

Cable networks for television signals, sound signals and interactive services - Part 101: System performance of forward paths loaded with digital channels only

## EESTI STANDARDI EESSÕNA

## NATIONAL FOREWORD

See Eesti standard EVS-EN 60728-101:2017 sisaldab Euroopa standardi EN 60728-101:2017 ingliskeelset teksti.	This Estonian standard EVS-EN 60728-101:2017 consists of the English text of the European standard EN 60728-101:2017.
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ICS 33.040.20; 33.160.01

English Version

**Cable networks for television signals, sound signals and  
interactive services - Part 101: System performance of forward  
paths loaded with digital channels only  
(IEC 60728-101:2016)**

Réseaux de distribution par câbles pour signaux de  
télévision, signaux de radiodiffusion sonore et services  
interactifs - Partie 101: Performances des systèmes de voie  
directe soumis à une charge de porteuses exclusivement  
numériques  
(IEC 60728-101:2016)

Kabelnetze für Fernsehsignale, Tonsignale und interaktive  
Dienste - Teil 101: Systemanforderungen in Verteilrichtung  
bei kompletter digitaler Kanallast  
(IEC 60728-101:2016)

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**CEN-CENELEC Management Centre: Avenue Marnix 17, B-1000 Brussels**

## European foreword

The text of document 100/2641/FDIS, future edition 1 of IEC 60728-101, prepared by Technical Area 5 "Cable networks for television signals, sound signals and interactive services" of IEC/TC 100 "Audio, video and multimedia systems and equipment" was submitted to the IEC-CENELEC parallel vote and approved by CENELEC as EN 60728-101:2017.

The following dates are fixed:

- latest date by which the document has to be (dop) 2017-11-19  
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publication of an identical national  
standard or by endorsement
- latest date by which the national (dow) 2020-05-19  
standards conflicting with the  
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The text of the International Standard IEC 60728-101:2016 was approved by CENELEC as a European Standard without any modification.

In the official version, for Bibliography, the following notes have to be added for the standards indicated:

ISO/IEC 13818 (series)

NOTE Harmonized as EN ISO/IEC 13818 (series).

## Annex ZA (normative)

### Normative references to international publications with their corresponding European publications

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.

NOTE 1 When an International Publication has been modified by common modifications, indicated by (mod), the relevant EN/HD applies.

NOTE 2 Up-to-date information on the latest versions of the European Standards listed in this annex is available here: [www.cenelec.eu](http://www.cenelec.eu).

<u>Publication</u>	<u>Year</u>	<u>Title</u>	<u>EN/HD</u>	<u>Year</u>
IEC 60050-705	-	International Electrotechnical Vocabulary (IEV) -- Chapter 705: Radio wave propagation	-	-
IEC 60050-712	-	International Electrotechnical Vocabulary (IEV) -- Chapter 712: Antennas	-	-
IEC 60050-725	-	International Electrotechnical Vocabulary (IEV) -- Chapter 725: Space radiocommunications	-	-
IEC 60728-1	-	Cable networks for television signals, sound signals and interactive services -- Part 1: System performance of forward paths	EN 60728-1	-
IEC 60728-1-1	-	Cable networks for television signals sound signals and interactive services -- Part 1-1: RF cabling for two way home networks	EN 60728-1-1	-
IEC 60728-1-2	-	Cable networks for television signals, sound signals and interactive services -- Part 1-2: Performance requirements or signals delivered at the system outlet in operation	EN 60728-1-2	-
IEC 60728-2	-	Cable networks for television signals, sound signals and interactive services - Part 2: Electromagnetic compatibility for equipment	-	-
IEC 60728-3	-	Cable networks for television signals, sound signals and interactive services -- Part 3: Active wideband equipment for cable networks	EN 60728-3	-
IEC 60728-3-1	-	Cable networks for television signals, sound signals and interactive services -- Part 3-1: Methods of measurement of non-linearity for full digital channel load with DVB-C signals	EN 60728-3-1	-
IEC 60728-5	-	Cable networks for television signals, sound signals and interactive services - Part 5: Headend equipment	EN 60728-5	-
IEC 60728-10	-	Cable networks for television signals, sound signals and interactive services -- Part 10: System performance of return paths	EN 60728-10	-
IEC 60728-11	-	Cable networks for television signals, sound signals and interactive services -- Part 11: Safety	EN 60728-11	-
IEC 60728-12	-	Cabled distribution systems for television and sound signals -- Part 12: Electromagnetic compatibility of systems	-	-

