



SLOVENSKI STANDARD
oSIST prEN IEC 60728-101-1:2022
01-november-2022

RF kabli za dvosmerna domača omrežja z obremenitvami popolnoma digitaliziranih kanalov (TA5)

RF cabling for two-way home networks with all-digital channels load (TA5)

iTeh STANDARD PREVIEW

Câblage RF pour réseaux domestiques bidirectionnels soumis à une charge de porteuses exclusivement numériques (TA5)

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TITLE:

RF cabling for two-way home networks with all-digital channels load (TA5)

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INTERNATIONAL ELECTROTECHNICAL COMMISSION

**CABLE NETWORKS FOR TELEVISION SIGNALS,
SOUND SIGNALS AND INTERACTIVE SERVICES –**
**Part 101-1: RF cabling for two-way home networks with all-digital
channels load**

FOREWORD

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International Standard IEC 60728-101-1 has been prepared by technical area 5: Cable networks for television signals, sound signals and interactive services, of IEC technical committee 100: Audio, video and multimedia systems and equipment.

This International Standard is to be used in conjunction with IEC 60728-101:2016.

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

FDIS	Report on voting
100/xx/FDIS	100/xx/RVD

Full information on the voting for its approval can be found in the report on voting indicated in the above table.

197 The language used for the development of this International Standard is English.

198 This document was drafted in accordance with ISO/IEC Directives, Part 2, and developed in
199 accordance with ISO/IEC Directives, Part 1 and ISO/IEC Directives, IEC Supplement, available at
200 https://www.iec.ch/members_experts/refdocs. The main document types developed by IEC are
201 described in greater detail at <https://www.iec.ch/standardsdev/publications>.

202 A list of all parts of the IEC 60728 series, under the general title *Cable networks for television*
203 *signals, sound signals and interactive services*, can be found on the IEC website.

204 The committee has decided that the contents of this document will remain unchanged until the
205 stability date indicated on the IEC website under webstore.iec.ch in the data related to the
206 specific document. At this date, the document will be

- 207 • reconfirmed,
- 208 • withdrawn,
- 209 • replaced by a revised edition, or
- 210 • amended.

211

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214

215 INTRODUCTION

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

221 This includes for instance

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

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

227 The extent of this standardization work is from the antennas and/or special signal source
228 inputs to the headend or other interface points to the network up to the terminal input of the
229 customer premises equipment.

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

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

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

<https://standards.iteh.ai/catalog/standards/sist/436e14cb-c422-4987-beed->

237 This part of the IEC 60728 deals with the requirements and implementation guidelines for a
238 home network that can be realised with different techniques. The following types of home
239 networks (HN) are possible:

- 240 • passive coaxial home network;
- 241 • active coaxial home network;
- 242 • different home network types.

