms to the CSR architecture. Details of its registers are specified by IEEE 1394.

The STATE_CLEAR.*cmstr* bit shall be implemented as specified by IEEE 1394a:2000, 8.3.2.2.1.

NOTE The *cmstr* bit is set automatically (see IEEE 1394a:2000, 8.3.2.2.1) by system software or hardware when a node becomes the new root after the bus reset process is completed. In this manner, it is possible to ensure the fast resumption and continuity of data transmission where the time scale is critical at the level of microseconds. The rapid activation of a new cycle master decreases the likelihood of a gap in the transmission of cycle start packets; uninterrupted transmission of cycle start packets at nominal 125 µs intervals is critical to the delivery of isochronous data within its latency requirements.

5.2.2 Serial bus node registers

Implementation requirements for bus-dependent registers in this standard conform to IEEE 1394. A node shall have the following registers:

- CYCLE_TIME register
- BUS_TIME register
- BUS_MANAGER_ID register
- BANDWIDTH_AVAILABLE register
- CHANNELS_AVAILABLE register

A node should have the following register specified by IEEE 1394a:2000:

- BROADCAST_CHANNEL register

5.2.3 Configuration ROM requirements

A node shall implement the general ROM format as defined in IEEE 1212:2001 and IEEE 1394. Additional information required for implementations of this standard shall be included in one of the unit directories. Figure 1 shows an example of the configuration ROM implementation for this standard.

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Offset (Base address FFFF F000 0000₁₆)

Bus_info_block

04 00 ₁₆	04 ₁₆	crc_length	rom_crc_value
04 04 ₁₆	" 1 3 9 4		
04 08 ₁₆	irmc cmc isc bmc	Reserved	cyc_clk_acc max_rec Reserved
04 0C ₁₆	node_vendor_id		chip_id_hi
04 10 ₁₆	chip_id_lo		

Root_directory



04 14 ₁₆	root_length	CRC
04 18 ₁₆	03 ₁₆	module_vendor_id
04 1C ₁₆	0C ₁₆	node_capabilities
04 20 ₁₆	8D ₁₆	node_unique_id offset
04 24 ₁₆	D1 ₁₆	unit_directory offset

04 28₁₆ :  **Optional** 

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Unit_directory

	unit_directory_length	CRC
	12 ₁₆	unit_spec_id
	13 ₁₆	unit_sw_version
:	 Optional 	

Node_unique_id leaf

00 02 ₁₆	CRC	
	node_vendor_id	chip_id_hi
	chip_id_lo	

IEC 3059/02

Figure 1 – Configuration ROM

5.2.3.1 Bus_Info_Block entry

Implementation requirements for the Bus_Info_Block in this standard shall conform to IEEE 1394.

5.2.3.2 Root directory

The following entries shall be present:

- Module_Vendor_ID;
- Node_Capabilities;
- Unit_Directory (offset to a unit directory defined by this standard).

Other entries may be implemented in addition to the above required entries.

5.2.3.3 Unit directory

The following entries shall be present:

- Unit_Spec_ID;
- Unit_SW_Version.

The value of the Unit_Spec_ID and the Unit_SW_Version for this standard are given as follows:

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Unit_Spec_ID: First octet = 00₁₆
Second octet = A0₁₆
Third octet = 2D₁₆

Unit_SW_Version: First octet = 01₁₆

The second and third octets of Unit_SW_Version for this standard are specified in Table 1 and indicate capabilities for command/transaction sets. The Unit_SW_Version field is used to identify which protocol is supported by the device. If a device supports more than one protocol, the device shall have a separate unit directory for each protocol supported.

