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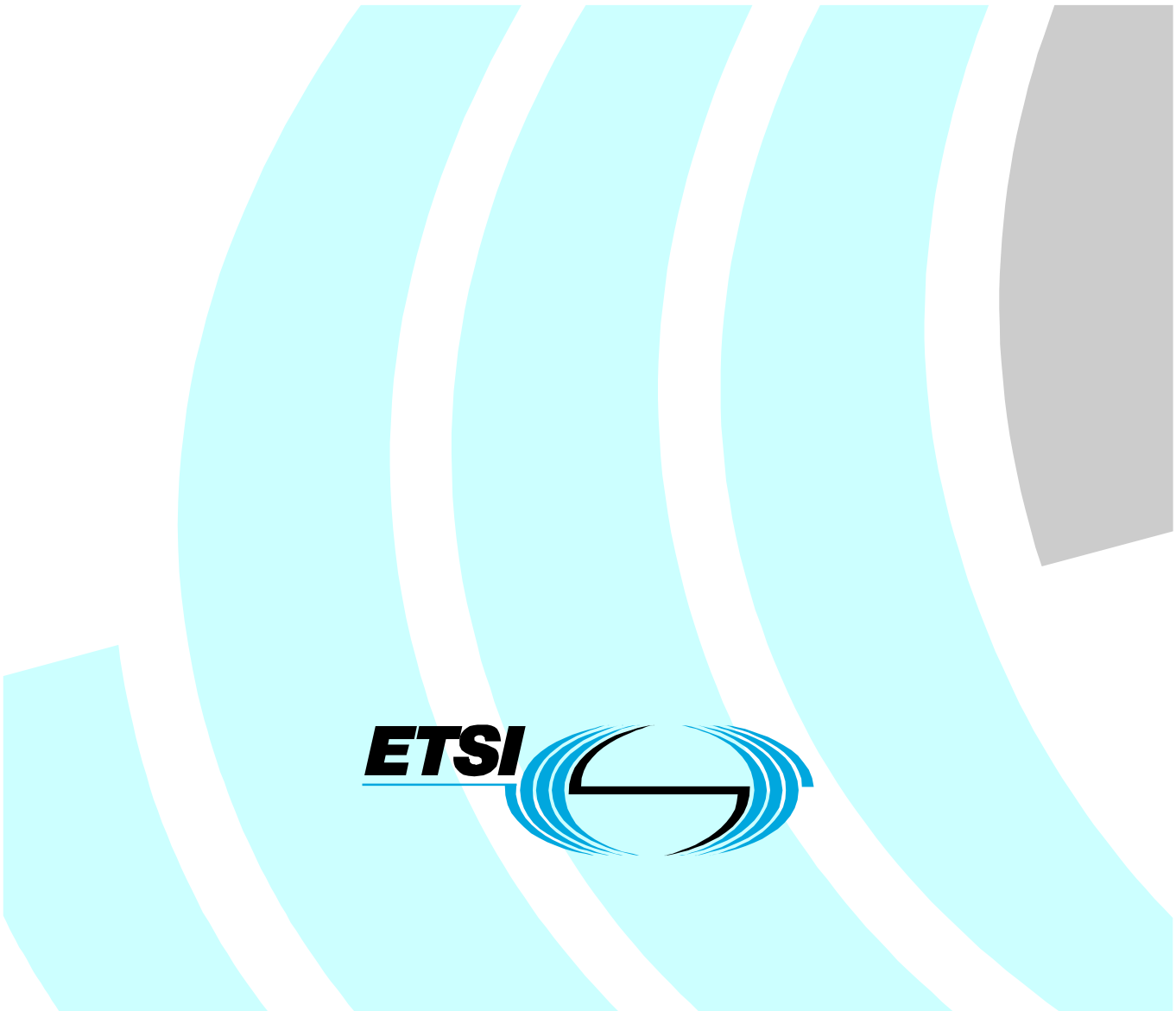
European Standard (Telecommunications series)

Terrestrial Trunked Radio (TETRA); Voice plus Data (V+D); Part 5: Peripheral Equipment Interface (PEI)



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ETSI

650 Route des Lucioles
F-06921 Sophia Antipolis Cedex - FRANCE

Tel.: +33 4 92 94 42 00 Fax: +33 4 93 65 47 16

Siret N° 348 623 562 00017 - NAF 742 C
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Contents

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Foreword

This European Standard (Telecommunications series) has been produced by ETSI Project Terrestrial Trunked Radio (TETRA), and is now submitted for the ETSI standards One-step Approval Procedure.

The present document is part 5 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)";

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 Release 1.1 specifications".

Proposed national transposition dates	
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1 Scope

The present document specifies the functional and technical aspects of TETRA Peripheral Equipment Interface (PEI) that is the interface between a Terminal Equipment type 2 (TE2) and a Mobile Termination type 2 (MT2) at reference point RT.

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 and/or edition number or version number) or non-specific.
- For a specific reference, subsequent revisions do not apply.
- For a non-specific reference, the latest version applies.

Referenced documents which are not found to be publicly available in the expected location might be found at http://docbox.etsi.org/Reference.

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

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

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

[4] ITU-T Recommendation V.24: "List of definitions for interchange circuits between data terminal equipment (DTE) and data circuit-terminating equipment (DCE)".

[5] ITU-T Recommendation V.250: "Serial asynchronous automatic dialling and control".

[6] ITU-T Recommendation V.28: "Electrical characteristics for unbalanced double-current interchange circuits".

[7] ETSI TS 100 585: "Digital cellular telecommunications system (Phase 2+) (GSM); Use of Data Terminal Equipment - Data Circuit terminating; Equipment (DTE - DCE) interface for Short Message Service (SMS) and Cell Broadcast Service (CBS) (GSM 07.05 version 7.0.1 Release 1998)".

[8] ETSI TS 100 916: "Digital cellular telecommunications system (Phase 2+); AT Command set for GSM Mobile Equipment (ME) (3GPP TS 07.07 version 7.8.0 Release 1998)".

[9] Void

[10] Void.

[11] ITU-T Recommendation T.50: "International Reference Alphabet (IRA) (Formerly International Alphabet No. 5 or IA5) - Information technology - 7-bit coded character set for information interchange".

[12] IETF RFC 1661: "The Point-to-Point Protocol (PPP)".

[13] IETF RFC 1662: "PPP in HDLC-like Framing".

[14] Void

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

[16] ITU-T Recommendation E.164: "The international public telecommunication numbering plan".

[17] ETSI TS 127 007 (V3.3.0): "Digital cellular telecommunications system (Phase 2+) (GSM); Universal Mobile Telecommunications System (UMTS); AT command set for 3GPP User Equipment (UE) (3G TS 27.007 version 3.3.0 Release 1999)".

[18] ETSI EN 300 812: "Terrestrial Trunked Radio (TETRA); Security aspects; Subscriber Identity Module to Mobile Equipment (SIM - ME) interface".

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

[20] ETSI ETS 300 392-12-7: "Terrestrial Trunked Radio (TETRA); Voice plus Data (V+D); Part 12: Supplementary services stage 3; Sub-part 7: Short Number Addressing (SNA)".

[21] ETSI ETS 300 392-12-16: "Terrestrial Trunked Radio (TETRA); Voice plus Data (V+D); Part 12: Supplementary services stage 3; Sub-part 16: Pre-emptive Priority Call (PPC)".

[22] ISO 8859-1: "Information technology - 8-bit single-byte coded graphic character sets - Part 1: Latin alphabet No. 1".

[23] Void.

[24] Void.

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

[26] ITU-T Recommendation T.35: "Procedure for the allocation of ITU-T defined codes for non-standard facilities".

[27] ETSI TS 101 356: "Digital cellular telecommunications system (Phase 2+); General Packet Radio Service (GPRS); Mobile Station (MS) supporting GPRS (GSM 07.60 version 7.2.0 Release 1998)".

[28] ETSI EN 300 396-10: "Terrestrial Trunked Radio (TETRA); Technical requirements for Direct Mode Operation (DMO); Part 10: Managed Direct Mode Operation (M-DMO)".

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

[30] 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)".

3 Symbols and abbreviations

3.1 Symbols

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

[...]	Optional sub parameter of a command or an optional part of a Mobile Termination (MT) response is enclosed in square brackets. Brackets themselves do not appear in the command line. When sub parameter is not given in parameter type commands, new value equals to its previous value. In action type commands, action should be done on the basis of the recommended default setting of the sub parameter.
<...>	Name enclosed in angle brackets is a syntactical element. Brackets themselves do not appear in the command line.
<CR>	Carriage return character, the value is specified by command S3.
<ESC>	Esc character.
<LF>	Linefeed character, which value is specified with command S4.
<SPACE>	One or more space characters.

bold Bold defined sub parameter value is the recommended default setting of this sub parameter. In parameter type commands, this value should be used in factory settings, which are configured by ITU-T Recommendation V.250 [5] command &F0. In action type commands, this value should be used when sub parameter is not given.

3.2 Abbreviations

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

AI	Air Interface
AP	Access Priority
AS	Area Selection
ASSI	Alias Short Subscriber Identity
AT	ATtention
ATD	ATtention Dial
CC	Call Control
CDPD	Cellular Digital Packet Data
CLIR	Calling Line Identification Restriction
CMCE	Circuit Mode Control Entity
CNMI	Command New Message Indication
CTCC	Command TETRA Call Connect
CTS	Clear To Send
DCD	Data Channel received line signal Detector
DCE	Data Circuit-terminating Equipment
DLL	Data Link Layer
DMO	Direct Mode Operation
DSR	Data Set Ready
DTE	Data Terminal Equipment
DTMF	Dual Tone Multi Frequency
DTR	Data Terminal Ready
GPS	Global Positioning System
GSM	Global System for Mobile communications
GSSI	Group Short Subscriber Identity
GTSI	Group TETRA Subscriber Identity
IANA	Internet Assigned Numbers Authority
IP	Internet Protocol
IPCP	Internet Protocol Control Protocol
IPv4	Internet Protocol version 4
IPv6	Internet Protocol version 6
IRA	International Reference Alphabet
IT	Information Technology
ITSI	Individual TETRA Subscriber Identity
LA	Location Area
LCP	Link Control Protocol
MCC	Mobile Country Code
MM	Mobility Management
MMI	Man Machine Interface
MNC	Mobile Network Code
MNI	Mobile Network Indetity
MS	Mobile Station
MSB	Most Significant Bit
MT	Mobile Termination
MTA	Mobile Terminal Application
MT2	Mobile Termination type 2
PABX	Private Automatic Branch eXchange
PC	Personal Computer
PCCA	Portable Computer and Communications Association
PDP	Pack Data Protocol
PDU	Packet Data Unit
PEI	Peripheral Equipment Interface
PG	Protective Ground

PPP	Point-to-Point Protocol
PSTN	Public Switched Telephone Network
PTT	Push To Talk
RD	Received Data
RFC	Request for Further Comment
RI	Ring Indicator
RT	Reference point
RTS	Request To Send
SAP	Service Access Point
SDL	Specification and Description Language
SDS	Short Data Service
SG	Signal Ground
SIM	Subscriber Identity Module
SMS	Short Message Service
SNA	Short Number Addressing
SS	Supplementary Service
SSI	Short Subscriber Identity
STCH	STealing CHannel
SwMI	Switching and Management Infrastructure
TCH	Traffic Channel
TD	Transmitted Data
TE	Terminal Equipment
TE2	Terminal Equipment type 2
TEI	Terminal Equipment Identity
TMD-SAP	Trunked Mode D Service Access Point
TMO	Trunked Mode Operation
TNP1	TETRA Network Protocol type 1
TNP1R	TETRA Network Protocol 1 Relay
TSI	TETRA Subscriber Identity
UDP	User Datagram Protocol

4 Overview of TETRA PEI

4.1 Introduction

The TETRA PEI provides a link between a Data Terminal, TE2, such as a Personal Computer (PC) or specialist data terminal, and a TETRA Mobile Station, MT2 at a reference point RT. The PEI provides external data devices with access to the services offered by a TETRA network.

The PEI is a dedicated point-to-point link, even for TNP1, which uses wide area addressing. In this issue of the document the PEI shall not be connected to a network.

The present document considers the radio part of the MT is always operating in trunked mode. A future version may introduce the concept of PEI commands (both AT and TNP1) operating an MT where the radio part is in Direct Mode Operation (DMO).

With respect to data services, the TETRA PEI will be used for the following:

- transmission and reception of packet data (including setting of packet data parameters);
- transmission and reception of circuit data (including setting of circuit data parameters);
- transmission and reception of short data (including setting of short data parameters).

In addition to data services the TETRA PEI may be used for the following:

- set-up and control of speech calls (including setting of speech call parameters);
- access to general information of MT2 and network;
- access to user applications located in MT2.

The TETRA PEI includes components which are not required by all the functions listed above and therefore, depending on the functionality that a MT2 supports, not all aspects of the PEI need to be implemented.

TETRA PEI has been designed to fulfil the following key requirements:

- a standard physical interface, widely adopted in the Information Technology (IT) world;
- minimal extra software in the TE2;
- broad compatibility with other wireless data systems;
- access to the full range of MT2 functionality (TE applications may use profiles to restrict functionality).

4.2 Protocol architecture

The physical layer for the TETRA PEI is assumed to be a serial form channel. Use of the ITU-T Recommendations V.24 [4] and V.28 [6] type serial interface is defined in the present document in detail due to the widespread use in the computing industry. PEI uses a sub-set of ITU-T Recommendation V.24 [4] interchange circuits. The present document does allow a manufacturer to provide other data interfaces in addition (e.g. infra red and Ethernet) but V.24 is used throughout as the layer 1 definition.

Figure 1 proposes the protocols to be used over the physical interface.

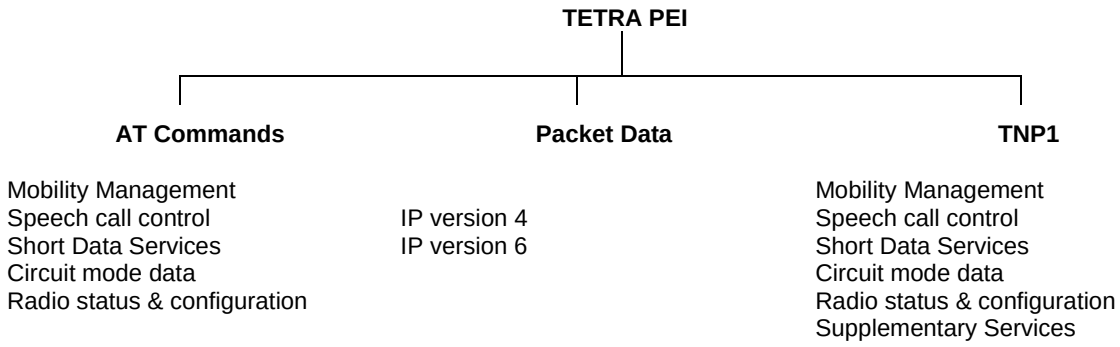

Figure 1: PEI Components

These three categories of service access are outlined in detail in the present document. Depending on the services being supported by a MT2, it may not be necessary to support all of these categories. The difference between AT command and TNP1 is that the TNP1 commands can be sent in parallel with ongoing packet data services whereas AT commands can only be sent in the command state.

4.3 Context model

The drawing in figure 2 shows the PEI in context with the MT and TE applications. The present document specifies the signalling at the reference point RT but the rest of the figure is useful to put the PEI in context with the rest of the TE and MT features. The names given to various SAPs in the figure are either Air Interface definitions taken from EN 300 392-2 [2] or given to the PEI for use throughout this overview.

Note that voice packets are never sent over the PEI. Only the call set up, maintenance and clear down signalling for speech calls are sent on the PEI. The actual voice packets go directly from the MT codec to the TMD-SAP. This switching is performed according to the "basic service information" element in call set up signalling.

Circuit mode data may be sent over the PEI, note that in TNP1 mode the data may be passed through the TNP1 entity in figure 2.

Throughout the present document the aim is to reuse applications that already exist in the MT as a result of other TETRA specifications.

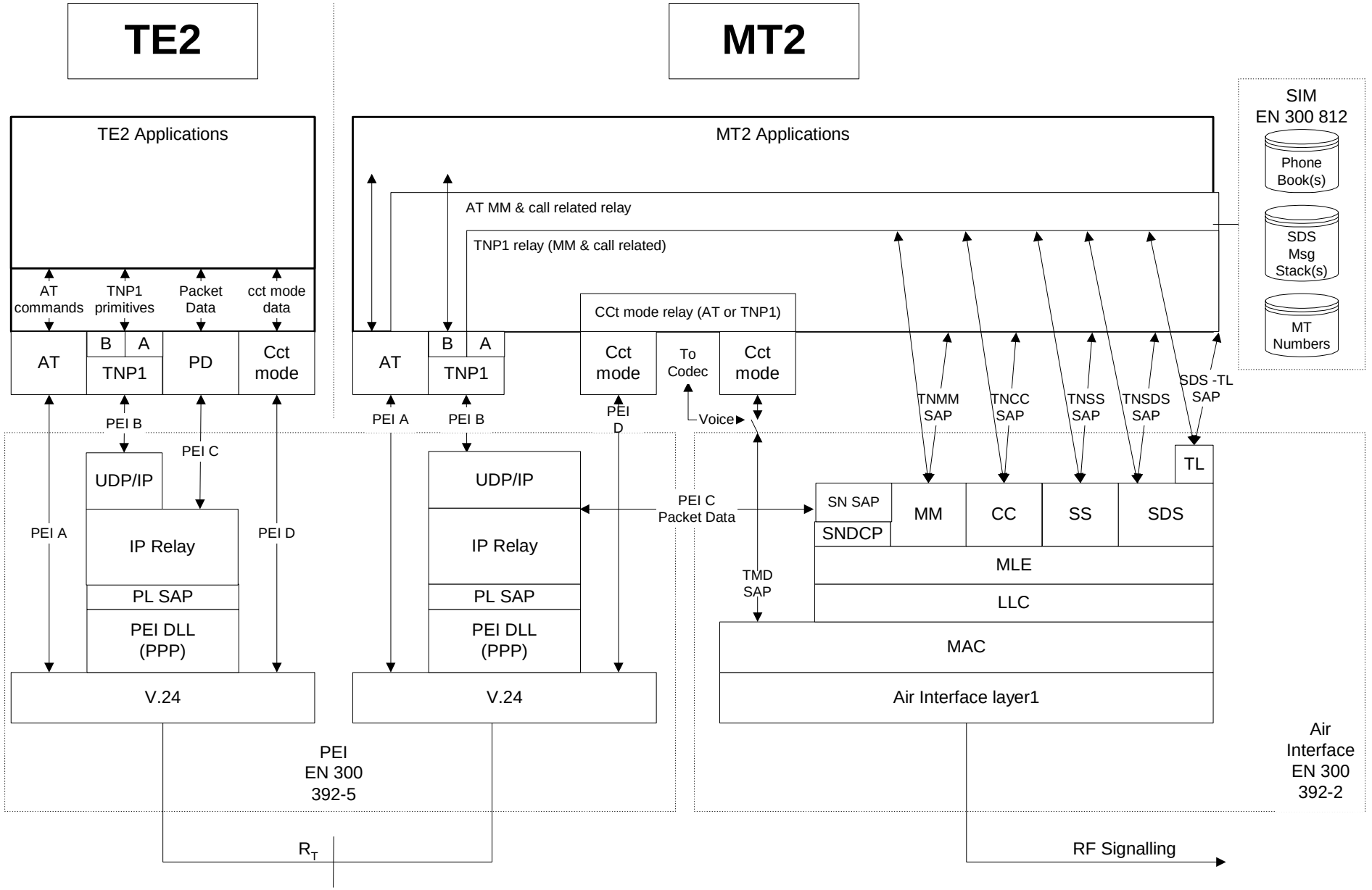

Figure 2: PEI Context

4.4 Void

4.5 SDS Message stacks

Incoming and outgoing SDS messages are optionally stored on message stacks in the MT. For the purposes of the present document the SDS message stacks are taken to be those defined in the SIM specifications EN 300 812 [18]. The stacks are not necessarily identical to the SIM, as these are typically copied into the MT applications, as the SIM interface is somewhat slow for real time use. The stacks (or their copies) are used by the MT application to remove any link with the air interface for the timing of SDS message sending. In some implementations, they may also be used to store sent and received messages for later review by the Mt or TE applications. This feature is particularly useful for the PEI as the TE and MT can synchronize their stacks by using read and write commands on link establishment.

NOTE 1: The behaviour of the SDS message stacks (SIMs) cannot be changed; they are fixed and linear. If a stack indicates it is full then no more messages can be received from the air interface or from the TE for that stack. Implementers should try to delete unneeded messages from the MT stack. Methods for determining the unneeded messages are outside the scope of the present document.

Indication of incoming messages to any stack may be relayed to applications of the MT, or to the PEI, or both. The choice is made by user commands, which set a profile of SDS stack operation. The PEI will use indications, sent to it, to read messages off the stack that are of interest to it (or its application). The TE should take care to read only the number of messages it can handle without memory overflow. This is especially important with SDS type 4 messages as they can contain many bytes each. It is an implementation decision as to when to read any subsequent SDS messages.

A summary of some of the SDS message stacks is given here for convenience so that the AT and TNP1 commands can be put in context, the specifications in EN 300 812 [18] have priority. Commands sent on the PEI can be used to act on the messages in the stacks.

NOTE 2: For reference to all SDS stacks within the MT the TE should track the references given to messages (in the index field) within the MT. When using SDS-TL messaging there is an additional reference within the TL header (message reference), which is also generated within the MT.

The local referencing shall be implemented by exchange of messages at the start of any SDS PEI sequence. To ensure complicity of TE and MT references SDS transactions shall be initiated one at a time and use the returned MT reference for linking further responses. For SDS-TL this field would be the "message reference". For other SDS transactions this would be "SDS instance" for direct messages and the combination of "AI Service" and "Message Index" for messages that use the message stacks.

All stacks have up to 255 entries, each of which is made up of several fields. The fields pertinent to the PEI are briefly explained below.

4.5.1 Status message texts

For each status value that has been provisioned with a text string this stack holds the status value and the programmed string. The text string is coded in the SIMs using the default 8-bit alphabet ISO 8859-1 [22].

4.5.2 SDS 1 message texts

For each SDS1 value that has been provisioned with a text string this stack holds the SDS1 value and the programmed string. The text string is coded in the SIMs using the default 8-bit alphabet ISO 8859-1 [22].

4.5.3 Status and SDS types 1, 2 and 3

Message Index 0 to 65,535, used to identify messages more uniquely than the message pointer (256).

Address Message Destination or Source identifier.

Message Status Message sending and reading status (Received from AI but not read / Received from AI and read/ Application originated to be sent / sent).

SDS type Status, SDS Type 1 SDS type 2 SDS type 3.

SwMI Time Defined in EN 300 392-2 [2].

User Data Dependant on the SDS type.

NOTE: If the SwMI time is to be used by the TE for outgoing messages it is out of the scope of the present document to define how it is set.

4.5.4 SDS type 4

Message Index 0 to 65,535, used to identify messages more uniquely than the message pointer (256).

Address Message Destination or Source identifier.

Message Status Message sending and reading status (Received from AI but not read/Received from AI and read/ Application originated to be sent / sent).

Protocol ID SDS-TL protocol identifier. Defined in EN 300 392-2 [2].

Message Header If SDS-TL is used this field is the SDS-TL header (message reference, delivery report request, storage, validity period, service selection, forward address (only in case of storage).

SwMI Time Defined in EN 300 392-2 [2].

User Data If SDS-TL protocol is used this field includes the TL header information (e.g. PID and message reference).

NOTE 1: If the SwMI time is to be used by the TE for outgoing messages it is out of the scope of the present document to define how it is set.

NOTE 2: In AT commands for SDS-TL, the data is structured more like the air interface than the SIM definitions. That is the fields for protocol ID and the TL header are part of the use data. The application developer should understand these fields (see clause 4.8).

4.6 Phone books

The phone books are also defined in the SIM definitions in EN 300 812 [18] and the MT may have access to several types of phone book. In particular there are books for PSTN numbers, TETRA numbers, group numbers and last numbers dialled or received.

In the present document TNP1 commands have no access to the phone books. The AT commands have access to a PSTN phone book only, for functionality similar to GSM.

The use of entries in this phone book (e.g. PABX numbers) is outside the scope of the present document.

Future versions of the present document will expand on the access to phone books in the MT.

4.7 Reserved status values considerations

The routing of all status values shall follow profile settings even if they contain reserved values (including the emergency value 0).

4.8 SDS-TL considerations

The SDS Transport Layer protocol is fully defined in EN 300 392-2 [2] and is in fact a layer on top of the standard SDS type 4 messages. This is shown in the context model of figure 2. The transport layer protocol elements are contained in a message header and are briefly:

- Protocol Identifier;
- Delivery Report request;
- Service Selection;
- Short Form Report;
- Storage (Store and forward via the SwMI or a service centre);
- Validity Period;
- Message Reference;
- Message Reference Handle (Applicable to TNP1 only as AT commands can only go "one at a time");
- Forward Addressing (Applicable when "storage" is true).

The application developer should understand these features and know that the SDS-TL header elements shall be encoded as part of the user data parameter, both on AT command lines and in TNP1 PDUs.

The "user data" part of a SDS type 4 message includes SDS-TL header information. . Some of the header element values and the treatment of the Transport Layer (TL) protocols should be set by the TE and some by the MT.

Only the application in the TE can know what values to put in some of the TL elements (protocol ID, delivery report request, service selection, storage and validity period). This means the TE manufacturer should understand the transport layer of SDS type 4 and be able to fill the relevant fields. The SDS-TL is defined in the TETRA air interface specification EN 300 392-2 [2] clause 29.

On the other hand the MT shall add the message reference to the data, as they are unique for the air interface, indeed SDS messages could be sent via the MT MMI (especially if the TE was not connected). For this reason the "message reference" for any given SDS-TL transfer shall be obtained from the MT.

NOTE: When using TNP1 commands the user application may make use of temporary message references (message reference handle). The AT command set does not use this reference, to keep more compatibility with GSM. The implication is that when using AT commands a second SDS-TL message cannot be sent until the MT has replied with the message identifier.

For store and forward applications there are two sides. The TE application will know if it wants to make use of the store and forward service centre and should indicate this to the MT. The service availability is sent in an Air Interface broadcast from the SwMI. As this may change as the MT roams the MT should forward (at least changes to) this broadcast information to the TE in near real time. The MT may still receive messages it cannot process and may have to look inside SDS-TL headers to confirm valid requests. Both TNP1 and AT commands will have the unsolicited response to carry system broadcast information.

Addressing is especially important for applications that want to send SDS-TL using a store and forward service centre. In this case the called party address field on the AT command line or the TNP1 PDU is that of the service centre. The final address (forward address) of the message is in the user data field. The service centre address can be obtained from the MT using AT or TNP1 commands. For details on addressing for store and forward services refer to EN 300 392-2 [2] clause 29.

The SDS-TL transport layer reports will be independent message exchanges, which are linked at the application layer by the SDS-TL "message reference". Local responses to message sending shall not be used to indicate that the destination user has read the SDS-TL message only that the SDS message has been sent or written to the message stack.

4.9 AT commands

4.9.1 General on AT commands

AT commands are widely used in the IT world as a means of controlling modems from a PC or other intelligent terminal. AT commands have been adopted by many wireless systems as a means for accessing data services (e.g. GSM, CDPD, Mobitex etc.) and are therefore used as a basis in the TETRA PEI to give access to TETRA services. The TETRA services available using AT commands includes call control, mobility management and SDS.

Access to Supplementary Services is not provided in this edition of the present document.

In addition there are commands to access the radio configuration and storage parameters.

Whilst compatibility with existing AT commands is important, it shall be borne in mind that the different services offered, as part of the TETRA specifications, (e.g. half duplex, group addressing and additional SDS services) will necessarily mean adaptation of the commands as defined in the present document.

The present document also gives AT commands that can be used to set up voice calls.

With reference to figure 2 the AT commands use the PEI A interface for commands.

Subsequent data calls will use the PEI D interface for circuit mode data or PEI C interface for packet data. Voice traffic is not carried over the PEI.

In the classical AT commands model, the MT effectively operates in one of two states, namely "Command" state and "On-line data" state. For the PEI this model has been altered slightly. The "On-line data" state is renamed to "AT circuit mode data" and there has been the addition of the "AT packet data" state. The "AT" is added to differentiate these states from any equivalent states entered by TNP1 commands.

The outline state diagram is shown in figure 3, if there is a conflict between the diagram and text the textual description takes precedence.

NOTE: When the MT or TE is not in "command state" then AT commands are ignored and only hardware or ESC sequences are recognized.

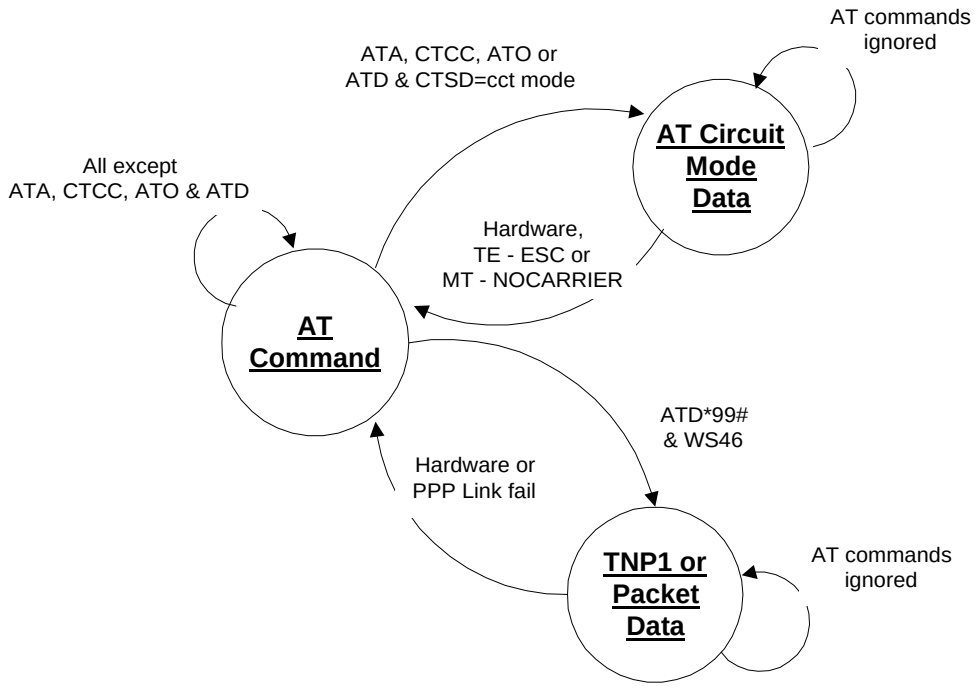

Figure 3: AT Command State Diagram

4.9.2 AT command state

Both TE and MT enter this state on initialization or PEI link establishment (e.g. DTR detection or AT? with OK response). It is always entered from on line data state when any ongoing call is cleared or when the TE sends a recognized Escape sequence.

Signalling received from the TE on logical circuit TD (V.24 circuit 103) is treated as command lines and processed by the MT. The MT command responses and any unsolicited messages are sent to the TE on logical circuit RD (V.24 circuit 104).

With reference to figure 2 the signalling is sent on the interface PEI A.

In this state all commands and responses will be accepted and acted on.

This is the state where typically the MT operating modes are set, MM information is received, SDS messages are sent and received and circuit mode calls are established.

Voice call(s) signalling (from the TE or air interface) will lead to a voice call(s) being active in this state.

NOTE 1: It is recommended that any signalling related to the setting up of a circuit mode data call be rejected during a voice call maintenance phase as the TD and RD lines are needed for call maintenance and clear down.

NOTE 2: Voice traffic is NOT carried over the PEI. This would typically be via a microphone and speaker connected to the MT audio path.

If a voice call is in progress, the MT will monitor the Air Interface for call maintenance and clear down signalling. The MT will also monitor for loss of connection with the other party(s). The MT will pass appropriate voice call maintenance and clear down signalling to the TE. The clear down of a voice call by the other party, the SwMI or loss of RF connection will cause a PEI disconnect signal with the appropriate cause.

The TE will monitor its any MMI actions or other applications and pass appropriate call maintenance and clear down signalling to the MT.

NOTE 3: If the MT has SDS stacks it is recommended the TE synchronize all the stacks using the "list" and "read" commands, or the "write commands when returning to AT command state.

4.9.3 AT circuit mode data state

A Circuit Mode Data call is in progress whilst in this state.

Signalling received from the TE on logical circuit TD (V.24 circuit 103) is forwarded as data to the appropriate destination (typically the MT U-Plane for transmission over the TETRA AI).

Circuit mode data destined for the TE is forwarded on logical circuit RD (V.24 circuit 104).

TE transmit flow control may be performed by the circuit CTS (V.24 circuit 106).

TE receive flow control may be performed by the circuit RTS (V.24 circuit 105).

NOTE: RS232 E reuses RTS as Ready For Receiving (RFR) for TE receive flow control.

With reference to figure 2 the signalling is sent on the interface PEI D.

The MT will monitor the Air Interface for call maintenance and clear down signalling.

In this state all AT commands are ignored as the signalling is on PEI D and nothing is routed to the AT entity. The TE Escape sequence from the TE or "NO CARRIER" from the MT may be considered as AT commands and are exceptions, as they will be acted upon. AT commands in this sense include indications of SDS messages that can be concurrently accepted by the MT (either directly or via the stacks).

4.9.4 TNP1 and packet data state

A TNP1 or Packet Data session is in progress whilst in this state. The correct destination for signalling in either direction is determined by the UDP/IP addressing.

Signalling received from the TE by the MT on logical circuit TD (V.24 circuit 103) is forwarded as data to the appropriate destination (typically the TNP1 relay or SNDCP for transmission over the TETRA AI). All AT commands are ignored in this state. AT commands in this sense include indications of SDS messages that can be concurrently accepted by the MT (either directly or via the stacks).

Signalling destined for the TE from the MT (TNP1 or packet data) is forwarded on logical circuit RD (V.24 circuit 104).

With reference to figure 2 the signalling is sent on the interface PEI B or PEI C.

This state has two sub-states called "local" and "wide". The local sub-state is one where the MT has no context active towards the SwMI. The wide sub-state is one where the MT has a context active towards the SwMI.

4.9.5 Transitions between states

4.9.5.1 Transition from AT command state to AT circuit mode data state

The AT Circuit Mode Data state is entered from AT Command as indicated below:

1) To initiate an outgoing circuit mode data call the TE sends a valid ATD command on logical circuit TD, where the previous +CTSDC command had defined the circuit mode data call parameters.

2) To accept an incoming circuit mode data call the TE sends a CTCC command on logical circuit TD, where the call set up signalling indicated a circuit mode data call.

3) For compatibility with GSM AT commands an incoming call may be answered with the ATA command. If the TE accepts all call parameters (e.g. number of slots) set by the incoming signalling.

4) For an ongoing circuit mode data call that has been interrupted by the TE Escape sequence the TE can send the ATO command to resume the interrupted call.

4.9.5.2 Transition from AT circuit mode data state to AT command state

The AT circuit mode data state is always left for AT Command, in one of four ways. The first two are only available if the hardware connection has circuits 108 and 109. Options 3 and 4 are only viable if the MT and TE both support the Hayes improved escape sequence with guard time. If hardware lines are used, the sending of "ESC" or "NOCARRIER" is optional.

1) The TE turns circuit 108 off (DTR, behaviour set using "&D" command).

2) The MT turns circuit 109 off (DCD, behaviour set using "&C" command).

3) The TE sends a complete, special "escape" sequence with timing constrictions (e.g. "<guard delay> +++ <guard delay>") on logical circuit TD.

4) The MT sends a special "<guard delay> NO CARRIER <guard delay>" unsolicited response on logical circuit RD.

NOTE: This method is not in any existing standard but is in the "industry standard" Hayes AT User Manual. It should only be used if the hardware circuits are not available.

4.9.5.3 Transition from AT command state to TNP1 or packet data state

The TNP1 or Packet Data state is entered from AT Command, for TNP1 link establishment or outgoing packet data context activation, as indicated below. Note only outgoing packet data context creation is possible:

1) The IP addressing to be used (wide or local) is set using the +WS46 command.

2) The TE sends ATD*99# on logical circuit TD. After the MT sends "CONNECT" the MT and TE negotiate a PPP link by transmitting LCP datagrams on logical circuits TD and RD. The IP addresses negotiated are determined by the previous +WS46 command according to table 2.

4.9.5.4 Transition from TNP1 and packet data state to AT command state

1) The TE turns circuit 108 off (DTR, behaviour set using "&D" command).

2) The MT turns circuit 109 off (DCD, behaviour set using "&C" command).

3) Either the TE or MT in the DLL closes the PPP link.

4.10 TNP1 and IP network layer

4.10.1 General operation

In order to transfer messages over the PEI, TNP1 uses the services of UDP/IP, IP Relay and the PEI DLL. The DLL used is PPP, which is defined in RFC 1661 [12]. The network layer is established in accordance with RFC 1662 [13]. The MT should be able to support all options to allow for different TE connections. This issue of the present document does not define a list of required options. Implementers should check for supported options of different suppliers through the MoU processes.

For TNP1 to operate, an IP connection between MT2 and TE2 has to be established. The exact mode of network layer establishment is outside the scope of the present document but is based on the PPP and UDP/IP combination. After receiving an administrative open event from the service user the TNP1 entity, as a kind of IP application, should ask for a socket from the IP service task. From this point the TNP1 entity is ready for service.

The TNP1 signalling is carried via a dedicated UDP port.

The IANA have allocated a well-known port number of 4024/udp for this purpose, which is called tnp1-port.

The context of the network layer and its SAPs in the overall PEI is shown in figure 2.

4.10.2 IP addressing

There are two modes of IP operation supported by the PEI. Each mode has different addressing requirements as described below. In total the TE/MT combination needs three different addresses.

1) "TE IP". This is a fixed IP address used by all TEs its value is 10.0.0.100.

2) "MT IP". This is a fixed IP address used by all MTs its value is 10.0.0.101.

3) "MS IP". This is a dynamic address given to the MT by the SwMI on context activation.

These addresses are used differently in the two modes described below:

1) In both modes IP packets from the TE2 to MT2 internal applications have to use the <MT-IP> address.

2) The default mode for the MT is "wide".

4.10.3 Local mode

In this mode TNP1 runs over the PEI and is used solely for control of the radio and call processing. Al services are available to TNP1 except packet data transfer. As TNP1 runs over UDP/IP it still needs an IP address at both the TE and MT in order to communicate. The addresses used are the two static addresses "TE IP" and "MT IP". These addresses are set on link establishment. To allow for a connection of equipment (e.g. PC) that does not know the static address the link can be established using dynamic address techniques but the address given is always "TE IP". The MS shall know if the TE wants local (TNP1) operation or wide (packet data transfer, with or without TNP1) to know whether to give "TE IP" or "MS IP". The TE shall use the AT command WS46 to set whether the TE wants a local connection or a wide connection (wide is the default).

The use of source and destination addresses for the different local communications is shown in table 1.

Table 1: Local mode address use

Comms / Address	TE2->MT2	MT2->TE2	TE2->XXX (note 1)	XXX->TE2 (note 1)	MT2->XXX (note 2)	XXX->MT2 (note 2)
Source Address	TE IP	MT IP	N/A	N/A	N/A	N/A
Destination Address	MT IP	TE IP	N/A	N/A	N/A	N/A
UDP/IP port	TNP1	TNP1	N/A	N/A	N/A	N/A
NOTE 1: These packets will be discarded by the MT. NOTE 2: These transactions are not applicable to the PEI.						

4.10.4 Wide mode

In this mode all TNP1 services are available, in addition packet data transfers towards the SwMI are possible. The address used by the TE is that given by the SwMI during context activation and is "MS IP". To go into this mode the TE shall ensure the MT is in wide mode (the AT command WS46) and send the ATD command in order to activate a context towards the SwMI. The SwMI will assign the "MS IP" address, which will be used by the TE for packet data transfer.

The use of source and destination addresses for the different type of communications is shown in table 2. In this case the "MS IP" address is represented by XXX. The port numbers used as part of the addressing are labelled YYY and ZZZ.

