IEC 62379-5-2

Edition 1.0 2014-03

INTERNATIONAL STANDARD

NORME INTERNATIONALE

Common control interface for networked digital audio and video products – Part 5-2: Transmission over networks – Signalling

Interface de commande commune pour produits audio et vidéo numériques connectés en réseaux – Partie 5-2: Transmission sur des réseaux – Signalisation

IEC 62379-5-2:2014-03(en-fr)

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COMMON CONTROL INTERFACE FOR NETWORKED DIGITAL AUDIO AND VIDEO PRODUCTS –

Part 5-2: Transmission over networks – Signalling

FOREWORD

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International Standard IEC 62379-5-2 has been prepared by technical area 4: Digital system interfaces and protocols of IEC technical committee 100: Audio, video and multimedia systems and equipment.

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

CDV	Report on voting
100/2050/CDV	100/2158/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.

A list of all parts in the IEC 62379 series, published under the general title *Common control interface for networked digital audio and video products*, can be found on the IEC website.

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 the stability 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

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- withdrawn,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

INTRODUCTION

IEC 62379 specifies the Common Control Interface, a protocol for managing networked audiovisual equipment. The following parts exist or are planned:

1 General
2 Audio
3 Video
4 Data
5 Transmission over networks
6 Packet transfer service
7 Measurement

IEC 62379-1:2007 specifies aspects which are common to all equipment, and it includes an introduction to the Common Control Interface.

IEC 62379-2:2008, IEC 62379-3 (under consideration) and IEC 62379-4 (under consideration) specify control of internal functions specific to equipment carrying particular types of live media. IEC 62379-4 refers to time-critical data such as commands to automation equipment, but not to packet data such as the control messages themselves.

IEC 62379-5 specifies control of transmission of these media over each individual network technology. It includes network specific management interfaces along with network specific control elements that integrate into the control framework.

IEC 62379-5-1 specifies management of aspects which are common to all network technologies. IEC 62379-5-3 onwards specify management of aspects which are particular to individual networking technologies.

IEC 62379-5-2 (this standard) specifies protocols which can be used between networking equipment to enable the setting up of calls which are routed across different networking technologies.

IEC 62379-6 specifies carriage of control and status messages and non-audiovisual data over transports that do not support audio and video, such as RS232 serial links, with (as for IEC 62379-5) a separate subpart for each technology.

IEC 62379-7 specifies aspects that are specific to the measurement of the service experienced by audio and video streams and in particular to the requirements of EBU ECN-IPM Measurements Group.

COMMON CONTROL INTERFACE FOR NETWORKED DIGITAL AUDIO AND VIDEO PRODUCTS –

Part 5-2: Transmission over networks – Signalling

1 Scope

This part of IEC 62379 specifies protocols which can be used between networking equipment to enable the setting up of calls which are routed across different networking technologies.

It also specifies encapsulation of digital media within those calls.

2 Normative references

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

IEC 60958 (all parts), *Digital audio interface*

IEC 62365:2009, *Digital audio – Digital input-output interfacing – Transmission of digital audio over asynchronous transfer mode (ATM) networks*

IEC 62379 (all parts), *Common control interface for networked digital audio and video products*

IEC 62379-1, *Common control interface for networked digital audio and video products – Part 1: General*

IEC 62379-2:2008, *Common control interface for networked digital audio and video products – Part 2: Audio*

IEC 62379-5-1, *Common control interface for networked digital audio and video products – Part 5-1: Transmission over networks – General* [1]

ITU-T Recommendation Q.850, *Usage of cause and location in the digital subscriber signalling system No. 1 and the signalling system No.7 ISDN used part*

AES53, *AES standard for digital audio – Digital input-output interfacing – Sample-accurate timing in AES47* (Audio Engineering Society, New York, NY, USA)

[1] To be published.

3 Terms and definitions

For the purposes of this document, the terms and definitions given in IEC 62379-1 and the following apply.

3.1
adjacent
<of two network elements> such that data can be sent from one to the other without passing through any other network element

3.2
asynchronous flow
flow consisting of data units for which the time of arrival at the destination is less important

3.3
asynchronous service
best-effort point-to-point service carrying asynchronous flows

3.4
call identifier
first 12 octets of a flow identifier

Note 1 to entry: See 4.3.

3.5
connectionless data unit
data unit which is not part of a flow

3.6
data unit
sequence of one or more octets which is conveyed across the network as a single unit

3.7
end equipment
equipment that is connected to the network and produces or consumes data units

3.8
extended unique identifier
EUI-64
64-bit globally unique identifier, the first 24 or 36 bits of which are an organizationally unique identifier (OUI) administered by the Institute of Electrical and Electronics Engineers (IEEE)

Note 1 to entry: The extended unique identifier contains 64 bit.

