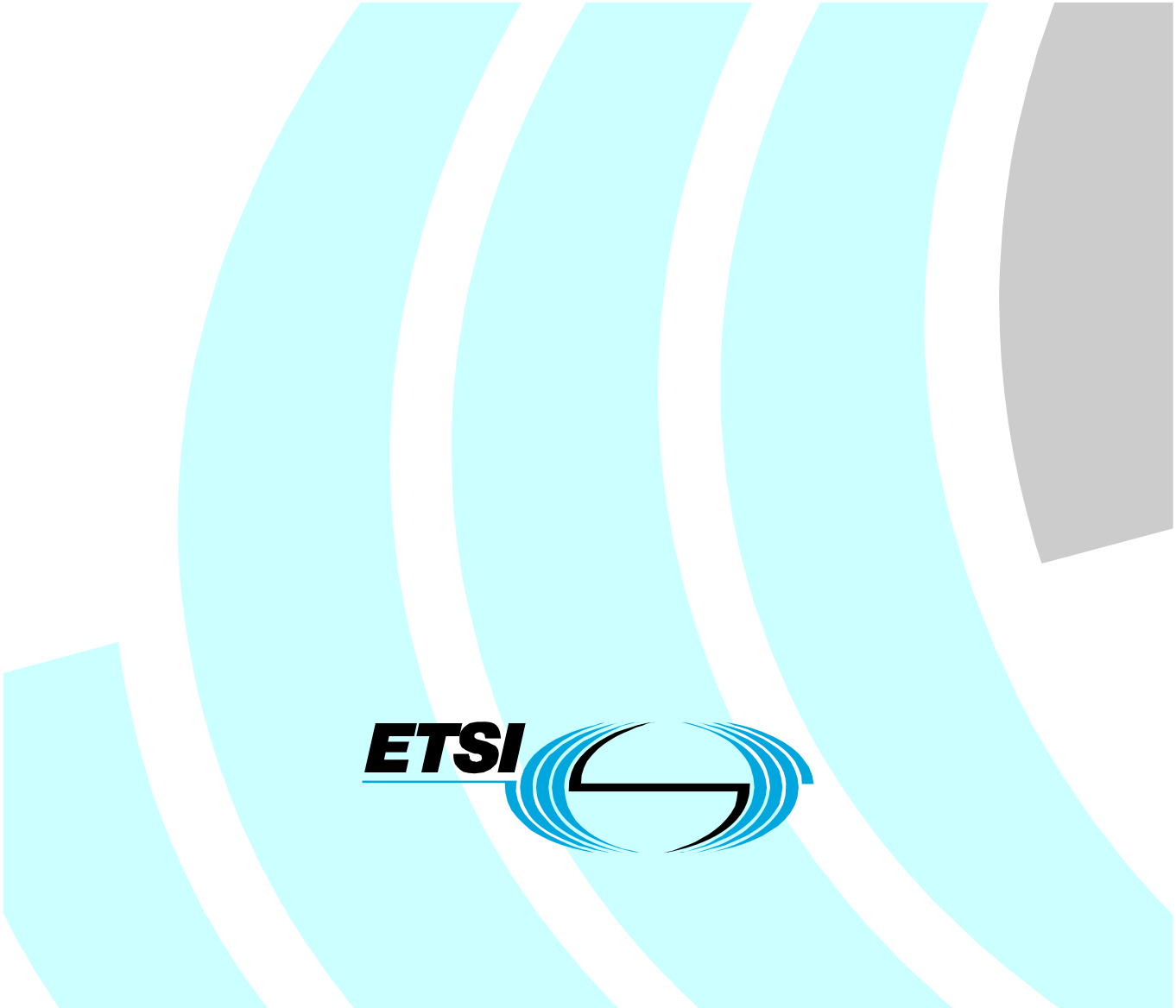
ETSI TR 102 021-1 V1.3.1 (2011-07)

Technical Report

Terrestrial Trunked Radio (TETRA);
User Requirement Specification TETRA Release 2.1;
Part 1: General overview



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Contents

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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 1 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: "Smart Card (SC) and 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 adapt existing standards for efficient digital PMR and PAMR voice and data services, including broadband evolution. The approved programme for TETRA Release 2.1 covers work areas, namely:

- high speed data;
- air interface enhancements;
- interworking and roaming;
- SIM and smart card;
- security;
- air - ground - air services;
- peripheral equipment interface enhancements;
- local mode broadband;
- over the air management;
- direct mode operation.

