SLOVENSKI STANDARD

SIST EN 50083-10:2003

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Nadomeġļa:

SIST EN 50083-10:2000

Kabelska omrežja za televizijske in zvokovne signale ter interaktivne storitve - 10. del: Lastnosti sistema za povratne poti

Cable networks for television signals, sound signals and interactive services - Part 10: System performance for return paths

Kabelnetze für Fernsehsignale, Tonsignale und interaktive Dienste - Teil 10: Rückkanal-Systemanforderungen

Réseaux de distribution par câbles pour signaux de télévision, signaux de radiodiffusion sonore et services interactifs - Partie 10: Caractéristiques des systèmes de voie de retour

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EUROPEAN STANDARD **EN 50083-10**

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English version

Cable networks for television signals, sound signals and interactive services Part 10: System performance for return paths

Réseaux de distribution par câbles pour signaux de télévision, signaux de radiodiffusion sonore et services interactifs
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Kabelnetze für Fernsehsignale, Tonsignale und interaktive Dienste
Teil 10: Rückkanal-Systemanforderungen

This European Standard was approved by CENELEC on 2001-10-01. CENELEC members are bound to comply with the CEN/CENELEC Internal Regulations which stipulate the conditions for giving this European Standard the status of a national standard without any alteration.

Up-to-date lists and bibliographical references concerning such national standards may be obtained on application to the Central Secretariat or to any CENELEC member.

This European Standard exists in three official versions (English, French, German). A version in any other language made by translation under the responsibility of a CENELEC member into its own language and notified to the Central Secretariat has the same status as the official versions.

CENELEC members are the national electrotechnical committees of Austria, Belgium, Czech Republic, Denmark, Finland, France, Germany, Greece, Iceland, Ireland, Italy, Luxembourg, Malta, Netherlands, Norway, Portugal, Spain, Sweden, Switzerland and United Kingdom.

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

Central Secretariat: rue de Stassart 35, B - 1050 Brussels

Ref. No. EN 50083-10:2002 E

Foreword

This European Standard was prepared by CENELEC Technical Committee TC 209, "Cable networks for television signals, sound signals and interactive services" on the basis of EN 50083-10:1999 and the first amendment to EN 50083-10.

The text of this first amendment was submitted to the Unique Acceptance Procedure and was approved by CENELEC on 2001-10-01 to be published as part of a second edition of EN 50083-10.

The following dates were fixed:

- latest date by which the EN has to be implemented at national level by publication of an identical national standard or by endorsement (dop) 2002-10-01
- latest date by which the national standards conflicting with the EN have to be withdrawn (dow) 2004-10-01

Annexes designated "normative" are part of the body of the standard.
Annexes designated "informative" are given for information only.
In this standard, Annex B is normative and Annexes A and C are informative.

Contents

1 Scope

1.1 General

Standards of EN 50083 series deal with cable networks for television signals, sound signals and interactive services including equipment, systems and installations

- for headend-reception, processing and distribution of television and 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.

All kinds of networks like

- CATV-networks
- MATV-networks and SMATV-networks
- individual receiving networks

and all kinds of equipment, systems and installations installed in such networks, are within this scope.

The extent of these standardisation work is from the antennas, special signal source inputs to the headend or other interface points to the network up to the system outlet or the terminal input, where no system outlet exists.

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

1.2 Specific scope of this part 10

This standard is dealing with the transparent return path of cable networks operated in the frequency range between 5 MHz and 65 MHz or parts thereof. Higher frequencies may be used in fibre based networks.

NOTE In addition it is possible to use the frequency range from 0 MHz to 5 MHz for return path transmissions, e.g. for NMS or other control, monitoring and signalling purposes. Applications below 5 MHz are not covered by this standard.

An active return path carries typically only return signals. A passive return path can be used for both return and forward signals.

This standard lays down the basic methods of measurement for signals typically used in the return path of cable networks in order to assess the performance of those signals and their performance limits.

All requirements refer to the performance limits which shall be obtained between the reference points (Figure 1) of the return path system.

One reference point is the network termination close to the subscriber. It is the last point where all forward and return signals are present and carried on the same cable. If no network termination point exists, the reference point is the system outlet.

The other reference point is the input of the return signal receiver (or transceiver). At this point the transparent signal path ends and behind this point the signal is treated in a non-transparent way. The return signal receiver can be situated at the headend but can also be at the node of the coaxial cell or at any other point of the network.

