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Terrestrial Trunked Radio (TETRA); Voice plus Data (V+D); Part 3: Interworking at the Inter-System Interface (ISI); Sub-part 1: General design

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Foreword

This European Telecommunication Standard (ETS) has been produced by the Terrestrial Trunked Radio (TETRA) Technical Committee of the European Telecommunications Standards Institute (ETSI).

This ETS consists of 14 parts as follows:

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: "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".

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1 Scope

This ETS 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 inter-working between TETRA networks;
- the inter-working 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.

This part defines the inter-working between TETRA networks over the corresponding interface, the Inter-System Interface (ISI). It comprises the following sub-parts:

- ISI general design;
- Additional Network Feature - ISI Mobility Management (ANF-ISIMM);
- 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);
- 8 kbit/s encoding of user information at the ISI.

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This sub-part contains the ISI General Design sub-part.

It specifies the general concepts which are the basis of the ISI operation between TETRA systems. It introduces the Additional Network Features (ANFs) used at the ISI, and specifies:

- the general protocol mechanism, called ISI Generic Functional Protocol (ISI GFP), upon which the definition of each ANF is based; and
- the security requirements for the ISI.

The ISI GFP specification applies to any TETRA Switching and Management Infrastructure (SwMI) which supports the ISI. The security requirements for the ISI only apply to SwMIs which support authentication or encryption over the ISI.

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2 Normative references

This European Telecommunication Standard (ETS) incorporates, by dated or undated reference, provisions from other publications. These references are cited at the appropriate places in the text and the publications are listed hereafter. For dated references, subsequent amendments to or revisions of any of these publications apply to this European Telecommunication Standard only when incorporated in it by amendment or revision. For undated references the latest edition of the publication referred to applies.

[1] CCITT Recommendation I.130 (1988): "Method for the characterization of telecommunication services supported by an ISDN and network capabilities of an ISDN".

[2] CCITT Recommendation I.460 (1988): "Multiplexing, rate adaption and support of existing interfaces".

[3] CCITT Recommendation X.209 (1988): "Specification of basic encoding rules for Abstract Syntax Notation One (ASN.1)".

[4] CCITT Recommendation X.219 (1988): "Remote operations: Model, notation and service definition".

[5] CCITT Recommendation X.229 (1988): "Remote operations: Protocol specification".

[6] ITU-T Recommendation Z.100 (1993): "CCITT specification and description language (SDL)".

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

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

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

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

[11] ETS 300 395-1: "Terrestrial Trunked Radio (TETRA); Speech CODEC for full-rate traffic channel; Part 1: General description of speech functions".

[12] ETS 300 402-1: "Integrated Services Digital Network (ISDN); Digital Subscriber Signalling System No. one (DSS1) protocol; Data link layer; Part 1: General aspects [ITU-T Recommendation Q.920 (1993), modified]".

[13] ETS 300 402-2: "Integrated Services Digital Network (ISDN); Digital Subscriber Signalling System No. one (DSS1) protocol; Data link layer; Part 2: General protocol specification [ITU-T Recommendation Q.921 (1993), modified]".

[14] ISO/IEC 11572 (1997): "Information technology - Telecommunications and information exchange between systems - Private Integrated Services Network - Circuit mode bearer services - Inter-exchange signalling procedures and protocol".

[15] 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".

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3 Definitions and abbreviations

3.1 Definitions

For the purposes of this ETS, the following definitions apply:

call: The instance of the use of a bearer or tele-service.

Group TETRA Subscriber Identity (GTSI): A TETRA Subscriber Identity assigned to a group.

Location Area (LA): The area within radio coverage of a base station or group of base stations within which a Mobile Station (MS) is allowed to operate.

Mobile Network Identity (MNI): The identity that is broadcast by all TETRA base stations to uniquely identify the SwMI. It consists of the Mobile Country Code (MNC) and the Mobile Network Code (MNC).

Mobile Station (MS): A physical grouping that contains all of the mobile equipment that is used to obtain TETRA services. By definition, a mobile station contains at least one Mobile Radio Stack (MRS).

segmentation: The act of generating two or more PDUs derived from an initial one.

service user: An abstract representation of the totality of those entities in a single system that make use of a service through a single access point.

supplementary service: A supplementary service modifies or supplements a basic bearer service or a basic teleservice. A supplementary service cannot be offered to a customer as a stand-alone service. It should be offered in combination with a bearer service or a teleservice.