3.9
flow
sequence of data units

3.10
information element
IE
element of a message, in tag-length-value format

3.11
link
means by which data units are conveyed between adjacent network elements

3.12
network delay
time from submission of a data unit to the network by the sender to its delivery to the recipient

3.13
network element
piece of equipment which takes part in the process of conveying data and conforms to this Standard

EXAMPLES: Switches, gateways, and interfaces, but not equipment internal to legacy networks.

3.14
path
sequence of links

3.15
route
path from source to destination of a flow

3.16
route identifier
first 13 octets of a flow identifier (see 4.3), excluding the least significant bit of the 13th octet

3.17
synchronous flow
flow for which the network delay experienced by data units is required to be within specified limits

Note 1 to entry: The size of the units, and also the rate at which units are transmitted, may be fixed or may be variable with a defined upper limit.

3.18
synchronous service
one-to-many service carrying synchronous flows

4 Identification

4.1 Byte order

All multiple-octet quantities shall be coded with the most significant octet first.

4.2 Unit identification

Each switch or end equipment unit shall have assigned to it a globally unique EUI-64.

NOTE The EUI-64 can be derived from the MAC address of one of the unit's interfaces by concatenating the first three octets of the MAC address, hexadecimal FFFE, and the last three octets of the MAC address.

4.3 Flow identifiers

Each flow shall be identified by a 16-octet value formatted as shown in Figure 1.

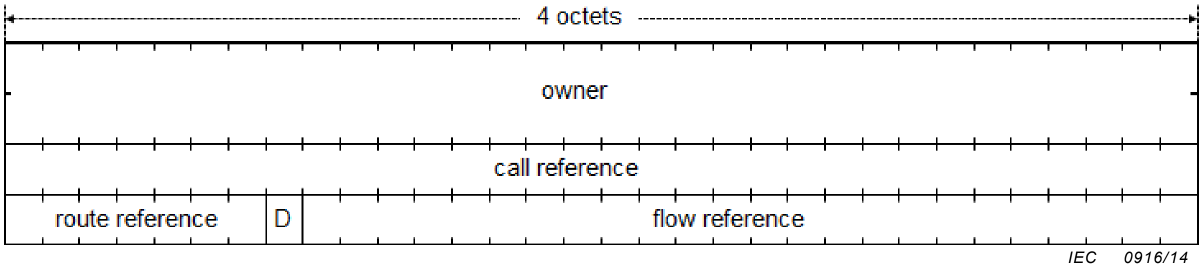


Figure 1 – Structure of flow identifier

The first 8 octets shall contain an EUI-64 identifying the unit which created the flow identifier. This unit is referred to in this standard as the “owner” of the flow identifier.

The next 4 octets shall contain a nonzero reference number, chosen by the owner, identifying the call of which the flow is a part. Call references should be chosen in a way that maximises the time from when a call ceases to exist until its reference is re-used for a new call.

The next octet shall contain, in its most significant seven bits, a nonzero reference number, chosen by the owner and unique within the call, selecting the route followed by the flow; and, in its least significant bit, a “direction” indicator which shall be 0 for a flow in the direction away from the owner and 1 for a flow in the direction towards it.

The remaining 3 octets shall contain a nonzero reference number, chosen by the owner, identifying the flow uniquely within the call. Where a pair of flows in opposite directions carries a two-way protocol such as TCP, the same flow reference value shall be used for each of them.

NOTE 1 The call reference distinguishes between different calls with the same owner. A call may be connected over several different routes (for instance, to give resilience in the event of failure) and the route reference distinguishes between them. The flow reference distinguishes between different flows within a call; for instance, a single call may carry video, programme audio, and talkback, and each of these streams will have its own flow reference.

NOTE 2 The flow reference is orthogonal to the route reference, so flows carrying the same content over different routes have the same flow reference, and flows carrying different content have different flow references even if they do not follow the same route. Different routes may carry different sets of flows, for instance a backup route might only carry the most important flows, or different kinds of flow may have different backup routes.

Zero in the route reference field shall indicate all routes for the call. Except where specified otherwise (e.g. in 5.6.3), zero in the "direction" bit and the flow reference field shall indicate all flows for the route(s), and zero in the flow reference with 1 in the "direction" bit is reserved.

NOTE 3 These identifiers are the same at all points in the system and there is just one set of call reference values for each owner. This contrasts with call references in ITU-T Recommendation Q.2931 where a call has a different reference on every link, and a switch can use the same call reference for different calls as long as they are on different links. See also Clause A.4.

In the case of a unicast call, the owner shall be the caller. In the case of a multicast, the owner shall be the sender or, in the case where for resilience the same content is transmitted by more than one unit, one of the senders. A caller wishing to join a multicast shall use a temporary call identifier (which it owns) until the identifier of the multicast (which may need to be created by the sender) has been discovered.

4.4 Address format

An address shall be represented as an octet string formatted as specified below.

NOTE It is thus a valid `TAddress` value (unless it is more than 255 o long).

