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Kabelska omrežja za televizijske in zvokovne signale ter interaktivne storitve - 5-1. del: Prehodi IP in vmesniki za glavne sprejemne postaje

Cable networks for television signals, sound signals and interactive services - Part 5-1: IP gateways and interfaces for headends

Kabelnetze für Fernsehsignale, Tonsignale und interaktive Dienste - Teil 5-1: IP-Gateways und -Schnittstellen für Kopfstellen

Réseaux de distribution par câbles pour signaux de télévision, signaux de radiodiffusion sonore et services interactifs - Partie 5-1: Passerelles IP et interfaces pour les têtes de réseau

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This Technical Report was approved by CENELEC on 2009-03-13.

CENELEC members are the national electrotechnical committees of Austria, Belgium, Bulgaria, Cyprus, the Czech Republic, Denmark, Estonia, Finland, France, Germany, Greece, Hungary, Iceland, Ireland, Italy, Latvia, Lithuania, Luxembourg, Malta, the Netherlands, Norway, Poland, Portugal, Romania, Slovakia, Slovenia, Spain, Sweden, Switzerland and the United Kingdom.

CENELEC

European Committee for Electrotechnical Standardization
Comité Européen de Normalisation Electrotechnique
Europäisches Komitee für Elektrotechnische Normung

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Foreword

This Technical Report was prepared by the Technical Committee CENELEC TC 209, Cable networks for television signals, sound signals and interactive services.

The text of the draft was submitted to vote in accordance with the Internal Regulations, Part 2, Subclause 11.4.3.3 (simple majority) and was approved by CENELEC as CLC/TR 50083-5-1 on 2009-03-13.

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1 Scope

1.1 General scope

Standards of the EN 60728 series deal with cable networks including equipment and associated methods of measurement for headend reception, processing and distribution of television signals, sound signals and their associated data signals and for processing, interfacing and transmitting all kinds of signals for interactive services using all applicable transmission media.

This includes

- CATV[1])-networks,
- MATV-networks and SMATV-networks,
- individual receiving networks

and all kinds of equipment, systems and installations installed in such networks.

The extent of this standardisation work is from the antennas and/or special signal source inputs to the headend or other interface points to the network up to the terminal input.

The standardisation of any user terminals (i.e., tuners, receivers, decoders, multimedia terminals, etc.) as well as of any coaxial, balanced and optical cables and accessories thereof is excluded.

1.2 Specific scope of this Technical Report

This Technical Report is an adjunct to the EN 60728/EN 50083 standards series and describes the characteristics of equipment which is used for the connection of IP based networks to and from headends such as described in EN 60728-5. Specifications from the transmission standard ETSI TS 102 034 are taken into account where applicable. The content of the data streams can be digital video, audio or other digital data.

This Technical Report describes the necessary characteristics and parameters of equipment such as IP gateways or IP interfaces on equipment at the input of headends (Figure 1) as well as at the output of headends (Figure 2).

Equipment at the input of headends can be either IP gateways which enable the connection to a DVB-ASI headend infrastructure according EN 50083-9 or, in the case of modular headend systems can also be single equipment with IP interfaces such as DVB modulators, transcoders, multiplexers and FM radio processors as shown in Figure 1. Edge devices are also covered by this technical report.

1) This word encompasses the HFC networks used nowadays to provide telecommunications services, voice, data, audio and video both broadcast and narrowcast.

