IEC 62295

Edition 1.0 2007-11

INTERNATIONAL STANDARD

Multimedia systems – Common communication protocol for inter-connectivity on heterogeneous networks

INTERNATIONAL
ELECTROTECHNICAL
COMMISSION

PRICE CODE XB

ICS 33.040.40; 33.160; 35.100

ISBN 2-8318-9351-8

CONTENTS

FOREWORD 6
INTRODUCTION 8

1 Scope and object 9
2 Normative references 10
3 Terms, definitions, abbreviations and conventions 10
3.1 Terms and definitions 10
3.2 Abbreviations 13
3.3 Conventions 14
4 Requirements 14
4.1 Home server interface requirements 15
4.1.1 Basic requirements for data delivery 15
4.1.2 Functional requirements for HNMP 15
4.1.3 Home server interface requirements for unicast, multicast and broadcast 15
4.2 CCP device requirements 16
4.2.1 Requirements for device registration 16
4.2.2 Requirements for classification of CCP devices 16
5 Common communication protocol (CCP) layer 17
5.1 CCP layer 17
5.2 Data delivery over heterogeneous networks 19
6 CCP addressing 20
6.1 General 20
6.2 An addressing structure to facilitate traffic switching for the home server.Version 0 20
6.2.1 Domain address 21
6.2.2 Cluster address 21
6.2.3 Device ID field 21
7 CCP packet format and fields 21
7.1 General 21
7.2 CCP packet format 22
7.2.1 CCP identification (CCPID) 22
7.2.2 CCP header version (CCPHDRVER) 22
7.2.3 CCP address version (CCPADDRVER) 23
7.2.4 Destination address (DESTADDR) 23
7.2.5 Source address (SRCADDR) 23
7.2.6 Type (TYPE) field 23
7.2.7 Reserved (RSV) field 25
7.2.8 CCP payload length (CCPPLEN) field 25
7.2.9 CCP payload field 25
8 Home network management protocol (HNMP) 25
8.1 General 25
8.2 HNMP packet format 26
8.2.1 Transaction ID (TID) 26
8.2.2 HNMP command (HNMPCMD) 26
8.2.3 Reserved (RSV) field 26

8.2.4 HNMP payload length (HNMPPLEN) field 26
8.2.5 HNMP payload 26
8.3 Home server registration 27
8.4 Device registration 27
8.4.1 Device registration request (DEV_REG_REQ) packet 27
8.4.2 Device registration response (DEV_REG_RES) packet 28
8.5 Device management 29
8.5.1 Add device (ADD_DEV) packet 31
8.5.2 Delete device (DEL_DEV) packet 31
8.5.3 Initialize device (INI_DEV) packet 32
8.5.4 Alive-check request (ALV_CHK_REQ) packet 32
8.5.5 Alive-check response (ALV_CHK_RES) packet 32
8.6 Address and name information of devices 32
8.6.1 Device address and name information request (DEV_INFO_REQ) packet 33
8.6.2 Device address and name information response (DEV_INFO_RES) packet 33
8.7 Other management functions 34
9 Universal home control protocol (UHCP) 34
9.1 UHCP packet format 34
9.1.1 Transaction ID (TID) 35
9.1.2 Message type (MT) and action type (AT) 35
9.1.3 Reserved (RSV) field 36
9.1.4 UHCP payload length (UHCPPLEN) field 36
9.1.5 UHCP payload 36
9.2 Execution messages (EXE) 36
9.2.1 Execution of registration (EXE_REG) 36
9.2.2 Execution of control (EXE_CTRL) 37
9.2.3 Response OK (EXE_RESOK) 38
9.2.4 Response NOK (EXE_RESNOK) 38
9.3 Query messages (QUE) 38
9.3.1 Query of registration status (QUE_REGSTAT) 38
9.3.2 Query of control status (QUE_CTRLSTAT) 39
9.3.3 Query of all status (QUE_ALLSTAT) 39
9.3.4 Response OK (QUE_RESOK) 40
9.3.5 Response NOK (QUE_RESNOK) 40
9.4 Notification messages (NTFY) 40
9.5 UHCP payload syntax 40
9.5.1 Basic syntax for UHCP payload 40
9.5.2 Syntax for UHCP registration 41
9.5.3 Syntax for device control 42
9.5.4 Syntax for query of controlling and monitoring status 43
9.5.5 Syntax for notification 44
10 Home data service protocol (HDSP) 45
10.1 Functional requirements of HDSP 45
10.1.1 Interoperability with CCP 45
10.1.2 File and directory services 45
10.1.3 Messaging service 46
10.2 HDSP packet format 46

