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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

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Foreword

This European Standard (EN) has been produced by ETSI Technical Committee TETRA and Critical Communications Evolution (TCCE).

The present document is part 3, sub-part 11 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.

For all subparts in the TETRA specification ETSI EN 300 392-3 [i.1], "Interworking at the Inter-System Interface (ISI)" the terms ISI and TETRA ISI are equivalent.

National transposition dates	
Date of adoption of this EN:	13 November 2019
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Date of latest publication of new National Standard or endorsement of this EN (dop/e):	31 January 2021
Date of withdrawal of any conflicting National Standard (dow):	31 January 2021

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).

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1 Scope

The present document defines the transport of Inter System Interface (ISI) PDUs using the Session Initiation Protocol (SIP) as transport layer and the Session Description Protocol (SDP) as media control protocol. It specifies:

- SIP methods and header fields used for transport of ISI PDUs; and

- the SDP content; and

- use the ISI Mediation Function which coordinates the communication between TETRA systems.

The ISI Mediation Function specification applies to an IP based TETRA Switching and Management Infrastructure (SwMI) which supports the ISI.

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.

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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] Void.

[2] 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".

[3] 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".

[4] ETSI EN 300 392-3-12: "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)".

[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 300 392-3-14: "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)".

[7] 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)".

[8] IETF RFC 3261: "SIP: Session Initiation Protocol".

[9]   IETF RFC 3264: "An Offer/Answer Model with Session Description Protocol (SDP)".

[10]   IETF RFC 3428: "Session Initiation Protocol (SIP) Extension for Instant Messaging".

[11]   IETF RFC 4028: "Session Timers in the Session Initiation Protocol (SIP)".

[12]   IETF RFC 4566: "SDP: Session Description Protocol".

[13]   IETF RFC 5621: "Message Body Handling in the Session Initiation Protocol (SIP)".

[14]   IETF RFC 6026: "Correct Transaction Handling for 2xx Responses to Session Initiation Protocol (SIP) INVITE Requests".

[15]   IETF RFC 6086: "Session Initiation Protocol (SIP) INFO Method and Package Framework".

[16]   IETF RFC 6141: "Re-INVITE and Target-Refresh Request Handling in the Session Initiation Protocol (SIP)".

[17]   IETF RFC 2045: "Multipurpose Internet Mail Extensions (MIME) Part One: Format of Internet Message Bodies".

2.2   Informative references

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   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 not necessary for the application of the present document but they assist the user with regard to a particular subject area.

   [i.1]   ETSI EN 300 392-3: "Terrestrial Trunked Radio (TETRA); Voice plus Data (V+D); Part 3: Interworking at the Inter-System Interface (ISI)".

3   Definition of terms, symbols and abbreviations

3.1   Terms

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

destination SwMI: Switching and Management Infrastructure where the receiving ANF-ISI entity is located (in the context of a single one-way exchange of information between two ANF-ISI entities located in different Switching and Management Infrastructures)

group attached SwMI: Switching and Management Infrastructure different from the home SwMI of the group considered in which at least one individual subscriber member of the group is attached to that group

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

home SwMI: Switching and Management Infrastructure in which the subscription of a given user is registered

   NOTE: That user is defined as being a subscriber (see below the definition of that term).

invocation: action taken by the user or by the service provider to execute a specific service function within real time

Location Area (LA): 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): identity that is broadcast by all TETRA base stations to uniquely identify the SwMI

NOTE: It consists of the Mobile Country Code (MCC) and the Mobile Network Code (MNC).

Mobile Station (MS): physical grouping that contains all of the mobile equipment that is used to obtain TETRA services

NOTE: By definition, a mobile station contains at least one Mobile Radio Stack (MRS).

originating SwMI: in the context of a TETRA call, Switching and Management Infrastructure where the calling user is registered (which implies that this user is located in that SwMI) or Switching and Management Infrastructure which originates a Call independent signalling connection

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

Short Subscriber Identity (SSI): network specific portion of a TSI

NOTE: A SSI is only unique within one TETRA sub-domain (one TETRA network).

source SwMI: Switching and Management Infrastructure where the sending ANF-ISI entity is located (in the context of a single one-way exchange of information between two ANF-ISI entities located in different Switching and Management Infrastructures)

subscriber: user of a telecommunication service, based on a contract with the provider of the service

NOTE 1: The subscriber may be an individual or a group: in the first case it is identified by an ITSI, in the second, by a GTSI.

NOTE 2: The individual subscriber is able to access an SwMI either through a MS or Line Station.

supplementary service: service which modifies or supplements a basic bearer service or a basic teleservice

NOTE: 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.

Switching and Management Infrastructure (SwMI): all of the TETRA equipment for a Voice plus Data (V+D) network

NOTE: The SwMI enables users to communicate with each other.

terminating SwMI: in the context of a TETRA call, Switching and Management Infrastructure where the calling user is registered (which implies that this user is located in that SwMI) or Switching and Management Infrastructure which terminates a Call independent signalling connection

TETRA Subscriber Identity (TSI): global TETRA network address that is to identify an individual or a group subscriber within the domain of all TETRA networks

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

NOTE: An individual user may be a person or an application process.

user information: TETRA coded speech

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

3.2   Symbols

Void.

