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European Standard (Telecommunications series)

**Terrestrial Trunked Radio (TETRA);
Voice plus Data (V+D);
Part 3: Interworking at the Inter-System Interface (ISI);
Sub-part 4: Additional Network Feature
Short Data Service (ANF-ISISDS)**

ETSI

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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 300 392-3-4. During the processing for Vote it was converted into an EN.

The present document is part 3, sub-part 4 of a multi-part deliverable covering the 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: "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".

Approved by EPT.3 for submission to EPT with recommendation to be submitted to public enquiry phase of ETSI 2 step approval.

National transposition dates	
Date of adoption of this EN:	10 November 2000
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Date of withdrawal of any conflicting National Standard (dow):	31 August 2001

1   Scope

The present document defines the Terrestrial Trunked Radio system (TETRA) 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 specifies the Additional Network Function (ANF) - Inter-System Interface (ISI) Short Data service (ANF-ISISD) which is part of the Interworking Basic Operation of the Terrestrial Trunked Radio system (TETRA) supporting Voice and Data (V+D). Specifically the present document details the stage 1, 2, and 3 aspects of the ANF-ISISD as seen from the TETRA Switching and Maintenance Infrastructure (SwMI) point of view at the Inter System Interface (ISI). This service comprises of:

-   TETRA user defined short message transmission over the ISI to individual and group addresses;

-   TETRA pre-defined short message transmission over the ISI to individual and group addresses.

ANF-ISISD enables short data and status messages to be set-up and transferred between a user registered in one TETRA network to another user registered in another TETRA network, operating at the ISI of both SwMIs.

Like all other Additional Network Feature (ANF) specifications, those of ANF-ISISD are produced in three stages, according to the method described in ITU-T Recommendation I.130 [4]. 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. The partial stage 3 description of ANF-ISISD specifies its protocol.

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.

- A non-specific reference to an ETS shall also be taken to refer to later versions published as an EN with the same number.

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

[2]   ETSI ETS 300 392-3-3: "Terrestrial Trunked Radio (TETRA); Voice plus Data (V+D); Part 3: Interworking at the Inter-System Interface (ISI); Sub-part 3: Additional Network Feature Group Call (ANF-ISIGC)".

[3]   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".

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

3 Definitions and abbreviations

3.1 Definitions

For the purposes of the present document, the terms and definitions in EN 300 392-2 [1], ETS 300 392-3-1 [3] and ETS 300 392-3-3 [2] apply.

3.2 Abbreviations

For the purposes of the present document, the abbreviations in EN 300 392-2 [1], ETS 300 392-3-1 [3] and ETS 300 392-3-3 [2] apply.

4 ANF-ISISD stage 1 specification

4.1 Description

ANF-ISISD provides support of the SDS service described in EN 300 392-2 [1], clause 13, across the ISI connection between 2 SwMIs. In addition the present document supports the embedded SDS-TL service described in EN 300 392-2 [1].

NOTE: The interpretation of status code values contained in predefined status or short message services are not defined in the TETRA suite of standards. The consistent interpretation of these code values in user equipment will not be made by the ANF-ISISD service but will be left to end-users to co-ordinate codeset interpretation.

4.2   Overview of operation

ANF-ISISD shall transparently take the SDS message as presented by the originating SwMI and transport it to the peer ANF-ISISD entity in the destination SwMI.

There shall be a single invocation of ANF-ISISD per SDS transfer. Each message therefore is considered as independent. Group addressed SDS shall be sent to the group controlling SwMI only for further distribution by that SwMI to each participating SwMI.

ANF-ISISD assumes that an equivalent to the TNSDS-SAP defined in EN 300 392-2 [1], clause 13 exists in the SwMI that provides an equivalent set of primitives.

For outgoing SDS messages the SwMI shall have received an equivalent to the TNSDS-UNITDATA indication primitive with those extensions required to indicate area selection. It shall then determine the destination SwMI. ANF-ISISD shall only be invoked if the destination is on another SwMI.

For incoming SDS ANF-ISISD shall deliver the SDS message to the SwMI in like manner to any internal SwMI device.

4.3   Security concerns

The participating SwMIs shall exchange the security class in use at the air interface. The destination SwMI shall discard any message for which the source SwMI is operating at a numerically higher security class.

