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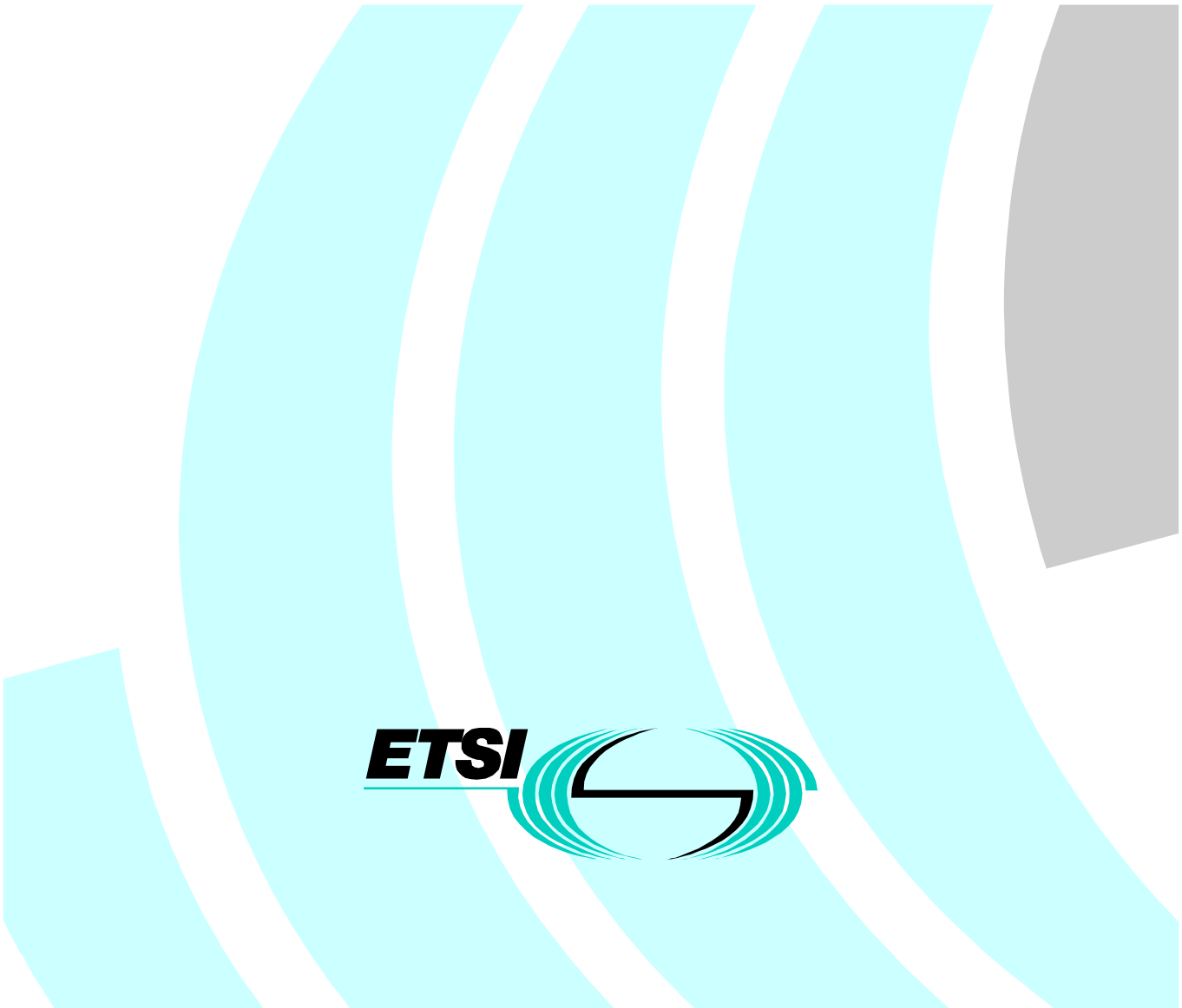
Technical Report

**Fixed Radio Systems;
Technical Information on
RF Interfaces applied by
Fixed Service Systems including
Fixed Wireless Access (FWA),
in the light of the R&TTE Directive (Article 4.2)**



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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 - NAF 742 C
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Contents

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Foreword

This Technical Report (TR) has been produced by ETSI Technical Committee Transmission and Multiplexing (TM).

The present document contains technical information intended to give the reader an overview of the status of the market and of the standardization of Point to Point (P-P) and Point to MultiPoint (P-MP) FRS with particular focus to the radio frequency interface in light of the requirements of article 4.2 (publication of interface specifications) of the Directive 1999/5/EC [1] (R&TTE Directive).

