



**SLOVENSKI STANDARD**  
**oSIST prEN 303 105-3 V1.0.3:2022**  
**01-april-2022**

---

**Digitalna videoradiodifuzija (DVB) - Radiodifuzijski sistem naslednje generacije za dlančnike, specifikacija fizične plasti (DVB-NGH) - 3. del: Hibridni profil**

Digital Video Broadcasting (DVB) - Next Generation broadcasting system to Handheld, physical layer specification (DVB-NGH) - Part 3: Hybrid Profile

**iTeh STANDARD**  
**PREVIEW**  
**(standards.iteh.ai)**

**Ta slovenski standard je istoveten z: ETSI EN 303 105-3 V1.0.3 (2021-12)**

[oSIST prEN 303 105-3 V1.0.3:2022](https://standards.iteh.ai/catalog/standards/sist/0bc76530-fd2c-4682-bd76-a7f4badc2040/osist-pren-303-105-3-v1-0-3-2022)

<https://standards.iteh.ai/catalog/standards/sist/0bc76530-fd2c-4682-bd76-a7f4badc2040/osist-pren-303-105-3-v1-0-3-2022>

**ICS:**

33.170	Televizijska in radijska difuzija	Television and radio broadcasting
35.100.10	Fizični sloj	Physical layer

**oSIST prEN 303 105-3 V1.0.3:2022**      **en**

**iTeh STANDARD  
PREVIEW  
(standards.iteh.ai)**

oSIST prEN 303 105-3 V1.0.3:2022

<https://standards.iteh.ai/catalog/standards/sist/0bc76530-fd2c-4682-bd76-a7f4badc2040/osist-pren-303-105-3-v1-0-3-2022>

Draft **ETSI EN 303 105-3** V1.0.3 (2021-12)



**Digital Video Broadcasting (DVB);  
Next Generation broadcasting system to Handheld,  
physical layer specification (DVB-NGH);  
Part 3: Hybrid Profile**

[oSIST prEN 303 105-3 V1.0.3:2022](https://standards.iteh.ai/catalog/standards/sist/0bc76530-fd2c-4682-bd76-a7f4badc2040/osist-pren-303-105-3-v1-0-3-2022)

<https://standards.iteh.ai/catalog/standards/sist/0bc76530-fd2c-4682-bd76-a7f4badc2040/osist-pren-303-105-3-v1-0-3-2022>

**EBU DVB<sup>®</sup>**

---

**Reference**DEN/JTC-DVB-373-3

---

---

**Keywords**audio, broadcasting, data, digital, DVB, hybrid, MIMO, MPEG, radio, satellite, terrestrial, TV, video

---

**ETSI**650 Route des Lucioles  
F-06921 Sophia Antipolis Cedex - FRANCE

---

Tel.: +33 4 92 94 42 00 Fax: +33 4 93 65 47 16

Siret N° 348 623 562 00017 - APE 7112B  
Association à but non lucratif enregistrée à la  
Sous-Préfecture de Grasse (06) N° w061004871

---

**Important notice**

The present document can be downloaded from:

<http://www.etsi.org/standards-search>

The present document may be made available in electronic versions and/or in print. The content of any electronic and/or print versions of the present document shall not be modified without the prior written authorization of ETSI. In case of any existing or perceived difference in contents between such versions and/or in print, the prevailing version of an ETSI deliverable is the one made publicly available in PDF format at [www.etsi.org/deliver](http://www.etsi.org/deliver).

Users of the present document should be aware that the document may be subject to revision or change of status.

Information on the current status of this and other ETSI documents is available at

<https://portal.etsi.org/TB/ETSIDeliverableStatus.aspx>

If you find errors in the present document, please send your comment to one of the following services:

<https://portal.etsi.org/People/CommitteeSupportStaff.aspx><https://standards.iteh.ai/catalog/standards/sist/0bc76530-fd2c-4682-9200-000000000000/etsi-en-303-105-3-v1-0-3-2022>**Notice of disclaimer & limitation of liability**

The information provided in the present deliverable is directed solely to professionals who have the appropriate degree of experience to understand and interpret its content in accordance with generally accepted engineering or other professional standard and applicable regulations.

No recommendation as to products and services or vendors is made or should be implied.

In no event shall ETSI be held liable for loss of profits or any other incidental or consequential damages.