4.4   Procedures

4.4.1   Provision/withdrawal

ANF-ISISD shall always be available.

4.4.2   Normal procedures

4.4.2.1   Activation/deactivation/registration/interrogation

ANF-ISISD shall always be activated. Registration and interrogation are not applicable to this ANF.

4.4.2.2   Invocation and operation

ANF-ISISD shall be invoked when a short data service request has been received by the originating SwMI and analysis of the destination address has shows that the destination user is not located within the originating SwMI. Analysis of the destination address may reveal one of the following scenarios:

1) the destination TETRA user identity belongs to the originating SwMI. In this scenario the destination user has migrated to a visited SwMI the details of which are known in the originating SwMI database;

2) the destination MS TETRA user identity does not belong to the originating SwMI and the destination MS is not migrated to the originating SwMI. In this scenario the details of the destination home SwMI are known from the destination TETRA user identity;

3) the destination MS TETRA user identity does not belong to the originating SwMI but the destination MS is migrated to the originating SwMI and the originating SwMI has knowledge of the concerned user SDS profiles.

4) the destination gateway is on another SwMI.

The present document shall address scenarios (1), (2) and (4) only. Scenario (3) shall not invoke ANF-ISISD.

The originating SwMI becomes the controlling SwMI and shall manage and administer this ANF-ISISD service. In scenario (2) the destination home SwMI becomes the controlling SwMI and shall manage and administer this ANF-ISISD service. In the scenario (3) the ANF-ISISD is not invoked and the SDS shall be managed in the originating SwMI.

4.4.3 Exceptional procedures

4.4.3.1 Activation/deactivation/registration/interrogation

Not applicable.

4.4.3.2 Invocation and operation

ANF-ISISD can reject a service request for any of the following reasons:

- user not subscribed to inter system short data service;

- inter system interface out of order; or

- remote SwMI does not support short data service.

During the lifetime of the service operation the SwMI may reject the service request with an appropriate failure indication for one of the following reasons:

- user not reachable; or

- user not known.

4.5 ANF-ISIDD primitives

The flow of short data service primitives shall be as illustrated in figure 1.
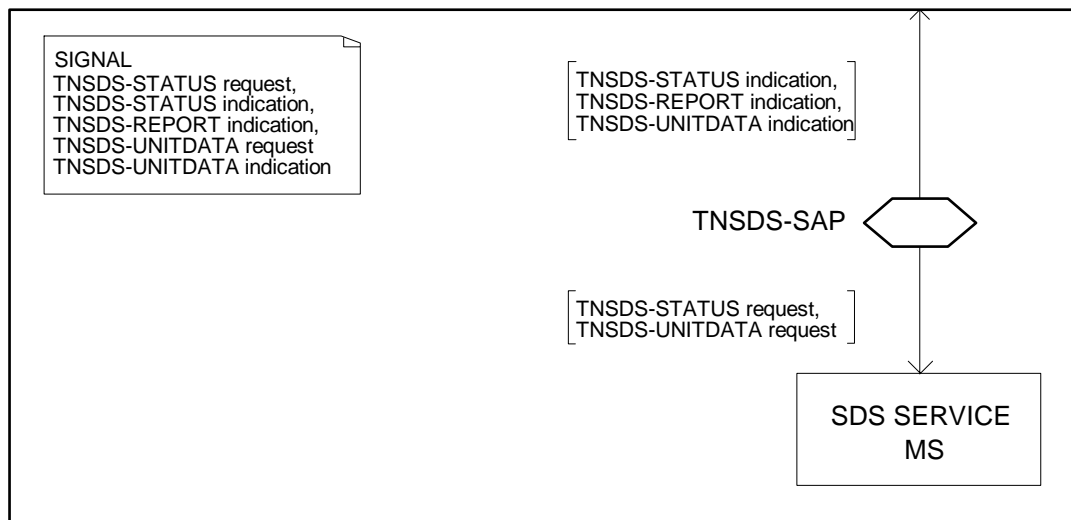
Figure 1: SDS provided at TNSDS-SAP (MS/LS)

The ANF-ISISD is invoked upon receipt by the SwMI of an equivalent primitive to the TNSDS-UNITDATA or TNSDS-STATUS primitives described in tables 53 and 55 of EN 300 392-2 [1] and as shown in tables 1 and 2 in their translated form as ANFISISD- primitives.

