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Foreword

This document is the Publicly Available Specification (PAS) of the TETRAPOL land mobile radio system, which shall provide digital narrow band voice, messaging, and data services. Its main objective is to provide specifications dedicated to the more demanding PMR segment: the public safety. These specifications are also applicable to most PMR networks.

This PAS is a multipart document which consists of:

Part 1	General Network Design
Part 2	Radio Air interface
Part 3	Air Interface Protocol
Part 4	Gateway to X.400 MTA
Part 5	Interface to dispatch centre
Part 6	Line Connected Terminal interface
Part 7	Codec
Part 8	Radio conformance tests
Part 9	Air interface protocol conformance tests
Part 10	Inter System Interface
Part 11	Gateway to PABX, ISDN, PDN
Part 12	Network Management Centre interface
Part 13	User Data Terminal to System Terminal interface
Part 14	System Simulator
Part 15	Gateway to External Data Terminal
Part 16	Security
TTR	Guide TETRAPOL features
Part 18	Base station to Radioswitch interface
Part 19	**Stand Alone Dispatch Position interface**

1. Scope

The terminal control interface between a System Terminal (ST) and a Terminal Control Equipment (TCE) shall enable the TCE to remotely control voice communications and status services through the ST.

The terminal control interface shall support an applicative protocol, STCP, that provides for:

- speech and encryption control;
- remote control of the system terminal in network connected mode;
- remote control of the system terminal in direct mode;
- status services;
- call advertising services;
- system monitoring;
- interface maintenance.

This document is divided into two clauses. The first one describes the messages of the applicative protocol, STCP, between the ST and TCE; the second one highlights the service protocol procedures

2. Normative references

This PAS incorporates by dated and undated reference, provisions from other publications. These normative references are cited at the appropriate places in the text and the publications are listed hereafter.

[1] PAS 0001-1-1: "TETRAPOL Specifications; General Network Design; Reference Model".

[2] PAS 0001-3: "TETRAPOL Specifications; Air Interface Protocol".

[3] PAS 0001-19-1: "TETRAPOL Specifications; Stand Alone Dispatch Position Interface".

[4] TTR 0001-1-2: "TETRAPOL Technical Report; Guide to TETRAPOL features; Reference and Terminology".

3. Definitions, symbols and abbreviations

3.1. Definitions

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

Coverage: Set of cells in the system.

CCH Monitoring: This function consists for the ST in transmitting to the TCE all-terminals-concerned broadcast informations on the signalling channel. The following PDUs are concerned by CCH monitoring mode :

- ST_EMERGENCY_NOTIFICATION
- ST_CELL_ACTIVATION_IND
- ST_MOCH_PER_ST
- ST_ECH_PER_ST
- ST_COV_PER_CELL
- ST_CRISIS_NOTIFICATION
- ST_BROADCAST_CALL_NOTIFICATION
- ST_STATUS_IND

All ST are not able to work in this mode : it is an ability given at code generation. The efficient use of a ST for CCH monitoring (cf PDU TCE_INIT_ST and TCE_CONFIG_ST) implies that this ability has been given to it at code generation. In this case, the ST can look over CCH, even during an use in a communication (ST on TCH). The correct use of CCH monitoring on ST to which this ability has not been given at code generation implies that the ST does not use TCH, that is to say, it is not used for communications.

Dispatch Position (DP): Work position connected to the DPS where the dispatchers operate. Dispatch Positions are Stand Alone Dispatch Positions (SADPs) and Dispatch Positions at the Dispatch Centre.

Incoming call: A call that is originated outside of the local system. A call over ISI is said to be an incoming call for a SwMI when its establishment propagates from the ISI to the SwMI.

Operational Group: An Operational Group (OG) is a group of TETRAPOL users all of whom share a certain right to participate in a Group Communication or to set-up a Multi-site Open Channel.

Outgoing call: A call that is originated from the local system. A call over ISI is said to be an outgoing call for a SwMI when its establishment propagates from the SwMI to the ISI.

System Terminal: Service access reference point provided to the user by the system. System Terminals (STs) are Radio Terminals (RTs), Line Connected Terminals (LCTs). A system terminal address identifies the system terminal within the system and includes a string of BCD-encoded digits, whose first-three digits identify the home base network of the system terminal.

System: The TETRAPOL system is composed of a large area fixed infrastructure (SwMI) called network and of the system terminals allowing user access to the available services.

Switching and Management Infrastructure (SwMI): The SwMI shall be a subsystem of the TETRAPOL network. It includes two subsystems: the Base Station (BS) and the radioswitch network (the radioswitch or RSW may include one or several switches organised or not with several hierarchical levels, as a manufacturer option). The SwMI also includes the Operation and Maintenance Centre (OMC) and the Key Management Centre (KMC). OMC and KMC are outside the scope of the present specification.

Talkgroup (TKG): Group communication involving group members over a geographic coverage.

Terminal Control Equipment (TCE): Equipment connected to a system terminal and that remotely controls voice services through the system terminal.

User Data Terminal (UDT): The User Data Terminal is a data terminal (Terminal Equipment TE) connected to the ST and used to provide data services.

3.2. Symbols

Not applicable.

3.3. Abbreviations

The abbreviations in TTR 0001-1-2: "TETRAPOL Technical Report; Guide to TETRAPOL features; Reference and Terminology".[4] apply, including the following abbreviations:

BN	Base Network of the switching and management infrastructure
BS	Base Station
BSC	Base Station controller
CCH	Control CHannel of the air interface
Codop	COde of OPeration for a message
CONF	CONFirmation message
COV	COVerage of a group communication
DC	Dispatch Centre
DMNM	Direct Mode operation with Network Monitoring
DM	Direct Mode operation
ECH	Emergency Open Channel
ID	IDentifier
IDR	Independant Digital Repeater
IE	Information Element
IND	INDication message
INIT	INITiation
MAXNB	MAXimum NumBer
MOCH	Multi-site Open Channel
MPAP	Mobile PC Asynchronous Protocol
MSW	Main SWitch of a base network
MSG	MeSssaGe
NSIG	Non-SIGnificant
OG	Operational Group
PABX	Private Automatic Branch Exchange
PAS	Publicly Available Specification
PDU	Protocol Data Unit
PMR	Private Mobile Radiocommunications
PRIO	Priority
PTT	Push-To-Talk
RSW	Radio SWitch
SAP	Service Access Point
ST	System Terminal
STCP	System Terminal Control Protocol
SwMI	Switching and Management Infrastructure
TCE	Terminal Control Equipment
TCH	Traffic CHannel of the air interface
TCI	Terminal Control Interface
TI	Speech Transmit Indication in the PTT Service
TPI	Talking Party Identification

4. Message coding requirements

4.1. Coding rules - PDU description

The encoding rules that apply over the interface between ST and TCE require byte-bounded information elements. No data structure alignment shall be used.

The information elements in a transmitted message shall be present in the same sequence order as downwards read in the tables. The information elements that might be not significant shall be transmitted with reserved value.

The information elements which are lists (or arrays) of elements of same type are named by the type followed by square brackets (type[]). The number of elements of the list or array is given in the column « Length », with the following pattern : type length x number_of_elements.

The byte coding order shall be from the least significant byte to the most significant byte (little endians).