Any software contained in this deliverable is provided "AS IS" with no warranties, express or implied, including but not limited to, the warranties of merchantability, fitness for a particular purpose and non-infringement of intellectual property rights and ETSI shall not be held liable in any event for any damages whatsoever (including, without limitation, damages for loss of profits, business interruption, loss of information, or any other pecuniary loss) arising out of or related to the use of or inability to use the software.

---

**Copyright Notification**

No part may be reproduced or utilized in any form or by any means, electronic or mechanical, including photocopying and microfilm except as authorized by written permission of ETSI.

The content of the PDF version shall not be modified without the written authorization of ETSI.

The copyright and the foregoing restriction extend to reproduction in all media.

© ETSI 2021.

© European Broadcasting Union 2021.

All rights reserved.

# Contents

Intellectual Property Rights .....	5
Foreword.....	5
Modal verbs terminology.....	6
1 Scope .....	7
2 References .....	7
2.1 Normative references .....	7
2.2 Informative references.....	7
3 Definition of terms, symbols and abbreviations.....	7
3.1 Terms.....	7
3.2 Symbols.....	7
3.3 Abbreviations .....	8
4 DVB-NGH hybrid system definition.....	8
4.1 System overview and architecture.....	8
4.1.1 Overview .....	8
4.1.2 Bit-interleaved coding and modulation, MISO precoding.....	10
4.1.3 Frame building, frequency interleaving.....	11
4.1.4 OFDM generation.....	11
4.1.5 SC-OFDM generation.....	12
5 Input processing .....	12
6 Bit interleaved coding and modulation .....	12
6.0 Overview .....	12
6.1 Constellation mapping.....	12
6.2 Time interleaver .....	12
6.3 Distributed and cross-polar MISO.....	14
7 Layer 1 signalling data specific for the Hybrid Profile .....	14
7.1 P1 and additional P1 signalling data.....	14
7.2 L1-PRE signalling data.....	15
7.3 L1-POST signalling data.....	15
7.3.1 L1-POST configurable signalling data .....	15
7.3.2 L1-POST dynamic signalling data.....	16
7.3.3 In-band signalling type A .....	16
8 Frame Builder.....	16
8.1 SC-OFDM .....	16
8.1.1 NGH hybrid SC-OFDM frames.....	16
8.1.1.1 Duration of the NGH hybrid SC-OFDM frame .....	16
8.1.1.2 Capacity and structure of the NGH hybrid SC-OFDM frame.....	17
8.1.2 Frequency interleaver .....	18
9 OFDM Generation.....	18
10 SC-OFDM generation .....	19
10.1 Overview .....	19
10.2 Spreading.....	19
10.3 Pilot insertion .....	20
10.3.1 Introduction.....	20
10.3.2 Definition of the reference NGH hybrid sequence .....	21
10.3.3 Scattered pilot insertion .....	21
10.3.3.0 Overview.....	21
10.3.3.1 Locations of the scattered pilots.....	21
10.3.3.2 Amplitudes of the scattered pilots.....	21
10.3.3.3 Modulation of the scattered pilots.....	22
10.4 IFFT - SC-OFDM modulation.....	22
10.5 Guard interval insertion.....	22

<b>Annex A (informative):</b>	<b>SC-OFDM pilot pattern .....</b>	<b>24</b>
<b>Annex B (normative):</b>	<b>Receiver Buffer Model extension.....</b>	<b>25</b>
<b>Annex C (informative):</b>	<b>Bibliography.....</b>	<b>26</b>
<b>History .....</b>		<b>27</b>

**iTeh STANDARD  
PREVIEW  
(standards.iteh.ai)**

[oSIST prEN 303 105-3 V1.0.3:2022](https://standards.iteh.ai/catalog/standards/sist/0bc76530-fd2c-4682-bd76-a7f4badc2040/osist-pren-303-105-3-v1-0-3-2022)  
[https://standards.iteh.ai/catalog/standards/sist/0bc76530-  
fd2c-4682-bd76-a7f4badc2040/osist-pren-303-105-3-  
v1-0-3-2022](https://standards.iteh.ai/catalog/standards/sist/0bc76530-fd2c-4682-bd76-a7f4badc2040/osist-pren-303-105-3-v1-0-3-2022)

---

# Intellectual Property Rights

## Essential patents

IPRs essential or potentially essential to normative deliverables may have been declared to ETSI. The declarations pertaining to these essential IPRs, if any, are publicly available for **ETSI members and non-members**, and can be found in ETSI SR 000 314: "*Intellectual Property Rights (IPRs); Essential, or potentially Essential, IPRs notified to ETSI in respect of ETSI standards*", which is available from the ETSI Secretariat. Latest updates are available on the ETSI Web server (<https://ipr.etsi.org/>).