3.3　　Abbreviations

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

ANF	Additional Network Feature
ANF-ISI	all Additional Network Features of the Inter-System Interface
AVP	Audio Video Profile
C	Conditional
GFP	Generic Functional Protocol
GTSI	Group TETRA Subscriber Identity
IC	Individual Call
IP	Internet Protocol
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
ITSI	Individual TETRA Subscriber Identity
LA	Location Area
M	Mandatory
MCC	Mobile Country Code
MNC	Mobile Network Code
MNI	Mobile Network Identity
MRS	Mobile Radio Stack
MS	Mobile Station
O	Optional
PDU	Protocol Data Unit
RFC	Request For Comments
RTP	Real-time Transport Protocol
SDL	Specification and Description Language
SDP	Session Description Protocol
SIP	Session Initiation Protocol
SSI	Short Subscriber Identity
SwMI	TETRA Switching and Management Infrastructure
TCP	Transmission Control Protocol
TLS	Transport Layer Security
TSI	TETRA Subscriber Identity
UDP	User Datagram Protocol
URI	Uniform Resource Identifier
V+D	Voice plus Data

4　　Usage of Session Initiation Protocol (SIP) and Session Description Protocol (SDP) for TETRA

4.1　　SIP functionality

The TETRA ISI application can use the Session Initiation Protocol (SIP) as transport mechanism for call control information between interconnected SwMIs. When using SIP as transport for call control information, Session Description Protocol (SDP) shall be used for the specification of the audio connection between interconnected SwMIs.

TETRA uses the SIP standard functionalities as defined in the following RFCs:

- IETF RFC 2045 [17].

- IETF RFC 3261 [8]. The following SIP request methods are used:

  - OPTIONS.

  - INVITE.

- ACK.

- CANCEL.

- BYE.

- IETF RFC 3428 [10].

- IETF RFC 4028 [11].

- IETF RFC 5621 [13].

- IETF RFC 6026 [14].

- IETF RFC 6086 [15].

- IETF RFC 6141 [16].

NOTE 1: Provisional responses to SIP:INVITE except 100 Trying are not used.

NOTE 2: The status of the SIP session is independent of the status of the ISI session e.g. the SIP session can be fully established (SIP:200 OK and SIP:ACK has been exchanged) while the ISI session is during establishment.
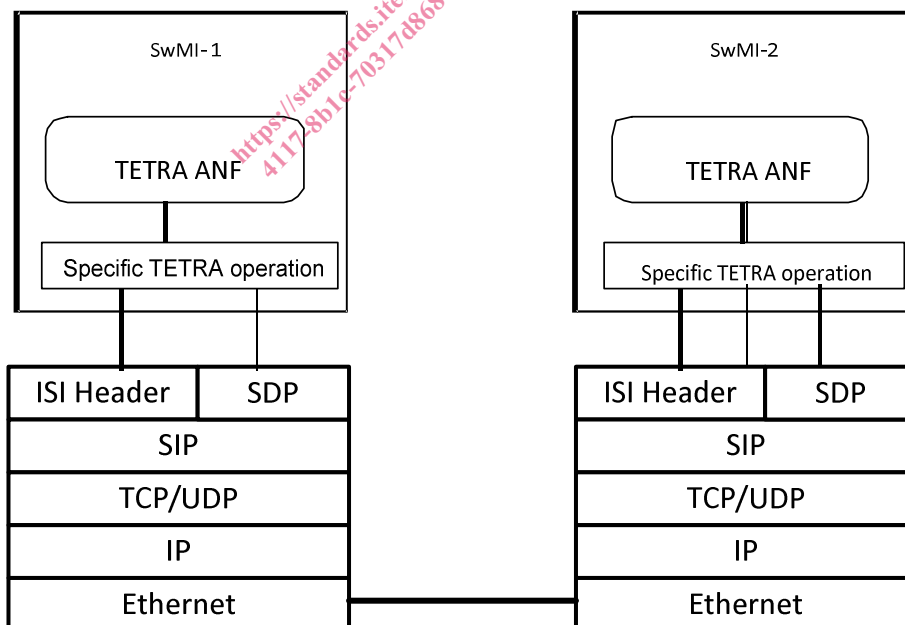
TETRA uses the SDP standard functionalities as defined in the following RFC:

- IETF RFC 4566 [12].

- IETF RFC 3264 [9].

SIP messages convey both TETRA ISI PDUs and SDP PDUs in the body part of the SIP messages.

4.2 Protocol stack for call control signalling information

Figure 4.1 shows how the protocols for TETRA ANF which apply at the ISI using SIP as transport mechanism.

NOTE: Layer 2 protocol depends on the type of the inter-connection.

Figure 4.1: IP protocol stack for TETRA