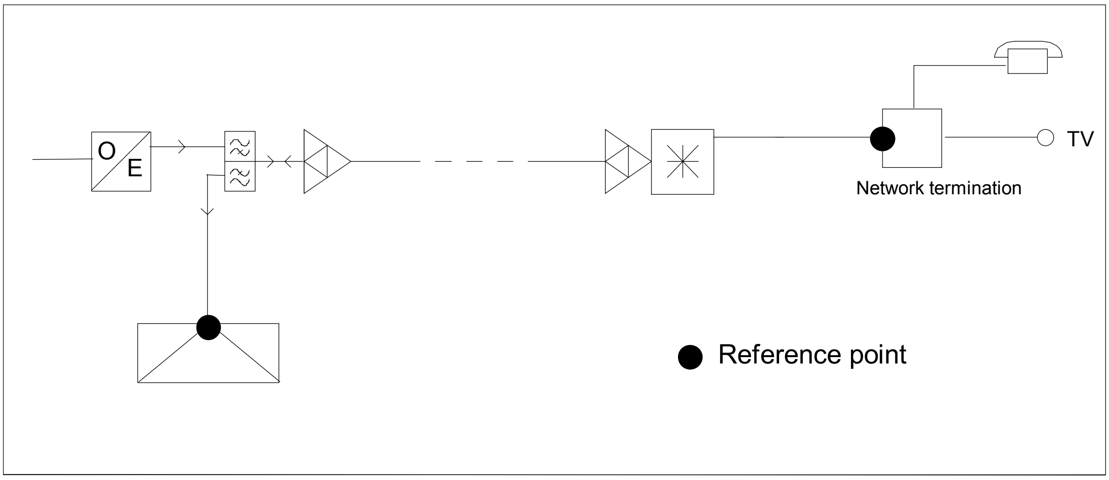


Figure 1 - Reference points of an active return path system (example)

In addition to the system performance requirements for the transparent return path, system performance recommendations were laid down in this standard e.g. for the overall frequency allocation, for the use of specific modulation techniques for different interactive multimedia services or for different sub-bands within the return path frequency range, etc.

Specific equipment installed in cable networks for the operation of such return paths is standardised in the relevant equipment standards, parts 3 to 6 of the EN 50083 series.

Transmission systems are not within the scope of this standard.

2 Normative references

This European Standard incorporates, by dated or undated reference, provisions from other publications. These normative references are cited at the appropriate places in the text and the publications are listed hereafter. For dated references, subsequent amendments to or revisions of any of these publications apply to this European Standard only when incorporated in it by amendment or revision. For undated references, the latest edition of the publication referred to applies.

EN 50083		Cable networks for television signals, sound signals and interactive services
EN 50083-1 + A1 + A2	1993 1997 1997	Part 1: Safety requirements
EN 50083-2	2001	Part 2: Electromagnetic compatibility for equipment
EN 50083-3	2002	Part 3: Active wideband equipment for coaxial cable networks
EN 50083-4	1998	Part 4: Passive wideband equipment for coaxial cable networks

EN 50083-5	2001	Part 5: Headend equipment
EN 50083-6	1997	Part 6: Optical equipment
EN 50083-7 + A1	1996 2000	Part 7: System performance
EN 50083-8	2002	Part 8: Electromagnetic compatibility for networks
ES 200 800 V1.3.1	2001	Digital Video Broadcasting (DVB); DVB interaction channel for Cable TV distribution systems (CATV)

3 Terms, definitions, symbols and abbreviations

3.1 Terms and definitions

3.1.1
amplitude response variation
peak-to-peak variation in frequency amplitude response of a specified signal path over a specified frequency band, expressed in dB

3.1.2
broadcast signal
signal comprising of video and/or audio and/or data content which is distributed to several receivers simultaneously

3.1.3
channel availability
percentage of the time during which the channel fulfils all performance requirements. The duration of the observation time has to be published

3.1.4
downstream direction
direction of signal flow in a cable network from the headend or any other central point (node) of a cable network to the subscribers´ area

3.1.5
forward path (downstream)
part of a cable network by which signals are distributed in the downstream direction from the headend or any other central point (node) of a cable network to the subscribers´ area

3.1.6
frequency error
quality of supply evaluated on the basis of the actual frequency of an electrical system compared to the nominal value. Frequency error consists of initial error, short term and long term frequency stability

3.1.7
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

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

3.1.8
hybrid fibre coaxial network (HFC)
cable network which is comprised of optical equipment and cables and coaxial equipment and cables in different parts

3.1.9
impulse noise
noise which is caused by electromagnetic interference into cable networks. Impulse noise is characterised by pulses with a duration of typically < 10 μs

3.1.10
ingress noise
noise which is caused by electromagnetic interference into cable networks. Its power decreases with increasing frequency. It is permanently present but slowly varies in its intensity as a function of time

3.1.11
interaction path
part of a cable network by which interactive signals are transmitted in the downstream direction (from the headend or node to the subscriber) and in the upstream direction (from the subscriber to the headend or node)

3.1.12
location specific noise
noise which occurs at a specific area of a cable network or which occurs in a cable network located in a specific environment

3.1.13
multiple interference
interfering signal which consists of ≥ 2 signals which originate from ≥ 2 sources

NOTE On return path the multiple interference consists of ingress noise and intermodulation distortion products.