NOTE: The service is unconfirmed at the radio interface and also on the ISI service.

In the tables listing the service elements in primitives, the column headed "Request" indicates which of these service elements are mandatory (M) and which are optional (O) in a request/indication information flow, and the column headed "Confirm" indicates which of these service elements are mandatory (M) and which are optional (O) in a response/confirmation information flow.

Table 1: Parameters for the ANFISISD-STATUS primitive

Parameter	Request	Indication
Area selection	O	O
Called party SSI	M	M
Called party extension	M	M
Called party external subscriber number	O	O
Calling party SSI	M	M
Calling party extension	M	M
Calling party external subscriber number	O	O
Status number	M	M
Hop count	M	M

Table 2: Parameters for the ANFISISD-UNITDATA primitive (from EN 300 392-2 [1])

Parameter	Request	Indication
Area selection	O	O
Called party SSI	M	M
Called party extension	M	M
Called party external subscriber number	O	O
Calling party external subscriber number	O	O
Calling party SSI	M	M
Calling party extension	M	M
Short data type identifier	M	M
User defined data-1	C (note)	C (note)
User defined data-2	C (note)	C (note)
User defined data-3	C (note)	C (note)
User defined data-4	C (note)	C (note)
Hop count	M	M
NOTE: Depending on the value of short data type identifier.		

4.5.1   Parameter description

Parameters shall be part of the primitives at the TNSDS SAP. When applied the parameters shall contain the values specified in this clause.

Area Selection =

See SS-AS.

Called party extension =

MCC + MNC.

Called party SSI=

ISSI; or

GSSI.

Calling party extension =

MCC + MNC.

Calling party SSI =

ISSI; or

GSSI.

External Subscriber Number =

Up to 24 DTMF digits.

Hop count =

Record of hops in path

Status number =

0, emergency call;

1 to 32767, reserved;

32768 to 65535, available for TETRA network specific definition.

Short data type identifier =

0   user defined data-1;

1   user defined data-2;

2   user defined data-3;

3   user defined data-4.

User defined data 1 =

16 bit user defined data 1.

User defined data 2 =

32 bit user defined data.

User defined data 3 =

64 bit user defined data.

User defined data-4 =

user defined data bits, maximum length 2 047 bits.

4.6   Overall SDL

The following figure shows the overall SDL model for ANF-ISISD.

Process ANF_ISISD 1(1)

```
                              ╭────────╮
                              │        │
                              ╰────────╯
                                  │
                                  ▼
                              ╭────────╮
                              │  IDLE  │
                              ╰────────╯
            ┌─────────────────────┴─────────────────────┐
```