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Switching and Management Infrastructure (SwMI): All of the TETRA equipment for a Voice plus Data (V+D) network. The SwMI enables users to communicate with each other via the SwMI.

Short Subscriber Identity (SSI): The network specific portion of a TSI. A SSI is only unique within one TETRA sub-domain (one TETRA network).

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TETRA Subscriber Identity (TSI): A global TETRA network address that is to identify an individual or a group subscriber within the domain of all TETRA networks. A valid TSI refers to a TSI that has been allocated by the network where it is being used.

subscriber: A user of a telecommunication service, based on a contract with the provider of the service. The subscriber is identified by an ITSI or GTSI.

NOTE 1: The subscriber is able to access the SwMI either through a MS or Line Station.

user: An entity using the services of a telecommunications network via an externally accessible service access point.

NOTE 2: A user may be a person or an application process.

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3.2 Abbreviations

For the purposes of this ETS, the following abbreviations apply:

AC	Authentication Centre
ACSE	Associated Control Service Element
ANF	Additional Network Feature
ANF-ISI	all Additional Network Features of the Inter-System Interface
APDU	Application Protocol Data Unit
ASN.1	Abstract Syntax Notation One
BS	Base Station
C	conditional
CCK	Common Cipher Key
C-LDB	Controlling Linking DataBase
CMCE	Circuit Mode Control Entity
DCK	Derived Cipher Key
ECMA	European Computer Manufacturers Association
GFP	Generic Functional Protocol
GFT	Generic Functional Transport
GTSI	Group TETRA Subscriber Identity
GCK	Group Cipher Key
G-HDB	Group Home DataBase
G-VDB	Group Visited DataBase
HAC	Home Authentication Centre
HDB	Home DataBase
ISI	Inter-System Interface
ITSI	Individual TETRA Subscriber Identity
I-HDB	Individual Home DataBase
I-VDB	Individual Visited DataBase
K	authentication Key
LA	Location Area
LS	Line Station
M	mandatory
MCC	Mobile Country Code
MM	Mobility Management
MNC	Mobile Network Code
MNI	Mobile Network Identity
MRS	Mobile Radio Stack
MS	Mobile Station
NFE	Network Facility Extension
O	optional
OTAR	Over The Air Re-keying
PC	Protocol Control
PDU	Protocol Data Unit
PINX	Private Integrated Network eXchange
PISN	Private Integrated Services Network
P-LBD	Participating Linking DataBase
PSS1	Private Signalling System 1
ROSE	Remote Operation Service Element
RS	Random Seed
SAP	Service Access point
SCK	Static Cipher Key
SDL	Specification and Description Language
SD	Short Data
SSE	Segmentation Service Element
SSI	Short Subscriber Identity
SwMI	TETRA Switching and Management Infrastructure
TETRA	TErrestrial Trunked Radio
TSI	TETRA Subscriber Identity
VAC	Visitor Authentication Centre
(V)ASSI	Visiting Short Subscriber Alias Identity

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V+D	Voice plus Data
VDB	Visitor DataBase
(V)GSSI	Visiting Short Subscriber Group Identity

4 ISI standardization methodology

4.1 3 stage methodology

The ISI Additional Network Features (ANFs) are standardized using the modelling method defined in CCITT Recommendation I.130 [1].

4.1.1 Stage 1

Stage 1 is a description of the services which the standardized ANF entity provides to the concerned service users, e.g. SwMI entities in the case of TETRA. The services are visible at the Service Access Points (SAPs). The stage 1 description is intended to allow an understanding of the services independently from the implementation.

For normal point to point services the service model is shown in figure 1.

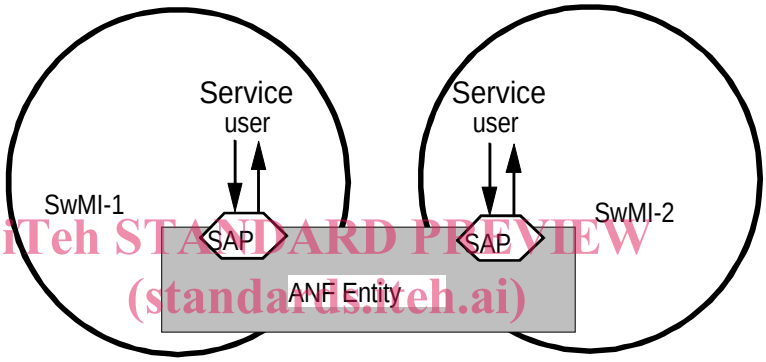

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Figure 1: Service Model for Point to Point services