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EUROPEAN STANDARD

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 Feature Individual Call (ANF-ISIIC)

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Contents

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Foreword

This draft European Standard (EN) has been produced by ETSI Technical Committee TETRA and Critical Communications Evolution (TCCE), and is now submitted for the combined Public Enquiry and Vote phase of the ETSI EN Approval Procedure (ENAP).

Proposed national transposition dates	
Date of latest announcement of this EN (doa):	3 months after ETSI publication
Date of latest publication of new National Standard or endorsement of this EN (dop/e):	6 months after doa
Date of withdrawal of any conflicting National Standard (dow):	6 months after doa

The present document is part 3, sub-part 12 of a multi-part deliverable covering the Terrestrial Trunked Radio (TETRA); Voice plus Data (V+D), as identified below:

Part 1: "General network design";

Part 2: "Air Interface (AI)";

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

Sub-part 1: "General design";

Sub-part 2: "Additional Network Feature Individual Call (ANF-ISIIC)";

Sub-part 3: "Additional Network Feature Group Call (ANF-ISIGC)";

Sub-part 4: "Additional Network Feature Short Data Service (ANF-ISISDS)";

Sub-part 5: "Additional Network Feature for Mobility Management (ANF-ISIMM)";

Sub-part 6: "Speech format implementation for circuit mode transmission";

Sub-part 7: "Speech Format Implementation for Packet Mode Transmission";

Sub-part 8: "Generic Speech Format Implementation";

Sub-part 9: "Transport layer independent, General design";

Sub-part 10: "General design, PSS1 over E.1";

Sub-part 11: "General design, SIP/IP";

Sub-part 12: "Transport layer independent Additional Network Feature Individual Call (ANF-ISIIC)";

Sub-part 13: "Transport layer independent Additional Network Feature Group Call (ANF-ISIGC)";

Sub-part 14: "Transport layer independent Additional Network Feature Short Data Service (ANF-ISISDS)";

Sub-part 15: "Transport layer independent Additional Network Feature, Mobility Management (ANF-ISIMM)";

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.

The present document is based on ETSI EN 300 392-3-2 [i.9] "Interworking at the Inter-System Interface, Sub-part 2 Additional Network Feature for Individual Call (ANF-ISIIC)". The main changes are:

- Removal of any reference to the bearer protocol.
- Clean up of stage 2 descriptions.

For all sub-parts in the TETRA specification ETSI EN 300 392-3, "Interworking at the Inter-System Interface (ISI)", the terms ISI and TETRA ISI are equivalent.

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 (TETRA) system supporting Voice plus Data (V+D). It specifies:

- the interworking of individual calls between TETRA networks;
- the supplementary services interaction with individual calls between TETRA networks.

The TETRA V+D interworking - basic operation part defines the interworking between TETRA networks over the corresponding interface: the Inter-System Interface (ISI). It comprises the following sub-parts:

- Transport layer independent General design [2];
- General Design, PSS1 over E.1 [i.10];
- General Design, SIP/IP [i.11];
- Transport layer independent Additional Network Feature - ISI Individual Call (ANF-ISIIC) (the present document);
- Transport layer independent Additional Network Feature - ISI Group Call (ANF-ISIGC) [5];
- Transport layer independent Additional Network Feature - ISI Short Data service (ANF-ISISDS) [i.8];
- Transport layer independent Additional Network Feature - ISI Mobility Management (ANF-ISIMM) [6];
- Generic Speech Format Implementation [i.7].

The present document is the ANF-ISIIC sub-part.

Like all other Additional Network Feature (ANF) specifications, those of ANF-ISIIC are produced in three stages, according to the method described in Recommendation ITU-T I.130 [i.4]. The present document contains the stage 1 and 2 descriptions of ANF-ISIIC, and stage 3 description. The stage 1 description specifies the ANF as seen by its users, which are essentially the individual call control entities in both TETRA networks. The stage 2 description identifies the functional entities involved in the ANF and the information flows between them. And the stage 3 description of ANF-ISIIC specifies its protocol.

NOTE 1: According to Recommendation ITU-T I.130 [i.4], the stage 3 description of a bearer or tele-service addresses the network implementation aspects. Consequently, it comprises two steps: the specifications of all protocols at the various reference points involved in any of the service procedures (notably the service operation) are the first step of the stage 3 description, and the specifications of the functions of the corresponding network entities are its second step.