NOTE: TNP1 messages always use the TNP1 port.

Table 2: Wide mode address use

Comms / Address	TE2->MT2	MT2->TE2	TE2->XXX	XXX->TE2	MT2->XXX	XXX->MT2
Source Address	MS IP	MT IP	MS IP	XXX	MS IP	XXX
Destination Address	MT IP	MS IP	XXX	MS IP	XXX	MS IP
UDP/IP port	TNP1	TNP1	YYY	YYY	ZZZ	ZZZ

4.11 TNP1 operation

The TETRA Network Protocol type 1 (TNP1) specifies a protocol to be used over the TETRA PEI designed to allow the TE to have control over the TETRA services. This includes mobility management; call control, SDS and supplementary services. In addition there are commands to access the radio configuration and storage parameters.

TNP1 itself is based on a connectionless, point-to-point, unreliable Network Layer Protocol.

With reference to figure 2 TNP1 commands and circuit mode data are carried over the PEI B interface via two SAPs.

- TNP1A-SAP, for conveying PDUs containing parameters required to invoke CMCE and MM service primitives, and to access circuit mode services of MAC;

- TNP1B-SAP, for communicating with user applications located in MT2.

There shall exist only one instance of TNP1A-SAP and TNP1B-SAP at a given point of time. No service access point identifier (SAPI) is provided, but the PDUs shall be routed to the right SAPs according to their PDU types.

Opening/closing of either of the TNP1A-SAP or TNP1B-SAP at either of the TNP1 peer entities will imply opening/closing of the same SAP at the peer entity.

The general availability of TNP1 services to the service users is defined by the link establishment status of the underlying PEI DLL service and UDP/IP service.

Packet data traffic initiated using TNP1 commands will use the PEI C interface. The differentiation between PEI B and PEI C (packet data) will be made using IP addresses set up at link establishment.

Circuit mode data calls initiated by TNP1 commands will use the PEIB interface and TEMAC Unitdata packets. Control of the data packet transmission towards the MT may be achieved by using the TEMAC Flow Control signalling.

NOTE 1: The voice traffic is not carried over the PEI but rather over the MT audio path.

Also shown in figure 2 is the MT TNP1 relay. Functions of the TNP1 Relay entity are:

- Transfer service requests between TNP1 entity and CC entity;
- Transfer SDS signalling between the TNP1 entity and either TNSDS SAP, TNSDS-TL SAP or the message stack;
- Transfer service requests between TNP1 entity and MM entity;
- Transfer circuit mode data and flow control indication between TNP1 entity and TMD SAP.

Routing of service requests between MT2 user applications and CMCE and MM entities is outside the scope of the present document. Similarly, rules for decision of which user application, located either in MT2 or ET2, shall handle the service primitives is outside the scope of the present document.

TNP1R is defined in order to clarify the relationship between the TNP1 protocol and MT2 services. The TNP1R-SAP is not intended to be a testable boundary.

NOTE 2: Implementation of any of the TNP1 PDUs is optional.

4.12 Link start up at the MT

Following common industry practice the PEI will always start in AT mode. Link establishment can be determined using the hardware signals (DTR, DSR) or by the TE sending "AT?" and receiving an "OK" response.

If the TE wants to use TNP1 it shall issue AT commands to start the UDP/IP link establishment in wide or local mode. For example, to go into wide TNP1 mode these would be WS46 = 14 followed by ATD*99#. The TNP1 link would be established as described in clause 6.8.4.3 negotiating the wide IP address.

NOTE 1: The default is "wide" mode, the WS46 = 14 command is strictly only needed if the local mode was previously selected.

NOTE 2: If the MT has SDS stacks it is recommended the TE synchronize all the stacks using the "list" and "read" commands, or the "write commands when the PEI link is established.

5 Physical layer

5.1 General on physical layer

This clause recommends the physical layers that should be used between a Terminal Equipment (TE) and a Mobile Termination (MT) at the TETRA reference point RT. The TE represents a DTE. The MT represents a DCE.

The present document defines a point-to-point configuration using a sub-set of ITU-T Recommendation V.24 [4] and ITU-T Recommendation V.28 [6]. In addition to the electrical level it defines physical connection pin numbers for certain widely used connector types, and the lowest layer transmission format for ITU-T Recommendations V.24 [4] and V.28 [6].

NOTE: The TE and MT shall have a minimum requirement of a hardware buffered UART on the serial port, to avoid loss of characters if the software is slow to read the incoming characters.

5.2 Electrical characteristics

The electrical characteristics should follow ITU-T Recommendation V.28 [6] for unbalanced signalling. Environments of high electrical noize may force implementers to adopt other electrical characteristics.

5.3 Physical connection

The present document does not specify the physical connection to be used at the interface. However, it is recommended that the MT presents a standard or commonly used interface to the TE (e.g. female DB-9 or RJ45). This may be presented via a MT specific cable.

If a D type connector is used, then it may be either a 25-pole or a 9-pole connector (receptacle).

If RJ11/RJ45 type connector is used, then it may be a 10-pole or 8-pole connector.

The pin assignment of the supported sub-set of V.24 signals to 9 way and 25 way D type connectors is shown in table 3, refer to ITU-T Recommendation V.24 [4] and ITU-T Recommendation V.28 [6]. The pin assignment follows current industry recommendations.

Table 3: V.24 interface pin assignment for Submin-D type connector

Circuit Number	Signal	Abbreviation	Submin-D type	
			9-pole	25-pole
101	Protective ground	PG	Screen	Screen + 1
102	Signal ground	SG	5	7
103	Transmitted Data	TD	3	2
104	Received Data	RD	2	3
105	Request to Send	RTS	7	4
106	Ready for sending (Clear to Send)	CTS	8	5
107	Data Set Ready	DSR	6	6
108/2	Data Terminal Ready	DTR	4	20
109	Data Channel received line signal Detector	DCD	1	8
125	Ring Indicator	RI	9	22
NOTE 1: The signal RTS may be reused as RFR according to RS232E. NOTE 2: The Ring Indicator signal is not used in this version of the present document. The circuit is reserved for possible future use.				

The pin assignment of a sub-set of V.24 signals to RJ11/RJ45 type connectors is shown in table 4. The 8 pole assignments are given in RS232D.

Table 4: V.24 interface pin assignment for RJ11/RJ45 type connector

Circuit Number	Signal	Abbreviation	RJ11/RJ45	
			8-pole	10-pole
101	Protective ground	PG		
102	Signal ground	SG	4	
103	Transmitted Data	TD	6	
104	Received Data	RD	5	
105	Request to Send	RTS	8	
106	Clear to Send	CTS	7	
107	Data Set Ready	DSR	1	
108/2	Data Terminal Ready	DTR	3	
109	Data Channel received line signal Detector	DCD	2	
NOTE: The Ring Indicator signal does not have a pin assigned for the 8-pole RJ11/45 connector.				

5.4 Character format

To enable fully transparent data transmission an 8-bit character format shall be used by default. In 8-bit format, characters are transmitted asynchronously with 1 start bit and 1 stop bit. No bit is used for parity checking. The 8-bit code is identified by b_8, b_7, b_6, b_5, b_4, b_3, b_2 and b_1, where b_8 is the most-significant bit (MSB) and b_1 is the least-significant bit (LSB). The bit combinations represent integer in the range 0 to 255 where b_8 has a weight of 128 and b_1 has a weight of 1.

The least-significant bit b_1 of the character is transmitted first.

The character format in the asynchronous operation is shown in figure 4.

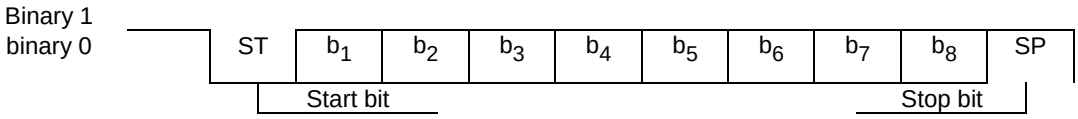

Figure 4: Asynchronous character transmission

Whilst the default is 8, N, 1 a MT may support other character formats, which a TE2 may select using the AT-command +ICF.

5.5 Data transmission rate

ITU-T Recommendation V.28 [6] shall apply. This generally defines signalling rates below 20 kbit/s, however under specific conditions described in annex A of ITU-T Recommendation V.28 [6], operation up to 115 kbit/s is possible.

The MT should be able to accept commands initially at 9 600 bit/s, as recommended in ITU-T Recommendation V.250 [5], and optionally be able to automatically detect the baud rate up to 115 kbit/s at the physical layer. Automatic baud rate detection at the establishment of the AT link needs the TE to transmit a sequence of redundant characters (e. g. "AT?") whilst waiting for a valid response (e. g. "OK").

6 AT command set

6.1 General on AT command set

This clause defines a profile of AT commands that may optionally be used in the PEI for controlling MT functions and TETRA network services from a TE. Whilst the whole clause is optional some commands have an "implementation" attribute of mandatory or optional. This attribute is conditional on the AT command set being implemented at all. In any case all the TETRA related commands should be implemented if the AT commands are implemented. Optional commands relate to the setting up of PEI parameters (e.g. S commands).

The terminology in relation to calls is that found in TETRA specifications.

Commands from ITU-T Recommendation V.250 [5] and existing digital cellular standards and TS 100 916 [8] are used whenever applicable.

The command prefixes "+C" for Digital Cellular are reserved as extensions to the basic command set in ITU-T Recommendation V.250 [5]. The present document uses the similar command prefixes and syntax to construct TETRA commands. Some existing commands have been taken as a basis and extended to include TETRA features. Some commands are specific to TETRA and so are new commands but use the "+C" prefix.

These AT commands allow access to voice, SDS, packet data and circuit data services.

6.2 Limitations

The AT implementation has the following limitations:

- Supplementary Services are not supported in the present document.
- The maximum length of a single line will be limited to that of the longest command (SDS-TL).
- AT commands can only be used when the TE and MT are both in the AT command state.
- All addressing digits in the command line are to be IRA characters.
- SDS, MM and MT status commands can be made during a voice call.
- The TE shall wait for a PEI response to an SDS message sending before sending another.

6.3 SDS user data

In AT commands the user data is defined by a combination of two parameters: A "length" parameter and the user data itself. The length parameter can be identified as the one before the <CR><LF> characters (useful in the event of optional parameters not present on the command line). The user data is after the <CR><LF> characters and before either a <CtrlZ> or <ESC> character. The <CtrlZ> character is used to "send" the data; the <ESC> character may be used to cancel the command. The cancel functionality is included to enable cancellation of sending in the event of manual entering of commands, where the operator may have made a typing mistake.

The length parameter gives the length of the user data in bits (excluding the <CR>, <LF> and <CtrlZ> characters) represented as ASCII Decimal. Whilst the length parameter is not strictly necessary for all except SDS type 4 it is made mandatory for consistency and MT sanity checking of the other data types (status, SDS types 1-3).

The user data itself is represented as ASCII Hex characters. Coding starts at the MS bit; each block of four bits is represented by one character; the characters are presented in the same order as the bits themselves. If the number of bits is not divisible by four, then the least significant bits of the least significant Hex digit are packed with "0".

For example, for a data field of "1010 0101 1011 1":

- The length will be "13".
- The user data will be "A5B8".

- The relevant part of a command line to send this data will be 13<CR><LF>A5B8<CtrlZ>.

6.4 AT command syntax

6.4.1 General on AT command syntax

This clause summarizes general aspects on AT commands and issues related to them. For further information see clause 5 of ITU-T RecommendationV.250 [5] and clause 4 of TS 100 916 [8]. In the descriptions that follow, words enclosed in **<angle brackets>** are references to syntactical elements. When they appear in a command line, the brackets are not used. Words enclosed in **[square brackets]** represent optional items; such items may be omitted from the command line at the point where they are specified, and when the items are used the square brackets are not included in the command line. Other characters that appear in syntax descriptions shall appear in the places shown.

6.4.2 Command line

A command line is made up of four elements: the prefix, the operator, the body, and the termination character, the general structure is shown below.

- <Command line> = < prefix><Body><termination character>.

6.4.2.1 Prefix

The command line prefix consists of the characters "**AT**" or "**at**". Alternatively, to repeat the execution of the previous command line, the characters "**A/**" or "**a/**".

6.4.2.2 Body

The body is made up of individual commands. Space characters are ignored and may be used freely for formatting purposes, unless they are embedded in numeric or string constants. The termination character may not appear in the body. The DCE should be capable of accepting at least 40 characters in the body.

The commands specified in the present document may be part of AT commands from other specifications, modified commands from other specifications or original commands to suit TETRA, the latter cannot be found in existing specifications. This body can have commands of types following those in ITU-T Recommendation V.250 [5] that is basic and extended. The extended commands have a body starting with the character "+".

6.4.2.3 Termination Character

The termination character is defined with the S3 register. The default value is <CR> (IRA 13).

6.4.3 Command Types

AT commands can have up to four different forms, indicated by an operator within the command body, defined below.

1) **Execution:** A command that has no parameters will have a body containing no operator at all. The MT will execute the command and any response returned. Some basic commands have no operator but nonetheless perform a "set" operation. Examples are ATA where no parameters are available and &D1 where the "1" is a value equivalent to a "set".

2) **Set:** A command body containing the operator "=" is used in two ways. It can either be used to "set" a parameter by storing a value or values for later use. Alternatively it can be used as an execution; that is to invoke a particular function of the equipment together with parameters needed as part of that function. Examples are ATS3=13 which sets the S3 parameter to <CR> and +CMSGL = <SDS status> which will read a list of SDS messages.

3) **Test:** A command body containing the operator "=?" is used to determine if the MT supports the command form the TE. The MT will return "OK" if the command is supported. If there are supported parameters associated with this command the range of values will be returned as well.

4) **Read:** A command body containing the operator "?" will return the value or values of any stored parameters related to that command.

6.4.4 Parameters

Set and read command types have an associated list of parameters, some are mandatory and some are optional. Optional parameters shall be treated in order. Parameters can be omitted if their place is "staked" by the ",". Trailing parameters and their "," can be omitted completely providing there are no more parameters. Any unused or omitted optional parameters shall be set to default values.

6.4.5 Examples

ATCMD1<CR> (basic execution command).

AT+CMD3=,15<CR> (extended set command with two leading optional parameters omitted).

AT+CMD3? <CR> (read command to get parameter values).

AT+CMD3=? <CR> (test command returns OK if supported and range of parameters).

6.4.6 Information responses and result codes

6.4.6.1 General on information responses and result codes

The MT responses should follow the definitions in ITU-T Recommendation V.250 [5]. They may be "verbose" or "numeric", as set by the "V" command. There are two types of responses that may be issued by the MT: information text and result codes.

Both consist of three parts: a header, text or result, and a trailer. The characters transmitted for the header are determined by a user setting (see the **V** command). In verbose mode the trailer consists of two characters, being the character having the ordinal value of parameter **S3** followed by the character having the ordinal value of parameter **S4**.

6.4.6.2 Information Responses

Information results have text only after the header. The result text may be transmitted as a number or as a string, depending on a user-selectable setting (see the **V** command).

6.4.6.3 Result Code

There are three types of result codes: final, intermediate, and unsolicited.
A final result code indicates the completion of a full DCE action and a willingness to accept new commands from the DTE. The final result code is either **OK** if the command was recognized and acted upon or **[+CME] ERROR** if the command is not recognized or has invalid parameters.

An intermediate result code is a report of the progress of a DCE action. The **CONNECT** result code is an intermediate result code because it indicates a transition to the online data state. When the DCE moves back to the command state it will then issue a final result code (such as **OK**). Another example is a list of SDS messages from the stack. Not until the **OK** has been sent is the MT able to accept other commands.

Unsolicited result codes indicate the occurrence of an event not directly associated with the issuance of a command from the DTE.

6.4.6.4 Examples

The MT responses for the example commands above could be as shown below. This example shows verbose format but note that non-verbose responses shall be supported. This would change the header and trailer and use numbers instead of text in the result field.

The header and trailer are shown as <CR> and <LF> but they are in fact the contents of S3 and S4.

<CR><LF>

+CMD3:3,0,15,"TETRA" <CR><LF> (response to AT+CMD3?)

<CR><LF>OK<CR><LF> (final result code)

<CR><LF>

+CMD3 (0-3), (0,1), (0-12,15), ("TETRA","IRA") <CR><LF> (response to AT+CMD3=?)

<CR><LF>OK<CR><LF> (final result code)

NOTE: If the result code is an error indication the response could be + CME ERROR: < extended error report code>. Error codes are described in clause 6.17.19.

6.5 Existing V.250 commands for call control

6.5.1 Commands

Table 5 summarizes commands from ITU-T Recommendation V.250 [5] relating to the control of call set up and control.

Those in the table are applicable to the PEI and are used as specified in ITU-T Recommendation V.250 [5]. All others will be ignored.

Table 5: ITU-T Recommendation V.250 [5] commands relating to call control

Command	Implementation	Comments
A	Optional	Answers a call
D [<dial string>]	Mandatory	Originates a call
H [<value>]	Optional	Hangs up a voice call
O	Optional	Changes state to on line data
NOTE 1: The ATA command is only suitable where there are no changes to the parameters set by the incoming call set up signalling. NOTE 2: The ATD command may not have a dial string, particularly for packet data session initiation.		

6.5.2 Result Codes

Note the result codes for the existing AT "D" and "A" commands may differ from those specified in ITU-T Recommendation V.250 [5]. In particular the TETRA result codes will be used to indicate the progress of an outgoing call, as the number of parameters is completely different from those envisaged in ITU-T Recommendation V.250 [5]. In some special cases the standard final result codes are allowed, these are indicated in table 6. All other cases should use the TETRA related commands.

Table 6: ITU-T Recommendation V.250 [5] results relating to call control

Result Code	Comments
BUSY	Engaged signal detected
CONNECT <text>	Issued if the call is connected with no change to call parameters. <text> is manufacturer specific and may include line speed, data compression etc.
ERROR	Command line not recognized or illegal parameters
NO CARRIER	Issued as a result for ATD if the MT is out of coverage
NO DIAL TONE	MT is out of service (e. g. coverage)
OK	Command successfully executed

6.5.3 Dialled string

The allowed digits associated with the "D" command are:

- "0 1 2 3 4 5 6 7 8 9 * # +". Implementation of these characters is mandatory for TETRA.

The address type can be changed by the +CTSDC or +CTSDS commands. For details of numbering see the latest version of TR 102 300-5 [25].

The SNA shall contain 1 to 3 decimal digits.

The SSI shall contain 1 to 8 decimal digits. Any leading zeros of the SSI shall be suppressed.

The TSI shall contain 8 to 15 decimal digits. The most significant 3 represent the mobile country code (MCC), the next 4 represent the Mobile network code (MNC) and the last 1 to 8 represent the short subscriber identity part (SSI) Leading zeroes shall be present.

The external subscriber number shall be a number as defined in ITU-T Recommendation E.164 [16].

6.6 Existing V.250 commands for PEI control

Table 7 summarizes commands from ITU-T Recommendation V.250 [5] relating to the formatting of commands and responses as well as the PEI hardware interface operation.

Those in the table are applicable to the PEI and are used as specified in ITU-T Recommendation V.250 [5]. All others will be rejected.

Table 7: ITU-T Recommendation V.250 [5] commands relating to TETRA PEI

Command	Implementation.	Comments
S0=[<value>]	Optional	Sets the number of call indications (rings) when the MT will automatically answer the call. Zero disables automatic answering and is the default.
S3=[<value>]	Mandatory	Command line termination character (mandatory default setting IRA 13 <cr>).
S4=[<value>]	Mandatory	Response formatting character (recommended default IRA 10 <lf>).
S5=[<value>]	Mandatory	Command line editing character (recommended default IRA 8 <backspace>).
E[<value>]	Mandatory	Command echo (recommended default 1 i.e. MT echoes commands back).
Q[<value>]	Mandatory	Result code suppression (recommended default 0 i.e. MT transmits result codes).
V[<value>]	Mandatory	MT response format (recommended default 1 i.e. verbose format).
X[<value>]	Optional	Defines CONNECT result code format; any added text (values 1-3) is manufacturer specific.
&C[<value>]	Optional	Determines how logical circuit 109 – Data Channel received line signal Detector (DCD) relates to the detection of received line signal from remote end (recommended default 1 i.e. logical circuit RLSD operation relates to detection of received signal) (see note).
&D[<value>]	Optional	Determines how MT responds when logical circuit 108/2 Data Terminal Ready (DTR) is changed from ON to OFF condition during either packet or circuit mode data state (recommended default 2 i.e. change causes MT to disconnect the call, return to command mode and return the result "OK") (see note).
+IFC=[<by_te> [,<by_ta>]]	Optional	TE-MT local flow control (recommended default 2,2 i.e. TE uses RTS (circuit 105) and MT uses CTS (circuit 106)).
+IPR=[<value>]	Optional	Sets a fixed PEI data rate if Auto baud rate detection is not supported (recommended default 0 i.e. automatic detection).
+ICF=[<format>[,<parity>]]	Optional	PEI character framing (recommended default 3,3 i.e. eight data bits, no parity, 1 stop bit).
NOTE: This command is not supported if the PEI uses a 4-pin connector.		

6.7 Existing V.250 commands for generic MT control

Table 8 summarizes commands from ITU-T Recommendation V.250 [5] relating to generic MT control.

Those in the table are applicable to the PEI and are used as specified in ITU-T Recommendation V.250 [5]. All others will be rejected.

Table 8: ITU-T Recommendation V.250 [5] generic MT control commands

Command	Implementation	Comments
Z	Mandatory	MT sets all parameters to their defaults as specified by a user memory profile or by the manufacturer and resets the MT.
&F	Mandatory	MT sets all parameters to their defaults as specified by the manufacturer.
I	Optional	Request manufacturer specific information about the MT.
+GMI	Mandatory	Request MT manufacturer identification.
+GMM	Mandatory	Request MT model identification.
+GMR	Mandatory	Request MT revision identification.
+GSN	Optional	Request MT serial number identification.
+GCI	Optional	Selects the country of installation for the MT using ITU-T Recommendation T.35 [26] annex A country codes.

6.8 Existing Hayes AT commands for PEI control

Table 9 summarizes commands from the Hayes AT user manual.

Those in the table are applicable to the PEI. All others will be rejected.

Table 9: Hayes AT commands related to PEI

Command	Implementation	Comments
S2=[<value>]	Optional	Escape character (default setting IRA 43 <+>).
S12=[<value>]	Optional	Escape guard time (default 1 s).

6.9 Existing GSM commands for MT control

Table 10 summarizes commands from TS 100 916 [8] relating to MT control.

Those in the table are applicable to the PEI and are used as specified in TS 100 916 [8] and TS 127 007 [17]. All others should be rejected.

Table 10: +Cellular commands related to PEI

Command	Implementation	Comments
+CBC	Optional	Informs the TE on the battery charger connection state <bcs> and the battery charge level <bcl> of the MT battery.
+CEER	Optional	Causes the MT to return one or more lines of information text on the reason for the failure in the last unsuccessful call set-up, call modification, or the reason for the last call release based on the information provided by the TETRA network.
+CSCS=[<chset>]	Optional	Informs the MT which character set (<chset>) is to be used by the TE. Default is International Reference Alphabet (ITU-T Recommendation T.50 [11]). Implementers should note that when the PEI has been configured for 8-bit framing at the physical layer and a 7 bit alphabet has been selected, then the MSB shall be set to 0. If 7 bits framing is used at the physical layer and 8-bits alpha-bet has been configured, errors will occur.
+CPAS	Optional	Returns the activity status <pas> of the MT.
+CSQ	Optional	Returns the received signal strength indication <rssi> and the channel bit error ration <ber> from the MT.

6.10 Modified PCCA wireless extended commands

Table 11 summarizes commands from PCCA STD-101 [see bibliography] relating to MT control. The WS45 command sets the PEI side stack. The WS 46 command is used to set the UDP/IP link into the correct mode for TNP1 or IP packet data transfer (local or wide). The modifications relate to values of the parameters <m> <n>. WS45 only has the allowed value of "4" whilst WS46 needs two new parameters allocated form the PCCA.

In the case where a MT supports neither packet data nor TNP1 these commands will not be supported.

Table 11: +PCCA commands related to PEI

Command	Implementation	Comments
+WS45=[<m>]	Optional	Used to select the stack on the PEI. For this edition the only valid value of <m> is 4 (PPP datagram encapsulation).
+WS46=[<n>]	Optional	Used to select the Wireless Data Service (WDS) to be used by the MT.

For the TETRA PEI valid values of <n> will be:

14 **MS wide Data Service (existing value in PCCA STD-101 (see bibliography) for TDMA Digital Cellular).**

252 MT2 Local Data Service.

253 reserved.

NOTE: The two new values of <n> shall be requested from the PCCA for TETRA.

6.11 Modified Cellular commands for MT control

6.11.1 General on cellular commands for MT control

This set of commands is modified GSM commands. They are defined in full, as existing specifications do not meet TETRA requirements.

The defined values for the parameters in these TETRA commands are collected in clause 6.17.

All commands can have normal or extended error reporting as described in clause 6.16.

6.11.2 MT Capabilities +GCAP

6.11.2.1 General on +GCAP

This command is an extension of the +GCAP command in the cellular set. The command operates in test and read modes. The changes are that the different services and MS capabilities related to TETRA are added to the response.

6.11.2.2 Description

The read command returns the mandatory field "TETRA", the class of MS and a list of TETRA services that are supported by the MT connected on the PEI. Each service is defined as two "layers" and shall be on a new line.

NOTE: The PID is only used in conjunction with "service layer1" = SDS-TL.

6.11.2.3 GCAP Read and Unsolicited Result Code Text

+GCAP: TETRA [, <class of MS>[, <stack present> [<CR><LF>[, <service layer1>[, <service layer2>[, PID <CR><LF>]]]]]]

NOTE: The services "voice" and "circuit mode data" are contained within the <class of MS> element and need not be repeated in this response.

6.11.3 Network registration +CREG

6.11.3.1 General on +CREG

This command is an extension of the +CREG command in the cellular set. The command operates in test, set and read modes. The changes are in the response format. GSM has different location area definitions.

6.11.3.2 CREG Set Syntax

+CREG=<Reg unsolic>

6.11.3.3 Description

The set command controls the sending of an unsolicited result code by the value of <Reg unsolic>, typically reported when there is a change in the MT network registration status or location area.

6.11.3.4 CREG Read and Unsolicited Result Code Text

+CREG: <Reg stat>[, <LA>[, <MNI>]]

6.11.4 Get MT TETRA identities +CNUM

6.11.4.1 General on +CNUM

This command is an extension of the +CNUM command in the cellular set. The command can only operate in test and read modes. The difference from GSM is that GSM specific parameters of speed, service and information transfer capability do not apply. In addition TETRA has different types of number, different values and the numbers themselves have different formats.

6.11.4.2 Description

The response to this command returns the TETRA subscriber identity number(s) programmed in the MT. If there is more than one number stored in the MT (e.g. groups and gateways) then each number will be returned on a separate line. There will always be an individual number returned but additional addresses such as groups will vary. Note the variable used for the identity is "Called party Identity". The "Num type" variable is different from the "called party type" as it can distinguish groups, gateways and external subscriber numbers. The identity returned will be linked to the type of number defined by "Num type".

6.11.4.3 CNUM Read Result Code Text

+CNUM: <Num type>, <Called Party Identity>[, <alpha>]<CR><LF>

[<Num type>[, <Called Party Identity>[, <alpha>]]]

6.12 Modified GSM SDS message stack commands

6.12.1 General on Modified GSM SDS message stack commands

The commands for use with the TETRA SDS are based on those used in the GSM Short Message Service (SMS) TS 100 585 [7]. Fields and their contents cannot be identical but the same command names are used to ease understanding by GSM application developers. The GSM standard has different modes of operation for SMS message handling (block, PDU and text), these are for backward compatibility within GSM and as such are not applicable to TETRA. There is also a difference in the storage between GSM and TETRA. TETRA SDS message storage is based on the SDS services, whilst GSM has "preferred storage". For these reasons the contents of GSM and TETRA commands are necessarily different.

In order to support all values of all information elements and user data types a TETRA special mixed mode is used in which parameters are conveyed in text and the user data part is conveyed in HEX string. The HEX string is preceded by a length parameter and the command is initiated by a <Ctrl - Z> or cancelled by a <ESC>.

The defined values for the parameters in these TETRA commands are collected in clause 6.17.

All commands can have normal or extended error reporting as described in clause 6.15.13.3.

All new incoming SDS messages onto any of the SDS stacks are indicated to the TE by the +CMTI command.

NOTE: Throughout this clause the <AI service> variable is used but only the values 9 thru 13 are valid for SDS services.

6.12.2 Delete message +CMGD

6.12.2.1 General on +CMGD

This command is based on the GSM command. The difference is that the TETRA command has to define the stack and has no field to define the type of deletion. The command operates in test and set modes.

6.12.2.2 CMGD Set Syntax

+CMGD=<AI service>, [<message index>] [, <message index>]

6.12.2.3 Description

The set command deletes the message from the message stack <AI service> at all given storage locations <message index>. If no index is given then all messages of the defined SDS type will be deleted.

6.12.3 List messages +CMGL

6.12.3.1 General on +CMGL

This command is based on the GSM list command. The difference is that the TETRA command has only one mode of operation and thus there is only one set of fields and their contents. The field definition and contents will differ from those found in GSM. The TETRA mode of operation is similar to that of GSM text and SMS status mode where only the index to the data is returned. The data message itself is retrieved using a CMGR command.

The command operates in test and set modes.

6.12.3.2 CMGL Set Syntax

+CMGL=<AI service> [, <SDS status>]

6.12.3.3 Description

The set command returns a list of messages stored in the MT message stack. Defined by <AI service>.

NOTE: The <AI service> variable is used but only the values 9 thru 13 are valid for SDS services.

If <SDS status> is present then only indices to messages with status value <SDS status> are returned. If not then all active message indices of SDS type defined by <AI service> are returned.

The result code text contains details of any messages in the stack that meet the set criteria.

The read message command +CMGR is used in conjunction with the <message index> to return the actual data.

6.12.3.4 CMGL Set Result Code Text

+CMGL: <AI service>, <message index>, <SDS status>, [<calling party ident>, <calling party ident type>], [<called party ident>, <called party type>]

NOTE 1: The "ident" is always paired with a "type". Calling or called may depend on the SDS status (incoming or outgoing).

NOTE 2: Due to air interface definitions the called party ident type is always TSI for received messages.

6.12.4 Read message +CMGR

6.12.4.1 General on +CMGR

This command is based on the GSM command. The difference is that the TETRA command has to define the stack and can optionally read more than one SDS message. The command operates in test, set and unsolicited read modes.

6.12.4.2 CMGR Set Syntax

+CMGR=<AI service>, [<message index>,] [<message index>]

6.12.4.3 Description

The set command reads the message from the message stack <AI service> at all given storage locations <message index>. If no message index is given then all messages of the defined SDS type will be read.

If <AI service> is "status" or SDS type 1 then the TE may associate the value read with a text string downloaded from the MT previously with a "CSTR" command. This is an application issue for implementers.

If the status of the message was "received unread" then it automatically changes to "received read" on the stack.

NOTE: The unsolicited result code may be used to inform the TE of any change in status of an outgoing message.

6.12.4.4 CMGR Set and unsolicited Result Codes

The set result is used to return data of the defined SDS type. The unsolicited result is used to inform the TE of a change in the SDS status parameter due to air interface lower layer sending reports, or if the stack has become full with incoming or MT originated messages.

+CMGR: <AI service>, <message index>, <SDS status>, <stack full>[, <calling party ident>] [, <calling party ident type>] [, [<called party ident>], [<calling party ident type>] [, <area> [, <SwMI time>]]]], <length><CR><LF>user data.

NOTE 1: The presence of optional parameters in a set result code depends on whether the message is MT originating or terminating. The unsolicited result code will only have the first four parameters. If the unsolicited result code indicate <stack full> the message index and SDS status fields will be set to those of the highest message index.

NOTE 2: If more than one index is defined in the set command, each message is retrieved in a separate result code.

6.12.5 Write message +CMGW

6.12.5.1 General on +CMGW

This command is based on the GSM command. The difference is that the TETRA command has to define the stack and does not operate in "text mode". The command operates in test set and unsolicited read modes.

6.12.5.2 CMGW Set Syntax

+CMGW = <called party ident>, <length>><CR><LF>**user data<CtrlZ>/<ESC>**

6.12.5.3 Description

The set command writes the message to the message stack <AI service>. The <called party ident type> is preset in the current CTSDS command.

The result code informs the TE of where the message was written or if the stack is full. In TETRA this write message is used in conjunction with (after) a CTSDS command which presets some of the parameters needed for a message write.

NOTE: IF the SDS-TL protocol AND "store and forward" is used the called party ident will be an SDS service centre address (SwMI or external service centre). The message destination address (forward address) is inside the user data.

The message is not sent on the air interface automatically by the MT. The CMSS command shall be used to send the message on the air interface using the current settings of +CTSDS. The CMSS command uses the "AI service" and "message index" to reference the message. When transmitted on the air interface the SDS status automatically changes to "sent" on the stack.

6.12.5.4 CMGW Set Result Codes

The set result code is used to inform the TE of the index where the message was written.

+CMGW: <AI service>, <message index>[, <stack full>]

If the result code indicates <stack full> the message index field will be set to the value of the highest index.

6.12.6 Message send from store +CMSS

6.12.6.1 General on +CMSS

This command is based on the GSM command. The difference is that the TETRA command has to define the stack. The command operates in test and set modes.

6.12.6.2 CMSS Set Syntax

+CMSS = <AI service>, <message index>

6.12.6.3 Description

The set command tells the MT to send, on the air interface, the message held in the stack <AI service> at location <message index>.

The message is sent on the air interface using some of the current settings of +CTSDS. The SDS type is known from the stack by <AI service>. The called party ident type and the called party identity are also taken from the stack. The values for <area>, <e-to-e encryption> and <access priority> are taken from the current setting of CTSDS.

NOTE: In the present document the called party ident cannot be changed by this command. If that is needed then the +CMGR can be used to read the message from the stack and the +CMGW commands needs to be used to define a new called party ident for the message before the +CMSS command is used to send the message.

When transmitted, the status automatically changes to "sent" on the stack.

6.12.6.4 CMSS Set Result Codes

The set result code is used to inform the TE that the message has been sent on the air interface.

+CMSS: <AI service>, <message index>[, <message reference>]

The message reference is only present if the message sent was using the SDS-TL protocol.

6.12.7 New message indication +CMTI

6.12.7.1 General on +CMTI

This command is based on the GSM CNMI command and its response. The difference is that the TETRA command uses CTSP to set the profile, it has only one mode of operation and thus there is only one field (message index). It relates to incoming messages in the SDS message stacks, which are in turn based on the TETRA SIM.

The command operates in unsolicited result mode only. For compatibility the CNMI may be used in the test mode.

6.12.7.2 Description

An unsolicited result code to indicate a new message has been put on the message stack. The parameters indicate the type of SDS and the location on the stack.

NOTE 1: The CMTI unsolicited result code will not be used if the MT does not have a message stack, or if the profile has been set to "MT only". If the MT has no message stack the CTSDSR unsolicited result code will be used.

NOTE 2: The command will not be sent if a message is received whilst the PEI is in either "circuit mode data" or "packet data" state. If the MT is capable of receiving SDS whilst in a circuit mode call or packet data session, then it may buffer the TE indications until the PEI returns to "command" state. Or the TE may perform a CMGL and CMGR on return to AT command state. The latter is recommended, as it is more useful for long-term breaks in the PEI.

6.12.7.3 CMTI Unsolicited Result Code Text

+CMTI <AI service>, <message index>[, <stack full>], <CR> <LF>**user data**.

If the result code indicates <stack full> the message index field will be set to the value of the highest message index.

6.13 Modified GSM SDS direct commands

6.13.1 General on GSM SDS direct commands

This clause describes the commands that are used to send and receive SDS messages directly. That is not via the SDS message stack.

The defined values for the parameters in these TETRA commands are collected in clause 6.17.

All commands can have normal or extended error reporting as described in clause 6.16.

6.13.2 Send message +CMGS

6.13.2.1 General on +CMGS

This command is based on the GSM command. The difference is that the TETRA command has only one mode of operation and thus there is only one set of fields and their contents. The field definition and contents will differ from those found in GSM.

The command operates in test and set modes. There is an unsolicited result code to indicate air interface transmission.

6.13.2.2 CMGS Set Syntax

+CMGS= <called party ident >, <length><CR> <LF>**user data<CtrlZ>/<ESC>**

6.13.2.3 Description

The command will send a data message to the MT over the PEI. The SDS type (<AI service>, <area> , <e-to-e encryption>, <access priority> and <called party ident type> relating to the message shall have been set with a previous +CTSDS command. Although only SDS type 4 has variable length the length field is mandatory for consistency and gives the MT a means for checking the current <AI service> field. The user data and length fields will follow the same constricts as those defined in clause 6.3.

6.13.2.4 CMGS Set and Unsolicited Result Code Text

The set result code only indicates delivery to the MT. In addition to the normal <OK> it contains a message reference <SDS instance>, which can be used to identify message upon unsolicited delivery status report result codes. For SDS-TL messages the SDS-TL message reference is returned. The unsolicited result code can be used to indicate later transmission over the air interface or the sending has failed.

+CMGS: <SDS Instance>[, <SDS status> [, <message reference>]]

6.14 TETRA MT control commands

6.14.1 General on TETRA MT control commands

The defined values for the parameters in these TETRA commands are collected in clause 6.17.

All commands can have normal or extended error reporting as described in clause 6.16.

6.14.2 TETRA Broadcast +CTBCT

6.14.2.1 General on +CTBCT

This command is not contained in any existing specifications. It is specific to TETRA and is used to inform the TE of broadcast information from the SwMI. The command operates in test and read modes, and as an unsolicited result code.

6.14.2.2 Description

This command is sent as an unsolicited result code from the MT every time it sees a change in the Sysinfo broadcast by the SwMI. The TE uses this information to determine the current SwMI features. The data is derived from the air interface SYSINFO with extended services element.

6.14.2.3 CTBCT Result Code text

+CTBCT: <LA>, <BS service>, <Security information>, <SDS-TL addressing>

6.14.3 TETRA Status Text Read +CTSTR

6.14.3.1 General on +CTSTR

This command is not contained in any existing specifications. It is specific to TETRA and is used by the MT to retrieve the text strings associated with SDS numeric values. The command operates in test, set and read modes.

6.14.3.2 CTSTR Set Syntax

+CTSTR=<AI service>

6.14.3.3 Description

The TE uses this command to retrieve text strings stored in the MT memories. Status and SDS type 1 in particular have text strings associate with them, which have meaning to a particular user or application. The TE would typically use this command at link recovery. Then the text strings looked up by the TE when reading SDS messages would be used in preference to the numeric value indicated in the <message index> field. Note the only valid values for <AI service> are those where text strings are given (status and SDS1).

6.14.3.4 CTSTR Read Result Code text

+CTSTR: <AI service>, <Status (or SDS 1) value>, <text> <CR><LF>

<Status (or SDS 1) value>, <text> <CR><LF>

6.14.4 TETRA Service Profile +CTSP

6.14.4.1 General on +CTSP

This command is not contained in any existing specifications. It is specific to TETRA and is used to inhibit incoming call signalling (from the air interface) to be sent to the TE by the MT. The command operates in test, set and read modes.

6.14.4.2 CTSP Set Syntax

+CTSP=<service profile>, <service layer1>[, <service layer2>] [, <PID>]

6.14.4.3 Description

This command is used to disable incoming call signalling (from the air interface) to the MT to be sent to the PEI. The default is that all signalling is forwarded to the PEI so a TE should disable each service for which it does not want to accept signalling. The read command will return all non-default services with a profile set by the TE.

NOTE 1: If the <service layer1> is SDS-TL then the <PID> field is valid instead of <service layer2>.

NOTE 2: The <service layer2> element need not be present if all of the <service layer1> services are to be routed.

NOTE 3: The "MM" service layers are different from the others as all air interface downlink messages are always sent to "both".

