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**Prizemni snopovni radio (TETRA) – Govor in podatki (V+D) – 3. del:
Medobratovanje na medsystemske vmesniku (ISI) – 2. poglavje: Dodatna
omrežna funkcija: posamezni (individualni) klic (ANF-ISIIC)**

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)

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**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)**

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Foreword

This European Standard (Telecommunications series) has been produced by ETSI Project Terrestrial Trunked Radio (TETRA).

The present document had been submitted to Public Enquiry as ETS 300 392-3-2. During the processing for Vote it was converted into an EN.

The present document is part 3 of a multi-part deliverable covering 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)";**
- Part 4: "Gateways basic operation";
- Part 5: "Peripheral Equipment Interface (PEI)";
- Part 6: "Line connected Station (LS)";
- Part 7: "Security";
- Part 9: "Supplementary services general design";
- 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".

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1 Scope

The present document defines the Terrestrial Trunked Radio (TETRA) system supporting Voice plus Data (V+D). It specifies:

- general design aspects (e.g. reference points, numbering and addressing, or protocol architecture);
- the system bearer and mobility management services, and the corresponding air interface protocols;
- the interworking between TETRA networks;
- the interworking of TETRA networks with other networks, via gateways;
- the peripheral equipment interface on the mobile station;
- the Line Station (LS) interface with TETRA networks;
- the security protocols and mechanisms applicable to TETRA networks and to TETRA terminal equipment;
- the supplementary services applicable to the basic TETRA tele- or bearer services.

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 subparts:

- ISI general design;
- Additional Network Feature - ISI Individual Call (ANF-ISIIC);
- Additional Network Feature - ISI Group Call (ANF-ISIGC);
- Additional Network Feature - ISI Short Data service (ANF-ISISD);
- Additional Network Feature - ISI Mobility Management (ANF-ISIMM);
- 8 kbit/s encoding of user information at the ISI.

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

ANF-ISIIC enables calls to be set-up by a user registered in one TETRA network to another user registered in another TETRA network, operating at the ISI of both SwMIs. It also supports call restoration when a user has migrated to another TETRA network during an established call. Additionally, ANF-ISIIC allows TETRA signalling information to be passed from a TETRA SwMI to another TETRA SwMI supporting the TETRA individual call procedures as defined in clauses 11 and 14 of EN 300 392-2 [1].

Like all other Additional Network Feature (ANF) specifications, those of ANF-ISIIC are produced in three stages, according to the method described in ITU-T Recommendation I.130 [11]. The present document contains the stage 1 and 2 descriptions of ANF-ISIIC, and its partial 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 partial stage 3 description of ANF-ISIIC specifies its protocol.

NOTE: According to ITU-T Recommendation I.130 [11], 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.

The latter 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 subclause 14.2 of EN 300 392-2 [1], and to their ANF-ISIIC entities defined in the stage 2 description.

2 References

The following documents contain provisions which, through reference in this text, constitute provisions of the present document.

- References are either specific (identified by date of publication, edition number, version number, etc.) or non-specific.
- For a specific reference, subsequent revisions do not apply.
- For a non-specific reference, the latest version applies.

- [1] ETSI EN 300 392-2: "Terrestrial Trunked Radio (TETRA); Voice plus Data (V+D); Part 2: Air Interface (AI)".
- [2] ETSI ETS 300 392-3-1: "Terrestrial Trunked Radio (TETRA); Voice plus Data (V+D); Part 3: Interworking at the Inter-System Interface (ISI); Sub-part 1: General design".
- [3] ETSI ETS 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)".
- [4] ETSI EN 300 392-7: "Terrestrial Trunked Radio (TETRA); Voice plus Data (V+D); Part 7: Security".
- [5] ETSI EN 300 392-9: "Terrestrial Trunked Radio (TETRA); Voice plus Data (V+D); Part 9: General requirements for supplementary services".
- [6] ETSI EN 300 172 (1997): "Private Integrated Services Network (PISN); Inter-exchange signalling protocol; Circuit-mode basic services [ISO/IEC 11572 (1996) modified]".
- [7] ETSI ETS 300 921 (1997): "Digital cellular telecommunications system; Service accessibility (GSM 02.11 version 5.0.1)".
- [8] ETSI ETS 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".
- [9] ETSI EN 300 392-12-4: "Terrestrial Trunked Radio (TETRA); Voice plus Data (V+D); Part 4: Supplementary services stage 3; Sub-part 4: Call forwarding".
- [10] ETSI ETS 300 395-2: "Terrestrial Trunked Radio (TETRA); Speech codec for full-rate traffic channel; Part 2: TETRA codec".
- [11] ITU-T Recommendation I.130 (1988): "Method for the characterization of telecommunication services supported by an ISDN and network capabilities of an ISDN".
- [12] ITU-T Recommendation I.140 (1993): "Attribute technique for the characterization of telecommunication services supported by an ISDN and network capabilities of an ISDN".
- [13] ITU-T Recommendation I.210 (1993): "Principles of telecommunication services supported by an ISDN and the means to describe them".
- [14] ITU-T Recommendation Z.100 (1993): "Specification and description language (SDL)".
- [15] ITU-T Recommendation V.110 (1996): "Support by an ISDN of data terminal equipments with V-series type interfaces".
- [16] 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".
- [17] ISO/IEC 11574: "Information technology; Telecommunications and information exchange between systems; Private Integrated Services Network; Circuit mode 64 kbit/s bearer services; Service description, functional capabilities and information flows".