NOTE 2: The SDL diagrams have not been provided since they can be derived from the specification of the functional entity actions in the stage 2 description.

The present document applies to TETRA networks which support inter-TETRA individual calls. More specifically, it applies to their Circuit Mode Control Entities (CMCE), as defined in clause 14.2 of ETSI EN 300 392-2 [1], and to their ANF-ISIIC entities defined in the stage 2 description.

The relation between the ANF-ISIIC and the transport layer protocol is described in the General Design documents [2], [i.10] and [i.11].

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

[2] ETSI EN 300 392-3-9: "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".

[3] Void.

[4] Void.

[5] ETSI EN 300 392-3-13: "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 Feature Group Call (ANF-ISIGC)".

[6] ETSI EN 300 392-3-15: "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 Feature, Mobility Management (ANF-ISIMM)".

[7] ETSI EN 300 392-9: "Terrestrial Trunked Radio (TETRA); Voice plus Data (V+D); Part 9: General requirements for supplementary services".

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

[9] ISO/IEC 11572: "Information technology — Telecommunications and information exchange between systems — Private Integrated Services Network — Circuit mode bearer services — Inter-exchange signalling procedures and protocol".

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

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 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 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 EN 300 392-7: "Terrestrial Trunked Radio (TETRA); Voice plus Data (V+D); Part 7: Security".

[i.2] ETSI EN 300 392-10-19: "Terrestrial Trunked Radio (TETRA); Voice plus Data (V+D); Part 10: Supplementary services stage 1; Sub-part 19: Barring of Incoming Calls (BIC)".

[i.3] ETSI EN 300 395-2: "Terrestrial Trunked Radio (TETRA); Speech codec for full-rate traffic channel; Part 2: TETRA codec".

[i.4] Recommendation ITU-T I.130: "Method for the characterization of telecommunication services supported by an ISDN and network capabilities of an ISDN".

[i.5] ETSI TR 102 300-5: "Terrestrial Trunked Radio (TETRA); Voice plus Data (V+D); Designers' guide; Part 5: Guidance on numbering and addressing".

[i.6] Void.

[i.7] ETSI EN 300 392-3-8: "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".

[i.8] ETSI EN 300 392-3-14: "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 Feature Short Data Service (ANF-ISISDS)".

[i.9] ETSI EN 300 392-3-2: "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)".

[i.10] ETSI EN 300 392-3-10: "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".

[i.11] ETSI EN 300 392-3-11: "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".

3 Definition of terms, symbols and abbreviations

3.1 Terms

For the purposes of the present document, the terms given in ETSI EN 300 392-3-9 [2] and the following apply:

called SwMI: Switching and Management Infrastructure to which ANF-ISIIC routes the first call attempt

controlling SwMI: Switching and Management Infrastructure responsible of the speech item management in half duplex individual calls

NOTE: During the call setup the originating SwMI is also the controlling SwMI. When the calling party migrates during a call the control of the call is transferred to that SwMI.

fleet call: call to a closed user group using a Fleet Specific Short Number

NOTE: Refer to ETSI TR 102 300-5 [i.5], clause 5.4.3.

forward switching: network routeing algorithm which performs the routeing from SwMI A to SwMI C by joining together the first connection, from SwMI A to SwMI B, and a second connection from SwMI B to SwMI C

home SwMI: SwMI which is the home of the MS (or LS) ITSI, i.e. to which the Mobile Network Identity (MNI) which is part of the ITSI belongs

loop connection: ISI connection which has both its ends in the same SwMI

originating SwMI: Switching and Management Infrastructure in which the calling user has registered when the call is set up

re-routeing: network routeing algorithm which performs the routeing from SwMI A to SwMI C by replacing the connection from SwMI A to SwMI B by another connection from SwMI A to SwMI C

SwMI A: Switching and Management Infrastructure in which the calling user has registered or in case of call forwarding SS where the call forwarding is performed

SwMI B: Switching and Management Infrastructure to which ANF-ISIIC of SwMI A routes the call attempt

SwMI C: Switching and Management Infrastructure in which the called user or the forwarded-to user has registered after having migrated from SwMI B, in the case where its home SwMI is SwMI B

terminating SwMI: Switching and Management Infrastructure in which the connected user is registered