The `TDomain` value identifying an address in the form specified in this subclause shall be

{ iso(1) standard(0) iec62379 network(5) signalling(2) address_format(2) }

The first octet of the address shall contain a “type” code; the format and interpretation of the remainder shall depend on the type and on the length of the octet string, as specified in Table 1.

Table 1 – Address type codes

Type	Remainder of octet string
0	second octet contains *n*, third to (*n*+2)th inclusive are an address (which shall not be of type 0) which acts as the locator, remainder is another address (the “local” address, which may be of type 0), which is to be interpreted at the specified location [a]
1	second octet contains *n*, third to (*n*+2)th inclusive are an OID, remainder is a value [b, c, d]
2	second octet contains *n*, third to (*n*+2)th inclusive are an OID, remainder is a value [b, c, e]
3	second octet contains *n*, third to (*n*+2)th inclusive are a TDomain value (which is an OID), remainder is an address within that domain [b, f]
4	IPv4 address if 4 octets, subnet address followed by subnet mask if 8 o
5	EUI-64 identifier
6	IPv6 address
7	URL
8	1 o containing a protocol identifier (as in IP headers, e.g. 6 for TCP and 17 for UDP) followed by a port number for the indicated protocol coded in 2 o as a 16-bit unsigned integer
9	IEC 62379 block identifier
10	service name coded as a UTF8 string
11	NetBIOS unique name
12	NetBIOS group name
13	NSAP address (20 o) or prefix
14	E.164 address
15-255	reserved

[a] In the case of type 0, the locator may be the address of a gateway, or some other identification of a subnetwork (such as an NSAP prefix or an IPv4 subnetwork address). It may also identify end equipment. The locator is not allowed to be a type 0 address so that the sequence of locations will be “flat” rather than nested.

[b] The OID in types 1-3 is coded in the same way as in ASN.1 Basic Encoding Rules (BER), including the compressed form for the first two arcs, but omitting the tag and length. These address types should only be used for address formats that cannot be supported by any of the other types. An IPv4 address, for instance, should use type 4 although it could also be expressed as a type 3 address or, if the target unit’s MIB includes its IP address, as a type 1. An IPv4 address with a port number should be type 0, with a type 4 locator and a type 8 local address.

[c] The value which follows the OID in types 1-2 is coded using ASN.1 Basic Encoding Rules (BER), including the tag and length.

[d] Type 1 identifies a unit in whose MIB the object identified by the OID (such as unitName or unitLocation) has the specified value. In the case of scalar objects, the OID may omit the final zero arc. Units are not required to support all objects in their MIBs that could be used in this context, and switches are not required to remember any but the most obviously useful for the units connected to them. Objects in IEC 62379 should be used in preference to those in other MIBs, for instance unitLocation (1.0.62379.1.1.1.2) rather than sysLocation (1.3.6.1.2.1.1.5).

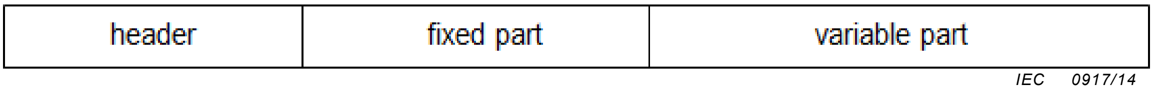
[e] Type 2 identifies a port or other resource within a unit, by searching the unit’s MIB, usually for a columnar object such as aPortName to select an audio port. The OID omits the index arcs. As with type 1, units are not required to support all objects in their MIBs that could be used in this context, so a management terminal which has discovered the port name (e.g. from a status broadcast) should use type 9 instead.

[f] For types 3 onwards, the remainder of the value is an octet string containing the address in the appropriate format. Some codes are only valid in certain contexts, for instance an IEC 62379 block identifier would not be valid on a subnetwork and a NetBIOS name would only be valid within a subnetwork that supported NetBIOS protocols.

5 Message format

5.1 General

All signalling messages shall consist of an octet string with the format shown in Figure 2.



NOTE The header is specified in 5.2 and the variable part in 5.3. The format of the fixed part depends on the message type, and is specified in 5.5.

Figure 2 – Signalling message format

Encapsulation of the octet string for transmission on a link (see 6.1) depends on the technology used for the link, and is not specified in this standard. It should not place a limitation on the maximum length of a message.

5.2 Header

The header of a signalling message shall consist of two octets formatted as shown in Figure 3.

Figure 3 – Signalling message header

The most significant bit of the first octet shall be 1 for an acknowledgement, 0 otherwise. The next two bits shall code the message class as specified in Table 2. The least significant five bits shall code the message type as specified in Table 3.

NOTE For the significance of the “acknowledgement” and “message class” fields, see also the definitions of “original” and “reply”, see 6.1.

The second octet shall contain the number of octets in the fixed part.

Table 2 – Message class

Code	Message class
0	request
1	response
2	confirmation
3	completion