Table 1 – Unit_SW_Version code assignment

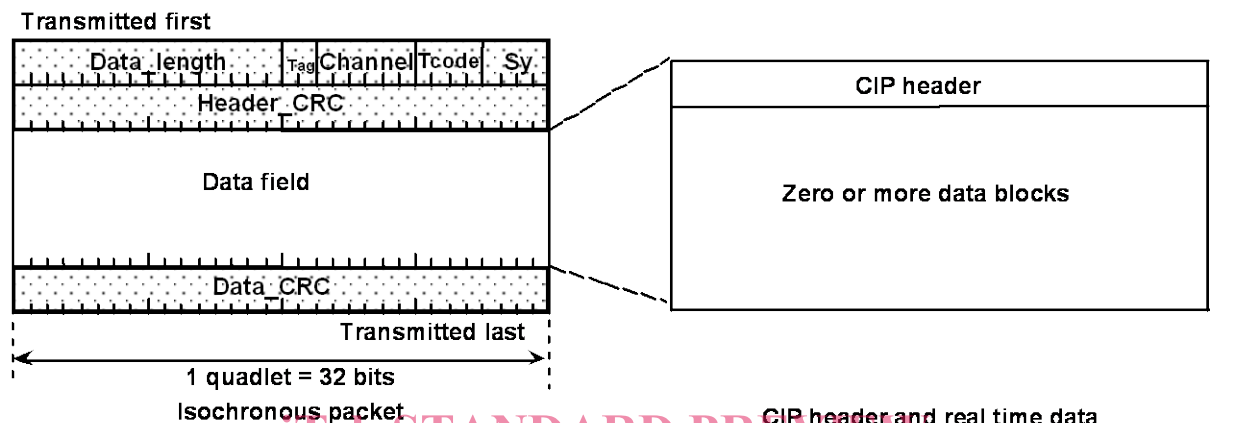
Unit_SW_Version	Command/transaction set
01 00 00 ₁₆	Reserved
01 00 01 ₁₆	AV/C protocol
01 00 02 ₁₆	Reserved for standardization by CAL
01 00 04 ₁₆	Reserved for standardization by EHS
01 00 08 ₁₆	HAVi protocol
01 00 0A ₁₆	Automotive
01 40 00 ₁₆	Vendor unique
01 40 01 ₁₆	Vendor unique
Other values	Reserved for future standardization

6 Real time data transmission protocol

6.1 Common isochronous packet (CIP) format

6.1.1 Isochronous packet structure

The structure of the isochronous packet utilized by this standard is illustrated in Figure 2. The packet header and header CRC are the first two quadlets of an IEEE 1394 isochronous packet. The CIP header is placed at the beginning of the data field of an IEEE 1394 isochronous packet, immediately followed by zero or more data blocks.



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Figure 2 – Isochronous packet

CIP header and real time data

IEC 3060/02

6.1.2 Packet header structure

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The packet header consists of the following items as specified in IEEE 1394.

Data_length: specifies the length of the data field of the isochronous packet in bytes, which is determined as follows:

CIP header size + signal data size

Tag: provides a high level label for the format of data carried by the isochronous packet

00₂ = No CIP header included

01₂ = CIP header included as specified in 6.1.3

10₂ = Reserved

11₂ = Reserved

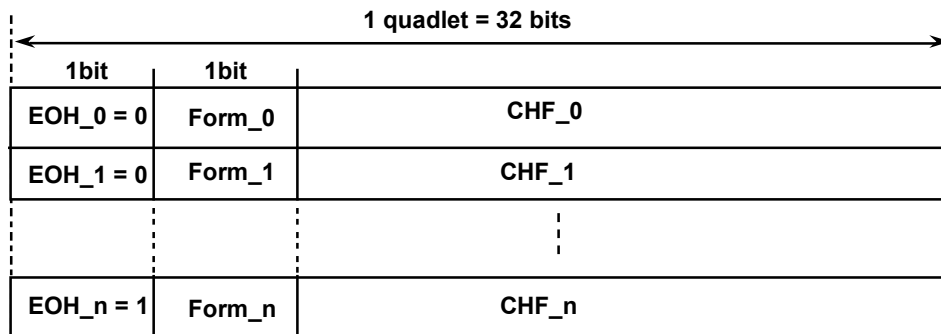
Channel: specifies the isochronous channel number for the packet

Tcode: specifies the packet format and the type of transaction that shall be performed (fixed at 1010₂)

Sy: application-specific control field

6.1.3 CIP header structure

The CIP header is placed at the beginning of the data field of an IEEE 1394 isochronous packet. It contains information on the type of the real time data contained in the data field following it. The structure of the CIP header is shown in Figure 3.



IEC 3061/02

Figure 3 – CIP header

The definitions of the fields are given as follows:

EOH_n (End of CIP header): means the last quadlet of a CIP header

0 = Another quadlet will follow

1 = The last quadlet of a CIP header

Form_n: in combination with EOH_n, shows the additional structure of CHF_n

CHF_n (CIP header field): CIP header field of nth quadlet. The additional structure of CHF_n depends on EOH_0, form_0, EOH_1, form_1, ..., EOH_n, and form_n

6.2 Transmission of fixed-length source packet

This protocol transfers a stream of source packets from an application on a device to an application on other device(s). A source packet is assumed to have a fixed length, which is defined for each type of data. The data rate can be variable.

A source packet may be split into 1, 2, 4 or 8 data blocks, and zero or more data blocks are contained in an IEEE 1394 isochronous packet. A receiver of the packet shall collect the data blocks in the isochronous packet and combine them to reconstruct the source packet to send to the application.

A model conforming to these requirements is shown in Figure 4.