Introduction

Article 4.2 of R&TTE asks for operators to publish the technical specifications of the interfaces at their Network Termination Points (NTP); the NTP has to be defined by national administrations, however no specific reference or guidance is given by the Commission to where the NTP has to be located. It is expected that it depends from the application and the characteristic of the various telecommunication system offered by the market.

The Fixed Radio Systems (FRS), referred in the Radio Regulations as Fixed Service, and in particular those digital systems used for Fixed Wireless Access (FWA), are one of many examples of telecommunication system subject to the R&TTE.

FRS, used in European countries, are presently referred to in a relatively large number of specific ETSI standards dealing with P-P and P-MP systems.

However the technical background for their network applications and deployment is no longer much spread inside Administrations and Network Operators, it is often restricted to few experts inside larger organizations possibly more focused on more popular radio services (e.g. mobile or satellite) or on different media (optical or copper transmission).

Therefore WG TM4, responsible for "Fixed Radio Systems" within TC TM "Transmission and Multiplexing" feel the necessity of producing, besides the required harmonized standards for the easiest placing of the products on the market, also the present document for giving a simple overview, from the technical point of view, of the equipments, networks, applications, deployment and market of FRS.

Wishing to address in particular readers not specifically skilled in Fixed Radio Systems applications, the approach taken has been to make a comparison of a number of "high level characteristics" with the corresponding ones of the most popular mobile radio system (GSM 900/1 800).

The comparison do not wish to criticize any one of those characteristics but only to briefly comment them, from an objective standpoint, for focusing their technical and operational differences.

1 Scope

The present document is intended for offering technical background to the requirements under article 4.2 (publication of interface specifications) of the Directive 1999/5/EC [1] (R&TTE Directive) when applied to fixed radio systems (FRS).

It is not in the scope of the present document to indicate which interfaces of FRS should be subject to publication under article 4.2 of R&TTE.

The scope of the present document is to offer a simple overview of the application of Fixed Radio Systems with particular attention to Point to Multipoint (P-MP) applications including Fixed Wireless Access (FWA) systems.

The present document aims to create a common technical background for defining whether a FRS radio frequency interface is worth for publishing under article 4.2 of R&TTE Directive [1] and in line with the ONP Directive [4] provisions.

Gaining the common background presented in the present document, it is felt that Administrators and Network Operators may more effectively decide on the requirement for interfaces publication under the article 4.2 of the R&TTE Directive.

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] Directive 1999/5/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).

[2] Directive 97/51/EC of the European Parliament and of the Council of 6 October 1997 amending Council Directives 90/387/EEC and 92/44/EEC for the purpose of adaptation to a competitive environment in telecommunications.

[3] Council Directive 90/387/EEC of 28 June 1990 on the establishment of the internal market for telecommunications services through the implementation of open network provision.

[4] Directive 98/10/EC of the European Parliament and of the Council of 26 February 1998 on the application of open network provision (ONP) to voice telephony and on universal service for telecommunications in a competitive environment.

[5] ETSI EG 202 306: "Transmission and Multiplexing (TM); Access networks for residential customers".

[6] Directive 98/13/EC of the European Parliament and of the Council of 12 February 1998 relating to telecommunications terminal equipment and satellite earth station equipment, including the mutual recognition of their conformity (Terminal Directive).

3 Abbreviations

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

CEPT	European Conference of Postal and Telecommunications Administrations
CS	Central station
DRRS	Digital radio-relay systems
ERC	European Radio Committee
FRS	Fixed radio systems
FWA	Fixed wireless access
P-P	Point-to-point
P-MP	Point-to-multipoint
R&TTE	Radio and Telecommunications Terminal Equipment
RF	Radio frequency
RS	Repeater station
TS	Terminal station
UNI	User network interface

4 EC Directives overview

Directive 1999/5/EC [1] (R&TTE Directive), for the interface publication argument, makes reference to previous Directive 98/10/EC [4] which also references back to Directive 97/51/EC [2] (amendment of ONP Council Directive 90/387/EEC [3]).

In the following some relevant excerpts, regarding interfaces publication, from the above Directives are reported and briefly commented, in particular focusing on new technologies for broadband access.