IEC 60966-2-4	-	CABLE ASSEMBLIES - Part 2-4: Detail specification for cable assemblies for radio and TV receivers - Frequency range 0 MHz to 3 000 MHz, IEC 61169-2 connectors	-
IEC 60966-2-5	-	Radio frequency and coaxial cable assemblies -- Part 2-5: Detail specification for cable assemblies for radio and TV receivers - Frequency range 0 MHz to 1 000 MHz, IEC 61169-2 connectors	EN 60966-2-5 -
IEC 60966-2-6	-	Radio frequency and coaxial cable assemblies -- Part 2-6: Detail specification for cable assemblies for radio and TV receivers - Frequency range 0 MHz to 3 000 MHz, IEC 61169-24 connectors	EN 60966-2-6 -
ISO/IEC 13818-1	-	Information technology - Generic coding of moving pictures and associated audio information - Part 1: Systems	-
ISO/IEC 13818-2	-	Information technology - Generic coding of moving pictures and associated audio information - Part 2: Video	-
ISO/IEC 13818-3	-	Information technology - Generic coding of moving pictures and associated audio information -- Part 3: Audio	-
ISO/IEC 13818-4	-	Information technology - Generic coding of moving pictures and associated audio information - Part 4: Conformance testing	-
ISO/IEC 14496-1	-	Information technology -- Coding of audio-visual objects -- Part 1: Systems	-
ISO/IEC 14496-2	-	Information technology - Coding of audio-visual objects - Part 2: Visual	-
ISO/IEC 14496-3	-	Information technology - Coding of audio-visual objects - Part 3: Audio	-
ETSI EN 300 421	-	Digital Video Broadcasting (DVB): Framing structure, channel coding and modulation for 11/12 GHz satellite services	-
ETSI EN 300 429	-	Digital Video Broadcasting (DVB): Framing structure, channel coding and modulation for cable systems	-
ETSI EN 300 468	-	Digital Video Broadcasting (DVB): Specification for Service Information (SI) in DVB systems	-
ETSI EN 300 473	-	Digital Video Broadcasting (DVB): Satellite Master Antenna Television (SMATV) distribution systems	-
ETSI EN 300 744	-	Digital Video Broadcasting (DVB): Framing structure, channel coding and modulation for digital terrestrial television	-
ETSI EN 300 748	-	Digital Video Broadcasting (DVB): Multipoint Video Distribution Systems (MVDS) at 10 GHz and above	-
ETSI EN 300 749	-	Digital Video Broadcasting (DVB): Microwave Multipoint Distribution Systems (MMDS) below 10 GHz	-
ETSI EN 302 307	-	Digital Video Broadcasting (DVB); Second generation framing structure, channel coding and modulation systems for Broadcasting, Interactive Services, News Gathering and other broadband satellite applications (DVB-S2)	-

ETSI EN 302 755	-	Digital Video Broadcasting (DVB); Frame structure channel coding and modulation for a second generation digital terrestrial television broadcasting system (DVB-T2)	-	-
ETSI EN 302 769	-	Digital Video Broadcasting (DVB) - Frame structure channel coding and modulation for a second generation digital transmission system for cable systems (DVB-C2)	-	-
ETSI ETS 300 784	-	Satellite Earth Stations and Systems (SES);Television Receive-Only (TVRO) satellite earth stations operating in the 11/12 GHz frequency bands	-	-
ETSI TR 101 211	-	Digital Video Broadcasting (DVB); Guidelines on implementation and usage of Service Information (SI)	-	-
ETSI TR 101 290	-	Digital Video Broadcasting (DVB);Measurement guidelines for DVB systems	-	-
ETSI TS 102 831 V1.2.1	-	Digital Video Broadcasting (DVB); Implementation guidelines for a second generation digital terrestrial television broadcasting system (DVB-T2)	-	-
ETSI TS 102 991 V1.2.1	-	Digital Video Broadcasting (DVB) - Implementation Guidelines for a second generation digital cable transmission system (DVB-C2)	-	-

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## INTRODUCTION

Standards and deliverables of the IEC 60728 series deal with cable networks including equipment and associated methods of measurement for headend reception, processing and distribution of television and sound signals and for processing, interfacing and transmitting all kinds of data signals for interactive services using all applicable transmission media. These signals are typically transmitted in networks by frequency-multiplexing techniques.

