

ETSI TR 100 392-17-6 V1.1.1 (2018-12)



TECHNICAL REPORT

**TETRA and Critical Communications Evolution (TCCE);  
Part 17: TETRA V+D, DMO and associated specifications;  
Sub-part 6: Release 2.2**

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**Reference**

DTR/TCCE-00250

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# Foreword

This Technical Report (TR) has been produced by ETSI Technical Committee TETRA and Critical Communications Evolution (TCCE).

The present document is part 17, sub-part 6 of a multi-part deliverable covering Terrestrial Trunked Radio (TETRA); Voice plus Data (V+D), as identified below:

- ETSI EN 300 392-1: "General network design";
- ETSI EN 300 392-2: "Air Interface (AI)";
- ETSI EN 300 392-3: "Interworking at the Inter-System Interface (ISI)";
- ETSI ETS 300 392-4: "Gateways basic operation";
- ETSI EN 300 392-5: "Peripheral Equipment Interface (PEI)";
- ETSI EN 300 392-7: "Security";
- ETSI EN 300 392-9: "General requirements for supplementary services";
- ETSI EN 300 392-10: "Supplementary services stage 1";
- ETSI EN 300 392-11: "Supplementary services stage 2";
- ETSI EN 300 392-12: "Supplementary services stage 3";
- ETSI ETS 300 392-13: "SDL model of the Air Interface (AI)";
- ETSI ETS 300 392-14: "Protocol Implementation Conformance Statement (PICS) proforma specification";
- ETSI TS 100 392-15: "TETRA frequency bands, duplex spacings and channel numbering";
- ETSI TS 100 392-16: "Network Performance Metrics";
- ETSI TR 100 392-17: "TETRA V+D and DMO specifications":**
  - Sub-part 1: "Release 1.1";
  - Sub-part 2: "Release 1.2";

- Sub-part 3: "Release 1.3";
- Sub-part 4: "Release 2.0";
- Sub-part 5: "Release 2.1";
- **Sub-part 6: "Release 2.2";**

ETSI TS 100 392-18: "Air interface optimized applications".

NOTE 1: Part 3, sub-parts 6 and 7 (Speech format implementation), part 4, sub-part 3 (Data networks gateway), part 10, sub-part 15 (Transfer of control), part 13 (SDL) and part 14 (PICS) of this multi-part deliverable are in status "historical" and are not maintained.

NOTE 2: Some parts are also published as Technical Specifications such as ETSI TS 100 392-2 and those may be the latest version of the document.

Related specifications and reports outside of TETRA V+D and DMO release 2.2 are also included in the present document. These include Harmonized ENs covering EMC standards, Lawful Interception, QOS, mission critical broadband. Technical reports are included as they provide very useful information on TETRA and critical communications.

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## Modal verbs terminology

In the present document "**should**", "**should not**", "**may**", "**need not**", "**will**", "**will not**", "**can**" and "**cannot**" are to be interpreted as described in clause 3.2 of the [ETSI Drafting Rules](#) (Verbal forms for the expression of provisions).

"**must**" and "**must not**" are **NOT** allowed in ETSI deliverables except when used in direct citation.

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## Introduction

The TETRA standard was developed to meet the needs of Professional Mobile Radio (PMR) user organizations for secure, reliable and robust critical communications. In particular, the following important services have been specified:

- Wide area fast call set-up "all informed net" group calls.
- Direct Mode Operation (DMO) allowing "back to back" communications between radio terminals independent of the network.
- High level voice encryption to meet the security needs of public safety organisations.
- An Emergency Call facility that gets through even if the system is busy.
- Full duplex voice for PABX and PSTN telephony communications.
- In addition to the needs of traditional PMR users, TETRA has been developed to meet the needs of Public Access Mobile Radio (PAMR) operators.

To meet the ever-changing user requirements and utilise the latest in technology developments, TETRA continues to be evolved and enhanced with the development of new standards including:

- TETRA Release 2, which incorporates the TETRA Enhanced Data Service (TEDS) that provides wideband high-speed data communication services.
- The interfacing between TETRA systems and mission-critical broadband services in order to allow interworking.
- TETRA Releases 2.x are defined in the Terms of Reference of ETSI Project TETRA for TETRA Release 2 [i.1] and are continuously maintained.

- Work has been ongoing since 2010 in developing specifications and reports related to the evolution to broadband critical communications and these are listed as they are either directly relevant to TETRA r2.2. e.g. interworking between TETRA and broadband systems or indirectly e.g. aspects of security for critical communications broadband systems.

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# 1 Scope

The present document identifies ETSI specifications and reports for TETRA V+D and DMO Release 2.2. It also includes ETSI specifications and reports relating to Critical Communications evolution undertaken by TC TCCE as well as specifications produced by other ETSI technical committees

ENs relating to TETRA specifications are often updated by first introducing an ETSI Technical Specification (TS) which will contain new features and change requests. Therefore, both the latest specification is shown along with the previous version if one is an EN and the other a TS. In the same way, EN versions of the same specification will also be updated replacing a TS in some cases Release 2.2 specifications were functionally frozen after the 52<sup>nd</sup> TC TCCE meeting in October 2018.

Release 2.2 specifications contain corrections and enhancements to Release 2.1 including a major development of the Inter System Interface specifications to develop separate specifications for IP and PSS1 over E.1 transport layers as well as transport layer independent parts.

NOTE 1: Functionally frozen means that no further functionality/features may be incorporated into the set of specifications, and that only corrective Change Requests (CRs) are to be accepted and agreed.

NOTE 2: It can be expected that corrective CRs will be introduced into the Release 2.2 specifications.

NOTE 3: Some of the CRs that will be produced will be for the next Release as they add new functionalities/features.

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## 2 References

### 2.1 Normative references

Normative references are not applicable in the present document.

### 2.2 Informative 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 referenced document (including any amendments) applies.

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

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] Terms of Reference of ETSI Technical Committee TETRA and Critical Communications Evolution (TC TCCE) revised 2013.

NOTE: Available at <https://portal.etsi.org/TBSiteMap/TCCE/TCCEToR.aspx>.

