ETSI TR 101 506 V1.2.1 (2008-05)

Technical Report

Fixed Radio Systems;
Generic definitions, terminology and applicability of essential requirements under the article 3.2 of 1999/05/EC Directive to Fixed Radio Systems

Reference
RTR/ATTM-04005

Keywords
DFRS, FWA, radio, regulation,

ETSI

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Foreword

This Technical Report (TR) has been produced by ETSI Technical Committee Access, Terminals, Transmission and Multiplexing (ATTM).

1 Scope

The present document, is intended for complementing the EG 201 399 [i.1] for specific guidance related to Digital Fixed Radio Systems (DFRS) in the production of candidate harmonized standards under the Council Directive 1999/5/EC [i.2] (commonly identified as the R&TTE Directive). Consequently the present document should always be used in conjunction with EG 201 399 [i.1] whenever DFRS are concerned.

The present document identifies, among the generic attributes and technical phenomena, relevant for the article 3.2 of the Directive, presently quoted by EG 201 399 [i.1], those which are relevant and applicable, for the various typologies of Fixed Digital Radio Systems.

Moreover it gives the cross reference from the generic terminology used in EG 201 399 [i.1] and that currently used within the Fixed Radio technical community.

Considerations about attributes and technical phenomena related to articles 3.1 (health, safety and EMC) and 3.3 (interworking and other special requirements) of the R&TTE Directive [i.2] are outside the scope of the present document.

2 References

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2.1 Normative references

The following referenced documents are indispensable for the application of the present document. For dated references, only the edition cited applies. For non-specific references, the latest edition of the referenced document (including any amendments) applies.

Not applicable.

2.2 Informative references

The following referenced documents are not essential to the use of the present document but they assist the user with regard to a particular subject area**.** For non-specific references, the latest version of the referenced document (including any amendments) applies.

[i.1] ETSI EG 201 399 (V2.1.1): "Electromagnetic compatibility and Radio spectrum Matters (ERM); A guide to the production of candidate Harmonized Standards for application under the R&TTE Directive".

[i.2] Directive 1999/05/EC of the European Parliament and of the Council of 9 March 1999 on radio equipment and telecommunications terminal equipment and the mutual recognition of their conformity (R&TTE Directive).

[i.3] ITU-T Recommendation G.826: "Error performance parameters and objectives for international, constant bit rate digital paths at or above the primary rate".

[i.4] ITU-T Recommendation G.827: "Availability parameters and objectives for path elements of international constant bit-rate digital paths at or above the primary rate".

[i.5] ITU-R Recommendation F.1399: "Vocabulary of terms for wireless access".

[i.6] ITU-R Recommendation F.1565: "Performance degradation due to interference from other services sharing the same frequency bands on a co-primary basis with real digital fixed wireless systems used in the international and national portions of a 27 500 km hypothetical reference path at or above the primary rate".

[i.7] ITU-R Recommendation F.1668: "Error performance objectives for real digital fixed wireless links used in 27 500 km hypothetical reference paths and connections".

[i.8] ITU-R Recommendation F.1703: "Availability objectives for real digital fixed wireless links used in 27 500 km hypothetical reference paths and connections".

[i.9] ETSI EN 301 390: "Fixed Radio Systems; Point-to-point and Multipoint Systems; Spurious emissions and receiver immunity limits at equipment/antenna port of Digital Fixed Radio Systems".

[i.10] CEPT/ERC Recommendation 74-01: "Spurious Emissions".

[i.11] ETSI EN 301 126-1: "Fixed Radio Systems; Conformance testing; Part 1: Point-to-Point equipment - Definitions, general requirements and test procedures".

[i.12] ETSI EN 302 217-4-2: "Fixed Radio Systems; Characteristics and requirements for point-to-point equipment and antennas; Part 4-2: Harmonized EN covering essential requirements of Article 3.2 of R&TTE Directive for antennas".

[i.13] ETSI EN 302 326-3: "Fixed Radio Systems; Multipoint equipment and antennas; Part 3: Harmonized EN covering the essential requirements of article 3.2 of the R&TTE Directive for Multipoint Radio Antennas".

[i.14] CEPT/ERC Recommendation 12-09: "Radio Frequency channel arrangement for fixed service systems operating in the band 57,0 - 59,0 GHz which do not require frequency planning".

[i.15] TCAM (8)51: "ADCO Report to TCAM8".

[i.16] TCAM (17)57: "Application of r&tte antenna (UK)".

[i.17] TCAM (20)02: "Minutes TCAM 19".

[i.18] TCAM (7)48: "Contribution on antennas (IT)".