The STCP uses service of low level protocol to exchange applicative control information between ST and TCE. The coding requirements for the use of the underlying layer are described by annexe A.

4.2. ST-TCE interface versions compatibility rules

In order to avoid interface compatibility problems, an interface version is exchanged at the STCP connection ; the ST is expected to work even if its interface version and the TCE's one are different.

The ST-TCE interface version described in this document is the interface version 3.

The management rules of compatibility are :

- in case of difference between the exchanged interface versions, the interface version used is the lowest one ; the uppest version extremity is not allowed to undertake services unknown by the lowest version extremity. Nevertheless, it is allowed to send messages whose length is greater than expected (the unknown information elements shall be located at the end of the PDU).

- the extremity, ST or TCE, which receives a message longer than expected shall accept it, but only takes into account the information elements known by it ;

- any unknown message received by an extremity, ST or TCE, shall be ignored by this one ; (this should never occur since the first rule has been taken into account by the uppest interface version extremity).

4.3. Speech and encryption remote control

4.3.1. ST_ACTIVATION_IND

Direction: ST ⇨ TCE

Short description: This PDU shall indicate that the ST is switching between CCH and TCH for an on-going group communication if this one has been selected as the default communication by the ST (see PDU TCE_DEFAULT_CALL_ENTER).

Table 1: ST_ACTIVATION_IND

Information element	Length	Comment
Codop	2	
Call_reference	1	
Info_activation	1	
Application_type	1	
Activation_mode	1	
MOCH/COV_identifier	1	
RSW_identifier	1	
BS_identifier	1	
OG_identifier	2	
Encryption_state	1	
Manual_key_modifier_index	1	
Call_type	1	

Info_activation describes the related activation being performed, i.e. begin, end or fail of activation; a begin of activation consists in switching to the TCH allocated for the on-going communication; an end of activation consists in switching to the CCH while no TCH is needed for the on-going communication. In case of fail Info_activation precises the cause.

Call_type, Application_type and Activation_mode describe the related group communication. Call_type is either MOCH_TYPE, ECH_TYPE or TALKGROUP_TYPE. In particular for broadcast calls it is set to MOCH_TYPE. Application_type is either GROUP_COMMUNICATION_SAP or ECH_SAP. Activation_mode applies to a begin of activation only.

MOCH/COV_identifier, applies to a group communication and is either the MOCH identifier, the broadcast call identifier or the coverage identifier for a talkgroup or a group call. Broadcast calls behave as MOCH. RSW_identifier and BS_identifier apply to an emergency open channel instead of MOCH/COV_identifier and identify the cell where the emergency open channel is active.

OG_identifier indicates the activation OG of the group communication ; it is set to ALL_OG for MOCH, broadcast calls and ECH, and to the OG of the talkgroup for talkgroups.

Encryption state indicate whether clear speech, network encryption or manual encryption applies, and is significant if Info_Activation = ACTIVATION_START Manual_key_modifier_index is significant if manual encryption applies.

Note that ST in CCH monitoring mode receive the same informations a second time, through the PDU ST_CELL_ACTIVATION_IND.

4.3.2. ST_ENCRYPTION_MODE

Direction: ST ⇨ TCE

Short description: This PDU shall indicate a modification of the encryption state of the on-going communication. This message is sent during the communication.

Table 2: ST_ENCRYPTION_MODE

Information element	Length	Comment
Codop	2	
Encryption_state	1	
Manual_key_modifier_index	1	

The encryption_state is set to clear speech, network encrypted or manually encrypted.

If the communication is manually encrypted, the manual key modifier used for the communication is indicated.

4.3.3. ST_RECEIVE_DETECTION

Direction: ST ⇨ TCE

Short description: This PDU shall indicate speech reception.

Table 3: ST_RECEIVE_DETECTION

Information element	Length	Comment
Codop	2	
Reception_Info	1	
Address	5	

Info indicates the begin, the end or the talking party identity of speech reception. For begin or end the talking party address is not significant.

Address refers to the talking party ST. The ST cannot guarantee transmission of talking party address. Nevertheless once transmitted it will not be repeated.

4.3.4. ST_PTT_RELEASE_IND

Direction: ST ⇨ TCE

Short description: This PDU shall be sent to indicate a PTT release to the TCE. It is only sent if the release occurs on a valid PTT release, on an external PTT equipment (i.e not located on the TCE : the PTT release comes from the accessory plug of the ST).

Table 4: ST_PTT_RELEASE_IND

Information element	Length	Comment
Codop	2	

4.3.5. ST_PTT_REQUEST_IND

Direction: ST ⇨ TCE

Short description: This PDU shall be sent to indicate a PTT request to the TCE. It is only sent if the request occurs on a valid PTT request, on an external PTT equipment (i.e not located on the TCE : the PTT request comes from the accessory plug of the ST).

Table 5: ST_PTT_REQUEST_IND

Information element	Length	Comment
Codop	2	

4.3.6. ST_TRANSMIT_IND

Direction: ST ⇨ TCE

Short description: This PDU shall indicate that outgoing transmission on TCH has begun or ended.

Table 6: ST_TRANSMIT_IND

Information element	Length	Comment
Codop	2	
Transmission_Info	1	

Transmission_Info indicates the begin or the end of transmission.

4.3.7. TCE_REMOTE_PTT_REQUEST

Direction: ST ⇦ TCE

Short description: This PDU shall be sent to force transmission on voice circuit on a distant ST, during a private individual call.

Table 7: TCE_REMOTE_PTT_REQUEST

Information element	Length	Comment
Codop	2	
Address	5	
Transmission_duration	1	
Target_ST_mode	1	

Address refers to the ST expected to transmit ; it shall be the address of the other talking party ST.

If Transmission_duration_is set to NSIG_TRANSMISSION_DURATION, transmission duration is set to the anti-gossip time-out.

Target_ST_mode allows to control the state of the target ST.

4.3.8. TCE_PTT_PRIORITY_CHANGE_REQ

Direction: ST ⇦ TCE

Short description: This PDU shall be used to request a new PTT priority, and shall be used only by dispatchers. This request remains valid until new PTT priority change request, and is not modified by switch off.

Table 8: TCE_PTT_PRIORITY_CHANGE_REQ

Information element	Length	Comment
Codop	2	
PTT_priority	1	

4.3.9. TCE_PTT_RELEASE

Direction: ST ⇦ TCE

Short description: This PDU shall be sent to end transmission on voice circuit as a push-to-talk release.

Table 9: TCE_PTT_RELEASE

Information element	Length	Comment
Codop	2	

4.3.10. TCE_PTT_REQUEST

Direction: ST ⇦ TCE

Short description: This PDU shall be sent to request transmission on voice circuit as a push-to-talk request.

Table 10: TCE_PTT_REQUEST

Information element	Length	Comment
Codop	2	

4.3.11. TCE_SET_MANUAL_KEY

Direction: ST ⇦ TCE

Short description: This PDU shall request a modification of a manual key. For ST this PDU is not relative to only one communication.

Table 11: TCE_SET_MANUAL_KEY

Information element	Length	Comment
Codop	2	
Manual_key_modifier_index	1	
Manual_key_modifier	4	

4.3.12. TCE_USE_MANUAL_KEY

Direction: ST ⇦ TCE

Short description: This PDU shall request the use of manual encryption or the end of the use of a manual encryption. For ST this PDU is not relative to only one communication.

