



SLOVENSKI STANDARD
DSIST ETS 300 396-2:1999
01-1 1999

Df]nYa b]gbc dc j b]fUX]c`fH9HF5Ł!`HY b] bY`nU hYj Y`nU`bYdcgfYXb]`bU]b
XY`c j Ub`UfB ACŁ!`&`XY. FUX]`g_]j]X_]]

Terrestrial Trunked Radio (TETRA); Technical requirements for Direct Mode Operation (DMO); Part 2: Radio aspects

Ta slovenski standard je istoveten z: ETS 300 396-2 E1.% - , !\$'

ICS:

33.020	Telekomunikacije na splošno	Telecommunications in general
33.070.10	Prizemni snopovni radio (TETRA)	Terrestrial Trunked Radio (TETRA)

DSIST ETS 300 396-2:1999 **en**



EUROPEAN
TELECOMMUNICATION
STANDARD

ETS 300 396-2

March 1998

Source: TETRA

Reference: DE/RES-06007-2

ICS: 33.020

Key words: Air interface, TETRA, radio

**Terrestrial Trunked Radio (TETRA);
Technical requirements for Direct Mode Operation (DMO);
Part 2: Radio aspects**

ETSI

European Telecommunications Standards Institute

ETSI Secretariat

Postal address: F-06921 Sophia Antipolis CEDEX - FRANCE

Office address: 650 Route des Lucioles - Sophia Antipolis - Valbonne - FRANCE

Internet: secretariat@etsi.fr - <http://www.etsi.fr> - <http://www.etsi.org>

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

Copyright Notification: No part may be reproduced except as authorized by written permission. The copyright and the foregoing restriction extend to reproduction in all media.

© European Telecommunications Standards Institute 1998. All rights reserved.

Contents

Foreword		7
1	Scope	9
2	Normative references	9
3	Definitions and abbreviations	9
3.1	Definitions	9
3.2	Abbreviations	10
4	Radio aspects.....	11
4.1	Introduction	11
4.2	Set of logical channels.....	11
4.3	Reference configuration.....	11
4.4	Error control schemes.....	11
4.5	Timeslot structure	12
4.5.1	Framing structure	12
4.5.2	Timeslots and bursts	12
4.5.3	Mapping of logical channels onto physical channels.....	12
4.6	Coding, interleaving and scrambling.....	12
4.7	Modulation	13
4.8	Transmission and reception.....	13
4.9	Other radio-related functions	13
4.10	Performance	13
5	Modulation.....	13
5.1	Introduction	13
5.2	Modulation type.....	13
5.3	Modulation rate	13
5.4	Modulation symbol definition.....	13
5.5	Modulated signal definition	14
5.6	Modulation filter definition	15
5.7	Modulation block diagram.....	15
6	Radio transmission and reception.....	15
6.1	Introduction	15
6.2	Frequency bands and channel arrangement	15
6.3	Reference test planes.....	16
6.4	Transmitter characteristics	16
6.4.1	Output power.....	16
6.4.2	Power classes	16
6.4.3	Unwanted conducted emissions.....	16
6.4.3.1	Definitions	16
6.4.3.2	Unwanted emissions close to the carrier.....	17
6.4.3.2.1	Emissions during the useful part of the burst.....	17
6.4.3.2.2	Emissions during the switching transients	17
6.4.3.3	Unwanted emissions far from the carrier.....	17
6.4.3.3.1	Discrete spurious	17
6.4.3.3.2	Wideband noise	17
6.4.3.4	Unwanted emissions during the Linearisation CHannel (LCH)	18
6.4.3.5	Unwanted emissions in the non-transmit state.....	18
6.4.4	Unwanted radiated emissions	18
6.4.5	Radio frequency tolerance	19
6.4.6	RF output power time mask	19