3 Definitions, symbols and abbreviations

3.1 Definitions

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

air interface interoperability: requirement by which DFRS terminals from different manufacturer can be connected inside the same radio systems

NOTE: It requires standardisation of the physical radio layer (e.g. modulation format, digital codings, synchronisation procedures, etc.) and part or all of the higher network layers protocols.

harmonized radio frequency band: commonly referred as a portion of the frequency spectrum that CEPT/ERC allocates to a specific service through a CEPT/ERC Decision (proper definition is currently under study by CEPT/ERC)

NOTE: It should be noted that, presently, radio frequency bands allocated to Fixed Service are not harmonized.

essential phenomenon: radio frequency phenomenon related to the essential requirements under article 3.2 of the Directive capable of being expressed in terms of quantifiable technical parameters

digital) fixed radio systems: comprise the whole family of Point-to-point (P-P), Point-to-multipoint (P-MP) and Multipoint-to-multipoint (MP-MP) radio equipment (see note 2), which may be used in fixed locations as part of public or private core or access networks (see note 3)

NOTE 1: It is equivalent to the ITU-R definition of Fixed Wireless Systems (FWS) and comprises Fixed Wireless Access (FWA) systems and, in specific cases, their optional extension to Nomadic Wireless Access (NWA) (see note 4).

NOTE 2: The two latter generically identified as Multipoint (MP) systems.

NOTE 3: Analogue systems are no longer implemented; therefore, for the purpose of the present document only digital applications are treated identified as DFRS.

NOTE 4: NWA systems are defined in ITU-R Recommendation F.1399 [i.5] as "*Wireless access application in which the location of the end-user termination may be in different places but it must be stationary while in use*".

radio Equipment (Article 2 of 1999/05/EC Directive [i.2]): radio equipment means a product, or relevant component thereof, capable of communication by means of the emission and/or reception of radio waves utilizing the spectrum allocated to terrestrial/space radiocommunication

telecommunications terminal equipment (Article 2 of 99/05/EC Directive [i.2]**):** telecommunications terminal equipment means a product enabling communication or a relevant component thereof which is intended to be connected directly or indirectly by any means whatsoever to interfaces of public telecommunications networks (that is to say, telecommunications networks used wholly or partly for the provision of publicly available telecommunications services)

3.2 Symbols

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

dBi	deciBels relative to isotropic radiator
GHz	GigaHertz

3.3 Abbreviations

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

ATPC	Automatic Transmission Power Control
BER	Bit Error Ratio
BTS	Base Station

CDMA	Code Division Multiple Access
CRS	Central Radio Station
CW	Continuous Wave
DFRS	Digital Fixed Radio Systems
EIRP	Effective Isotropic Radiation Power
FDMA	Frequency Division Multiple Access
FH	Frequency Hopping
FWA	Fixed Wireless Access
FWS	Fixed Wireless Systems
GSM	Global System Mobile
MP	MultiPoint
MP-MP	MultiPoint-to-MultiPoint
NWA	Nomadic Wireless Access
PCN	Public Communication Network
P-MP	Point-to-MultiPoint
P-P	Point-to-Point
QoS	Quality of Service
R&TTE	Radio equipment and Telecommunications Terminal Equipment and the mutual recognition of their conformity
RE	Radio Equipment
RFC	Remote Frequency Control
RPE	Radiation Pattern Envelope
RSL	Received Signal Level
RTPC	Remote Transmit Power Control
RX	interface signal Receiver
TCAM	Telecommunication Conformity Assessment and Market Surveillance Committee
TDMA	Time Division Multiple Access
TTE	Telecommunication Terminal Equipment
WG TM4	Working group TM4 of ETSI Technical Committee Access, Terminals, Transmission and Multiplexing (TC ATTM)
XPD	cross Polar Discrimination

4 General principles

The objective of a Harmonized Standard under the R&TTE Directive [i.2] for a DFRS is to define clear and unambiguous provisions for the essential requirements referred in the Directive, which are applicable to the system concerned.

To aid the ETSI Technical Bodies in the production of candidate harmonized standards, ETSI produced the EG 201 399 [i.1] that expands the general concepts of essential requirements into a more detailed subdivision and gives guidance for categorizing Telecommunication Terminal Equipment (TTE) and Radio Equipment (RE) in order to identify the technical phenomena relevant to the essential requirement under consideration.

However, particularly in the parts that refer to article 3.2 "The effective use of the radio spectrum" of the R&TTE Directive, also EG 201 399 [i.1] uses terminology and concepts that, when applied to a specific family of radio systems such as the Fixed Radio, proves to be still too generic; therefore further guidance, more technically based on the technology and terminology used by the relevant technical community, is reported in the present document. Therefore the present document should always be used in conjunction with the EG 201 399 [i.1] whenever Fixed Digital Radio Systems (DFRS) are concerned.

5 Application of Equipment Attributes in EG 201 399 to Digital Fixed Radio Systems (DFRS)

5.1 Equipment Attributes

Presently EG 201 399 [i.1] defines the following attributes for Radio Equipment (RE) and Telecommunication Terminal Equipment (TTE) or both:

A) RE that is unable to transmit before receiving an appropriate enabling signal under any circumstances.