243 Figure 1 shows typical situations that are possible when considering RF home networks.

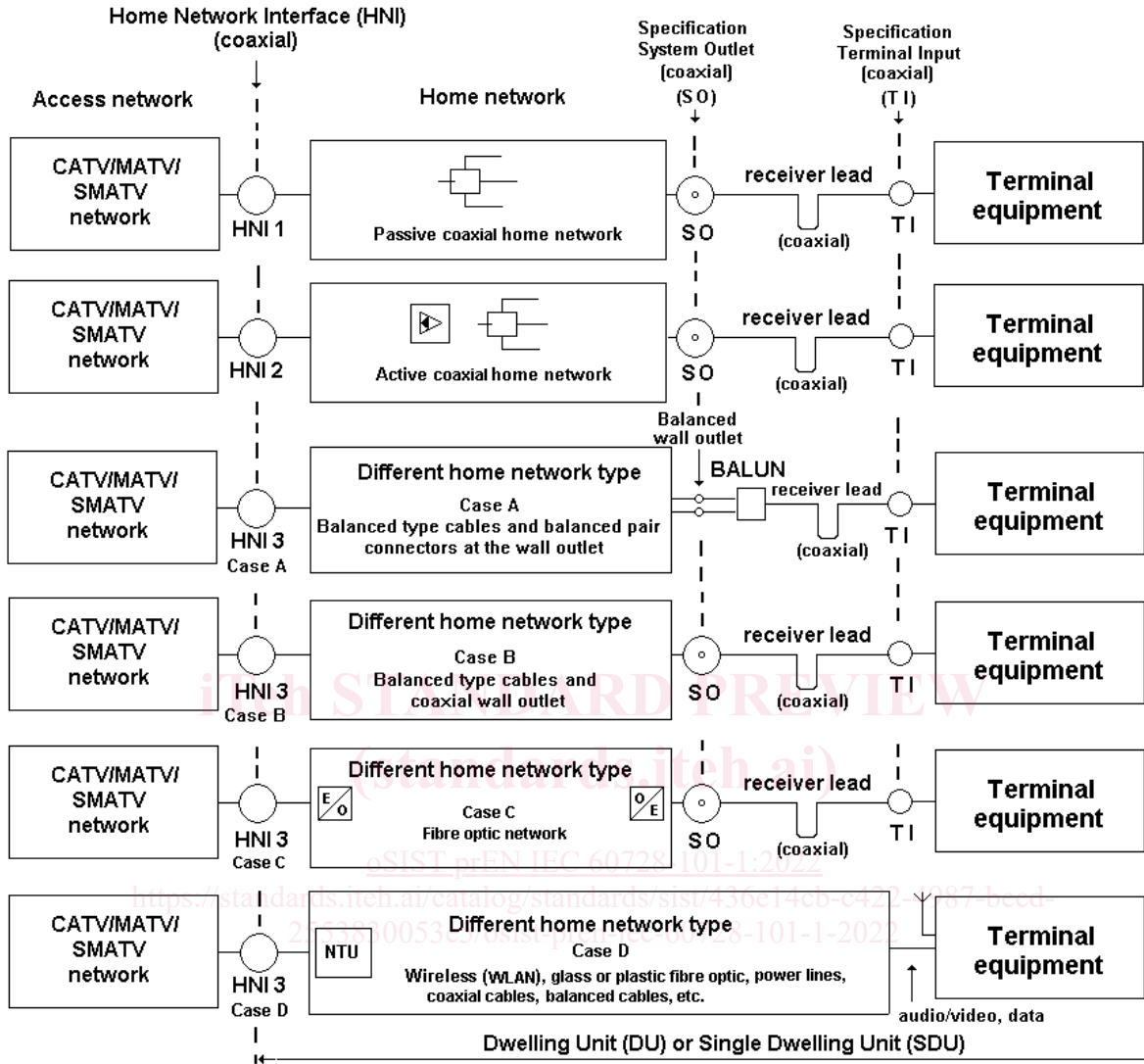
244 The RF home network can be realised using coaxial cables, balanced cables, optical cables
245 or radio links.

246 This document considers digital signals only and is based on IEC 60728-101 dealing with
247 system performance of forward paths loaded with digital channels only. For RF cable systems
248 loaded with analogue and digital signals refer to IEC 60728-1-1 ED2.

249 Figures 4 to 9 have been amended to take into account the level requirement for digital
250 signals only.

251 Although the upper frequency range of terrestrial broadcast signals depends on the allocation
252 frequency plan of each region (e.g., in Europe it is reduced to 694 MHz, being the 700 MHz
253 and 800 MHz bands assigned to telecommunication services), the upper frequency range into
254 the cable networks can be maintained to 862 MHz in order to maximise the number of
255 channels to be distributed in the cable networks, assuming that sufficient immunity (screening
256 efficiency) to signals radiated in the 700 MHz and 800 MHz bands is provided.

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IEC 2523/09

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Figure 1 – Examples of RF home network types

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CABLE NETWORKS FOR TELEVISION SIGNALS, SOUND SIGNALS AND INTERACTIVE SERVICES –

Part 101-1: RF cabling for two-way home networks with all-digital channels load

269 1 Scope

270 This part of IEC 60728 provides the requirements and describes the implementation
271 guidelines of RF cabling for two-way home networks; it is applicable to any home network that
272 distributes signals provided by CATV/MATV/SMATV cable networks (including individual
273 receiving systems) having a coaxial cable output. It is also applicable to home networks
274 where some part of the distribution network uses wireless links, for example in place of the
275 receiver cord.

