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**Service diagnostic interface for consumer
electronics products and networks –
Implementation for IEEE 1394**

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Tel: +41 22 919 02 11
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International Electrotechnical Commission, 3, rue de Varembé, PO Box 131, CH-1211 Geneva 20, Switzerland
Telephone: +41 22 919 02 11 Telefax: +41 22 919 03 00 E-mail: inmail@iec.ch Web: www.iec.ch



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INTERNATIONAL ELECTROTECHNICAL COMMISSION

**SERVICE DIAGNOSTIC INTERFACE FOR CONSUMER
ELECTRONICS PRODUCTS AND NETWORKS –
Implementation for IEEE 1394**

FOREWORD

- 1) The IEC (International Electrotechnical Commission) is a worldwide organization for standardization comprising all national electrotechnical committees (IEC National Committees). The object of the IEC is to promote international co-operation on all questions concerning standardization in the electrical and electronic fields. To this end and in addition to other activities, the IEC publishes International Standards. Their preparation is entrusted to technical committees; any IEC National Committee interested in the subject dealt with may participate in this preparatory work. International, governmental and non-governmental organizations liaising with the IEC also participate in this preparation. The IEC collaborates closely with the International Organization for Standardization (ISO) in accordance with conditions determined by agreement between the two organizations.
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International Standard IEC 62286 has been prepared by IEC technical committee 100: Audio, video and multimedia systems and equipment.

This standard was developed by a project team of service and interface specialists within the European Association of Consumer Electronics Manufacturers (EACEM). EACEM subsequently merged with EICTA in September 2001. EICTA is the European Information, Communications and Consumer Electronics Technology Industry Association.

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

CDV	Report on voting
100/432/CDV	100/493A/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.

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

The committee has decided that the contents of this publication will remain unchanged until 2005. At this date, the publication will be

- reconfirmed;
- withdrawn;
- replaced by a revised edition, or
- amended.

A bilingual version of this standard may be issued at a later date.

INTRODUCTION

Consumer products are often repaired by service workshops who are servicing all kinds of products developed by different manufacturers.

For high complexity products, the fault diagnosis becomes more and more difficult and time consuming. To make diagnosis possible, manufacturers often develop some built-in diagnostic software which can be used for fault finding together with an external diagnostic unit through a Service Diagnostic Interface (SDI).

To avoid the need for a service workshop to purchase several different diagnostic units from different manufacturers for different products, a standardized SDI is proposed for use by all manufacturers and in all products in which such diagnostic interfaces are required. The result will be that only one SDI is needed in the service workshops.

The SDI should also be suitable for diagnosis in a network (A/V or multimedia network) in which different products from different manufacturers are connected together. The interface should also allow for future development.

The standard SDI which has to be specified, should:

- be usable in future products;
- be easily connectable to a product or a network;
- be cheap;
- not limit product design.

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SERVICE DIAGNOSTIC INTERFACE FOR CONSUMER ELECTRONICS PRODUCTS AND NETWORKS – Implementation for IEEE 1394

1 Scope

This International Standard specifies the requirements that have to be implemented in future products that incorporate a digital interface, and service diagnostic software developed for these products. The Service Diagnostic Interface (SDI) requires the use of a PC (desktop or laptop) into which service diagnostic software can be loaded. A part of this PC software has to be standardised while another part of this PC software is manufacturer/product related.

To reach a common approach in servicing all products from all manufacturers, it is necessary to standardise specific items in the products (Device Under Test/DUT) as well as in the diagnostic software on the PC.

The Service Diagnostic Interface (SDI) is based on the IEEE 1394:1995 specification because this interface will be used in most future products. The use of this connection and existing communication protocols enable implementation in products at low cost, and gives maximum flexibility and efficiency.