B) RE that is able to transmit without receiving an appropriate enabling signal.

C) RE capable of receive only.

D) Apparatus intended for use in "Emergency applications".

E) Short range radio transmitting devices.

F) RE intended for installation in sites which may be shared with other RE without co-ordination from a single operator.

G) RE sharing radio spectrum resources with or without operational co-ordination.

H) TTE using an electrical interface for communication.

I) TTE using an optical interface for communication.

J) RE using received signal (e.g. the receiver level) to control transmitter power level or channel access (automatically or manually).

5.2 Equipment attributes and their applicability to DFRS

5.2.1 Attribute A: RE that is unable to transmit before receiving an appropriate enabling signal under any circumstances.

This attribute is typical of systems like GSM, of which terminals of different manufacturer can be connected at any time to a BTS; in this case the radio frequency interface is standardized in GSM coexistence standards and air interface interoperability.

Even without requirement for air interface interoperability, some MP terminals need granting from CRS, however, in this case, the enabling signal still is an "intra system" feature, therefore not relevant from the point of view of the essential requirements under the R&TTE Directive.

This attribute would be relevant for DFRS only in the case of standards that would possibly be developed requiring air interface interoperability.

The analysis of the relevant phenomena is left for further study, if required.

5.2.2 Attribute B: RE that is able to transmit without receiving an appropriate enabling signal.

In principle conventional DFRS transmit without enabling signals. However, in order to avoid harmful or unacceptable interference and to ensure the efficient use of the spectrum in not harmonized frequency bands, allocated to the Fixed Service, national frequency co-ordination and link by link licensing is applied. In not harmonized and not co-ordinated bands (e.g. 58 GHz) the argument is not relevant.

The "national licensing" may be considered as an "enabling signal" of different nature, therefore this attribute is considered not relevant for conventional DFRS.

Presently, for DFRS, this attribute could be relevant only to transportable equipment for provisional links (in the event that the national licensing policy is different from permanent links). This type of equipment is in general not considered specifically in WG TM-4 standards, but is possibly offered independently by suppliers to specific customers as not standardized options.

The analysis of the relevant phenomena is left for further study, if required.

5.2.3 Attribute C: RE capable of receive only.

This attribute is presently considered not relevant for DFRS presently standardized in WG TM-4, because DFRS applies only to telecommunications.

5.2.4 Attribute D: Apparatus intended for use in 'Emergency applications'.

This attribute is also more detailed in the EG 201 399 [i.1] as "Equipment having this attribute requires a high assurance of performance when operating".

From the applicable essential phenomena point of view, this attribute is one of the two that presently require as essential phenomena the "(Maximum usable) sensitivity (including duplex)" and the only one requiring "co-channel rejection"; these parameters are commonly required for frequency co-ordination purpose in order to guarantee the link performance and availability.

It is commonly understood that when used in PCN (Public Communication Networks), DFRS, as all other media equipment, should meet a number of ITU-T and ITU-R performance and availability recommendations (e.g. ITU-T Recommendations G.826 [i.3], G.827 [i.4] and ITU-R Recommendations F.1668 [i.7], F.1703 [i.8], F.1565 [i.6]), which are essential for national and international communications that may commonly include any kind of high priority government, business and emergency communications.

It is also noted that, having the fulfilment of those ITU requirements implies the definition, for each link, of a well-defined fade-margin, which is composed by the TX Pout as well as by the RX minimum sensitivity. Therefore, poor RX sensitivity and co-channel rejection, beyond a minimum standardised requirement, would require a correspondent higher TX power with potential increase of the probability of causing harmful interference to other users of the band.

Therefore it is considered that, for P-P and MP equipment used in the "public core and access networks", carrying traffic which includes conventional voice telephony and "high performance leased lines option" this attribute is applicable.

For equipment intended only for "residential access network" (where entertainment and commercial traffic may dominate) and private networks, the subject is left to a case-by-case analysis.

By the nature and usage of not co-ordinated bands (e.g. 58 GHz band referenced in CEPT/ERC Recommendation 12-09 [i.14]), equipment designed for these bands, are not considered suitable for this attribute.

5.2.5 Attribute E: Short range radio transmitting devices.

This attribute is not relevant for DFRS.

5.2.6 Attribute F: RE intended for installation in sites which may be shared with other RE without co-ordination from a single operator.

This attribute is specifically referred by EG 201 399 [i.1] as applicable to DFRS.

However at least one other attribute should accompany this attribute.

The suggested phenomena for this attribute, to be considered in defining essential requirements, cover only transmitter and receiver intermodulation, which are a consequence of the shared installation site, not elsewhere covered by other equipment specific attributes.