NOTE 4: If the <service layer1> is an SDS service and the MS has a message stack, then the profile only applies to the routing of "new message in the stack" indications (CMTI).

NOTE 5: If the service is status, some reserved values for SDS-TL acknowledgements ([2] clause 14.8.34) will be sent to both.

6.14.4.4 CTSP Read Result Code text

+CTSP: =<service profile>, <service layer1>[, <service layer2>] [, <PID>] <CR><LF>

<service profile>, <service layer1>[, <service layer2>] [, <PID>] <CR><LF>

6.14.5 TETRA service definition for Circuit Mode services +CTSDC

6.14.5.1 General on +CTSDC

This command is not contained in any existing specifications. It is specific to TETRA and is used in conjunction with (before) other commands to perform outgoing TETRA call set up (of any sort). The command and associated responses shall be as presented below. The command operates in test, set and read modes.

6.14.5.2 CTSDC Set Syntax

+CTSDC=<AI service>, <called party ident type>, [<area>, <hook>, <simplex>, [<e to e encryption>, [<comms type>, [<slots/codec>, [<RqTx>, [<priority>, [<CLIR control>]]]]]]]

6.14.5.3 Description

This command sets all parameters to be used on the TETRA Air Interface in outgoing circuit mode call set up. A MT uses the parameters set with this command in subsequent call set up, after reception of a dial command (D).

Some parameters are conditional on others and need not be specified (as long as the syntax of ITU-T Recommendation V.250 [5] is followed). For example if the service is set to "TETRA speech" then the number of slots shall be 1, duplex circuit mode calls have no need for <RqTx>.

The MT should check for validity of the parameters and their combination before accepting the command. The valid combinations may vary from supplier to supplier for functionality that is optional or phased.

NOTE: Implementers should take care when mixing different services on the air interface.

6.14.5.4 CTSDC Read Result Code text

+CTSDC: <AI service>, <called party ident type>, [<area>, <hook>, <simplex>, [<e to e encryption>, [<comms type>, [<slots/codec>, [<RqTx>, [<priority>, [<CLIR control>]]]]]]]

6.14.6 TETRA service definition for SDS Service +CTSDS

6.14.6.1 General on +CTSDS

This command is not contained in any existing specifications. It is specific to TETRA and is used in conjunction with (before) commands that perform writing to the stack and sending of both TETRA STATUS and SDS messages. The command and associated responses shall be as presented below. The command operates in test, set and read modes.

6.14.6.2 CTSDS Set Syntax

+CTSDS=<AI service>, <called party ident type>[, <area>[, <access priority> [, <e-to-e encryption>]]]

NOTE: The <e-to-e encryption> parameter is included for future expansion.

6.14.6.3 Description

This command sets parameters to be used on the TETRA air interface in outgoing Status and SDS messaging. The MT uses the parameters set with this command in subsequent SDS sending commands, either directly or via a message stack.

The MT should check for validity of the parameters and their combination before accepting the command. The valid combinations may vary from supplier to supplier for functionality that is optional or phased.

NOTE: Implementers should take care when mixing different services on the air interface.

6.14.6.4 CTSDS Read Result Code text

+CTSDS: <AI service>, <called party ident type>[, <area>[, <access priority> [, <e to e encryption>]]]

6.15 New TETRA call handling commands

6.15.1 General on new TETRA call handling commands

This clause deals with call handling of TETRA circuit mode (voice or data) calls and incoming SDS messages that are not sent to the message stack. New outgoing circuit mode call set up commands are used in conjunction with the service definition command +CTSDC. The two commands are used in sequence to set the behaviour of the MT and to initiate a call.

The defined values for the parameters in these TETRA commands are collected in clause 6.17.

All commands can have normal or extended error reporting as described in clause 6.16.

6.15.2 TETRA Call Connect +CTCC

6.15.2.1 General on +CTCC

This command is not contained in any existing specifications. It is specific to TETRA and is used to inform the MT that a call set up phase has finished and the call maintenance phase should be entered. The command operates in test and set modes.

6.15.2.2 CTCC Set Syntax

+CTCC=<CC Instance>, <hook>, <simplex>, [<AI service>, [<e to e encryption>, [<comms type>, [<slots/codec>, [<proprietary>]]]]]]

6.15.2.3 Description

This command is used to end the call set up phase for incoming and outgoing calls to the MT. It contains all the parameters necessary to connect the called and calling parties. For half duplex calls this will include the transmission grant state. This command may be used to modify parameters of the call set up request.

6.15.3 TETRA Call Release +CTCR

6.15.3.1 General on +CTCR

This is an unsolicited response code and is not contained in any existing specifications.

6.15.3.2 Description

This response is specific to TETRA and is based on the D-Release message. It indicates to the TE that either the other party or the network has cleared an ongoing call.

6.15.3.3 CTCR Unsolicited Result Code Text

+CTCR: <CC instance >, <disconnect cause>

6.15.4 TETRA Incoming Call Notification +CTICN

6.15.4.1 General on +CTICN

This is an unsolicited response code and is not contained in any existing specifications.

6.15.4.2 Description

This unsolicited response is specific to TETRA and is based on the TETRA D-Set-up, D-Connect Ack and D-Info messages. It indicates an incoming call and its progress to the TE. The TE uses the parameters set with this command to interpret how to handle the call (e.g. whether to sound a ringing tone (hook) or to start call maintenance (direct) or possibly to negotiate slot use according to the baud rate on the PEI).

Some parameters are conditional on others. For example if the service is set to "TETRA speech" then the number of slots shall be 1.

The fields <calling party ident type> and <ident> will normally be present in the first notification messages unless the calling party has withheld them.

6.15.4.3 CTICN Unsolicited Result Code Text

+CTICN: <CC instance >, <call status>, <AI service>, [, <calling party ident type> [, <ident> [, <hook> [, <simplex> [, <e to e encryption> [<comms type>, [, <slots/codec>]]]]]]

6.15.5 TETRA outgoing Call progress notification +CTOCP

6.15.5.1 General on +CTOCP

This is an unsolicited response code and is not contained in any existing specifications.

6.15.5.2 Description

This response gives an indication to the TE as to the progress of an outgoing call. It is specific to TETRA and is based on the Call-Proceeding, D-Alert, D-Connect and D-Info messages. The reception by the MT of one of these air interface messages will result in this PEI message. All parameters are subject to change by the SwMI in the course of a call set up so the TE should check their values even though it set them in the CTSDC command.

6.15.5.3 CTOCP Unsolicited Result Code Text

+CTOCP: <CC instance >, <call status>, <AI service>, [<hook> [, <simplex> [, <e to e encryption> [, <comms type> [, <slots/codec>]]]]

6.15.6 TETRA Group Set up +CTGS

6.15.6.1 General on +CTGS

This command is not contained in any existing specifications. The command should always supply the complete group selection and scanning requirements; that is there is no history to a sequence of commands.

The command operates in test, set and read modes.

6.15.6.2 CTGS Set Syntax

+CTGS=<group type>, <Called Party Called Party Identity> … [, <group type>, < Called Party Identity>]

6.15.6.3 Description

This command is used to instruct the MT to set groups in the MT as selected or scanned. The set result codes will be given after all Air Interface signalling has been successfully completed.

If there is more than one group in the MT each group identity will be returned on a different line.

The result code can be unsolicited as the group attachments of the MT may change as it moves.

Note the variable "Called Party Identity" is used but it shall be a group identity obtained via the +CNUM command. If not the set command should be rejected.

6.15.6.4 CTGS Read and unsolicited Result Code text

+CTGS: <group type>, < Called Party Identity><CR><LF>

… [, <group type>, < Called Party Identity>]

6.15.7 TETRA SDS Receive +CTSDSR

6.15.7.1 General on +CTSDSR

This command is not contained in any existing specifications. It is specific to TETRA.

The command operates in test and read modes.

6.15.7.2 Description

This is an unsolicited message that carries an incoming SDS message from a MT that has no message stack.

6.15.7.3 CTSDSR unsolicited Result Codes

+CTSDSR: <AI service>, [<calling party ident>], [<calling party ident type>], <called party ident>, <called party ident type>, <length><CR><LF> **user data**.

6.15.8 Transmit Demand +CTXD

6.15.8.1 General on +CTXD

This command is not contained in any existing specifications.

The command operates in test and set modes.

6.15.8.2 CTXD Set Syntax

+CTXD= <CC instance >, <TxDemandPriority>[, <e to e encryption>]

6.15.8.3 Description

This command is specific to TETRA and is based on the U-TX Demand message. In a simplex call this command is used in conjunction with the transmission grant response to control the transmissions of the MT. The TE will generate this command on pressing of the MMI representing the PTT. The only allowed result code is either <OK> or <error>.

6.15.9 Up Transmit Ceased +CUTXC

6.15.9.1 General +CUTXC

This command is not contained in any existing specifications.

The command operates in test and set modes.

6.15.9.2 CUTXC Set Syntax

+CTXC= <CC instance >.

6.15.9.3 Description

This command is specific to TETRA and is based on the U-TxCeased message. In a simplex call this command is used in conjunction with the transmission grant response to control the transmissions. The TE will generate this command on release of the MMI representing the PTT. The only allowed result code is either <OK> or <error>.

6.15.10 Transmission Grant +CTXG

6.15.10.1 General on +CTXG

This is an unsolicited response and is not contained in any existing specifications.

6.15.10.2 Description

This response is specific to TETRA and is based on the D-TxGrant message. It indicates to the TE who is allowed to transmit in a simplex call. Typically the TE may use this information to display the identity of the transmitting party.

6.15.10.3 CTXG Unsolicited Result Code Text

+CTXG: <CC instance >, <TxGrant>, <TxRqPrmsn>, <e to e encryption> [, <TPI type> [, <TPI>]]

6.15.11 Down Transmission Ceased +CDTXC

6.15.11.1 General on +CDTXC

This is an unsolicited response and is not contained in any existing specifications.

6.15.11.2 Description

This response is specific to TETRA and is based on the D-TxCeased message. In simplex calls it indicates to the TE that the talking party has ceased its transmission so it can update its MMI. The TE may request permission to transmit depending on the value of <TxRqPrmsn>.

6.15.11.3 CDTXC Unsolicited Result Code Text

+CTXG: <CC instance >, < TxRqPrmsn >

6.15.12 Transmission Continue +CTXN

6.15.12.1 General on +CTXN

This is an unsolicited response and is not contained in any existing specifications.

6.15.12.2 Description

This response is specific to TETRA and is based on the D-TX Continue message. In simplex calls it indicates to the TE that an interrupted speech item may continue. The TE may request permission to transmit depending on the value of <TxRqPrmsn>.

6.15.12.3 CDTXN Unsolicited Result Code Text

+CTXG: <CC instance >, <TxCont>, < TxRqPrmsn >

6.15.13 Transmission Interrupt +CTXI

6.15.13.1 General on +CTXI

This is an unsolicited response and is not contained in any existing specifications.

6.15.13.2 Description

This response is specific to TETRA and is based on the D-TX Interrupt message. It indicates to the TE that permission to transmit has been withdrawn.

6.15.13.3 CTXI Unsolicited Result Code Text

+CTXG: <CC instance >, <TxGrant>, <TxRqPrmsn>, <e to e encryption> [, <TPI type> [, <TPI>]]

6.15.14 Transmission Wait +CTXW

6.15.14.1 General on +CTXW

This is an unsolicited response and is not contained in any existing specifications.

6.15.14.2 Description

This response is specific to TETRA and is based on the D-TX Wait message. In simplex calls it indicates to the TE that the call is being interrupted. The TE may request permission to transmit depending on the value of <TxRqPrmsn>.

6.15.14.3 CDTXN Unsolicited Result Code Text

+CTXG: <CC instance >, < TxRqPrmsn >

6.16 MT errors

6.16.1 General on MT errors

This clause describes how to enable extended error reporting from the MT using the +CMEE command and the form of those extended reports. These codes are identical to codes specified in GSM [8] and are seen as applicable to TETRA.

6.16.2 Report MT error +CMEE

6.16.2.1 General on +CMEE

This command is not contained in any existing specifications and is specific to TETRA.

The command operates in test, set and read modes.

6.16.2.2 CMEE Set Syntax

+CMEE=<extend error report>

6.16.2.3 Description

Set command disables or enables the use of the final result code +CME ERROR: <extended error report code>. When enabled, MT related errors cause +CME ERROR: <extended error report code> instead of the regular ERROR final result code. ERROR is returned when the error is related to syntax, invalid parameters or MT functionality.

6.16.2.4 CMEE Set Result Code Text

+CMEE: <extend error report>

6.16.3 MT error result code +CME ERROR

6.16.3.1 General on +CME ERROR

This command is not contained in any existing specifications and is specific to TETRA.

The command operates in test and unsolicited result modes.

6.16.3.2 Description

The response +CME ERROR: <extended error report code> result code is similar to the regular ERROR result code but gives the TE more detailed information on the command error.

The format of <extended error report code> can be either numeric or verbose. This is set with the command +CMEE.

NOTE: ITU-T Recommendation V.250 [5] command V does not affect the format of this result code.

6.16.3.3 CME ERROR Unsolicited Result Code Text

+CME ERROR <extended error report code>

6.17 Parameter description and values

6.17.1 General on parameters

This clause details the allowed values for the parameters used in the commands specific to TETRA. The value parameters shall be encoded in decimal digits using the default character set unless changed by the CSCS command.

The values are presented in both numeric and verbose formats where applicable.

The default values are underlined.

The MT should check combinations of parameters in command lines to ensure they are compatible with TETRA operation.

6.17.2 Access Priority

The lower layers of the MT use this to give PDUs a priority for access to the air interface.

- **0 - Low**;
- ***1 - High***;
- 2 - Emergency.

6.17.3 AI Service

This parameter is used to determine the type of service to be used in air interface call set up signalling. The services are all defined in EN 300 392-2 [2].

- **0 - TETRA speech**;
- 1 - 7,2 kbit/s unprotected data;
- 2 - Low protection 4,8 kbit/s short interleaving depth = 1;
- 3 - Low protection 4,8 kbit/s medium interleaving depth = 4;
- 4 - Low protection 4,8 kbit/s long interleaving depth = 8;
- 5 - High protection 2,4 kbit/s short interleaving depth = 1;
- 6 - High protection 2,4 kbit/s medium interleaving depth = 4;
- 7 - High protection 2,4 kbit/s high interleaving depth = 8;
- 8 - Packet Data;
- 9 - SDS type 1(16 bits);
- 10 - SDS type 2 (32 bits);
- 11 - SDS type 3 (64 bits);
- 12 - SDS type 4 (0 - 2 047 bits);
- 13 - Status (16 bits, some values are reserved in EN 300 392-2 [2]).

6.17.4 Alpha

Optional alphanumeric string used to help MMI for TETRA identities returned with the CNUM command.

6.17.5 Area

Area [30] used by the area selection supplementary service in call set up.

NOTE: Some SwMIs use this field without the SS to restrict group call area during the set up phase. The areas are predefined in the SwMI and are made up of Location Areas.

- 0 - Area not defined;

- 1 - Area 1;
- 2 - Area 2;
- 3 - Area 3;
- 4 - Area 4;
- 5 - Area 5;
- 6 - Area 6;
- 7 - Area 7;
- 8 - Area 8;
- 9 - Area 9;
- 10 - Area 10;
- 11 - Area 11;
- 12 - Area 12;
- 13 - Area 13;
- 14 - Area 14;
- 15 - All areas.

6.17.6 BS service

This parameter is used to indicate to the TE, the supported services of the BS where the MT is registered. The table is copied into table 12, from EN 300 392-2 [2] for convenience. The table in EN 300 392-2 [2] will always take precedence. The table gives a bit oriented indication of the MS capabilities. The value sent in the command line string will be the HEX equivalent of the total bit array, with the MSB the one at the top of the table. For example a BS capable of all services will have the parameter value "FFF".

Table 12: +BS Service Details

Information element	Length	Value	Remark
Registration	1	0	Registration not required on this cell
		1	Registration mandatory on this cell
De-registration	1	0	De-registration not required on this cell
		1	De-registration mandatory on this cell
Priority cell	1	0	Cell is not a priority cell
		1	Cell is a priority cell
Minimum mode service	1	0	Cell may use minimum mode
		1	Cell never uses minimum mode
Migration	1	0	Migration is not supported by this cell
		1	Migration is supported by this cell
System wide services	1	0	System wide services temporarily not supported
		1	Normal mode
TETRA voice service	1	0	TETRA voice service is not supported on this cell
		1	TETRA voice service is supported on this cell
Circuit mode data service	1	0	Circuit mode data service is not supported on this cell
		1	Circuit mode data service is supported on this cell
Reserved	1	0	Service is not available on this cell
		1	Service is available on this cell
SNDCP Service	1	0	SNDCP service is not available on this cell
		1	SNDCP service is available on this cell
Air interface encryption Service	1	0	Air interface encryption is not available on this cell
		1	Air interface encryption is available on this cell
Advanced link supported	1	0	Advanced link is not supported on this cell
		1	Advanced link is supported on this cell

6.17.7 Call status

This parameter is used to indicate the status of either incoming or outgoing circuit mode call set up. The values are sent in D-Call Proceeding and D-info on the air interface.

- **0 - Call progressing**;
- 1 - Call queued;
- 2 - Called party paged;
- 3 - Call continue;
- 4 - Hang time expired.

6.17.8 Called party identity

A digit stream to be interpreted dependant on the value of <called party type>. The presentation shall be in ASCII. If the called party type is an external subscriber number then the gateway identity is provisioned in the MT.

6.17.9 Calling party identity

A digit stream to be interpreted dependant on <calling party type>. The presentation shall be in ASCII.

Typically used by any TE MMI to display the identity of the calling party.

6.17.10 Called party identity type

This parameter is used to indicate the type of identity to be used as the called party address. The associated identity used in signalling will be interpreted differently according to this parameter. External subscriber number addresses are used in association with a PSTN or PABX gateway.

- **0 - SSI**;

- 1 - TSI;
- 2 - SNA;
- 3 - PABX external subscriber number;
- 4 - E164 external subscriber number.

NOTE: The actual value of the gateway identities (PSTN, PABX) is provisioned in the MT and cannot be changed over the PEI by AT commands. The rules governing what the "leading digit" in a dialling scheme means are also defined in the MT. For example there may be more than one PABX gateway that can be chosen using this digit. The leading digit may be discarded before dialling.

6.17.11 Calling party identity type

This parameter is used to indicate the type of identity received as the calling party address. The associated identity used in signalling will be interpreted differently according to this parameter. External subscriber number addresses are used in association with a PSTN or PABX gateway.

- **0 - SSI**;
- 1 - TSI;
- 2 - Reserved;
- 3 - PABX external subscriber number;
- 4 - PSTN external subscriber number.

6.17.12 CC instance

A three-digit number used to identify an ongoing call. The originating MT assigns it. The number will be assigned at the beginning of any particular call (incoming or outgoing) and used to relate all PEI signalling related to that call. The value of CC instance is not used on the air interface, although there is an equivalent "call identity".

6.17.13 Class of MS

This parameter is used to indicate to the TE the capabilities of the MS regarding air interface characteristics. The table is copied, into table 13 from EN 300 392-2 [2] for convenience. The table in EN 300 392-2 [2] will always take precedence. The table gives a bit oriented indication of the MS capabilities. The value sent in the command line string will be the HEX equivalent of the total bit array, with the MSB the one at the top of the table. For example a MS capable of all services except security will have the parameter value "FFFF00".

Table 13: +PCCA commands related to PEI

Information sub-element	Length	$Value_2$	Remark
Frequency simplex/duplex	1	0	Frequency simplex supported
		1	Frequency duplex and simplex supported
Single/multislot	1	0	Single slot supported
		1	Multislot and single slot supported
Concurrent multi-carrier operation	1	0	Single carrier operation supported
		1	Multi and single carrier operation supported
Voice	1	0	No voice calls supported
		1	Voice calls supported
End-to-end encryption	1	0	End-to-end encryption supported
		1	End-to-end encryption not supported
Circuit mode data	1	0	No circuit mode data supported
		1	Circuit mode data supported
TETRA packet data	1	0	TETRA packet data not supported
		1	TETRA packet data supported
Fast switching	1	0	Fast switching not supported
		1	Fast switching supported
DCK air interface encryption	1	0	DCK air interface encryption not supported
		1	DCK air interface encryption supported
CLCH needed on carrier change	1	0	No CLCH needed on carrier change
		1	CLCH needed on carrier change
Concurrent channels (i.e. concurrent services)	1	0	Concurrent channels not supported
		1	Concurrent channels supported
Advanced link	1	0	Advanced link not supported
		1	Advanced link supported
Minimum mode	1	0	Minimum mode not supported
		1	Minimum mode supported
Carrier specific signalling channel	1	0	Carrier specific signalling channel not supported
		1	Carrier specific signalling channel supported
Authentication	1	0	Authentication not supported
		1	Authentication supported
SCK air interface encryption	1	0	SCK air interface encryption not supported
		1	SCK air interface encryption supported
TETRA air interface standard version number	3	000	EN 300 392-2 [2], no security functions
		001	EN 300 392-2 [2] and ETS 300 392-7 [29]
		010	EN 300 392-2 [2] and EN 300 392-7 [19]
		011	Reserved
		...etc.	...etc.
		111	Reserved
Reserved	1	0	Default value
		1	Reserved for future expansion
Reserved	1	0	Default value
		1	Reserved for future expansion
Reserved	1	0	Default value
		1	Reserved for future expansion
Reserved	1	0	Default value
		1	Reserved for future expansion
Reserved	1	0	Default value
		1	Reserved for future expansion

6.17.14 CLIR control

This parameter shall be used to control presentation of the user identity.

- 0 - Not implemented or use default mode;
- 1 - Reserved;
- 2 - Presentation not restricted;
- 3 - Presentation restricted.

6.17.15 Comms type

This parameter is used to indicate the type of communication to be used in the maintenance phase of the current call set up.

- **0 - Point to Point**;
- 1 - Point to multipoint;
- 2 - Point to multipoint (acknowledged);
- 3 - Broadcast.

6.17.16 Disconnect cause

This parameter is given in the disconnect message from the MT when a voice call is cleared by the other end, the SwMI or the MT itself. The TE could use the information in MMI or to initiate retries.

- 0 - Not defined or unknown;
- 1 - User request;
- 2 - Called party busy;
- 3 - Called party not reachable;
- 4 - Called party does not support encryption;
- 5 - Network congestion;
- 6 - Not allowed traffic;
- 7 - Incompatible traffic;
- 8 - Service not available;
- 9 - Pre-emption;
- 10 - Invalid call identifier;
- 11 - Called party rejection;
- 12 - No CC entity;
- 13 - Timer expiry;
- 14 - SwMI disconnect;
- 15 - No acknowledgement;
- 16 - Unknown TETRA identity;
- 17 - Supplementary Service dependent;

- 18 - Unknown external subscriber number;
- 19 - Call restoration failed.

6.17.17 E to E encryption

This parameter is used to indicate encryption is to be used in either incoming or outgoing circuit mode call set up.

- **0 - Clear**;
- 1 - Encrypted.

NOTE: The encryption referred to is end to end, not air interface.

6.17.18 Extended error report

- **0 - Disable +CME ERROR: <extended error report code> and use "ERROR"**;
- 1 - Enable +CME ERROR: <extended error report code> result code and use numeric <extended error report code> values;
- 2 - Enable +CME ERROR: <extended error report code> result code and use verbose <extended error report code> values.

6.17.19 Extended error report codes

These are values returned as final result codes if extended error reporting is enabled and an error is encountered.

- ***0 - MT failure***;
- ***1 - No connection to MT***;
- 2 - MT adapter link reserved;
- 3 - Operations not allowed;
- 4 - Operation not supported;
- ***5 - PH-SIM PIN required***;
- 6 - Reserved;
- 7 - Reserved;
- 8 - Reserved;
- 9 - Reserved;
- 10 - SIM not inserted;
- 11 - SIM CHV1 required;
- 12 - SIM UNBLOCKING CHV1 required;
- 13 - SIM failure;
- 14 - SIM busy;
- 15 - SIM wrong;
- 16 - Incorrect password;
- 17 - SIM CHV2 required;

- 18 - SIM UNBLOCKING CHV2 required;
- 19 - Reserved;
- 20 - Memory full;
- 21 - Invalid index;
- 22 - Not found;
- 23 - Memory failure;
- 24 - Text string too long;
- 25 - Invalid characters in text string;
- 26 - Dial string too long;
- 27 - Invalid characters in dial string;
- 28 - Reserved;
- 29 - Reserved;
- 30 - No network service;
- 31 - Network timeout;
- 32 - Error decoding data;
- 33 - Parameter wrong type;
- 34 - Parameter value out of range;
- 35 - Syntax error;
- 36 - Data received without command;
- 37 - Timeout waiting for data;
- ***38 - Protocol identifier already registered***;
- 39 - Registration table full;
- 100 - Unknown;
- 101 - 150 Reserved for use by GPRS (values are specified in TS 101 356 [27]);
- 151 - 255 Reserved;
- 330 - SMSC address unknown.

6.17.20 Group type

This parameter is used when setting the MT groups for use. A selected group will be used for outgoing calls. Either selected or scanned groups will receive incoming calls. Only incoming group calls with a priority higher than the scan level will interrupt ongoing group calls of a lower level.

If the group type is "none" all groups will be detached from the SwMI.

- **0 - None**;
- 1 - Select;
- 2 - Scan priority 1;

- 3 - Scan priority 2;
- 4 - Scan priority 3;
- 5 - Scan priority 4;
- 6 - Scan priority 5;
- 7 - Scan priority 6.

6.17.21 Hook

This parameter is used to indicate the type signalling in either incoming or outgoing circuit mode call set up. An incoming hook signalling call should ring until answered by the TE. An incoming direct call will not ring but go straight to a circuit mode channel.

- **0 - Hook signalling**;
- 1 - Direct.

6.17.22 LA

14-bit location area code [2] presented in character set defined by +CSCS.

NOTE: This field is only valid if the MT is registered (<Reg stat> = 1 or 5).

6.17.23 Length

This parameter indicates the length of the "user data" field in SDS related commands. The length is given in ASCII decimal. The length does not include the command line parameters used to delineate the user data (<CR>, <LF>, <Ctrl-Z> or <ESC> characters). In the event of optional parameters not present on the command line, the length parameter can be identified as the one before the <CR><LF> characters.

6.17.24 Message index

An identifier, for use with SDS message stack entries. This is independent of the memory location and is used in operations on the message stack. There is a different message index for each of the two stacks, one for Status, SDS 1-3 and one for SDS4. It has the range 0 - 65,535.

6.17.25 Message reference

An identifier used in the SDS-TL message protocol. For definition see EN 300 392-2 [2] clause 29.

NOTE: The EN 300 812 [18] defines that the value "FF" is used when the message is waiting for transmission and no real value is not yet allocated.

6.17.26 MNI

24 bits Mobile Network Identity [2] presented in character set defined by +CSCS.

NOTE: This field is only valid if the MT has roamed (<Reg stat> = 5).

6.17.27 Num type

This parameter is used to indicate the type of identity returned by the +CNUM command. The service centre is used as (an optional) part of the SDS-TL transport service protocol. The gateways returned are those used in the SwMI for access to PSTN and PABX services.

- 0 - Individual;
- 1 - Group;
- 2 - PSTN Gateway;
- 3 - PABX Gateway;
- 4 - Service Centre (ITSI);
- 5 - Service Centre (E164 number).

6.17.28 PID

This parameter is used in the capability and profile setting commands. It shall be used in conjunction with a "service layer1" of SDS-TL. Value taken for the PIDs are those defined in EN 300 392-2 [2] clause 29.

- 0 to 255.

6.17.29 Priority

This parameter is used to indicate the priority to be used in resource queueing of either incoming or outgoing circuit mode call set up. Refer to EN 300 392-12-10 [3] and ETS 300 392-12-16 [21] for further details.

- 0 - Priority not defined by this parameter;
- 1 - Priority 1;
- 2 - Priority 2;
- 3 - Priority 3;
- 4 - Priority 4;
- 5 - Priority 5;
- 6 - Priority 6;
- 7 - Priority 7;
- 8 - Priority 8;
- 9 - Priority 9;
- ***10 - Priority 10***;
- 11 - Priority 11;
- 12 - Priority 12;
- 13 - Priority 13;
- 14 - Priority 14;
- 15 - Priority 15.

6.17.30 Proprietary

This is a variable sized information element used to convey specific information relating to other fields in the current command. It is included for possible future expansion of some commands.

NOTE: This element shall include the "proprietary element owner" element as the first field.

6.17.31 Proprietary element owner

This is the first part of the proprietary field to identify the manufacturer of the MT.

- ***0 - Reserved***;
- 1 to 255 - Allocated to each manufacturer by ETSI (see annex H of EN 300 392-2 [2]).

6.17.32 Reg stat

This parameter is used to indicate the registration status of the MT to the TEI.

- 0 - Not registered or searching;
- 1 - Registered home network;
- 2 - Not registered, but MT is currently searching a network;
- 3 - System reject;
- 4 - Unknown;
- ***5 - Registered, roaming***.

6.17.33 Reg unsolic

This parameter enables the unsolicited reporting of changes in registration status and/or Location Area.

- 0 - disable network registration unsolicited result code;
- 1 - enable network registration unsolicited result code for change in registration status (Reg status) only;
- 2 - enable network registration unsolicited result code LA for change in registration status, MNI or LA.

6.17.34 RqTx

This parameter is used in outgoing simplex circuit mode calls to give the call originator the first speech/ data item.

- ***0 - Request to Tx***;
- 1 - No Request to Tx.

6.17.35 SDS instance

A two-digit number identifying a particular SDS message in sending of Status and SDS messages without using the stack. The originating MT assigns this number. The number will be assigned at the beginning of any particular message sending and used to relate all PEI signalling related to that message sending. The value of SDS instance is not used on the air interface.

6.17.36 SDS-TL addressing

This parameter is used to indicate the SwMI support for its preferred SDS-TL addressing method as described in the extended services broadcast. Refer to EN 300 392-2 [2] for further details.

- ***0 - Reserved***;
- 1 - Service centre addressing preferred;
- 2 - Never use service centre addressing;
- 3 - MS choice to use service centre addressing.

6.17.37 SDS Status

This parameter is used to indicate the status of outgoing and incoming SDS messages in the MT message stack. It is used to poll the stack for types of messages.

- 0 - Incoming message stored and unread;
- 1 - Incoming message stored and read;
- 2 - Outgoing message stored and unsent;
- 3 - Outgoing message stored and sent.

6.17.38 Security information

An indication of whether the SwMI supports Air Interface encryption and if so what level. The full details can be found in EN 300 392-7 [19].

NOTE: Associated air interface Key information shall not be passed over the PEI. Class 1 systems have no AI encryption, class 2 systems use SCK AI encryption, and class 3 systems use authentication and AI encryption with both SCK and DCK.

- **0 - Class 1**;
- 1 - Class 2;
- 2 - Class 3.

6.17.39 Service profile

This parameter is used to tell the MS where to route, or allow routing of air interface downlink and uplink signalling respectively. Its main purposes are to prevent unnecessary signalling and to avoid conflict in responses.

- **0 - MT Only**;
- 1 - TE Only;
- 2 - Both;
- 3 - Neither.

6.17.40 Service layer1

This parameter is used to indicate the MS capabilities and to set profiles directing services to and from the TE and/or MT. Each one is split into "layer2" sub-parameters.

- 0 - CC;
- 1 - MM;
- 2 - SDS;
- 3 - SDS-TL;
- 4 - Packet Data.

6.17.41 Service layer2

This parameter is used (in conjunction with "service layer1" to indicate the MS capabilities and to set profiles directing services to and from the TE and/or MT. The set is split into groups of ten, where each group relates to a "layer1".

- 0 - Voice;
- 1 - Data;
- 2 - 9 Reserved;
- 10 - Registration;
- 11 - Group Management;
- 12 - Security;
- 13 - Enable;
- 14 - Energy saving;
- 15 - 19 Reserved;
- 20 - Status;
- 21 - SDS type 1;
- 22 - SDS type 2;
- 23 - SDS type 3;
- 24 - SDS type 4 (not SDS-TL);
- 25 - 29 Reserved;
- 30 - IPV4;
- 31 - IPV6;
- 32 - 39 Reserved.

6.17.42 Simplex

This parameter is used to indicate the type of circuit mode channel in either an incoming or an outgoing call set up. Simplex channels will be used in conjunction with transmission request and grant signalling once the call is established (maintenance phase).

- ***0 - Duplex***;
- 1 - Simplex.

6.17.43 Slots/Codec

The meaning of this parameter is dependant on the value of <AI service> in the same command. If <AI service> is a data service then this field is used to indicate the number of air interface slots to be used in either incoming or outgoing packet or circuit mode data call set up. If <AI service> is the voice service then this field indicates the type of Codec used.

Data

- 0 - 1 slot;
- 1 - 2 slots;
- 2 - 3 slots;
- 3 - 4 slots.

Speech

- **1 - TETRA encoded speech**;
- 2 - Reserved;
- 3 - Reserved;
- 4 - Proprietary encoded speech.

6.17.44 Stack full

This parameter is used to indicate when the MT message stack is full. TE applications should take care to ensure the stack does not stay full, as the MT can receive no more messages from the air interface. The application should delete messages from the stack before any more arrive.

- **0 - Stack not full**;
- 1 - Stack full.

6.17.45 Stack present

This parameter is used to indicate if the MT supports a SDS message stack.

- **0 - Stack present**;
- 1 - Stack not present.

6.17.46 TPI (Transmitting Party Identity)

A digit stream to be interpreted dependant on <TPI type>. Typically used by the TE MMI to display the identity of the party currently transmitting in a simplex call.

6.17.47 TPI (Transmitting Party Identity) type

This parameter is used in the call maintenance of a simplex call. It informs the TE how to interpret the Transmitting Party Identity field.

- **0 - SSI**;
- 1 - TSI;
- 2 - External subscriber number.

NOTE: The SSI refers to the current network to which the MT is registered.

6.17.48 TxCont

This parameter is used in the call maintenance phase of simplex circuit mode calls. When received from the MT the TE will know that any interruption of a call has ceased.

- 0 - Do not continue;
- **1 - Continue.**

6.17.49 TxDemandPriority

This parameter is used in the call maintenance phase of simplex circuit mode calls. It sets the priority to be used in a particular Tx Demand.

- 0 - Low;
- **1 - High;**
- 2 - Pre-emptive;
- 3 - Emergency.

6.17.50 TxGrant

This parameter is used in the call maintenance phase of simplex circuit mode calls. When received from the MT the TE will know what to do with the transmitter on the established circuit.

- 0 - Transmission granted;
- **1 - Transmission not granted;**
- 2 - Transmission queued;
- 3 - Transmission granted to another.

6.17.51 TxRqPrmsn

This parameter is used in the call maintenance phase of simplex circuit mode calls. It tells the TE whether it is allowed to request a transmission permission.

- **0 - Allowed to request**;
- 1 - Not allowed to request.

6.17.52 User data

This is ASCII Hex representation of the user data bit stream in SDS related messages. Coding is done starting at the MS bit; each block of four bits is represented by one character; the characters are presented in the same order as the bits themselves (no swapping of nibbles). If the number of bits is not divisible by four, then the least significant bits of the least significant Hex digit are packed with "0".

6.18 Outgoing call set up methodology

6.18.1 General on outgoing call set up methodology

This clause describes the procedures for successful set up of outgoing calls. In the event of an error at any step the MT will reply with an error message and the call set up will be cancelled.

6.18.2 Voice calls

The initiation of an outgoing voice call takes two commands.

1) A +CTSDC command is used to set parameters for subsequent dial commands.

2) A D command is used to initiate a call set up using the predefined parameters.

Subsequent calls of the same type (e.g. group) do not need a new +CTSDC command but it is recommended that a new set of parameters be set for every call. Implementers should take care that no calls overlap if they have different CTSDC parameters.

The application within the TE may have different forms of MMI to generate these commands but these commands will always be used to initiate an outgoing call. For example the MMI could have a PTT which when pushed would generate a set of signalling to initiate a group call.

The MT interprets the "D" command in different ways depending on the <AI service> and <called party ident type> parameters set by the +CTSDC command. The dialled string is normally used as the called party address and the call is set up using the parameters set by the previous +CTSDC command.

The MT should check the dialled string for valid numbering. Illegal numbers or combinations of the dialled string and the +CTSDC parameters shall cause an error result code.

A voice call is set up on an "ATD" command if the <AI service> parameter has been set to voice. The dialled string in the "ATD" command will be treated in different ways depending on the values of <called party ident type>, <comms type> and <AI service>. When the final result code indicates successful execution of the "ATD" command the MT and TE still treat signalling on TD and RD as commands. This allows other services such as SDS and other voice calls to run concurrently, if the MT supports it.

1) If the <called party ident type> is PABX the MT will put the PABX gateway into the called party field on the air interface and the dialled string into the ESN field.

2) If the <called party ident type> is PSTN the MT will put the PSTN gateway into the called party field on the air interface and the dialled string into the ESN field.

3) In all other cases the MT will perform computations on the dialled string to generate the called party address field used on the air interface. The computations will depend on the value of <called party ident type>.

The outgoing call progress responses (+CTOP) inform the TE of the call set up progress. The use of call progress signalling is implementation dependant, but for example will be used by the TE to indicate a resource queue.

The reception of a connect (+CTCC) message informs the TE to enter the call maintenance phase.

NOTE: In some cases the final result code may be "CONNECT". This special case shall be predetermined in both the MS and TE. Such predetermination is outside the scope of the present document and for this reason its use is not recommended.

6.18.3 Circuit mode data calls

The initiation of an outgoing circuit mode data call takes two commands.

1) A +CTSDC command is used to set parameters for subsequent dial commands.

2) A D command is used to initiate a call set up using the predefined parameters.

Subsequent calls of the same type do not need a new +CTSDC command but it is recommended that a new set of parameters be set for every call. Implementers should take care that no calls overlap if they have different CTSDC parameters.

The MT interprets the "D" command in different ways depending on the <AI service> and <called party ident type> parameters set by the +CTSDC command. The dialled string is normally used as the called party address and the call is set up using the parameters set by the previous +CTSDC command.

The MT should check the dialled string for valid numbering. Illegal numbers or combinations of the dialled string and the +CTSDC parameters shall cause an error result code.

A circuit mode data call is set up on a "ATD" command if the <AI service> parameter has been set to one of the circuit mode data selections (values 1-7). The MT will generate the called party address field used on the air interface from the dialled string in the "ATD" command. The computations will depend on the value of <called party ident type>. Note PSTN and PABX are not valid <called party ident types>. When the final result code indicates successful execution of the "ATD" command the MT and TE change to AT circuit mode data state. Signalling on TD and RD is treated as data and passed through the MT as a transparent stream.

The outgoing call progress responses (+CTOP) inform the TE of the call set up progress The use of call progress signalling is implementation dependant, but for example will be used by the TE to indicate a resource queue.

The reception of a connect (+CTCC) message informs the TE to enter the call maintenance phase.

NOTE: In some cases the final result code may be "CONNECT". This special case shall be predetermined in both the MS and TE. Such predetermination is outside the scope of the present document and for this reason its use is not recommended.

6.18.4 Sending of SDS messages

6.18.4.1 General on sending of SDS messages

The initiation of an outgoing SDS message can be done in two ways, directly to the air interface, or via the stack. In either case sending a message takes two commands. The choice of which method to use for SDS sending is TE and MT implementation dependant. If the MT does not have message stack capability then "direct" shall be used.

1) A +CTSDS command is used to set parameters for subsequent CMGW or CMGS commands.

2) A CMGW or CMGS command is used to send the message (stack or direct) using the predefined parameters.

Subsequent calls of the same type do not need a new +CTSDS command but it is recommended that a new set of parameters be set for every call. Implementers should take care that no calls overlap if they have different CTSDS parameters.

6.18.4.2 Send via Stack

The CTSDS command is followed by a CMGW command, which writes the message to the stack. The response to the command informs the TE of a reference (message index) within the stack. The message is sent (later) on the air interface using a CMSS command from the TE. The CMSS command does not use the current setting for "called party ident type" of the CTSDS command but that stored in the stack for that message index. The other parameters of the U-SDS Data air interface PDU will be made up from the current CTSDS command.