4.1 Directive 1999/5/EC (R&TTE Directive)

The R&TTE introduce the argument of interface publication in whereas (9) that quotes:

> *"Whereas Directive 98/10/EC [4] of the European Parliament and of the Council of 26 February 1998 on the application of open network provision (ONP) to voice telephony and on universal service for telecommunications in a competitive environment calls on national regulatory authorities to ensure the publication of details of technical interface specifications for network access for the purpose of ensuring a competitive market for the supply of terminal equipment;"*

The basic rule for interface publication is article 4.2 of R&TTE Directive [1] that quotes:

> *"Each Member State shall notify to the Commission the types of interface offered in that State by operators of public telecommunications networks. Member States shall ensure that such operators publish accurate and adequate technical specifications of such interfaces before services provided through those interfaces are made publicly available, and regularly publish any updated specifications. The specifications shall be in sufficient detail to permit the design of telecommunications terminal equipment capable of utilizing all services provided through the corresponding interface. The specifications shall include, inter alias, all the information necessary to allow manufacturers to carry out, at their choice, the relevant tests for the essential requirements applicable to the telecommunications terminal equipment. Member States shall ensure that those specifications are made readily available by the operators."*

However the R&TTE directive do not offer hints for understanding if an interface is due to be published or not; this background should be found in previous more generic Directives.

4.2 Directive 98/10/EC (ONP application to voice telephony and on universal service for telecommunications in a competitive environment)

A useful material, for understanding the background of article 4.2 of R&TTE Directive [1], is reported by Directive 98/10/EC [4] which is referenced in whereas (9) of R&TTE for introducing the argument of interface publication; it seems therefore logic that the same concepts should apply also to the R&TTE.

The Directive 98/10/EC [4] in article 11(2) quotes:

> *"National regulatory authorities shall ensure that organizations providing **fixed public telephone networks** provide them with details of technical interface specifications for network access, as identified in Annex II, part 1, to be made available in accordance with paragraph 4. Changes in existing network interface specifications and information on new network interface specifications shall be communicated to the national regulatory authority in advance of implementation. The national regulatory authority may lay down a suitable period of notice."*

It may be noted that, while this Directive apply *"…on the application of open network provision (ONP) voice telephony and on universal service for telecommunications in a competitive environment"* and the concept of *"universal service"* is widely used through the whole text, in article 11 only "*fixed public telephone networks "* are mentioned and Annex II part 1 further details these interfaces as:

> *"Information to be supplied to the national regulatory authority in accordance with article 11(2)*
> *Technical characteristics of network interfaces.*
> *Technical characteristics of interfaces at commonly provided network termination points are required, including where applicable reference to relevant national and/or international standards or recommendations:*
>
> *- for analogue and/or digitally presented networks:*
>
> *(a) single line interface;*
>
> *(b) multiline interface;*
>
> *(c) direct dialling-in (DDI) interface;*
>
> *(d) other interfaces **commonly** provided,*
>
> *- for ISDN: (where provided)*
>
> *(a) specification of basic and primary rate interfaces at the S/T reference points, including the signalling protocol;*
>
> *(b) details of bearer services able to carry voice telephony services;*
>
> *(c) other interfaces **commonly** provided,*
>
> *- and any other interfaces **commonly** provided.*

It may be further notice that, a part of standard analogue/digital/ISDN connections, there is the reference to "*any other interfaces **commonly** provided"*, the word "commonly" possibly enforcing the concept of widely used interfaces only.

This Directive was published in 1998, when broadband access (other than ISDN) were already at initial deployment stage, this is already recognized in whereas (1) were it is quoted:

> *"…..…whereas the concept of **universal service** must evolve to keep pace with advances in technology, market developments and changes in user demand;…..…".*

This means that a new technology interface, presently possibly not subject of publication, may be required to be published only when that service would eventually become *"**commonly provided**"*.

4.3 Directives 97/51/EC and 90/387/EEC (ONP Directive and its later revision)

To further analyse the EC position, another reference to be taken into account is the general provisions of the Directive 97/51/EC [2] that from article 1(2), amending article 2(5) of ONP Directive 90/387/EEC [3], quotes:

> *"Network termination point shall mean the physical point at which a user is provided with access to a public telecommunications network. The **locations of Network Termination Points** shall be **defined by the national regulatory authority** and shall represent a boundary, for regulatory purposes, of the public telecommunications network".*

The same article 1(2) of the Directive 97/51/EC [2], amending article 2(8) of ONP Directive 90/387/EEC [3] clarify the argument quoting:

> *"Open network provision conditions shall mean the conditions, harmonized in accordance with this Directive, which govern open and efficient access to public telecommunications networks and, where applicable, public telecommunications services and the efficient use of those networks and services.*
> *Without prejudice to their **application on a case-by-case basis**, open network provision conditions **may include harmonized conditions** with regard to:*
>
> - *technical interfaces, including the definition and implementation of **network termination points**, where required,*
> - *usage conditions,*
> - *tariff principles and*
> - *access to frequencies and numbers/addresses/names, where required in accordance with the reference framework of the Annex;"*

From the above texts it may be understood that, in general, the interface publication is **not required a priori,** it applies in a case-by-case basis. It may also mean, particularly for new technologies, that the **operator may** (should?), in the interface description, **propose the location of NTP** together with other details of the physical connection.