The SDI consists of:

- Specific hardware and software requirements of the DUT.
- Specific requirements of the PC:
 - the Service software, [IEC 62286:2003](https://standards.iteh.ai/catalog/standards/sist/da768075-a08c-469f-83d5-0da61c75d2c/iec-62286-2003)
 - an IEEE 1394 interface (to be built in if not already present).
- The connection between the PC and the DUT.

This specification is a minimal specification necessary to be able to carry out computerised diagnosis and covers the standardised software of the PC as well as the standardised software and provisions in the DUT.

If an IEEE 1394 interface is present on the product, then the requirement for product identification as described in this document (see 6.3) is mandatory. In addition, all communication for any service application should go through the IEEE 1394 interface only, as described in this document (in Clause 7).

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.

IEC 61883-1:2003, *Consumer audio/video equipment – Digital Interface – Part 1: General*

IEEE 1212:2001, *Microprocessor Systems – Control and Status Registers (CSR): Architecture for microcomputer buses*

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

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

3 Terms, definitions and abbreviations

3.1 Terms and definitions

For the purposes of this International Standard, the following terms and definitions apply.

3.1.1

configuration ROM

area of memory within an IEEE 1394-enabled device which holds specific information about the device, as defined in IEEE 1212. Device information is held in a hierarchy of directories within the ROM

3.1.2

EACEM unit directory

see unit directory

3.1.3

HW_Version

hardware version. IEEE 1212 optionally uses this to identify diagnostic software

3.1.4

instance directory

second level in the directory hierarchy. The instance directories provide a method to group unit architectures (software protocols) to identify shared physical components. This directory contains the offset into memory of various Unit Directories, including the EACEM unit directory

3.1.5

IEEE 1394 repeater

another IEEE 1394 device in the network capable of relaying or repeating data. This device may have more IEEE 1394 sockets and can provide a suitable connection into the system

3.1.6

Key_ID

Key Identifier. IEEE 1212 use this to identify the contents of the remaining 3 bytes of a quadlet in a directory. Key_ID is 6 bits long: the proceeding 2 bits are the type, which identifies whether the data in the following 3 bytes is immediate (i.e. they contain the actual data) or whether the 3 bytes are an offset to another place in memory

3.1.7

minimal ASCII

IEEE 1212 defines a limited set of Latin characters that can be used for text. The particular set specified in SDI uses the 1 byte coding specified in IEEE 1212

3.1.8

model_ID

model Identifier. IEEE 1212 optionally provide this to identify the model. The model should represent a family or class of products and should not be unique to individual devices

3.1.9

multimedia

products or networks combining audio, video, computer and/or communication data

3.1.10

network

two or more CE (audio, video or multimedia) products connected together

3.1.11 quadlet

group of four bytes (32 bits). IEEE 1394 transmission is based on the transfer of quadlets and all data is quadlet-aligned

3.1.12 remote diagnosis

diagnosis of product via telephone, internet, etc.

3.1.13 root directory

the top level directory in the hierarchy of directories. This contains some basic information about the device, such as the Vendor_ID, and also the offset into memory of the Instance directory

3.1.14 unit directory

the third and lowest level in the hierarchy of directories. Each unit directory uniquely identifies the software interface (unit architecture) used to control the unit. The EACEM Unit directory provides additional information, either directly or indirectly, needed to specify locations used in the SDI specification

3.1.15 Vendor_ID

vendor Identifier. This is the RID for the vendor

3.2 Abbreviations

ASCII-1	American Standard Code for Information Interchange. This defines a set of Latin characters and control codes representing text. See also Minimal ASCII in 3.1.7.
A/V	Audio/Video
AV/C	Audio, Video/Control
AV/C-CTS	Audio, Video/Control – Command and Transaction Set
CE	Consumer Electronics
CSR	Control and Status Register
DUT	Device Under Test
EACEM	European Association of Consumer Electronics Manufacturers
ID	Identifier
IEEE	Institute of Electrical and Electronics Engineers
OEM	Original Equipment Manufacturer
PC	Personal Computer
RID	Registration authority Identifier
ROM	Read Only Memory
SDI	Service Diagnostic Interface

4 Different types of service diagnostics

4.1 Stand-alone products

In this situation, a connection is made between the diagnostic PC and the DUT, where the DUT is from any manufacturer and of any type.