10.2.1 Transaction ID (TID) 46
10.2.2 HDSP command 46
10.2.3 HDSP payload length (HDSPPLEN) field 47
10.2.4 HDSP payload 47
10.3 Messages for directory services 47
10.3.1 Query request message (DIR_QUE_REQ) 48
10.3.2 Query response message (DIR_QUE_RES) 48
10.3.3 Deletion request message (DIR_DEL_REQ) 49
10.3.4 Deletion response message (DIR_DEL_RES) 49
10.3.5 Renaming request message (DIR_REN_REQ) 49
10.3.6 Renaming response message (DIR_REN_RES) 49
10.3.7 Making request message (DIR_MAKE_REQ) 49
10.3.8 Making response message (DIR_MAKE_RES) 50
10.4 Messages for file services 50
10.4.1 Query request message (FILE_QUE_REQ) 53
10.4.2 Query response message (FILE_QUE_RES) 53
10.4.3 Deletion request message (FILE_DEL_REQ) 53
10.4.4 Deletion response message (FILE_DEL_RES) 53
10.4.5 Renaming request message (FILE_REN_REQ) 53
10.4.6 Renaming response message (FILE_REN_RES) 54
10.4.7 Negotiation request message (FILE_NEGO_REQ) 54
10.4.8 Negotiation response message (FILE_NEGO_RES) 54
10.4.9 Getting request message (FILE_GET_REQ) 54
10.4.10 Getting response message (FILE_GET_RES) 54
10.4.11 Putting request message (FILE_PUT_REQ) 55
10.4.12 Putting response message (FILE_PUT_RES) 55
10.5 Messages for messaging service 55
10.5.1 Sending request message (MSG_PUT_REQ) 56
10.5.2 Sending response message (MSG_PUT_RES) 56
10.6 Error codes 56
11 Home multimedia service protocol (HMSP) 57
11.1 Functional requirements of HMSP 58
11.1.1 Interoperability with CCP 58
11.1.2 Management of multimedia resource 58
11.1.3 Stream and play of multimedia resource 58

Annex A (informative) FSM of FS-CCPDEV supporting HNMP 60
Annex B (informative) FSM of FS-CCPDEV for supporting UHCP 63

Figure 1 – Communication layer structures of network technologies 10
Figure 2 – Server interface 11
Figure 3 – Cluster and domain network 12
Figure 4 – Classification of CCP devices 16
Figure 5 – Definitions of application program, CCP API, lower protocol layers interface, and lower protocol layers 18
Figure 6 – Location of CCP layer 18
Figure 7 – Example of data transmission over heterogeneous networks using CCP layer 20

Figure 8 – CCP address format of CCP address by version 0 21
Figure 9 – CCP packet format of CCP header by version 0 22
Figure 10 – Type fields 23
Figure 11 – HNMP packet format 26
Figure 12 – DEV_REG_REQ and DEV_REG_RES packets 28
Figure 13 – Example of HNMP command sequence for device registration 29
Figure 14 – ADD_DEV, DEL_DEV and INI_DEV packets 30
Figure 15 – ALV_CHK_REQ and ALV_CHK_RES packets 30
Figure 16 – Example of HNMP command sequence for device management 31
Figure 17 – DEV_INFO_REQ and DEV_INFO_RES packets 33
Figure 18 – Example of HNMP command sequence for retrieving device address and name information 33
Figure 19 – UHCP packet format 35
Figure 20 – Message type and action type fields of UHCP packet 36
Figure 21 – Example of registration process 37
Figure 22 – Example of EXE_CTRL message 38
Figure 23 – Example of QUE_REGSTAT message 39
Figure 24 – Example of QUE_CTRLSTAT message 39
Figure 25 – Example of QUE_ALLSTAT message 40
Figure 26 – HDSP packet format 46
Figure 27 – Example of usage of directory service messages 50
Figure 28 – Example of usage of file service messages 52
Figure 29 – Example of usage of Messaging service messages 56
Figure A.1 – FSM of FS-CCPDEV for supporting HNMP 60
Figure B.1 – FSM of FS-CCPDEV for supporting UHCP 63

Table 1 – Cast type field 24
Table 2 – Traffic type field 24
Table 3 – Payload type field 25
Table 4 – HDSP commands 47
Table 5 – Messages for directory services 48
Table 6 – Messages for file services 51
Table 7 – Messages for messaging services 55
Table 8 – Error codes for HDSP 57