5 Status of fixed radio systems based on WG TM4 standards

TM4 Standardization activity started with ETSI in 1989, however a CEPT TM4 standardization group was active well before 1980 (23 CEPT TM4 meetings held on ~ 9 month cadence).

Since then the TM4 group standardized initially P-P digital radio-relay systems (DRRS) for long and short haul applications. More recently TM4 turned its attention to "access focused" FRS, P-P for infrastructure of mobile networks and P-MP systems. Such systems are now called fixed wireless access (FWA) but are also known with many other names (e.g. WLL, TLL, ..).

Prior to discussing the impact of RF interfaces disclosure (by publication under article 4.2 of the R&TTE Directive [1]) it is necessary to analyse the background for the standardization (e.g. by WG TM4) of fixed radio systems in the Fixed Service, in relation to the peculiar technical characteristics of this Service and its corresponding market.

5.1 Background for the present ETSI standardization policy for Fixed Radio Systems

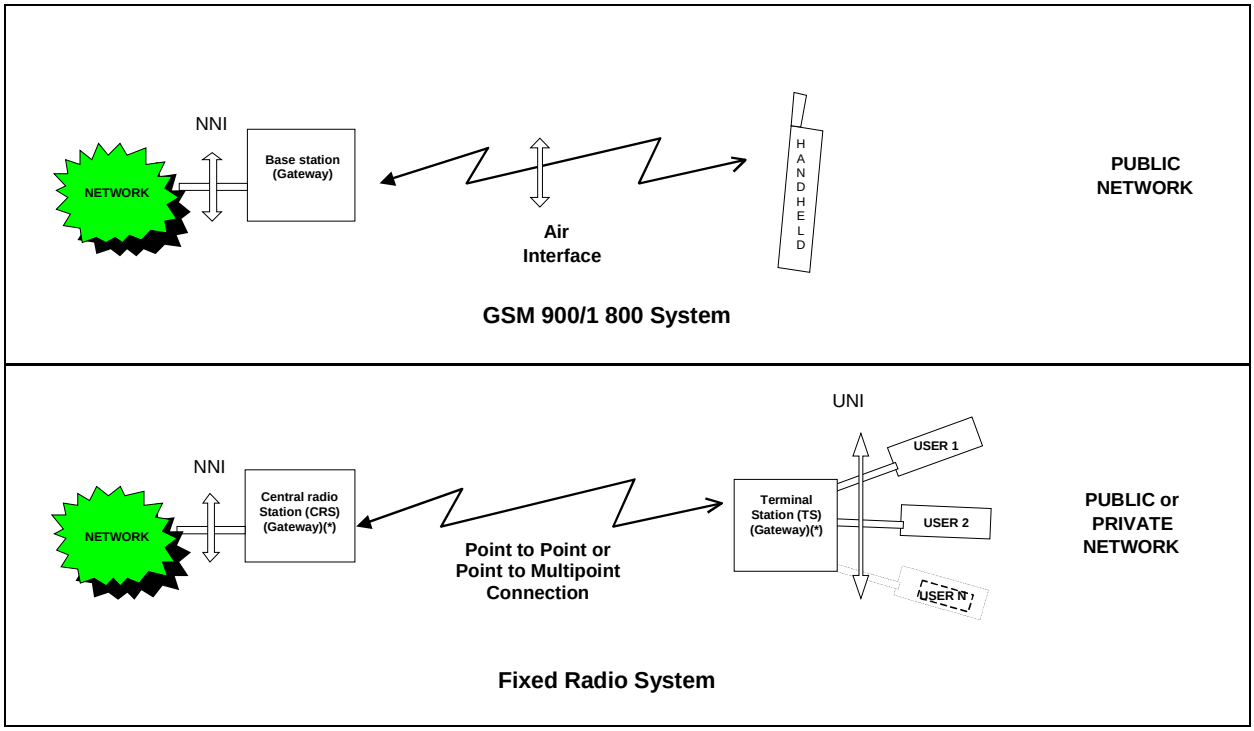
The radio parameters subject to standardization have been, until now, always limited to co-existence parameters and system performance; these have also been recently agreed to be bases for fulfilling the essential parameters under article 3.2 of the R&TTE.

The requirement of not extending standardization beyond this set of RF parameters for co-existence can be easily understood looking at the peculiarity of the fixed radio market that can be summarized and compared with the dominant mobile systems (e.g. GSM and UMTS, as a typical example of a fully "RF standardized systems") as follows.