276 This part of IEC 60728 is therefore applicable to RF cabling for two-way home networks with
277 wired cords or wireless links inside a room and primarily intended for television and sound
278 signals operating between about 5 MHz and 3 300 MHz. The frequency range is extended to
279 6 000 MHz for distribution techniques that replace wired cords with a wireless two-way
280 communication inside a room (or a small number of adjacent rooms) that uses the 5 GHz to
281 6 GHz band.

282 In a building divided into apartment blocks, the distribution of the signals inside the home
283 starts from the home network interface (HNI) up to the system outlet or terminal input. The
284 requirements at the system outlet are given in IEC 60728-101, Clause 5 and the requirements
285 at the HNI are given in IEC 60728-101, Clause 7. In Clause 5 of this standard additional
286 requirements are given.

287 This document deals with various possibilities to distribute signals in a home network, using
288 coaxial cables, balanced pair cables, fibre optic cables (glass or plastic) and also wireless
289 links inside a room (or a small number of adjacent rooms) to replace wired cords.

290 This document gives references to basic methods of measurement of the operational
291 characteristics of the home cable network in order to assess its performance.

292 All requirements refer to the performance limits, which are obtained between the input(s) at
293 the home network interface (HNI) and the output at any system outlet when terminated in a
294 resistance equal to the nominal load impedance of the system, unless otherwise specified.
295 Where system outlets are not used, the above applies to the terminal input.

296 NOTE 1 If the home network is subdivided into a number of parts, using different transmission media (e.g. coaxial
297 cabling, balanced cabling, optical cabling, wireless links) the accumulation of degradations should not exceed the
298 figures given below.

299 NOTE 2 Performance requirements of return paths as well as special methods of measurement for the use of the
300 return paths in cable networks are described in IEC 60728-10.

301 Clause 5 defines the performance limits measured at system outlet or terminal input for an
302 unimpaired (ideal) test signal applied at the HNI. Under normal operating conditions for any
303 digital channel and meeting these limits, the cumulative effect of the impairment of any single
304 parameter at the HNI and that due to the home network will produce signals not worse than
305 the requirements given in IEC 60728-101-2. For digitally modulated signals the quality
306 requirement is a QEF (Quasi Error Free) reception.

307 This document describes the physical layer connection for home networks. Description of
308 protocols required for Layer 2 and higher layers is out of the scope of this document. Logical
309 connections between devices within the home network are therefore not always guaranteed.

310 2 Normative references

311 The following referenced documents are indispensable for the application of this document.
312 For dated references, only the edition cited applies. For undated references, the latest edition
313 of the referenced document (including any amendments) applies.

314 IEC 60050-705, *International Electrotechnical Vocabulary – Chapter 705: Radio wave*
315 *propagation*

316 IEC 60050-712, *International Electrotechnical Vocabulary – Chapter 712: Antennas*

317 IEC 60050-725, *International Electrotechnical Vocabulary – Chapter 725: Space*
318 *radiocommunications*

319 IEC 60617, *Graphical symbols for diagrams*

320 IEC 60728-101:2016, *Cable networks for television signals sound signals and interactive*
321 *services – Part 1: System performance of forward paths loaded with digital channels only*

322 IEC 60728-101-2, *Cable networks for television signals sound signals and interactive*
323 *services – Part 1-2: Performance requirements for signals delivered at system outlet in*
324 *operation with all-digital channels load*

325 IEC 60728-3:2010, *Cable networks for television signals sound signals and interactive*
326 *services – Part 3: Active wideband equipment for coaxial cable networks*

327 IEC 60728-10, *Cable networks for television signals, sound signals and interactive services*
328 *– Part 10: System performance of return paths*

329 IEC 60966 (all parts), *Radio frequency and coaxial cable assemblies*

330 IEC 60966-2-4, *Radio frequency and coaxial cable assemblies – Part 2-4: Detail*
331 *specification for cable assemblies for radio and TV receivers – Frequency range 0 MHz to 3*
332 *000 MHz, IEC 61169-2 connectors*