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## 3 Abbreviations

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

AGA	Air-Ground-Air
AI	Air Interface
AL	Ambience Listening
AMR	Adaptive Multi-Rate
ANF	Additional Network Feature
ANF-ISIGC	Additional Network Feature - Inter-System Interface Group Call

ANF-ISIIC	Additional Network Feature - Inter-System Interface Individual Call
ANF-ISIMM	Additional Network Feature - Inter-System Interface Mobility Management
ANF-ISISDS	Additional Network Feature - Inter-System Interface Short Data Service
AP	Access Priority
AS	Area Selection
BIC	Barring of Incoming Calls
BOC	Barring of Outgoing Calls
CAD	Call Authorized by Dispatcher
CCBS	Call Completion to Busy Subscriber
CCNR	Call Completion on No Reply
CF	Call Forwarding
CI	Call Identification
CR	Change Request
CRT	Call Retention
CW	Call Waiting
DG	Designer's Guide
DGNA	Dynamic Group Number Assignment
DL	Discreet Listening
DMO	Direct Mode Operation
DOTAM	Direct Mode Over the Air Management
EMC	Electromagnetic Compatibility
HOLD	Call Hold
HSD	High Speed Data
IC	Include Call
IC	Integrated Circuit
ISDN	Integrated Services Digital Network
ISI	Inter-System Interface
LE	Late Entry
LI	Lawful Interception
LIP	Location Information Protocol
LSC	List Search Call
MCPTT	Mission Critical Press To Talk
MS-MS	Mobile Station to Mobile Station
NAP	Net Assist Protocol
PABX	Private Automatic Base eXchange
PAMR	Public Access Mobile Radio
PC	Priority Call
PEI	Peripheral Equipment Interface
PICS	Protocol Implementation Conformance Statement
PMR	Private/ Professional Mobile Radio
PPC	Pre-emptive Priority Call
PSS	Public Security and Safety
PSTN	Public Switched Telephone Network
QAM	Quadrature Amplitude Modulation
QOS	Quality Of Service
R&TTE	Radio and Terminal Telecommunications Equipment
RF	Radio Frequency
SC	Smart Card
SDL	Specification and Description Language
SIM-ME	Subscriber Identity Module to Mobile Equipment
SNA	Short Number Addressing
SPAN	Service and Protocols for Advanced Networks
SSD	Service Specific Details
STQ	Speech and multi-media Transmission Quality
TEDS	TETRA Enhanced Data Service
TMO	Trunked Mode Operation
ToR	Terms of Reference
TPI	Talking Party Identification
TR	Technical Report
UHF	Ultra High Frequency
UICC	Universal Integrated Circuit Card
V+D	Voice plus Data



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## 4 Specifications of TETRA Release 2.2 plus related specifications and reports

### 4.0 General

The following clauses contain ETSI deliverables included in TETRA V+D and DMO Release 2.2.

NOTE: After the list of TETRA V+D and DMO specifications there are listed specifications and reports applicable to TETRA including evolution to critical communications broadband.

### 4.1 Voice plus Data (V+D)

#### 4.1.1 General Network Design

ETSI TS 100 392-1 (V1.5.1, 2018-04): "Terrestrial Trunked Radio (TETRA); Voice plus Data (V+D); Part 1: General network design".

ETSI EN 300 392-1 (V1.4.1, 2009-01): "Terrestrial Trunked Radio (TETRA); Voice plus Data (V+D); Part 1: General network design".

NOTE: This has been superseded by ETSI TS 100 392-1 (V1.5.1, 2018-04).

#### 4.1.2 Air Interface

NOTE 1: A new version of this specification ETSI EN 300 392-2 (V3.9.1) is awaiting approval and will be published as soon as possible.

ETSI EN 300 392-2 (V3.8.1, 2016-08): "Terrestrial Trunked Radio (TETRA); Voice plus Data (V+D); Part 2: Air Interface (AI)".

ETSI TS 100 392-2 (V3.9.1): "Terrestrial Trunked Radio (TETRA); Voice plus Data (V+D); Part 2: Air Interface (AI)".

NOTE 2: This has been approved and is shortly to be published.

#### 4.1.3 Inter-system interface

These specifications have been completely changed. The new TSs that now comprise the current ISI specification are listed, followed by the original EN specifications which have now been made historical. The next stage will be to issue the new TSs as ENs and after this the old ENs will be made void.

ETSI TS 100 392-3-8 (V1.3.1, 2018-05): "Terrestrial Trunked Radio (TETRA); Voice plus Data (V+D); Part 3: Interworking at the Inter-System Interface (ISI); Sub-part 8: Generic Speech Format Implementation".

ETSI TS 100 392-3-9 (V1.1.1, 2018-05): "Terrestrial Trunked Radio (TETRA); Voice plus Data (V+D); Part 3: Interworking at the Inter-System Interface (ISI); Sub-part 9: Transport Layer Independent, General Design".

ETSI TS 100 392-3-10 (V1.1.1, 2018-05): "Terrestrial Trunked Radio (TETRA); Voice plus Data (V+D); Part 3: Interworking at the Inter-System Interface (ISI); Sub-part 10: General Design, PSS1 over E.1".

ETSI TS 100 392-3-11 (V1.1.1, 2018-05): "Terrestrial Trunked Radio (TETRA); Voice plus Data (V+D); Part 3: Interworking at the Inter-System Interface (ISI); Sub-part 11: General Design, SIP/IP".

ETSI TS 100 392-3-12 (V1.1.1, 2018-05): "Terrestrial Trunked Radio (TETRA); Voice plus Data (V+D); Part 3: Interworking at the Inter-System Interface (ISI); Sub-part 12: Transport Layer Independent Additional Network features".

ETSI TS 100 392-3-13 (V1.1.1, 2018-05): "Terrestrial Trunked Radio (TETRA); Voice plus Data (V+D); Part 3: Interworking at the Inter-System Interface (ISI); Sub-part 13: Transport Layer Independent Additional Network features, Group Call (ANF-ISIGC)".

ETSI TS 100 392-3-14 (V1.1.1, 2018-05): "Terrestrial Trunked Radio (TETRA); Voice plus Data (V+D); Part 3: Interworking at the Inter-System Interface (ISI); Sub-part 14: Transport Layer Independent Additional Network features, Short Data Service (ANF-ISISDS)".

ETSI TS 100 392-3-15 (V1.1.1, 2018-05): "Terrestrial Trunked Radio (TETRA); Voice plus Data (V+D); Part 3: Interworking at the Inter-System Interface (ISI); Sub-part 15: Transport Layer Independent Additional Network features, Mobility Management (ANF-ISIMM)".

ETSI EN 300 392-3-1 (V1.4.1, 2015-12): "Terrestrial Trunked Radio (TETRA); Voice plus Data (V+D); Part 3: Interworking at the Inter-System Interface (ISI); Sub-part 1: General design".

NOTE 1: Made historical since being superseded by ETSI TS 100 392-3 subparts 9, 10 and 11.

ETSI EN 300 392-3-2 (V1.4.1, 2010-8): "Terrestrial Trunked Radio (TETRA); Voice plus Data (V+D); Part 3: Interworking at the Inter-System Interface (ISI); Sub-part 2: Additional Network Feature Individual Call (ANF-ISIIC)".