INTERNATIONAL ELECTROTECHNICAL COMMISSION

MULTIMEDIA SYSTEMS – COMMON COMMUNICATION PROTOCOL FOR INTER-CONNECTIVITY ON HETEROGENEOUS NETWORKS

FOREWORD

1) The International Electrotechnical Commission (IEC) is a worldwide organization for standardization comprising all national Electrotechnical committees (IEC National Committees). The object of 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, IEC publishes International Standards, Technical Specifications, Technical Reports, Publicly Available Specifications (PAS) and Guides (hereafter referred to as "IEC Publication(s)"). 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. IEC collaborates closely with the International Organization for Standardization (ISO) in accordance with conditions determined by agreement between the two organizations.
2) The formal decisions or agreements of IEC on technical matters express, as nearly as possible, an international consensus of opinion on the relevant subjects since each technical committee has representation from all interested IEC National Committees.
3) IEC Publications have the form of recommendations for international use and are accepted by IEC National Committees in that sense. While all reasonable efforts are made to ensure that the technical content of IEC Publications is accurate, IEC cannot be held responsible for the way in which they are used or for any misinterpretation by any end user.
4) In order to promote international uniformity, IEC National Committees undertake to apply IEC Publications transparently to the maximum extent possible in their national and regional publications. Any divergence between any IEC Publication and the corresponding national or regional publication shall be clearly indicated in the latter.
5) IEC provides no marking procedure to indicate its approval and cannot be rendered responsible for any equipment declared to be in conformity with an IEC Publication.
6) All users should ensure that they have the latest edition of this publication.
7) No liability shall attach to IEC or its directors, employees, servants or agents including individual experts and members of its technical committees and IEC National Committees for any personal injury, property damage or other damage of any nature whatsoever, whether direct or indirect, or for costs (including legal fees) and expenses arising out of the publication, use of, or reliance upon, this IEC Publication or any other IEC Publications.
8) Attention is drawn to the Normative references cited in this publication. Use of the referenced publications is indispensable for the correct application of this publication.
9) Attention is drawn to the possibility that some of the elements of this IEC Publication may be the subject of patent rights. IEC shall not be held responsible for identifying any or all such patent rights.

International Standard IEC 62295 has been prepared by technical area 8: Multimedia home server systems, 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
100/1200/CDV	100/1283/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 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

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

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

INTRODUCTION

Numerous wired and wireless home network technologies of various types have been developed and are in use today. However, since these technologies have been developed for specific functions such as control, A/V and data services, interoperability is not guaranteed among products employing these technologies. Hence, users who wish to implement the home network environment either purchase devices that are based on a single technology for interoperability or install independent, non-compatible networks in their home.

To solve these problems, home network businesses and service providers have taken into account and developed a number of specific technologies in order to allow interoperability among home network technologies. However, most of these technologies are local and offer interoperability between a limited range of devices and give rise to new problems caused by complexity and diversity in technologies of different companies.

In order to incorporate such complex and diverse technologies, there is a need to develop a new convergence technology that can integrate not only current technologies but also those expected to surface in the future.

The needs for the new convergence technology are the following:

– provide interoperability and interconnectivity among heterogeneous networks through a specific convergence layer;
– provide expandability for applications in not only current network technologies, but also new technologies to be developed in the future;
– are applicable in small devices with low processing capabilities by providing protocols such as simple signaling in the convergence layer;
– available at a low cost and simple to implement on a device;
– able to provide diverse home network services (or applications).

MULTIMEDIA SYSTEMS – COMMON COMMUNICATION PROTOCOL FOR INTER-CONNECTIVITY ON HETEROGENEOUS NETWORKS

1 Scope and object

This International Standard specifies the common communication protocol (CCP) layer that is capable of providing interoperability and interconnectivity between heterogeneous network technologies, as well as the basic data transmission scheme between devices linked to heterogeneous networks through the CCP layer. The standard also specifies the packet structure in the CCP layer and the common addressing scheme that can be understood among heterogeneous devices. Furthermore, there are specifications regarding protocols capable of providing diverse home network applications through the CCP layer such as the home network management protocol (HNMP), universal home control protocol (UHCP), home multimedia service protocol (HMSP) and home data service protocol (HDSP).

NOTE HNMP is the overall home network management protocol that detects or registers devices. UHCP controls and monitors devices from remote locations. HMSP is the A/V protocol for home entertainment services. HDSP deals with data and messaging services.

This standard is to be applied to systems with network capabilities and those that constitute home networks such as electronic appliances, A/V components, control devices, network terminals and home servers. Moreover, this standard is applicable to a home network consisting of a single home server.

This International Standard gives

– a definition of the CCP layer,
– a data transmission scheme in the CCP layer,
– a CCP packet structure,
– a CCP addressing scheme,
– a home network management protocol (HNMP),
– a universal home control protocol (UHCP),
– a home data service protocol (HDSP),
– requirements of home multimedia service protocol (HMSP).

A home network provides interoperability and interconnectivity regardless of the appliance manufacturer or the network type so that the user is able to receive desired services at any point in time. However, current home network technologies have independent communication protocol layer structures, as shown in Figure 1, with different addressing schemes, data transmission schemes, data processing methods and data formats.

In order to solve problems associated with interoperability and interconnectivity among heterogeneous network technologies, this standard aims to define the CCP layer as a type of a convergence layer.

Further objectives of this standard include specifying the data transmission method, packet structure and common addressing scheme as well as the signaling protocol for providing home network management, control, A/V and data services.