



**SLOVENSKI STANDARD**  
**SIST EN 300 639 V1.2.1:2003**  
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Fixed Radio Systems; Point-to-point equipment; Sub-STM-1 digital radio systems operating in the 13 GHz, 15 GHz and 18 GHz frequency bands with about 28 MHz co-polar and 14 MHz cross-polar channel spacing

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# ETSI EN 300 639 V1.2.1 (2000-03)

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*European Standard (Telecommunications series)*

**Fixed Radio Systems;  
Point-to-point equipment;  
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## Foreword

This European Standard (Telecommunications series) has been produced by ETSI Technical Committee Transmission and Multiplexing (TM).

The present document contains the minimum technical requirements to ensure compatibility of products and conformance with radio regulations across the European states of interest to ETSI Member. Radio terminals from different manufacturers are not required to interwork at radio frequency (i.e. no common air interface).

The present document defines the requirements of radio terminal and radio relay equipment and associated interfaces. The requirements for multiplex, network management and antenna/feeder equipment may be addressed elsewhere.

The present document is a revision of ETS 300 639. Clause 2, subclauses 6.5, 6.5.1 and 6.5.2 have been modified and approved as amendment under ETS 300 639/A1, under ETSI Standards One-step Approval Procedure 9956. The complete document is published as EN 300 639 V1.2.1.

The former title of the present document was: "Transmission and Multiplexing (TM); Sub-STM1 Digital Radio Relay Systems (DRRS) operating in the 13 GHz, 15 GHz and 18 GHz frequency bands with about 28 MHz co-polar and 14 MHz cross-polar channel spacing".

### National transposition dates

Date of adoption of this EN:	31 December 1999
Date of latest announcement of this EN (doa):	31 March 2000
Date of latest publication of new National Standard or endorsement of this EN (dop/e):	30 September 2000
Date of withdrawal of any conflicting National Standard (dow):	30 September 2000

# 1 Scope

The present document specifies the minimum performance parameters for terrestrial fixed services radio communications equipment, as given below, for operation in the 13 GHz, 15 GHz and 18 GHz frequency bands (i.e. 12,75 to 13,25 GHz, 14,50 to 15,35 GHz and 17,70 to 19,70 GHz).

The equipments covered by the present document are intended for operation with about 28 MHz basic channel spacing with frequency re-use either in 14 MHz interleaved mode or in co-channel mode (definitions are in ITU-R Recommendation F.746-4 [27]).

The present document covers equipment for the transmission of sub-Synchronous Transport Module level-1 (STM-1) digital signals with a Virtual Container-3 (VC-3) payload capacity. The standardization of sub-STM-1 radio systems for 13 GHz, 15 GHz and 18 GHz bands has been prepared to ensure the compatibility with the existing plesiochronous and the new synchronous systems concerning frequency plans and performance. The architecture and functional aspects should be in accordance with ITU-R Recommendation F.750-3 [7] and transmission characteristics and performance requirements in accordance with ITU-R Recommendation F.751-2 [8].

The present document do not cover aspects related to test procedures and test conditions which are currently under study in TM4.

The application of these Digital Radio Relay Systems (DRRS) is anticipated to be for point-to-point links in local, regional and national networks, mobile base station connections and customer access links. Consideration has to be given to special requirements of the local network (e.g. simple towers with less space for antenna, different network structures with high density nodes).

The systems considered in the present document are intended to operate on average hop lengths about 15 km for 18 GHz band, 20 km for 15 GHz band and 30 km for 13 GHz band.

Equipment should be designed in order to meet network performance and availability requirements defined by ITU-T Recommendations G.821 [18] and G.826 [19], following the criteria defined in ITU-R Recommendations F.634-4 [3], F.695 [32], F.696-2 [5], F.697-2 [6], F.1092-1 [30] and F.1189-1 [31], for high or medium or local grade or the international or the national portion of the digital connection.

The parameters to be specified fall into two categories:

- a) those that are required to provide compatibility between Radio Frequency (RF) channels occupied by different sources of equipment on the same route connected either:
  - to separate antennas; or
  - to separate polarization of the same antenna;
- b) parameters defining the transmission quality of the proposed system.

The standardization deals with Intermediate Frequency (IF), RF and baseband characteristics relevant to sub-STM-1 Synchronous Digital Hierarchy (SDH) transmission. Spurious emissions and ElectroMagnetic Compatibility (EMC) requirements are also included in the present document.

Safety aspects are outside the mandate of ETSI and they will not be considered in the present document.



## 2 References

The following documents contain provisions which, through reference in this text, constitute provisions of the present document.

- References are either specific (identified by date of publication, edition number, version number, etc.) or non-specific.
- For a specific reference, subsequent revisions do not apply.
- For a non-specific reference, the latest version applies.
- A non-specific reference to an ETS shall also be taken to refer to later versions published as an EN with the same number.