If the message was a SDS-TL with a PID indicating use of the TL protocol the response will contain the message reference of the SDS-TL layer.

NOTE: SDS messages that have not been sent on the air interface can be deleted from this stack, effectively cancelling the send request.

6.18.4.3 Direct Send

An SDS direct send is initiated by a "CMSG" command if the <AI service> parameter has been set to one of the valid SDS selection (values 9 - 13). The MT will generate the called party address field used on the air interface from the address field in the "CMSG" command. The computations will depend on the value of <called party ident type>.

NOTE: PSTN and PABX are not valid <called party ident types> for SDS messages.

6.19 Incoming call set up methodology

6.19.1 General on incoming call set up methodology

This clause describes the procedures for successful incoming calls. In the event of an error at any step the MT or TE will reply with an error message and the call set up will be cancelled.

Incoming calls are always indicated by unsolicited messages from the MT towards the TE. The type of message and its parameters will tell the TE all details of the incoming call.

6.19.2 Voice calls

The unsolicited response (+CTICN) informs the TE that a voice call request has been made to the TE/MT station. The parameters are used to determine further TE actions. For example the parameters <hook> and <simplex> values will determine whether the TE starts a ring tone or goes straight to the call maintenance phase and whether to use the PTT in speech calls.

In the event of hook signalling the TE will send the standard command "A" when the TE MMI (or application) goes "off hook" to continue the call set up process.

The incoming call progress may be updated by further optional messages (+CTICN) to inform the TE of the call set up progress and for example will be used by the TE to indicate a resource queue.

In the event of a voice call with direct signalling the TE MMI will indicate open voice paths to selected speakers and microphones.

When the call is ready for completion the TE sends a connect message to the MT and both enter the call maintenance phase.

6.19.3 Circuit mode data calls

The unsolicited response (+CTICN) with the right parameters informs the TE that a circuit mode data call request has been made to the TE/MT station. The parameters are used to determine further TE actions. For example the parameters <hook> and <slots/codec> values will determine whether the TE starts a ring tone or goes straight to the call maintenance phase and whether it needs to change the baud rate of the PEI.

In the event of hook signalling the TE will send the standard command "A" when the TE MMI goes "off hook" to continue the call set up process.

The incoming call progress may be updated by further optional messages (+CTICN) to inform the TE of the call set up progress and for example will be used by the TE to indicate a resource queue.

In the event of a circuit mode data call with direct signalling the TE MMI will indicate connection and connect the data device to the circuit.

When the call is ready for completion the TE sends a connect message to the MT and both will change state to AT circuit mode data. Signalling on TD and RD will now be treated as data. Call maintenance is described in clause 6.15.8.

6.19.4 Reception of SDS messages

6.19.4.1 Received via Stack

The TE will receive the unsolicited message +CMTI to indicate a new message has been stored on the MT message stack. The parameters of this message will inform the TE of the type of message and where it is to be found. A "list" and subsequent "read" message are used to retrieve the messages from the appropriate stack. SDS-TL messages will need handling according to the SDS-TL protocol, including sending a "consumed" message back to the source.

Both TE and MT stay in the command state.

6.19.4.2 Direct Received

The TE will receive the unsolicited message +CTSDSR, which has all parameters to define the message type and its contents. SDS-TL messages will need handling according to the SDS-TL protocol, including sending a "consumed" message back to the source.

6.20 Voice and circuit mode data call maintenance commands

In the voice and circuit mode data call maintenance phase the treatment of signalling on circuits TD and RD will be used for in call signalling, including disconnect.

In voice calls, the <simplex> parameter will indicate to the TE whether or not to use the MMI and commands associated with PTT. The outgoing commands are "transmit demand" and "transmit ceased" (+CTXD, +CUTXC). The associated responses will be "transmission granted" and "transmission ceased" (+CTXG, +CDTXC). The TE will use these for MMI purposes, including the display of the talking party identity.

In order to use these commands the TE and MT shall change into the AT command state (using hardware or escape signalling) the Transmit arbitration commands can be used. Once the transmit direction has been established the TE shall send an ATO command which (when acknowledged) will put both back into AT circuit data mode.

6.21 Call clear down commands

6.21.1 General on call clear down commands

All circuit mode (voice and data) calls and packet data sessions have a clear down phase. These are treated differently depending on the type of call that is in progress and which end clears the call.

6.21.2 TE Initiated clear

1) A voice call can be cleared from the TE, by sending the standard command "H".

2) A circuit mode data call can be cleared from the TE, in one of two ways depending on the setting of the "&D" command. If the "&D" command has been set to "2" (orderly clear down of call) the TE drops the DTR circuit.

   - If the hardware is not present then the "&D" command has been set to "0" (ignore DTR). In this case the TE sends an escape character (set by S2) sequence with guard times (set by S12) on the TD line. The MT shall be capable of decoding this sequence out of the transparent data stream.

6.21.3 Network and MT Initiated clear

All calls will be subject to clearing by a remote station, the SwMI or the MT itself. Definitions of the source of a clear are beyond the scope of the present document but include reasons such as the other party clearing the call, time outs and pre-emption. Different services will have different timeouts, some set in a MT and some in the SwMI. Examples are speech item duration (different for different speech services), circuit mode data duration and packet data session timer.

The TE will receive signalling as though the MT cleared the call.

1) A voice call can be cleared from the MT, by sending the release command (+CTCR) with its associated "disconnect cause" to indicate why and where the call clear was originated.

2) A circuit mode data call can be cleared from the MT in one of two ways:

   - if the circuit DCD is available and &C has been set to 1 the MT drops the DCD circuit;

   - if the hardware is not present then the &C has been set to 0 (ignore DCD) the MT can send the special "NO CARRIER" sequence with guard times. The TE shall be capable of decoding this sequence out of the transparent data stream.

7 TNP1 service description

7.1 Service primitives at the TNP1A-SAP

TNP1-SERVICE ACCESS request/indication: These primitives shall be used to extend the access to CMCE and MM services to the user applications located in TE2.

TNP1- SDS SERVICE PROFILE request/indication/response/confirm: These primitives shall be used by the user applications located in` TE2 to specify the SDS 1/2/3 and Status service profile.

TNP1- CC SERVICE PROFILE request/indication/response/confirm: These primitives shall be used by the user applications located in TE2 to specify the CC service profile.

TNP1- MM SERVICE PROFILE request/indication/response/confirm: These primitives shall be used by the user applications located in TE2 to specify the MM service profile.

TNP1- SDS-TL SERVICE PROFILE request/indication/response/confirm: These primitives shall be used by the user applications located in TE2 to specify the SDS-TL service profile.

TNP1-UNITDATA request/indication: These primitives shall be used to send and receive U-plane circuit mode traffic to/from TMD-SAP.

TNP1-UNITDATA REPORT indication: This primitive shall be used deliver indications from U-plane circuit mode traffic.

7.2 Service primitives at the TNP1B-SAP

TNP1- SDS-TL CAPABILITY request/indication/response/confirm: These primitives shall be used to query the essential SDS-TL capabilities of a MT2 by user applications located in a TE2.

TNP1- SERVICES CAPABILITY request/indication/response/confirm: These primitives shall be used to query the essential capabilities (out of the SDS-TL capabilities) of a MT2 by user applications located in a TE2.

TNP1-IDENTIFICATION request/indication/response/confirm: These primitives shall be used to query the essential identification data of a MT2 by user applications located in a TE2.

TNP1-STATE request/indication/response/confirm: These primitives shall be used to query basic information of the operational state of a MT2 by user applications located in a TE2.

7.3 Service primitives at TNP1A-SAP and TNP1B-SAP

TNP1-CLOSE request/indication: These primitives shall be used to close the communication between peer TNP1 entities.

TNP1-OPEN request/indication: These primitives shall be used to close the communication between peer TNP1 entities.

TNP1-REPORT indication: This primitive shall be used to inform the user application about abnormal conditions within TNP1.

7.4 Primitive descriptions

7.4.1 TNP1- Services CAPABILITY

TNP1-SERVICES CAPABILITY request: shall be used by a TE2 user application to request capability information.

TNP1-SERVICES CAPABILITY indication: shall indicate a capability information request to the MT2 application in charge of providing the capability information.

TNP1-SERVICES CAPABILITY response: shall be used to initiate the capability information delivery by the MT2 application in charge of providing the capability information.

TNP1-SERVICES CAPABILITY confirm: shall be used to deliver the capability information to an MT2 application.

The parameters of the primitives shall be as defined in table 14.

Table 14: Parameters for the primitive TNP1- SERVICES CAPABILITY

Parameter	Request	Indication	Response	Confirm
Circuit mode and MS services	-	-	M	M
Security	-	-	M	M
SDS mode services	-	-	M	M
Packet mode services	-	-	M	M
Reserved, note			M	M
NOTE: The reserved field is 8 bits in length.				

7.4.2 TNP1- SDS-TL CAPABILITY

TNP1-SDS-TL CAPABILITY request: shall be used by a TE2 user application to request capability information.

TNP1-SDS-TL CAPABILITY indication: shall indicate a capability information request to the MT2 application in charge of providing the capability information.

TNP1-SDS-TL CAPABILITY response: shall be used to initiate the capability information delivery by the MT2 application in charge of providing the capability information.

TNP1-SDS-TL CAPABILITY confirm: shall be used to deliver the capability information to an MT2 application.

The parameters of the primitives shall be as defined in table 15. Its content shall be according to table 67.

Table 15: Parameters for the primitive TNP1- SDS-TL CAPABILITY

Parameter	Request	Indication	Response	Confirm
SDS-TL services	-	-	M	M

7.4.3 TNP1-IDENTIFICATION

TNP1-IDENTIFICATION request: shall be used by a TE2 user application to request identification information.

TNP1-IDENTIFICATION indication: shall indicate an identification information request to the MT2 application in charge of providing the identification information.

TNP1-IDENTIFICATION response: shall be used to initiate the identification information delivery by the MT2 application in charge of providing the identification information.

TNP1-IDENTIFICATION confirm: shall be used to deliver the identification information to the requesting MT2 application.

The parameters of the primitives shall be as defined in table 16.

Table 16: Parameters for the primitive TNP1-IDENTIFICATION

Parameter	Request	Indication	Response	Confirm
Terminal equipment identity	-	-	M	M
Manufacturer identifier	-	-	M	M
Model	-	-	M	M
Software version	-	-	M	M
Hardware version	-	-	O	O
Product serial No	-	-	O	O
ISO global object ID	-	-	O	O
TNP1 protocol version	-	-	O	O
TNP1 release	-	-	O	O

7.4.4 TNP1-IDENTITIES

TNP1-IDENTITIES request: shall be used by a TE2 user application to request the radio identities.

TNP1-IDENTITIES indication: shall indicate an identities information request to the MT2 application in charge of providing the identities information.

TNP1-IDENTITIES response: shall be used to initiate the identities information delivery by the MT2 application in charge of providing the identities information.

TNP1-IDENTITIES confirm: shall be used to deliver the identities information to the requesting MT2 application.

The parameters of the primitives shall be as defined in table 17.

Table 17: Parameters for the primitive TNP1-IDENTITIES

Parameter	Request	Indication	Response	Confirm
ITSI	-	-	M	M
Number of static groups	-	-	M	M
GTSI	-	-	M	M
Number of dynamic groups	-	-	M	M
GTSI	-	-	M	M
More information flag	-		M	M

7.4.5 TNP1-REPORT

TNP1-REPORT indication: This primitive shall be used to inform the user application about normal and abnormal conditions within TNP1 and PEI DLL.

The parameters of the primitives shall be as defined in table 18.

Table 18: Parameters for the primitive TNP1-REPORT

Parameter	Indication
Report reason	M
Cause	O (note)
Result	O (note)
NOTE: Shall be present only when Reason indicates a "PEI DLL failure". Cause and Result shall be given the values of the corresponding PL-REPORT indication.	

7.4.6 TNP1-SERVICE ACCESS

TNP1-SERVICE ACCESS request: shall be used to initiate transmission of a TNP1 PDU to the peer entity. The PDU that shall be generated and transmitted, shall be defined by the parameter "PDU Type".

TNP1-SERVICE ACCESS indication: shall be used to transfer the values of the information elements of a received TNP1 PDU to the service user.

The parameters of the primitives are defined in table 19.

Table19: Parameters for the primitive TNP1-SERVICE ACCESS

Parameter	Request	Indication
PDU Type	M	M
PDU parameters	M (note)	M (note)
NOTE: Depending on the MT2 service. Some service primitives do not require any parameters.		

7.4.7 TNP1-SERVICE PROFILES

7.4.7.1 General on TNP1 service profiles

The TNP1 Service Profiles will be used to define the level of concurrency that is allowed for the MT and the TE while TNP1 is active. The concurrency defined is per service type, where for each service type a separate Service Profile is defined. It is assumed that the Service Profiles for the different services are unrelated.

The Service Profile for each service is defined in clauses 7.4.7.2 to 7.4.7.5.

There is no need of service profile for the Supplementary services. The SS are related to other service types. DGNA is to be handled by the Mobility attach/detach service. Other SS are to be handled by the application controlling the Call Control.

7.4.7.2 TNP1- SDS SERVICE PROFILE

TNP1- SDS SERVICE PROFILE request: shall be used by a TE2 user application to set the service profile of TE2 user applications for SDS access or to get the current state of the profile. The operation is selected with parameter Service Profile Operation.

TNP1- SDS SERVICE PROFILE indication: shall indicate the TNP1 Relay service profile configuration.

TNP1-SDS SERVICE PROFILE response: shall be used by the TNP1 Relay to initiate a service profile delivery to TE2 user application.

TNP1- SDS SERVICE PROFILE confirm: shall indicate the delivery of the service profile information to the TE2 user application.

The parameters of the primitives shall be as defined in table 20.

Table 20: Parameters for the primitive TNP1-SDS SERVICE PROFILE

Parameter	Request	Indication	Response	Confirm
Service profile operation	M	M	-	-
SDS status profile	O (note)	O (note)	M	M
SDS user data 1 profile	O (note)	O (note)	M	M
SDS user data 2profile	O (note)	O (note)	M	M
SDS user data 3 profile	O (note)	O (note)	M	M
Service profile request result	-	-	M	M
Set profile request	O (note)	O (note)		
NOTE: Not relevant when Service profile operation = Get service profile.				

7.4.7.3 TNP1- CC SERVICE PROFILE

TNP1- CC SERVICE PROFILE request: shall be used by a TE2 user application to set the service profile of TE2 user applications for CC access or to get the current state of the profile. The operation is selected with parameter Service Profile Operation.

TNP1- CC SERVICE PROFILE indication: shall indicate the TNP1 Relay service profile configuration.

TNP1-CC SERVICE PROFILE response: shall be used by the TNP1 Relay to initiate a service profile delivery to TE2 user application.

TNP1- CC SERVICE PROFILE confirm: shall indicate the delivery of the service profile information to the TE2 user application.

The parameters of the primitives shall be as defined in table 21.

Table 21: Parameters for the primitive TNP1-CC SERVICE PROFILE

Parameter	Request	Indication	Response	Confirm
Service profile operation	M	M	-	-
CC profile	O (note)	O (note)	M	M
Service profile request result	-	-	M	M
Set Profile request	O (note)	O (note)	-	-
NOTE: Not relevant when Service profile operation = Get service profile.				

7.4.7.4 TNP1- MM SERVICE PROFILE

TNP1- MM SERVICE PROFILE request: shall be used by a TE2 user application to set the service profile of TE2 user applications for MM access or to get the current state of the profile. The operation is selected with parameter Service Profile Operation.

TNP1- MM SERVICE PROFILE indication: shall indicate the TNP1 Relay service profile configuration.

TNP1-MM SERVICE PROFILE response: shall be used by the TNP1 Relay to initiate a service profile delivery to TE2 user application.

TNP1- MM SERVICE PROFILE confirm: shall indicate the delivery of the service profile information to the TE2 user application.

The parameters of the primitives shall be as defined in table 22.

Table 22: Parameters for the primitive TNP1-MM SERVICE PROFILE

Parameter	Request	Indication	Response	Confirm
Service profile operation	M	M	-	-
MM profile	O (note)	O (note)	M	M
Service profile request result	-	-	M	M
Set profile request	O (note)	O (note)	-	-
NOTE: Not relevant when Service profile operation = Get service profile.				

7.4.7.5 TNP1- SDS-TL SERVICE PROFILE

TNP1- SDS-TL SERVICE PROFILE request: shall be used by a TE2 user application to set the service profile of TE2 user applications for SDS-TL access or to get the current state of the profile. The operation is selected with parameter Service Profile Operation.

TNP1- SDS-TL SERVICE PROFILE indication: shall indicate the TNP1 Relay service profile configuration.

TNP1-SDS-TL SERVICE PROFILE response: shall be used by the TNP1 Relay to initiate a service profile delivery to TE2 user application.

TNP1- SDS-TL SERVICE PROFILE confirm: shall indicate the delivery of the service profile information to the TE2 user application.

The parameters of the primitives shall be as defined in table 23.

Table 23: Parameters for the primitive TNP1-SDS-TL SERVICE PROFILE

Parameter	Request	Indication	Response	Confirm
Service profile operation	M	M	-	-
Protocol identifier kind	M	M	M	M
Protocol identifier	M	M	M	M
SDS user data 4 profile	O (note)	O (note)	M	M
Service profile request result	-	-	M	M
Set profile request	O (note)	O (note)		
NOTE: Not relevant when Service PROFILE OPERATION = Get service profile.				

7.4.8 TNP1-STATE

TNP1-STATE request: shall be used by a TE2 user application to request basic information of the operational state of MT2.

TNP1-STATE indication: shall indicate a state information request to the MT2 user application in charge of providing information of the operational state of MT2.

TNP1-STATE response: shall be used to initiate the state information delivery by the MT2 application in charge of providing the state information.

TNP1-STATE confirm: shall be used to deliver the state information to a TE2 application.

The parameters of the primitives shall be as defined in table 24.

Table 24: Parameters for the primitive TNP1-STATE

Parameter	Request	Indication	Response	Confirm
Battery charge	-	-	O	O
Field strength	-	-	M	M
Bit error ratio	-	-	M	M
Internal temperature	-	-	O	O
Over temperature indication	-	-	O	O
Proprietary	-	-	O	O

7.4.9 TNP1-UNITDATA

TNP1-UNITDATA request: shall be used to send U-plane circuit mode traffic through TMD-SAP.

TNP1-UNITDATA indication: shall be used to receive U-plane circuit mode traffic from TMD-SAP.

The parameters of the primitives are defined in table 25.

Table 25: Parameters for the primitive TNP1-UNITDATA

Parameter	Request	Indication
PDU Type	M	M
Stolen	M	M
Data indicator	M	M
User data	M	M

7.4.10 Mapping of TNP1 PDUs and MT2 service primitives

Table 26 defines the mapping between TNP1 PDUs and service primitives available at TNP1A-SAP, TNP1B-SAP, TNCC-SAP, TNSS-SAP, TNSDS-SAP and TNMM-SAP. The mapping shall be applied in the TNP1 Relay.

Table 26: Mapping between TNP1 PDUs and MT2 service primitives

TNP1 PDU	Service Primitive
TECC-ALERT IND	TNCC-ALERT indication
TECC-COMPLETE REQ	TNCC-COMPLETE request
TECC-COMPLETE IND	TNCC-COMPLETE indication
TECC-COMPLETE CON	TNCC-COMPLETE confirm
TECC-DTMF REQ	TNCC-DTMF request
TECC-DTMF IND	TNCC-DTMF indication
TECC-MODIFY REQ	TNCC-MODIFY request
TECC-MODIFY IND	TNCC-MODIFY indication
TECC-NOTIFY IND	TNCC-NOTIFY indication
TECC-PROCEED IND	TNCC-PROCEED indication
TECC-RELEASE REQ	TNCC-RELEASE request
TECC-RELEASE IND	TNCC-RELEASE indication
TECC-RELEASE CON	TNCC-RELEASE confirm
TECC-SETUP REQ	TNCC-SETUP request
TECC-SETUP IND	TNCC-SETUP indication
TECC-SETUP RES	TNCC-SETUP response
TECC-SETUP CON	TNCC-SETUP confirm
TECC-TX REQ	TNCC-TX request
TECC-TX IND	TNCC-TX indication
TECC-TX CON	TNCC-TX confirm
TESS-ERROR IND	TNSS-ERROR indication
TESS-INFO REQ	TNSS-INFO request
TESS-INFO IND	TNSS-INFO indication
TESS-INFO RES	TNSS-INFO response
TESS-INFO CON	TNSS-INFO confirm
TESS-SERVICE REQ	TNSS-SERVICE request
TESS-SERVICE IND	TNSS-SERVICE indication
TESS-SERVICE RES	TNSS-SERVICE response
TESS-SERVICE CON	TNSS-SERVICE confirm
TESDS-STATUS REQ	TNSDS-STATUS request
TESDS-STATUS IND	TNSDS-STATUS indication
TESDS-REPORT IND	TNSDS-REPORT indication
TESDS-UNITDATA REQ	TNSDS-UNITDATA request
TESDS-UNITDATA IND	TNSDS-UNITDATA indication
TEMM-ATTACH DETACH GROUP IDENTITY REQ	TNMM-ATTACH DETACH GROUP IDENTITY request
TEMM-ATTACH DETACH GROUP IDENTITY IND	TNMM-ATTACH DETACH GROUP IDENTITY indication
TEMM-ATTACH DETACH GROUP IDENTITY CON	TNMM-ATTACH DETACH GROUP IDENTITY confirm
TEMM-DISABLING IND	TNMM-DISABLING indication

TNP1 PDU	Service Primitive
TEMM-ENABLING IND	TNMM-ENABLING indication
TEMM-ENERGY SAVING REQ	TNMM-ENERGY SAVING request
TEMM-ENERGY SAVING CON	TNMM-ENERGY SAVING confirm
TEMM-REPORT IND	TNMM-REPORT indication
TEMM-REGISTRATION IND	TNMM-REGISTRATION indication
TEMM-REGISTRATION CON	TNMM-REGISTRATION confirm
TEMM-SERVICE IND	TNMM-SERVICE indication
TEMTA- XXX CAPABILITY REQ	TNP1-XXX CAPABILITY request
TEMTA-XXX CAPABILITY RESP	TNP1-XXX CAPABILITY response
TEMTA-IDENTIFICATION REQ	TNP1-IDENTIFICATION request
TEMTA-IDENTIFICATION RESP	TNP1-IDENTIFICATION response
TEMTA-OPERATION	TNP1-OPERATION request/indication
TEMTA-XXX SERVICE PROFILE	TNP1-XXX SERVICE PROFILE request
TEMTA-XXX SERVICE PROFILE RESP	TNP1-XXX SERVICE PROFILE response
TEMTA-STATE REQ	TNP1-STATE request
TEMTA-STATE RESP	TNP1-STATE response

7.5 Parameter description

All the parameters that are not defined in this clause, are defined in clause 8.5.

Cause =

Definition of EN 300 392-2 [2] clause 20.2.4 shall apply as applicable.

Data Indicator

Data available;

No data available.

PDU parameters =

A set of parameters required to fill the information elements of the PDU defined by the parameter MT2 service. Each parameter shall be equally enumerated and its values shall have equal interpretation as the corresponding PDU information element. Parameters for filling the PDU information elements shall be available in the following manner:

One parameter for each Mandatory information element of the PDU;

One parameter for each Optional information element required in the specific use of the PDU;

One parameter for each Conditional information element required by the existence of a determining Optional information element in the PDU.

PDU type =

The parameter defines the PDU that shall be generated as a consequence of a service request, the indication type service primitive that shall be generated as a response to a received PDU.

The values of PDU Type and their interpretation shall be equal to the values and interpretation of PDU Type information element encoding defined in clause 8.5.91.

Result =

Definition of EN 300 392-2 [2], clause 20.2.4.3 shall apply as applicable.

Stolen

0 User data originates from a normal slot

1 User data originates from a stolen slot

2 User data is to be delivered in a normal slot

3 User data is to be delivered in a stolen slot.

7.6 Service states for TNP1A-SAP

The TNP1A-SAP has three states, described below:

CLOSED: No services of the TNP1A-SAP are available to the service users. No service requests shall be issued.

IDLE: All services and service requests of TNP1A-SAP are available to the service users.

PROFILE CHANGE: Change of the service profile is requested but not yet completed. No other TNP1A-SAP services or service requests shall be accessed while the profile change is in progress.

7.7 Service states for TNP1B-SAP

CLOSED: The services of the TNP1B-SAP are not available to the service users. No service requests shall be issued.

IDLE: All services of TNP1B-SAP are available to the service users.

8 TNP1 protocol

8.1 Procedures

8.1.1 Establishing communication between TE2 user applications and MT2

AS TNP1 runs over a UDP/IP link the TNP1 communication between TE2 and MT2 is always established when the IP link is established. When the TNP1 entity receives an indication that the IP link is established it shall issue TNP1-OPEN indication.

8.1.2 Closing the TNP1 communication

The TNP1 communication will be closed when the IP link between the TE2 and the MT2 is disconnected. On detection of that disconnection a TNP1-CLOSE indication shall be issued by TNP1 entity.

8.1.3 Reporting normal and abnormal events

At any moment when the TNP1 communication is established, the application level entities may receive TNP1-REPORT indications that inform about abnormal events within the TNP1 peer entity. Both TE2 and MT2 TNP1 entities may report failures, see figures 5 and 6.

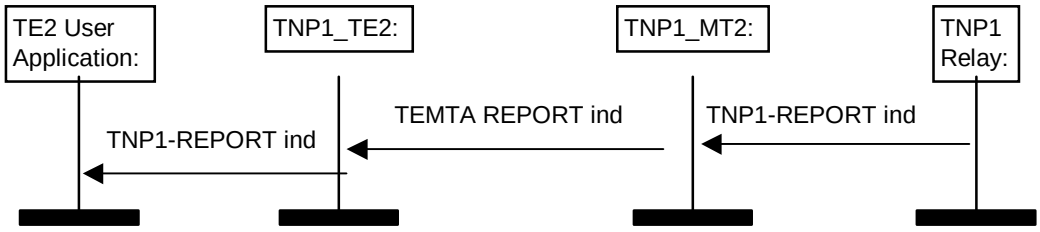

Figure 5: Reporting normal and abnormal events from TNP1 peer entity, MT2 end

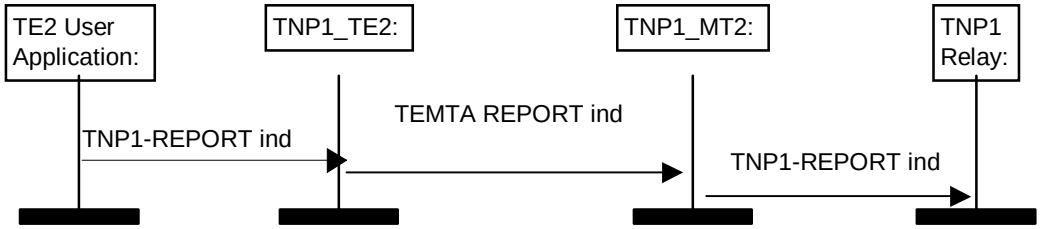

Figure 6: Reporting normal and abnormal events from TE2

8.1.4 Querying MT2 identification information

To query the MT2 identification information, a TE2 user application may issue a TNP1-IDENTIFICATION request. There shall be an application present in MT2 that responds to a TNP1-IDENTIFICATION indication with a TNP1-IDENTIFICATION response, refer figure 7.

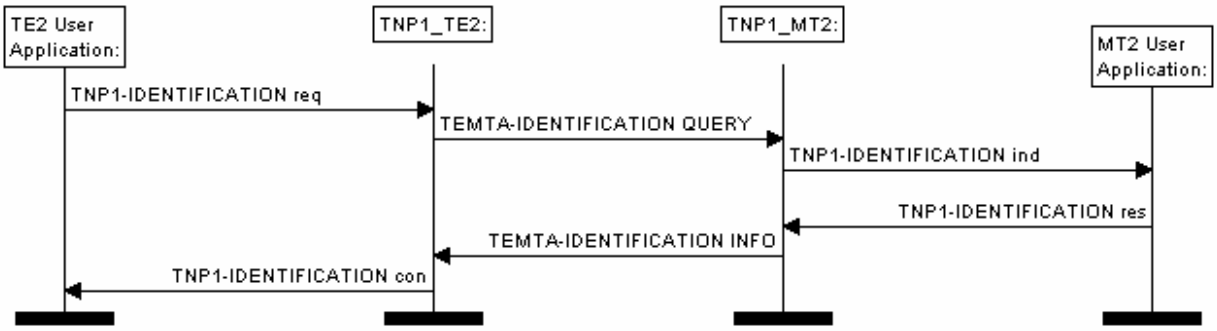

Figure 7: Querying MT2 identification information

8.1.5 Querying MT2 capabilities

To query the MT2 capabilities, a TE2 user application may issue a TNP1-CAPABILITY request. There shall be an application present in MT2 that responds to a TNP1-CAPABILITY indication with a TNP1-CAPABILITY response, see figure 8.

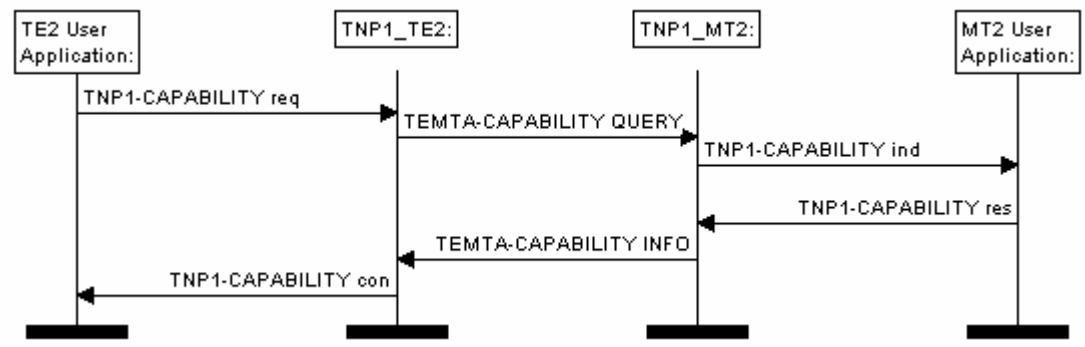

Figure 8: Querying MT2 capabilities

8.1.6 Querying MT2 state

To query current state of the MT2, a TE2 user application may issue a TNP1-STATE request. There shall be an application present in MT2 that responds to a TNP1-STATE indication with a TNP1-STATE response, see figure 9.

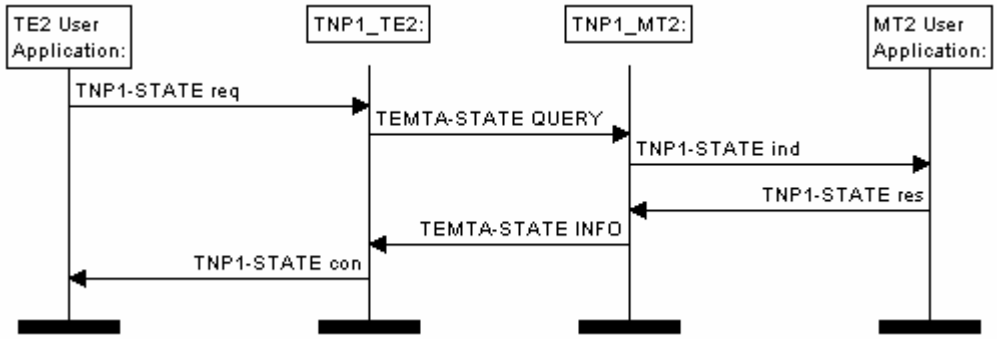

Figure 9: Querying MT2 state

8.1.7 Setting/getting the service profile

To get or set the current state of the MT2, a TE2 user application may issue a TNP1-XXX SERVICE PROFILE request. The selection between "get" and "set" operations shall be done with parameter Service Profile Operation. For both operations, there shall be an application present in MT2 that responds to a TNP1-XXX SERVICE PROFILE indication with a TNP1-XXX SERVICE PROFILE response, see figure 10.

Where XXX stands for SDS/CC/MM/SDS-TL.

The application shall:

- Optionally maintain a service profile according to successive "set" operations.
- Return the service profile as a response to "set" and "get" operations. The response to "set" shall indicate the profile after the "set" operation.

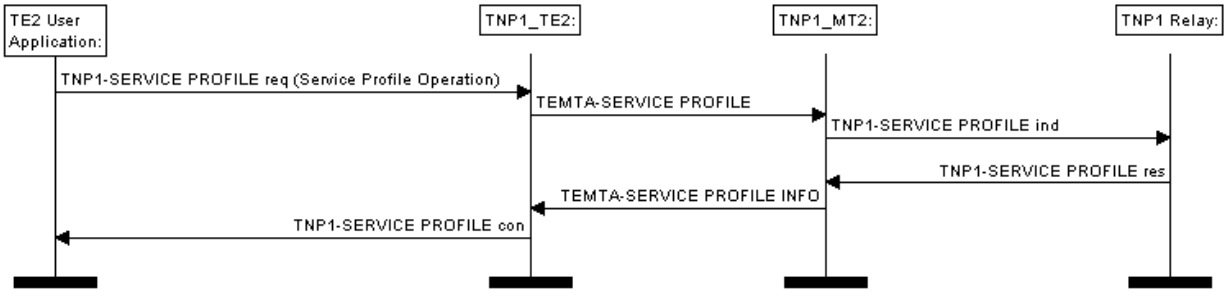

Figure 10: Setting/getting the service profile

8.1.8 Accessing CMCE and MM services

User applications in TE2 shall access CMCE and MM services by issuing the TNP1-SERVICE ACCESS request, see figure 11.

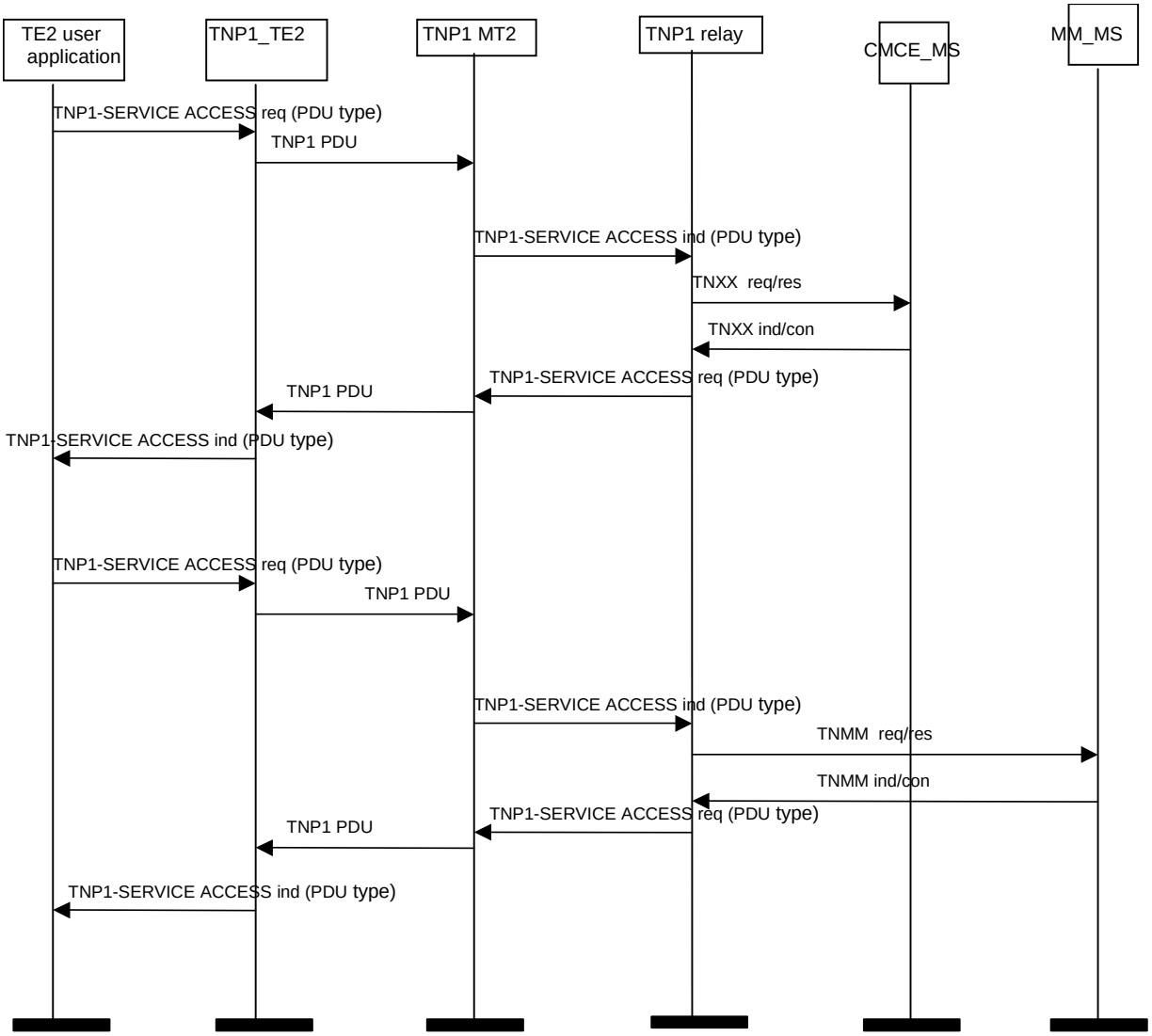

Figure 11: Accessing CMCE and MM services

The CC, SDS and MM procedures are defined in detail in clauses 14 and 15 of EN 300 392-2 [2].

8.1.9 Circuit mode data

Within the context of TNP1, circuit mode data is transmitted in-band using the TEMAC-UNITDATA PDU together with the TNP1-UNITDATA request and indication primitives. Flow control may be achieved using the TEMAC Flow Control PDUs.

8.2 Protocol timers

For MM and CMCE services and procedures, the timers defined in EN 300 392-2 [2] shall apply.

8.3 PDU structure

8.3.1 General on PDU structure

The boundaries of TNP1 PDUs are aligned to octet boundaries to ease handling and to be suitable for transmission over an underlying octet-oriented serial link.

Two length values are specified for each information element. The length in octets ($Length_8$) defines the number of octets that shall be reserved for the element. The length in bits ($Length_2$) defines the number of bits within the octets of the information element that are used for encoding the value carried by the element.

The generic TNP1 PDU layout shall be as defined in table 27.

Table 27: TNP1 PDU layout

Information element	$Length_2$	$Length_8$
PDU Type	16	2
Type 1 element (1)	Constant	Constant
Type 1 element (2)	Constant	Constant
...etc.	…etc.	…etc.
Type 1 element (n)	Constant	Constant
P-bit	8	1
Type 2 element (1)	Constant	Constant
Type 2 element (2)	Constant	Constant
P-bit	8	1
...etc.	…etc.	…etc.
P-bit	8	1
Type 2 element (n)	Constant	Constant
Type 3 element descriptor (1)	16	2
Type 3 element (1)	Varies	Varies
Type 3 element descriptor (2)	16	2
Type 3 element (2)	Varies	Varies
...etc.	…etc.	…etc.
Type 3 element descriptor (n)	16	2
Type 3 element (n)	Varies	Varies

The first information element of each PDU shall be the PDU Type, used for translation of the PDU as a request or response and to determine the peer entity for that request or response. The PDU Type information element contains Group ID and PDU ID sub-elements.

The PDU Type may be followed by a variable number of type 1, 2, 3 elements. Type 1 elements are either mandatory or conditional to a type 1 or type 2 element and shall be placed within the PDU in a fixed order as specified in the PDU description tables. Lengths of type 1 element are constant. A conditional type 1 element shall be present only as defined by the element on which it is conditional. When a type 2 element is not present, then all other elements conditional on it shall not be present.

Type 2 elements are optional and shall be placed within the PDU in a fixed order as specified in the PDU description tables. Lengths of type 2 elements are constant. The presence of a Type 2 element is indicated with a Presence bit (P-bit) as defined in clause 8.3.3.