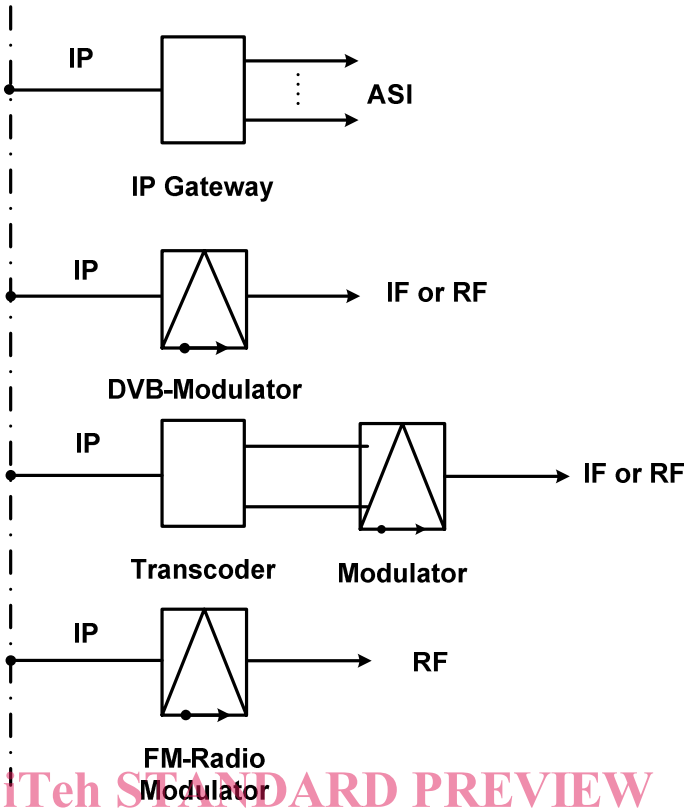

Figure 1 – Examples of IP gateways/interfaces at the input of headends

Equipment at the output of headends can be either IP gateways which enable the connection from DVB-ASI interfaces according EN 50083-9 to IP based networks or, in the case of modular headend systems, can also be single equipment with IP interfaces such as encoders, multiplexers and switches as shown in Figure 2.

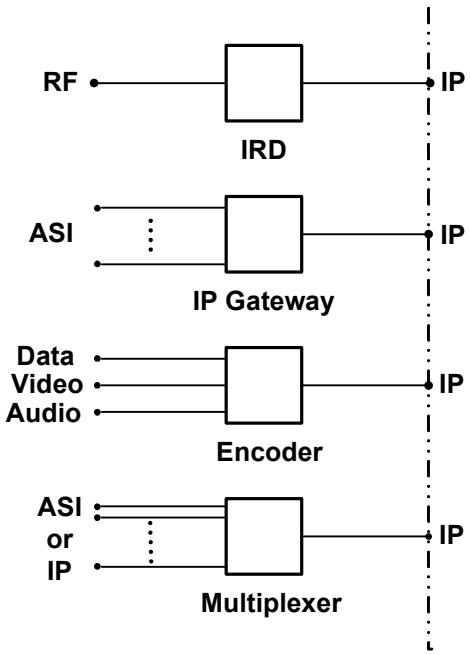

Figure 2 – Examples of IP gateways/interfaces at the output of central headends

The scope of this Technical Report covers all three quality grades as defined in EN 60728-5.

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.

EN 50083-9	Cable networks for television signals, sound signals and interactive services - Part 9: Interfaces for CATV/SMATV headends and similar professional equipment for DVB/MPEG-2 transport streams
EN 60728-5	Cable networks for television signals, sound signals and interactive services - Part 5: Headend equipment
EN 61754-20	Fibre optic connector interfaces -- Part 20: Type LC connector family
ETSI EN 300 468	Digital Video Broadcasting (DVB);Specification for Service Information (SI) in DVB systems
ETSI TS 101 154	Digital Video Broadcasting (DVB);Specification for the use of Video and Audio Coding in Broadcasting Applications based on the MPEG-2 Transport Stream
ETSI TS 102 034	Digital Video Broadcasting (DVB);Transport of MPEG-2 TS Based DVB Services over IP Based Networks
IEC 60874-19 (series)	Fibre optic interconnecting devices and passive components - Connectors for optical fibres and cables - Part 19: Fibre optic connectors type duplex SC
ISO/IEC 8802-3:2000 (IEEE 802.3-2005 [2])	Information technology - Telecommunications and information exchange between systems - Local and metropolitan area networks - Specific requirements - Part 3: Carrier sense multiple access with collision detection (CSMA/CD) access method and physical layer specifications
ISO/IEC 11801 + Amendment 1	Information technology - Generic cabling for customer premises
ISO/IEC 13818-1	Information technology - Generic coding of moving pictures and associated audio information: Systems
ISO/IEC 13818-2	Information technology - Generic coding of moving pictures and associated audio information: Video
ISO/IEC 13818-3	Information technology - Generic coding of moving pictures and associated audio information - Part 3: Audio

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[2] The last edition of IEEE 802.3 was published in 2005 with several corrections and amendments published in 2006 and 2007. Information on the actual version could be found at http://standards.ieee.org/getieee802/802.3.html.
Information on the structure of document IEEE 802.3 is provided in the Bibliography of this Technical Report.

3 Terms, definitions, symbols and abbreviations

3.1 Terms and definitions

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

NOTE Terms and definitions defined in the IEV (IEC 60050-723 and IEC 60050-732) are used as far as possible.