333 IEC 60966-2-5, *Radio frequency and coaxial cable assemblies – Part 2-5: Detail*
334 *specification for cable assemblies for radio and TV receivers – Frequency range 0 MHz to 1*
335 *000 MHz, IEC 61169-2 connectors*

336 IEC 60966-2-6, *Radio frequency and coaxial cable assemblies – Part 2-6: Detail*
337 *specification for cable assemblies for radio and TV receivers – Frequency range 0 MHz to 3*
338 *000 MHz, IEC 61169-24 connectors*

339 ISO/IEC/IEEE 8802.11:2018, *Information technology – Telecommunications and information*
340 *exchange between systems – Local and metropolitan area network – Specific Requirements –*
341 *Part 11: Wireless LAN medium access control (MAC) and physical layer (PHY) specifications*

342 IEEE 802.11ax, *IEEE Standard for Information Technology - Telecommunications and*
343 *Information Exchange between Systems - Local and Metropolitan Area Networks - Specific*
344 *Requirements - Part 11: Wireless LAN Medium Access Control (MAC) and Physical Layer*
345 *(PHY) Specifications - Amendment 1: Enhancements for High-Efficiency WLAN*

346 EN 50117-2-4, *Coaxial cables – Part 2-4: Sectional specification for cables used in cabled*
 347 *distribution networks - Indoor drop cables for systems operating at 5 MHz to 3000 MHz*

348 ETSI EN 300 421, *Digital Video Broadcasting (DVB): DVB framing structure, channel coding*
 349 *and modulation for 11/12 GHz satellite services*

350 ETSI EN 300 429, *Digital Video Broadcasting (DVB): DVB framing structure, channel coding*
 351 *and modulation for cable systems*

352 ETSI EN 300 473, *Digital Video Broadcasting (DVB): DVB Satellite Master Antenna*
 353 *Television (SMATV) distribution systems*

354 ETSI EN 300 744, *Digital Video Broadcasting (DVB): Framing structure, channel coding and*
 355 *modulation for digital terrestrial television*

356 ETSI EN 301 893 V2.1.1 (2017-05) *5 GHz RLAN; Harmonised Standard covering the*
 357 *essential requirements of article 3.2 of Directive 2014/53/EU*

358 ETSI EN 302 307, *Digital Video Broadcasting (DVB): Second generation framing structure,*
 359 *channel coding and modulation systems for Broadcasting, Interactive Services, News*
 360 *Gathering and other broadband satellite applications*

361 ETSI EN 302 755, *Digital Video Broadcasting (DVB): Frame structure channel coding and*
 362 *modulation for a second-generation digital terrestrial television broadcasting system (DVB-T2)*

363 ETSI EN 302 769 (2015), *Digital Video Broadcasting (DVB); Frame structure channel coding*
 364 *and modulation for a second generation digital transmission system for cable systems (DVB-*
 365 *C2)*

366 **3 Terms, definitions, symbols and abbreviations**

367 **3.1 Terms and definitions**

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

369 ISO and IEC maintain terminology databases for use in standardization at the following
 370 addresses:

- 371 • IEC Electropedia: available at <https://www.electropedia.org/>
- 372 • ISO Online browsing platform: available at <https://www.iso.org/obp>

373 **3.1.1**

374 **active home network**

375 home network that uses active equipment (for example, amplifiers) in addition to passive
 376 equipment like splitters, taps, system outlets, cables and connectors up to the coaxial RF
 377 interface (input and/or output) of the terminal equipment for distributing and combining RF
 378 signals

379 [SOURCE: IEC 60728-1:2014, 3.1.2]

380 **3.1.2**

381 **antenna**

382 part of a radio transmitting or receiving system which is designed to provide the required
 383 coupling between a transmitter or a receiver and the medium in which the radio wave
 384 propagates

385 Note 1 to entry: In practice, the terminals of the antenna or the points to be considered as the interface between
 386 the antenna and the transmitter or receiver are specified.