From local SwMI

From remote SwMI

ISISD_Transfer_request ISISD_Transfer_indication

Validate request Validate packet

Send packet Deliver

TX−ACTIVE IDLE
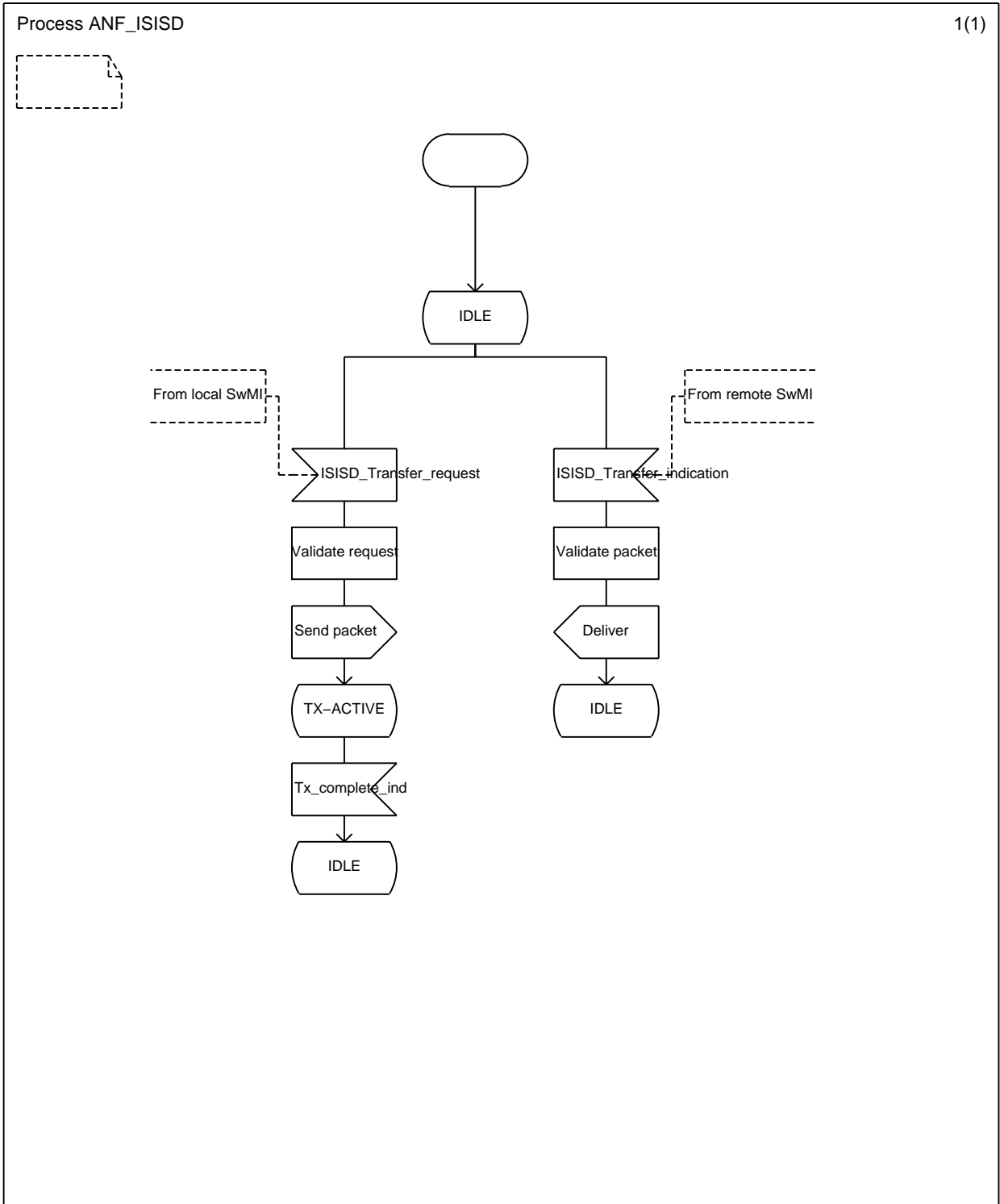
Tx_complete_ind

IDLE

Figure 2: SDL diagram for ANF-ISISD

5   ANF-ISISD stage 2 specification

5.1   Overview of functional entities

The following functional entities shall exist:

   FE1   Originating Short Data (OSD) functional entity;

   FE2   Originating ISI Short Data (OISD) transfer functional entity;

   FE3   Destination ISI Short Data (DISD) transfer functional entity;

   FE4   Destination Short Data functional entity.

5.1.1   FE2, Originating ISI Short Data transfer functional entity

The role of FE2 is to accept from FE1 a request to deliver an SDS or Status message to the peer FE3 entity.

It shall encode tetraIsiMessage where the ROSE source and destination entities are anfIsisd as defined in table 10 of ETS 300 392-3-1 [3].

It shall increment the value of hop count on every transmission. This may be used to detect problems (maximum value of hop count should be 2 (i.e. from source to home of destination, from home of destination to SwMI where destination is registered)).

5.1.2   Relationships between FEs
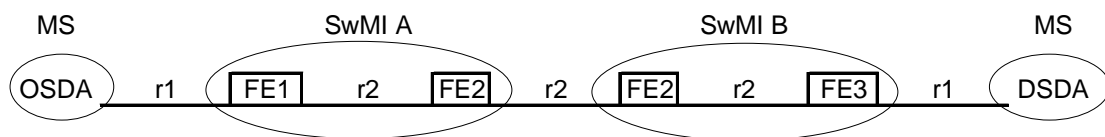
Figure 3: FEs and the relationships between them