NOTE: Unless an interaction with one or more supplementary services which modify the routeing of the call (e.g. call forwarding) has occurred, the connected user will be the called user; and the terminating SwMI will be the SwMI where the called user is registered, i.e. SwMI B or SwMI C.

transit SwMI: TETRA SwMI involved in a call but not being controlling or terminating SwMI

NOTE: A SwMI performing forward switching becomes a transit SwMI. Also in case of call restoration the old visited SwMI becomes a transit SwMI.

trombone connection: two inter-SwMI connections between two SwMIs for the same call

visited SwMI: TETRA network which MNI is not equal to the user's MNI

NOTE: In the present document the term visited SwMI follows the definition of the Air Interface standard ETSI EN 300 392-2 [1].

3.2 Symbols

Void.

3.3 Abbreviations

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

AL	Ambience Listening
ANF	Additional Network Feature
AP	Access Priority
APDU	Application Packet Data Unit
AS	Area Selection
BIC	Barring of Incoming Calls
BOC	Barring of Outgoing Calls
CAD	Call Authorized by Dispatcher
CC	Call Control

NOTE: PISN functional entity.

CCAp	Call Control Application

NOTE: SwMI functional entity.

CCBS	Call Completion to Busy Subscriber
CCNR	Call Completion on No Reply
CF	Call Forwarding
CFB	Call Forwarding on Busy
CFNRc	Call Forwarding on Not Reachable
CFNRy	Call Forwarding on No Reply
CFU	Call Forwarding Unconditional
CLIP	Calling Line Identification Presentation
CLIR	Calling/connected Line Identification Restriction
CMCE	Circuit Mode Control Entities
COLP	COnnected Line identification Presentation
CR	Call Report
CRT	Call ReTention
CRV	Call Retention Value
CW	Call Waiting
DGNA	Dynamic Group Number Assignment

DL	Discreet Listening
DTMF	Dual Tone Multi Frequency
FE	Functional Entity
GTSI	Group TETRA Subscriber Identity
GW	GateWay
HOLD	call Hold
IC	Include Call
IE	Information Element
ISDN	Integrated Services Digital Network
ISI	Inter System Interface
ISIGC	Inter System Interface Group Call
ISIIC	Inter System Interface Individual Call
ISIMM	Inter System Interface Mobility Management
ISISDS	Inter System Interface Short Data Service
ISISS	Inter System Interface Supplementary Service
ITSI	Individual TETRA Subscriber Identity
LE	Late Entry
LS	Line Station
LSC	List Search Call
MLE	Mobile Link Entity
MM	Mobility Management
MNI	Mobile Network Identity
MS	Mobile Station
MSISDN	Mobile Station Integrated Services Digital Network
PC	Priority Call
PDU	Protocol Data Unit
PEI	Peripheral Equipment Interface
PISN	Private Integrated Services Network
PPC	Pre-emptive Priority Call
PSS1	Private integrated Signalling System number 1
PSTN	Public Switched Telephone Network
RSI	Removal of Subscriber Information
SDL	Specification and Description Language
SNA	Short Number Addressing
SS	Supplementary Service
SSI	Short Subscriber Identity
SwMI	Switching and Management Infrastructure
TNCC	TETRA Network layer Call Control
TPI	Talking Party Identification
TX	Transmission

4 ANF-ISIIC stage 1 specification

4.1 Description

4.1.1 General description

ANF-ISIIC enables individual calls to be set-up from a TETRA user registered in one Switching and Management Infrastructure (SwMI) to another TETRA user registered in another SwMI. ANF-ISIIC operates at the Inter System Interface (ISI) of the SwMI Call Control Applications (CCAps), in such a manner that these calls can be routed between and through transit SwMIs. Additionally, for the duration of each call, ANF-ISIIC allows TETRA signalling information to be passed from TETRA SwMI to TETRA SwMI in accordance with the TETRA Individual Call procedures as defined in ETSI EN 300 392-2 [1]. In addition, ANF-ISIIC participates in call restoration when a user has migrated to another TETRA network during an established call.

The entities with which ANF-ISIIC interacts are the originating, the terminating and transit SwMI CCAps, and in addition, some SwMI databases, especially that of the called user home SwMI.