The User Requirement Specification for each of these work areas is covered by its own document.

The present document provides the General Overview of the User Requirement Specification required by TC TETRA for TETRA Release 2.1 as described in all of these URSs.

1 Scope

The present document outlines the process employed by TC TETRA Working Group 1 in generating user requirements in general, and the methodology used for creating User Requirements Specifications (URSs) for Release 2.1 in particular. It also covers the process of identifying interdependencies, which is considered important for ensuring that various stand-alone URSs fit together into an integrated and coherent URS for TETRA Release 2.1 as a whole.

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

NOTE: Some of the parts may stay as TETRA Release 2, but are part of the present set of URSs.

Each of the work areas of the TETRA Release 2.1 programme is covered by its own stand-alone URS. The URSs were produced by the membership of WG1, who are responsible for capturing and defining user requirements for TETRA.

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 102 021-2: "Terrestrial Trunked Radio (TETRA); User Requirement Specification TETRA Release 2.1; Part 2: High Speed Data".

[i.2] ETSI TR 102 021-3: "Terrestrial Trunked Radio (TETRA); User Requirement Specification TETRA Release 2; Part 3: Codec".

[i.3] ETSI TR 102 021-4: "Terrestrial Trunked Radio (TETRA); User Requirement Specification TETRA Release 2.1; Part 4: Air Interface Enhancements".

[i.4] ETSI TR 102 021-5: "Terrestrial Trunked Radio (TETRA); User Requirement Specification TETRA Release 2.1; Part 5: Interworking and Roaming".

[i.5] ETSI TR 102 021-6: "Terrestrial Trunked Radio (TETRA); User Requirement Specification TETRA Release 2.1; Part 6: Smart Card (SC) and Subscriber Identity Module (SIM)".

[i.6] ETSI TR 102 021-7: "Terrestrial Trunked Radio (TETRA); User Requirement Specification TETRA Release 2.1; Part 7: Security".

[i.7] ETSI TR 102 021-8: "Terrestrial Trunked Radio (TETRA); User Requirement Specification TETRA Release 2; Part 8: Air - Ground - Air services".

[i.8] ETSI TR 102 021-9: "Terrestrial Trunked Radio (TETRA); User Requirement Specification TETRA Release 2.1; Part 9: Peripheral Equipment Interface".

[i.9] ETSI TR 102 021-10: "Terrestrial Trunked Radio (TETRA); User Requirement Specification TETRA Release 2.1; Part 10: Local Mode Broadband".

[i.10] ETSI TR 102 021-11: "Terrestrial Trunked Radio (TETRA); User Requirement Specification TETRA Release 2.1; Part 11: Over The Air Management".

[i.11] ETSI TR 102 021-12: "Terrestrial Trunked Radio (TETRA); User Requirement Specification TETRA Release 2.1; Part 12: Direct Mode Operation". .

NOTE: Part 12 was in preparation at time of publication of the present document.

[i.12] ETSI TR 102 621: "Terrestrial Trunked Radio (TETRA); TWC2007 Future of TETRA workshop report".

3 Definitions and abbreviations

3.1 Definitions

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

High Speed Data (HSD): net data rates in excess of 28,8 kbit/s which is the current capability of TETRA Release 1

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

NOTE 1: This definition is on purpose limited to the case where the user is in its home system. Normally interworking is used to provide communication between different technologies.

NOTE 2: The first version of the present document defined also term "interoperability" which was a combination of roaming and interworking in the case of roaming between TETRA and another technology. Refer to scenarios in TR 102 021-5 [i.4], clause 4.3.

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 1: This definition is used in the present document. This may be different from the definition of roaming used in other TETRA documents.

NOTE 2: In TETRA standards term migration is used with the same meaning as roaming of the present definition.