5.1.1 Basic differences between FRS and GSM

5.1.1.1 High level system concept

Figure 1 shows the two basic concepts; it could be noted that, while GSM foresee a single user connection per radio interface, FWA are, in principle structured for serving more than one user.



(*) Provided that a FRS Terminal Station (TS), in some cases, can offer traffic concentration, the network gateway may be considered extended to the TS too.

Figure 1: GSM and P-MP Fixed Radio System basic difference

The difference between FRS Central Radio Station and GSM Base Station is not relevant and will not be analysed any further in the present document.

On the contrary fundamental differences are present when a FRS Terminal Station (TS) is compared to a GSM mobile phone terminal; they are more specifically analysed in the paragraphs following.

5.1.1.2 Frequency Bands

- The number of frequency bands where fixed links are traditionally deployed is very large ranging from lower than 1 GHz up to 60 GHz.
  GSM has only two nearby bands, 900 MHz, 1 800 MHz.

- The bands for Fixed Service are generally not harmonized by any ERC Decision, national variations exist and are subject to be changed; therefore the bands and the market are "not protected" from regulatory changes.
  GSM bands are harmonized and the market is "protected" from regulatory changes.

5.1.1.3 System characteristics

The following table summarize some high level system characteristics related to the specific technology used in FRS and GSM.

Table 1

Characteristic	FRS Terminal Stations	GSM Terminal handsets
Propagation behavior	Standing the far different frequency band regions and instantaneous bandwidths, the propagation impairments can be dominated by one or more different phenomena. They can be related to terrain reflections, line-of-sight conditions, multipath, rain intensity, gaseous absorption …	GSM is deployed only in two nearby bands with similar propagation behavior
RF front-end technology	The propagation behavior and front-ends technology (for both transmitters and receivers), for such a wide frequency range, requires a number of far different solutions to be developed for each band	For the two nearby bands GSM needs only one technology
System capacity options	The system capacity options (bit-rates) required are numerous, ranging from less than 64 kbit/s up to STM-4 (including both P-P and P-MP systems) to cope with the different services transported over the fixed radio systems	GSM has only one transmission bit-rate, being able to transport only "narrow" band services
Spectral efficiency and Quality of Service (QoS)	Having mainly a "transport" mission, fixed radio systems are mostly designed on the bases of "**transparency**" and "**recommended ITU based QoS**" (e.g. for leased lines). The main option for increasing the spectral efficiency per RF channel is to increase the modulation complexity. The challenge of QoS with complex modulation required the manufacturer to develop a variety of advanced solutions (e.g. error correction, bit/byte-interleaving, adaptive equalizers, MAC protocols,…….) and, most important, many combinations of those solutions.	GSM has to deliver "services", such as voice and data modem interface, with "subjective QoS" only, e.g. it could select the option of complex voice codes going down from 32 kbit/s to 16 and 8 kbit/s, not affecting the physical layer of the RF interface. The real increased efficiency systems will be named UMTS and will be deployed in a completely different frequency band
Network management	The market usually requires that all radio stations, including the so-called P-MP TSs, are controlled (for fault and QoS) by a suitable network management system (TMN) allowing the Operator to guarantee a Customer satisfaction, similar to that of any wired network.	GSM terminals are not controlled by any TMN, they are only "acknowledged for connection"; faults are a Customer business and QoS follows completely different concepts
Traffic concentration and multiplexing	P-MP TSs likely perform statistical multiplexing/concentration among a number of like or different pay-load inputs; Therefore P-MP terminals may serve several subscribers, this situation is often found in multi-dwelling buildings or in a dense urban environment. A multi-subscriber terminal reduces the cost per subscriber and the environmental load of many antennas on the roof. With reference to figure 1 and 4, such a unit is then considered part of the network gateway equipment under operator's responsibility, and as such, the interface point with the subscriber is generally intended the User Network Interface (UNI) and not the air interface.	In GSM multi-subscriber units do not exist. The air interface is the interface point between the subscriber's equipment, the handset, and the operator's equipment, the base station

5.1.1.4 System deployment

The majority of the bands available for FRS are above 3 GHz, thus requiring line-of-sight connections. Therefore in most cases the connection of any new radio station (e.g. a P-MP TS) requires a "link project" in order to verify the effective "line-of-sight" and the "link budget" to guarantee the required QoS.
This may be guaranteed only through the expertise and network knowledge of the Operator and sometimes through additional infrastructures (e.g. a pylon for antenna height extension or even a repeater in an intermediate location).

The physical deployment of FRS implies also some complexity; figures 2 and 3 show the schematic and a typical building deployment, respectively.