Pursuant to the ETSI Directives including the ETSI IPR Policy, no investigation regarding the essentiality of IPRs, including IPR searches, has been carried out by ETSI. No guarantee can be given as to the existence of other IPRs not referenced in ETSI SR 000 314 (or the updates on the ETSI Web server) which are, or may be, or may become, essential to the present document.

## Trademarks

The present document may include trademarks and/or tradenames which are asserted and/or registered by their owners. ETSI claims no ownership of these except for any which are indicated as being the property of ETSI, and conveys no right to use or reproduce any trademark and/or tradename. Mention of those trademarks in the present document does not constitute an endorsement by ETSI of products, services or organizations associated with those trademarks.

**DECT™**, **PLUGTESTS™**, **UMTS™** and the ETSI logo are trademarks of ETSI registered for the benefit of its Members. **3GPP™** and **LTE™** are trademarks of ETSI registered for the benefit of its Members and of the 3GPP Organizational Partners. **oneM2M™** logo is a trademark of ETSI registered for the benefit of its Members and of the oneM2M Partners. **GSM®** and the GSM logo are trademarks registered and owned by the GSM Association.

---

## Foreword

(standards.iteh.ai)

This draft European Standard (EN) has been produced by Joint Technical Committee (JTC) Broadcast of the European Broadcasting Union (EBU), Comité Européen de Normalisation ELECTrotechnique (CENELEC) and the European Telecommunications Standards Institute (ETSI), and is now submitted for the combined Public Enquiry and Vote phase of the ETSI standards EN Approval Procedure.

**NOTE:** The EBU/ETSI JTC Broadcast was established in 1990 to co-ordinate the drafting of standards in the specific field of broadcasting and related fields. Since 1995 the JTC Broadcast became a tripartite body by including in the Memorandum of Understanding also CENELEC, which is responsible for the standardization of radio and television receivers. The EBU is a professional association of broadcasting organizations whose work includes the co-ordination of its members' activities in the technical, legal, programme-making and programme-exchange domains. The EBU has active members in about 60 countries in the European broadcasting area; its headquarters is in Geneva.

European Broadcasting Union  
CH-1218 GRAND SACONNEX (Geneva)  
Switzerland  
Tel: +41 22 717 21 11  
Fax: +41 22 717 24 81

The DVB Project is an industry-led consortium of broadcasters, manufacturers, network operators, software developers, regulators and others from around the world committed to designing open, interoperable technical specifications for the global delivery of digital media and broadcast services. DVB specifications cover all aspects of digital television from transmission through interfacing, conditional access and interactivity for digital video, audio and data. The consortium came together in 1993.

The present document is part 3 of a multi-part deliverable. Full details of the entire series can be found in part 1 [1].

<b>Proposed national transposition dates</b>	
Date of latest announcement of this EN (doa):	3 months after ETSI publication
Date of latest publication of new National Standard or endorsement of this EN (dop/e):	6 months after doa
Date of withdrawal of any conflicting National Standard (dow):	6 months after doa

---

## Modal verbs terminology

In the present document "**shall**", "**shall not**", "**should**", "**should not**", "**may**", "**need not**", "**will**", "**will not**", "**can**" and "**cannot**" are to be interpreted as described in clause 3.2 of the [ETSI Drafting Rules](#) (Verbal forms for the expression of provisions).

"**must**" and "**must not**" are **NOT** allowed in ETSI deliverables except when used in direct citation.

