



TECHNICAL REPORT

**TETRA and Critical Communications Evolution (TCCE);
TETRA security;
Additional security measures introduced in TETRA standards**

get full document from standards.iteh.ai

Reference

DTR/TCCE-06228

Keywords

security, TETRA

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 - APE 7112B
Association à but non lucratif enregistrée à la
Sous-Préfecture de Grasse (06) N° w061004871

Important notice

The present document can be downloaded from the
[ETSI Search & Browse Standards](#) application.

The present document may be made available in electronic versions and/or in print. The content of any electronic and/or print versions of the present document shall not be modified without the prior written authorization of ETSI. In case of any existing or perceived difference in contents between such versions and/or in print, the prevailing version of an ETSI deliverable is the one made publicly available in PDF format on [ETSI deliver](#) repository.

Users should be aware that the present document may be revised or have its status changed,
this information is available in the [Milestones listing](#).

If you find errors in the present document, please send your comments to
the relevant service listed under [Committee Support Staff](#).

If you find a security vulnerability in the present document, please report it through our
[Coordinated Vulnerability Disclosure \(CVD\)](#) program.

Notice of disclaimer & limitation of liability

The information provided in the present deliverable is directed solely to professionals who have the appropriate degree of experience to understand and interpret its content in accordance with generally accepted engineering or other professional standard and applicable regulations.

No recommendation as to products and services or vendors is made or should be implied.

No representation or warranty is made that this deliverable is technically accurate or sufficient or conforms to any law and/or governmental rule and/or regulation and further, no representation or warranty is made of merchantability or fitness for any particular purpose or against infringement of intellectual property rights.

In no event shall ETSI be held liable for loss of profits or any other incidental or consequential damages.

Any software contained in this deliverable is provided "AS IS" with no warranties, express or implied, including but not limited to, the warranties of merchantability, fitness for a particular purpose and non-infringement of intellectual property rights and ETSI shall not be held liable in any event for any damages whatsoever (including, without limitation, damages for loss of profits, business interruption, loss of information, or any other pecuniary loss) arising out of or related to the use of or inability to use the software.

Copyright Notification

No part may be reproduced or utilized in any form or by any means, electronic or mechanical, including photocopying and microfilm except as authorized by written permission of ETSI.

The content of the PDF version shall not be modified without the written authorization of ETSI.

The copyright and the foregoing restriction extend to reproduction in all media.

© ETSI 2026.
All rights reserved.

Contents

Intellectual Property Rights	4
Foreword.....	4
Modal verbs terminology.....	4
Introduction	4
1 Scope	6
2 References	6
2.1 Normative references	6
2.2 Informative references.....	6
3 Definition of terms, symbols and abbreviations.....	6
3.1 Terms.....	6
3.2 Symbols.....	7
3.3 Abbreviations	7
4 Security enhancements.....	7
4.1 New authentication and air interface encryption algorithms	7
4.1.1 Threat.....	7
4.1.2 Countermeasure	8
4.2 Requirement for different RAND values.....	8
4.2.1 Threat.....	8
4.2.2 Countermeasure	8
4.3 TDMA frame number validation - uplink	8
4.3.1 Threat.....	8
4.3.2 Countermeasure	9
4.4 TDMA frame number validation - downlink	9
4.4.1 Threat.....	9
4.4.2 Countermeasure	9
4.5 Entropy of TEA1	9
4.5.1 Threat.....	9
4.5.2 Countermeasure	9
4.6 Identity Encryption.....	9
4.6.1 Threat.....	9
4.6.2 Countermeasure	10
4.7 Message injection	10
4.7.1 Threat.....	10
4.7.2 Countermeasure	10
4.8 Reuse of CCK between algorithms	10
4.8.1 Threat.....	10
4.8.2 Countermeasure	10
4.9 End-to-end encryption	11
History	12

Intellectual Property Rights

Essential patents

IPRs essential or potentially essential to normative deliverables may have been declared to ETSI. The declarations pertaining to these essential IPRs, if any, are publicly available for **ETSI members and non-members**, and can be found in ETSI SR 000 314: *"Intellectual Property Rights (IPRs); Essential, or potentially Essential, IPRs notified to ETSI in respect of ETSI standards"*, which is available from the ETSI Secretariat. Latest updates are available on the [ETSI IPR online database](#).

Pursuant to the ETSI Directives including the ETSI IPR Policy, no investigation regarding the essentiality of IPRs, including IPR searches, has been carried out by ETSI. No guarantee can be given as to the existence of other IPRs not referenced in ETSI SR 000 314 (or the updates on the ETSI Web server) which are, or may be, or may become, essential to the present document.

Trademarks

The present document may include trademarks and/or tradenames which are asserted and/or registered by their owners. ETSI claims no ownership of these except for any which are indicated as being the property of ETSI, and conveys no right to use or reproduce any trademark and/or tradename. Mention of those trademarks in the present document does not constitute an endorsement by ETSI of products, services or organizations associated with those trademarks.

DECT™, **PLUGTESTS™**, **UMTS™** and the ETSI logo are trademarks of ETSI registered for the benefit of its Members. **3GPP™**, **LTE™** and **5G™** logo are trademarks of ETSI registered for the benefit of its Members and of the 3GPP Organizational Partners. **oneM2M™** logo is a trademark of ETSI registered for the benefit of its Members and of the oneM2M Partners. **GSM®** and the GSM logo are trademarks registered and owned by the GSM Association.

Foreword

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

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.

Introduction

TETRA security is specified in ETSI EN 300 392-7 and ETSI TS 100 392-7 [i.1] (latest version of either specification applies) for Trunked Mode Operation (TMO) and in ETSI EN 300 396-6 and ETSI TS 100 392-6 [i.2] (latest version of either specification applies) for Direct Mode Operation (DMO). The security mechanisms specified in these documents have evolved over time in response to changing market needs and to perceived vulnerabilities.

Version 4.1.1 of [i.1] and version 2.1.1 of [i.2] incorporated new authentication algorithms ([i.1] only) and air interface encryption algorithms ([i.1] and [i.2]) to ensure that TETRA security remains protected against brute force attacks into the future as the cost of computing power falls over time. During development of these specifications, perceived vulnerabilities in the previous versions of these specifications were published, and so the revised specifications also include countermeasures against these perceived vulnerabilities. The perceived vulnerabilities were declared to ETSI under the ETSI CVD (Coordinated Vulnerability Disclosure) process, and all finders of perceived vulnerabilities are encouraged to use this process. ETSI TCCE have now also defined a TETRA-specific policy document which adds TCCE-specific roles and responsibilities to the ETSI process (ETSI TR 104 246 [i.3]).

The purpose of the present document is to list the updated security measures included in [i.1] from version 4.1.1 onwards and [i.2] from version 2.1.1 onwards, and the threats (or perceived vulnerabilities) against which the updates were made. This should allow users of TETRA to make their own evaluation of the threats, and to decide the necessity or urgency for implementing the countermeasures that were added to the standards in their own TETRA systems.

Sample Document

get full document from standards.iteh.ai