NOTE 2: Made historical since being superseded by ETSI TS 100 392-3-12.

ETSI EN 300 392-3-3 (V1.4.1, 2017-12): "Terrestrial Trunked Radio (TETRA); Voice plus Data (V+D); Part 3: Interworking at the Inter-System Interface (ISI); Sub-part 3: Additional Network Feature Group Call (ANF-ISIGC)".

NOTE 3: Made historical since being superseded by ETSI TS 100 392-3-13.

ETSI EN 300 392-3-4 (V1.3.1, 2010-08): "Terrestrial Trunked Radio (TETRA); Voice plus Data (V+D); Part 3: Interworking at the Inter-System Interface (ISI); Sub-part 4: Additional Network Feature Short Data Service (ANF-ISISDS)".

NOTE 4: Made historical since being superseded by ETSI TS 100 392-3-14.

ETSI EN 300 392-3-5 (V1.5.1, 2016-6): "Terrestrial Trunked Radio (TETRA); Voice plus Data (V+D); Part 3: Interworking at the Inter-System Interface (ISI); Sub-part 5: Additional Network Feature for Mobility Management (ANF-ISIMM)". Draft version ETSI EN 300 392-3-5 (V1.5.2, 2016-12).

NOTE 5: Made historical since being superseded by ETSI TS 100 392-3-15.

#### 4.1.4 Voice +Data Gateways

ETSI ETS 300 392-4-1 (Ed.1, 1999-01): "Terrestrial Trunked Radio (TETRA); Voice plus Data (V+D); Part 4: Gateways basic operation; Sub-part 1: Public Switched Telephone Network (PSTN)".

ETSI ETS 300 392-4-2 (Ed.1, 2000-09): "Terrestrial Trunked Radio (TETRA); Voice plus Data (V+D); Part 4: Gateways basic operation; Sub-part 2: Integrated Services Digital Network (ISDN) gateway".

#### 4.1.5 Peripheral Equipment Interface

ETSI TS 100 392-5 (V2.6.1, 2018-06): "Terrestrial Trunked Radio (TETRA); Voice plus Data (V+D); Part 5: Peripheral Equipment Interface (PEI)".

ETSI EN 300 392-5 (V2.5.1, 2016-10): "Terrestrial Trunked Radio (TETRA); Voice plus Data (V+D); Part 5: Peripheral Equipment Interface (PEI)".

NOTE: Superseded by ETSI TS 100 392-5 (V2.6.1, 2018-06).

#### 4.1.6 Security

ETSI EN 300 392-7 (V3.4.1, 2017-01): "Terrestrial Trunked Radio (TETRA); Voice plus Data (V+D); Part 7: Security".

## 4.1.7 General requirements for Supplementary Services

ETSI TS 100 392-9 (V1.6.1, 2018-05): "Terrestrial Trunked Radio (TETRA); Voice plus Data (V+D); Part 9: General requirements for supplementary services".

ETSI EN 300 392-9 (V1.5.1, 2012-04): "Terrestrial Trunked Radio (TETRA); Voice plus Data (V+D); Part 9: General requirements for supplementary services".

NOTE: Superseded by ETSI TS 100 392-9 (V1.6.1, 2018-05).

## 4.1.8 V +D Supplementary Services Stage 1

ETSI EN 300 392-10-1 (V1.3.1, 2004-01): "Terrestrial Trunked Radio (TETRA); Voice plus Data (V+D); Part 10: Supplementary services stage 1; Sub-part 1: Call Identification (CI)".

ETSI ETS 300 392-10-2 (Ed.2, 2000-08): "Terrestrial Trunked Radio (TETRA); Voice plus Data (V+D); Part 10: Supplementary services stage 1; Sub-part 2: Call report".

ETSI ETS 300 392-10-3 (Ed.2, 1999-07): "Terrestrial Trunked Radio (TETRA); Voice plus Data (V+D); Part 10: Supplementary services stage 1; Sub-part 3: Talking Party Identification (TPI)".

ETSI EN 300 392-10-4 (V1.3.1, 2003-09): "Terrestrial Trunked Radio (TETRA); Voice plus Data (V+D); Part 10: Supplementary services stage 1; Sub-part 4: Call Forwarding (CF)".

ETSI ETS 300 392-10-5: (Ed.2, 2000-08): "Terrestrial Trunked Radio (TETRA); Voice plus Data (V+D); Part 10: Supplementary services stage 1; Sub-part 5: List Search Call (LSC)".

ETSI EN 300 392-10-6 (V1.4.1, 2006-08): "Terrestrial Trunked Radio (TETRA); Voice plus Data (V+D); Part 10: Supplementary services stage 1; Sub-part 6: Call Authorized by Dispatcher (CAD)".

ETSI ETS 300 392-10-7 (Ed.2, 1999-09): "Terrestrial Trunked Radio (TETRA); Voice plus Data (V+D); Part 10: Supplementary services stage 1; Sub-part 7: Short number addressing".

ETSI EN 300 392-10-8 (V1.2.1, 2004-02): "Terrestrial Trunked Radio (TETRA); Voice plus Data (V+D); Part 10: Supplementary services stage 1; Sub-part 8: Area Selection (AS)".

ETSI ETS 300 392-10-9 (Ed.2, 1998-12): "Terrestrial Trunked Radio (TETRA); Voice plus Data (V+D); Part 10: Supplementary services stage 1; Sub-part 9: Access priority".

ETSI EN 300 392-10-10 (V1.2.1, 2002-05): "Terrestrial Trunked Radio (TETRA); Voice plus Data (V+D); Part 10: Supplementary services stage 1; Sub-Part 10: Priority Call (PC)".

ETSI EN 300 392-10-11 (V1.3.1, 2004-01): "Terrestrial Trunked Radio (TETRA); Voice plus Data (V+D); Part 10: Supplementary services stage 1; Sub-Part 11: Call Waiting (CW)".

ETSI EN 300 392-10-12 (V1.3.1, 2004-02): "Terrestrial Trunked Radio (TETRA); Voice plus Data (V+D); Part 10: Supplementary services stage 1; Sub-Part 12: Call Hold (HOLD)".

ETSI ETS 300 392-10-13 (Ed.2, 1999-09): "Terrestrial Trunked Radio (TETRA); Voice plus Data (V+D); Part 10: Supplementary services stage 1; Sub-part 13: Call completion to busy subscriber".

ETSI EN 300 392-10-14 (V1.2.1, 2002-09): "Terrestrial Trunked Radio (TETRA); Voice plus Data (V+D); Part 10: Supplementary services stage 1; Sub-part 14: Late Entry (LE)".

ETSI EN 300 392-10-16 (V1.3.1, 2006-08): "Terrestrial Trunked Radio (TETRA); Voice plus Data (V+D); Part 10: Supplementary services stage 1; Sub-part 16: Pre-emptive priority call".