The type 1 and/or type 2 elements may be followed by a variable number of type 3 elements. A type 3 element is always preceded with a type 3 element descriptor that defines presence, type and length of the subsequent type 3 element. Type 3 Elements are optional and shall be normally placed at the PDU end in numerical order as specified within the type 3 element identifier. The presence of a Type 3 element is indicated with a presence bit (M-bit) as defined in clause 8.3.4. Type 3 element coding can contain sub-elements, which can be either of type 1, 2 or 3.

Type 3 element descriptor are not shown in the PDU description tables, nor is their length taken into account in the PDU descriptions.

NOTE 1: The last existing information element whether type 1, 2 or 3 is not followed either by a P or M-bit, contrary to the air interface PDU encoding.

The octet and bit ordering within each information element shall be as defined in figure 12. When an information element contains more than one octet, the most significant octet (octet 1) containing the Most Significant Bit (MSB) b_n of the information element shall be transmitted first. The MSB of an information element can be any of the bits in that octet. If the MSB of the information element is not bit number 8, then all bits having a higher bit number shall be set to zero. The Least Significant Bit (LSB) b_1 of the information element shall be transmitted as the first bit of the least significant octet (octet n). The bits are numbered within each octet as defined in figure 39. The bit 1 of an octet shall be transmitted first.

NOTE 2: In the air interface the bits of an information element are in order from the most significant bit to the least significant bit and the most significant bit is sent first (closest to the beginning of the MAC slot).

8	7	6	5	4	3	2	1	Bit number
b_n (MSB)	b_{n-1}	b_{n-2}	b_{n-3}	b_{n-4}	b_{n-5}	b_{n-6}	b_{n-7}	Octet 1 (most significant octet)
...	...	...	...	...	...	...	...	...etc.
b_{16}	b_{15}	b_{14}	b_{13}	b_{12}	b_{11}	b_{10}	b_9	Octet m-1
b_8	b_7	b_6	b_5	b_4	b_3	b_2	b_1 (LSB)	Octet m (least significant octet)

Figure 12: Octet and bit order in information elements of TNP1 PDUs

8.3.2 Structure and encoding of Type 1 elements

Each type 1 Element has a fixed length within a PDU. The length of the type 1 Element ($Length_8$) in bytes is derived from the length of the associated information element ($Length_2$) with the following formula:

$$Length_8 = 1 + ((Length_2 - 1) \text{ div } 8)$$

The bits of the associated information element shall be right aligned to the octets of type 1 element, the least significant bit positioned to the bit 1 of the least significant octet. Unused bits of the most significant octet are set to zero.

NOTE: Conditional information elements are constructed as type 1 elements, but there is no type information in the PDU description.

8.3.3 Structure and encoding of Type 2 elements

Each type 2 Element has a fixed length within a PDU. The length of the type 2 element ($Length_8$) in bytes is derived from the length of the associated information element ($Length_2$) with the following formula:

$$Length_8 = 2 + ((Length_2 - 1) \text{ div } 8)$$

The bits of the associated information element shall be right aligned to the octets of the type 2 element, the least significant bit positioned to the bit 1 of the least significant octet.

The presence of a valid value in the type 2 element is indicated with a Presence bit (P-bit). The P-Bit is positioned in the most significant bit of the most significant octet (b_n of the information element). The P-bit shall be set to "1" to indicate a present value and "0" to indicate a non-present value. Unused bits of the most significant octet are set to "0". Consequently the P-bit uses a whole octet and its value is either 128 or 0.

For a non-present type 2 element, the mapping shall result in $Length_8$ placeholder octet with all bits set to "0".

8.3.4 Structure and encoding of Type 3 elements

A type 3 element is made up of three sub-elements; M bit, element identifier and length.

The M-bit, type 3 element identifier and Length Indicator (LI) of a type 3 element shall be mapped to a two-octet type 3 element descriptor preceding the information element itself, as depicted in figure 13.

8	7	6	5	4	3	2	1	bit
M-bit	Type 3 element identifier				LI_{11}	LI_{10}	LI_9	Octet 1
LI_8	LI_7	LI_6	LI_5	LI_4	LI_3	LI_2	LI_1	Octet 2

Figure 13: Structure of type 3 Element Identifier

The presence of a type 3 element is indicated with a more bit (M-bit) placed in bit 8 of octet 1. The M-bit shall be set to "1" if a type 3 element exists and to "0" if not.

If the M-bit is set to "0", then all other bits of the type 3 element descriptor shall be set to zero, too. Thus the length of type 3 element identifier is always 2 octets as shown in table 27 and in figure 13.

The type 3 element identifier can have one of four different sets of values, depending on the type of PDU in which it is contained. The four sets are CMCE, MM, MTA and SS.

The Length Indicator (LI) is an eleven-bit integer value defining the length of the subsequent type 3 element in bits. The most significant bit LI_{11} of the Length Indicator is mapped in bit 3 of octet 1 and the least significant bit LI_1 in bit 1 of octet 2.

The length of the type 3 element user data in octets ($Length_8$) is derived from the length of the associated information element in bits ($Length_2$), using the following formula:

$$Length_8 = 1 + ((Length_2 - 1) \text{ div } 8)$$

The bits of the associated information element are right aligned to the octets of the type 3 element, the least significant bit positioned to the bit 1 of the least significant octet. Unused bits of the most significant octet are set to zero.

NOTE: The M-bit as such is redundant as the Length part of the type 3 element descriptor is set to a non-zero value, when the M-bit is "1" and to zero value, when the M-bit is "0".

Type 3 element coding of a PDU can contain sub-elements that can be either of Type 1, 2 or 3. When sub-elements exist, the value of Length Indicator in associated Type 3 element identifier shall be set to indicate the total number of bits contained in the octet-mapped sub-elements, i.e. the value of Length Indicator is the number of octets times 8.

8.3.5 Examples of PDU encoding

Table 27A gives an example of PDU encoding using the TECC-MODIFY IND PDU as defined in table 34.

Table 27A: Example of TECC-MODIFY IND PDU contents

Information element	$Length_2$	$Length_8$	Type	C/O/M	PDU bits	Remark
PDU Type	16	2	1	M	00001001	TECC-MODIFY IND
					00000111	
Call handle	16	2	1	M	nnnnnnnn	Any
					nnnnnnnn	
					10000000	P-bit, optional element present
Basic service information	8	2	2	O	00010000	Speech, encr., pnt-to-pnt, one slot
					10000000	P-bit, optional element present
Simplex/duplex selection	1	1	2	O	10000000	Duplex requested
					00000000	P-bit, optional element not present
Call time-out	4	1	2	O		Empty, no bits
					10101000	M-bit, Optional element present,
					00010001	Proprietary, length 17 bits
Proprietary (data)			3	O	nnnnnnnn	Proprietary element owner, any
					00000001	Data "1 1111 1101" (right aligned)
					11111101	

In the example in the table 27A the total length of the PDU is 14 octets.

Table 27B gives an example of PDU encoding of the same PDU as in the table 27A in the case of no optional elements included.

NOTE: The example is given only for explanation of the PDU encoding. In normal use that PDU should have at least one optional element present.

Table 27B: Example of TECC-MODIFY IND PDU contents without optional information elements

Information element	$Length_2$	$Length_8$	Type	C/O/M	PDU bits	Remark
PDU Type	16	2	1	M	00001001	TECC-MODIFY IND
					00000111	
Call handle	16	2	1	M	nnnnnnnn	Any
					nnnnnnnn	
					00000000	P-bit, optional element not present
Basic service information	8	2	2	O		Empty, no bits
					00000000	P-bit, optional element not present
Simplex/duplex selection	1	1	2	O		Empty, no bits
					00000000	P-bit, optional element not present
Call time-out	4	1	2	O		Empty, no bits
					00000000	M-bit, Optional element not present,
					00000000	Proprietary, length 0 bits
Proprietary (data)			3	O		Proprietary element owner, Empty
						Empty, no bits

The total length of the PDU in the table 27B is 9 octets.

8.4 TNP1 PDU descriptions

8.4.1 General on TNP1 PDU descriptions

The PDUs are designed to map easily onto the primitives defined in EN 300 392-2 [2] at the TNMM-SAP, TNCC-SAP, TNSDS-SAP and TNSDS-TL-SAP. The mapping is not exact, as some supplementary services fields have been added to the call control PDUs. Supplementary Services PDUs still exist for non-call related services.

In all the tables below the "length" column is left blank if the element is itself made up of other elements (i.e. is a structure). Sometimes the length of the structure is fixed and sometimes it is variable.

8.4.2 CC PDUs

8.4.2.1 TECC-ALERT IND

This PDU shall be used to convey the parameters of TNCC-ALERT indication from MT2 to TE2 as defined in table 28.

Table 28: TECC-ALERT IND PDU contents

Information element	$Length_2$	$Length_8$	Type	C/O/M	Remark
PDU Type	8	1	1	M	
Call handle	16	2	1	M	
Call time-out, set-up phase	3	1	1	M	
Simplex/duplex selection	1	1	1	M	
Basic service information	8	2	2	O	note
Call queued	1	1	2	O	
Notification indicator	6	1	2	O	
Facility			3	O	
Proprietary			3	O	
NOTE: If different from requested.					

8.4.2.2 TECC-COMPLETE CON

This PDU shall be used to convey the parameters of TNCC-COMPLETE confirm from MT2 to TE2 as defined in table 29.

Table 29: TECC-COMPLETE CON PDU contents

Information element	$Length_2$	$Length_8$	Type	C/O/M	Remark
PDU Type	8	1	1	M	
Call handle	16	2	1	M	
Call time-out	4	1	1	M	
Transmission grant	2	1	1	M	
Transmission request permission	1	1	1	M	
Notification indicator	6	1	2	O	
Facility			3	O	
Proprietary			3	O	

8.4.2.3 TECC-COMPLETE IND

This PDU shall be used to convey the parameters of TNCC-COMPLETE indication from MT2 to TE2 as defined in table 30.

Table 30: TECC-COMPLETE IND PDU contents

Information element	$Length_2$	$Length_8$	Type	C/O/M	Remark
PDU Type	8	1	1	M	
Call handle	16	2	1	M	
Call time-out	4	1	1	M	
Transmission grant	2	1	1	M	
Transmission request permission	1	1	1	M	
Notification indicator	6	1	2	O	
Facility			3	O	
Proprietary			3	O	

8.4.2.4 TECC-COMPLETE REQ

This PDU shall be used to convey the parameters of TNCC-COMPLETE request from TE2 to MT2 as defined in table 31.

Table 31: TECC-COMPLETE REQ PDU contents

Information element	$Length_2$	$Length_8$	Type	C/O/M	Remark
PDU Type	8	1	1	M	
Call handle	16	2	1	M	
Hook method selection	1	1	1	M	
Simplex/duplex selection	1	1	1	M	
Access priority	2	1	2	O	
Basic service information (offered)	8	2	2	O	
Traffic stealing	1	1	2	O	
Facility			3	O	
Proprietary			3	O	

8.4.2.5 TECC-DTMF IND

This PDU shall be used to convey the parameters of TNCC-DTMF indication from MT2 to TE2 as defined in table 32.

Table 32: TECC-DTMF IND PDU contents

Information element	$Length_2$	$Length_8$	Type	C/O/ M	Remark
PDU Type	8	1	1	M	
Call handle	16	2	1	M	
DTMF tone delimiter	1	1	1	O	note 1
DTMF result	1	1		C	note 2
Number of DTMF digits	8	1		C	note 3
DTMF digit				C	note 3 and note 4
Proprietary			3	O	
NOTE 1: The time difference between "DTMF tone start" and "DTMF tone end" may not correspond to the tone duration at the originator. NOTE 2: Present when DTMF tone delimiter is not present. NOTE 3: Present when DTMF tone delimiter is present and set to "DTMF tone start". NOTE 4: This element shall be repeated according to the number of DTMF digits.					

8.4.2.6 TECC-DTMF REQ

This PDU shall be used to convey the parameters of TNCC-DTMF request from TE2 to MT2 as defined in table 33.

Table 33: TECC-DTMF REQ PDU contents

Information element	$Length_2$	$Length_8$	Type	C/O/M	Remark
PDU Type	8	1	1	M	
Call handle	16	2	1	M	
DTMF tone delimiter	1	1	1	M	
Number of DTMF digits	8	1		C	note 1
DTMF digit				C	note 1 and note 2
Access priority	2	1	2	O	
Traffic stealing	1	1	2	O	
Proprietary			3	O	
NOTE 1: Present when the value of DTMF tone delimiter is "DTMF tone start". NOTE 2: This element shall be repeated according to the number of DTMF digits.					

8.4.2.7 TECC-MODIFY IND

This PDU shall be used to convey the parameters of TNCC-MODIFY indication from MT2 to TE2 as defined in table 34.

Table 34: TECC-MODIFY IND PDU contents

Information element	$Length_2$	$Length_8$	Type	C/O/M	Remark
PDU Type	8	1	1	M	
Call handle	16	2	1	M	
Basic service information	8	2	2	O	
Simplex/duplex selection	1	1	2	O	
Call time-out	4	1	2	O	
Proprietary			3	O	

8.4.2.8 TECC-MODIFY REQ

This PDU shall be used to convey the parameters of TNCC-MODIFY request from TE2 to MT2 as defined in table 35.

Table 35: TECC-MODIFY REQ PDU contents

Information element	$Length_2$	$Length_8$	Type	C/O/M	Remark
PDU Type	8	1	1	M	
Call handle	16	2	1	M	
Access priority	2	1	2	O	
Basic service information	8	2	2	O	
Simplex/duplex selection	1	1	2	O	
Traffic stealing	1	1	2	O	
Proprietary			3	O	

8.4.2.9 TECC-NOTIFY IND

This PDU shall be used to convey the parameters of TNCC-NOTIFY indication from MT2 to TE2 as defined in table 36.

Table 36: TECC-NOTIFY IND PDU contents

Information element	$Length_2$	$Length_8$	Type	C/O/M	Remark
PDU Type	8	1	1	M	
Call handle	16	2	1	M	note 1
Call status	3	1	2	O	
Call time-out, set-up phase	3	1	2	O	
Call time-out	4	1	2	O	
Call ownership	1	1	2	O	
Notification indicator	6	1	2	O	
Poll request	1	1	2	O	note 2
Poll response percentage	6	1	2	O	note 2
Poll response number	6	1	2	O	note 2
Poll response addresses			3	O	note 2
Facility			3	O	
Proprietary			3	O	

NOTE 1: If the message is sent connectionless the call handle shall be a dummy call handle.
NOTE 2: Shall be valid for acknowledged group call only. Only one of these values is applicable in a service primitive.

8.4.2.10 TECC-PROCEED IND

This PDU shall be used to convey the parameters of TNCC-PROCEED indication from MT2 to TE2 as defined in table 37.

Table 37: TECC-PROCEED IND PDU contents

Information element	$Length_2$	$Length_8$	Type	C/O/M	Remark
PDU Type	8	1	1	M	
Call handle	16	2	1	M	
Basic service information	8	2	2	O	note
Call status	3	1	2	O	
Hook method selection	1	1	2	O	
Simplex/duplex selection	1	1	2	O	
Notification indicator	6	1	2	O	
Facility			3	O	
Proprietary			3	O	
NOTE: If different from requested.					

8.4.2.11 TECC-RELEASE CON

This PDU shall be used to convey the parameters of TNCC-RELEASE confirm from MT2 to TE2 as defined in table 38.

Table 38: TECC-RELEASE CON PDU contents

Information element	$Length_2$	$Length_8$	Type	C/O/M	Remark
PDU Type	8	1	1	M	
Call handle	16	2	1	M	
Disconnect cause	5	1	1	M	
Disconnect status	2	1	1	M	
Notification indicator	6	1	2	O	
Facility			3	O	
Proprietary			3	O	

8.4.2.12 TECC-RELEASE IND

This PDU shall be used to convey the parameters of TNCC-RELEASE indication from MT2 to TE2 as defined in table 39.

Table 39: TECC-RELEASE IND PDU contents

Information element	$Length_2$	$Length_8$	Type	C/O/M	Remark
PDU Type	8	1	1	M	
Call handle	16	2	1	M	
Disconnect cause	5	1	1	M	
Notification indicator	6	1	2	O	
Facility			3	O	
Proprietary			3	O	

8.4.2.13 TECC-RELEASE REQ

This PDU shall be used to convey the parameters of TNCC-RELEASE request from TE2 to MT2 as defined in table 40.

Table 40: TECC-RELEASE REQ PDU contents

Information element	$Length_2$	$Length_8$	Type	C/O/M	Remark
PDU Type	8	1	1	M	
Call handle	16	2	1	M	
Disconnect cause	5	1	1	M	
Disconnect type	2	1	1	M	
Traffic stealing	1	1	2	O	
Access priority	2	1	2	O	
Facility			3	O	
Proprietary			3	O	

8.4.2.14 TECC-SETUP CON

This PDU shall be used to convey the parameters of TNCC-SETUP confirm from MT2 to TE2 as defined in table 41.

Table 41: TECC-SETUP CON PDU contents

Information element	$Length_2$	$Length_8$	Type	C/O/M	Remark
PDU Type	8	1	1	M	
Call handle	16	2	1	M	
Basic service information	8	1	1	M	note
Call time-out	4	1	1	M	
Hook method selection	1	1	1	M	
Transmission grant	2	1	1	M	
Transmission request permission	1	1	1	M	
Call ownership	1	1	1	M	
Call amalgamation	2	1	1	M	
Simplex/duplex selection	1	1	1	M	
Call priority	4	1	2	O	
Notification indicator	6	1	2	O	
Facility			3	O	
Proprietary			3	O	
NOTE: If different from requested.					

8.4.2.15 TECC-SETUP IND

This PDU shall be used to convey the parameters of TNCC-SETUP indication from MT2 to TE2 as defined in table 42.

Table 42: TECC-SETUP IND PDU contents

Information element	$Length_2$	$Length_8$	Type	C/O/M	Remark
PDU Type	8	1	1	M	
Call handle	16	2	1	M	
Hook method selection	1	1	1	M	
Simplex/duplex selection	1	1	1	M	
Basic service information	8	1	1	M	
Transmission grant	2	1	1	M	
Transmission request permission	1	1	1	M	
Call priority	4	1	1	M	
Call time-out	4	1	1	M	
Called party type identifier	3	1	1	M	
Called party SSI	24	3		C	note 1
Called party extension	24	3		C	note 1
Calling party type identifier	2	1	2	O	
Calling party SSI	24	3		C	note 2
Calling party extension	24	3		C	note 2
External subscriber number (calling)				M	
CLIR control	2	1	2	O	
Notification indicator	6	1	2	O	
Facility			3	O	
Proprietary			3	O	

NOTE 1: Shall be conditional on the value of Called Party Type Identifier (CPTI):
- CPTI = 0012; Called Party SSI;
- CPTI = 0102; Called Party SSI + Called Party Extension.

NOTE 2: Shall be conditional on the value of Calling Party Identifier (CGPTI):
- CGPTI = 012; Calling Party SSI;
- CGPTI = 102; Calling Party SSI + Calling Party Extension.

8.4.2.16 TECC-SETUP REQ

This PDU shall be used to convey the parameters of TNCC-SETUP request from TE2 to MT2 as defined in table 43.

Table 43: TECC-SETUP REQ PDU contents

Information element	$Length_2$	$Length_8$	Type	C/O/M	Remark
PDU Type	8	1	1	M	
Hook method selection	1	1	1	M	
Simplex/duplex selection	1	1	1	M	
Basic service information	8	1	1	M	
Request to transmit/send data	1	1	1	M	
Call priority	4	1	1	M	
Called party type identifier	3	1	1	M	SNA/SSI/TSI
Called party SNA	8	1		C	note 1
Called party SSI	24	3		C	note 1
Called party extension	24	3		C	note 1
External subscriber number (called)				M	
Area selection	4	1	1	O	note 2
Access priority	2	1	2	O	note 3
Traffic stealing	1	1	2	O	note 4
CLIR control	2	1	2	O	
Facility			3	O	
Proprietary			3	O	

NOTE 1: Shall be conditional on the value of Called Party Type Identifier (CPTI):
- CPTI = 000_2; Called Party SNA;
- CPTI = 001_2; Called Party SSI;
- CPTI = 010_2; Called Party SSI + Called Party Extension.

NOTE 2: If not used then the MT2 should use value "not defined".
NOTE 3: If not used then the MT2 should use value "low priority".
NOTE 4: If not used then the MT2 should use value "no stealing".

8.4.2.17 TECC-SETUP RES

This PDU shall be used to convey the parameters of TNCC-SETUP response from TE2 to MT2 as defined in table 44.

Table 44: TECC-SETUP RES PDU contents

Information element	$Length_2$	$Length_8$	Type	C/O/M	Remark
PDU Type	8	1	1	M	
Call handle	14	2	1	M	
Hook method selection	1	1	1	M	
Simplex/duplex selection	1	1	2	O	
Basic service information	8	2	2	O	
Access priority	2	1	2	O	note 1
Traffic stealing	1	1	2	O	note 2
CLIR control	2	1	2	O	
Facility			3	O	
Proprietary			3	O	

NOTE 1: If not used then the MT2 should use value "low priority".
NOTE 2: If not used then the MT2 should use value "no stealing".

8.4.2.18 TECC-TX CON

This PDU shall be used to convey the parameters of TNCC-TX confirm from MT2 to TE2 as defined in table 45.

Table 45: TECC-TX CON PDU contents

Information element	$Length_2$	$Length_8$	Type	C/O/M	Remark
PDU Type	8	1	1	M	
Call handle	16	2	1	M	
Transmission status	2	1	1	M	
Transmission request permission	1	1	1	M	
End to end encryption flag	1	1	1	M	
Notification indicator	6	1	2	O	
Facility			3	O	
Proprietary			3	O	

8.4.2.19 TECC-TX IND

This PDU shall be used to convey the parameters of TNCC-TX indication from MT2 to TE2 as defined in table 46.

Table 46: TECC-TX IND PDU contents

Information element	$Length_2$	$Length_8$	Type	C/O/M	Remark
PDU Type	8	1	1	M	
Call handle	14	2	1	M	
Transmission status	2	1	1	M	
Transmission request permission	1	1	1	M	
End to end encryption flag	1	1	1	M	
Transmitting party type identifier	2	1	2	O	
Transmitting party SSI	24	3		C	note
Transmitting party extension	24	3		C	note
External subscriber number				M	
Notification indicator	6	1	2	O	
Facility			3	O	
Proprietary			3	O	
NOTE: Shall be conditional on the value of Transmitting Party Type Identifier (TPTI): TPTI = 012; Transmitting Party SSI; TPTI = 102; Transmitting Party SSI + Transmitting Party Extension.					

8.4.2.20 TECC-TX REQ

This PDU shall be used to convey the parameters of TNCC-TX request from TE2 to MT2 as defined in table 47.

Table 47: TECC-TX REQ PDU contents

Information element	$Length_2$	$Length_8$	Type	C/O/M	Remark
PDU Type	8	1	1	M	
Call handle	16	2	1	M	
Transmission condition	1	1	1	M	
TX demand priority	2	1	2	M	
End to end encryption flag	1	1	2	M	
Access priority	2	1	2	O	note 1
Traffic stealing	1	1	2	O	note 2
Facility			3	O	
Proprietary			3	O	
NOTE 1: If not used then the MT2 should use value "low priority". NOTE 2: If not used then the MT2 should use value "no stealing".					

8.4.3 PDUs for circuit mode data

8.4.3.1 TEMAC-FLOW CONTROL PDU

This PDU shall be used to control circuit mode data rate between TE2 application and MT2 as defined in table 48.

The receiver of data shall transmit this PDU to limit the data to the number of blocks specified. Either the TE or the MT can use this but the MT will most likely use it as the air interface normally operates at a lower speed than the PEI.

Table 48: TEMAC-FLOW CONTROL PDU contents

Information element	$Length_2$	$Length_8$	Type	C/O/M	Remark
PDU type	8	1	1	M	
Max data	8	1	1	M	

8.4.3.2 TEMAC-UNITDATA

This PDU shall be used to transmit circuit mode data between TE2 application and MT2 as defined in table 49.

Table 49: TEMAC-UNITDATA PDU contents

Information element	$Length_2$	$Length_8$	Type	C/O/M	Remark
PDU type	8	1	1	M	
Call identity	14	2	1	M	
Traffic stealing	1	1	1	M	
Circuit mode data				C	

8.4.4 MM PDUs

8.4.4.1 General on MM PDUs

NOTE: TEMM-REGISTRATION PDUs are not recommended to be controlled by the TE application.

8.4.4.2 TEMM-ATTACH DETACH GROUP IDENTITY CON

This PDU shall be used to convey the parameters of TNMM-ATTACH DETACH GROUP IDENTITY confirm from MT2 to TE2 as defined in table 50.

Table 50: TEMM-ATTACH DETACH GROUP IDENTITY CON PDU contents

Information element	$Length_2$	$Length_8$	Type	C/O/M	Remark
PDU Type	8	1	1	M	
Attach detach request status	3	1	1	M	
Group identity attach/detach mode	1	1	1	M	
Number of groups	4	1	1	M	
Group identity downlink				C	note
Group identity report	1	1	2	O	
Proprietary			3	O	
NOTE: Repeatable according to the Number of groups.					

8.4.4.3 TEMM-ATTACH DETACH GROUP IDENTITY IND

This PDU shall be used to convey the parameters of TNMM-ATTACH DETACH GROUP IDENTITY indication from MT2 to TE2 as defined in table 51.

Table 51: TEMM-ATTACH DETACH GROUP IDENTITY IND PDU contents

Information element	$Length_2$	$Length_8$	Type	C/O/M	Remark
PDU Type	8	1	1	M	
Number of groups	4	1	1	M	
Group identity downlink				C	note
Proprietary			3	O	
NOTE: Repeatable according to the Number of groups.					

8.4.4.4 TEMM-ATTACH DETACH GROUP IDENTITY REQ

This PDU shall be used to convey the parameters of TNMM-ATTACH DETACH GROUP IDENTITY request from TE2 to MT2 as defined in table 52.

Table 52: TEMM-ATTACH DETACH GROUP IDENTITY REQ PDU contents

Information element	$Length_2$	$Length_8$	Type	C/O/M	Remark
PDU Type	8	1	1	M	
Group identity attach/detach mode	1	1	1	M	
Number of groups	4	1	1	M	
Group identity uplink				C	note
Group identity report	1	1	2	O	
Proprietary			3	O	
NOTE: Repeatable according to the Number of groups.					

8.4.4.5 TEMM-DISABLING IND

This PDU shall be used to convey the parameters of TNMM-DISABLING indication from MT2 to TE2 as defined in table 53.

Table 53: TEMM-DISABLING IND PDU contents

Information element	$Length_2$	$Length_8$	Type	C/O/M	Remark
PDU Type	8	1	1	M	
Enable/disable status (for subscription)	2	1	1	M	
Enable/disable status (for equipment)	2	1	1	M	

8.4.4.6 TEMM-DEREGISTRATION REQ

This PDU shall be used to convey the parameters of TNMM-DEREGISTRATION request from TE2 to MT2 as defined in table 54.

Table 54: TEMM-DEREGISTRATION REQ PDU contents

Information element	$Length_2$	$Length_8$	Type	C/O/M	Remark
PDU Type	8	1	1	M	
ISSI	24	3	2	O	
Address extension	24	3	2	O	

8.4.4.7 TEMM-ENABLING IND

This PDU shall be used to convey the parameters of TNMM-ENABLING indication from MT2 to TE2 as defined in table 55.

Table 55: TEMM-ENABLING IND PDU contents

Information element	$Length_2$	$Length_8$	Type	C/O/M	Remark
PDU Type	8	1	1	M	
Enable/disable status (for subscription)	2	1	1	M	
Enable/disable status (for equipment)	2	1	1	M	

8.4.4.8 TEMM-ENERGY SAVING CON

This PDU shall be used to convey the parameters of TNMM-ENERGY SAVING confirm from MT2 to TE2 as defined in table 56.

Table 56: TEMM-ENERGY SAVING CON PDU contents

Information element	$Length_2$	$Length_8$	Type	C/O/M	Remark
PDU Type	8	1	1	M	
Energy economy mode	3	1	1	M	
Energy economy mode status	1	1	1	M	

8.4.4.9 TEMM-ENERGY SAVING IND

This PDU shall be used to convey the parameters of TNMM-ENERGY SAVING indication from TE2 to MT2 as defined in table 56A.

Table 56A: TEMM-ENERGY SAVING IND PDU contents

Information element	$Length_2$	$Length_8$	Type	C/O/M	Remark
PDU Type	8	1	1	M	
Energy economy mode	3	1	2	O	
Energy economy mode status	1	1	2	O	

8.4.4.10 TEMM-ENERGY SAVING REQ

This PDU shall be used to convey the parameters of TNMM-ENERGY SAVING request from TE2 to MT2 as defined in table 57.

Table 57: TEMM-ENERGY SAVING REQ PDU contents

Information element	$Length_2$	$Length_8$	Type	C/O/M	Remark
PDU Type	8	1	1	M	
Energy economy mode	3	1	1	M	

8.4.4.11 TEMM-REPORT IND

This PDU shall be used to convey the parameters of TNMM-REPORT indication from MT2 to TE2 as defined in table 58.

Table 58: TEMM-REPORT IND PDU contents

Information element	$Length_2$	$Length_8$	Type	C/O/M	Remark
PDU Type	8	1	1	M	
MM transfer result	1	1	1	M	

8.4.4.12 TEMM-REGISTRATION CON

This PDU shall be used to convey the parameters of TNMM-REGISTRATION confirm from MT2 to TE2 as defined in table 59.

Table 59: TEMM-REGISTRATION CON PDU contents

Information element	$Length_2$	$Length_8$	Type	C/O/M	Remark
PDU Type	8	1	1	M	
Registration status	1	1	1	M	
Registration reject cause	5	1		C	note 1
LA (where registered)	14	2	1	M	
MCC (where registered)	10	2	1	M	
MNC (where registered)	14	2	1	M	
Number of groups	4	1	1	M	
Group identity downlink				C	note 2
Energy economy mode	3	1	2	O	
Energy economy mode status	1	1	2	O	
Group identity attach/detach mode	1	1	2	O	
NOTE 1: Shall be present if "Registration status" = Failure. NOTE 2: Shall be repeated according to the Number of groups.					

8.4.4.13 TEMM-REGISTRATION IND

This PDU shall be used to convey the parameters of TNMM-REGISTRATION indication from MT2 to TE2 as defined in table 60.

Table 60: TEMM-REGISTRATION IND PDU contents

Information element	$Length_2$	$Length_8$	Type	C/O/M	Remark
PDU Type	8	1	1	M	
Registration status	2	1	1	M	
Registration reject cause	5	1		C	note 1
LA (where registered)	14	2	1	M	
MCC (where registered)	10	2	1	M	
MNC (where registered)	14	2	1	M	
Number of groups	4	1	1	M	
Group identity downlink				C	note 2
Group identity attach/detach mode	1	1	2	O	
NOTE 1: Shall be present "if Registration "status = Failure. NOTE 2: Shall be repeated according to the Number of groups.					

8.4.4.14 TEMM-REGISTRATION REQ

This PDU shall be used to convey the parameters of TNMM-REGISTRATION request from TE2 to MT2 as defined in table 61.

Table 61: TEMM-REGISTRATION REQ PDU contents

Information element	$Length_2$	$Length_8$	Type	C/O/M	Remark
PDU Type	8	1	1	M	
Registration type	2	1	1	M	
ISSI	24	3	1	M	
MCC (of the ISSI)	10	2	1	M	
MNC (of the ISSI)	14	2	1	M	
Number of groups	4	1	1	M	
Group identity uplink				C	note 1
Preferred LA list			2	O	note 2
Preferred MCC list			2	O	note 3
Preferred MNC list			2	O	note 3
Energy economy mode	3	1	2	O	
Group identity attach/detach mode	1	1	2	O	
NOTE 1: Shall be repeatable as the number of groups. NOTE 2: Shall be used if Registration Type = "No new ITSI – forward registration". NOTE 3: Shall be used if Registration Type = "New ITSI"; or Registration Type = "No new ITSI – forward registration".					

8.4.4.15 TEMM-SERVICE IND

This PDU shall be used to convey the parameters of TNMM-SERVICE indication from MT2 to TE2 as defined in table 62.

Table 62: TEMM-SERVICE IND PDU contents

Information element	$Length_2$	$Length_8$	Type	C/O/M	Remark
PDU Type	8	1	1	M	
Service status	2	1	1	M	
Enable/disable status	3	1	1	M	

8.4.4.15A TEMM-SERVICE REQ

This PDU shall be used to request the service status information from TE2 to MT2 as defined in table 62A.

Table 62A: TEMM-SERVICE REQ PDU contents

Information element	$Length_2$	$Length_8$	Type	C/O/M	Remark
PDU Type	8	1	1	M	TEMM-SERVICE REQ

8.4.4.16 TEMM-STATUS IND

This PDU shall be used to convey the parameters of TNMM-STATUS indication from MT2 to TE2 as defined in table 63.

Table 63: TEMM-STATUS IND PDU contents

Information element	$Length_2$	$Length_8$	Type	C/O/M	Remark
PDU Type	8	1	1	M	
Service status	2	1	1	M	
Enable/disable status	3	1	1	M	
Dual watch	4	1	2	O	
Energy economy mode	3	1	2	O	note
NOTE: Applicable with the dual watch parameter.					

8.4.4.17 TEMM-STATUS CON

This PDU shall be used to convey the parameters of TNMM-STATUS confirm from MT2 to TE2 as defined in table 64.

Table 64: TEMM-STATUS CON PDU contents

Information element	$Length_2$	$Length_8$	Type	C/O/M	Remark
PDU Type	8	1	1	M	
Dual watch	4	1	2	O	
Energy economy mode	3	1	2	O	note
NOTE: Applicable with the dual watch parameter.					

8.4.4.18 TEMM-STATUS REQ

This PDU shall be used to convey the parameters of TNMM-STATUS request from TE2 to MT2 as defined in table 65.

Table 65: TEMM-STATUS REQ PDU contents

Information element	$Length_2$	$Length_8$	Type	C/O/M	Remark
PDU Type	8	1	1	M	
Direct mode	1	1	2	O	
Dual watch	4	1	2	O	
Energy economy mode	3	1	2	O	note
NOTE: Applicable with the dual watch parameter.					

8.4.5 MT Application PDUs

8.4.5.1 TEMTA- Services CAPABILITY RESP

This PDU shall be used to convey the parameters of TNP1- SERVICES CAPABILITY response from MT2 to TE2 as defined in table 66.

Table 66: TEMTA-SERVICES CAPABILITY RESP PDU contents

Information element	$Length_2$	$Length_8$	Type	C/O/M	Remark
PDU Type	8	1	1	M	
Circuit mode and MS services	24	3	1	M	
Security			1	M	
SDS mode services		4	1	M	
Packet mode services	4	1	1	M	
Reserved	8	1	1	M	
Proprietary			3	O	
NOTE: Reserved for future indication of capabilities (e.g. transaction protocol).					

8.4.5.2 TEMTA- SDS-TL CAPABILITY RESP

This PDU shall be used to convey the parameters of TNP1- SDS-TL CAPABILITY response from MT2 to TE2 as defined in table 67.

Table 67: TEMTA-SDS-TL CAPABILITY RESP PDU contents

Information element	$Length_2$	$Length_8$	Type	C/O/M	Remark
PDU Type	8	1	1	M	
SDS-TL service capability	1	1	1	M	
SDS-TL Service centre capability	1	1		C	note 1
Store and forward PDU capability	3	1		C	note 1, note 2
SDS-TL service centre default address				C	note 1, note 2
Proprietary			3	O	
NOTE 1: Shall be present if the 'SDS-TL service capability' is 'Capable'. NOTE 2: Shall be present if the 'SDS-TL Service centre capability' is 'Capable'.					

8.4.5.3 TEMTA- Services CAPABILITY REQ

This PDU shall be used to convey the parameters of TNP1-SERVICES CAPABILITY request from TE2 to MT2 as defined in table 68.

Table 68: TEMTA-SERVICES CAPABILITY REQ PDU contents

Information element	$Length_2$	$Length_8$	Type	C/O/M	Remark
PDU Type	8	1	1	M	

8.4.5.4 TEMTA- SDS-TL CAPABILITY REQ

This PDU shall be used to convey the parameters of TNP1- SDS-TL CAPABILITY request from TE2 to MT2 as defined in table 69.

Table 69: TEMTA-SDS-TL CAPABILITY REQ PDU contents

Information element	$Length_2$	$Length_8$	Type	C/O/M	Remark
PDU Type	8	1	1	M	

8.4.5.5 TEMTA- IDENTITIES RESP

This PDU shall be used to convey the identities information elements from the MT2 to TE2 as defined in table 70.

Table 70: TEMTA-IDENTITIES RESP PDU contents

Information element	$Length_2$	$Length_8$	Type	C/O/M	Remark
PDU Type	8	1	1	M	
ITSI			1	M	
Number of static groups	4	1	1	M	
GTSI				C	note 1
Number of dynamic groups	8	1	1	M	
GTSI				C	note 2
More information flag	1	1	1	M	note 3
NOTE 1: Shall be repeated as defined by the number of static groups. NOTE 2: Shall be repeated as defined by the number of dynamic groups. NOTE 3: If this flag is set to "yes" the TE shall not send any more commands until all identities have been returned by the MT (flag set to "no").					

8.4.5.6 TEMTA- IDENTITIES REQ

This PDU shall be used to request the identities information elements from the MT2 as defined in table 71.

Table 71: TEMTA-IDENTITIES REQ PDU contents

Information element	$Length_2$	$Length_8$	Type	C/O/M	Remark
PDU Type	8	1	1	M	

8.4.5.7 TEMTA-SETVOLUME REQ

This PDU shall be used to control the volume setting from the TE2 as defined in table 72.

Table 72: TEMTA-SETVOLUME REQ PDU contents

Information element	$Length_2$	$Length_8$	Type	C/O/M	Remark
PDU Type	8	1	1	M	
Volume level	6	1	1	M	

8.4.5.8 TEMTA-SPEAKER-MIC REQ

This PDU shall be used to control the speaker/microphone from the TE2 as defined in table 73.

Table 73: TEMTA-SETVOLUME REQ PDU contents

Information element	$Length_2$	$Length_8$	Type	C/O/M	Remark
PDU Type	8	1	1	M	
Speaker on off	1	1	2	O	
Microphone on off	1	1	2	O	

8.4.5.9 TEMTA- SYSINFO RESP

This PDU shall be used to convey the Sysinfo information elements from the MT2 to TE2 as defined in table 74.

Table 74: TEMTA-SYSINFO RESP PDU contents

Information element	$Length_2$	$Length_8$	Type	C/O/M	Remark
PDU Type	8	1	1	M	
Security information	8	1	1	M	
BS service details	12	2	1	M	
NOTE: The MT will send this PDU on TE request or on any change in the broadcast information.					

8.4.5.10 TEMTA- SYSINFO REQ

This PDU shall be used to request the Sysinfo information elements from the TE2 to MT2 as defined in table 75.

Table 75: TEMTA-SYSINFO REQ PDU contents

Information element	$Length_2$	$Length_8$	Type	C/O/M	Remark
PDU Type	8	1	1	M	

8.4.5.11 TEMTA-IDENTIFICATION RESP

This PDU shall be used to convey the parameters of TNP1-IDENTIFICATION response from MT2 to TE2 as defined in table 76.

Table 76: TEMTA-IDENTIFICATION RESP PDU contents

Information element	$Length_2$	$Length_8$	Type	C/O/M	Remark
PDU type	8	1	1	M	TEMTA-IDENTIFICATION RESP
Terminal equipment identity	60	8	1	M	
Manufacturer Identifier			3	M	
Model			3	M	
Software version			3	M	
Hardware version			3	O	
Product serial number			3	O	
ISO global object ID			3	O	
TNP1 protocol version			3	O	
TNP1 release			3	O	note
Proprietary			3	O	
NOTE: The TNP1 release shall inform the TE2 user application about the MT2 TNP1 release. Contents of this information element is not be restricted by the standard (every manufacture can use this field for his purposes).					