Table 12: TCE_USE_MANUAL_KEY

Information element	Length	Comment
Codop	2	
Action	1	
Manual_key_modifier_index	1	

Action is either to enable or disable the manual encryption.

Manual_key_modifier_index is significant if manual encryption is enabled and a key modifier has been set for the related index.

4.4. Remote control of the system terminal in network connected mode

4.4.1. ST_ALERTING

Direction: ST ⇨ TCE

Short description: This PDU shall be sent to indicate that the called system terminal is rung.

Table 13: ST_ALERTING

Information element	Length	Comment
Codop	2	
Call_reference	1	

4.4.2. ST_CALL_REFERENCE

Direction: ST ⇨ TCE

Short description: A call shall be identified with a Call_reference unless the opposite has been requested by TCE_ST_INIT. This PDU indicates to the TCE the Call_reference allocated by the ST for the ongoing call.

Table 14: ST _CALL_REFERENCE

Information element	Length	Comment
Codop	2	
Reference_type	1	
Call_reference	1	

Reference_type indicates if the call reference is a new one or the current one.

The ST allocates a new call reference for an outgoing call upon receipt of one of the following messages: TCE_OUTGOING_SETUP, TCE_MOCH_SETUP, TCE_MOCH_RELEASE, TCE_ECH_SETUP, TCE_ECH_RELEASE, TCE_INTRUSION, TCE_REMOTE_CALL_CLEARING, TCE_FALLBACK_MOCH_ENTER and TCE_OUTGOING_GROUP_CALL. The TCE shall have to wait for this reference to resume the call.

Reference_type is set to current upon receipt of any message from the TCE with a call reference different from current reference memorised by ST. In that case the call reference provided back to the TCE is the valid call reference according to the ST. The TCE is then able whether this is due to colliding establishments.

NSIG_CALL_REF is a reserved value.

4.4.3. ST_CALL_SUSPEND

Direction: ST ⇨ TCE

Short description: This PDU shall be sent to indicate that the call is suspended.

Table 15: ST _CALL_SUSPEND

Information element	Length	Comment
Codop	2	
Call_reference	1	

4.4.4. ST_CALL_SWITCH

Direction: ST ⇨ TCE

Short description: This PDU shall indicate that the ST is switched into a call, e.g. after a failed private call transfer or for a higher priority private call.

Table 16: ST_CALL_SWITCH

Information element	Length	Comment
Codop	2	
Call_reference	1	
Call_type	1	
Address	5	
Call_priority	1	

Address indicates the ST address.

Call_type, calling address and call_priority define the private call.

Over the terminal control interface, a call reference is allocated.

4.4.5. ST_CONNECT

Direction: ST ⇨ TCE

Short description: This PDU shall be sent to establish the voice path connectivity, synchronise the end of the establishment of a group communication or a private call and indicate the encryption state of the call.

Table 17: ST_CONNECT

Information element	Length	Comment
Codop	2	
Call_reference	1	
Encryption_state	1	
Call_priority	1	
Boolean	1	PABX call indication
Boolean	1	Multi activation communication
Manual_key_modifier_index	1	
Boolean	1	Dispatch position call indication

The connect request is related to the call characterised with Call_reference over the terminal control interface.

The encryption state indicates whether the call is clear speech, network encrypted or manually encrypted. If the call is manually encrypted, the manual key modifier index is provided, otherwise a non significant value is provided.

The boolean Information element PABX_call indicates whether it is a PABX call.

Whether the call is a quasi-transmission trunking communication, i.e. based on multi-activation, it is indicated with activation.boolean.

4.4.6. ST_DEFAULT_CALL_IND

Direction: ST ⇨ TCE

Short description: This PDU shall indicate the entry in a default call.

Table 18: ST_DEFAULT_CALL_IND

Information element	Length	Comment
Codop	2	
Call_reference	1	
Call_type	1	Default communication type
Call_priority	1	
Number	1	Number of calls of the list
Call_type[]	1 x CALL_PER_SCAN_MAXNB	Scanned group communications type
MOCH/COV_identifier[]	1 x CALL_PER_SCAN_MAXNB	
OG_identifier[]	2 x CALL_PER_SCAN_MAXNB	Participation OG
RSW_identifier	1	
BS_identifier	1	

Default Call_type defines the type of default communication: MOCH, broadcast call, ECH, talkgroup, scanning in priority mode or scanning in sequential listening mode.

Number of calls indicates, in case of scanning, the number of scanned communications otherwise is no significant. The list of scanned communication contains a maximum of CALL_PER_SCAN_MAXNB elements.

Scanned Call_type defines the type of the scanned communications MOCH or talkgroup otherwise is no significant.

MOCH/COV_identifier is a MOCH identifier for a MOCH or a COV identifier for a talkgroup.

RSW_identifier and BS_identifier are reserved for ECH.

4.4.7. ST_END

Direction: ST ⇨ TCE

Short description: This PDU shall indicate the end of a call or the end of a transaction. On receipt of ST_END the call reference is no longer valid.

Table 19: ST_END

Information element	Length	Comment
Codop	2	
Call_reference	1	
Cause_type	1	
Cause	1	
Family_cause	1	

Cause_type and cause field indicate the cause for the end of transaction or the cause for call end.

Family_cause indicates a synthetic cause regrouping values of “cause” field.

Over the terminal control interface, a call reference is indicated.

4.4.8. ST_INCOMING_GROUP_CALL

Direction: ST ⇨ TCE

Short description: This PDU shall indicate the set-up of an incoming group call. This PDU is only transmitted to OBC-type TCE.

Table 20: ST_INCOMING_GROUP_CALL

Information element	Length	Comment
Codop	2	
Call_reference	1	
Group_call_type	1	
Call_priority	1	
MOCH/COV_identifier	1	
OG_identifier	2	

Group_call_type indicates whether the ST which activates the call belongs to the group or not.

Call_priority is set to ROUTINE.

OG identifier indicates the called OG.

4.4.9. ST_INCOMING_SETUP

Direction: ST ⇨ TCE

Short description: This PDU shall indicate an incoming private call.

Table 21: ST_INCOMING_SETUP

Information element	Length	Comment
Codop	2	
Call_reference	1	
Call_type	1	
Address	5	Calling ST address
Call_priority	1	
Subaddress_quartet_length	1	Called ST subaddress length
Subaddress	SUBADDRESS_BYTE_MAXLENGTH	Called ST subaddress
Behaviour_on_incoming_call	1	

Call_type is either PRIVATE_CALL_TYPE, DISPATCH_POSITION_CALL_TYPE, or PABX_CALL_TYPE, in which case a subaddress is provided.

The calling address is the RFSI address of the calling ST.

The called subaddress may be interpreted by the TCE. The CalledSubaddress is BCD-encoded, its length is indicated in quartet and does not exceed SUBADDRESS_QUARTETS_MAXLENGTH quartets.

Behaviour_on_incoming_call precises the expected TCE behaviour, when receiving the incoming private call.

Over the terminal control interface, a call reference is allocated.