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:

DMO	Direct Mode Operation
GPRS	General Packet Radio Service
GSM	Global System for Mobile communications
HSD	High Speed Data
LMB	Local Mode Broadband

PAMR	Public Access Mobile Radio
PMR	Private Mobile Radio
RF	Radio Frequency
SC	Smart Card
SIM	Subscriber Identity Module
TC	Technical Committee
TETRA	TErrestrial Trunked Radio
TMO	Trunked Mode Operation
TR	Technical Report
UMTS	Universal Mobile Telecommunications System
URS	User Requirement Specification
USB	Universal Serial Bus
V+D	Voice plus Data
WG	TC TETRA Working Group

NOTE: Abbreviations TMO and V+D are used interchangeably in TETRA documents.

4 User Requirement Specification (URS)

4.1 The Process

Within TC TETRA, WG1 has been given the responsibility for capturing the requirements of the "TETRA Market" from a variety of user entities and for producing User Requirement Specifications. These are then used as a basis for all the other TC TETRA working groups, each of which is responsible for development of a particular aspect of the Release 2.1 standard, e.g. air interface, network aspects, data, codec, etc.

WG1 membership consists of the representatives from end-users of TETRA systems and equipments, Network Operators, Regulators, Manufacturers and Administrations and its task is to collate often conflicting requirements from different user entities. The URS will comprise the list of services and facilities to be included in the new product/specification, the relative attractiveness of the market opportunity associated with each, and the indication by when should the product/specification be available in the market place. Since in reality, there are always some constraints governing budgets and resources, some prioritization of services and facilities should ideally be a part of the URS in order to assist the selection process in the technical working groups. If they were absent from the users they will be produced by WG1, in their role as the TC TETRA voice of the market, in order to assist the detailed technical selection processes taking place in the WGs.

4.2 Methodology

In order to ensure that the most up-to-date information is used for the URSs, WG1 undertook to produce and send out a comprehensive Market Questionnaire, which was sent to the members of TC TETRA and the TETRA Association. Replies received from respondents to the Questionnaire were used as the main references for the Release 2 URSs. A series of WG1 membership meetings and conference calls took place to agree and approve the content of each URS.

It is important to note that the number of respondents to the TETRA Release 2 Questionnaire (2001) was relatively small reflecting only a small number of large Public Safety and PAMR TETRA user organizations, and/or potential TETRA user organizations in Western Europe. Although the investment in TETRA by these user organizations is estimated to represent over 70 % of the TETRA market in Western Europe, it is recognized that TETRA is being deployed in other regions of the world in a number of market segments outside Public Safety and PAMR. For this reason, a further review of user requirements may be necessary.

TETRA Release 2.1 builds on Release 2, further enhancing the functionality based on the findings from e.g. the Future of TETRA workshop during the TETRA World Congress 2007 [i.12], also adding new parts, namely Local Mode Broadband, Over The Air Management and Direct Mode Operation, to the TR 102 021 series ([i.1] to [i.11]).

Following approval of the URSs WG1 will continue to provide, as required by Working Groups, clarifications and guidance during the standard development process, as well as the interpretation of the URSs in cases of ambiguity. In addition, WG1 is expected to continuously monitor the market in terms of new major technologies and the services and facilities they offer to the users and to assess their potential impact on the Release 2 and take the necessary steps to keep it up-to-date or to document the requirements for future releases.

4.3 Interdependencies between URSs

As already mentioned, the Release 2.1 URS is divided into several separate documents, each covering only one of the sections of the Release 2.1 requirement. This method had the advantage of maximum flexibility when it came to the production and maintenance of each of the documents, since different parts of the Release 2.1 programme have different completion timescales. However, in order to ensure that all the URSs "fit together" into a coherent, integrated specification, allowing users to mix and match the Release 2.1 enhancements in various combinations and permutations, it is essential that all of the technical dependencies between different work areas are identified by the relevant working groups and that they are resolved as part of their work programme.

4.4 Individual URSs and their scope

The URSs for TETRA Release 2.1, with a brief description of each, are listed in clauses 4.4.1 to 4.4.7. The updated URSs contain also the requirements from the previous versions with indications of main achievements.