ETSI EN 300 392-10-17 (V1.2.1, 2002-05): "Terrestrial Trunked Radio (TETRA); Voice plus Data (V+D); Part 10: Supplementary services stage 1; Sub-part 17: Include Call (IC)".

ETSI EN 300 392-10-18 (V1.3.1, 2003-10): "Terrestrial Trunked Radio (TETRA); Voice plus Data (V+D); Part 10: Supplementary services stage 1; Part 10-18: Barring of Outgoing Calls (BOC)".

ETSI EN 300 392-10-19 (V1.2.1, 2002-09): "Terrestrial Trunked Radio (TETRA); Voice plus Data (V+D); Part 10: Supplementary services stage 1; Sub-part 19: Barring of Incoming Calls (BIC)".

ETSI ETS 300 392-10-20 (Ed.2, 1999-05): "Terrestrial Trunked Radio (TETRA); Voice plus Data (V+D); Part 10: Supplementary services stage 1; Sub-part 20: Discreet Listening (DL)".

ETSI EN 300 392-10-21 (V1.2.1, 2003-09): "Terrestrial Trunked Radio (TETRA); Voice plus Data (V+D); Part 10: Supplementary services stage 1; Sub-part 21: Ambience Listening (AL)".

ETSI EN 300 392-10-22 (V1.2.1, 2002-01): "Terrestrial Trunked Radio (TETRA); Voice plus Data (V+D); Part 10: Supplementary services stage 1; Sub-part 22: Dynamic Group Number Assignment (DGNA)".

ETSI ETS 300 392-10-23 (Ed.2, 1999-09): "Terrestrial Trunked Radio (TETRA); Voice plus Data (V+D); Part 10: Supplementary services stage 1; Sub-part 23: Call completion on no reply".

ETSI ETS 300 392-10-24 (Ed.2, 2000-04): "Terrestrial Trunked Radio (TETRA); Voice plus Data (V+D); Part 10: Supplementary services stage 1; Sub-part 24: Call Retention (CRT)".

#### 4.1.9 V+D Supplementary Services Stage 2

ETSI EN 300 392-11-1 (V1.2.1, 2004-01): "Terrestrial Trunked Radio (TETRA); Voice plus Data (V+D); Part 11: Supplementary services stage 2; Sub-part 1: Call Identification (CI)".

ETSI ETS 300 392-11-2 (Ed.1, 2000-09): "Terrestrial Trunked Radio (TETRA); Voice plus Data (V+D); Part 11: Supplementary services stage 2; Sub-part 2: Call Report (CR)".

ETSI ETS 300 392-11-3 (Ed.1, 1999-07): "Terrestrial Trunked Radio (TETRA); Voice plus Data (V+D); Part 11: Supplementary services stage 2; Sub-part 3: Talking Party Identification (TPI)".

ETSI EN 300 392-11-4 (V1.1.1, 2003-07): "Terrestrial Trunked Radio (TETRA); Voice plus Data (V+D); Part 11: Supplementary services stage 2; Sub-part 4: Call Forwarding (CF)".

ETSI ETS 300 392-11-5 (Ed.1, 2000-09): "Terrestrial Trunked Radio (TETRA); Voice plus Data (V+D); Part 11: Supplementary services stage 2; Sub-part 5: List Search Call (LSC)".

ETSI EN 300 392-11-6 (V1.2.1, 2004-01): "Terrestrial Trunked Radio (TETRA); Voice plus Data (V+D); Part 11: Supplementary services stage 2; Sub-part 6: Call Authorized by Dispatcher (CAD)".

ETSI ETS 300 392-11-7 (Ed.2, 2000-04): "Terrestrial Trunked Radio (TETRA); Voice plus Data (V+D); Part 11: Supplementary services stage 2; Sub-part 7: Short Number Addressing (SNA)".

ETSI EN 300 392-11-8 (V1.1.1, 2000-12): "Terrestrial Trunked Radio (TETRA); Voice plus Data (V+D); Part 11: Supplementary services stage 2; Sub-part 8: Area Selection (AS)".

ETSI ETS 300 392-11-9 (Ed.1, 1998-10): "Terrestrial Trunked Radio (TETRA); Voice plus Data (V+D); Part 11: Supplementary services stage 2; Sub-part 9: Access Priority (AP)".

ETSI EN 300 392-11-10 (V1.1.1, 2001-05): "Terrestrial Trunked Radio (TETRA); Voice plus Data (V+D); Part 11: Supplementary services stage 2; Sub-Part 10: Priority Call (PC)".

ETSI ETS 300 392-11-11 (Ed.1, 2000-09): "Terrestrial Trunked Radio (TETRA); Voice plus Data (V+D); Part 11: Supplementary services stage 2; Sub-Part 11: Call Waiting (CW)".

ETSI EN 300 392-11-12 (V1.1.2, 2003-05): "Terrestrial Trunked Radio (TETRA); Voice plus Data (V+D); Part 11: Supplementary services stage 2; Sub-Part 12: Call Hold (HOLD)".

ETSI ETS 300 392-11-13 (Ed.1, 2000:03): "Terrestrial Trunked Radio (TETRA); Voice plus Data (V+D); Part 11: Supplementary services stage 2; Sub-part 13: Call Completion to Busy Subscriber (CCBS)".

ETSI EN 300 392-11-14 (V1.1.1, 2002-07): "Terrestrial Trunked Radio (TETRA); Voice plus Data (V+D); Part 11: Supplementary services stage 2; Sub-part 14: Late Entry (LE)".

ETSI EN 300 392-11-16 (V1.2.1, 2004-09): "Terrestrial Trunked Radio (TETRA); Voice plus Data (V+D); Part 11: Supplementary services stage 2; Sub-part 16: Pre-emptive Priority Call (PPC)".

ETSI EN 300 392-11-17 (V1.1.2, 2002-01): "Terrestrial Trunked Radio (TETRA); Voice plus Data (V+D); Part 11: Supplementary services stage 2; Sub-part 17: Include Call (IC)".

ETSI EN 300 392-11-18 (V1.1.1, 2001-08): "Terrestrial Trunked Radio (TETRA); Voice plus Data (V+D); Part 11: Supplementary services stage 2; Sub-part 18: Barring of Outgoing Calls (BOC)".

ETSI EN 300 392-11-19 (V1.1.1, 2001-08): "Terrestrial Trunked Radio (TETRA); Voice plus Data (V+D); Part 11: Supplementary services stage 2; Sub-part 19: Barring of Incoming Calls (BIC)".