4.4.10. ST_TRANSFER_IND

Direction: ST ⇨ TCE

Short description: This PDU shall be sent to request a transfer an on-going private call from the ST to another terminal. The priority of the transfer is implicitly that one of the call.

Table 22: ST_TRANSFER_IND

Information element	Length	Comment
Codop	2	
Call_reference	1	
Call_type	1	
Address	5	Transfer-to ST address
Encryption_state	1	
Call_priority	1	
Boolean	1	PABX call indication
Manual_key_modifier_index	1	
Boolean	1	Dispatch position call indication

Over the Terminal control interface, a call reference is indicated.

4.4.11. TCE_CALL_ANSWER

Direction: ST ⇦ TCE

Short description: This PDU shall be sent to indicate to the ST that the TCE accepts the call set-up request, within the time window defined over the Air Interface (T710 timer).

Table 23: TCE_CALL_ANSWER

Information element	Length	Comment
Codop	2	
Call_reference	1	

4.4.12. TCE_DEFAULT_CALL_ENTER

Direction: ST ⇦ TCE

Short description: This PDU shall be sent to select a group communication as the default communication for an ST, i.e. the ST is candidate to that communication when it is not busy with another communication. Prior to sending TCE_DEFAULT_CALL_ENTER, for a scanning service in sequential listening mode, the TCE shall check that one of the scanned communications at least is established within the coverage of the ST; for a scanning in priority mode, the TCE shall check that the priority scanned communication is established within the coverage of the ST.

Table 24: TCE_DEFAULT_CALL_ENTER

Information element	Length	Comment
Codop	2	
Call_type	1	Default group communication type
Call_priority	1	
Number	1	Number of calls of the list
Call_type[]	1 x CALL_PER_SCAN_MAXNB	Scanned group communications types
MOCH/COV_identifier[]	1 x CALL_PER_SCAN_MAXNB	
OG_identifier[]	2 x CALL_PER_SCAN_MAXNB	Participation OG
RSW_identifier	1	
BS_identifier	1	
PTT_on_CCH_communication_Index	1	
OG_identifier[]	2 x CALL_PER_SCAN_MAXNB	Activation OG
Manual_encrypted_communication_index	1	

Default Call_type differentiates between MOCH, Talkgroup, broadcast call, ECH, priority mode scanning, sequential listening mode scanning.

The priority of the communication is indicated. A scanning service in sequential listening mode or a talkgroup has a routine priority.

In case of scanning, the number of scanned communications is indicated;

Call_type differentiates between MOCH, Talkgroup for each communication in a scanning service. In a priority mode scanning service, call types equal to TALKGROUP_TYPE are forbidden. If this rule is not followed, the ST will send the message ST_DEBUG_IND.

MOCH/COV_identifier applies to MOCH and talkgroup; for a scanning service, some COV_identifiers or Participation OG identifiers may be unknown and set to a non significant value; the TCE may then provide the missing parameters later with TCE_SET_DEFAULT_CALL. This does not apply to the priority scanned communication for scanning in a priority mode.

RSW and BS_identifier are reserved to ECH.

Participation OG identifier applies to MOCH, broadcast call, talkgroup.

PTT_on_CCH_Communication.Index refers the communication in the list to which the ST takes part, on a PTT request on CCH. If the ST is allowed to take part to none of the communications of the list, PTT_on_CCH_Communication.Index is set to NO_PTT_ON_CCH_COMMUNICATION.

Manual_encrypted_communication.Index indicates the communication of the list to which manual encryption applies. Its value is either 0 (i.e the first communication of the list), or NO_MANUAL_ENCRYPTED_COMMUNICATION (if the first communication of the list is not present).

For talkgroups, the activation OG equal participation OG ; for other communication types, they are set to ALL_OG.

Note : the use of this PDU with customer talkgroups implies the knowledge of the associated COV.

4.4.13. TCE_DEFAULT_CALL_RESP

Direction: ST ⇦ TCE

Short description: This PDU shall be sent to acknowledge the entry indication in a default call.

Table 25: TCE_DEFAULT_CALL_RESP

Information element	Length	Comment
Codop	2	
Call_reference	1	

4.4.14. TCE_DEFAULT_CALL_WITHDRAWAL

Direction: ST ⇦ TCE

Short description: This PDU shall be sent to withdraw from the on-going default call and to cancel the default call definition.

Table 26: TCE_DEFAULT_CALL_WITHDRAWAL

Information element	Length	Comment
Codop	2	

4.4.15. TCE_DM_LISTEN

Direction: ST ⇦ TCE

Short description: This PDU shall request to begin or end listening to a direct mode channel. It allows ST to detect any activity on this channel. This PDU shall be reserved for radio terminal.

Table 27: TCE_DM_LISTEN

Information element	Length	Comment
Codop	2	
Channel_identifier	2	
Band_identifier	1	
Dm_action	1	

Dm_action is a mask of bits precising the listening mode, DMNM or network mode, with one-channel watchover, and the begining or the end of DM listening.

Channel_identifier and Band_identifier are significant only if Dm_action indicates begin-listening;

4.4.16. TCE_ECH_RELEASE

Direction: ST ⇦ TCE

Short description: This PDU shall be sent to request the release of an ECH. The result of the release shall be provided by ST_END.

Table 28: TCE_ECH_RELEASE

Information element	Length	Comment
Codop	2	
RSW_identifier	1	
BS_identifier	1	

RSW_identifier and BS_identifier identify the cell of the ECH to be released.

4.4.17. TCE_ECH_SETUP

Direction: ST ⇦ TCE

Short description: This PDU shall be sent to request the establishment of an emergency open channel. The result shall be provided by ST_END.

Table 29: TCE_ECH_SETUP

Information element	Length	Comment
Codop	2	
Address	5	
RSW_identifier	1	
BS_identifier	1	
Key_reference	1	

Address is the address of the terminal in emergency situation.

RSW_identifier and BS_identifier identify the cell of the ECH.

Key_reference indicates whether clear speech applies or whether the encryption mode is decided by the network.

4.4.18. TCE_ECH_SETUP_DP_RESP

Direction: ST ⇦ TCE

Short description: This PDU shall be used to notify to the ST, the acceptation or the refusal by the dispatch position, to set up an emergency- or a crisis call.

This PDU shall be used only as an answer to the PDU ST_STATUS_IND whose information element Status_code is STATUS_EMERGENCY_SETUP_REQ or STATUS_CRISIS_CALL_SETUP_REQ.

Table 30: TCE_ECH_SETUP_DP_RESP

Information element	Length	Comment
Codop	2	
Boolean	1	Decision
RSW_identifier	1	
BS_identifier	1	
Address	5	
Organization	1	

Decision is either to accept or refuse the setup of the call.

RSW_identifier, BS_identifier and Address refers to the cell and the ST concerned by the emergency- or crisis call.

In a multi-organization network, the Organization concerned by the PDU is indicated by the element information Organization.

4.4.19. TCE_FALLBACK_MOCH_ENTER

Direction: ST ⇦ TCE

Short description: This PDU shall be sent for a radio ST to enter in a fallback MOCH, in a cell where the base station is in BSC disconnected mode, instead of re-selecting another cell. The TCE has checked that the cell in BSC disconnect mode before sending the message. This PDU is only relevant for RTs.