4.4.1 TR 102 021-2 "User Requirement Specification TETRA Release 2.1; Part 2: High Speed Data"

TR 102 021-2 [i.1] provides the user requirement for High Speed Data (HSD). The main issues cover:

- HSD applications and net data rates to support non-voice applications;
- data rate capacity in addition to TETRA Release 1 V+D and TETRA Release 2 HSD;
- RF coverage requirements for HSD;
- frequency spectrum efficiency requirements;
- integration of HSD with TETRA Release 1 V+D services;
- compatibility of HSD with TETRA Release 1 V+D services;
- HSD services including point to multipoint data;
- backward compatibility with TETRA Release 1;
- migration from TETRA Release 1;
- availability of HSD;
- relative importance of HSD user requirement criteria.

4.4.2 TR 102 021-3 "User Requirement Specification TETRA Release 2; Part 3: Codec"

TR 102 021-3 [i.2] provides the user requirements for voice coding. The main issues cover:

- improved end-to-end delay performance;
- voice quality improvement over existing codec;
- equal or better immunity to background noise;
- interworking with GSM/UMTS (No double vocoding);

- interoperability with lower rate, standard codec.

4.4.3 TR 102 021-4 "User Requirement Specification TETRA Release 2.1; Part 4: Air Interface Enhancements"

TR 102 021-4 [i.3] provides the user requirements for the air interface enhancements. The main issues cover:

- improved spectrum efficiency;
- increased network capacity;
- improved system performance;
- improved quality of service;
- reduction in size and weight of terminals;
- increased battery life;
- increased coverage;
- message concatenation in short data service;
- handover criteria;
- provisioning of location information.

4.4.4 TR 102 021-5 "User Requirement Specification TETRA Release 2.1; Part 5: Interworking and roaming"

TR 102 021-5 [i.4] provides the user requirement for interworking and roaming. The main issues covers:

- interworking between TETRA systems;
- improvements in interworking between TETRA and public mobile networks such as GSM, GPRS and UMTS;
- provision of inter-standard roaming, "service roaming";
- backward compatibility and integration of the new services with existing TETRA standards.

4.4.5 TR 102 021-6 "User Requirement Specification TETRA Release 2.1; Part 6: Smart Card (SC) and Subscriber Identity Module (SIM)"

TR 102 021-6 [i.5] provides the user requirement for the Smart Card (SC) and Subscriber Identity Module (SIM). The main issues cover:

- introduction to smart cards;
- security functions;
- personalisation functions.

4.4.6 TR 102 021-7 "User Requirement Specification TETRA Release 2.1; Part 7: Security"

TR 102 021-7 [i.6] provides the user requirement for security issues.

4.4.7 TR 102 021-8 "User Requirement Specification TETRA Release 2; Part 8: Air - Ground - Air services"

TR 102 021-8 [i.7] provides the user requirement for air - ground - air services. The main issues cover:

- general requirements;
- air to ground implementation;
- signalling;
- large radius cells;
- direct mode operation.

4.4.8 TR 102 021-9 "User Requirement Specification TETRA Release 2.1; Part 9: Peripheral Equipment Interface"

TR 102 021-9 [i.8] provides the user requirement for peripheral equipment interface. The main issues cover:

- background including high speed data;
- wired solutions including USB variants;
- wireless solutions;
- comparison of technologies and conclusion;
- user requirements for enhancements.

4.4.9 TR 102 021-10 "Terrestrial Trunked Radio (TETRA); User Requirement Specifications TETRA Release 2.1; Part 10; Local Mode Broadband"

TR 102 021-10 [i.9] provides the user requirements for local mode broadband. The main issues cover:

- general requirements;
- scenarios;
- networking capability for Local Mode Broadband area to Local Mode Broadband area;
- frequency range and efficiency;
- service reliability/availability;
- data rate;
- voice and data services and their interaction;
- service transparency between TMO and LMB to allow seamless operation;
- LMB gateway;
- security.

4.4.10 TR 102 021-11 "Terrestrial Trunked Radio (TETRA); User Requirement Specifications TETRA Release 2.1; Part 11; Over The Air Management"

TR 102 021-11 [i.9] provides the user requirements for over the air management. The main issues cover:

- general requirements;
- TMO group management;
- DMO group and frequency management;
- phonebook management;
- firmware over the air;
- management of encryption keys;
- management of technical parameters.