ETSI ETS 300 392-11-20 (Ed.1, 1999-08): "Terrestrial Trunked Radio (TETRA); Voice plus Data (V+D); Part 11: Supplementary services stage 2; Sub-part 20: Discreet Listening (DL)".

ETSI EN 300 392-11-21 (V1.1.1, 2003-04): "Terrestrial Trunked Radio (TETRA); Voice plus Data (V+D); Part 11: Supplementary services stage 2; Sub-part 21: Ambience Listening (AL)".

ETSI ETS 300 392-11-22 (Ed.1, 2000-04): "Terrestrial Trunked Radio (TETRA); Voice plus Data (V+D); Part 11: Supplementary services stage 2; Sub-part 22: Dynamic Group Number Assignment (DGNA)".

ETSI ETS 300 392-11-23 (Ed.1, 2000-04): "Terrestrial Trunked Radio (TETRA); Voice plus Data (V+D); Part 11: Supplementary services stage 2; Sub-part 23: Call Completion on No Reply (CCNR)".

ETSI ETS 300 392-11-24 (Ed.1, 2000-09): "Terrestrial Trunked Radio (TETRA); Voice plus Data (V+D); Part 11: Supplementary services stage 2; Sub-part 24: Call Retention (CRT)".

#### 4.1.10 V+D Supplementary Services Stage 3

ETSI EN 300 392-12-1 (V1.2.2, 2007-08): "Terrestrial Trunked Radio (TETRA); Voice plus Data (V+D); Part 12: Supplementary services stage 3; Sub-part 1: Call Identification (CI)".

ETSI ETS 300 392-12-2 (Ed.1, 2000-09): "Terrestrial Trunked Radio (TETRA); Voice plus Data (V+D); Part 12: Supplementary services stage 3; Sub-part 2: Call Report (CR)".

ETSI EN 300 392-12-3 (V1.3.1, 2006-04): "Terrestrial Trunked Radio (TETRA); Voice plus Data (V+D); Part 12: Supplementary services stage 3; Sub-part 3: Talking Party Identification (TPI)".

ETSI EN 300 392-12-4 (V1.4.1, 2016-07): "Terrestrial Trunked Radio (TETRA); Voice plus Data (V+D); Part 12: Supplementary services stage 3; Sub-part 4: Call Forwarding (CF)".

ETSI ETS 300 392-12-5 (Ed.1, 2000-09): "Terrestrial Trunked Radio (TETRA); Voice plus Data (V+D); Part 12: Supplementary services stage 3; Sub-part 5: List Search Call (LSC)".

ETSI EN 300 392-12-6 (V1.3.1, 2006-02): "Terrestrial Trunked Radio (TETRA); Voice plus Data (V+D); Part 12: Supplementary services stage 3; Sub-part 6: Call Authorized by Dispatcher (CAD)".

ETSI ETS 300 392-12-7 (Ed.1, 2000-4): "Terrestrial Trunked Radio (TETRA); Voice plus Data (V+D); Part 12: Supplementary services stage 3; Sub-part 7: Short Number Addressing (SNA)".

ETSI EN 300 392-12-8 (V1.2.1, 2010-07): "Terrestrial Trunked Radio (TETRA); Voice plus Data (V+D); Part 12: Supplementary services stage 3; Sub-part 8: Area Selection (AS)".

ETSI ETS 300 392-12-9 (Ed.1, 1998-10): "Terrestrial Trunked Radio (TETRA); Voice plus Data (V+D); Part 12: Supplementary services stage 3; Sub-part 9: Access Priority (AP)".

ETSI EN 300 392-12-10 (V1.2.1, 2004-02): "Terrestrial Trunked Radio (TETRA); Voice plus Data (V+D); Part 12: Supplementary services stage 3; Sub-Part 10: Priority Call (PC)".

ETSI ETS 300 392-12-11 (Ed.1, 2000-09): "Terrestrial Trunked Radio (TETRA); Voice plus Data (V+D); Part 12: Supplementary services stage 3; Sub-Part 11: Call Waiting (CW)".

ETSI EN 300 392-12-12 (V1.1.2, 2003-05): "Terrestrial Trunked Radio (TETRA); Voice plus Data (V+D); Part 12: Supplementary services stage 3; Sub-Part 12: Call Hold (HOLD)".

ETSI EN 300 392-12-13 (V1.2.1, 2012-03): "Terrestrial Trunked Radio (TETRA); Voice plus Data (V+D); Part 12: Supplementary services stage 3; Sub-part 13: Call Completion to Busy Subscriber (CCBS)".

ETSI EN 300 392-12-14 (V1.2.1, 2012-03): "Terrestrial Trunked Radio (TETRA); Voice plus Data (V+D); Part 12: Supplementary services stage 3; Sub-part 14: Late entry (LE)".

ETSI EN 300 392-12-16 (V1.2.1, 2004-09): "Terrestrial Trunked Radio (TETRA); Voice plus Data (V+D); Part 12: Supplementary services stage 3; Sub-part 16: Pre-emptive Priority Call (PPC)".

ETSI EN 300 392-12-17 (V1.1.2, 2002-01): "Terrestrial Trunked Radio (TETRA); Voice plus Data (V+D); Part 12: Supplementary services stage 3; Sub-part 17: Include Call (IC)".

ETSI EN 300 392-12-18 (V1.1.1, 2001-08): "Terrestrial Trunked Radio (TETRA); Voice plus Data (V+D); Part 12: Supplementary services stage 3; Sub-part 18: Barring of Outgoing Calls (BOC)".

ETSI EN 300 392-12-19 (V1.1.1, 2001-08): "Terrestrial Trunked Radio (TETRA); Voice plus Data (V+D); Part 12: Supplementary services stage 3; Sub-part 19: Barring of Incoming Calls (BIC)".

ETSI EN 300 392-12-20 (V1.2.1, 2012-04): "Terrestrial Trunked Radio (TETRA); Voice plus Data (V+D); Part 12: Supplementary services stage 3; Sub-part 20: Discreet Listening (DL)".

ETSI EN 300 392-12-21 (V1.5.1, 2012-04): "Terrestrial Trunked Radio (TETRA); Voice plus Data (V+D); Part 12: Supplementary services stage 3; Sub-part 21: Ambience Listening (AL)".

ETSI EN 300 392-12-22 (V1.4.1, 2015-02): "Terrestrial Trunked Radio (TETRA); Voice plus Data (V+D); Part 12: Supplementary services stage 3; Sub-part 22: Dynamic Group Number Assignment (DGNA)".

ETSI EN 300 392-12-23 (V1.2.1, 2012-04): "Terrestrial Trunked Radio (TETRA); Voice plus Data (V+D); Part 12: Supplementary services stage 3; Sub-part 23: Call Completion on No Reply (CCNR)".