This includes for instance

- regional and local broadband cable networks,
- extended satellite and terrestrial television distribution systems,
- individual satellite and terrestrial television receiving systems,

and all kinds of equipment, systems and installations used in such cable networks, distribution and receiving systems.

The extent of this standardization 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 of the customer premises equipment.

The standardization work will consider coexistence with users of the RF spectrum in wired and wireless transmission systems.

The standardization 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.

The reception of television signals inside a building requires an outdoor antenna and a distribution network to convey the signal to the TV receivers.

The installation of an outdoor antenna for each TV receiver should be avoided for technical, economical and practical reasons.

In a building divided into apartment blocks, the installation of a master antenna television system for terrestrial (MATV) and/or satellite (SMATV) reception, as shown in Figure 1, Figure 2, Figure 3, Figure 4 and Figure 5, describing as an example the various parts of the system is usual. Most of the terms used in the IEC 60728 series can be referred to these figures.

When signals to be conveyed to the TV receivers are picked up far away, for geographical reasons, and the number of users (subscribers) is very high, the installation of a cable network using coaxial cables and/or fibre optic cables is used, as indicated in Figure 4, describing as an example the various parts of the system.

A system model of a cable network is shown in Figure 5, where the main parts of the systems are indicated, as defined in Clause 3.

This standard deals with digital signals only.

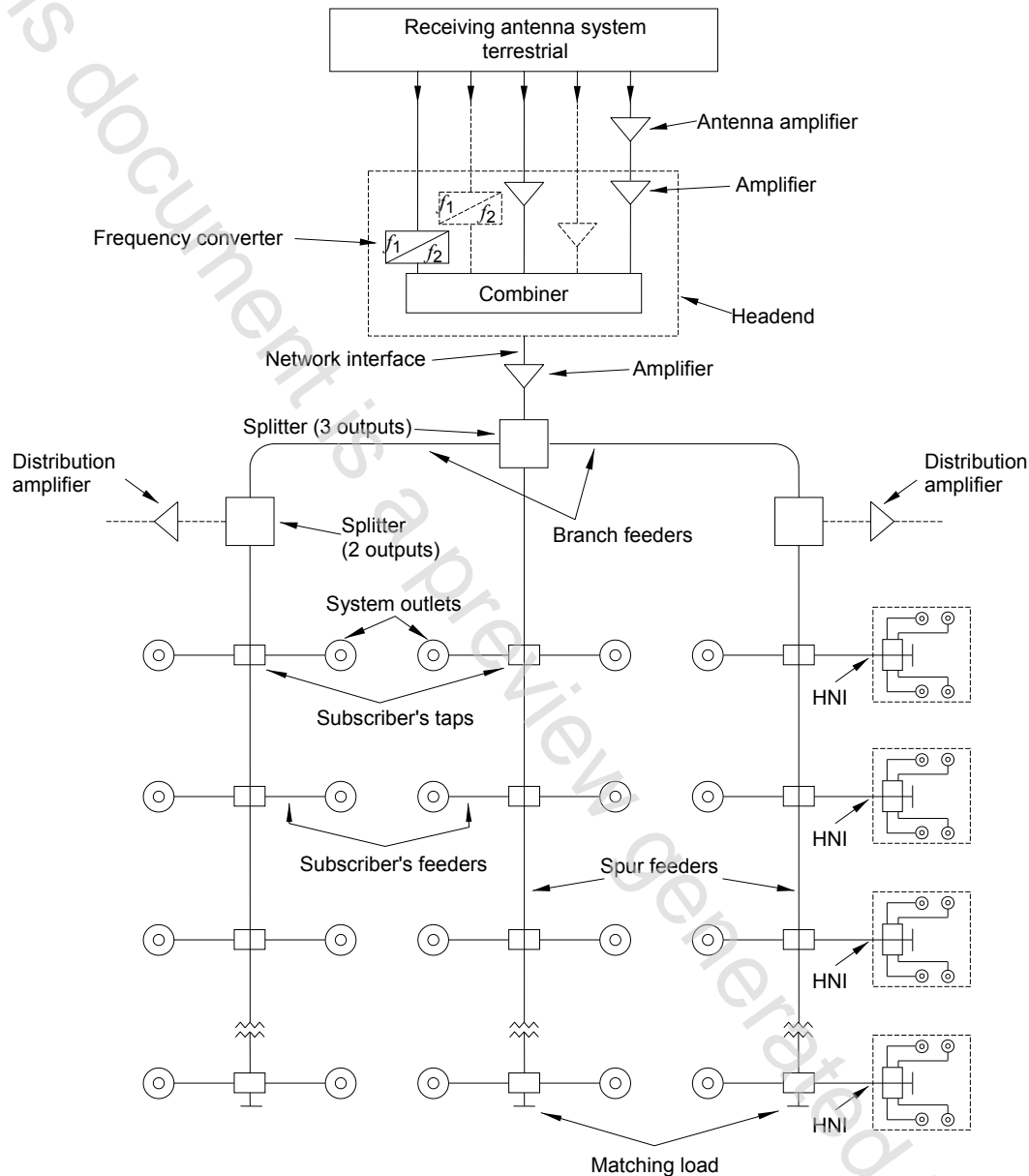
For forward path analogue signals refer to IEC 60728-1. For return paths signals (analogue and digital) refer to IEC 60728-10.