5.2   Information flow

5.2.1   Definitions of information flows

Each ANF-ISISD message is sent from the source SwMI to the home of the destination SwMI, or for group addressed messages to the group controlling SwMI. The transfer is connectionless with the message being carried in a ROSE Invoke APDU. There is limited ROSE confirmation (i.e. the service improves upon best effort).
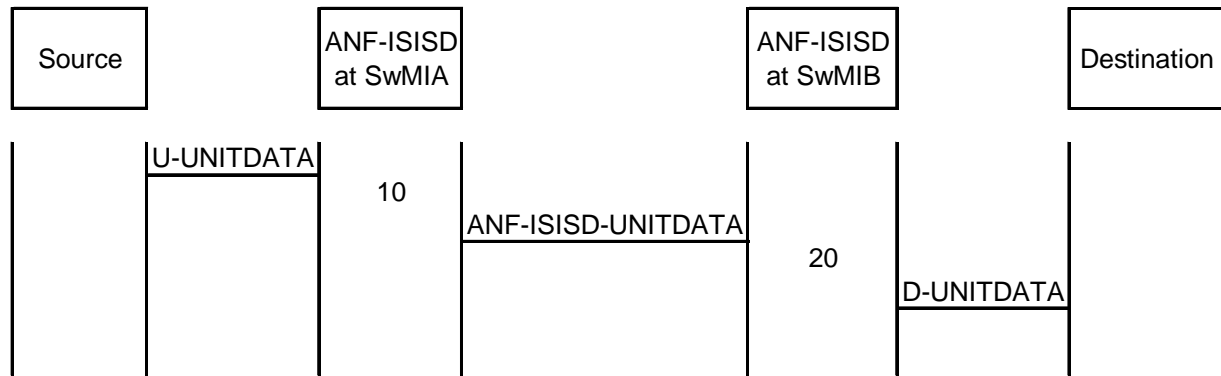
Figure 4: ITSI addressed SDS/Status from SwMIA to SwMIB

The ANF-ISISD-UNITDATA request is an unconfirmed information flow.

Upon receipt in the SwMI of the U-UNITDATA from the source MS the parameters received shall be translated to an ANFISISD-UNITDATA primitive which shall invoke the ANF-ISISD-UNITDATA transmission.

6   ANF-ISISD stage 3 specification

ANF-ISISD shall be carried as an Invoke APDU of the ROSE operation tetraIsiMessage defined in table 10 of ETS 300 392-3-1 [3].

The exception handling described in ETS 300 392-3-1 [3] shall apply.

6.1   ROSE operation

ANF-ISISD shall be transported using a call unrelated ROSE APDU as defined in ETS 300 392-3-1 [3], subclause 8.3.2.2 and set up as defined in ETS 300 392-3-1 [3], subclause 8.3.2.2.1 where no call independent signalling connection exists, or as defined in ETS 300 392-3-1 [3], subclause 8.3.2.2.2 where an independent signalling connection already exists.

The service primitives described in tables 1 and 2 shall be encoded into the TetraMessage element of the ROSE message as follows:

The source entity and destination entity shall be set to "anfIsisd" as defined in ETS 300 392-3-1 [3], table 16.

Table 3: Parameters for the ANF-ISISD-UNITDATA PDU

Parameter	Type	M/O/C	Length	Notes
Called party SSI	1	M	24	
Called party extension	1	M	24	
Called party external subscriber number length	1	M	5	
Called party external subscriber number	1	C	varies	Up to 24 digits
Calling party SSI	1	M	24	
Calling party extension	1	M	24	
Calling party external subscriber number length	1	M	5	
Calling party external subscriber number	1	C	varies	Up to 24 digits
ISISD Subtype	1	M	1	0 = Status 1 = SDS
Status number	1	C	16	If ISISD subtype = 0
Short data type identifier	1	C	2	If ISISD subtype = 1
User defined data-1 (note)	1	C	16	
User defined data-2 (note)	1	C	32	
User defined data-3 (note)	1	C	64	
Length of SDS-4 (note)	1	C	11	
User defined data-4 (note)	1	C	varies	
Hop count	1	M	2	
Radio interface access priority	3	O		
Area selection	3	O		
Proprietary	3	O		
NOTE: Depending on the value of short data type identifier.				