Table 31: TCE_FALLBACK_MOCH_ENTER

Information element	Length	Comment
Codop	2	

4.4.20. TCE_INTRUSION

Direction: ST ⇦ TCE

Short description: This PDU shall be sent to request an intrusion into a private call.

Table 32: TCE_INTRUSION

Information element	Length	Comment
Codop	2	
Intrusion_type	1	
reserved	1	
Address	5	Private communication initiater ST address
reserved	1	
reserved	1	

Intrusion type is set to PRIVATE_INTRUSION_TYPE.

Address is the calling party address of the intruded private call.

The reserved fields are supplied for compatibility.

4.4.21. TCE_MOCH_RELEASE

Direction: ST ⇦ TCE

Short description: This PDU shall be sent to release an established MOCH. The result shall be provided by ST_END.

Table 33: TCE_MOCH_RELEASE

Information element	Length	Comment
Codop	2	
MOCH/COV_identifier	1	
Call_priority	1	

4.4.22. TCE_MOCH_SETUP

Direction: ST ⇦ TCE

Short description: This PDU shall be sent to request the set-up of a MOCH. The result shall be provided by ST_END.

Table 34: TCE_MOCH_SETUP

Information element	Length	Comment
Codop	2	
MOCH/COV_identifier	1	
Call_priority	1	
Key_reference	1	
Number	1	Number of OG of the list
OG_identifier[]	2 x SIMPLE_OG_MAXNB	
Activation_mode	1	

Call_priority is the external establishment priority.

Call_priority, Key_reference, Activation_mode are attributes of the MOCH identified with MOCH/COV_identifier.

Key_reference indicates whether clear speech applies or whether the encryption mode is decided by the network.

Number of OG and OG list define the list of participation OG for the MOCH. Simple group is considered only, i.e. no group identifier for a group composition.

There is a maximum of SIMPLE_OG_MAXNB group identifiers in the list.

Activation mode indicates the type of open channel and is set to MOCH_ACTIVATION or BROADCAST_ACTIVATION.

4.4.23. TCE_OUTGOING_GROUP_CALL

Direction: ST ⇦ TCE

Short description: This PDU shall be sent for a group call set-up request.

Table 35: TCE_OUTGOING_GROUP_CALL

Information element	Length	Comment
Codop	2	
Group_call_type	1	
Call_priority	1	
MOCH/COV_identifier	1	
OG_identifier	2	

Group_call_type indicates whether the ST owns the group or not.

Call_priority is set to routine.

COV_identifier is only significant for internal group calls. Otherwise it is set to COV_NSIG.

OG identifier designates the called OG.

4.4.24. TCE_OUTGOING_SETUP

Direction: ST ⇦ TCE

Short description: This PDU shall be sent for an outgoing private call set-up request.

Table 36: TCE_OUTGOING_SETUP

Information element	Length	Comment
Codop	2	
Call_priority	1	
Number	1	Number of addresses of the list
Address[]	5 x ADR_MAXNB	
Subaddress_quartet_length	1	
Subaddress	SUBADDRESS_BYTE_MAXLENGTH	
Behaviour_on_incoming_call	1	

Number of addresses, Address list, Subaddress_quartet_length, Subaddress describe the list of called parties.

The maximum value for Number of addresses is ADR_MAXNB. Address is an array of ADR_MAXNB addresses in the RFSI addressing plan. The number of significant addresses in the array is indicated by Number of addresses.

A subaddress may be associated with the first address in the address list. The length of the subaddress is indicated as a number of quartets, with a maximum quartet length being SUBADDRESS_QUARTET_MAXLENGTH. Each digit of the subaddress is BCD-encoded in a quartet.

Behaviour_on_incoming_call precises the expected behaviour of the called ST.

4.4.25. TCE_REMOTE_CALL_CLEARING

Direction: ST ⇦ TCE

Short description: This PDU shall be sent to request the remote clearing of a private call. The result shall be provided by ST_END.

Table 37: TCE_REMOTE_CALL_CLEARING

Information element	Length	Comment
Codop	2	
Address	5	Calling party address

The calling party is that one of the call to be cleared.

4.4.26. TCE_SCAN_RESUME

Direction: ST ⇦ TCE

Short description: This PDU shall be sent to search another on-going communication in a scanning sequence, i.e. skip the current communication and resume scanning. The listening of current communication is suspended for T_SCAN. This request shall be forbidden by TCE in scanning priority mode when the ongoing communication is the priority communication. A PTT request on CCH activates the associated communication even if its listening is suspended.

Table 38: TCE_SCAN_RESUME

Information element	Length	Comment
Codop	2	
Call_reference	1	

4.4.27. TCE_SET_DEFAULT_CALL

Direction: ST ⇦ TCE

Short description: This PDU shall be used as a request to dynamically set the coverage of talkgroups or OG of MOCH listed for a scanning service as previously defined with TCE_DEFAULT_CALL_ENTER. This PDU shall be used also to modify the communication associated with PTT (first one of the scanned communication list) on CCH for scanning in sequential listening mode.

Table 39: TCE_SET_DEFAULT_CALL

Information element	Length	Comment
Codop	2	
Call_reference	1	
Call_type[]	1 x CALL_PER_SCAN_MAXNB	Scanned group communications type
MOCH/COV_identifier[]	1 x CALL_PER_SCAN_MAXNB	
OG_identifier[]	2 x CALL_PER_SCAN_MAXNB	
PTT_on_CCH_communication_Index	1	

Scanned group communications call type includes MOCH_ENTER_TYPE and TALKGROUP_ENTER_TYPE.

There is either one or a maximum of CALL_PER_SCAN_MAXNB call_attributes in the list.

PTT_on_CCH_Communication_Index identifies the communication in the list to which the ST takes part, on a PTT request on CCH.

4.4.28. TCE_TRANSFER

Direction: ST ⇦ TCE

Short description: This PDU shall be sent to request a transfer an on-going private call from the ST to another terminal. The priority of the transfer is implicitly that one of the call.

Table 40: TCE_TRANSFER

Information element	Length	Comment
Codop	2	
Call_reference	1	
Address	5	
Subaddress_quartet_length	1	
Subaddress	SUBADDRESS_BYTE_MAXLENGTH	

Over the Terminal control interface, a call reference is indicated.

Address, Subaddress_quartet_length and Subaddress refers to the Transfer-to terminal.

Subaddress is BCD-encoded, its length is indicated in quartet and does not exceed SUBADDRESS_QUARTET_MAXLENGTH quartets. Subaddress is significant to transfer to PABX.

4.4.29. TCE_WITHDRAWAL

Direction: ST ⇦ TCE

Short description: This PDU shall be sent to the ST for its withdrawal from a private call or a group call.

Table 41: TCE_WITHDRAWAL

Information element	Length	Comment
Codop	2	
Call_reference	1	

Over the terminal control interface, a call reference is indicated and is no longer valid.

4.5. Remote control of the system terminal in direct mode

4.5.1. ST_DM_CALL_STATE_IND

Direction: ST ⇨ TCE

Short description: This PDU shall indicate that a state transition has occurred during the direct mode communication call. This PDU shall only be sent by a RT.

Table 42: ST_DM_CALL_STATE_IND

Information element	Length	Comment
Codop	2	
Call_state	1	

Call state indicates whether the communication is active or inactive. The inactivity is detected by elapse of the direct mode communication inactivity timer. TCE shall withdraw from the call at this time.