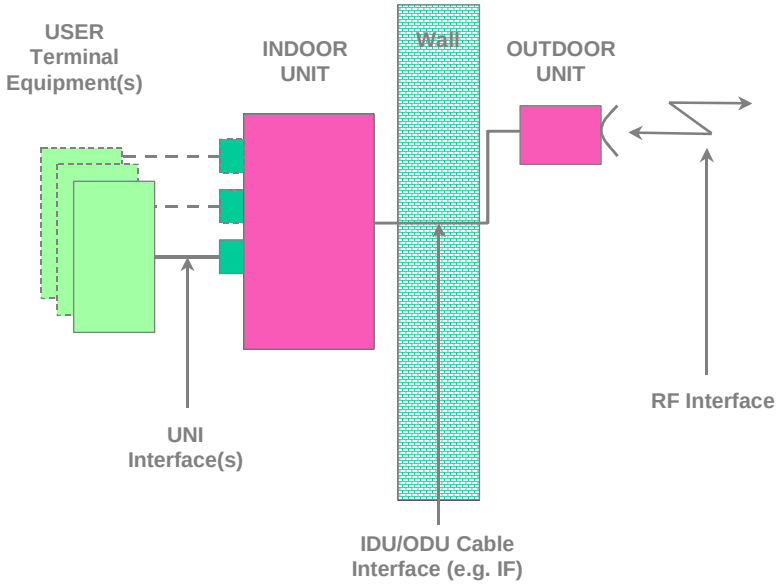


Figure 2: FRS deployment: schematic diagram

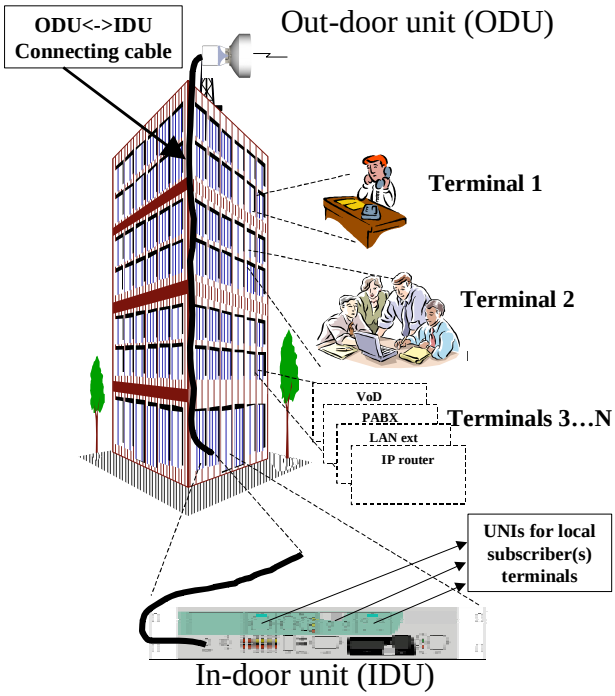


Figure 3: FRS deployment: actual example

Most installation being on the roof of buildings, security is also involved (equipments must be secured from falls and properly grounded for protection against lightning hazards. Careful planning and professional installations are in most cases a must.

In GSM none of the above is required, if you don't have connection in your house, the operator suggests to go on the balcony and people is trained not to complain it.

5.1.1.5 Market competition

The coexistence requirements, contained in the ETSI standards developed by WG TM4, allowed the market to build-up considerable networks in a large number of frequency bands available (but not harmonized by the ERC) for the Fixed Service in ETSI Member Countries.

However this market is presently composed by a large number of different systems from different manufacturers, competing in the same band and for the same service provided. Each one of this systems is present in a relatively low number of pieces of equipment and each one with a specific set "proprietary" physical and functional parameters at RF. Nevertheless a highly competitive market is already in place forcing the manufacturers (competitors) to continuously improve their systems (technically as well as on cost effectiveness).

Table 2

Characteristic	FRS Terminal Stations	GSM Terminal handsets
Basic for competition (System)	The market competition in fixed radio is on the base of "one system against another system" in the same band and for the same transport service provided and involves system design, performance, spectrum efficiency and overall cost effectiveness.	GSM is a unique system therefore competition is mostly made on industrial capability and mass-media advertising of the "unique profile" terminals). Thus GSM suppresses the technical evolution process
Basic for competition (equipments)	The network operators are handling fixed radio systems and are responsible on a per link (transmitter/receivers on both sites) basis (P-P) or on a per cell basis (P-MP) taking into account planning, installation, operation and maintenance. The interconnection of different links of different origin is done at the standardized base band interfaces (e.g. by ITU-T, ETSI and others international bodies). The manufactures are competing on a per link basis.	GSM terminals are commodity products, and sold directly to the end-users. Manufacturers compete separately on base stations and user terminals
Market size	The amount of equipments (single transceivers) presently deployed for each capacity option/band/channel, is relatively low (e.g. up to few thousands per country); only Hiperaccess system, under EP-BRAN responsibility, has in view a larger market (provided to exploit a suitable harmonized band), which is yet to be proven.	GSM terminals are in the order of many tens of millions
Commercial/operational life of equipments	The commercial and operational life of fixed radio equipment is in the order of many years (e.g. ten years).	For GSM terminals it is in the range of few months