Clause 4 defines the methods of measurement of the system performance parameters at the system outlet.

Clause 5 defines the system performance limits which will, with an unimpaired input, (headend input signal), produce picture and sound signals (at system outlets) where the quality requirement is a quasi-error-free (QEF) reception.

Appropriate performance requirements for the signals at the receiving antennas site are given in Clause 6 in order to provide, at the input of the headend of the cable network, for digital television signals with suitable quality.

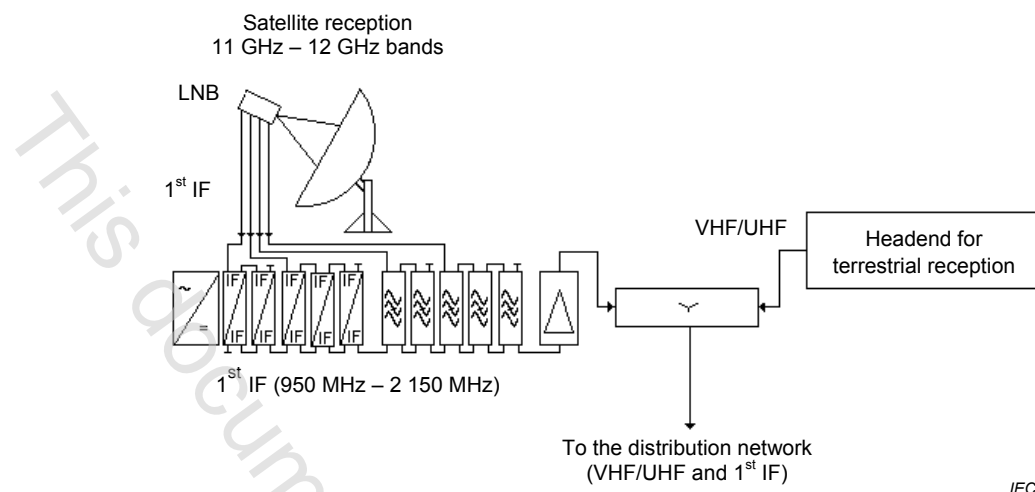
Clause 7 is applicable to home networks (including those of individual receiving systems) using coaxial cables, balanced cables or optical cables and is primarily intended for television signals, sound signals and interactive services, operating between about 30 MHz and 3 000 MHz. Clause 7 also considers basic operational characteristics of a home network, specifies the requirements with respect to the home network interface (HNI) taking into account the performance requirements given at the system outlet or at the terminal input.



IEC

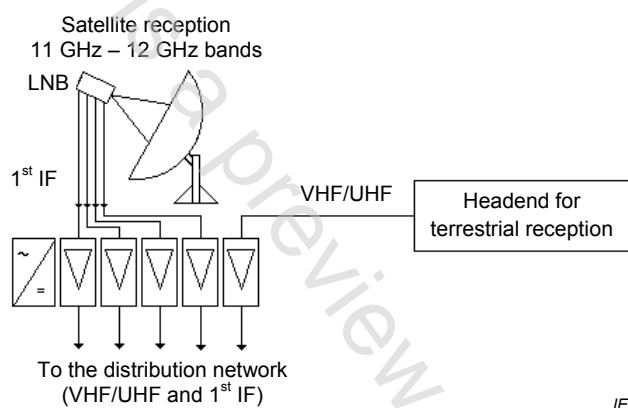
Some apartments (dwelling units) are served with a home network (HN), interfaced to the MATV system by the home network interface (HNI).