4.5.2. ST_DM_CONNECT

Direction: ST ⇨ TCE

Short description: This PDU shall be sent to establish the voice path connectivity to a direct mode channel. This PDU shall be reserved for radio terminal.

Table 43: ST_DM_CONNECT

Information element	Length	Comment
Codop	2	
Encryption_state	1	
Manual_key_modifier_index	1	

The encryption state indicates whether the call is clear speech or manually encrypted. If the call is manually encrypted, the manual key modifier index is provided, otherwise is not significant.

4.5.3. ST_DM_DATA_IND

Direction: ST ⇨ TCE

Short description: This PDU shall indicate the reception of data on a direct channel.

Table 44: ST_DM_DATA_IND

Information element	Length	Comment
Codop	2	
Length	1	
Data[]	1 x Length	

Length is limited to DM_DATA_MAXLENGTH.

4.5.4. ST_DM_DATA_CONF

Direction: ST ⇨ TCE

Short description: This PDU shall indicate the result of data transmission on a direct channel.

Table 45: ST_DM_DATA_CONF

Information element	Length	Comment
Codop	2	
Reference	2	
Boolean	1	Result of the direct data transmission request
Cause_type	1	
Cause	1	
Family_cause	1	

Reference indicates the message concerned by the PDU.

Family_cause indicates a synthetic cause regrouping values of “cause” field.

4.5.5. TCE_DM_DATA_REQ

Direction: ST ⇦ TCE

Short description: This PDU shall request to send data on direct channel.

Table 46: TCE_DM_DATA_REQ

Information element	Length	Comment
Codop	2	
Channel_identifier	2	
Band_identifier	1	
Power	1	
Reference	2	
Length	1	
Data[]	1 x Length	

The values of channel and band identifiers are not controlled by the ST.

Power indicates the power required to avoid any disturbance on the radio link.

Reference is an indication given to the message to register it.

Length indicates the number of bytes that TCE requests to transmit. It is limited to DM_DATA_MAXLENGTH.

4.5.6. TCE_DM_ENCRYPTION

Direction: ST ⇦ TCE

Short description: This PDU shall be sent to indicate the expected encryption state of a DM communication. This PDU shall be reserved for radio terminal.

Table 47: TCE_DM_ENCRYPTION

Information element	Length	Comment
Codop	2	
Boolean	1	Encryption indication

The effects of this PDU over DM communications is :

If the encryption indication is set to FALSE, the DM communications won't be encrypted.

On the contrary, if the encryption indication is set to TRUE :
- this information element is ignored for DM emergency calls,
- for the other types of DM communications, they will be encrypted ; the use of a manual key modifier and / or only the default DM encryption key depends on the values of the information elements of the PDU TCE_USE_MANUAL_KEY.

4.5.7. TCE_DM_ENTER

Direction: ST ⇦ TCE

Short description: This PDU shall be sent to enter in direct mode operation. This PDU shall be reserved for radio terminal.

Table 48: TCE_DM_ENTER

Information element	Length	Comment
Codop	2	
Channel_identifier	2	
Band_identifier	1	
Boolean	1	Dual Watch indicator
Direct_mode_operation_mode	1	

DualWatch is set to FALSE.

Direct_mode_operation_mode include independentDigitalRepeater mode and direct mode. Only the last one shall be used by a TCE.

4.5.8. TCE_DM_WITHDRAWAL

Direction: ST ⇦ TCE

Short description: This PDU shall be sent to withdraw from direct mode operation.. This PDU shall be reserved for radio terminal. On DM inactivity detection this PDU shall be sent to ST.

Table 49: TCE_DM_WITHDRAWAL

Information element	Length	Comment
Codop	2	

4.6. Short datagram and status

4.6.1. ST_STATUS_CONF

Direction: ST ⇨ TCE

Short description: This PDU shall indicate that a status transmission has been taken into account by the network. The ST cannot send any status with inferior or equal priority until it receives the confirmation of the preceding one.

Table 50: ST_STATUS_CONF

Information element	Length	Comment
Codop	2	
Result	1	
Cause	1	
Cause_type	1	
Family_cause	1	

Result confirms whether the status has been sent or not.

Cause and Cause_type describe cause for not being sent and are not significant otherwise.

Family_cause indicates a synthetic cause regrouping values of "cause" field.

4.6.2. ST_STATUS_IND

Direction: ST ⇨ TCE

Short description: This PDU shall indicate the receipt of a status. It is used either as a call me back status, or as an emergency notification or to indicate that another dispatcher has answered a call me back status, or to indicate that another dispatcher is supervising a group communication (MOCH), or to send an operational status, for instance a manual location. This PDU is also used to notify dispatchers that a ST dispatcher call failed, because all dispatchers are busy.

Table 51: ST_STATUS_IND

Information element	Length	Comment
Codop	2	
Status_code	1	
Status_info	1	
RSW_identifier	1	
BS_identifier	1	
Address	5	Sending ST address
Call_priority	1	
Address	5	Called ST address
Subaddress_quartet_length	1	
Subaddress	SUBADDRESS_BYTE_MAXLENGTH	

Status_code and status_info are the status information

RSW_identifier, BS_identifier, Sending ST address identify the sending terminal and its location.

If the information element status_code equals STATUS_DISPATCHER_CALL_FAILURE_IND :
- the information elements Call_priority and Called ST address ARE significant,
- the information elements RSW_identifier and BS_identifier ARE NOT significant.

A subaddress may be associated to the Called ST address. The length of the subaddress is indicated as a number of quartets, with a maximum quartet length being SUBADDRESS_QUARTET_MAXLENGTH. Each digit of the subaddress is BCD-encoded in a quartet.

4.6.3. TCE_STATUS_REQ

Direction: ST ⇦ TCE

Short description: This PDU shall be used in order to send a status towards the network. The status code may indicate that the dispatcher has answered an incoming call or to indicate that the dispatcher is supervising an MOCH.

Table 52: TCE_STATUS_REQ

Information element	Length	Comment
Codop	2	
Status_type	1	
Status_code	1	
Status_info	1	

Status_type differentiates between standard users and dispatchers.

Status_code and status_info describe the status details.

4.7. Call advertising

4.7.1. ST_CELL_ACTIVATION_IND

Direction: ST ⇨ TCE

Short description: This PDU shall indicate the activation or deactivation of a multi-activation group communication in the cell of the ST. Only ST in CCH monitoring mode shall transmit this PDU. if the ST in not on TCH related to the communication the deactivation may be inferred upon an Air Interface time-out (D774).

Table 53: ST_CELL_ACTIVATION_IND

Information element	Length	Comment
Codop	2	
Info_activation	1	
Application_type	1	
Activation_mode	1	
MOCH/COV_identifier	1	
RSW_identifier	1	
BS_identifier	1	
OG_identifier	2	Activation OG
Encryption_state	1	
Manual_key_modifier_index	1	
Call_type	1	

Info_activation describes the related activation being performed: begin or end of activation

Call_type, Application_type and Activation_mode describe the related group communication. Call_type is either MOCH, ECH or talkgroup. Broadcast calls behave as MOCH. Activation_mode is significant to a begin of activation

MOCH/COV_identifier, applies to MOCH, broadcast call, group call or talkgroup

RSW_identifier and BS_identifier apply to an ECH, in which case MOCH/COV_identifier is not significant.