- [1] ITU-R Recommendation F.497-6: "Radio-frequency channel arrangements for radio-relay systems operating in the 13 GHz frequency band".
- [2] ITU-R Recommendation F.595-6: "Radio-frequency channel arrangements for radio-relay systems operating in the 18 GHz frequency band".
- [3] ITU-R Recommendation F.634-4: "Error performance objectives for real digital radio-relay links forming part of the high-grade portion of international digital connections at a bit rate below the primary rate within an integrated services digital network".
- [4] ITU-R Recommendation F.636-3: "Radio-frequency channel arrangements for radio-relay systems operating in the 15 GHz band".
- [5] ITU-R Recommendation F.696-2: "Error performance and availability objectives for hypothetical reference digital sections forming part or all of the medium-grade portion of an ISDN connection at a bit rate below the primary rate utilizing digital radio-relay systems".
- [6] ITU-R Recommendation F.697-2: "Error performance and availability objectives for the local-grade portion at each end of an ISDN connection at a bit rate below the primary rate utilizing digital radio-relay systems".
- [7] ITU-R Recommendation F.750-3: "Architectures and functional aspects of radio-relay systems for SDH-based networks".
- [8] ITU-R Recommendation F.751-2: "Transmission characteristics and performance requirements of radio-relay systems for SDH-based networks".
- [9] ITU-T Recommendation G.703: "Physical/electrical characteristics of hierarchical digital interfaces".
- [10] ITU-T Recommendation G.707: "Network node interface for the synchronous digital hierarchy (SDH)".
- [11] ITU-T Recommendation G.708: "Network node interface for the synchronous digital hierarchy".
- [12] ITU-T Recommendation G.709: "Synchronous multiplexing structure".
- [13] ITU-T Recommendation G.773: "Protocol suites for Q interfaces for management of transmission systems".
- [14] ITU-T Recommendation G.781: "Structure of Recommendations on equipment for the synchronous digital hierarchy (SDH)".
- [15] ITU-T Recommendation G.782: "Types and general characteristics of synchronous digital hierarchy (SDH) equipment".
- [16] ITU-T Recommendation G.783: "Characteristics of synchronous digital hierarchy (SDH) equipment functional blocks".

- [17] ITU-T Recommendation G.784: "Synchronous digital hierarchy (SDH) management".
- [18] ITU-T Recommendation G.821: "Error performance of an international digital connection operating at a bit rate below the primary rate and forming part of an integrated services digital network".
- [19] ITU-T Recommendation G.826: "Error performance parameters and objectives for international, constant bit-rate digital paths at or above the primary rate".
- [20] ITU-T Recommendation G.957: "Optical interfaces for equipments and systems relating to the synchronous digital hierarchy".
- [21] CEPT/ERC Recommendation 74-01: "Spurious Emissions".
- [22] ETSI EN 300 385: "Electromagnetic compatibility and Radio spectrum Matters (ERM); ElectroMagnetic Compatibility (EMC) standard for fixed radio links and ancillary equipment".
- [23] ETSI ETS 300 132: "Equipment Engineering (EE); Power supply interface at the input to telecommunications equipment".
- [24] ETSI ETS 300 174 (1992): "Network Aspects (NA); Digital coding of component television signals for contribution quality applications in the range 34 - 45 Mbit/s".
- [25] IEC 835-2-4 (1993): "Methods of measurement for equipment used in digital microwave radio transmission systems - Part 2: Measurements on terrestrial radio-relay systems - Section 4: Transmitter/receiver including modulator/demodulator".
- [26] IEC 835-2-8 (1993): "Methods of measurement for equipment used in digital microwave radio transmission systems - Part 2: Measurements on terrestrial radio-relay systems - Section 8: Adaptive equalizer".
- [27] ITU-R Recommendation F.746-4: "Radio-frequency channel arrangements for radio-relay systems".
- [28] ITU-R Recommendation F.1191-1: "Bandwidths and unwanted emissions of digital radio-relay systems".
- [29] ETSI ETS 300 119: "Equipment Engineering (EE); European telecommunication standard for equipment practice".
- [30] ITU-R Recommendation F.1092-1: "Error performance objectives for constant bit rate digital path at or above the primary rate carried by digital radio-relay systems which may form part of the international portion of a 27 500 km hypothetical reference path".
- [31] ITU-R Recommendation F.1189-1: "Error performance objectives for constant bit rate digital paths at or above the primary rate carried by digital radio-relay systems which may form part or all of the national portion of a 27 500 km hypothetical reference path".
- [32] ITU-R Recommendation F.695: "Availability objectives for real digital radio-relay links forming part of a high-grade circuit within an integrated services digital network".

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## 3 Symbols and abbreviations

### 3.1 Symbols

For the purposes of the present document, the following symbols apply:

dB	decibel
dBm	decibel relative to 1 mW
GHz	Gigahertz
km	kilometre
Mbit/s	Megabit per second
MHz	Megahertz
ns	nanosecond
ppm	parts per million

### 3.2 Abbreviations

For the purposes of the present document, the following abbreviations apply:

ATPC	Automatic Transmit Power Control
BB	BaseBand
BER	Bit Error Rate
BWe	evaluation BandWidth (of spectrum analyser)
CMI	Coded Mark Inversion
CW	Continuous Wave
IF	Intermediate Frequency
IF/RF	Intermediate Frequency/Radio Frequency
LO	Local Oscillator
NNI	Network Node Interface
PDH	Plesiochronous Digital Hierarchy
PRBS	Pseudo-Random Binary Sequence
QAM	Quadrature Amplitude Modulation
RF	Radio Frequency
RSL	Receive Signal Level
R <sub>x</sub>	Receiver
SDH	Synchronous Digital Hierarchy
SOH	Section OverHead
SRL	Spectrum Reference Level
STM-1	Synchronous Transport Module (level)-1
TM	Transmission and Multiplex
TMN	Telecommunications Management Network
T <sub>x</sub>	Transmitter
VSWR	Voltage Standing Wave Ratio
XPD	Cross-Polar Discrimination

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## 4 General characteristics

### 4.1 Frequency bands and channel arrangements

The frequency bands covered by the present document are the 12,75 to 13,25 GHz, 14,5 to 15,35 GHz and the 17,7 to 19,7 GHz fixed service bands.

The channelling arrangement for the 13 GHz frequency band is the plan with 28 MHz adjacent channel spacing according to ITU-R Recommendation F.497-6 [1] and to the relevant CEPT Recommendation: where applicable frequency re-use in co-channel mode can be envisaged (according to hop length and climate zone).