3.1.1
central headend
headend from which signals are delivered to regional or local headends via a long-distance link

3.1.2
client
functional unit that receives services from a server

[IEV 732-01-12]

3.1.3
Ethernet frame
ISO/IEC 8802-3 standard (IEEE 802.3) defines a basic data frame format and several additional optional formats that are used to extend the protocol's basic capability. The basic data frame format contains seven data fields shown in Figure 9

3.1.4
frame-check sequence
CRC check-sum to detect transmission failures

3.1.5
gateway
functional unit that connects two computer networks with different network architectures

EXAMPLES – LAN gateway, mail gateway.

NOTE The computer networks may be either local area networks, wide area networks, or other types of networks.

[IEV 732-01-16]

3.1.6
headend
equipment, which is connected between receiving antennas or other signal sources and the remainder of the cable network, to process the signals to be distributed

[IEV 723-09-11, modified]

NOTE The headend may, for example, comprise antenna amplifiers, frequency converters, combiners, separators and generators.

3.1.7
header
supplemental data placed at the beginning of payload data being transmitted; a header contains information for the handling of a data block

3.1.8
inter-frame gap
IFG
Ethernet devices must allow a minimum idle period between transmissions of Ethernet frames. This period is called the inter-frame gap (IFG). The minimum inter-frame gap is 96 bit times

3.1.9
IP backbone network
the top level of a network infrastructure that interconnects various networks; mostly, the transmission capacity (bandwidth) of the backbone is greater than that of the networks connected to it

3.1.10
IP headend
headend comprising at least one IP gateway/interface at the input and/or at the output

3.1.11
local headend
headend having stand-alone signal acquisition or fed from central headend; distribution to hubsites via optical or RF trunks

3.1.12
maximum transmission unit
MTU
maximum packet size (in bytes) that a given layer can transmit

3.1.13
MPEG-2
refers to the ISO/IEC 13818 series. System coding is defined in ISO/IEC 13818-1, video coding in ISO/IEC 13818-2, audio coding in ISO/IEC 13818-3

3.1.14
multicast
connection between a single transmitter and multiple receivers (point-to-multipoint)

3.1.15
payload
part of a data packet, which carries the useful information

3.1.16
real-time transmission protocol
RTP
defines a standardized packet format for delivering audio and video over the Internet; services provided by RTP include e.g.: sequence numbering - allow the detection of out of order packets and packet loss, time stamping - allow synchronization and jitter calculations

3.1.17
router
functional unit that establishes a path through one or more computer networks

NOTE In OSI conforming computer networks, a router operates at the network layer.

[IEV 732-01-17]

3.1.18
server
functional unit that provides services to workstations, to personal computers or to other functional units in a computer network

EXAMPLES – A file server, a print server, a mail server

[IEV 732-01-11]

3.1.19
service information
SI
digital data describing the delivery system, content and scheduling/timing of broadcast data streams, etc. including MPEG-2 PSI together with independently defined extensions

3.1.20
socket
combination of IP address and port number

3.1.21
transport stream
TS
data structure defined in ISO/IEC 13818-1 which is the basis of the digital video broadcasting (DVB) related standards

3.1.22
unicast
connection between a single transmitter and receiver (point-to-point)

3.1.23
user datagram protocol
UDP
one of the core protocols of the Internet protocol suite; UDP uses ports to allow application-to-application communication

3.2 Abbreviations

AII_D	All Designated
AII_SPF	All Shortest Path First
ASI	Asynchronous Serial Interface
ATSC	Advanced Television Systems Committee
BAT	Bouquet Association Table
CAT	Conditional Access Table
CAT.3	Category 3 (components, e.g. cable and connecting hardware)
CAT.5	Category 5 (components, e.g. cable and connecting hardware)
CAT.6A	Category 6A (components, e.g. cable and connecting hardware)
CATV	Community Antenna Television
CBR	Constant Bit Rate
CD	Collision Detection
CHE	Central Headend
CSMA	Carrier Sense Multiple Access
DHCP	Dynamic Host Configuration Protocol
DVB	Digital Video Broadcast
DVB-C	Digital Video Broadcast, Cable
DVB-S	Digital Video Broadcast, Satellite
DVB-S2	Digital Video Broadcast, Satellite 2nd generation
DVB-T	Digital Video Broadcast, Terrestrial
DVMRP	Distance Vector Multicast Routing Protocol
EIT	Event Information Table
EMM	Entitlement Management Message
EPG	Electronic Programme Guide
FCS	Frame Check Sequence
FEC	Forward Error Correction
FM	Frequency Modulation
GigE	Gigabit Ethernet
HE	Headend