OG_identifier is set to ALL_OG for MOCH, broadcast call and ECH, is the OGfor talkgroup and group call.

Encryption state indicate whether clear speech, network encryption or manual encryption applies, and is significant if Info_Activation = ACTIVATION_START. Manual encryption can apply on clear speech or network encryption.

Manual_key_modifier_index is significant if manual encryption applies

4.7.2. ST_BROADCAST_CALL_NOTIFICATION

Direction: ST ⇨ TCE

Short description: This PDU shall indicate the establishment of a broadcast call, providing the reference of the MOCH used for the call, and the OG concerned by the broadcast call. Only the ST in CCH monitoring mode shall transmit this PDU.

Table 54: ST_BROADCAST_CALL_NOTIFICATION

Information element	Length	Comment
Codop	2	
Number	1	Number of OG of the list
OG_identifier[]	2 x SIMPLE_OG_MAXNB	

Number of OG and OG list refers to the list of the OG concerned by the PDU, which is provided by the network.

Only the first Number of OG elements of the OG list are significant.

4.7.3. ST_CRISIS_NOTIFICATION

Direction: ST ⇨ TCE

Short description: This PDU shall indicate the establishment of a crisis call, providing the identity of the terminal in emergency situation, and the reference of the MOCH used for the crisis call. Only the ST in CCH monitoring mode shall transmit this PDU.

Table 55: ST_CRISIS_NOTIFICATION

Information element	Length	Comment
Codop	2	
MOCH_identifier	1	
Address	5	
Organization	1	
Number	1	
OG_identifier[]	2 x SIMPLE_OG_MAXNB	

Address identifies the terminal in emergency situation

Number and OG list refer to the list of the OG concerned by the PDU, which is provided by the network.

4.7.4. ST_DM_ACTIVITY_NOTIFICATION

Direction: ST ⇨ TCE

Short description: This PDU shall indicate that a direct mode channel is being used; This message is transmitted only if the direct mode monitoring is activated (TCE_DM_LISTEN) and if no communication is being set up or has been set-up;

Table 56: ST_DM_ACTIVITY_NOTIFICATION

Information element	Length	Comment
Codop	2	
Channel_identifier	2	
Band_identifier	1	

4.7.5. ST_EMERGENCY_NOTIFICATION

Direction: ST ⇨ TCE

Short description: This PDU shall indicate the establishment of an ECH in the cell of the ST, providing the identity of the terminal in emergency situation, and its cell. Only the ST in CCH monitoring mode shall transmit this PDU.

Table 57: ST_EMERGENCY_NOTIFICATION

Information element	Length	Comment
Codop	2	
RSW_identifier	1	
BS_identifier	1	
Address	5	

RSW_identifier and BS_identifier characterise the cell associated to the ECH.

Address identifies the terminal in emergency situation

4.7.6. ST_HOOK_ON_INVITATION

Direction: ST ⇨ TCE

Short description: This PDU shall indicate the TCE that another voice call or a data transfer is waiting and user is invited to hook on the current call.

Table 58: ST_HOOK_ON_INVITATION

Information element	Length	Comment
Codop	2	
Cause	1	

Cause indicates why the call through the ST should be released by user on-hook.

4.7.7. ST_PRESENCE_CHECKING

Direction: ST ⇨ TCE

Short description: This PDU shall indicate a presence check, used for call presentation with implicit addressing. The TCE may answer with TCE_PRESENCE_CHECKING_RESP within the air interface time window (T71A timer).

Table 59: ST_PRESENCE_CHECKING

Information element	Length	Comment
Codop	2	
Call_priority	1	
Call_identifier	1	

Call_identifier identifies the presence checking transaction and shall be used by the answer.

Call_priority is the priority of the call for which a presence checking transaction is performed.

4.7.8. TCE_PRESENCE_CHECKING_RESP

Direction: ST ⇦ TCE

Short description: This PDU shall be an answer to a presence check made by the TCE and used to accept a call on an implicit address.

Table 60: TCE_PRESENCE_CHECKING_RESP

Information element	Length
Codop	2
Answer	1
Call_identifier	1

Answer is either to accept or refuse the call for which a presence checking is done

Call_identifier identifies the call to be accepted or refused and is provided by ST_PRESENCE_CHECKING.

4.8. System monitoring

4.8.1. ST_COV_PER_CELL

Direction: ST ⇨ TCE

Short description: This PDU shall indicate the established coverages accessible in a cell, providing COV. Only the ST in CCH monitoring mode of dispatch centre shall transmit this PDU. This PDU is sent when the established coverages have changed. When the registration is lost an empty list is transmitted.

Table 61: COV_attributes

Information element	Length	Comment
COV_identifier	1	
Cell_type	1	

COV_identifier identifies the coverage

Cell_type differentiate between district and umbrella cells

Table 62: ST_COV_PER_CELL

Information element	Length	Comment
Codop	2	
Info_segmented_list	1	
Boolean	1	attach transaction need indication
Number	1	
COV_attributes[]	COV_attributes_LENGTH x Number	

Info_segmented_list shall indicate a complete list. Segmentation never occurs.

Boolean shall indicate if an attach transaction shall be processed when any talkgroup is selected or deselected through a radio ST.

4.8.2. ST_DELIVERED_OG_PER_ST

Direction: ST ⇨ TCE

Short description: This PDU shall provide the list of nominal.OG, national OG, and regional OG supplied for the ST on the Air interface or by TPS

Table 63: ST_DELIVERED_OG_PER_ST

Information element	Length	Comment
Codop	2	
OG	2	Nominal OG
Number	1	Number of national OG
OG_identifier[]	2 x NAT_OG_MAXNB	List of national OG
Number	1	Number of local OG
OG_identifier[]	2 x LOC_OG_MAXNB	List of local OG

Nominal OG is the access gate nominal operational group

Number of national OG and National OG list indicate which national OG have been downloaded into the ST

Number of local OG and Local OG list indicate which local OG have been downloaded into the ST

For both lists, only the first number of concerned OG are significant.

4.8.3. ST_DELIVERED_TALKGROUP_PER_ST

Direction: ST ⇨ TCE

Short description: This optional PDU shall provide the list of talkgroups, supplied on the Air Interface, defined by a couple (OG, COV), or supplied by TCE with only OG.

Table 64: ST_DELIVERED_TALKGROUP_PER_ST

Information element	Length	Comment
Codop	2	
Number	1	Number of national talkgroups
OG_identifier[]	2 x NAT_TALKGROUP_MAXNB	List of national talkgroups OG
COV_identifier[]	1 x NAT_TALKGROUP_MAXNB	List of national talkgroups COV
Number	1	Number of local talkgroups
OG_identifier[]	2 x LOC_TALKGROUP_MAXNB	List of local talkgroups OG
COV_identifier[]	1 x LOC_TALKGROUP_MAXNB	List of local talkgroups COV
Number	1	Number of customer talkgroups
OG_identifier[]	2 x CUST_TALKGROUP_MAXNB	List of customer talkgroups OG

Number of national talkgroups, list of national talkgroups OG and list of national talkgroups COV describe the attribute of a talkgroup with a national OG.

