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TECHNICAL SPECIFICATION

Terrestrial Trunked Radio (TETRA); Voice plus Data (V+D); Part 7: Security

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Foreword

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

The present document is part 7 of a multi-part deliverable covering the Terrestrial Trunked Radio (TETRA); Voice plus Data (V+D), Release 2, as identified below:

Part 1: "General network design";

Part 2: "Air Interface (AI)";

Part 3: "Interworking at the Inter-System Interface (ISI)";

Part 4: "Gateways basic operation";

Part 5: "Peripheral Equipment Interface (PEI)";

Part 7: "Security";

Part 9: "General requirements for supplementary services";

Part 10: "Supplementary services stage 1";

Part 11: "Supplementary services stage 2";

Part 12: "Supplementary services stage 3";

Part 13: "SDL model of the Air Interface (AI)";

Part 14: "Protocol Implementation Conformance Statement (PICS) proforma specification";

Part 15: "TETRA frequency bands, duplex spacings and channel numbering";

Part 16: "Network Performance Metrics";

Part 17: "TETRA V+D and DMO specifications";

Part 18: "Air interface optimized applications";

Part 19: "Interworking between TETRA and Broadband systems".

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.

Modal verbs terminology

In the present document "**shall**", "**shall not**", "**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.

1 Scope

The present document defines the Terrestrial Trunked Radio system (TETRA) supporting Voice plus Data (V+D). It specifies the air interface, the inter-working between TETRA systems and to other systems via gateways, the terminal equipment interface on the mobile station, the connection of line stations to the infrastructure, the security aspects in TETRA networks, the management services offered to the operator, the performance objectives, and the supplementary services that come in addition to the basic and teleservices.

The present part describes the security mechanisms in TETRA V+D. It provides mechanisms for confidentiality of control signalling and user speech and data at the air interface, authentication and key management mechanisms for the air interface and for the Inter-System Interface (ISI).

Clause 4 describes the authentication and key management mechanisms for the TETRA air interface. The following authentication services have been specified for the air-interface in ETSI ETR 086-3 [i.3], based on a threat analysis:

- authentication of an MS by the TETRA infrastructure;
- authentication of the TETRA infrastructure by an MS;
- mutual authentication of MS and TETRA infrastructure.

The key management mechanisms specified in clause 4 enable the provision of key material for the air interface encryption mechanisms specified in clause 6.

Clause 5 describes the mechanisms and protocol for enable and disable of both the mobile station equipment and the mobile station user's subscription.

Air interface encryption may be provided as an option in TETRA. Where employed, clause 6 describes the confidentiality mechanisms using encryption on the air interface, for circuit mode speech, circuit mode data, packet data and control information. Clause 6 describes both encryption mechanisms and mobility procedures. It also details the protocol concerning control of encryption at the air interface. Encryption mechanisms and control protocol are specified for two different air interface encryption algorithm sets.

Annex A specifies the Protocol Data Units and Information Elements required to fulfil the protocols specified in clauses 4, 5 and 6. Annex B specifies boundary conditions, dimensioning and summaries of the cryptographic algorithms, parameters and processes specified in the present document. Annex C specifies timer values used within the protocols. Annex D provides considerations for a transition process between the usage of encryption algorithms from different air interface encryption algorithm sets.

The present document does not address the detail handling of protocol errors or any protocol mechanisms when TETRA is operating in a degraded mode. These issues are implementation specific and therefore fall outside the scope of the TETRA standardization effort.

The detail description of the Authentication Centre is outside the scope of the present document.

2 References

2.1 Normative 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.

Referenced documents which are not found to be publicly available in the expected location might be found in the ETSI docbox.

NOTE 1: While any hyperlinks included in this clause were valid at the time of publication, ETSI cannot guarantee their long-term validity.

NOTE 2: Note that for the TETRA standards, the reference is always to a European Standard (ETSI EN 300 xxx) if such has been published, but the latest version of that standard can be either an EN or a Technical Specification (ETSI TS 100 xxx), even if this is not visible in the reference list.

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

[1] ETSI EN 300 392-1: "Terrestrial Trunked Radio (TETRA); Voice plus Data (V+D); Part 1: General network design".

[2] ETSI EN 300 392-2: "Terrestrial Trunked Radio (TETRA); Voice plus Data (V+D); Part 2: Air Interface (AI)".

[3] ISO 7498-2: "Information processing systems — Open Systems Interconnection — Basic Reference Model — Part 2: Security Architecture".

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

[5] ETSI EN 300 396-6: "Terrestrial Trunked Radio (TETRA); Direct Mode Operation (DMO); Part 6: Security".

[6] ETSI EN 302 109: "Terrestrial Trunked Radio (TETRA); Security; Synchronization mechanism for end-to-end encryption".

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

[8] ETSI EN 300 392-3-5: "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)".

[9] ETSI EN 300 396-1: "Terrestrial Trunked Radio (TETRA); Technical requirements for Direct Mode Operation (DMO); Part 1: General network design".

[10] ETSI ES 200 812-2: "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".

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.

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The following referenced documents may be useful in implementing an ETSI deliverable or add to the reader's understanding, but are not required for conformance to the present document.

[i.1] ETSI ETS 300 392-2 (1996): "Terrestrial Trunked Radio (TETRA); Voice plus Data (V+D); Part 2: Air Interface (AI)".

[i.2] ETSI ETS 300 392-7: "Terrestrial Trunked Radio (TETRA); Voice plus Data (V+D); Part 7: Security".

[i.3] ETSI ETR 086-3: "Trans European Trunked Radio (TETRA) systems; Technical requirements specification; Part 3: Security aspects".