

Terrestrial Trunked Radio (TETRA); User Requirement Specification TETRA Release 2.1; Part 5: Interworking and Roaming



Reference

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Foreword

This Technical Report (TR) has been produced by ETSI Technical Committee Terrestrial Trunked Radio (TETRA).

The present document is part 5 of a multi-part deliverable covering the User Requirement Specifications (URSs) for TETRA Release 2 and Release 2.1, as identified below:

- Part 1: "General overview" (Release 2.1);
- Part 2: "High Speed Data" (Release 2.1);
- Part 3: "Codec" (Release 2);
- Part 4: "Air Interface Enhancements" (Release 2.1);
- Part 5: "Interworking and Roaming" (Release 2.1);**
- Part 6: "Subscriber Identity Module (SIM)" (Release 2.1);
- Part 7: "Security" (Release 2.1);
- Part 8: "Air - Ground - Air services" (Release 2);
- Part 9: "Peripheral Equipment Interface" (Release 2.1);
- Part 10: "Local Mode Broadband" (Release 2.1);
- Part 11: "Over The Air Management" (Release 2.1);
- Part 12: "Direct Mode Operation" (Release 2.1).

Introduction

The Terms of Reference for TC TETRA approved at ETSI Board meeting #69, November 2008 are to produce ETSI deliverables (and maintenance thereafter) in accordance with the following requirements:

- The provision of user driven services, facilities and functionality as required by traditional Professional Mobile Radio (PMR) user organizations such as the Emergency Services, Government, Military, Transportation, Utility and Industrial organizations as well as Public Access Mobile Radio (PAMR) Operators.
- The evolution and enhancement of TETRA as required by the market with the provision of new services, facilities and functionality made possible by new technology innovations and standards.
- Further enhancements of the TETRA standard in order to provide increased benefits and optimization in terms of spectrum efficiency, network capacity, system performance, quality of service, security and other relevant parameters.

- The backward compatibility and integration of the new services, facilities and functionality with existing TETRA standards in order to future-proof the existing and future investments of TETRA users.

Technical Objective

TETRA is one of a number of digital wireless communication technologies standardized by ETSI.

ETSI TC TETRA produces standards and/or adapts existing standards for efficient digital PMR and PAMR voice and data services, including broadband evolution.

The present document provides the User Requirement Specifications for interworking and roaming.

The URS is required by Working Group 3 (WG3) of TC TETRA to provide improved interworking and roaming between TETRA networks and other TETRA networks and between TETRA networks and public mobile networks such as GSM, GPRS and UMTS.

1 Scope

The user requirements contained in this URS are described in non-technical terms and are based on an analysis of the results for air interface enhancements from the TETRA Release 2 Market Questionnaire, described in TR 102 021-1 [i.1], clauses 4.2 and 4.3 and the Future of TETRA workshop held during the TETRA World Congress 2007, TR 102 621 [i.2]. The present document provides the user requirements for TETRA interworking and roaming.

The present document is applicable to the specification of TETRA Release 2.1 equipment.

2 References

References are either specific (identified by date of publication and/or edition number or version number) or non-specific. For specific references, only the cited version applies. For non-specific references, the latest version of the reference document (including any amendments) applies.

Referenced documents which are not found to be publicly available in the expected location might be found at <http://docbox.etsi.org/Reference>.

NOTE: While any hyperlinks included in this clause were valid at the time of publication ETSI cannot guarantee their long term validity.

2.1 Normative references

The following referenced documents are necessary for the application of the present document.

Not applicable.

2.2 Informative references

The following referenced documents are not necessary for the application of the present document but they assist the user with regard to a particular subject area.

- [i.1] ETSI TR 102 021-1: "Terrestrial Trunked Radio (TETRA); User Requirement Specification TETRA Release 2; Part 1: General Overview".
- [i.2] ETSI TR 102 621: "Terrestrial Trunked Radio (TETRA); TWC2007 Future of TETRA workshop report".
- [i.3] ETSI TR 101 448: "Terrestrial Trunked Radio (TETRA); Functional requirements for the TETRA ISI derived from Three-Country Pilot Scenarios".

3 Definitions and abbreviations

3.1 Definitions

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

interworking: where TETRA users on one system can communicate with mobile users on another system (which could be TETRA or different), as long as they operate within their home TETRA network, i.e. they cannot roam into another system

roaming: utilization of a mobile terminal in a network other than the one where the mobile is subscribed but on which the mobile can still be located and operated by agreement between the respective network operators

NOTE: In the present document the term roaming is used maybe different from the definition of roaming used in other TETRA documents.