3.1.14
multimedia signal
signal comprising of two or more different media contents e.g. video, audio, text, data, etc.

3.1.15
network management system (NMS)
software based system for controlling and supervising cable networks

3.1.16
network segment
part of a cable network comprising a set of functions and/or a specific extent of the complete cable network

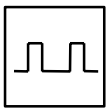
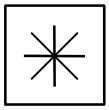
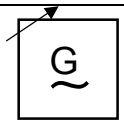
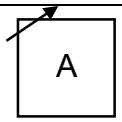
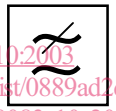
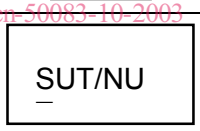
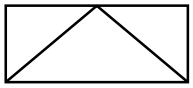
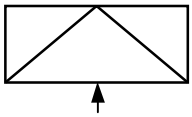
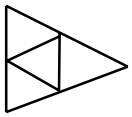
3.1.17
network termination
electrical termination of a cable network at any outlet on subscribers' side and headend or node side

3.1.18
node
central point of a network segment at which signals could be fed into the forward path or could be gathered from a number of subscribers out of the return path

3.1.19
return path (upstream)
part of a cable network by which signals are transmitted in the upstream direction from any subscriber, connected to the network, to the headend or any other central point (node) of a cable network

3.1.20
upstream direction
direction of signal flow in a cable network from a subscriber to the headend or any other central point (node) of a cable network

3.2 Symbols

Symbols	Terms	Symbols	Terms
	Optical receiver		Spectrum analyser
	Test waveform generator		Passive distribution network
	Variable signal generator		Oscilloscope
	Variable attenuator		Low pass filter
	High pass filter		System Under Test Network Under Test
	Demodulator		Modulator
	Amplifier with return path amplifier		Bit Error Rate Detector

3.3 Abbreviations

BER	Bit Error Rate
BW	Bandwidth, equivalent noise bandwidth
CATV	Community Antenna Television
CB	Citizen Band
CDMA	Code Division Multiple Access
C/MI	Carrier-to-Multiple Interference ratio
C/N	Carrier-to-Noise ratio
COFDM	Coded Orthogonal Frequency Division Multiplexing
CSO	Composite Second Order
CTB	Composite Triple Beat
DC	Direct Current
DVB	Digital Video Broadcasting
EMC	Electromagnetic Compatibility
FM	Frequency Modulation
FSK	Frequency Shift Keying
HFC	Hybrid Fibre Coaxial
IF	Intermediate Frequency
IM	Intermodulation
I/Q	In-phase/Quadrature signals
ISM	Industrial, Scientific, Medical
LPF	Low-Pass Filter
MATV	Master Antenna Television (Network)
MMDS	Multichannel Multipoint Distribution System
MPEG	Motion Picture Experts Group
MUX	Multiplex(er)
MVDS	Multichannel Video Distribution System
NMS	Network Management System
NUT	Network Under Test
OFDM	Orthogonal Frequency Division Multiplexing
PAL	Phase Alternating Line
PRBS	Pseudo Random Binary Sequence
QAM	Quadrature Amplitude Modulation
QPSK	Quaternary Phase Shift Keying
RF	Radio Frequency
RMS	Root Mean Square
RBW	Resolution Bandwidth
S	Signal level, before corrections
SHF	Super High Frequency
SI	Service Information
SL	Signal level (corrected)
SMATV	Satellite Master Antenna Television (Network)

S/N	Signal-to-Noise ratio
SUT	System Under Test
TS	Transport Stream
TV	Television
UHF	Ultra-High Frequency
VBW	Video Bandwidth
VHF	Very-High Frequency

4 Methods of measurement

4.1 Setup of the network

Even if the main target of this part four of this standard is to describe the measurement methods for the performance of the return path it is very important to do this on a properly aligned network plant. The following setup and operational procedures is a guideline for that.

The return path differs in several ways from the forward path, even though they share mostly the same physical network. Table 1 gives some hints.

Table 1 - Characterisation criteria for downstream and upstream operations

Criteria	Downstream	Upstream
signals present	continuously	intermittently or continuously
power levels	well-defined	varying
channel allocation	well-defined	may vary over time
signal bandwidth	well-defined	application dependent
modulation scheme	fixed	application dependent
amplifier input	single	several inputs

As can be seen from the table the variable factors require that the procedures used to operate the return path plant differ from those used in downstream direction.

One major difference is that the amplifiers in downstream direction are aligned by adjusting their output signals to predetermined levels and in the return direction the network plant is adjusted so that the input signals from different sources are equalised at the amplifier input. Different type of signals may be at different levels.