5.1.1.6 IPR Policy

Presently, for the reasons detailed in the previous paragraphs 5.1.1.1 through 5.1.1.5, the IPR policy for the FRS is not widely exploited by manufacturers. Actually RF interfaces are proprietary and their unlicensed reproduction by a second party is nearly impossible (i.e. it is largely not rewarding), so the cost of generalized IPR claims may technically not be justified.
GSM IPRs were well present and exploited since the beginning of standardization, prior than the system deployment.

5.1.2 Status of TM4 equipment standards

On the above bases all ETSI standards developed by WG TM4 for FRS traditionally contain a section on interworking specifically stating:

P-P standards: ***"There shall be no requirement to operate transmitting equipment from one manufacturer with receiving equipment from another".***

P-MP standards: ***"There is no requirement to operate the CRS from one manufacturer with the TS and RS from another manufacturer"*** (see figure 4 for references).

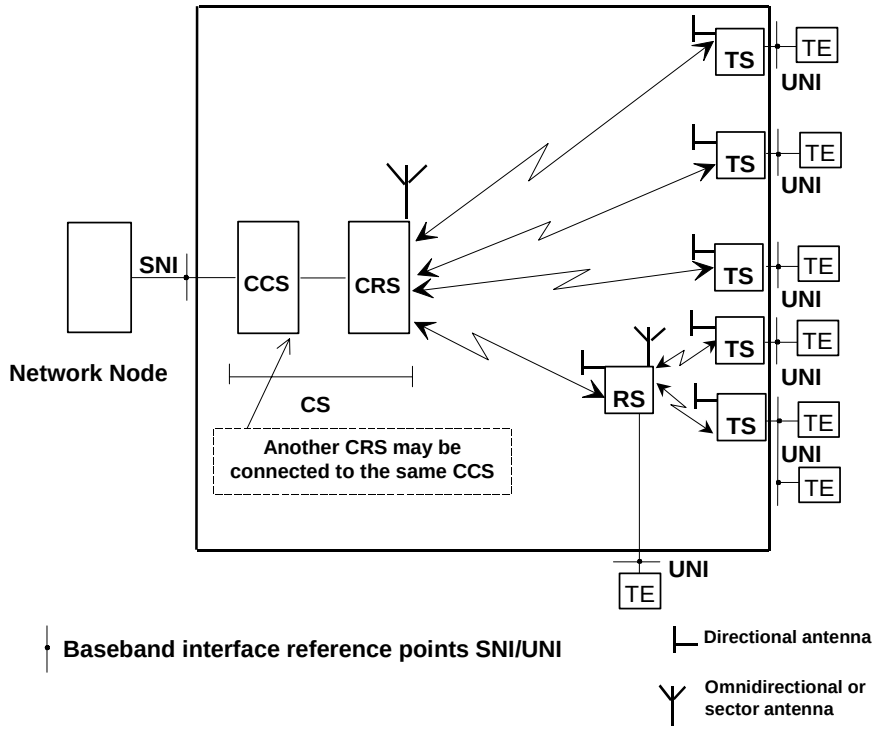
The interfacing among radio equipment are done through baseband interfaces, which are standardized and published by other international bodies (e.g. ITU-T, IEEE and other ETSI TBs), and eventually already identified as Network Termination Points (NTP).

Therefore WG TM-4 standards presently focused only on coexistence parameters generally falling under R&TTE article 3.2 essential requirements. They already allows competition on "system against system" basis.

Point-to-Point systems stations are generally under the responsibility of one operator; when it is not the case (e.g. international cross-border connections), the same manufacturer always delivers the two end stations.

For P-MP each TM4 standard also clearly identifies the boundary of the system with a system architecture similar to figure 4; (this is the most updated version, in line with EG 202 306 [5].

From figure 4, it may be seen that what is named "Terminal Station" (TS) in TM4 standards is an equipment which belongs to the Access Network and which is different from the Terminal Equipment itself (TE). The Public Interface by which an end user is connected to this network is the point, referenced as UNI, located between the Terminal Station (TS) and the Terminal Equipment (TE). The UNI is then considered the user-side NTP that falls under provision of article 4.2 of R&TTE.