Table 4: Encoding of ANF-ISISD information element in a PSS1 FACILITY message

PSS1 FACILITY message	M/O/C
Facility information element	
Protocol discriminator	M
Call reference	M
Message type	M
Facility information element	
Identifier	M
Length	M
Protocol profile (Networking Extensions)	M
Network Facility Extension (NFE)	M
Network Protocol Profile	-
Interpretation APDU	O
Service APDU: ROSE INVOKE	
Identifier	M
InvokeId	M
LinkedId	-
OperationValue	M
ARGUMENT: tetralsiMessage	
SourceEntity anflsisd	
DestinationEntity anflsisd	
TetraMessage M	
PDU Type ANF-ISISD	
Security level at calling user air interface M	
… and the ANF-ISISD PDU goes here M	
Notification indicator O	
Proprietary O	
END of TetraMessage	
Extension O	
END of ARGUMENT	
END of Service APDU	
END of facility information element	
Notification Indicator O	
END of PSS1 SETUP message	

NOTE 1:	The value put in the information element calling party number will be a PISN number in the range of numbers allocated to the originating SwMI.	
NOTE 2:	The value put in the information element calling party number will be a PISN number in the range of numbers allocated to the called SwMI.	
NOTE 3:	SSI = Short Subscriber Identity.	

Annex A (normative):
Interaction with other TETRA supplementary services and ANFs

Interactions with other TETRA supplementary services and ANFs for which TETRA Standards were available at the time of publication of the present document are specified below. SDS is a connectionless service and that those supplementary services which apply to connection oriented only services shall not apply.

A.1 Calling Line Identification Presentation (SS-CLIP)

Not applicable. The calling party identity is an integral part of SDS.

A.2 Connected Line Identification Presentation (SS-COLP)

Not applicable. Not applicable to SDS as the service is connectionless.

A.3 Calling/Connected Line Identification Restriction (SS-CLIR)

Not applicable. Not applicable to SDS as the calling party identity is an integral part of SDS.

A.4 Connected Name Identification Presentation (SS-CONP)

Not applicable. Not applicable to SDS as the service is connectionless.

A.5 Completion of Calls of Busy Subscriber (SS-CCBS)

Not applicable.

A.6 Completion of Calls on No Reply (SS-CCNR)

Not applicable.

A.7 Call Forward Unconditional (SS-CFU)

Shall be activated upon definition. Shall apply to all ANF-ISISD messages directing the message to the forwarded to address. The definition of CFU may invoke ANF-ISISD.

A.8   Call Forwarding Busy (SS-CFB)

Not applicable.

A.9   Call Forwarding No Reply (SS-CFNR)

Not applicable.

A.10   Call Report (SS-CR)

Not applicable.

A.11   Talking Party Identification (SS-TPI)

Not applicable.

A.12   List Search Call (SS-LSC)

Not applicable.

A.13   Call Authorized by Dispatcher (SS-CAD)

Not applicable.

A.14   Short Number Addressing (SS-SNA)

Not applicable.

A.15   Area Selection (SS-AS)

Contained within source Primitive. May be used to qualify the invocation of ANF-ISISD. Carried in the transferred PDU for interpretation by receiving SwMI.

A.16   Access Priority (SS-AP)

Not applicable.

A.17   Priority Call (SS-PC)

Not applicable.

A.18 Call Waiting (SS-CW)

Not applicable.

A.19 Call Hold (SS-HOLD)

Not applicable.

A.20 Late Entry (SS-LE)

Not applicable.

A.21 Transfer of Control (SS-TC)

Not applicable.

A.22 Pre-emptive Priority Call (SS-PPC)

Not applicable.

A.23 Include Call (SS-IC)

Not applicable.

A.24 Advice of Charge (SS-AoC)

Not applicable.

A.25 Barring of Outgoing Calls (SS-BOC)

Not applicable.

A.26 Barring of Incoming Calls (SS-BIC)

Not applicable.

A.27 Discreet Listening (SS-DL)

Not applicable.

A.28 Ambience Listening (SS-AL)

Not applicable.

A.29 Dynamic Group Number Assignment (SS-DGNA)

Not applicable.

A.30 Call Retention (SS-CRT)

Not applicable.

A.31 ISI Individual Call (ANF-ISIIC)

No interaction.

A.32 ISI group call (ANF-ISIGC)

No interaction.

A.33 ISI Mobility Management (ANF-ISIMM)

The mobility management shall allow SDS to be operated over ISI.

History

Document history				
Edition 1	March 2000	Public Enquiry (as ETS 300 392-3-4)	PE 20000728:	2000-03-29 to 2000-07-28
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