8.4.5.12 TEMTA-IDENTIFICATION REQ

This PDU shall be used to convey the parameters of TNP1-IDENTIFICATION request from TE2 to MT2 as defined in table 77.

Table 77: TEMTA-IDENTIFICATION REQ PDU contents

Information element	$Length_2$	$Length_8$	Type	C/O/M	Remark
PDU Type	8	1		M	

8.4.5.13 TEMTA-SDS STACK MESSAGES

8.4.5.13.1 General on TEMA-SDS stack messages

All incoming/outgoing SDS messages (from / to the air interface) may be stored on a message stack in the MT. There are two stacks, as defined in TS 127 007 [17], one for Status, SDSS type 1/2/3 and another for SDS4 messages.

Each stack should have 255 entries, each of which has the following fields:

SDS type – Status, SDS Type 1/2/3/4

SDS message format in the SDS stacks, as described in TS 127 007 [17] clause 10.3.42 (for SDS4) and in clause 10.3.41 (for SDS status/1/2/3).

8.4.5.13.2 TEMTA-SDS DELETE MESSAGES

This PDU shall be used to delete from an MT2 a list of SDS messages in the SDS message stack as defined in table 78.

Table 78: TEMTA-SDS DELETE MESSAGES REQ PDU contents

Information element	$Length_2$	$Length_8$	Type	C/O/M	Remark
PDU Type	8	1	1	M	
SDS type	3	1	1	M	
Number of messages	8	1	1	M	
Message index	16	1		C	note 1, note 2
NOTE 1: Shall be repeated as defined by the number of messages to be deleted. NOTE 2: The index is a record for each message that will be used to point to the SDS message in the stack.					

8.4.5.13.3 TEMTA-SDS MESSAGE ERROR

This PDU shall be a response from the MT2 to SDS message error in the SDS message stack as defined in table 79.

Table 79: TEMTA-SDS MESSAGE ERROR PDU contents

Information element	$Length_2$	$Length_8$	Type	C/O/M	Remark
PDU Type	8	1	1	M	
SDS type	3	1	1	M	
Message index	16	1	1	M	note
SDS error	3	1	1	M	note
NOTE: This message shall be used as a response to Request message if the request is not valid.					

8.4.5.13.4 TEMTA-SDS MESSAGES IND

This PDU shall be used to convey an SDS message in the SDS message stack from MT2 to TE2 as defined in table 80.

Table 80: TEMTA-SDS MESSAGE IND PDU contents

Information element	$Length_2$	$Length_8$	Type	C/O/M	Remark
PDU Type	8	1	1	M	
SDS type	3	1	1	M	
SDS or SDS-TL data message				M	note
NOTE: The format shall be as described in TS 127 007 [17] clause 10.3.42 for SDS4 and in clause 10.3.41 for SDS status/1/2/3.					

8.4.5.13.5 TEMTA-SDS MESSAGE REQ

This PDU shall be used to request from a MT2 an SDS message in the SDS message stack as defined in table 81.

Table 81: TEMTA-SDS MESSAGE REQ PDU contents

Information element	$Length_2$	$Length_8$	Type	C/O/M	Remark
PDU Type	8	1	1	M	TEMTA-SDS MESSAGE REQ
SDS type	3	1	1	M	
Message index	16	1	1	M	

8.4.5.13.6 TEMTA-SDS GET LIST BY KEY MESSAGES

This PDU is used to access to SDS messages that are satisfied to given key(s). As a result a list of indexes of the relevant messages will be sent to the application.

Table 82: TEMTA-SDS MESSAGE GET LIST MESSAGES PDU contents

Information element	$Length_2$	$Length_8$	Type	C/O/M	Remark
PDU Type	8	1	1	M	
Key mask	4	1	1	M	
SDS type	3	1		C	note
SDS message status	3	1		C	note
NOTE: Shall be conditional on the value of key mask information element.					

8.4.5.13.7 TEMTA-SDS LIST MESSAGES REPLY

This PDU shall be used as a reply to delete request or to get list messages as defined in table 83. The SDS message identity shall contain all the deleted messages with their new status.

Table 83: TEMTA-SDS LIST MESSAGES REPLY PDU contents

Information element	$Length_2$	$Length_8$	Type	C/O/M	Remark
PDU Type	8	1	1	M	
Number of messages	8	1	1	M	
Message index	16	1	1	M	note
SDS message status	3	1	1	M	note
SDS type	3	1	1	M	note
NOTE: Shall be repeated as defined by the number of messages information element.					

8.4.5.13.8 TEMTA-SDS NOTIFICATION

This PDU shall be used as a notification to the user application about "message stack full" or a downlink message was received in the message stack, as defined in table 84.

Table 84: TEMTA-SDS NOTIFICATION PDU contents

Information element	$Length_2$	$Length_8$	Type	C/O/M	Remark
PDU Type	8	1	1	M	
SDS type	3	1	1	M	note
SDS notification	1	1	1	M	
NOTE: The SDS type is used to indicate the appropriate stack.					

8.4.5.14 TEMTA- XXX SERVICE PROFILE RESP

This PDU shall be used to convey the parameters of TNP1-XXX SERVICE PROFILE response from MT2 to TE2 as defined in tables 85, 86, 87 and 88.

Table 85: TEMTA-SDS SERVICE PROFILE RESP PDU contents

Information element	$Length_2$	$Length_8$	Type	C/O/M	Remark
PDU Type	8	1	1	M	
Service profile request result	2	1	1	M	
SDS profile type	8	1	1	M	
SDS status profile				C	note
SDS user data 1 profile				C	note
SDS user data 2 profile				C	note
SDS user data 3 profile				C	note
NOTE: Conditional on SDS profile type.					

Table 86: TEMTA-CC SERVICE PROFILE RESP PDU contents

Information element	$Length_2$	$Length_8$	Type	C/O/M	Remark
PDU Type	8	1	1	M	
Service profile request result	2	1	1	M	
CC profile			1	M	

Table 87: TEMTA-MM SERVICE PROFILE RESP PDU contents

Information element	$Length_2$	$Length_8$	Type	C/O/M	Remark
PDU Type	8	1	1	M	
Service profile request result	2	1	1	M	
MM profile			1	M	

Table 88: TEMTA-SDS-TL SERVICE PROFILE RESP PDU contents

Information element	$Length_2$	$Length_8$	Type	C/O/M	Remark
PDU Type	8	1	1	M	
Protocol identifier kind	1	1	1	M	
Protocol identifier	8	1	1	M	
Service profile request result	2	1	1	M	
SDS user data 4 profile				M	

8.4.5.15 TEMTA-XXX SERVICE PROFILE REQ

These PDUs shall be used to request the parameters of TNP1-XXX SERVICE PROFILE from TE2 to MT2 as defined in tables 89, 90, 91 and 92.

Table 89: TEMTA- SDS SERVICE PROFILE REQ PDU contents

Information element	$Length_2$	$Length_8$	Type	C/O/M	Remark
PDU Type	8	1	1	M	
SDS profile type	8	1	1	M	

Table 90: TEMTA- CC SERVICE PROFILE REQ PDU contents

Information element	$Length_2$	$Length_8$	Type	C/O/M	Remark
PDU Type	8	1	1	M	

Table 91: TEMTA- MM SERVICE PROFILE REQ PDU contents

Information element	$Length_2$	$Length_8$	Type	C/O/M	Remark
PDU Type	8	1	1	M	

Table 92: TEMTA- SDS-TL SERVICE PROFILE REQ PDU contents

Information element	$Length_2$	$Length_8$	Type	C/O/M	Remark
PDU Type	8	1	1	M	
Protocol identifier kind	1	1	1	M	
Protocol identifier	8	1	1	M	

8.4.5.16 TEMTA- XXX SERVICE PROFILE SET

This PDU shall be used to convey the parameters of TNP1-XXX SERVICE PROFILE request from TE2 to MT2 as defined in tables 93, 94, 95 and 96.

Table 93: TEMTA- SDS SERVICE PROFILE SET PDU contents

Information element	$Length_2$	$Length_8$	Type	C/O/M	Remark
PDU Type	8	1	1	M	
SDS profile type	8			M	
Set profile request	8			M	
SDS status profile				C	note
SDS user data 1 profile				C	note
SDS user data 2 profile				C	note
SDS user data 3 profile				C	note
NOTE: Conditional on SDS profile type and set profile request.					

Table 94: TEMTA- CC SERVICE PROFILE SET PDU contents

Information element	$Length_2$	$Length_8$	Type	C/O/M	Remark
PDU Type	8	1		M	
Set profile request	8	1	1	M	
CC profile				C	note
NOTE: Conditional on set profile request.					

Table 95: TEMTA- MM SERVICE PROFILE SET PDU contents

Information element	$Length_2$	$Length_8$	Type	C/O/M	Remark
PDU Type	8	1	1	M	
Set profile request	8	1	1	M	
MM profile		1		C	note
NOTE: Conditional on set profile request.					

Table 96: TEMTA- SDS-TL SERVICE PROFILE SET PDU contents

Information element	$Length_2$	$Length_8$	Type	C/O/M	Remark
PDU Type	8	1	1	M	
Protocol identifier kind	1	1	1	M	
Protocol identifier	8	1	1	M	
Set profile request	8	1	1	M	
SDS user data 4 profile				C	note
NOTE: Conditional on set profile request.					

8.4.5.17 TEMTA-STATE RESP

This PDU shall be used to convey the parameters of TNP1-STATE response from MT2 to TE2 as defined in table 97.

Table 97: TEMTA-STATE RESP PDU contents

Information element	$Length_2$	$Length_8$	Type	C/O/M	Remark
PDU Type	8	1	1	M	
Field Strength	7	1	1	M	
Bit error ratio	8	1	1	M	
Battery charge	7	1	2	O	
Internal temperature	16	8	2	O	
Over temperature indication	1	1	2	O	
Proprietary			3	O	

8.4.5.18 TEMTA-STATE REQ

This PDU shall be used to convey the parameters of TNP1-STATE request from TE2 to MT2 as defined in table 98.

Table 98: TEMTA-STATE REQ PDU contents

Information element	$Length_2$	$Length_8$	Type	C/O/M	Remark
PDU Type	8	1	1	M	

8.4.5.19 TEMTA-REPORT IND

This PDU shall be used to convey the parameters of TNP1-REPORT primitive from either the TE2 to MT2 or vice versa, as defined in table 99.

Table 99: TEMTA-REPORT IND PDU contents

Information element	$Length_2$	$Length_8$	Type	C/O/M	Remark
PDU Type	8	1	1	M	
Report reason	8	1	1	M	
PDU type (*)	16	2	1	M	note
NOTE: This information element shall contain the PDU type of the unrecognized, received PDU, to which this message is the reply.					

NOTE: Neither TE nor MT shall send more than two successive failure reports. In this event it is considered the link, applications or DLL are not working and the link shall be declared as failed.

8.4.6 SDS PDUs

8.4.6.1 General on SDS PDUs

These SDS PDUs are used to convey information TE2 and TNSDS service access point in the MT2. For an SDS message stack support TEMTA PDUs are defined in clause 8.4.5.13.

8.4.6.2 TESDS-REPORT IND

This PDU shall be used to convey the parameters of TNSDS-REPORT indication from MT2 to TE2 as defined in table 100.

Table 100: TESDS-REPORT IND PDU contents

Information element	$Length_2$	$Length_8$	Type	C/O/M	Remark
PDU Type	8	1	1	M	
SDS transfer result	8	1	1	M	
User application reference	8	1	1	M	

8.4.6.3 TESDS-STATUS IND

This PDU shall be used to convey the parameters of TNSDS-STATUS indication from MT2 to TE2 as defined in table 101.

Table 101: TESDS-STATUS IND PDU contents

Information element	$Length_2$	$Length_8$	Type	C/O/M	Remark
PDU Type	8	1	1	M	
Called party self address type	2	1	1	M	
Called party type identifier	3	1	1	M	
Called party SSI	24	3		C	See note 1
Called party extension	24	3		C	See note 1
Calling party type identifier	2	1	1	M	
Calling party SSI	24	3		C	See note 2
Calling party extension	24	3		C	See note 2
External subscriber number (calling)				M	
Status number	16	2	1	M	

NOTE 1: Shall be conditional on the value of Called Party Type Identifier (CDPTI):
- CDPTI = 001_2; Called Party SSI;
- CDPTI = 010_2; Called Party SSI + Called Party Extension.

NOTE 2: Shall be conditional on the value of Calling Party Type Identifier (CGPTI):
- CGPTI = 01_2; Calling Party SSI;
- CGPTI = 10_2; Calling Party SSI + Calling Party Extension.

8.4.6.4 TESDS-STATUS REQ

This PDU shall be used to convey the parameters of TNSDS-STATUS request from TE2 to MT2 as defined in table 102.

Table 102: TESDS-STATUS REQ PDU contents

Information element	$Length_2$	$Length_8$	Type	C/O/M	Remark
PDU Type	8	1	1	M	TESDS-STATUS REQ
Called party type identifier	3	1	1	M	
Called party SNA	8	1		C	See note
Called party SSI	24	3		C	See note
Called party extension	24	3		C	See note
Called external subscriber number	variable	variable	1	M	
User application reference	8	1	1	M	
Status number	16	2	1	M	
Access priority	2	1	2	O	
Traffic stealing	1	1	2	O	
Area selection	4	1	2	O	
NOTE: Shall be conditional on the value of Called Party Type Identifier (CPTI): - CPTI = 000_2; Called Party SNA; - CPTI = 001_2; Called Party SSI; - CPTI = 010_2; Called Party SSI + Called Party Extension.					

8.4.6.5 TESDS-UNITDATA IND

This PDU shall be used to convey the parameters of TNSDS-UNITDATA indication from MT2 to TE2 as defined in table 103.

Table 103: TESDS-UNITDATA IND PDU contents

Information element	$Length_2$	$Length_8$	Type	C/O/M	Remark
PDU Type	8	1	1	M	TESDS-UNITDATA IND
Called party self address type	2	1	1	M	
Called party type identifier	3	1	1	M	
Called party SSI	24	3		C	See note 1
Called party extension	24	3		C	See note 1
Calling party type identifier	2	1	1	M	
Calling party SSI	24	3		C	See note 2
Calling party extension	24	3		C	See note 2
Calling external subscriber number	variable	variable		M	
Short data type identifier	2	1	1	M	
User defined data-1	16	2		C	See note 3
User defined data-2	32	4		C	See note 3
User defined data-3	64	8		C	See note 3
NOTE 1: Shall be conditional on the value of Called Party Type Identifier (CDPTI): - CDPTI = 001_2; Called Party SSI; - CDPTI = 010_2; Called Party SSI + Called Party Extension. NOTE 2: Shall be conditional on the value of Calling Party Type Identifier (CGPTI): - CGPTI = 01_2; Calling Party SSI; - CGPTI = 10_2; Calling Party SSI + Calling Party Extension. NOTE 3: Shall be conditional on the value of Short Data Type Identifier (SDTI): - SDTI = 0; User Defined Data-1; - SDTI = 1; User Defined Data-2; - SDTI = 2; User Defined Data-3.					

8.4.6.6 TESDS-UNITDATA REQ

This PDU shall be used to convey the parameters of TNSDS-UNITDATA request from TE2 to MT2 as defined in table 104.

Table 104: TESDS-UNITDATA REQ PDU contents

Information element	$Length_2$	$Length_8$	Type	C/O/M	Remark
PDU Type	8	1	1	M	TESDS-UNITDATA REQ
Called party type identifier	3	1	1	M	
Called party SNA	8	1		C	See note 1
Called party SSI	24	3		C	See note 1
Called party extension	24	3		C	See note 1
Called external subscriber number	variable	variable	1	M	
User application reference	8	1	1	M	
Short data type identifier	2	1	1	M	
User defined data-1	16	2		C	See note 2
User defined data-2	32	4		C	See note 2
User defined data-3	64	8		C	See note 2
Access priority	2	1	2	O	
Traffic stealing	1	1	2	O	
Area selection	4	1	2	O	
NOTE 1: Shall be conditional on the value of Called Party Type Identifier (CPTI): - CPTI = 0002; Called Party SNA; - CPTI = 0012; Called Party SSI; - CPTI = 0102; Called Party SSI + Called Party Extension. - CPTI = 1002; MT2 default gateway address (refer TESDS-STATUS REQ PDU). NOTE 2: Shall be conditional on the value of Short Data Type Identifier (SDTI): - SDTI = 0; User Defined Data-1; - SDTI = 1; User Defined Data-2; - SDTI = 2; User Defined Data-3.					

8.4.7 SDS-TL PDUs

8.4.7.1 TESDS-TL-ACK IND

This PDU shall be used to convey the parameters of TLSDS-ACK indication from MT2 to TE2 as defined in table 105.

Table 105: TESDS-ACK IND PDU contents

Information element	$Length_2$	$Length_8$	Type	C/O/M	Remark
PDU Type	8	1	1	M	TESDS-ACK IND
Called party self address type	2	1	1	M	
Called party type identifier	3	1	1	M	
Called party SSI	24	3		C	See note 1
Called party extension	24	3		C	See note 1
Calling party type identifier	3	1	1	M	
Calling party SSI	24	3		C	See note 2
Calling party extension	24	3		C	See note 2
Calling external subscriber number	variable	variable	1	M	
Protocol identifier	8	1	1	M	
Delivery status	8	1	1	M	
Message reference	8	1	1	M	
NOTE 1: Shall be conditional on the value of Called Party Type Identifier (CDPTI): - CDPTI = 0012; Called Party SSI; - CDPTI = 0102; Called Party SSI + Called Party Extension. NOTE 2: Shall be conditional on the value of Calling Party Type Identifier (CGPTI): CGPTI = 012; Calling Party SSI; CGPTI = 102; Calling Party SSI + Calling Party Extension.					

8.4.7.2 TESDS-TL-ACK REQ

This PDU shall be used to convey the parameters of TLSDS-ACK request from TE2 to MT2 as defined in table 106.

Table 106: TESDS-TL-ACK REQ PDU contents

Information element	$Length_2$	$Length_8$	Type	C/O/M	Remark
PDU Type	8	1	1	M	
Called party type identifier	3	1	1	M	
Called party SNA	8	1		C	See note 1
Called party SSI	24	3		C	See note 1
Called party extension	24	3		C	See note 1
Called external subscriber number	variable	variable	1	M	
Protocol identifier	8	1	1	M	
Delivery status	8	1	1	M	
Message reference	8	1	1	M	
Storage	1	1	1	M	See note 2
Access priority	2	1	2	O	
Traffic stealing	1	1	2	O	
Area selection	4	1	2	O	
NOTE 1: Shall be conditional on the value of Called Party Type Identifier (CPTI): - CPTI = 0; Called Party SNA; - CPTI = 1; Called Party SSI; - CPTI = 2; Called Party SSI + Called Party Extension. NOTE 2: The storage shall be "storage not allowed".					

8.4.7.3 TESDS-TL-REPORT IND

This PDU shall be used to convey the parameters of TLSDS-REPORT indication from MT2 to TE2 as defined in table 107.

Table 107: TESDS-TL-REPORT IND PDU contents

Information element	$Length_2$	$Length_8$	Type	C/O/M	Remark
PDU Type	8	1	1	M	TESDS-TL-REPORT IND
Called party self address type	2	1	1	M	
Called party type identifier	3	1	1	M	
Called party SSI	24	3		C	See note 1
Called party extension	24	3		C	See note 1
Calling party type identifier	2	1	1	M	See note 2
Calling party SSI	24	3		C	
Calling party extension	24	3		C	
Calling external subscriber number	variable	variable		M	
Protocol identifier	8	1	1	M	
Acknowledgement required	1	1	1	M	
Delivery status	8	1	1	M	
Message reference	8	1	1	M	
Message reference handle	8	1	1	M	
Storage	1	1	1	M	
Validity period	6	1		C	See note 3
Forward address type identifier	4	1		C	See note 3

Information element	$Length_2$	$Length_8$	Type	C/O/M	Remark
Forward address SNA	8	1		C	See notes 3 and 4
Forward address SSI	24	3		C	See notes3 and 4
Forward address extension	24	3		C	See notes3 and 4
Forward address external subscriber number	variable	variable		C	See notes3 and 4
User data	Variable			M	
NOTE 1: Shall be conditional on the value of Called Party Type Identifier (CDPTI): - CDPTI = 1; Called Party SSI; - CDPTI = 2; Called Party SSI + Called Party Extension. NOTE 2: Shall be conditional on the value of Calling Party Type Identifier (CGPTI): CGPTI = 012; Calling Party SSI; CGPTI = 102; Calling Party SSI + Calling Party Extension. NOTE 3: Shall be conditional on the value of Storage: - Storage = 0; - Storage = 1; validity period + Forward address. NOTE 4: Shall be conditional on the value of Forward address Type Identifier (FATI): - FATI = 0; Forward Address SNA; - FATI = 1; Forward Address SSI; - FATI = 2, Forward Address SSI + Forward Address Extension; - FATI = 3; Forward External subscriber number.					

8.4.7.4 TESDS-TL-REPORT REQ

This PDU shall be used to convey the parameters of TLSDS-REPORT request from TE2 to MT2 as defined in table 108.

Table 108: TESDS-TL-REPORT REQ PDU contents

Information element	$Length_2$	$Length_8$	Type	C/O/M	Remark
PDU Type	8	1	1	M	
Called party type identifier	3	1	1	M	
Called party SNA	8	1		C	See note 1
Called party SSI	24	3		C	See note 1
Called party extension	24	3		C	See note 1
Called external subscriber number	variable	variable	1	M	
Protocol identifier	8	1	1	M	
Acknowledgement required	1	1	1	M	
Delivery status	8	1	1	M	
Message reference	8	1	1	M	
Storage	1	1	1	M	
Validity period	6	1		C	See note 2
Forward address type identifier	4	1		C	See note 2
Forward address SNA	8	1		C	See notes 2 and 3
Forward address SSI	24	3		C	See notes 2 and 3
Forward address extension	24	3		C	See notes 2 and 3
Forward address external subscriber number	variable	variable		C	See notes 2 and 3
Access priority	2	1	2	O	
Traffic stealing	1	1	2	O	

Information element	$Length_2$	$Length_8$	Type	C/O/M	Remark
Area selection	4	1	2	O	
User data	Variable			M	
NOTE 1: Shall be conditional on the value of Called Party Type Identifier (CPTI): - CPTI = 0; Called Party SNA; - CPTI = 1; Called Party SSI; - CPTI = 2; Called Party SSI + Called Party Extension. NOTE 2: Shall be conditional on the value of Storage: - Storage = 0; - Storage = 1; - Validity period + Forward address. NOTE 3: Shall be conditional on the value of Forward address Type Identifier (FATI): - FATI = 0; Forward Address SNA; - FATI = 1; Forward Address SSI; - FATI = 2, Forward Address SSI + Forward Address Extension; - FATI = 3; Forward External subscriber number.					

8.4.7.5 TESDS-TL-TRANSFER IND

This PDU shall be used to convey the parameters of TLSDS-TRANSFER indication from MT2 to TE2 as defined in table 109.

Table 109: TESDS-TL-TRANSFR IND PDU contents

Information element	$Length_2$	$Length_8$	Type	C/O/M	Remark
PDU Type	8	1	1	M	TESDS-TL-TRANSFR IND
Called party self address type	2	1	1	M	
Called party type identifier	3	1	1	M	
Called party SSI	24	3		C	See note 1
Called party extension	24	3		C	See note 1
Calling party type identifier	2	1	1	M	
Calling party SSI	24	3		C	See note 2
Calling party extension	24	3		C	See note 2
Calling external subscriber number	variable	variable	1	M	
Protocol identifier	8	1	1	M	
Delivery report request	2	1	1	M	
Short form report	1	1	1	M	
Message reference	8	1	1	M	
Storage	1	1	1	M	
Validity period	6	1		C	See note 3
Forward address type identifier	4	1		C	See note 3
Forward address SNA	8	1		C	See notes 3 and 4
Forward address SSI	24	3		C	See notes 3 and 4
Forward address extension	24	3		C	See notes 3 and 4
Forward address External subscriber number	variable	variable		C	See notes 3 and 4
User data	variable	variable	1	M	
NOTE1: Shall be conditional on the value of Called Party Type Identifier (CPTI): - CDPTI = 1; Called Party SSI; - CDPTI = 2; Called Party SSI + Called Party Extension. NOTE 2: Shall be conditional on the value of Calling Party Type Identifier (CGPTI): CGPTI = 012; Calling Party SSI; CGPTI = 102; Calling Party SSI + Calling Party Extension. NOTE 3: Shall be conditional on the value of Storage: - Storage = 0; - Storage = 1; Validity period + Forward address. NOTE 4: Shall be conditional on the value of Forward address Type Identifier (FATI): - FATI = 0; Forward Address SNA; - FATI = 1; Forward Address SSI; - FATI = 2, Forward Address SSI + Forward Address Extension; - FATI= 3; Forward External subscriber number.					

8.4.7.6 TESDS-TL-TRANSFER REQ

This PDU shall be used to convey the parameters of TLSDS-TRANSFER request from TE2 to MT2 as defined in table 110.

Table 110: TESDS-TL-TRANSFER REQ PDU contents

Information element	$Length_2$	$Length_8$	Type	C/O/M	Remark
PDU Type	8	1	1	M	
Called party type identifier	3	1	1	M	
Called party SNA	8	1		C	See note 1
Called party SSI	24	3		C	See note 1
Called party extension	24	3		C	See note 1
Called external subscriber number	variable	variable	1	M	
Protocol identifier	8	1	1	M	
Delivery report request	2	1	1	M	
Service selection	1	1	1	M	
Message reference handle	8	1	1	M	
Storage	1	1	1	M	
Validity period	6	1		C	See note 2
Forward address type identifier	4	1		C	See note 2
Forward address SNA	8	1		C	See notes 2 and 3
Forward address SSI	24	3		C	See notes 2 and 3
Forward address extension	24	3		C	See notes 2 and 3
Forward address external subscriber number	variable	variable		C	See notes 2 and 3
Access priority	2	1	2	O	
Traffic stealing	1	1	2	O	
Area selection	4	1	2	O	
User data	variable			M	

NOTE 1: Shall be conditional on the value of Called Party Type Identifier (CPTI):
- CPTI = 0; Called Party SNA;
- CPTI = 1; Called Party SSI;
- CPTI = 2; Called Party SSI + Called Party Extension.

NOTE 2: Shall be conditional on the value of Storage:
- Storage = 0;
- Storage = 1;
- Validity period + Forward address.

NOTE 3: Shall be conditional on the value of Forward address Type Identifier (FATI):
- FATI = 0; Forward Address SNA;
- FATI = 1; Forward Address SSI;
- FATI = 2, Forward Address SSI + Forward Address Extension;
- FATI = 3; Forward External subscriber number.

8.4.7.7 TESDS-TL-TNSDS-REPORT IND

This PDU shall be used to convey the parameters of TESDS-TL-TNSDS-REPORT indication from MT2 to TE2 as defined in table 111.

Table 111: TESDS-TL-TNSDS-REPORT IND PDU contents

Information element	$Length_2$	$Length_8$	Type	C/O/M	Remark
PDU Type	8	1	1	M	
SDS reference type	2	1	1	M	
User application reference	8	1		C	See note
Message reference handle	8	1		C	See note
Message reference	8	1		C	See note
SDS transfer result	8	1	1	M	
NOTE: Shall be conditional on the value of the SDS reference type (SRFT) - SRFT = 0; Message reference handle + Message reference (in case the TESDS-TL-TRANSFER REQ has been transmitted successfully or the transmission failure. - SFRT = 1; Message reference (in case the TESDS-TL-ACK REQ/ TESDS-TL-REPORT-REQ have been transmitted successfully or the transmission failure. - SFRT = 2; User Application Reference (in case the TESDS-TL-UNIT-DATA REQ has been transmitted successfully or the transmission failure.					

8.4.7.8 TESDS-TL-UNITDATA IND

This PDU shall be used to convey the parameters of TNSDS-TL-UNITDATA indication from MT2 to TE2 as defined in table 112.

Table 112: TESDS-TL-UNITDATA IND PDU contents

Information element	$Length_2$	$Length_8$	Type	C/O/M	Remark
PDU Type	8	1	1	M	TESDS-TL-UNITDATA IND
Called party self address type	2	1	1	M	
Called party type identifier	3	1	1	M	
Called party SSI	24	3		C	See note 1
Called party extension	24	3		C	See note 1
Calling party type identifier	2	1	1	M	
Calling party SSI	24	3		C	See note 2
Calling party extension	24	3		C	See note 2
Calling external subscriber number	variable	variable	1	M	
Protocol identifier	8	1	1	M	
User data	variable	variable	1	M	
NOTE 1: Shall be conditional on the value of Called Party Type Identifier (CDPTI): CDPTI = 0012; Called Party SSI; CDPTI = 0102; Called Party SSI + Called Party Extension. NOTE 2: Shall be conditional on the value of Calling Party Type Identifier (CGPTI): CGPTI = 012; Calling Party SSI; CGPTI = 102; Calling Party SSI + Calling Party Extension.					

8.4.7.9 TESDS-TL-UNITDATA REQ

This PDU shall be used to convey the parameters of TNSDS-TL-UNITDATA request from TE2 to MT2 as defined in table 113.

Table 113: TESDS-TL-UNITDATA REQ PDU contents

Information element	$Length_2$	$Length_8$	Type	C/O/M	Remark
PDU Type	8	1	1	M	
Called party type identifier	3	1	1	M	
Called party SNA	8	1		C	See note
Called party SSI	24	3		C	See note
Called party extension	24	3		C	See note
Called external subscriber number	variable	variable		M	
User application reference	8	1	1	M	
Protocol identifier	8	1	1	M	
Access priority	2	1	2	O	
Traffic stealing	1	1	2	O	
Area selection	4	1	2	O	
User data	variable	variable		M	
NOTE: Shall be conditional on the value of Called Party Type Identifier (CPTI): - CPTI = 0; Called Party SNA; - CPTI = 1; Called Party SSI; - CPTI = 2; Called Party SSI + Called Party Extension.					

8.4.8 SS PDUs

8.4.8.1 TESS-FACILITY CON

This PDU shall be used to convey the parameters of TNSS-FACILITY confirm from MT2 to TE2 as defined in table 114.

Table 114: TESS-FACILITY CON PDU contents

Information element	$Length_2$	$Length_8$	Type	C/O/M	Remark
PDU Type	8	1	1	M	
SS type	6	1	1	M	
SS PDU type			3	M	
SS facility parameters			3	O	

8.4.8.2 TESS-FACILITY IND

This PDU shall be used to convey the parameters of TNSS-FACILITY indication from MT2 to TE2 as defined in table 115.

Table 115: TESS-FACILITY IND PDU contents

Information element	$Length_2$	$Length_8$	Type	C/O/M	Remark
PDU Type	8	1	1	M	
SS type	6	1	1	M	
SS PDU type			3	M	
SS facility parameters			3	O	

8.4.8.3 TESS-FACILITY REQ

This PDU shall be used to convey the parameters of TNSS-FACILITY request from TE2 to MT2 as defined in table 116.

Table 116: TESS-FACILITY REQ PDU contents

Information element	$Length_2$	$Length_8$	Type	C/O/M	Remark
PDU Type	8	1	1	M	
SS type	6	1	1	M	
SS PDU type			3	M	
SS facility parameters			3	O	

8.4.8.4 TESS-FACILITY RES

This PDU shall be used to convey the parameters of TNSS-FACILITY response from TE2 to MT2 as defined in table 117.

Table 117: TESS-FACILITY RES PDU contents

Information element	$Length_2$	$Length_8$	Type	C/O/M	Remark
PDU Type	8	1	1	M	
SS type	6	1	1	M	
SS PDU type			3	M	
SS facility parameters			3	O	

8.5 Information elements coding

8.5.1 General on information element coding

Any of the following information elements can be coded as TNP1 Type 1, 2 or 3 depending on the PDU.

The lengths (Length) of the information elements and their sub-elements are defined in number of bits.

All information element values not explicitly defined are reserved and shall not be used in this version of the protocol.

Most of the information elements defined in this clause are originally defined for TETRA AI protocols in EN 300 392-2 [2]. Whenever the definition of the present document and EN 300 392-2 [2] differ, EN 300 392-2 [2] takes precedence.

8.5.2 Access Priority (AP)

The AP information element shall indicate to the accessed entity urgency of the service request as defined in table 118. This field is that described in EN 300 392-2 [2] clause 11.

Table 118: Access Priority information element contents

Information element	Length	$Value_2$	Remark
Access Priority	2	00	Low priority
		01	High priority
		10	Emergency priority

8.5.3 Acknowledgement required

The acknowledgement required information element shall indicate acknowledgement request for the message as defined in table 119.

Table 119: Acknowledgement required information element contents

Information element	Length	$Value_2$	Remark
Acknowledgement required	1	0	Acknowledgement not required
		1	Acknowledgement required

8.5.4 Address extension

The address extension information element shall indicate the extended part of TSI address as defined in table 120.

Table 120: Address extension information element contents

Information element	Length	Value	Remark
Mobile country code (MCC)	10	any	
Mobile Network Code (MNC)	14	any	

8.5.5 Area Selection (AS)

The AS information element shall indicate to the SwMI the distribution of the call as defined in table 121.

Table 121: Area selection information element contents

Information element	Length	$Value_2$	Remark
Area Selection	4	0000	Area not defined
		0001	Area 1
		0010	Area 2
		…etc.	…etc.
		1110	Area 14
		1111	All Areas this system

8.5.6 Attach detach request status

The attach detach request status information element is defined in table 122.

Table 122: Attach detach request status information element contents

Information element	Length	$Value_2$	Remark
Attach Request Status	3	000	Attach status none
		001	Attach success
		010	Attach reject (MM is busy)
		011	Attach timeout (T535 expires)
		100	Attached failed
		101	Attached break
		110	Attached reject SwMI report active
		111	Not supported by MT

8.5.7 Basic service information

The basic service information element shall inform the SwMI what basic service is requested as defined in table 123. The total element length of the information element is 8 bits.

Table 123: Basic service information element contents

Information sub-element	Length	$Value_2$	Remark
Circuit mode type note 1	3	000	Speech: TCH/S
		001	Unprotected: TCH/7.2
		010	Low Protection: TCH/4.8, N = 1
		011	Low Protection: TCH/4.8, N = 4
		100	Low Protection: TCH/4.8, N = 8
		101	High Protection: TCH/2.4, N = 1
		110	High Protection: TCH/2.4, N = 4
		111	High Protection: TCH/2.4, N = 8
End to end encryption flag note 2	1	0	Clear Mode
		1	End-to-end encryption
Communication type	2	00	Point-to-point
		01	Point-to-multipoint
		10	Point-to-multipoint Acknowledged
		11	Broadcast
Slots per frame note 3	2	00	One slot
		01	Two slots
		10	Three slots
		11	Four slots
NOTE 1: Indicates the traffic channel (TCH) type and the interleaving depth N. NOTE 2: Indicates whether the circuit mode speech or circuit mode data is end-to-end encrypted. NOTE 3: Indicates the required bit rate for a circuit mode data call. For TCH/7.2, TCH/4.8 and TCH/2.4 the resulting bit rate is the TCH bit rate multiplied by the number of slots per frame. (For example, TCH/7.2 in four time slots per frame gives a circuit mode data rate of 28,8 kbit/s.) For TCH/S this element shall be present (set to 0).			

8.5.8 Battery charge

The battery charge information element shall indicate the charging state of the MT2 battery as defined in table 124.

Table 124: Battery Charge information element contents

Information element	Length	Value	Remark
Battery charge	7	0	Empty
		…etc.	…etc.
		100	Full
		101	Reserved
		…etc.	…etc.
		127	Reserved

8.5.9 Bit error ratio

The bit error ratio information element shall indicate the bit error ratio detected by the MT2 in the AI as defined in table 125.

Table 125: Bit Error Ratio information element contents

Information element	Length	Value	Remark
Bit error ratio	8	0	BER < 0,01 %
		1	0,01 % to less than 0,1 %
		2	0,1 % to less than 0,5 %
		3	0,5 % to less than 1,0 %
		4	1,0 % to less than 2,0%
		5	2,0 % to less than 4,0 %
		6	4,0 % to less than 8,0 %
		7	≥ 8,0 %
		8	Reserved
		…etc.	…etc.
		98	Reserved
		99	Not known or detectable
		100	Reserved
		…etc.	…etc.
		254	Reserved

8.5.10 BS service details

The BS service details information element includes the parameters included in the BS service details - see clause 18.5.2 in EN 300 392-2 [2], as defined in table 126.

Table 126: BS service details information element

Information sub-element	Length	Value	Remark
Registration	1	0	Registration not required on this cell
		1	Registration mandatory on this cell
De-registration	1	0	De-registration not required on this cell
		1	De-registration mandatory on this cell
Priority cell	1	0	Cell is not a priority cell
		1	Cell is a priority cell
Minimum mode service	1	0	Cell may use minimum mode
		1	Cell never uses minimum mode
Migration	1	0	Migration is not supported by this cell
		1	Migration is supported by this cell
System wide services	1	0	System wide services temporarily not supported
		1	Normal mode
TETRA voice service	1	0	TETRA voice service is not supported on this cell
		1	TETRA voice service is supported on this cell
Circuit mode data service	1	0	Circuit mode data service is not supported on this cell
		1	Circuit mode data service is supported on this cell
Reserved	1	0	Default value
		1	Reserved for future expansion
NDCP Service	1	0	SNDCP service is not available on this cell
		1	SNDCP service is available on this cell
Air interface encryption Service	1	0	Air interface encryption is not available on this cell
		1	Air interface encryption is available on this cell
Advanced link supported	1	0	Advanced link is not supported on this cell
		1	Advanced link is supported on this cell

8.5.11 Call amalgamation

The call amalgamation information element is as defined in table 127.

Table 127: Call amalgamation information element contents

Information element	Length	Value	Remark
Call amalgamation	1	0	Call not amalgamated
		1	Call amalgamated

8.5.12 Call handle

The call handle information element shall be used to distinguish between multiple or concurrent service instances as defined in table 128.

Table 128: Call handle information element contents

Information element	Length	Value	Remark
Call handle	16	0	Dummy call handle
		1	Call instance label
		…etc.	…etc.
		2^{16}-1	Call instance label

NOTE: This information element is not used on the air interface, although there is an equivalent information element "call identity".

8.5.13 Called party extension

The called party extension information element shall indicate to the SwMI the extended part of the TSI address of the called user as defined in table 129.

Table 129: Called party extension information element contents

Information element	Length	Value	Remark
Country Code	10	any	See EN 300 392-1 [1] clause 7
Network Code	14	any	See EN 300 392-1 [1] clause 7

8.5.14 Called party self address type

The called party self address type information element shall indicate the address, which is followed in the PDU as defined in table 130.

Table 130: Called Party self address type information element contents

Information element	Length	$Value_2$	Remark
Called party self address type	2	00	Reserved
		01	Individual address
		10	Group address
		11	Broadcast

8.5.15 Called party short number address (SNA)

The called party short number address information element shall indicate to the SwMI the Short Number address (SNA) of the called user as defined in table 131.

Table 131: Called party short number address information element contents

Information element	$Length_2$	Value	Remark
Called party short number address	8	0-255	See ETS 300 392-12-7 [20]

8.5.16 Called party Short Subscriber Identity (SSI)

The called party short subscriber identity information element shall indicate to the SwMI the Short Subscriber Identity (SSI) address of the called user as defined in table 132.

Table 132: Called party short subscriber identity information element contents

Information element	Length	Value	Remark
Short subscriber identity	24	any	See EN 300 392-1 [1] clause 7

8.5.17 Called party type identifier

The called party type identifier information element shall indicate the type of address, which shall follow in the PDU as defined in table 133.

Table 133: Called party type identifier information element contents

Information element	Length	$Value_2$	Remark
Called party type identifier	3	000	Short Number Address (SNA)
		001	Short Subscriber Identity (SSI)
		010	Tetra Subscriber Identity (TSI = MNI+SSI)
		011	Reserved
		100	MT2 external subscriber number default gateway address

8.5.18 Calling party extension

The calling party extension information element shall indicate the extended part of the TSI address of the calling user as defined in table 134.