# iTeh STANDARD PREVIEW (standards.iteh.ai)

[oSIST prEN 303 105-3 V1.0.3:2022](https://standards.iteh.ai/catalog/standards/sist/0bc76530-fd2c-4682-bd76-a7f4badc2040/osist-pren-303-105-3-v1-0-3-2022)  
[https://standards.iteh.ai/catalog/standards/sist/0bc76530-  
fd2c-4682-bd76-a7f4badc2040/osist-pren-303-105-3-  
v1-0-3-2022](https://standards.iteh.ai/catalog/standards/sist/0bc76530-fd2c-4682-bd76-a7f4badc2040/osist-pren-303-105-3-v1-0-3-2022)



---

# 1 Scope

The present document describes the next generation transmission system for digital hybrid (combination of terrestrial with satellite transmissions) broadcasting to handheld terminals. It specifies the differences of the Hybrid Profile physical layer part to the physical layer part of the Base Profile ETSI EN 303 105-1 [1] from the input streams to the transmitted signals. This transmission system is intended for carrying Transport Streams or generic data streams feeding linear and non-linear applications like television, radio and data services. DVB-NGH terminals might also process DVB-T2-lite signals.

---

## 2 References

### 2.1 Normative references

References are either specific (identified by date of publication and/or edition number or version number) or non-specific. For specific references, only the cited version applies. For non-specific references, the latest version of the referenced document (including any amendments) applies.

Referenced documents which are not found to be publicly available in the expected location might be found at <https://docbox.etsi.org/Reference/>.

NOTE: While any hyperlinks included in this clause were valid at the time of publication, ETSI cannot guarantee their long term validity.

The following referenced documents are necessary for the application of the present document.

- [1] ETSI EN 303 105-1: "Digital Video Broadcasting (DVB); Next Generation broadcasting system to Handheld, physical layer specification (DVB-NGH); Part 1: Base Profile".

### 2.2 Informative references

References are either specific (identified by date of publication and/or edition number or version number) or non-specific. For specific references, only the cited version applies. For non-specific references, the latest version of the referenced document (including any amendments) applies.

NOTE: While any hyperlinks included in this clause were valid at the time of publication, ETSI cannot guarantee their long term validity.

The following referenced documents are not necessary for the application of the present document but they assist the user with regard to a particular subject area.

Not applicable.

---

## 3 Definition of terms, symbols and abbreviations

### 3.1 Terms

For the purposes of the present document, the terms given in ETSI EN 303 105-1 [1] apply.

### 3.2 Symbols

For the purposes of the present document, the symbols given in ETSI EN 303 105-1 [1] apply.

### 3.3 Abbreviations

For the purposes of the present document, the abbreviations given in ETSI EN 303 105-1 [1] apply.

## 4 DVB-NGH hybrid system definition

### 4.1 System overview and architecture

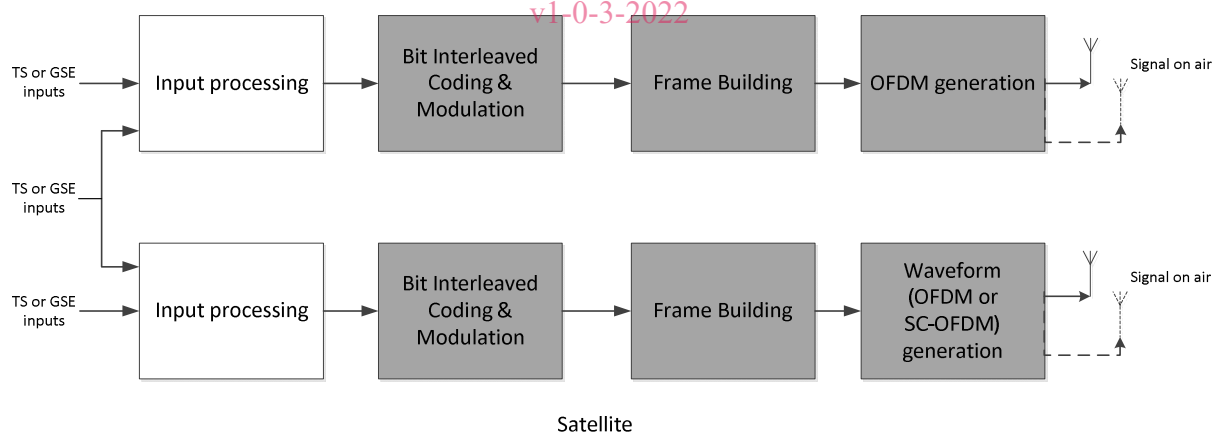
#### 4.1.1 Overview

The Hybrid Profile - reflected by the present document - specifies the hybrid signal format, composed of a component coming from the terrestrial network, and an additional component, coming from the satellite. Hybrid signals according to the NGH profile reflected by the present document include an additional P1 symbol (aP1, see ETSI EN 303 105-1 [1], clause 11.8.3). The satellite component of the Hybrid Profile - reflected by the present document - is defined for channel bandwidths 1, 7, 2 and 5 MHz (these three bandwidths are also covered by the Base Profile [1]).