TETRA Release 2: work programme with new terms of reference within ETSI Project TETRA to enhance the services and facilities of TETRA in order to meet new user requirements, utilize new technology and increase the longevity of TETRA within the traditional market domains of PMR and PAMR

TETRA Release 2.1: Work Programme within TC TETRA to enhance the services and facilities of TETRA in order to meet new user requirements, utilize new technology and increase the longevity of TETRA within the traditional market domains of PMR and PAMR

3.2 Abbreviations

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

APN	Access Point Name
ETSI	European Telecommunications Standards Institute
GPRS	General Packet Radio Service
GSM	Global System for Mobile communications
IP	Internet Protocol
ISI	Inter System Interface
MS	Mobile Station
PAMR	Public Access Mobile Radio
PMR	Private Mobile Radio
PSTN	Public Switched Telephone Network
SDS	Short Data Service
SMS	Short Message Service
SwMI	Switching and Management Infrastructure
TETRA	TErrestrial TRunked RAdio
TMO	Trunked Mode Operation
TR	Technical Report
UMTS	Universal Mobile Telecommunications System
URS	User Requirement Specification
WAP	Wireless Application Protocol

4 User requirement specification

4.1 Introduction

TETRA networks will rarely exist in isolation. These networks are built to enable communication between users of TETRA networks and to/from other networks and network users. The present document describes the need to interface to existing and future networks mobile and fixed in order to enable interoperability of services and roaming between networks.

There are two main classes of requirements:

- The interworking requirements are concerned with the ability to interface different networks so that higher level services and application are enabled when at least one of the parties is on a different network.
- The roaming requirements give users of a network the ability to access services when outside the area covered by their subscribed network.

There are roaming requirements for both voice services and data services.

There are interworking requirements for both voice services and data services.

A specific TETRA network may need to interface with the following networks (not a complete list):

- Another TETRA network.
- A GSM network.
- A GPRS network.
- A UMTS network.
- A Tetrapol network.
- Another mobile network.
- A fixed network (e.g. the PSTN).
- A private network (PABX).
- An private fixed IP network.
- The Internet.
- Other data networks.

The basic requirement to enable interworking and roaming are the interconnections between networks. TETRA networks will need to support the common interfaces to connect to GSM, PSTN and IP networks for voice, data and signalling.

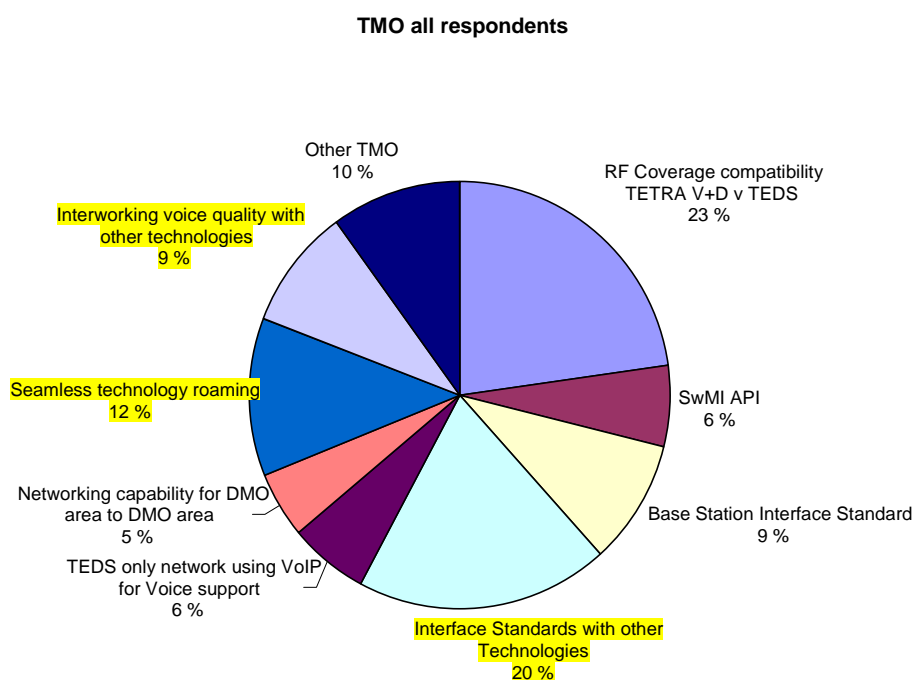


Figure 1: TMO Network Enhancements all workshop respondents from clause 5.1 in TR 102 621 [i.2]

In the TWC2007 Future of TETRA workshop the different aspects of interworking and roaming were identified as important TMO Network enhancement areas, see the figure above from clause 5.1 in TR 102 621 [i.2].

4.2 Interworking

Interworking is the ability of multiple networks to co-operate and together render a service. It is an essential feature when parties involved in communication services are not connected to the same network. Those parties would typically be end-users in a voice communication. They could also be a client and a server in an automated transaction.

Users needs for voice interworking are expressed differently than user needs for data interworking. We will discuss each of them separately.

