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Functional receiver specification of satellite digital interactive television with a low Data Rate Return Channel Via Satellite - Model Layer specification

Functional receiver specification of satellite digital interactive television with a low Data Rate Return Channel Via Satellite - Model Layer specification

EESTI STANDARDI EESSÕNA **NATIONAL FOREWORD**

Käesolev Eesti standard EVS-EN 50478:2007 sisaldab Euroopa standardi EN 50478:2007 ingliskeelset teksti. Käesolev dokument on jõustatud 27.04.2007 ja selle kohta on avaldatud teade Eesti standardiorganisatsiooni ametlikus väljaandes. Standard on kättesaadav Eesti standardiorganisatsioonist.	This Estonian standard EVS-EN 50478:2007 consists of the English text of the European standard EN 50478:2007. This document is endorsed on 27.04.2007 with the notification being published in the official publication of the Estonian national standardisation organisation. The standard is available from Estonian standardisation organisation.

Käsitlusala: This standard applies for the interaction channel for interactive television networks using Geostationary Satellites with fixed return channel satellite terminals via low data rate dedicated return link. It specifies the essential elements for the implementation of the interaction channel.	**Scope:** This standard applies for the interaction channel for interactive television networks using Geostationary Satellites with fixed return channel satellite terminals via low data rate dedicated return link. It specifies the essential elements for the implementation of the interaction channel.

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Functional receiver specification of satellite digital interactive television with a low data rate return channel via satellite - Modem layer specification

Spécification pour le fonctionnement du récepteur pour la télévision interactive par satellite avec une voie de retour à bas débit par satellite - Spécification du modem de la couche

Funktionale Empfängerspezifikation für digitales interaktives Satellitenfernsehen mit Rückkanal niedriger Datenrate über Satellit - Festlegungen Modemschicht

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CENELEC

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

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Foreword

This European Standard was prepared by the Technical Committee CENELEC TC 206, Consumer equipment for entertainment and information and related sub-systems.

The text of the draft was submitted to the Unique Acceptance Procedure and was approved by CENELEC as EN 50478 on 2006-06-01.

The following dates were fixed:

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Introduction

This European Standard has been produced by CENELEC Committee TC 206 with the support of the research and development activities carried out within the SATMODE Project. The SATMODE project is part of the ARTES program of the European Space Agency (Contract No 16905/02/NL/US). More information on SATMODE project is available in Annex D.

This document provides the specification containing the essential elements necessary to facilitate the implementation of the interaction channel for interactive television networks using Geostationary Satellites with fixed return channel satellite terminals via low data rate dedicated return link.

The system is called SATMODE and consists of many terminals installed at the user-customer premises, one or several HUB stations, possibly co-located with the broadcaster or interactive service provider uplink stations, and a satellite which is transparent for uplink and downlink signals. The main application for SATMODE system is the implementation of suitable networks for interactive digital television systems requiring a return channel of low data rate.

The document facilitates the use of SATMODE system for individual or collective installation (e.g. SMATV) in a domestic environment applied to interactive digital television (iTV). It also supports the connection of such terminals with in-house data networks. The document may be applied to all frequency bands allocated to GEO satellite services. The solutions provided for interaction channel for satellite interactive networks are a part of a wide set of alternatives to implement interactive services associated to digital television systems following the DVB reference model for interactive services.

The modem layer specification included in this document (physical air interface layer and data link layer components) describes the requirements needed to establish radio communication links between the user earth stations (terminals) and the HUB earth station and between the HUB station and the user terminals.

The Satmode System

The SATMODE design having led to the present specification was optimized for the iTV case.

The choice of constant envelope modulations was made to minimize the terminal cost. Thanks to this property, very low cost ODUs operating at full saturation and in non-linear mode can be used.

The moderate bit rates of SATMODE allow to use very low power transmitters (typically 100 mW), keeping the cost compatible with the mass-market.

The selected access scheme -slotted ALOHA- is efficient on iTV traffic and very easy to scale up to a very high number of terminals only sending a few packets from time to time.

The SATMODE modem specification aims at fully specifying the behavior SATMODE modem function used in a terminal.

To increase the applicability and the probability of commercial success of SATMODE, it was decided to design SATMODE as a system usable with existing space segments and ready for future satellites improved for point-to-point applications.

Considering this objective, it was considered as mandatory to have built-in flexibility in terminals deployed today and ready for the future.

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This flexibility allows SATMODE to be used in extreme scenarios by adjusting the modem parameters:

- very power limited scenarios (it's the case for most VSAT Ku-band satellites);
- aggressive multi-beam space segment, targeting high spectral efficiency.

To reach that goal and nevertheless keep full interoperatibility of terminals, SATMODE uses a fully specified waveform toolbox.

Each building block has a well-defined space of operation and can be used without limitation in this space.

The building blocks of the SATMODE toolbox are

- symbol Rate: 2 kHz to 128 kHz,
- binary or quaternary CPM,
- programmable phase filter for CPM modulations (GMSK being a specific case),
- flexible Turbo or Turbo-like,
- programmable interleavers (3),
- programmable constituent codes with bypass possibilities (2),
- programmable Unique Word structure,
- tables extraction from a DVB TS (DVB-S or DVB-S2 broadcast).

All the parameters are sent by the HUB through tables, even allowing changes during operation:

- FCT: Sprectrum organisation in Carrier Groups;
- FAT: Spectrum Allocation to services.

Signalisation information sent to specific terminals is embedded in the SMT tables.

The terminal is fully defined: it must be able to play the complete waveform space.

The HUB usually only implements one scheme and send the tables to the terminals to instruct them to play that scheme.

Modem Layer providers can thus compete on the modem performances, although using fully interoperable terminals.

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1 Scope

This standard applies for the interaction channel for interactive television networks using Geostationary Satellites with fixed return channel satellite terminals via low data rate dedicated return link. It specifies the essential elements for the implementation of the interaction channel.

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.

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

ETSI EN 300 468, *Digital Video Broadcasting (DVB); Specification for Service Information (SI) in DVB systems*

ETSI EN 300 802, *Digital Video Broadcasting (DVB); Network-independent protocols for DVB interactive services*

ETSI EN 301 192, *Digital Video Broadcasting (DVB); DVB specification for data broadcasting*

ETSI EN 301 459, *Satellite Earth Stations and Systems (SES); Harmonized EN for Satellite Interactive Terminals (SIT) and Satellite User Terminals (SUT) transmitting towards satellites in geostationary orbit in the 29,5 GHz to 30,0 GHz frequency bands covering essential requirements under Article 32 of the R&TTE Directive*

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*

ETSI ETR 154, *Digital Video Broadcasting (DVB); Implementation guidelines for the use of MPEG-2 Systems, Video and Audio in satellite, cable and terrestrial broadcasting applications*

EN ISO/IEC 13818-1, *Information technology - Generic coding of moving pictures and associated audio information; Part 1: Systems (*ISO/IEC 13818-1)

ETSI TR 101 202, *Digital Video Broadcasting (DVB); Implementation guidelines for Data Broadcasting*

3 Definitions, symbols and abbreviations

3.1 Definitions

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

3.1.1
forward link
satellite link carrying traffic towards the user terminals

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