4.4.11 TR 102 021-12 "Terrestrial Trunked Radio (TETRA); User Requirement Specifications TETRA Release 2.1; Part 12; Direct Mode Operation"

TR 102 021-12 [i.11] provides the user requirements for over the air management. The main issues cover:

- general requirements;
- scenarios;
- DMO workshop results.

NOTE: Part 12 was in preparation at the publication of the present document.

4.5 Relative Market importance of each area of Release 2.0

Based on the replies from the Market Questionnaire (2001), the relative importance of each area of Release 2.0 is given in figure 1.

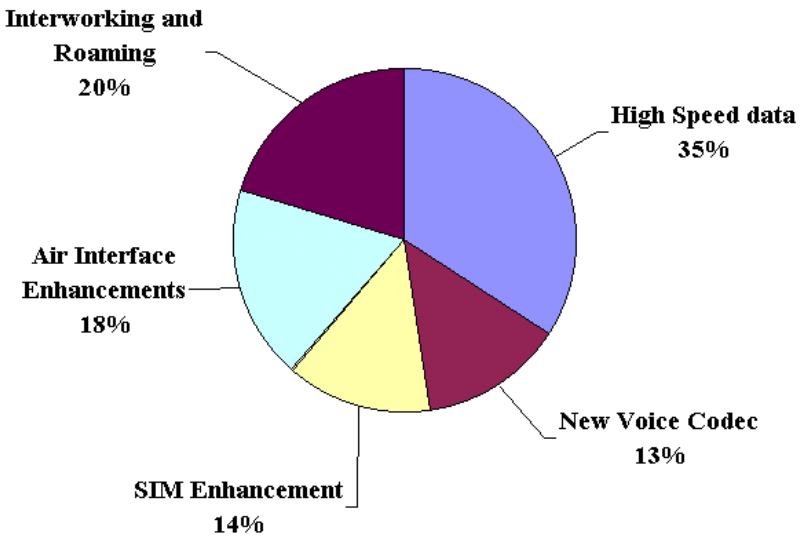

Figure 1: Overall importance

Note that the important improvements to Security and air-ground-air services, for which separate URSs have been published (see clauses 4.4.6 and 4.4.7), were not included in the original Questionnaire.

4.6 General Enhancement Areas all workshop respondents

TETRA World Congress 2007 Future of TETRA workshop report [i.12] answers to question 4 from questionnaire 2 are presented in figure 2.

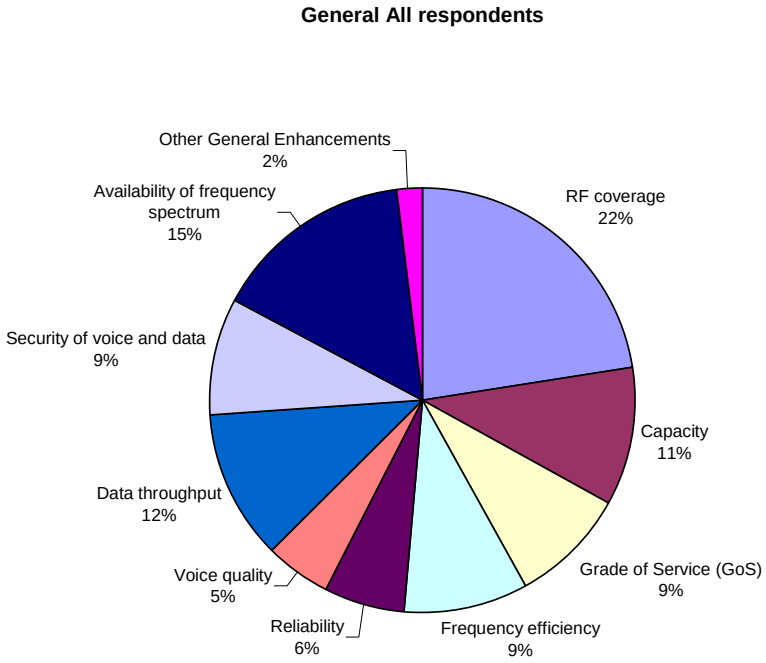

Figure 2: General enhancement areas

History

Document history		
V1.1.1	December 2001	Publication
V1.2.1	May 2005	Publication
V1.3.1	July 2011	Publication