4.2.1 Voice interworking requirements

Voice interworking is required between TETRA and other voice networks listed in clause 4.1.

Most TETRA voice communications are a combination of group calls and simplex and/or duplex "one to one" calls.

The interworking of duplex calls to PSTN, GSM and UMTS users, where most of the installed base of voice terminals are connected, is an essential requirement.

There is growing interest to extend all TETRA voice services to users on mobile and fixed IP networks (Seamless Technology roaming in TR 102 621 [i.2]).

The European Public Safety community has a specific requirement of interworking with Tetrapol networks.

4.2.2 Data interworking requirements

Data interworking requirements are of two main sorts:

- TETRA users wanting access to servers in other fixed or mobile networks; and
- users on other fixed or mobile networks wanting exchange of data with TETRA users.

There are requirements for both. However, the possibility to access the outside world from the TETRA network stands out as being the most important for all user segments.

TETRA users will need access to the networks where the applications and other users are. This translates into: TETRA SDS, TETRA status, IP Packet Data, SMS, GPRS, 3G networks, APNs, WAP servers, intranets, the Internet.

The TETRA community considers security and confidentiality as important requirements. It is important that interworking requirement do not have a negative impact on those, so the following should be considered:

- proper mechanisms such as firewalls need to be put in place in particular to control access from IP networks; and
- flexible authorization mechanisms are needed, in particular the concept of call barring for data calls is required.

4.3 Roaming

Roaming has implications on the terminal as well as on the SwMI. Here we consider the user requirements for the roaming service and therefore we do not make explicit distinction whether the implications are at the terminal level or at the SwMI level.

Roaming between different TETRA networks is essential and by far the most important requirement. The Public Safety community is looking forward to interconnect the national TETRA networks to provide cross-border communications and cooperation. Operational tests with interim Inter System Interface implementations have underlined the need for roaming between Public Safety TETRA networks and have provided more detail on the requirements, see TR 101 448 [i.3].

This requirement also includes roaming between networks providing the same RF coverage for reasons of back up communications and for inter-communication needs between different organizations during disaster scenarios.

In all forms of roaming, users want full access to all services: voice-only roaming is important, data-only roaming is important, but voice and data roaming is the essential requirement.

Some users also have specific roaming requirements: even though the possibilities for interworking between TETRA and PMR-systems are well recognized by the public safety community, it is important to explore how roaming (and additional interworking solutions) could be provided. This requires a terminal supporting two air interface technologies.

When roaming it is desirable that the user perceives as little difference as possible in the service offering and the profile. However, it is recognized that when roaming to a network of a different technology the users will certainly perceive a difference in the service.

4.4 Service roaming

Service roaming is defined as a combination of roaming and interworking where TETRA services are provided via a non-TETRA air interface. Service Roaming should allow users on a non-TETRA systems to transparently participate in the group and individual communication on a TETRA system and to use the other TETRA services, for example SDS and status messages.

For service roaming a much higher degree of integration is needed between a TETRA system and the non-TETRA system than for interworking.

The connected system with non-TETRA air interface could have the form of:

- a full blown system that provides TETRA services via a non-TETRA air interface and has its own non-TETRA user database; or
- a system that provides TETRA services via a non-TETRA Air interface to MSs that are defined, managed and controlled from the TETRA system.

The MSs on the non-TETRA system could be:

- TETRA MSs both supporting native TETRA air interface and TETRA services via the non-TETRA air interface; or
- MSs only supporting TETRA services via the non-TETRA air interface.

4.5 Implementing technical requirements

Implementations of interworking and roaming should pay particular attention to the following aspects:

- Minimum impact on operational costs.
- Maximum transparency to the end-user.
- Minimum impact on network requirement.
- Co-ordination of numbering across technologies.
- Co-ordination of user identities across technologies.
- Minimum impact on Lawful Interception.
- Minimum impact on billing systems.
- In recent years Internet technology has transformed the networks of the telecom operators. Due to this their main stream products and services are based on the use of IP links instead of E1 links. A carefull study is needed into the use of IP links instead of E1 links.

4.6 Timeline

Interworking and roaming between different TETRA networks is an immediate requirement of users. The requirement for roaming between TETRA networks varies between user organization. Some users in the Public Safety market have a requirement in 2011. A more significant portion of this market has requirements soon after that. The study into the use of IP links instead of E1 links should be finalized before this larger scale use of the ISI.

The requirement for voice interworking between TETRA networks and GSM/UMTS or PSTN and data interworking between TETRA and IP networks has been fulfilled in the TETRA implementations and is widely available in the form of gateways.

Service roaming is a relatively new requirement. There is no strong market push yet.

History

Document history		
V1.1.1	May 2002	Publication
V1.2.1	December 2010	Publication