Hybrid NGH signals can also be Base Profile compliant, in which case they are covered by ETSI EN 303 105-1 [1].

Besides defining the hybrid signals, the Hybrid Profile - reflected by the present document - defines moreover the mechanisms to receive two signals simultaneously (one signal from a terrestrial transmitter and one from the satellite) and to combine their outputs to a single stream.

Figure 1 represents the high level NGH physical layer block diagram of the Hybrid Profile - reflected by the present document. Two chains are present, one for the terrestrial component and the other for the satellite component. Compared to the Base Profile, the terrestrial and satellite chains of the Hybrid Profile - reflected by the present document - present potential functional differences in the BICM, frame building and waveform generation. The system architecture of the satellite component is that of the terrestrial component, with the possibility of replacing the OFDM modulation block by the SC-OFDM modulation block, characterized additionally by the absence of particular functional blocks as explained in clause 4.1. Time frequency slicing can be applied to both, the terrestrial and the satellite components.



NOTE: Blocks differing from the Base Profile are shaded grey.

**Figure 1: High level NGH physical layer block diagram of the Hybrid Profile - reflected by the present document**

Both SFN and MFN configurations are possible for the Hybrid Profile - reflected by the present document. In the SFN case, when the satellite and terrestrial components share the same frequency, the signal transmitted in the two components shall be exactly the same. The system input(s) to the terrestrial and the satellite path may differ from each other in the MFN case. In the MFN case, the system architecture of the Hybrid Profile of DVB-NGH - reflected by the present document - is composed of two components: the terrestrial component, as specified in ETSI EN 303 105-1 [1], and the satellite component, as represented in figure 1.

MISO in the Hybrid Profile - reflected by the present document - is applicable to OFDM only, to both, the terrestrial and the satellite paths.

Table 1 indicates the allowed parameter settings for the Hybrid Profile - reflected by the present document. According to it, the following hybrid cases can be devised:

- SFN, OFDM: The terrestrial network and the satellite share the same frequency and the same signal is transmitted on the two components. The signal waveform is OFDM and the preambles of both components consist of a P1 plus an aP1 symbol. The OFDM parameter set is applicable to both components, terrestrial and satellite. Alternatively, the Base Profile could be adopted for both components. In that case the P1 part of the preamble of both components consists of a P1 symbol only.
- MFN, OFDM: The satellite signal is transmitted on a different frequency, OFDM is used on both components. The terrestrial component is transmitted according to the Base Profile, the satellite component according to the OFDM settings listed in table 1. The preamble of the terrestrial component consists of a P1 symbol and the preamble of the satellite component consists of a P1 plus an aP1 symbol.
- SFN, SC-OFDM: This case consists of the satellite coverage and of terrestrial gap fillers sharing the same frequency of the satellite signal. The SC-OFDM settings are applicable to both components, terrestrial and satellite. Preambles consist of P1 plus aP1 symbols for the satellite and the terrestrial component.
- MFN, SC-OFDM on the satellite component, OFDM on the terrestrial component: The terrestrial component is configured in line with the Base Profile, the satellite component using the permitted SC-OFDM settings outlined in table 1. The preamble of the terrestrial component consists of a P1 symbol and the one of the satellite component of a P1 plus an aP1 symbol.

**Table 1: Allowed parameter settings for the Hybrid Profile - reflected by the present document**

Parameters	Hybrid waveform		
	Modulation	OFDM	SC-OFDM
Bandwidths	1,7 MHz	X	X
	2,5 MHz	X	X
	5,0 MHz	X	X
	6,0 MHz		
	7,0 MHz		
	8,0 MHz		
	10,0 MHz		
	15,0 MHz		
Constellations	QPSK	X	X
	16-QAM	X	X
	64-QAM		
	256-QAM		
FFT sizes	0,5k		X
	1k	X	X
	2k	X	X
	4k		
	8k		
	16k		