6.4.7	Transmitter intermodulation attenuation	20
6.4.7.1	Definition	20
6.4.7.2	Specification	20
6.5	Receiver characteristics	20
6.5.1	Blocking characteristics	20
6.5.1.1	Definition	20
6.5.1.2	Specification	20
6.5.2	Spurious response rejection	21
6.5.2.1	Definition	21
6.5.2.2	Specification	21
6.5.3	Intermodulation response rejection	21
6.5.3.1	Definition	21
6.5.3.2	Specification	22
6.5.4	Unwanted conducted emissions	22
6.5.4.1	Definition	22
6.5.4.2	Specification	22
6.5.5	Unwanted radiated emissions	22
6.6	Transmitter/receiver performance	22
6.6.1	Modulation accuracy	22
6.6.1.1	Ideal case	22
6.6.1.2	Vector error magnitude requirement at symbol time	23
6.6.2	Receiver performance	24
6.6.2.1	Nominal error rates	24
6.6.2.2	Dynamic reference sensitivity	24
6.6.2.3	Receiver performance at reference interference ratios	25
6.6.2.4	Static reference sensitivity	25
6.6.2.5	MS receiver performance for acquisition of synchronization burst	26
6.6.3	Propagation conditions	26
6.6.3.1	Tap-gain process types	26
6.6.3.2	DM propagation models	27
7	Radio sub-system synchronization	27
7.1	Introduction	27
7.2	Definitions and general requirements for synchronization of DM-MSs	27
7.3	Timebase counters	28
7.3.1	Definition of counters	28
7.3.2	Relationship between the counters	28
7.4	Requirements for the frequency source of DM mobiles	28
7.5	Requirements for the synchronization of a slave DM mobile	29
7.6	Synchronization requirements for a master MS operating on channel B in frequency efficient mode	29
8	Channel coding and scrambling	29
8.1	Introduction	29
8.2	General	30
8.2.1	Interfaces in the error control structure	30
8.2.2	Notation	31
8.2.3	Definition of error control codes	31
8.2.3.1	16-state Rate-Compatible Punctured Convolutional (RCPC) codes	31
8.2.3.1.1	Encoding by the 16-state mother code of rate 1/4	32
8.2.3.1.2	Puncturing of the mother code	32
8.2.3.1.3	Puncturing scheme of the RCPC code of rate 2/3	32
8.2.3.1.4	Puncturing scheme of the RCPC code of rate 292/432	32
8.2.3.1.5	Puncturing scheme of the RCPC code of rate 148/432	33
8.2.3.2	($K_1 + 16, K_1$) block code	33
8.2.4	Definition of interleaving schemes	33
8.2.4.1	Block interleaving	33

	8.2.4.2	Interleaving over N blocks	33
8.2.5		Definition of scrambling	34
	8.2.5.1	Scrambling method.....	34
	8.2.5.2	Scrambling sequence	34
8.3		Error control schemes.....	34
	8.3.1	Signalling channels.....	35
	8.3.1.1	Synchronization Signalling CHannel (SCH/S)	35
	8.3.1.2	Half-slot Signalling CHannel (SCH/H) and Stealing CHannel (STCH)	36
	8.3.1.3	Full-slot Signalling CHannel (SCH/F)	36
	8.3.2	Traffic channels in circuit switched mode.....	37
	8.3.2.1	Traffic channel, net rate = 7,2 kbit/s (TCH/7,2)	37
	8.3.2.2	Traffic channel, net rate = 4,8 kbit/s (TCH/4,8)	38
	8.3.2.3	Traffic channel, net rate = 2,4 kbit/s (TCH/2,4)	39
	8.3.2.4	Speech Traffic Channel, full slot (TCH/S)	39
	8.3.2.5	Speech Traffic Channel, half slot (TCH/S)	40
9		Channel multiplexing for DM	40
	9.1	Introduction	40
	9.2	Logical channels	40
	9.2.1	Logical channels hierarchy	40
	9.2.2	Traffic channels	40
	9.2.3	Control channels	41
	9.2.3.1	General	41
	9.2.3.2	Linearization CHannel (LCH).....	41
	9.2.3.3	Signalling CHannel (SCH)	41
	9.2.3.4	STealing CHannel (STCH)	41
	9.3	The physical resource.....	41
	9.3.1	General.....	41
	9.3.2	Timeslots	42
	9.3.3	DM frame.....	42
	9.3.4	Multiframe.....	42
	9.4	Physical channels	42
	9.4.1	General.....	42
	9.4.2	Bursts	42
	9.4.2.1	General	42
	9.4.2.2	Modulation symbol numbering.....	42
	9.4.2.3	Modulation bit numbering	42
	9.4.2.4	Burst timing.....	42
	9.4.3	Type of bursts.....	43
	9.4.3.1	General	43
	9.4.3.2	Modulation bits allocation	43
	9.4.3.2.1	DM Normal Burst (DNB)	44
	9.4.3.2.2	DM Linearization Burst (DLB)	44
	9.4.3.2.3	DM Synchronization Burst (DSB).....	44
	9.4.3.3	Burst fields.....	44
	9.4.3.3.1	Frequency correction field.....	44
	9.4.3.3.2	Inter-slot frequency correction field.....	45
	9.4.3.3.3	Normal training sequence and preamble	45
	9.4.3.3.4	Synchronization training sequence	45
	9.4.3.3.5	Phase adjustment bits	46
	9.4.3.3.6	Tail bits.....	46
	9.4.4	DM-MS multiple slot transmission	46
	9.4.5	General mapping of logical channels	47
10		Radio subsystem link control.....	47
	10.1	Introduction	47
	10.2	RF power control.....	47
	10.3	Radio link measurements	47
	10.3.1	Signal strength	47
	10.3.2	Signal quality	47

History 48