**Figure 1 – Example of a master antenna television system (MATV) for terrestrial reception**

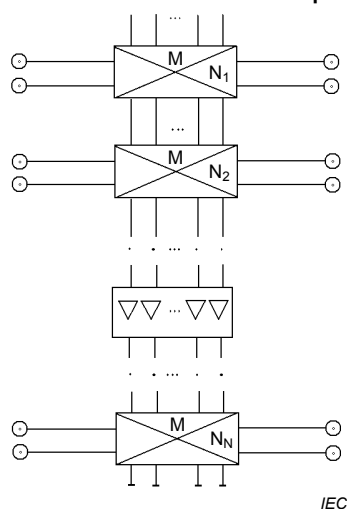


NOTE Distribution at the 1<sup>st</sup> IF on the same cable as terrestrial VHF/UHF channels.

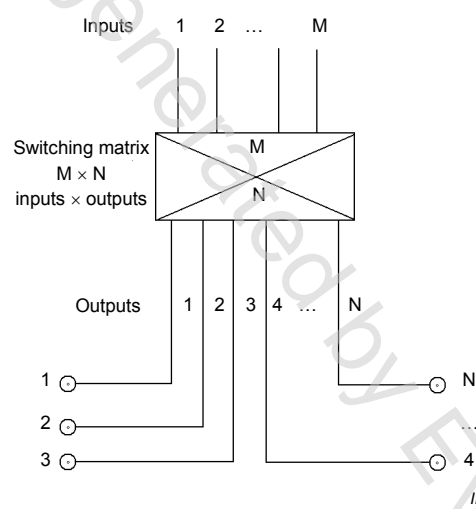
**Figure 2 – Example of the headend of a master antenna television system for satellite (SMATV) reception**



**Figure 3a – Headend for terrestrial and satellite reception using multicable distribution**



**Figure 3b – Distribution with switching matrix at each flat**



**Figure 3c – Distribution with switching matrix: star configuration**

NOTE Distribution at the 1<sup>st</sup> IF using multicable and multi-switch technique.