- [18] ISO/IEC 11582 (1995): "Information technology; Telecommunications and information exchange between systems; Private Integrated Services Network; Generic functional protocol for the support of supplementary services; Inter-exchange signalling procedures and protocol".
- [19] ITU-T Recommendation I.460: "Multiplexing, rate adaption and support of existing interfaces".

3 Definitions and abbreviations

3.1 Definitions

For the purposes of the present document, the terms and definitions of ETS 300 392-3-1 [2] apply, in addition to the following:

originating SwMI or SwMI A: Switching and Management Infrastructure in which the calling user has registered

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

SwMI C: Switching and Management Infrastructure in which the called 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 1: Unless an interaction with one or more supplementary services which modify the routing 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.

forward switching: network routing algorithm which performs the routing 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

re-routing: network routing algorithm which performs the routing 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

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

trombone connection: special case of loop connection where all inter-TETRA connections making up the loop connection are used twice

NOTE 2: If no interaction occurs with supplementary services which modify the routing of the call (e.g. call forwarding), the only loop connection which can be established by an invoked ANF-ISIIC is a trombone connection (i.e. when SwMI C coincides with SwMI A).

3.2 Abbreviations

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

CC	Call Control (PISN functional entity)
CCAp	Call Control Application (SwMI functional entity)
FE	Functional Entity
ISDN	Integrated Services Digital Network
ISI	Inter System Interface
ITSI	Individual TETRA Subscriber Identity
LS	Line Station
MNI	Mobile Network Identity
MS	Mobile Station
PDU	Protocol Data Unit
PINX	Private Integrated Services Network Exchange
PISN	Private Integrated Services Network
PSS1	Private Integrated Signalling System Number 1

SDL	Specification and Description Language
SS-BIC	Supplementary Service Barring of Incoming Calls
SS-CAD	Supplementary Service Call Authorized by Dispatcher
SS-CCBS	Supplementary Service Call Completion to Busy Subscriber
SS-CCNR	Supplementary Service Call Completion on No Reply
SS-CF	Supplementary Service Call Forwarding (general abbreviation for the call forwarding supplementary services)
SS-CFB	Supplementary Service Call Forwarding on Busy
SS-CFU	Supplementary Service Call Forwarding Unconditional
SS-CFNRc	Supplementary Service Call Forwarding on Not Reachable
SS-CFNRY	Supplementary Service Call Forwarding on No Reply
SS-CLIR	Supplementary Service Calling/connected Line Identification Restriction
SS-CW	Supplementary Service Call Waiting
SS-HOLD	Supplementary Service Call Hold
SSI	Short Subscriber Identity
SwMI	Switching and Management Infrastructure

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 both SwMI Call Control Applications (CCAs), in such a manner that these calls can be routed through (transit) Private Integrated Services Networks (PISNs). 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 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 and the terminating SwMI CCAs, and in addition, some SwMI databases, especially that of the called user home SwMI.

4.1.2 Qualifications on applicability to telecommunication services

ANF-ISIIC is applicable to all point-to-point circuit mode tele- and bearer services defined in EN 300 392-2 [1]:

- point-to-point TETRA clear mode speech;
- point-to-point TETRA end-to-end encrypted speech;
- point-to-point one slot 2,4 kbit/s, 4,8 kbit/s or 7,2 kbit/s TETRA circuit mode data;
- point-to-point N x 2,4 kbit/s, N x 4,8 kbit/s or N x 7,2 kbit/s TETRA circuit mode data, with N = 2, 3 or 4;
- point-to-point end-to-end encrypted one slot 2,4 kbit/s, 4,8 kbit/s or 7,2 kbit/s TETRA circuit mode data;
- point-to-point end-to-end encrypted N x 2,4 kbit/s, N x 4,8 kbit/s or N x 7,2 kbit/s TETRA circuit mode data, with N = 2, 3 or 4.

4.2 Procedures

4.2.1 Provision/withdrawal

Provision of ANF-ISIIC shall always be available.