Table 134: Calling party extension information element contents

Information element	Length	Value	Remark
Country Code	10	any	See EN 300 392-1 [1] clause 7
Network Code	14	any	See EN 300 392-1 [1] clause 7

8.5.19 Calling party Short Subscriber Identity (SSI)

The calling party short subscriber identity information element shall indicate the Short Subscriber Identity (SSI) address of the calling user as defined in table 135.

Table 135: Calling party short subscriber identity information element contents

Information element	Length	Value	Remark
Short subscriber identity	24	any	See EN 300 392-1 [1] clause 7

8.5.20 Calling party type identifier

The calling party type identifier information element coding shall indicate the type of address, which shall follow in the PDU as defined in table 136.

Table 136: Calling Party Type Identifier information element contents

Information element	Length	Value	Remark
Calling party type identifier	2	0	Reserved
		1	Short Subscriber Identity (SSI)
		2	Tetra Subscriber Identity (TSI = MNI + SSI)
		3	None

8.5.21 Call ownership

The call ownership information element in group call shall indicate to the MS whether it is capable to disconnect the call or not as defined in table 137. In individual call it shall indicate to both parties whether the call set up is for a normal or amalgamated call.

Table 137: Call ownership information element contents

Information element	Length	$Value_2$	Remark
Call ownership	1	0	Not a call owner (Group call) Normal call set up (Individual call)
		1	A call owner (Group call) Amalgamated call (Individual call)

8.5.22 Call priority

The call priority information element shall inform the SwMI or the MS/LS about the call priority as defined in table 138.

Table 138: Call priority information element contents

Information element	Length	$Value_2$	Remark
Call priority	4	0000	Priority not defined
		0001	Priority 1 (Lowest priority)
		0010	Priority 2
		…etc.	…etc.
		1011	Priority 11
		1100	Pre-emptive priority 1
		1101	Pre-emptive priority 2
		1110	Pre-emptive priority 3
		1111	Pre-emptive priority 4

8.5.23 Call queued

The call queued information element shall inform the calling MS/LS that the call has been put in queue as defined in table 139.

Table 139: Call queued information element contents

Information element	Length	$Value_2$	Remark
Call queued	1	0	Call is not queued
		1	Call is queued

8.5.24 Call status

The call status information element shall inform the MS/LS about the status of the call as defined in table 140.

Table 140: Call status information element contents

Information element	Length	$Value_2$	Remark
Call status	3	000	Call is progressing
		001	Call is queued
		010	Requested subscriber is paged
		011	Call Continue
		100	Hang time expired
		101	Reserved
		110	Reserved
		111	Reserved

8.5.25 Call time-out

The call time-out information element shall set the maximum call time (T310) as defined in table 141.

Table 141: Call time-out information element contents

Information element	Length	$Value_2$	Remark
Call time-out	4	0000	Infinite Time
		0001	30 s
		0010	45 s
		0011	60 s
		0100	2 minutes
		0101	3 minutes
		0110	4 minutes
		0111	5 minutes
		1000	6 minutes
		1001	8 minutes
		1010	10 minutes
		1011	12 minutes
		1100	15 minutes
		1101	20 minutes
		1110	30 minutes
		1111	Reserved

8.5.26 Call time-out, set-up phase

The call time-out, set-up phase information element (T301 and T302) shall set the maximum set-up time valid for the call set up phase as defined in table 142.

Table 142: Call time-out, set-up phase information element contents

Information element	Length	$Value_2$	Remark
Call time out, set-up phase	3	000	Use predefined value (note)
		001	1 s
		010	2 s
		011	5 s
		100	10 s
		101	20 s
		110	30 s
		111	60 s
NOTE: This value shall indicate that the MS/LS shall use a predefined value for the timer.			

8.5.27 CC profile

The CC profile information element shall define operation of the TNP1 Relay for CC signalling messages as defined in table 143.

Table 143: CC profile information element contents

Information element	Length	Value	Remark
Speech voice call control	1	0	Speech Voice call control - MT controlled
		1	Speech Voice call control - TE controlled
Data voice call control	1	0	Data Voice call control - MT controlled
		1	Data Voice call control - TE controlled

8.5.28 Circuit mode and MS services

The circuit mode and MS services information element shall list the circuit mode capabilities of the MT2 as defined in table 144. It shall not give any information of the capabilities of the underlying network. This information element shall contain sub-elements so that the total length$_2$ is 9 bits, which are encoded into two octets in the PDUs.

Table 144: Circuit mode and MS services information element contents

Information element	Length	Value$_2$	Remark
TETRA encoded speech	1	0	Not capable
		1	Capable
7,2 kbit/s unprotected data/speech	1	0	Not capable
		1	Capable
7,2 kbit/s non-TETRA encoded speech	1	0	Not capable
		1	Capable
4,8 kbit/s unprotected data/speech, Interleaving depth = 1	1	0	Not capable
		1	Capable
4,8 kbit/s unprotected data/speech, Interleaving depth = 4	1	0	Not capable
		1	Capable
4,8 kbit/s unprotected data/speech, Interleaving depth = 8	1	0	Not capable
		1	Capable
2,4 kbit/s unprotected data/speech, Interleaving depth = 1	1	0	Not capable
		1	Capable
2,4 kbit/s unprotected data/speech, Interleaving depth = 4	1	0	Not capable
		1	Capable
2,4 kbit/s unprotected data/speech, Interleaving depth = 8	1	0	Not capable
		1	Capable
Frequency simplex/duplex	1	0	Frequency simplex supported
		1	Frequency duplex and simplex supported
Single/multislot	1	0	Single slot supported
		1	Multislot and single slot supported
Concurrent multicarrier operation	1	0	Single carrier operation supported
		1	Multi and single carrier operation supported
Fast switching MS	1	0	Fast switching not supported
		1	Fast switching supported
DCK air interface encryption	1	0	DCK air interface encryption not supported
		1	DCK air interface encryption supported
CLCH needed on carrier change	1	0	No CLCH needed on carrier change
		1	CLCH needed on carrier change
Concurrent channels (Concurrent services)	1	0	Concurrent channels not supported
		1	Concurrent channels supported
Advanced link	1	0	Advanced link not supported
		1	Advanced link supported
Minimum mode	1	0	Minimum mode not supported
		1	Minimum mode supported
Carrier specific signalling channel	1	0	Carrier specific signalling channel not supported
		1	Carrier specific signalling channel supported

Information element	Length	$Value_2$	Remark
Authentication	1	0	Authentication not supported
		1	Authentication supported
SCK air interface encryption	1	0	SCK air interface encryption not supported
		1	SCK air interface encryption supported
TETRA air interface standard version number	3	000	EN 300 392-2 [2], no security functions
		001	EN 300 392-2 [2] and EN 300 392-7 [19] (V2.1.1)
		010	EN 300 392-2 [2] (V2.3.2) and EN 300 392-7 [19] (V2.1.1)
		011	Reserved
		...etc.	...etc.
		111	Reserved

8.5.29 Circuit mode data

The circuit mode data information element shall carry data related to circuit mode traffic as defined in table 145.

Table 145: Circuit mode data information element contents

Information element	$Length_2$	Value	Remark
Circuit mode data	varies	any	

8.5.30 Class of usage

The class of usage information element shall be encoded and defined in table 146.

Table 146: Class of usage information element contents

Information element	Length	$Value_2$	Remark
Class of usage	3	000	Class of Usage 1
		001	Class of Usage 2
		010	Class of Usage 3
		011	Class of Usage 4
		100	Class of Usage 5
		101	Class of Usage 6
		110	Class of Usage 7
		111	Class of Usage 8

8.5.31 CLIR control

The CLIR control information element shall be encoded as defined in table 147.

Table 147: CLIR control information element contents

Information element	Length	$Value_2$	Remark
CLIR control	2	00	Not implemented or use default mode
		01	Reserved
		10	Presentation not restricted
		11	Presentation restricted

8.5.32 Delivery report request

The delivery report request information element shall be encoded as defined in table 148.

Table 148: Delivery report request information element contents

Information element	Length	$Value_2$	Remark
Delivery report request	2	00	No delivery report request
		01	Message received report requested
		10	Message consumed report requested
		11	Message received and consumed report requested

8.5.33 Delivery status

The delivery status information element shall be encoded as defined in table 149.

Table 149: Delivery status information element contents

Information element	Length	Value	Remark	Report source
Delivery status	8	$000xxxxx_2$	**SDS data transfer success**	-
		00000000_2	SDS receipt acknowledged by destination	Destination
		00000001_2	SDS receipt report acknowledgement	SwMI/Source
		00000010_2	SDS consumed by destination	Destination
		00000011_2	SDS consumed report acknowledgement	SwMI/Source
		00000100_2	SDS message forwarded to external network	SwMI
		00000101_2	SDS sent to group, acknowledgements prevented	SwMI
		00000110_2 to 00011111_2	Reserved	-
		$001xxxxx_2$	**Temporary error, SwMI still trying to transfer SDS data**	-
		00100000_2	Congestion, message stored by SwMI	SwMI
		00100001_2	message stored by SwMI	SwMI
		00100010_2	Destination not reachable, message stored by SwMI	SwMI
		00100011_2 to 00111111_2	Reserved	-
		$010xxxxx_2$	**SDS data transfer failed, SwMI is not making any more transfer attempts**	-
		01000000_2	Network overload	SwMI
		01000001_2	Service permanently not available on BS	SwMI
		01000010_2	Service temporary not available on BS	SwMI
		01000011_2	Source is not authorized for SDS	SwMI
		01000100_2	Destination is not authorized for SDS	SwMI
		01000101_2	Unknown destination, gateway, or service centre address	SwMI
		01000110_2	Unknown forward address	SwMI
		01000111_2	Group address with individual service	SwMI
		01001000_2	Validity period expired, message not received by far end	SwMI
		01001001_2	Validity period expired, message not consumed by far end	SwMI
		01001010_2	Delivery failed	SwMI
		01001011_2	Destination not registered on system	SwMI
		01001100_2	Destination queue full	SwMI
		01001101_2	Message too long for destination or gateway	SwMI

Information element	Length	Value	Remark	Report source
		01001110_2	Destination does not support SDS-TL data transfer service PDUs	SwMI/Destination
		01001111_2	Destination host not connected	Destination
		01010000_2	Protocol not supported	Destination
		01010001_2	Data coding scheme not supported	Destination
		01010010_2	Destination memory full, message discarded	Destination
		01010011_2	Destination not accepting SDS messages	SwMI
		01010100_2	Reserved	-
		01010101_2	Reserved	-
		01010110_2	Destination address administratively prohibited	SwMI
		01010111_2	Can not route to external network	SwMI
		01011000_2	Unknown external subscriber number	SwMI
		01011001_2	Negative report acknowledgement	Source
		01011010_2	Destination not reachable, message delivery failed	SwMI
		01011011_2 to 01011111_2	Reserved	-
		$011xxxxx_2$	**Flow control messages**	-
		01100000_2	Destination memory full	Destination
		01100001_2	Destination memory available	Destination
		01100010_2	Start pending messages	Destination
		01100011_2	No pending messages	SwMI
		01100100_2 to 01111111_2	Reserved	-
		$100xxxxx_2$	**End to end control messages**	-
		10000000_2	Stop sending	Destination
		10000001_2	Start sending	Destination
		10000010_2 to 10011111_2	Available for user application definition, note	Destination
		$101xxxxx_2$ to $111xxxxx_2$	Reserved for future use	-
NOTE: These values may be co-ordinated outside the scope of the present document in order to prevent clashed.				

8.5.34 Direct mode

The direct mode information element shall be encoded as defined in table 150.

Table 150: Direct mode information element contents

Information element	Length	Value	Remark
Direct mode	1	1	Start of direct mode operation

8.5.35 Disconnect type

The disconnect type information element shall be encoded as defined in table 151.

Table 151: Disconnect type information element contents

Information element	Length	Value	Remark
Disconnect type	2	00	Disconnect call
		01	Leave call without disconnection
		10	Leave call temporarily
		11	Reserved

8.5.36 DTMF result

The DTMF information element shall be encoded as defined in table 152.

Table 152: DTMF Result element contents

Information element	Length	Value	Remark
DTMF Result	1	0	DTMF not supported
		1	DTMF not subscribed

8.5.37 Disconnect cause

The disconnect cause information element shall inform the MS/LS or the infrastructure of the reason for the release/disconnection as defined in table 153.

Table 153: Disconnect cause information element contents

Information element	Length	$Value_2$	Remark
Disconnect cause	5	00000	Cause not defined or unknown
		00001	User requested disconnect
		00010	Called party busy
		00011	Called party not reachable
		00100	Called party does not support encryption
		00101	Congestion in infrastructure
		00110	Not allowed traffic case
		00111	Incompatible traffic case
		01000	Requested service not available
		01001	Pre-emptive use of resource
		01010	Invalid Call Identifier
		01011	Call Rejected by the called party
		01100	No idle CC entity
		01101	Expiry of timer
		01110	SwMI requested Disconnection
		01111	Acknowledged Service not completed
		10000	Reserved
		…etc.	…etc.
		11111	Reserved

8.5.38 Disconnect status

The disconnect status information element shall be encoded as defined in table 154.

Table 154: Disconnect status information element contents

Information element	Length	Value	Remark
Disconnect status	2	00	Disconnect successful
		01	Disconnect unsuccessful, the release is released from the call
		10	Disconnection unsuccessful, not the call owner, the user is released from the call
		11	The user is released from the call

8.5.39 DTMF digits

The DTMF information element shall allow the transfer of DTMF digits (n digits where n shall be less than or equal to 255) to another user application. Each digit shall be encoded as defined in table 155.

Table 155: DTMF information element contents

Information element	Length	$Value_2$	Remark
DTMF digit	4	0000	Digit "0"
		0001	Digit "1"
		0010	Digit "2"
		0011	Digit "3"
		0100	Digit "4"
		0101	Digit "5"
		0110	Digit "6"
		0111	Digit "7"
		1000	Digit "8"
		1001	Digit "9"
		1010	Digit "*"
		1011	Digit "#"
		1100	Digit "A"
		1101	Digit "B"
		1110	Digit "C"
		1111	Digit "D"

8.5.40 DTMF tone delimiter

The DTMF tone delimiter information element is defined in table 156.

Table 156: DTMF tone delimiter information element contents

Information element	Length	Value	Remark
DTMF tone delimiter	1	0	DTMF tone start
		1	DTMF tone end

8.5.41 Dual watch

The dual watch information element is defined in table 157.

Table 157: Dual Watch information element contents

Information element	Length	$Value_2$	Remark
Dual watch	4	0000	Starting dual watch mode
		0001	Modify or resume dual watch mode
		0010	Dual watch mode accepted
		0011	Dual watch mode rejected
		0100	Dual watch mode not supported
		0101	Terminating dual watch mode
		0110	Terminating dual watch mode response
		0111	Dual watch energy economy group changed by SwMI
		1000	Dual watch mode terminated by SwMI

8.5.42 Enable/Disable status

The Enable/disable status information element shall indicate which of the enable/disable status types (i.e. temporary or permanent) for TEI or equipment is requested as defined in table 158.

Table 158: Enable/disable status information element contents

Information element	Length	Value	Remark
Enable/disable status	2	0	Enabled
		1	Temporary disabled
		2	Permanent disabled
		3	Not used

8.5.43 End to end encryption flag

The end-to-end encryption flag information element shall indicate/request for end-to-end encryption, as defined in table 159.

Table 159: End-to-end encryption flag information element contents

Information element	Length	Value	Remark
End to end encryption flag	1	0	Clear
		1	End to End encrypted

8.5.44 Energy economy mode

The energy economy mode information element shall be used to indicate which energy saving scheme is requested (if any) as defined in table 160.

Table 160: Energy economy mode information element contents

Information element	Length	$Value_2$	Remark
Energy economy mode	3	000	Stay alive
		001	Economy mode 1 (EG1)
		010	Economy mode 2 (EG2)
		011	Economy mode 3 (EG3)
		100	Economy mode 4 (EG4)
		101	Economy mode 5 (EG5)
		110	Economy mode 6 (EG6)
		111	Economy mode 7 (EG7)

8.5.45 Energy economy mode status

The energy economy mode status information element shall be encoded as defined in table 161.

Table 161: Energy economy mode status information element contents

Information element	Length	Value	Remark
Energy economy mode status	1	0	Accepted
		1	Rejected

8.5.46 External subscriber number

The external subscriber number information element is a structure with two fields. First a length element, second the list of digits. The external subscriber number information element shall be encoded as described in table 162.

Table 162: External subscriber number information element contents

Information element	Length	Remark
Number of digits	8	See notes 2 and 3
External subscriber number digit		See note 1

NOTE 1: This information element shall be repeated according to the number of digits.
NOTE 2: The number of digits will be 0 if no external number is present.
NOTE 3: When building the PDUs, if the number of digits is odd then the value 1111_2 will be appended to the end of the string of digits.

8.5.47 External subscriber number digits

Each digit in the external subscriber number information element shall be as defined in table 163.

Table 163: External subscriber digit information element contents

Information element	Length	$Value_2$	Remark
External subscriber number digit	4	0000	Digit "0"
		0001	Digit "1"
		0010	Digit "2"
		0011	Digit "3"
		0100	Digit "4"
		0101	Digit "5"
		0110	Digit "6"
		0111	Digit "7"
		1000	Digit "8"
		1001	Digit "9"
		1010	Digit "*"
		1011	Digit "#"
		1100	Digit "+"
		1101	Reserved
		1110	Reserved
		1111	Reserved

8.5.48 Facility

The facility information element is an optional variable length information element and shall be used to send and receive SS information appended to the PDUs, which can carry the facility information element.

The size and the structure of the facility information element are dependent on each individual SS and shall be further detailed in the SS protocol clauses.

There can be multiple facility information elements in the same PDU.

8.5.49 Field strength

The field strength information element shall indicate the current field strength detected by the MT2 as defined in table 164. See EN 300 392-2 [2], clause 10.3.

Table 164: Field strength information element contents

Information element	Length	Value	DBm	Remark
Field strength	7	0	-	Parameter not available
		1	-115	
		2	-114	
		…etc.	…etc.	
		65	-51	
		66	-50	
		67	More than -50	
		68		Reserved
		…etc.	-	…etc.
		98	-	Reserved
		99	-	Not know or not detectable
		100	-	Reserved
		…etc.	-	…etc.
		127	-	Reserved

8.5.50 Forward address type identifier

The forward address type identifier information element coding shall indicate the type of address as defined in table 165.

Table 165: Forward address type identifier information element contents

Information element	Length	Value	Remark
Forward address type identifier	4	0000	SNA
		0001	Short Subscriber Identity (SSI)
		0010	Tetra Subscriber Identity (TSI)
		0011	External Subscriber Number
		0100	Reserved
		…etc.	…etc.
		1111	Reserved

8.5.51 Function

The function information element shall associate a predefined function to the PDU as defined in table 166.

Table 166: Function information element contents

Information element	Length	$Value_2$	Remark
Function	7	0000000	Available for proprietary user applications
		…etc.	…etc.
		0111111	Available for proprietary user applications
		1000000	Reserved
		…etc.	…etc.
		1111111	Reserved

8.5.52 Group identity address type

The group identity address type information element shall indicate type of group identity address type in the attachment/detachment of group identities as defined in table 167.

Table 167: Group identity address type information element contents

Information element	Length	Value	Remark
Group identity address type	2	0	GSSI
		1	GTSI
		2	(V)GSSI
		3	GTSI+(V) GSSI

8.5.53 Group identity attach/detach mode

The group identity attach/detach mode information element shall indicate the mode of the attachment/detachment of group identities as defined in table 168.

Table 168: Group identity attach/detach mode information element contents

Information element	Length	Value	Remark
Group Identity Attach/Detach Mode	1	0	Amendment
		1	Detach all currently active group identities and attach group identities defined in the group identity (downlink/uplink) element (if any)

8.5.54 Group identity attach/detach type identifier

The group identity attach/detach type identifier information element shall be encoded as defined in table 169.

Table 169: Group identity attach/detach type identifier information element contents

Information element	Length	Value	Remark
Group identity attach/detach type identifier	1	0	Attached
		1	Detached

8.5.55 Group identity attachment

The group identity attachment information element shall be encoded as defined in table 170.

Table 170: Group identity attachment information element contents

Information element	Length	Value	Remark
Group identity attachment lifetime	2	any	
Class of usage	3	any	

8.5.56 Group identity attachment lifetime

The group identity attachment lifetime information element shall indicate a lifetime of the attachment of the group identity defined by the infrastructure for a MS as defined in table 171.

Table 171: Group identity attachment lifetime < information element contents

Information element	Length	Value	Remark
Group identity attachment lifetime	2	00	Attachment not needed
		01	Attachment for next ITSI attach required
		10	Attachment not allowed for next ITSI attach
		11	Attachment for next location update required

8.5.57 Group identity detachment downlink

The group identity detachment information element shall indicate the infrastructure detachment reasons as defined in table 172.

Table 172: Group identity detachment downlink information element contents

Information element	Length	$Value_2$	Remark
Group identity detachment downlink	2	00	Unknown group identity (note)
		01	Temporary 1 detachment (note)
		10	Temporary 2 detachment (note)
		11	Permanent detachment (note)
NOTE: All these values are network dependent.			

8.5.58 Group identity detachment uplink

The group identity detachment uplink information element shall indicate the MS detachment reasons as defined in table 173.

Table 173: Group identity detachment uplink information element contents

Information element	Length	Value	Remark
Group identity detachment uplink	2	0	Unknown group identity
		1	No valid encryption key (end-to-end)
		2	User initiated
		3	Capacity exceeded

8.5.59 Group identity downlink

The group identity downlink information element shall be used to join the parameters for a group identity attachment/detachment used by the infrastructure as defined in table 174.

Table 174: Group identity downlink information element contents

Information element	Length	Value	Type	C/O/M	Remark
Group identity attach/detach type identifier	1	any	1	M	
Group identity attachment	5	any		C	See note 1
Group identity detachment downlink	2	any		C	See note 1
Group identity address type	2	any		M	
GSSI	24	any		C	See note 2
Address extension	24	any		C	See note 2
NOTE 1: Shall be conditional on the value of Group Identity Attach/Detach Type Identifier (GIADTI): - GIADTI = 0; Group Identity Attachment; - GIADTI = 1; Group Identity Detachment Downlink. NOTE 2: Shall be conditional on the value of Group Identity Address Type (GIAT): - GIAT = 0; GSSI; - GIAT = 1; GSSI + Address Extension (GTSI).					

8.5.60 Group identity report

The group identity report information element shall indicate whether all MSs active group identities shall be reported as defined in table 175.

Table 175: Group identity report information element contents

Information element	Length	Value	Remark
Group identity report	1	0	Not report request
		1	Report request

8.5.61 Group identity uplink

The group identity uplink information element shall be used to join the parameters for a group identity attachment/detachment used by the MS as defined in table 176.

Table 176: Group identity uplink information element contents

Information element	Length	Value	Type	C/O/M	Remark
Group identity attach/detach type identifier	1	any	1	M	
Class of usage	3	any		C	See note 1
Group identity detachment uplink	2	any		C	See note 1
Group identity address type	2	any	1	M	
GSSI	24	any		C	See note 2
Address extension	24	any		C	See note 2
NOTE 1: Shall be conditional on the value of Group Identity Attach/Detach Type Identifier (GIADTI): - GIADTI = 0; Class of Usage; - GIADTI = 1; Group Identity Detachment uplink. NOTE 2: Shall be conditional on the value of Group Identity Address Type (GIAT): - GIAT = 0; GSSI; - GIAT = 1; GSSI + Address Extension (GTSI).					

8.5.62 Group Short Subscriber Identity (GSSI)

The GSSI information element shall indicate the GSSI or (V) GSSI that the MS shall use in subsequent contacts with the SwMI, as defined in table 177.

Table 177: Group Short Subscriber Identity information element contents

Information element	Length	Value	Remark
GSSI	24	any	See EN 300 392-1 [1]

8.5.63 GTSI

The ITSI information element shall indicate a group identity as defined in table 178.

Table 178: GTSI information element contents

Information element	Length	Value	Remark
Group Short Subscriber Identity (GSSI)	24	any	See EN 300 392-1 [1]
Address extension	24	any	See EN 300 392-1 [1]

8.5.64 Hardware version

The hardware version information element shall inform the TE2 user application about the MT2 hardware version as defined in table 179. The total number of characters, including line terminators, shall not exceed 128 characters.

Table 179: Hardware version information element contents

Information element	Length	Value	Remark
Hardware version	n x 8	any	8 bits for each ASCII alphabet character

8.5.65 Hook method selection

The hook method selection information element shall inform the infrastructure and the called user(s) of the preferred hook method as defined in table 180.

Table 180: Hook method selection information element contents

Information element	Length	Value	Remark
Hook method selection	1	0	No hook signalling (direct through-connect)
		1	Hook on/Hook off signalling

8.5.66 Internal temperature

The internal temperature information element shall indicate the MT2 temperature as defined in table 181.

Table 181: Internal temperature information element contents

Information element	Length	Value	Remark
Temperature scale	1	0	Celsius
		1	Fahrenheit
Temperature sign	1	0	Positive degree
		1	Negative degree
Temperature degree	8	0-255	
Temperature sub degree	4	0-15	Additional 1/16 degree precision
Reserved	2	00	Reserved

EXAMPLE: 1 0 00100101 0001 00 means: Celsius, positive, 37 + 1/16 degrees.

8.5.67 ISO global object ID

The ISO global object ID information element shall inform the TE2 user application about the MT2 identification in terms of global ISO definition as defined in table 182. The characters shall be aligned sequentially. The total number of characters, including line terminators, shall not exceed 256 characters.

Table 182: ISO global object ID information element contents

Information element	Length	Value	Remark
ISO global object ID	n * 8	any	8 bits for each ASCII alphabet character

8.5.68 ITSI

The ITSI information element shall indicate identity of the radio as defined in table 183.

Table 183: ITSI information element contents

Information element	Length	Value	Remark
SSI	24	any	ISSI of the MS
Address extension	24	any	MNI of the MS

8.5.69 Key Mask

The key mask information element indicates type of keys that shall appear in the request and be checked among SDS stack messages. The key mask can include multiple keys.

Table 184: Key mask information element contents

Information element	Length	$Value_2$	Remark
Key mask	4	1111	All keys shall appear
		0001	SDS type
		0010	SDS message status
		0011	SDS type and SDS message status
		0100	Reserved
		…etc.	…etc.
		1110	Reserved

8.5.70 LA

The LA information element shall indicate the area in which a cell is located, either the serving cell or a neighbour cell as define in table 185.

Table 185: Location area information element contents

Information element	Length	Value	Remark
LA	14	any	

8.5.71 Length indicator

The length indicator information element shall define the length of the next information element such as Application user data as defined in table 186.

Table 186: Length indicator information element contents

Information element	Length	Value	Remark
Length indicator	11	0	0 bits
		1	1 bit
		etc.	etc.
		$2^{11}-1$	2 047 bits

8.5.72 Manufacturer identifier

The manufacturer identifier information element shall inform the TE2 user application about the manufacturer of the MT2 as defined in table 187.

Table 187: Manufacturer IDENTIFIER information element contents

Information element	Length	Value	Remark
Manufacturer identifier	n x 8	any	8 bits for each ASCII alphabet character

8.5.73 Max data

The max data information element shall indicate how much data MT2 can accept from TE2 as defined in table 188. The amount of data shall be measured in timeslots as used in the current circuit mode type.

Table 188: Max DATA information element contents

Information element	Length	Value	Remark
Max data	8	0	No data
		1	1 timeslot
		2	2 timeslots
		etc.	etc.
		(2^8-1)	255 timeslots

8.5.74 MCC

The MCC information element shall indicate the mobile country code, as defined in table 189.

Table 189: MCC information element contents

Information element	Length	Value	Remark
MCC	10	any	See EN 300 392-1 [1], clause 7

8.5.75 Message index

The message index information element shall point to an SDS message in the MT2 SDS message stack (stack for SDS status, SDS1/2/3 or SDS 4), as defined in table 190.

Table 190: Message index information element contents

Information element	Length	Value	Remark
Message index	16	0-65,535	

8.5.76 Message reference

The message reference information element shall be as defined in table 191.

Table 191: Message reference information element contents

Information element	Length	Value	Remark
Message reference	8	0 - 255	

8.5.77 Message reference handle

The message reference handle information element shall be as defined in table 192.

Table 192: Message reference handle information element contents

Information element	Length	Value	Remark
Message reference handle	8	0 - 255	

8.5.78 Microphone on off

The microphone on off information element shall be as defined in table 193.

Table 193: Microphone on off information element contents

Information element	Length	Value	Remark
Microphone on off	1	0	Microphone off
		1	Microphone on

8.5.79 MM profile

The MM profile information element shall define operation of the TNP1 Relay for MM signalling messages as defined in table 194.

Table 194: MM profile information element contents

Information element	Length	Value	Remark
Registration/ De-registration control (note)	1	0	Registration/ De-registration – MT controlled
		1	Registration/ De-registration – TE controlled
Security control (authentication, enable/disable, encryption) (note)	1	0	Security – MT controlled
		1	Security – TE controlled
MM status control (energy saving, dual watch) (note)	1	0	MM status control – MT controlled
		1	MM status control – TE controlled
Group management control (group attach/detach) (note)	1	0	Group Management – MT controlled
		1	Group Management –TE controlled
NOTE: All the updates will be sent to both applications (MT and TE).			

8.5.80 MM transfer result

The MM transfer result information element shall inform the TE2 user application about the success of the U-ITSI DETACH transfer as defined in table 195.

Table 195: MM transfer result information element contents

Information element	Length	$Value_2$	Remark
MM transfer result	1	0	Transfer successful done
		1	Transfer fail

8.5.81 MNC

The MNC information element shall indicate the mobile network code, as defined in table 196.

Table 196: MNC information element contents

Information element	Length	Value	Remark
MNC	14	any	See EN 300 392-1 [1], clause 7

8.5.82 Model

The model information element shall inform the TE2 user application about the MT2 model as defined in table 197.

Table 197: Model information element contents

Information element	Length	Value	Remark
Model	n * 8	any	8 bits for each ASCII alphabet character

8.5.83 Modify

The modify information element shall be used to change an ongoing call either to a new basic service or the behaviour from simplex to duplex or reverse as defined in table 198.

Table 198: Modify information element contents

Information element	Length	Value	Remark
Simplex/Duplex selection	1	any	See description of the Simplex/Duplex selection" information element
Basic service information	8	any	See description of the basic service information element

8.5.84 More information flag

The more information flag information element shall be used to indicate to the application that there are more messages as defined in table 199. If this flag is set to "more information" the TE shall not send any more commands until all related data has been returned by the MT (flag set to "no more information").

Table 199: More information flag information element contents

Information element	Length	Value	Remark
More information flag	1	0	No more information
		1	More information

8.5.85 MT2 default gateway address

The MT2 default gateway address information element shall be encoded as defined in table 200.

Table 200: MT2 gateway default address information element contents

Information element	Length	Value	Type	C/O/M	Remark
Address type identifier	2	any	1	M	
SSI	24	any		C	See note
Address extension	24	any		C	See note
NOTE: Shall be conditional on the value of Address Type Identifier (ATI): - ATI = 1; SSI; - ATI = 2; SSI + Address Extension.					

8.5.86 Notification indicator

The notification indicator information element shall be used in SSs by the SwMI to inform a MS/LS of various events as presented in table 201 and defined in EN 300 392-9 [15] clause 7.2.

Table 201: Notification indicator information element contents

Information element	Length	Value	Remark
Notification indicator	6	0-63	See EN 300 392-9 [15]

8.5.87 Number of groups

The number of groups information element shall indicate the number of uplink or downlink groups identity as defined in table 202.

Table 202: Number of groups information element contents

Information element	Length	Value	Remark
Number of groups	4	0-15	

8.5.88 Number of messages

The number of messages information element shall be used for repeatable sub elements, as defined in table 203.

Table 203: Number of messages information element contents

Information element	Length	Value	Remark
Number of messages	8	0-254	
		255	All messages

8.5.89 Over temperature indication

The MTE over temperature indication information element shall be as defined in table 204.

Table 204: Over temperature indication information element contents

Information element	Length	Value	Remark
Over temperature indication	1	0	Normal temperature
		1	Over temperature

8.5.90 Packet data mode services

The data mode services information element shall list the packet data mode capabilities of the MT2. It shall not give any information of the capabilities of the underlying network as defined in table 205.

Table 205: Packet data mode services information element contents

Information element	Length	Value	Remark
Ipv4	1	0	Not capable
		1	Capable
Ipv6	1	0	Not capable
		1	Capable
Reserved	1	0	Not capable
		1	Capable
Reserved	1	0	Not capable
		1	Capable

8.5.91 PDU type

The PDU type information element shall identify the type of TNP1 PDU sent over the PEI as defined in table 206 and table 207.

Table 206: PDU type information element contents

Information element	Length	Value	Type	C/O/M	Remark
PDU Group ID	8	any	1	M	
PDU ID	8	any	1	M	

8.5.92 PDU type values

The PDU type values information element shall be encoded as defined in table 207. All the unused group ID and PDU ID values are reserved.

Table 207: PDU type values information element contents

Group ID	Group ID value$_2$	PDU Name	PDU ID value$_2$
CC	00001001	TECC-ALERT IND	00000001
		TECC-COMPLETE CON	00000010
		TECC-COMPLETE IND	00000011
		TECC-COMPLETE REQ	00000100
		TECC-DTMF IND	00000101
		TECC-DTMF REQ	00000110
		TECC-MODIFY IND	00000111
		TECC-MODIFY REQ	00001000
		TECC-NOTIFY IND	00001001
		TECC-PROCEED IND	00001010
		TECC-RELEASE CON	00001011
		TECC-RELEASE IND	00001100
		TECC-RELEASE REQ	00001101
		TECC-SETUP CON	00001110
		TECC-SETUP IND	00001111
		TECC-SETUP REQ	00010000
		TECC-SETUP RES	00010001
		TECC-TX CON	00010010
		TECC-TX IND	00010011
		TECC-TX REQ	00010100
SS	00001011	TESS-FACILITY CON	00000000
		TESS-FACILITY IND	00000001
		TESS-FACILITY REQ	00000010
		TESS-FACILITY RES	00000011
SDS	00001111	TESDS-REPORT IND	00000000
		TESDS-STATUS IND	00000001
		TESDS-STATUS REQ	00000010
		TESDS-UNITDATA IND	00000011
		TESDS-UNITDATA REQ	00000100
SDS-TL		TESDS-TL-ACK IND	00001011
		TESDS-TL-ACK REQ	00001100
		TESDS-TL-REPORT IND	00001101
		TESDS-TL-REPORT REQ	00001110
		TESDS-TL-TNSDS-REPORT IND	00001111
		TESDS-TL-TRANSFER IND	00010000
		TESDS-TL-TRANSFER REQ	00010001
		TESDS-TL-UNITDATA IND	00010010
		TESDS-TL-UNITDATA REQ	00010011

Group ID	Group ID value$_2$	PDU Name	PDU ID value$_2$
MM	00010001	TEMM-ATTACH DETACH GROUP IDENTITY CON	00000000
		TEMM-ATTACH DETACH GROUP IDENTITY IND	00000001
		TEMM-ATTACH DETACH GROUP IDENTITY REQ	00000010
		TEMM-ENERGY SAVING CON	00000100
		TEMM-ENERGY SAVING REQ	00000101
		TEMM-ENERGY SAVING IND	00000110
		TEMM-REPORT IND	00000111
		TEMM-REGISTRATION CON	00001000
		TEMM-REGISTRATION IND	00001001
		TEMM-REGISTRATION REQ	00001010
		TEMM-DEREGISTRATION REQ	00001011
		TEMM-SERVICE IND	00001100
		TEMM-DISABLING IND	00001101
		TEMM-ENABLING IND	00001110
		TEMM-STATUS CON	00001111
		TEMM-STATUS IND	00010000
		TEMM-STATUS REQ	00010001
		TEMM-SERVICE REQ	00010010
Circuit mode traffic related	00010011	TEMAC-FLOW CONTROL	00000000
		TEMAC-UNITDATA	00000001
MT2 user application PDUs	00010100	TEMTA-IDENTIFICATION RESP	00000001
		TEMTA-IDENTIFICATION REQ	00000010
		TEMTA-SERVICES CAPABILITY RESP	00000011
		TEMTA-SERVICES CAPABILITY REQ	00000100
		TEMTA-SDS-TL CAPABILITY RESP	00000101
		TEMTA-SDS-TL CAPABILITY REQ	00000110
		TEMTA-SDS DELETE MESSAGES REQ	00000111
		TEMTA-SDS MESSAGE ERROR	00001000
		TEMTA-SDS MESSAGE IND	00001001
		TEMTA-SDS GET LIST MESSAGES BY KEY REQ	00001010
		TEMTA-SDS LIST MESSAGES REPLY	00001011
		TEMTA-SDS NOTIFICATION	00001100
		TEMTA-SDS SERVICE PROFILE RESP	00001110
		TEMTA-SDS SERVICE PROFILE SET	00001111
		TEMTA-SDS SERVICE PROFILE REQ	00010000
		TEMTA-CC SERVICE PROFILE RESP	00010001
		TEMTA-CC SERVICE PROFILE SET	00010010
		TEMTA-CC SERVICE PROFILE REQ	00010011
		TEMTA-MM SERVICE PROFILE RESP	00010100
		TEMTA-MM SERVICE PROFILE SET	00010101
		TEMTA-MM SERVICE PROFILE REQ	00010110
		TEMTA-SDS-TL SERVICE PROFILE RESP	00010111
		TEMTA-SDS-TL SERVICE PROFILE SET	00011000
		TEMTA-SDS-TL SERVICE PROFILE REQ	00011001
		TEMTA-STATE RESP	00011101
		TEMTA-STATE REQ	00011110
		TEMTA-SYSINFO RESP	00011111
		TEMTA-SYSINFO REQ	00100000
		TEMTA-IDENTITIES RESP	00100001
		TEMTA-IDENTITIES REQ	00100010
		TEMTA-REPORT IND	00100011
		TEMTA-SPEAKER-MIC REQ	00100101
		TEMTA-SETVOLUME REQ	00100110
		TEMTA-SDS MESSAGE REQ	00100111

8.5.93 Poll request

This poll request information element shall be used by the SwMI to request a poll response back from the MS/LS when an acknowledged group call has been initiated as defined in table 208.

Table 208: Poll request information element contents

Information element	Length	Value	Remark
Poll request	1	0	No poll answer requested
		1	Poll answer requested

8.5.94 Poll response

This poll response information element shall be used by the MS/LS to respond to a poll request in an acknowledged group call from the SwMI as defined in table 209.

Table 209: Poll response information element contents

Information element	Length	Value	Remark
Poll response	1	0	No Poll response
		1	Poll response

8.5.95 Poll response addresses

The poll response addresses information element shall provide the addresses on responding group members in an acknowledged group call as defined in table 210.

Table 210: Poll response addresses information element contents

Information element	Length	Value	Remark
1st TSI address	48	any	For TSI address definition see EN 300 392-1 [1] clause 7
2nd TSI address	48	any	
…etc.	…etc.	any	
Nth TSI address	48	any	

8.5.96 Poll response number

The poll response number information element shall provide the number of responding group members in an acknowledged group call as defined in table 211.

Table 211: Poll response number information element contents

Information element	Length	Value	Remark
Number of responding group members	6	0-63	

8.5.97 Poll response percentage

The poll response percentage information element shall provide the percentage of responding group members in an acknowledged group call as defined in table 212.

Table 212: Poll response percentage information element contents

Information element	Length	Value	Remark
Percentage of responding number of group members	6	0	0 %
		1	2 %
		…etc.	…etc.
		50	100 %
		51	Reserved
		…etc.	…etc.
		63	Reserved

8.5.98 Preferred LA list

The preferred LA list information element shall define the list of the preferred location areas used for cell selection as defined in table 213.

Table 213: Preferred LA list information element contents

Information element	Length	Value	Type	C/O/M	Remark
Number (of LA)	8	any	1	M	
LA	14	any		C	See note
NOTE: This element shall be repeatable according to the number field.					

8.5.99 Preferred MCC list

The preferred MCC list information element shall define the list of the preferred MCC used for cell selection as defined in table 214.