ETSI ETS 300 392-12-24 (Ed.1, 2000-09): "Terrestrial Trunked Radio (TETRA); Voice plus Data (V+D); Part 12: Supplementary services stage 3; Sub-part 24: Call Retention (CRT)".

#### 4.1.11 TETRA frequency bands, duplex channel spacing and numbering

ETSI TS 100 392-15 (V1.5.1, 2011-02): "Terrestrial Trunked Radio (TETRA); Voice plus Data (V+D); Part 15: TETRA frequency bands, duplex spacings and channel numbering".

#### 4.1.12 V+D Network Performance Metrics

ETSI TS 100 392-16 (V1.2.1, 2006-09): "Terrestrial Trunked Radio (TETRA); Voice plus Data (V+D); Part 16: Network Performance Metrics".

#### 4.1.13 V+D Air Interface optimized applications

ETSI TS 100 392-18-1 (V1.7.2, 2018-01): "Terrestrial Trunked Radio (TETRA); Voice plus Data (V+D) and Direct Mode Operation (DMO); Part 18: Air interface optimized applications; Sub-part 1: Location Information Protocol (LIP)".

ETSI TS 100 392-18-2 (V1.1.1, 2008-11): "Terrestrial Trunked Radio (TETRA) Voice plus Data (V+D) and Direct Mode Operation (DMO); Part 18: Air interface optimized applications; Sub-part 2: Net Assist Protocol (NAP)".

ETSI TS 100 392-18-3 (V1.2.1, 2010-12): "Terrestrial Trunked Radio (TETRA) Voice plus Data (V+D) and Direct Mode Operation (DMO); Part 18: Air interface optimized applications; Sub-part 3: Direct mode Over the Air Management protocol (DOTAM)".

ETSI TS 100 392-18-4 (V1.2.1, 2015-07): "Terrestrial Trunked Radio (TETRA) Voice plus Data (V+D) and Direct Mode Operation (DMO); Part 18: Air interface optimized applications; Sub-part 4: Voice plus Data (V+D) Air interface optimized applications: Net Assist Protocol 2 (NAP2)".

## 4.2 Speech codec

ETSI EN 300 395-1 (V1.2.1, 2005-01): "Terrestrial Trunked Radio (TETRA); Speech codec for full-rate traffic channel; Part 1: General description of speech functions".

ETSI EN 300 395-2 (V1.3.1, 2005-01): "Terrestrial Trunked Radio (TETRA); Speech codec for full-rate traffic channel; Part 2: TETRA codec".

ETSI EN 300 395-3 (V1.2.1, 2005-01): "Terrestrial Trunked Radio (TETRA); Speech codec for full-rate traffic channel; Part 3: Specific operating features".

ETSI EN 300 395-4 (V1.3.1, 2005-06): "Terrestrial Trunked Radio (TETRA); Speech codec for full-rate traffic channel; Part 4: Codec conformance testing".

## 4.3 Direct Mode Operation (DMO)

ETSI EN 300 396-1 (V1.2.1, 2011-12): "Terrestrial Trunked Radio (TETRA); Technical requirements for Direct Mode Operation (DMO); Part 1: General network design".

ETSI EN 300 396-2 (V1.4.1, 2011-12): "Terrestrial Trunked Radio (TETRA); Technical requirements for Direct Mode Operation (DMO); Part 2: Radio aspects".

ETSI EN 300 396-3 (V1.4.1, 2011-12): "Terrestrial Trunked Radio (TETRA); Technical requirements for Direct Mode Operation (DMO); Part 3: Mobile Station to Mobile Station (MS-MS) Air Interface (AI) protocol".

ETSI EN 300 396-4 (V1.4.1, 2011-12): "Terrestrial Trunked Radio (TETRA); Technical requirements for Direct Mode Operation (DMO); Part 4: Type 1 repeater air interface".

ETSI EN 300 396-5 (V1.3.1, 2011-12): "Terrestrial Trunked Radio (TETRA); Technical requirements for Direct Mode Operation (DMO); Part 5: Gateway air interface".

ETSI EN 300 396-6 (V1.6.1, 2016-11): "Terrestrial Trunked Radio (TETRA); Direct Mode Operation (DMO); Part 6: Security".

## 4.4 Subscriber Identity Module (SIM)

ETSI ES 200 812-1 (V2.2.5, 2003-12): "Terrestrial Trunked Radio (TETRA); Subscriber Identity Module to Mobile Equipment (TSIM-ME) interface; Part 1: Universal Integrated Circuit Card (UICC); Physical and logical characteristics".

This is also published as:

ETSI TS 100 812-1 (V2.2.5, 2003-10): "Terrestrial Trunked Radio (TETRA); Subscriber Identity Module to Mobile Equipment (TSIM-ME) interface; Part 1: Universal Integrated Circuit Card (UICC); Physical and logical characteristics".

ETSI TS 100 812-2 (V2.4.1, 2005-08): "Terrestrial Trunked Radio (TETRA); Subscriber Identity Module to Mobile Equipment (TSIM-ME) interface; Part 2: Universal Integrated Circuit Card (UICC); Characteristics of the TSIM application".

This is also published as:

ETSI ES 200 812-2 (V2.4.2, 2005-10): "Terrestrial Trunked Radio (TETRA); Subscriber Identity Module to Mobile Equipment (TSIM-ME) interface; Part 2: Universal Integrated Circuit Card (UICC); Characteristics of the TSIM application".

ETSI EN 300 812-3 (V2.3.1, 2005-12): "Terrestrial Trunked Radio (TETRA); Subscriber Identity Module to Mobile Equipment (SIM-ME) interface; Part 3: Integrated Circuit (IC); Physical, logical and TSIM application characteristics".

## 4.5 Regulatory

### 4.5.1 TETRA Conformance

NOTE 1: The R&TTE directive (1999/5/EC) has been now been replaced by the Radio Equipment Directive (2014/53/EU). Eventually all specifications relating to the R&TTE Directive will be made historical and replaced with updated standards compliant with the Radio Equipment Directive.

ETSI EN 301 489-5 (V2.1.0, 2016-11): "ElectroMagnetic Compatibility (EMC) standard for radio equipment and services; Part 5: Specific conditions for Private land Mobile Radio (PMR) and ancillary equipment (speech and non-speech) and Terrestrial Trunked Radio (TETRA); Harmonised Standard covering the essential requirements of article 3.1(b) of Directive 2014/53/EU".

ETSI EN 302 561 (V2.1.1, 2016-03): "Land Mobile Service; Radio equipment using constant or non-constant envelope modulation operating in a channel bandwidth of 25 kHz, 50 kHz, 100 kHz or 150 kHz; Harmonised Standard covering the essential requirements of article 3.2 of the Directive 2014/53/EU".