**Figure 3 – Example of a master antenna television system for terrestrial and satellite (SMATV) reception**



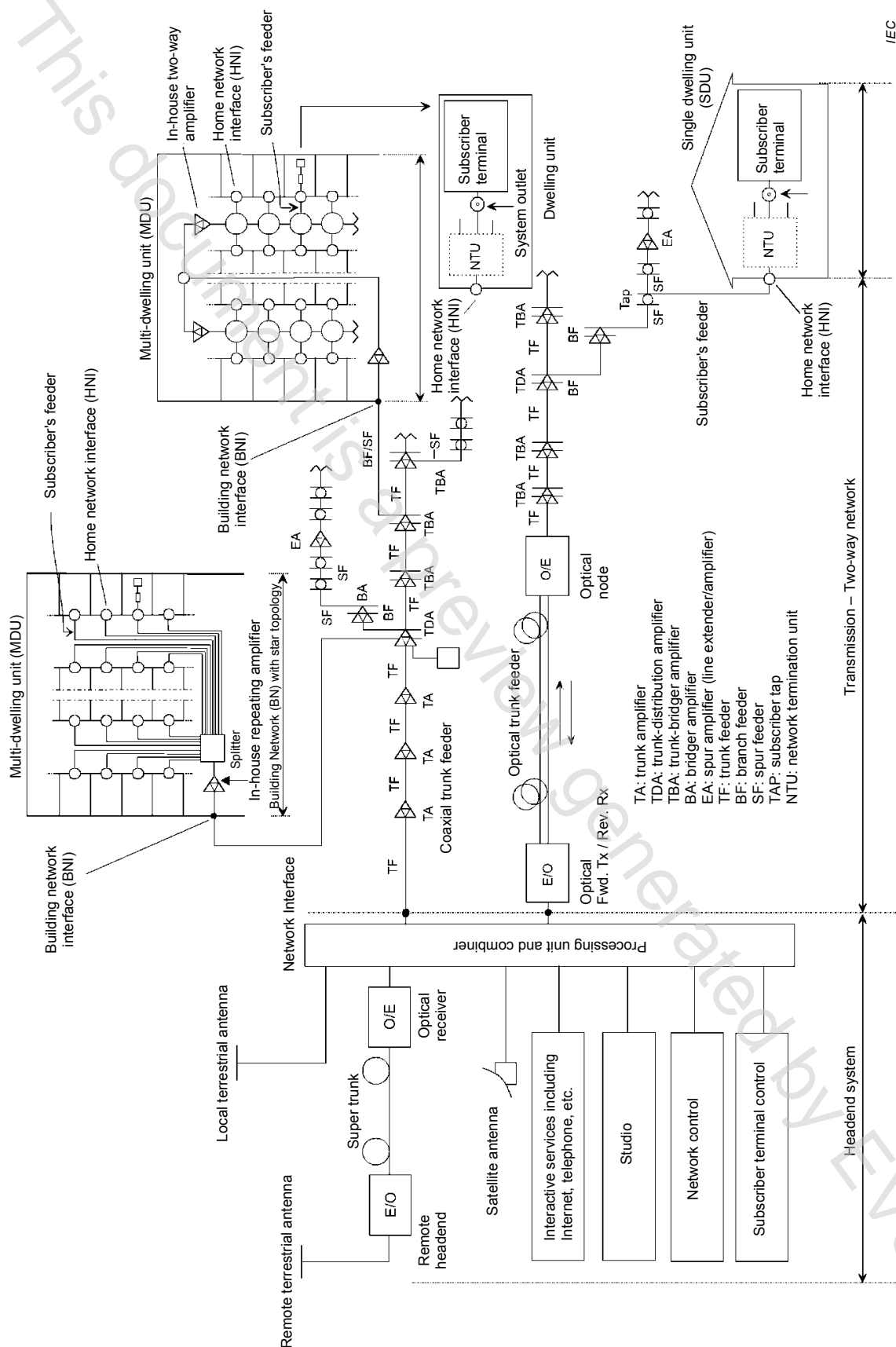


Figure 4 – Example of a cabled distribution system for television and sound signals

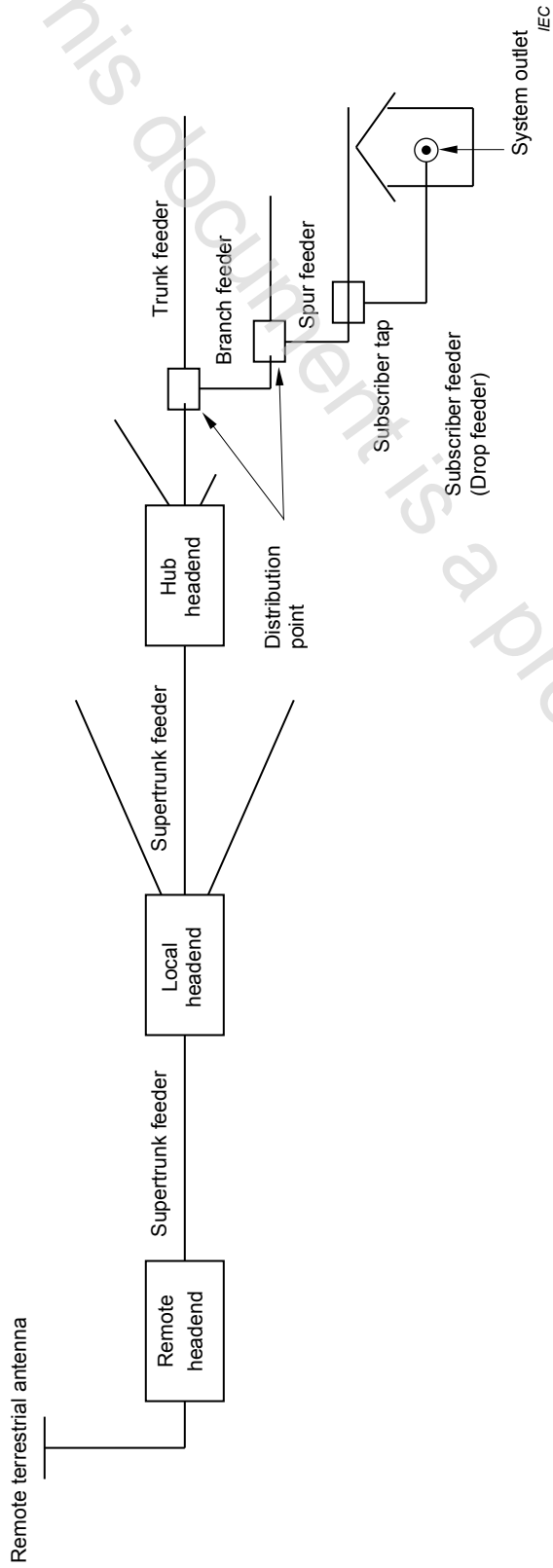


Figure 5 – System model for downstream direction of a cable network for television and sound signals (CATV)