Table 214: Preferred MCC list information element contents

Information element	Length	Value	Type	C/O/M	Remark
Number of MCCs	8	any	1	M	
MCC	10	any		C	See note
NOTE: This element shall be repeatable according to the number of MCCs information element.					

8.5.100 Preferred MNC list

The preferred MNC list information element shall define the list of the preferred MNC used for cell selection as defined in table 215.

Table 215: Preferred MNC list information element contents

Information element	Length	Value	Type	C/O/M	Remark
Number of MNCs	8	any	1	M	
MNC	14	any		C	See note
NOTE: This element shall be repeatable according to the number of MNCs information element.					

8.5.101 Product serial number

The product serial number information element shall inform the TE2 user application about the MT2 production number as defined in table 216.

Table 216: Product serial number information element contents

Information element	Length	Value	Remark
Product serial number	n * 8		8 bits for each ASCII alphabet character

8.5.102 Proprietary

Proprietary is an optional, variable length information element and may be used to send and receive proprietary defined information appended to the PDUs. The proprietary information element is not used on the air interface.

The first information element following any type 3 element identifier "proprietary" shall be a numeric Manufacturer identifier information element. The subsequent information element(s) are manufacturer-specific.

The proprietary information element shall be encoded as defined in table 217.

Table 217: Proprietary information element contents

Information element	Length	Value	Remark
Proprietary element owner	8		See clause 8.5.103 for definition
Proprietary	Varies		See note
NOTE: The use, the size and the rest of the structure of the proprietary information element are outside the scope of the present document.			

8.5.103 Proprietary element owner

The proprietary information element owner element shall inform the TE2 user application about the manufacturer of the MT2 as defined in table 218.

Table 218: Proprietary element owner information element contents

Information element	Length	Value	Remark
Proprietary element owner	8	0	Reserved
		1-255	To be allocated to manufacturers by ETSI
NOTE: This information element and the method of allocation are described in further detail in annex H of EN 300 392-2 [2].			

8.5.104 Protocol identifier

The protocol identifier information element shall refer to the user application utilizing the SDS-TL protocol as defined in table 219. The clause numbers in table 219 are clauses of EN 300 392-2 [2].

Table 219: Protocol identifier information element contents

Information element	Length	Value	Remark	Clause
Protocol identifier	8	00000000_2	Reserved, notes 1 and 2	-
		00000001_2	OTAK (Over The Air re-Keying for end to end encryption), refer to EN 300 392-7 [19] clause 7.6, see notes 2 and 3	29.5.1
		00000010_2	Simple Text Messaging, see note 2	29.5.2
		00000011_2	Simple GPS, see note 2	29.5.5
		00000100_2	Wireless Datagram Protocol WAP, see note 2	29.5.8
		00000101_2	Wireless Control Message Protocol WCMP, see note 2	29.5.8
		00000110_2	M-DMO (Managed DMO), refer to EN 300 396-10 [28], see note 2	29.5.1
		00000111_2	PIN authentication, see note 2	29.5.1
		00001000_2	End-to-end encrypted message, see notes 2 and 6	-
		00001001_2	Simple immediate text messaging, see note 2	29.5.2
		00001010_2 to 00111111_2	Reserved for future standard definition, see note 2	29.5.1
		01000000_2 to 01111111_2	Available for user application definition, see notes 2 and 4	29.5.1
		10000000_2 to 10000001_2	Reserved, see note 5	-
		10000010_2	Text Messaging, see note 5	29.5.3
		10000011_2	GPS, see note 5	29.5.6
		10000100_2	Wireless Datagram Protocol WAP, see note 5	29.5.8
		10000101_2	Wireless Control Message Protocol WCMP, see note 5	29.5.8
		10000110_2	M-DMO (Managed DMO), refer to EN 300 396-10 [28], note 5	29.5.1
		10000111_2	Reserved for future standard definition, note 5	
		10001000_2	End-to-end encrypted message, see notes 5 and 6	-
		10001001_2	Immediate text messaging, see note 5	29.5.3
		10001010_2 to 10111111_2	Reserved for future standard definition, see note 5	-
		11000000_2 to 11111111_2	Available for user application definition, see notes 4 and 5	-

NOTE 1: This protocol identifier value should not be used as it is not allocated for a pre-defined application.
NOTE 2: The SDS-TL data transfer service shall not be used for these protocol identifiers, refer to 29.4.1.
NOTE 3: In the EN 300 392-7 [19] clause 7.6 the protocol identifier is identified as "SDS type 4 header".
NOTE 4: The assignment of these protocol identifiers will be co-ordinated in order to prevent clashes, refer to annex J.
NOTE 5: The SDS-TL data transfer service shall be used for these protocol identifiers.
NOTE 6: Refer to TETRA MoU SFPG recommendation 07 for information.

8.5.105 Protocol identifier kind

This protocol identifier kind information element shall be used by the MS to request an SDTSL profile kind as defined in table 220.

Table 220: PI kind information element contents

Information element	Length	Value	Remark
Protocol identifier kind	1	0	For all protocol identifiers
		1	For protocol identifiers according to protocol identifier

8.5.106 Reject cause

The reject cause information element shall indicate what type of rejection has been detected as defined in table 221.

Table 221: Reject cause information element contents

Information element	Length	$Value_2$	Remark
Reject Cause	5	00000	Reserved
		00001	ITSI unknown
		00010	Illegal MS
		00011	Location Area not allowed
		00100	Location Area unknown
		00101	Network failure
		00110	Congestion
		00111	Service not supported
		01000	Service not subscribed
		01001	Mandatory element error
		01010	Message consistency error
		01011	Roaming not supported
		01100	Migration not supported
		01101	No cipher KSG
		01110	Identified cipher KSG not supported
		01111	Requested cipher key type not available
		10000	Identified cipher key not available
		10001	Incompatible service
		10010	Reserved
		…etc.	…etc.
		11111	Reserved

8.5.107 Registration status

The registration status information element shall indicate the success/failure of the most recent registration attempt as defined in table 222.

Table 222: Registration status information element contents

Information element	Length	Value	Remark
Registration status	1	0	Success
		1	Failure

8.5.108 Registration type

The registration type information element shall indicate the registration type of the registration request as defined in table 223.

Table 223: Registration type information element contents

Information element	Length	Value	Remark
Registration type	2	0	No new ITSI - periodic registration
		1	No new ITSI - forward registration
		2	New ITSI

8.5.109 Report reason

The transaction reason information element shall indicate what is the reason for the abnormal event report as defined in table 224.

Table 224: Report reason information element contents

Information element	Length	$Value_2$	Remark
Report reason	7	0000000	Success
		0000001	Unrecognized PDU
		0000010	Facility or addressing not supported
		0000011	Protocol state mismatch detected
		0000100	Illegal PDU structure
		0000101	Illegal value of an information element
		0000110	PEI DLL failure
		0000111	Reserved
		...etc.	...etc.
		0111111	Reserved
		1000000	Proprietary
		...etc.	...etc.
		1111111	Proprietary

8.5.110 Request to transmit/send data

The request to transmit/send data information element shall inform the infrastructure about immediate request to transmit or data transmission at through-connection as defined in table 225.

Table 225: Request to transmit/send data information element contents

Information element	Length	Value	Remark
Request to transmit/send data	1	0	Request to transmit/send data
		1	Request that other MS/LS may transmit/send data

8.5.111 Reset call time-out timer (T310)

The reset call time-out timer information element shall reset and start the overall call length timer T310 in the MS/LS. The timer shall be started with the current value as defined in table 226.

Table 226: Reset Call time-out timer information element contents

Information element	Length	Value	Remark
Reset call time-out value	1	0	No reset of call time-out timer T310
		1	Reset call time-out timer T310

8.5.112 SDS control

The SDS control information element shall be encoded as defined in table 227.

Table 227: SDS control information element contents

Information Element	Length	Value	Remark
SDS control (SDS 1/2/3/4)	2	0	SDS – MT controlled
		1	SDS – TE controlled
		2	Reserved
		3	SDS - Neither

8.5.113 SDS error

The SDS error information element shall indicate reason for unsuccessful result as defined in table 228.

Table 228: SDS error information element contents

Information element	Length	Value	Remark
SDS error	3	0	Request failed for undefined reason
		1	Request not supported
		2	SDS message not available
		3	Reserved
		…etc.	…etc.
		7	Reserved

8.5.114 SDS full storage action

The SDS full storage action information element shall be encoded as defined in table 229.

Table 229: SDS full storage action information element contents

Information element	Length	Value	Remark
SDS full storage action	2	0	Re-write the first old record
		1	Re-write the last record
		2	Reject message
		3	Reserved

8.5.115 SDS message stack storage

The SDS message stack storage information element shall be encoded as defined in table 230.

Table 230: SDS message stack storage information element contents

Information element	Length	Value	Remark
SDS message stack storage	2	0	Downlink message storage in message stack
		1	Uplink message storage in message stack
		2	Uplink and Downlink message storage in message stack
		3	Reserved

8.5.116 SDS message status

The SDS message status information element shall indicate status of the SDS message in the MT2 SDS message stack as defined in table 231.

Table 231: SDS message status information element contents

Information element	Length	$Value_2$	Remark
SDS message status	3	000	Record not used
		001	Message received by application; message read
		010	RFU
		011	Message received by application; message to be read
		100	RFU
		101	Application originates a message; message sent to network;
		111	Application originates a message; message to be sent to network

8.5.117 SDS mode services

The SDS mode services information element shall list the SDS mode capabilities of the MT2, as defined in table 232.

Table 232: SDS mode services information element contents

Information Element	Length	$Value_2$	Remark
Status	1	0	Not capable
		1	Capable
SDS Type 1	1	0	Not capable
		1	Capable
SDS Type 2	1	0	Not capable
		1	Capable
SDS Type 3	1	0	Not capable
		1	Capable
SDS Type 4	2	00	Not capable
		01	Capable with SDS4 direct only
		10	Capable with TL and direct also
		11	Reserved
SDS message stack in MT2	1	0	Not capable
		1	Capable
Reserved	1	0	Reserved
MT2 Default Gateway address	24		Conditional on one of the SDS capability

8.5.117ASDS notification

The SDS notification element shall indicate the status of the stack when receiving new SDS message as defined in table 232A.

Table 232A: SDS notification element contents

Information element	Length	Value	Remark
SDS notification	1	0	Message stack available
		1	Message stack full

8.5.118 SDS profile type

The SDS profile type information element shall indicate the type of the SDS 1/2/3/status service profile requested/indicated, as defined in table 233.

Table 233: SDS profile type information element contents

Information Element	Length	Value	Remark
SDS profile type	8	0	Service profile for SDS 1
		1	Service profile for SDS 2
		2	Service profile for SDS 3
		3	Service profile for SDS status

8.5.119 SDS reference type

The SDS reference type information element shall be defined in table 234.

Table 234: SDS reference type information element contents

Information element	Length	Value	Remark
SDS reference type	2	0	Message reference handle + message reference
		1	Message reference
		2	User application reference
		3	Reserved

8.5.120 SDS stack message handling

The SDS stack message handling information element shall be encoded as defined in table 235.

Table 235: SDS stack message handling information element contents

Information element	Length	Value	Type	C/O/M	Remark
Stack usage	1	any	1	M	See note 1
SDS message stack storage	2	any		C	See notes 1 and 2
SDS full storage action	2	any		C	See notes 1 and 2
SDS validity period	5	any		C	See notes 1 and 2
NOTE 1: Relevant only when MT has a stack capability (see SDS mode services). NOTE 2: Shall be conditional on the value of the "Stack usage" (SU): - SU = 1: SDS message stack storage + SDS Full Storage action + SDS validity period; - SU = 0: Shall not be present.					

8.5.121 SDS status profile

The SDS status profile information element shall be encoded as defined in table 236.

Table 236: SDS status profile information element contents

Information element	Length	Type	C/O/M	Value	Remark
SDS stack message handling					According to the definition
User status control, note	1	1	M	0	User status - MT controlled
				1	User status - TE controlled
Default status control, note	1	1	M	0	Other status - MT controlled
				1	Other status - TE controlled
NOTE: User Status is defined as Status with values: 8000-EFFF. For other status values, no additional profile is required: - Status Ack (defined as FE00-FE0F) – both applications will receive; - SDS-TL short reporting (defined as 7B00-7FFF) – according to SDS-TL profile; - Emergency alarm- both applications can send the message; - Call back request (defined as FEFF or FEFC) – according to the Call control profile; - Other – as defined in default status control.					

8.5.122 SDS type

The SDS type information element shall indicate type of the SDS message in the MT2 SDS message stack as defined in table 237.

Table 237: SDS type information element contents

Information element	Length	Value	Remark
SDS type	3	0	SDS type 1
		1	SDS type 2
		2	SDS type 3
		3	SDS status
		4	SDS type 4
		5	Reserved
		6	Reserved
		7	Reserved

8.5.123 SDS user data 1 profile

The SDS user data 1 profile information element shall define operation of the TNP1 Relay for SDS type 1 messages as defined in table 238.

Table 238: SDS user data 1 profile information element contents

Information element	Length	Value	Remark
SDS control	2	any	
SDS stack message handling			

8.5.124 SDS user data 2 profile

The SDS user data 2 profile information element shall define operation of the TNP1 Relay for SDS type 2 messages. The format shall be as in SDS user data profile 1.

8.5.125 SDS user data 3 Profile

The SDS user data 3 profile information element shall define operation of the TNP1 Relay for SDS type 3 messages. The format shall be as in SDS user data profile 1.

8.5.126 SDS user data 4 Profile

The SDS user data 4 profile information element shall define operation of the TNP1 Relay for SDS type 4 messages of a certain SDS type 4 protocol. The SDS user data 4 profile information element shall define operation of the TNP1 Relay for SDS type 4 messages. The format shall be as in SDS user data profile 1.

8.5.127 SDS-TL service capability

The SDS service capability information element shall list the SDS-TL capability of the MT2 as defined in table 239.

Table 239: SDS-TL service capability information element contents

Information Element	Length	Value	
SDS-TL service capability	1	0	Not capable
		1	Capable

8.5.128 SDS-TL service centre address type

The SDS service centre address type information element shall list the SDS-TL capability of the MT2 as defined in table 240.

Table 240: SDS-TL service centre address type information element contents

Information element	Length	Value	Remark
SDS-TL service centre address type	3	0	Short Number Address (SNA)
		1	Short Subscriber Identity (SSI)
		2	Tetra Subscriber Identity (TSI = MNI+SSI)
		3	SSI+ESN

8.5.129 SDS-TL service centre capability

The SDS-TL service centre capability information element shall list the service centre capability of the MT2 as defined in table 241.

Table 241: SDS-TL service centre capability information element contents

Information Element	Length	Value	Remark
SDS-TL service centre capability	1	0	Not capable
		1	Capable

8.5.130 SDS-TL service centre default address

The SDS-TL service default address information element shall indicate the service centre default address as defined in table 242.

Table 242: SDS-TL service centre default address information element contents

Information element	Length	Value	Type	C/O/M	Remark
SDS-TL service centre address type	3	any	1	M	
Short number address (SNA)	8	any			See note
SSI	24				See note
Extension	24				See note
External subscriber number					See note
NOTE: Shall be conditional on the service centre address type.					

8.5.131 SDS transfer result

The SDS transfer result information element shall inform the TE2 user application about the success of the SDS transmittal as defined in table 243.

Table 243: SDS transfer result information element contents

Information element	$Length_2$	$Value_2$	Remark
SDS transfer result	8	00000000	Failed for undefined reason
		00000001	Success
		00000010	Requested service not supported
		00000011	Reserved
		…etc.	…etc.
		11111111	Reserved

8.5.132 Security

The security information element shall indicate the security capabilities of MT2 as defined in table 244.

Table 244: Security information element contents

Information element	Length	Value	Type	C/O/M	Remark
Security class of MS	2	any	1	M	
End to end encryption flag	1	any	1	M	

8.5.133 Security class of MS

The security class information element shall indicate the security class of MS as defined in table 245.

Table 245: Security class of MS information element contents

Information element	Length	Value	Remark
Security class of MS	2	0	Security class 1
		1	Security class 2
		2	Security class 3
		3	Reserved

8.5.134 Security information

The information element security information shall indicate the security information included in the extended services broadcast information, as defined in table 246.

Table 246: Security information element contents

Information sub-element	Length	Type	C/O/M	Value	Remark
Authentication	1	1	M	0	Authentication not required in this cell
				1	Authentication required in this cell
Security class 1	1	1	M	0	Security class 1 MS not supported on this cell
				1	Security class 1 MS supported on this cell
Security class 2 or 3	1	1	M	0	Security class 2 MS supported on this cell
				1	Security class 3 MS supported on this cell
SCKN (note 1)	5		C	any	
DCK retrieval during initial cell selection (note 2)	1		C	0	Service not supported
				1	Service supported
DCK retrieval during cell re-selection (note 2)	1		C	0	Service not supported
				1	Service supported
GCK supported Note 2	1		C	0	Service not supported
				1	Service supported
NOTE 1: Shall be conditional on the value of "security class 2 or 3" (sc23): - SC23= 0; SCKN; - SC23=1. NOTE 2: Shall be conditional on the value of "security class 2 or 3" (sc23): - SC23=1; DCK retrieval during initial cell selection + DCK retrieval during cell re-selection + GCK supported; - SC23=0.					

8.5.135 Service profile operation

The service profile operation information element shall specify the operation performed on the TNP1 Relay service profile as defined in table 247.

Table 247: Service profile operation information element contents

Information element	Length	Value	Remark
Service profile operation	2	0	Get service profile
		1	Set service profile
		2	Reserved
		3	Reserved

8.5.136 Service profile request result

The service profile request result information element shall specify if the set request was successful or not as defined in table 248.

Table 248: Service Profile request result information element contents

Information element	Length	Value	Remark
Service profile request result	2	0	Unsuccessful
		1	Success
		2	Not applicable
		3	Unsupported feature

8.5.137 Service selection

The service selection information element shall indicate which of the service selection is indicated as defined in table 249.

Table 249: Service selection information element contents

Information element	Length	Value	Remark
Service selection	1	0	Individual service
		1	Group or individual service

8.5.138 Service status

The service status information element shall indicate which of the service status is indicated as defined in table 250.

Table 250: Service status information element contents

Information element	Length	Value	Remark
Service status	2	0	In service
		1	In service waiting for registration
		2	Out of service
		3	Reserved

8.5.139 Set profile request

The set profile request information element shall indicate which one of the set operation for the profile set request PDU is requested as defined in table 251.

Table 251: Set profile request information element contents

Information element	Length	Value	Remark
Set operation profile request	8	0	Set current service profile
		1	Set current service profile and store as user defined Service profile
		2	Restore user defined service profile (to the current service profile)
		3	Restore default service profile (to the current service profile)
		4	Reserved
		…etc.	…etc.
		255	Reserved

8.5.140 Short data type identifier

The short data type identifier information element shall identify the length of the user-defined data sent to or received from the SwMI as defined in table 252.

Table 252: Short DATA TYPE IDENTIFIER information element contents

Information element	Length	Value	Remark
Short data type identifier	2	0	User defined data 1 element is 16 bits long
		1	User defined data 2 element is 32 bits long
		2	User defined data 3 element is 64 bits long
		3	Reserved

8.5.141 Short form report

The short form report information element shall indicate request for short report as defined in table 253.

Table 253: Short form report information element contents

Information element	Length	Value	Remark
Short form report	1	0	Short form report recommended during the validity period of the message
		1	Only standard report allowed

8.5.142 Simplex/duplex selection

The simplex/duplex selection information element shall inform the infrastructure the preferred mode of operation as defined in table 254.

Table 254: Simplex/duplex selection information element contents

Information element	Length	Value	Remark
Simplex/duplex selection	1	0	Simplex requested
		1	Duplex requested

8.5.143 Software version

The software version information element shall inform the TE2 user application about the MT2 software version as defined in table 255. The total number of characters, including line terminators, shall not exceed 128 characters.

Table 255: Software version information element contents

Information element	$Length_2$	Value	Remark
Software version	n x 8		8 bits for each ASCII alphabet character

8.5.144 Speaker on off

The speaker on off information element shall be as defined in table 256.

Table 256: Speaker on off information element contents

Information element	Length	Value	Remark
Speaker on off	1	0	Speaker Off
		1	Speaker On

8.5.145 SS PDU type

The SS PDU type information element is a mandatory information element and shall be the next element after SS type in every SS PDU. The information element encoding shall be as defined in EN 300 392-9 [15] clause 8.2.

8.5.146 SS type

The SS type information element shall specify the SS in question. The information element encoding shall be as defined in EN 300 392-9 [15] clause 8.1 for the SS type information element.

8.5.147 SSI

The SSI information element shall indicate the ASSI or (V) ASSI that the MS shall use in subsequent contacts with the SwMI as defined in table 257.

Table 257: Short Subscriber Identifier information element contents

Information element	Length	Value	Remark
Short Subscriber Identity (SSI)	24		See EN 300 392-1 [1], clause 7

8.5.148 Stack usage

The stack usage information element shall give information indicating if the stack is used as defined in table 258.

Table 258: stack usage information element contents

Information element	Length	Value	Remark
Stack usage	1	0	The messages are not stored in the stack
		1	The messages are stored in the stack

8.5.149 Status number

The status number information element shall define general-purpose status messages known to all TETRA systems as defined in EN 300 392-2 [2] and repeated in table 259.

Table 259: Status number information element contents

Information element	Length	Value	Remark
Status number	16	0	Emergency
		1	Reserved
		...etc.	...etc.
		$31\ 743_{10}$	Reserved
		$31\ 744_{10}$	Refer to SDS-TL in clause 29 of EN 300 392-2 [2]
		…etc.	…etc.
		$32\ 767_{10}$	Refer to SDS-TL in clause 29 "of EN 300 392-2 [2]
		$32\ 768_{10}$	Available for TETRA network and user specific definitions
		...etc.	...etc.
		$65\ 535_{10}$	Available for TETRA network and user specific definitions

8.5.150 Storage

The storage information element shall indicate if the SwMI is allowed to store the message as defined in table 260.

Table 260: Storage information element contents

Information element	Length	Value	Remark
Storage	1	0	Storage not allowed
		1	Storage allowed

8.5.151 Store and forward PDU capability

The Store and forward capability information element shall give information on what PDUs store and forward are used as defined in table 261.

Table 261: Store and forward PDU capability information element content

Information element	Length	Value	Remark
Store and forward PDU capability	2	0	None
		1	Transfer
		2	Transfer Report
		3	Transfer Report Ack

8.5.152 Terminal Equipment Identity (TEI)

TEI information element shall contain the TEI value of the MT2 as defined in EN 300 392-1 [1] clause 7.5 and repeated in table 262.

Table 262: TEI information element contents

Information element	Length	Value	Remark
Type Approval Code (TAC)	24		8 characters (see note)
Final Assembly Code (FAC)	8		3 characters (see note)
Electronic Serial Number (ESN)	24		8 characters (see note)
Spare (SPR)	4		Reserved
NOTE: Each information element is a binary number and its values shall be presented as printable ASCII characters from "0" to "9", most significant digit placed first.			

8.5.153 Traffic stealing

The traffic stealing information element shall inform the MS/LS about preferred stealing policy as defined in table 263.

Table 263: Traffic stealing information element contents

Information element	$Length_2$	Value	Remark
Traffic Stealing	1	0	Do not steal traffic
		1	Steal traffic

8.5.154 TNP1 protocol version

The TNP1 protocol version information element shall inform the TE2 user application about the MT2 TNP1 protocol version as defined in table 264. The TNP1 protocol version shall contain the version of the present document.

The format of the TNP1 protocol version shall be according to the following rule: V1.2.1CRxxx where the V1.2.1 represents the version of the present document and the CRxxx represents the change request. The detail how change request number is allocated is outside the scope of the present document.

Table 264: Protocol version information element contents

Information element	Length	Value	Remark
TNP1 protocol version	n*8		8 bits for each ASCII alphabet character

8.5.155 TNP1 release

The TNP1 release information element is devoted for free text manufacture dependent, as defined in table 265. The length of the TNP1 release information element is outside the scope of the present document.

Table 265: TNP1 release information element contents

Information element	Length	Value	Remark
TNP1 release	N*8		8 bits for each ASCII alphabet character

8.5.156 Transmission condition

The transmission condition information element shall inform the MS/LS about requested transmission condition as defined in table 266.

Table 266: Transmission condition information element contents

Information element	Length	Value	Remark
Transmission condition	1	0	Request to transmit
		1	Transmission ceased

8.5.157 Transmission grant

The transmission grant information element shall inform the MS/LS about permission to transmit as defined in table 267.

Table 267: Transmission grant information element contents

Information element	Length	Value	Remark
Transmission grant	2	0	Transmission granted
		1	Transmission not granted
		2	Transmission request queued
		3	Transmission granted to another user

8.5.158 Transmission request permission

The transmission request permission information element shall inform the MS/LS if it is allowed to request for transmit permission as defined in table 268.

Table 268: Transmission request permission information element contents

Information element	Length	Value	Remark
Transmission request permission	1	0	Allowed to request for transmission
		1	Not allowed to request for transmission

8.5.159 Transmission status

The transmission status information element shall be encoded as defined in table 269.

Table 269: Transmission status information element content

Information element	Length	$Value_2$	Remark
Transmission status	3	000	Transmission ceased
		001	Transmission granted
		010	Transmission not granted
		011	Transmission request queued
		100	Transmission granted to another user
		101	Transmission interrupt
		110	Transmission wait
		111	Transmission request failed

8.5.160 Transmitting party extension

The transmitting party extension information element shall indicate the extended part of the TSI address of the transmitting user as defined in table 270.

Table 270: Transmitting party extension information element contents

Information element	Length	Value	Remark
Country Code	10	any	See EN 300 392-1 [1] clause 7
Network Code	14	any	See EN 300 392-1 [1] clause 7

8.5.161 Transmitting party Short Subscriber Identity (SSI)

The transmitting party Short Subscriber Identity information element shall indicate the Short Subscriber Identity (SSI) address of the transmitting user as defined in table 271.

Table 271: Transmitting party Short Subscriber Identity information element contents

Information element	Length	Value	Remark
Short subscriber identity	24		See EN 300 392-1 [1] clause 7

8.5.162 Transmitting party type identifier

The transmitting party type identifier information element coding shall indicate the type of address, which shall follow in the PDU as defined in table 272.

Table 272: Transmitting party type identifier information element contents

Information element	Length	Value	Remark
Transmitting party type identifier	2	0	Reserved
		1	Short Subscriber Identity (SSI)
		2	Tetra Subscriber Identity (TSI)
		3	Reserved

8.5.163 TX demand priority

The TX demand priority information element shall inform the SwMI about the importance of a TX-Demand as defined in table 273.

Table 273: TX demand priority information element contents

Information element	Length	Value	Remark
TX demand priority	2	0	Low Priority level
		1	High Priority level
		2	Pre-emptive Priority level
		3	Emergency Pre-emptive Priority level

8.5.164 Type 3 CMCE element identifier

The Type 3 CMCE element identifier information element shall indicate the type of the following Type 3 element in the circuit mode and short data PDUs as defined in table 274.

Table 274: Type 3 CMCE element identifier information element contents

Information element	Length	$Value_2$	Remark
Type 3 CMCE element identifier	4	0000	Reserved
		0001	DTMF
		0010	External Subscriber number
		0011	Facility
		0100	Poll Response Addresses
		0101	Proprietary
		0110	Reserved for future Type 3 CMCE element
		...etc	...etc.
		1111	Reserved for future Type 3 CMCE element

8.5.165 Type 3 MM element identifier

The Type 3 MM element identifier information element shall indicate the type of the following Type 3 element in the mobility management PDUs as defined in table 275.

Table 275: Type 3 MM element identifier information element contents

Information element	Length	$Value_2$	Remark
Type 3 MM element identifier	4	0000	Reserved
		0001	Group identity location demand Ack
		0010	New registered area
		0011	Group identity location demand
		0100	Proprietary
		0101	Group identity location accept
		0110	Security
		0111	Group identity downlink
		1000	Group identity uplink
		1001	Reserved for future Type 3 MM element
		…etc.	…etc.
		1111	Reserved for future Type 3 MM element

8.5.166 Type 3 MTA element identifier

The Type 3 MTA element identifier information element shall indicate the type of the following Type 3 element in the MT application PDUs as defined in table 276.

Table 276: Type 3 MTA element identifier information element contents

Information element	Length	$Value_2$	Remark
Type 3 MTA element identifier	4	0000	Reserved
		0001	Manufacturer Identifier
		0010	Model
		0011	Software Version
		0100	Hardware Version
		0101	Product Serial No
		0110	ISO Global Object ID
		0111	TNP1 Protocol Version
		1000	TNP1 Release
		1001	Proprietary
		1010	Reserved for future Type 3 MTA element
		...etc.	...etc.
		1111	Reserved for future Type 3 MTA element

8.5.167 Type 3 SS element identifier

The Type 3 SS element identifier information element shall indicate the type of the following Type 3 element in the Supplementary services PDUs as defined in table 277.

Table 277: Type 3 SS element identifier information element contents

Information element	Length	$Value_2$	Remark
Type 3 SS element identifier	4	0000	Reserved
		0001	SS PDU type
		0010	SS facility parameters
		0011	Proprietary
		0100	Reserved for future Type 3 SS element
		...etc.	...etc.
		1111	Reserved for future Type 3 SS element

8.5.168 User application reference

The User application reference information element shall be used in local SDS and SDS-TL report indication as defined in table 278.

Table 278: User Application Reference element identifier information element contents

Information element	Length	Value	Remark
User application reference	8		

8.5.169 User data

The user data information element shall contain the application data as defined in table 279.

Table 279: User data information element contents

Information element	$Length_2$	$Length_8$	Type	C/O/M	Remark
Length indicator	11	2	1	M	
Application user data	varies		1	C	See notes 1 and 2
NOTE 1: The length of this information element in bits shall be as defined by the Length indicator information element. NOTE 2: All bits are available for the user application.					

8.5.170 User defined data-1

The user defined data-1 information element shall enable the user applications to determine their own interpretation of the SDS message as defined in table 280.

Table 280: User defined data-1 information element contents

Information element	Length	Value	Remark
User defined data-1	16	$0 - (2^{16}-1)$	All values available for the user application

8.5.171 User defined data-2

The user defined data-2 information element shall enable the user applications to determine their own interpretation of the SDS message as defined in table 281.

Table 281: User defined data-2 information element contents

Information element	Length	Value	Remark
User defined data-2	32	$0 - (2^{32} - 1)$	All values available for the user application

8.5.172 User defined data-3

The user defined data-3 information element shall enable the user applications to determine their own interpretation of the SDS message as defined in table 282.

Table 282: User defined data-3 information element contents

Information element	Length	Value	Remark
User defined data-3	64	$0 - (2^{64} - 1)$	All values available for the user application

8.5.173 (Void)

Table 283: (Void)

8.5.174 Visitor Group Short Subscriber Identity (V)GSSI

The (V)GSSI information element shall indicate that the MS shall use in subsequent contacts with the SwMI as defined in table 284.

Table 284: Visitor Group Short Subscriber Identity information element contents

Information element	Length	Value	Remark
Visitor Group Short Subscriber Identity	24		See EN 300 392-1 [1]

8.5.175 Validity period

The validity period information element is defined in table 285.

Table 285: Validity period information element contents

Information element	Length	Value	Remark
Validity period (VP)	6	0	No validity period, see note 1
		1 to 6	VP x 10 seconds, see note 2
		7 to 10	(VP - 5) x 1 minute, see note 3
		11 to 16	(VP - 10) x 10 minutes, see note 4
		17 to 21	(VP - 15) x 1 hour, see note 5
		22 to 24	(VP - 20) x 6 hour, see note 6
		25 to 30	(VP - 24) x 2 day, see note 7
		31	Infinite validity period, see note 8
		32	The MT2 default Validity period shall be used
NOTE 1: In this case, the SwMI should attempt to deliver the message. If unsuccessful, the message is dropped. NOTE 2: 10 s intervals up to 60 s. NOTE 3: 1 minute intervals up to 5 minutes. NOTE 4: 10 minute intervals up to 1 h. NOTE 5: 1 h intervals up to 6 h. NOTE 6: 6 h intervals up to 24 h. NOTE 7: 2 day intervals up to 12 days. NOTE 8: In this case, the SwMI should attempt to deliver the message until expiry of a network dependant maximum time.			

8.5.176 Volume level

The Volume level information element is defined in table 286.

Table 286: Volume level information element contents

Information element	Length	Value	Remark
Volume level	6	0	Minimum
		1 to 64	Volume level setting (64 - maximum)

Annex A (normative): Formatting transparent circuit mode data to MAC PDU

The MAC-TRAFFIC PDU is used for sending U-plane traffic data on the uplink and downlink using TCH/S, TCH/7.2, TCH/4.8 or TCH/2.4, as defined in EN 300 392-2 [2], clause 21.4.6. This PDU has no header and all capacity is devoted to traffic information passed to and from the U-plane. When the MAC is in traffic mode, this PDU type is assumed unless the slot flag indicates the presence of the STCH.

This annex defines the formatting of transparent circuit mode data in the MAC-TRAFFIC PDU. This formatting should be used for all transparent circuit mode data originating from/targeted to TE2 over RT and applications internal to MT2. Figure A.1 defines the general formatting to be applied to all TCHs. The Most Significant Bit (MSB) of any octet is placed in the MAC TRAFFIC PDU bit with the smallest ordinal number. Values for total number of octets (N) and total number of bits (B) per a MAC TRAFFIC PDU are defined in table A.1 for different TCHs.

Octet	1	2	...etc.	N
MAC block bit	1 ... 8	9 ... 16	...etc.	(B - 8) ... B

Figure A.1: Octet and bit alignment in MAC TRAFFIC PDU

Table A.1: Capacity of a single MAC TRAFFIC PDU at different logical channels

Logical channel	Number of data bits (B)	Octets/timeslot (N)
TCH/7,2	432	54
TCH/4,8	288	36
TCH/2,4	144	18

The 8-bit (octet) formatting defined in this annex should be used as basic formatting to transfer transparent mode data of any character length. For other character lengths than 8-bit, a mapping to this basic formatting should be defined at application level.

NOTE: This mechanism removes all redundant information from the serial line lower layer character format and no information about possible parity bit or number of stop bits will be transferred over the AI. As a result e.g. 4 800 bit/s second low protected data rate is equivalent to 6 600 bit/s, when the serial line interface applies start bit, eight information bits, parity bit and one stop bit.

For half MAC blocks, the same octet and bit ordering and alignment should apply.

Annex B (informative): DMO Considerations

This annexe is a reminder of the need for DMO to be included in a later edition of the present document. Both AT and TNP1 will need commands for DMO.

The context diagram will need updating to include DMO.

Features that will affect the DMO commands are:

- Select DMO or TMO mode. The mode command should differentiate TMO, DMO, dual watch, repeater and gateway modes. The profile, capability and service definition commands would then apply to the selected mode.
- The addressing during DMO mode may be different due to the repeater and gateway identities. This may need a change of the call set up commands or a new command to set the repeater or gateway address.
- An additional command to indicate DM channel state (available, occupied, reserved) and "in repeater range".
- The selection of DMO RF carrier and colour code. The reverse direction - to get the information on what channels and colour codes are available. The colour codes could be related to the MNI.
- There is no MM information in DMO.
- There are additional values for call set up and clear down elements, conversely some TMO reasons are not applicable.
- There are no full duplex calls in DMO.
- There is no packet data in DMO.
- There is no multi slot data in DMO.
- There are only four levels of priority in DMO (15 in TMO).
- DMO has acknowledged SDS transfer.

Annex C (informative): Supplementary Services Considerations

This annex is a place marker for future editions. When the air interface supplementary services become stable the PEI will have to cater for transfer of this information to and from the TE. The vehicle for supplementary services will be the SS facility elements. The coding of air interface SS facility elements will involve packing the air interface element bits into octets for use on the PEI.

Annex D (informative): Supported functionality and PPP options

At the initial publication date of the present standard, the following functionality and PPP options are supported in some MT2s on the market:

- Single PDP context;
- Context activation and context deactivation;
- Datagram relay from TE to SwMI and from SwMI to TE;
- IP static and dynamic addressing;
- IP user authentication;
- Header compression.

The following functionality may not available at present:

- Multiple PDP contexts;
- IP broadcast and multicast;
- Data compression;
- Mobile IPv4;
- IPv6 addressing.

Annex E (informative): Bibliography

- TIA/EIA/IS-135 (1995): "800 MHz Cellular Systems - TDMA Services - Async Data and Fax".
- PCCA STD-101: "Data Transmission Systems and Equipment - Serial Asynchronous Automatic Dialling and Control for Character Mode DCE on Wireless Data Services". http://www.opengroup.org/cannes2002/proceedings/plenary-wednesday/sturniolo/img4.html.

Annex F (informative): Change requests

The present document contains change resquests as described in table F.1.

Table F.1: Change requests

No	CR vers.	Standard Version	TS	EN	Clauses affected	Title
001	APP	V1.1.1	X	X	8.4.7.4	TNP1: remove 'Short form report' element from TESDS-TL-REPORT REQ
002	APP	V1.1.1	X	X	8.5.71, 8.5.169	TNP1: add 'Length indicator' to the variable length SDS-TL User data
003	APP	V1.1.1	X	X	8.4.5.2	TNP1 SDSTL capability
004	APP	V1.1.1	X	X	8.5.92	TNP1 Missing PDUs IDs
005	APP	V1.1.1	X	X	8.4.5.13.6, 8.5.69	TNP1 SDS message status
006	APP	V1.1.1	X	X	8.5.117A	TNP1 SDS message stack notification
007	APP	V1.1.1	X	X	8.4.5.17	TNP1 Bit Error Ratio & Field strength
008	APP	V1.1.1	X	X	8.3.1	TNP1 PDUs structure
009	APP	V1.1.1	X	X	6.17.19	PEI error codes vs. GSM error codes
010	APP	V1.1.1	X	X	8.5.112, 8.5.123	TNP1: add 'Neither' to 'SDS control'
011	APP	V1.1.1	X	X	8.4.4.15A, 8.4.5.11, 8.4.5.13.5, 8.5.92	TNP1: Fields changes in several PDUs
012	APP	V1.1.1	X	X	8.4.6.4, 8.4.6.5, 8.4.6.6, 8.4.7.1, 8.4.7.3, 8.4.7.5, 8.4.7.8	TNP1: C/O/M fields changed in several SDS and SDS-TL PDUs
013	APP	V1.1.1	X	X	8.4.5.1, 8.5.8, 7.4.8	TNP1: Battery charge optional
014	APP	V1.1.1	X	X	8.4.6.4, 8.4.6.5, 8.4.6.6, 8.4.7.1, 8.4.7.2, 8.4.7.3, 8.4.7.4, 8.4.7.6, 8.4.7.6, 8.4.7.8, 8.4.7.9	TNP1: ESN mandatory
015	10	V1.1.1	X	X	8.3.1	TNP1: Wrong references
016	10	V1.1.1	X	X	8.3.1, 8.3.2, 8.3.3	TNP1: PDU encoding rules
017	11	V1.1.1	X	X	8.4.2.9	PDU encoding rule in 8.4.2.9 TECC-NOTIFY IND
018	10	V1.1.1	X	X	4.10.1	TNP1: Port numbers allocated by IANA
019	01	V1.1.1	X	X	8.5.8, 8.5.9, 8.5.12, 8.5.13, 8.5.15, 8.5.16, 8.5.18, 8.5.19, 8.5.22, 8.5.33, 8.5.49, 8.5.50, 8.5.51, 8.5.62, 8.5.63, 8.5.71, 8.5.77, 8.5.79, 8.5.81, 8.5.86, 8.5.95, 8.5.104, 8.5.113, 8.5.114, 8.3.115, 8.5.122, 8.5.131, 8.5.133, 8.5.135, 8.5.138, 8.5.139, 8.5.147, 8.5.160, 8.5.161, 8.5.174	Editorial completion of some table on the (missing) reserved values

History

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V1.2.1	July 2003	One-step Approval Procedure OAP 20031121: 2003-07-23 to 2003-11-21