Abbreviations:

CS: The Central Station, which interfaces the network. It can be integrated or divided into two units:
i): the Central Controller Station (CCS) also called the exchange unit which is the interface to the local switch;
ii): the Central Radio Station (CRS) also called the radio unit which is the central baseband/radio transceiver equipment. More than one CRS may be controlled by one CCS.
TS: The Terminal Station (outstations with subscriber interfaces). A TS may serve more than one Terminal Equipment (TE).
RS: The Repeater Station (radio repeater outstations with or without subscriber interfaces). An RS may serve one or more TS.
SNI: Service Node Interface. (EG 202 306 [5]).
UNI: User Network Interface. (EG 202 306 [5]).
TE: Terminal (Subscriber) Equipment.
NOTE: Central Controller Station (CCS) may control more than one Central Radio Station (CRS).

Figure 4: P-MP General System Architecture

5.2 Standardization cost in case of a RF multivendor interface

As shown in previous paragraph there was not, until now, any need for RF standardization beyond coexistence parameters; the manufacturers have developed proprietary and very complex RF interfaces to cope with the large amount of requirements.

The complexity of any RF interface in FRS, in particular of P-MP systems with dynamic band-allocation and statistic multiplexing, including the TMN protocols, can be easily comparable to the GSM one.

We should remind that the development of the set of ETSI standards for GSM interface required the joint efforts of hundreds of technicians for many years; and the higher layers are still under development. However those efforts had been invested on the base of the largest telecommunication market.

In the case of FRS even P-MP systems in the various available bands, the cost for having a "standardized interfaces" is presently far too high for the present market share of any manufacturer; we should consider the total cost in term of actual standardization efforts, plus, once the standard is released, that of re-design and re-engineering the first-generation to fully meet the standards for guarantying the terminal interoperability.

Possibly, a different background might be present only for EP-BRAN/Hiperaccess System; the working assumption is for large potential markets on a (initially) single band (eventually harmonized) such as 40,5 GHz to 43,5 GHz; therefore on this basis, EP-BRAN is actually working for a standardized "open" air interface. However, it should be emphasized that no band has been secured solely for Hiperaccess, and the business case for Hiperaccess is yet to materialize.

6 Conclusion and practical background offered for the possible selection of candidate interfaces for publication among not standardized RF interfaces of P-MP Terminal Stations

For article 4.2 of the R&TTE Directive [1] the publication of network interfaces should be made so that:

> *"The specifications shall be in sufficient detail to permit **the design of telecommunications terminal equipment** capable of utilizing all services provided through the corresponding interface".*

This is certainly required for systems whose standards have been currently published under the late Terminal Directive [6]; however, careful consideration should be given to radio systems that do not fall in that category (P-MP TSs included).

An inappropriate application of article 4.2 provisions can result in a detriment of the Fixed Radio market, creating additional unnecessary burdening to operators and manufacturers; therefore against the spirit of the Directive.

From the previous considerations, few general remarks may be derived on the benefit of RF interface publication to the market development (that should be the ultimate aim of any regulatory policy based on the Commission Directives).

Unless an interface is already standardized by ETSI or other bodies with "sufficient detail" as required by article 4.2, for a publication of a proprietary interface so that positively effects the market, three conditions are essential:

1) For justifying the effort, for a "proprietary interface", of "formally produce" and publish all the documentation required by article 4.2 of R&TTE, the volume of equipments deployed shall be by far much higher than that presently experienced by manufacturers of TM4 based P-MP systems.

2) For justifying the investment, for a second party, the development of P-MP terminals, based on that published interface, the volume of equipment deployed shall again be much higher than that presently experienced by TM4 based P-MP systems.

3) For a correct and fair IPR policy among manufacturers, any possible compulsory publication procedure should allow for a suitable time-delay frame in order to make all the necessary IPRs effective before the publication itself.

The above three conditions could be satisfied, for FRS "not standardized interfaces", only by a "selective publication" requirement.

The selective publication might be made on the basis of a decision tree based on the following points:

A) Publication might be required only for systems operating in ERC Harmonized bands.

B) Publication might be required only for P-MP systems offering dynamic band allocation and statistical multiplexing (potentially open to an undefined number of subscribers).

C) Publication might be required after the evidence that the quantity of TSs, in the Operator network, may exceed a predefined suitable number (e.g. defined through a long term deployment plan).

D) Publication might be required with a time-delay frame sufficient for IPRs to be claimed and exploited.

We should also note that, at the time of the publication of the present document, no P-MP system under TM4 responsibility fulfils the above requirements.

In any case ETSI WG TM4 should be considered the only "technical" competence centre for any consultation and guidance on the argument.

History

Document history		
V1.1.1	September 2000	Publication