4.2 A/V or multimedia network

In this situation, a connection is made between the diagnostic PC and a network of A/V or multimedia products.

In an A/V or multimedia network, several different products are interconnected and not all of them are necessarily from the same manufacturer.

In this case, the SDI must be able to list the products on the network, detect which product is causing a problem, and diagnose the product concerned.

4.3 Remote diagnosis

In addition to the configurations described above (stand-alone product or network), a link can be made (for example via telephone, Internet, etc.) between the diagnostic PC in the workshop and a DUT/network at the customer's home. Therefore, if a product has both an IEEE 1394 interface and a remote connection capability, this product should be able to transfer the diagnostic data, as described in this document, through the remote connection.

It has to be specified how this type of communication is carried out, and which level of diagnosis will be possible. These items are not in the scope of this document, and will be defined later on.

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5 Specification of the SDI

5.1 General

The SDI consists of:

- hardware and software, both in the DUT and in the test equipment (“tester”);
- the connection between the tester and the DUT.

The total SDI can be divided into the elements specified in 5.2 and 5.3.

5.2 Hardware

5.2.1 Tester hardware requirements

This can be a computer (for example desktop or laptop PC, MAC, or workstation) provided with at least one suitable IEEE 1394 interface as specified in IEC 61883-1 and running the necessary diagnostic software. (Minimum specification depends on the respective tester platform).

5.2.2 Connection cable

One IEEE 1394 connection cable is required. The type of cable depends on the connector (4pin or 6pin) configuration that is used on the DUT and the PC.

For the specification of the cable, please refer to IEC 61883-1, IEEE 1394 and IEEE 1394a.

5.2.3 Device Under Test (DUT) hardware requirements

5.2.3.1 General

The DUT shall be provided with at least one IEEE 1394 connector (4 or 6 pins) as specified in IEC 61883-1, IEEE 1394 and IEEE 1394a.

5.2.3.2 Stand alone products

For diagnosis in a stand-alone product, one connector, as specified in 5.2.3.1, is adequate.

5.2.3.3 A/V or multimedia network

In a network, several products are connected to each other in serial, star or parallel configuration. In this case, most products will be provided with two IEEE 1394 connectors.

For diagnosis on a network, the PC should be connected to any connector that is not in use on one of the products in the network.

If no IEEE 1394 connector is free in the network, there are 3 possibilities:

- 1) Use an IEEE 1394 repeater.
- 2) Disconnect one of the products from the network.
- 3) Use a tester provided with two IEEE 1394 connectors.

5.3 Software

5.3.1 General

The software for the SDI can be divided into two parts (tester and DUT) of which each part again can be divided into mandatory (SDI common) software and non-mandatory (manufacturer-dependent) software.

The manufacturer dependent software will not be specified in this document.

5.3.2 Tester software requirements

The software platform of the tester must be able to handle IEEE 1394 communication (for example on a PC implementation, Windows® 98 2nd edition, Windows® 2000 or higher, or an equivalent operating system is required).

The SDI common software on the tester (developed under the responsibility of EACEM) has the following functionalities:

- a) To initiate a Self_Test as described in this document. (7.1.1.6 and 7.1.1.7).
- b) To read out the Self_Test response (available in the Test_Result_Register) of all products.
- c) To display a list of all products connected to the IEEE 1394 network to which the tester is connected. On the display should be listed:
 - name of the manufacturer,
 - model number of the products,
 - textual description of the products.
- d) To indicate which product has passed its Self_Test and is found to be “OK” or “Not OK”.
- e) To start up all product/manufacturer specific diagnostic software. The start-up mechanism to which the specific diagnostic software shall conform is described in 6.1.