NOTE 2: This document is not currently considered to be adequate because of the relaxation of TETRA Rx parameters and is now subject to a new TCCE work item (at present awaiting TB approval) which will replace ETSI EN 302 561 in relation to TETRA equipment compliant to ETSI EN 300 392-2.

ETSI EN 303 035-1 (V1.2.1, 2001-12): "Terrestrial Trunked Radio (TETRA); Harmonized EN for TETRA equipment covering essential requirements under article 3.2 of the R&TTE Directive; Part 1: Voice plus Data (V+D)".

ETSI EN 303 035-2 (V1.2.2, 2003-01): "Terrestrial Trunked Radio (TETRA); Harmonized EN for TETRA equipment covering essential requirements under article 3.2 of the R&TTE Directive; Part 2: Direct Mode Operation (DMO)".

ETSI EN 300 394-1 (V3.3.1, 2015-04): "Terrestrial Trunked Radio (TETRA); Conformance testing specification; Part 1: Radio".

NOTE 3: This conformance testing specification has been superseded by ETSI EN 392 561 (see note 2).

## 4.5.2 TETRA cryptographic key management rules

ETSI TS 101 052 (V2.1.1, 2016-02): "Rules for the management of the TETRA standard authentication and key management algorithm set TAA1".

ETSI TS 101 053-1 (V2.1.1, 2016-02): "Rules for the management of the TETRA standard encryption algorithms; Part 1: TEA1".

ETSI TS 101 053-2 (V2.4.1, 2018-01): "Rules for the management of the TETRA standard encryption algorithms; Part 2: TEA2".

ETSI TS 101 053-3 (V2.1.1, 2016-02): "Rules for the management of the TETRA standard encryption algorithms; Part 3: TEA3".

ETSI TS 101 053-4 (V2.1.1, 2016-02): "Rules for the management of the TETRA standard encryption algorithms; Part 4: TEA4".

## 4.6 Other standards and specifications related to TETRA and Critical Communications Evolution

### 4.6.1 General

The specifications shown in this clause are not all directly a part of TETRA r2.2 but do relate to TETRA and the evolution to critical communications broadband.

### 4.6.2 TETRA RF Safe Area Mode

ETSI TS 101 975 (V1.2.1, 2007-07): "Terrestrial Trunked Radio (TETRA); RF Sensitive Area Mode".

### 4.6.3 Lawful Interception

ETSI EN 301 040 (V2.1.1, 2006-03): "Terrestrial Trunked Radio (TETRA); Security; Lawful Interception (LI) interface".

ETSI TS 102 232-1 (V3.15.1, 2017-11): "Lawful Interception (LI); Handover Interface and Service-Specific Details (SSD) for IP delivery; Part 1: Handover specification for IP delivery".



ETSI ES 201 671 (V3.2.1, 2018-05): "Lawful Interception (LI); Handover interface for the lawful interception of telecommunications traffic".

NOTE: ETSI TS 101 671 (V3.8.1) below, adds extensions and corrects identified mistakes in ETSI ES 201 671 and should be used as the normative reference.

ETSI TS 101 671 (V3.14.1, 2018-06): "Lawful Interception (LI); Handover interface for the lawful interception of telecommunications traffic".

#### 4.6.4 End to end encryption synchronization

ETSI EN 302 109 (V1.1.1, 2003-10): "Terrestrial Trunked Radio (TETRA); Security; Synchronization mechanism for end-to-end encryption".

ETSI ES 202 109 (V1.1.1, 2003-01): "Terrestrial Trunked Radio (TETRA); Security; Synchronization mechanism for end-to-end encryption".

#### 4.6.5 IP interworking

ETSI TS 101 747 (V1.1.1, 2001-07): "Terrestrial Trunked Radio (TETRA); Voice plus Data (V+D); IP Interworking (IP)".

#### 4.6.6 TETRA TMO repeaters

ETSI TS 101 789-1 (V1.1.2, 2007-04): "Terrestrial Trunked Radio (TETRA); TMO Repeaters Part 1: Requirements, Test Methods and Limits".

#### 4.6.7 Plugtest scenarios for MCPTT

ETSI TS103 564 (V1.1.1, 2017-10): "Tetra and Critical Communications Evolution (TCCE); Testing: Plugtest™ scenarios for Mission Critical Push to Talk (MCPTT)".

#### 4.6.8 Critical Communications applications, mobile to network architecture

ETSI TS103 269-2 (V1.2.1, 2017-06): "Tetra and Critical Communications Evolution (TCCE); Part 2: Critical Communications application mobile to network interface architecture".

#### 4.6.9 STQ; QOS

ETSI TS 102 250-1 (V2.2.1, 2011-04): "STQ: QOS aspects for popular services in mobile networks: Part 1: Assessment of Quality of Service".

ETSI TS 102 250-2 (V2.6.1, 2017-10): "STQ: QOS aspects for popular services in mobile networks: Part 2: Definition of Quality of Service parameters and their computation".

ETSI TS 102 250-3 (V2.3.2, 2015-08): "STQ: QOS aspects for popular services in mobile networks: Part 3: Typical procedures for Quality of Service measurement equipment".

ETSI TS 102 250-4 (V2.2.1, 2011-04): "STQ: QOS aspects for popular services in mobile networks: Part 4: Requirements for Quality of Service measurement equipment".

ETSI TS 102 250-5 (V2.4.2, 2015-09): "STQ: QOS aspects for popular services in mobile networks: Part 5: Definition of typical measurement profiles".

### 4.7 Technical reports and ETSI guides

#### 4.7.0 General

Clause 4.7 shows reports and guides produced by TC TCCE.

### 4.7.1 Designer's guides

ETSI TR 102 300-2 (V1.2.1, 2013-09): "Terrestrial Trunked Radio (TETRA); Voice plus Data (V+D); Designer's guide; Part 2: Radio channels, network protocols and service performance".

ETSI TR 102 300-3 (V1.3.3, 2009-06): "Terrestrial Trunked Radio (TETRA); Voice plus Data (V+D); Designer's guide; Part 3: Direct Mode Operation (DMO)".

ETSI ETR 300-4 (Ed.1, 1997-07): "Terrestrial Trunked Radio (TETRA); Voice plus Data (V+D); Designer's guide; Part 4: Network management".

ETSI TR 102 300-5 (V1.4.1, 2015-06): "Terrestrial Trunked Radio (TETRA); Voice plus Data (V+D); Designer's guide; Part 5: Guidance on Numbering and addressing".

ETSI TR 102 300-6 (V1.1.2, 2016-05): "Terrestrial Trunked Radio (TETRA); Designer's guide; Voice plus Data; Part 6: Air-Ground-Air".

ETSI TR 102 300-7 (V1.2.1, 2016-11): "Terrestrial Trunked Radio (TETRA); Designer's guide; Voice plus Data; Part 7: TETRA High-Speed Data (HSD); TETRA Enhanced Data Service (TEDS)".

### 4.7.2 User Requirements specifications

ETSI TR 102 021-1 (V1.3.1, 2011-07): "Terrestrial Trunked Radio (TETRA); User Requirement Specification TETRA Release 2.2; Part 1: General Overview".

ETSI TR 102 021-2 (V1.3.1, 2010-12): "Terrestrial Trunked Radio (TETRA); User Requirement Specification TETRA Release 2.2; Part 2: High Speed Data".

ETSI TR 102 021-3 (V1.1.1, 2001-12): "Terrestrial Trunked Radio (TETRA); User Requirement Specification TETRA Release 2; Part 3: Codec".

ETSI TR 102 021-4 (V1.4.1, 2011-08): "Terrestrial Trunked Radio (TETRA); User Requirement Specification TETRA Release 2.2; Part 4: Air Interface Enhancements".

ETSI TR 102 021-5 (V1.2.1, 2010-12): "Terrestrial Trunked Radio (TETRA); User Requirement Specification TETRA Release 2.2; Part 5: Interworking and roaming".

ETSI TR 102 021-6 (V1.2.1, 2011-08): "Terrestrial Trunked Radio (TETRA); User Requirement Specification TETRA Release 2.2; Part 6: Smart Card (SC) and Subscriber Identity Module (SIM)".

ETSI TR 102 021-7 (V1.3.1, 2010-12): "Terrestrial Trunked Radio (TETRA); User Requirement Specification TETRA Release 2.2; Part 7: Security".

ETSI TR 102 021-8 (V1.1.1, 2003-09): "Terrestrial Trunked Radio (TETRA); User Requirement Specification TETRA Release 2; Part 8: Air - Ground - Air services".

ETSI TR 102 021-9 (V1.2.1, 2010-12): "Terrestrial Trunked Radio (TETRA); User Requirement Specification TETRA Release 2.2; Part 9: Peripheral Equipment Interface".

ETSI TR 102 021-10 (V1.1.1, 2010-12): "Terrestrial Trunked Radio (TETRA); User Requirement Specification TETRA Release 2.2; Part 10: Local Mode Broadband".

ETSI TR 102 021-11 (V1.1.1, 2011-07): "Terrestrial Trunked Radio (TETRA); User Requirement Specification TETRA Release 2.2; Part 11: Over the Air Management".

ETSI TR 102 021-12 (V1.1.1, 2012-08): "Terrestrial Trunked Radio (TETRA); User Requirement Specifications TETRA Release 2.2; Part 12; Direct Mode Operation".

ETSI TR 102 022-1 (V1.1.1, 2012-08): "User Requirement Specification; Mission Critical Broadband Communication Requirements".

ETSI TR 102 022-2 (V1.2.1, 2018-01): "User Requirements Specification; Mission Critical Broadband Communications; Part 2: Critical Communications Application".

### 4.7.3 Mission critical broadband and interworking

ETSI TR 103 565 (V1.1.1, 2017-10): "TETRA and Critical Communications Evolution (TCCE); Terrestrial Trunked Radio (TETRA); Study into interworking between TETRA and 3GPP mission critical services".

NOTE: This TR is about to be re-numbered to ETSI TR 103 565-1.

ETSI TR 103 565-2 (V1.1.1, 2018-05): "TETRA and Critical Communications Evolution (TCCE); Terrestrial Trunked Radio (TETRA); Security of interworking between TETRA and Broadband applications".

ETSI TR 103 269-1 (V1.1.1, 2014-07): "TETRA and Critical Communications Evolution (TCCE); Critical Communications Architecture; Part 1: Critical Communications Architecture Reference Model".

### 4.7.4 EMC

ETSI EG 200 053 (V1.5.1, 2004-08): "Electromagnetic compatibility and Radio Spectrum Matters (ERM); Radio site engineering for radio equipment and systems".

NOTE: This report provides very useful information on radio site engineering but contains references that may be out of date. e.g. refers to the now outdated R&TTE directive.

ETSI TR 102 459 (V1.1.1, 2006-05): "Electromagnetic compatibility and Radio Spectrum Matters (ERM); TETRA Air-Ground-Air Services (AGA); Systems reference document".

ETSI TR 102 491 (V1.2.1, 2006-05): "Electromagnetic compatibility and Radio Spectrum Matters (ERM); TETRA Enhanced Data Service (TEDS); System reference document".

ETSI TR 102 628 (V1.1.1, 2014-09): "Electromagnetic compatibility and Radio Spectrum Matters (ERM); System reference document; Land Mobile Service; Additional spectrum requirements for future Public Safety and Security (PSS) wireless communication systems in the UHF frequency range".

### 4.7.5 Other reports

ETSI TR 101 448 (V1.1.1, 2005-05): "Terrestrial Trunked Radio (TETRA); Functional requirements for the TETRA ISI derived from Three-Country Pilot Scenarios".

ETSI TR 101 977 (V1.1.1, 2001-07): "Terrestrial Trunked Radio (TETRA); Study of the suitability of the GSM Adaptive Multi-Rate (AMR) speech codec for use in TETRA".

ETSI TR 101 987 (V1.1.1, 2001-08): "Terrestrial Trunked Radio (TETRA); Proposed Air Interface Enhancements for TETRA Release 2; Analysis and Feasibility Assessment".

ETSI EG 202 118 (V1.1.1, 2003-05): "Services and Protocols for Advanced Networks (SPAN); The structure of the TETRA numbering resource, interworking and high-level policy for administration".

ETSI TR 102 512 (V1.1.1, 2006-08): "Terrestrial Trunked Radio (TETRA); Security; Security requirements analysis for modulation enhancements to TETRA".

ETSI TR 102 513 (V1.1.1, 2006-12): "Terrestrial Trunked Radio (TETRA); PSS TEDS spectrum feasibility study".

ETSI TR 102 582 (V1.1.1, 2007-07): "Terrestrial Trunked Radio (TETRA); Evaluation of low rate (2,4 Kbit/s) speech codec".

ETSI TR 102 621 (V1.1.1, 2008-04): "Terrestrial Trunked Radio (TETRA); TWC2007 Future of TETRA workshop report".

ETSI TR 102 753 (V1.1.1, 2008-05): "Terrestrial Trunked Radio (TETRA); TETRA mobiles moving at high velocity".

ETSI TR 103 414: (V1.1.1, 2016-09): "TETRA and Critical Communications Evolution (TCCE); Study into the provision of speech services over QAM channels".

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## History

<b>Document history</b>		
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