Number of local talkgroups, list of local talkgroups OG and list of local talkgroups COV describe the attribute of a talkgroup with a local OG.

Number of customer talkgroups and list of customer talkgroups OG describe the attribute of a talkgroup (chosen by the user, if any allowed) with a local or a national OG.

4.8.4. ST_ECH_PER_ST

Direction: ST ⇨ TCE

Short description: This PDU shall indicate the list of set up emergency open channels accessible in a cell, providing the RSW and the cell where the emergency call has been initiated. Only the CCH monitoring ST shall send this PDU. This PDU is sent when the list has changed. When the registration is lost an empty list shall be transmitted.

Table 65: ECH_attributes

Information element	Length	Comment
RSW_identifier	1	
BS_identifier	1	

Table 66: ST_ECH_PER_ST

Information element	Length	Comment
Codop	2	
Info_segmented_list	1	
Number	1	number of ECH
ECH_attributes[]	ECH_attributes_LENGTH x number	

ST_ECH_PER_ST includes a list of ECH attributes, made of Number of ECH elements.

Info_segmented_list shall indicate a complete list of ECH_attributes. Segmentation never occurs.

4.8.5. ST_MOCH_PER_ST

Direction: ST ⇨ TCE

Short description: This PDU shall indicate the list of set up MOCH that are within the coverage of a registered ST. The attributes of each MOCH are provided, including MOCH identifier, priority, OG, type of associated cell. The list of MOCH may be segmented into several PDU. Only the registered CCH monitoring ST shall be able to transmit these PDU. This PDU is sent when the list has changed. When the registration is lost an empty list is transmitted. For dispatch no filtering is processed, in the others configurations the list is filtered according to the OG delivered to ST.

Table 67: MOCH_attributes

Information element	Length	Comment
MOCH_identifier	1	
Call_priority	1	priority of the MOCH
OG_identifier	2	
Cell_type	1	
Number	1	number of OG of the list
OG_identifier[]	2 x SIMPLE_OG_MAXNB	

MOCH_identifier, Call_priority, OG_identifier, Number of OG, OG list are attributes of a MOCH.

Cell_type differentiate between district cells and umbrella cell if double coverage applies

The list of OG includes simple (not composed) OG.

Table 68: ST_MOCH_PER_ST

Information element	Length	Comment
Codop	2	
Info_segmented_list	1	
Boolean	1	
Number	1	Number of MOCH
MOCH_attributes[]	MOCH_attributes_LENGTH x Number	attach transaction need indication

ST_MOCH_PER_ST includes a list of MOCH_attributes, made of Number of MOCH elements.

Info_segmented_list shall indicate whether the following list of MOCH_attribute a complete list or not. Segmentation occurs if Number_of_MOCH > MOCH_PER_SEGMENT_MAXNB

Boolean shall indicate if an attach transaction shall be processed when any MOCH is selected or deselected through a radio ST.

4.8.6. ST_TALKGROUP_PER_ST

Direction: ST ⇨ TCE

Short description: This PDU shall provide list of the ST accessible talkgroup. This PDU shall not be transmitted to dispatchers. This PDU contains no information about customer talkgroups.

Table 69: TALKGROUP_attributes

Information element	Length	Comment
OG_identifier	2	
COV_identifier	1	
Cell_type	1	

table 70: ST_TALKGROUP_PER_ST

Information element	Length	Comment
Codop	2	
Info_segmented_list	1	
Boolean	1	
Number	1	Number of talkgroups
Talkgroup_attributes[]	TALKGROUP_attributes_LENGTH.x Number	

Boolean shall indicate if an attach transaction shall be processed when any talkgroup is selected or deselected through a radio ST.

For customer talkgroups only the OG_identifier is significant. COV_identifier is set to COV_NSIG

4.9. Interface control

4.9.1. ST_ALARM_IND

Direction: ST ⇨ TCE

Short description: This PDU shall indicate an ST alarm or a problem. If PDU indicates alarm or fatal problem the ST is no longer available for the TCE except for maintenance and suicide.

Table 71: ST_ALARM_IND

Information element	Length	Comment
Codop	2	
Alarm_type	1	
Alarm_cause	CAUSE_LENGTH	

4.9.2. ST_DEBUG_IND

Direction: ST ⇨ TCE

Short description: This PDU shall indicate an error condition on the interface between the ST and the TCE

Table 72: ST_DEBUG_IND

Information element	Length	Comment
Codop	2	
Codop	2	Erroneous codop
Cause	1	Internal error cause
Number	1	Number of the erroneous information element, in the erroneous PDU
Family_cause	1	Family of error

Erroneous codop indicates the codop of the PDU that ST is unable to treat.

Number is significant only if cause equals « erroneous information element » or « inconsistent information element ».

4.9.3. ST_END_RESYNCHRO

Direction: ST ⇨ TCE

Short description: This PDU shall be sent upon the end of an ST resynchronisation

Table 73: ST_END_RESYNCHRO

Information element	Length	Comment
Codop	2	
Result	1	

4.9.4. ST_FORWARD_STATE

Direction: ST ⇨ TCE

Short description: This PDU shall indicate the forward state of the ST. It is send to confirm a forward request.

Table 74: ST_FORWARD_STATE

Information element	Length	Comment
Codop	2	
Forward_state	1	
Address	5	Host address
Cause_type	1	
Cause	1	
Family_cause	1	

When unconditionally forwarded, the call request to the ST are deviated to the host address.

Cause_type and cause indicate the result of forwarding request.

Family_cause indicates a synthetic cause regrouping values of "cause" field.

4.9.5. ST_INIT

Direction: ST ⇨ TCE

Short description: This PDU shall be sent as an indication that the ST is up and initialised. After transmission of this message ST is waiting for TCE_INIT_ST (duration T1).

Table 75: Trap

Information element	Length	Comment
Trap_identifer	2	
Process_identifier	2	

Table 76: ST_INIT

Information element	Length	Comment
Codop	2	
Interface_version	1	
Reset_origin	1	
Number	1	Number of traps
Trap[]	Trap_LENGTH x TRAP_MAXNB	list of traps
Number	1	Number of alarms
Alarm[]	2 x ALARM_MAXNB	list of alarms
Address	5	ST Address
ST_serial_number	4	ST Serial number
OG_identifier	2	Nominal OG
Software_version	10	
Debug_flag	1	
Debug_class	1	
Forward_state	1	
Address	5	Host address
ST_type	1	
ST_range	1	
Loudspeaker_state	1	
Volume	1	Speech volume
Volume	1	Tone volume
PTT_priority	1	

Interface_version indicates the version of the interface that ST supports. If the version supported by TCE is not compatible (ST version lower than the lowest version supported by TCE), the TCE closes the service of the underlying layer.

Trap list, Alarm list, Debug_flag and Debug_class are used for maintenance or debug.

Host address is related to the forward state of the ST.

ST_Type indicates whether ST is line-connected or radio.

PTT_priority indicates the last PTT priority given to the ST.

4.9.6. ST_RADIO_FIELD_IND

Direction: ST ⇨ TCE

Short description: This PDU shall be sent to indicate the current received BS radio field level. It occurs only on radio ST.

Table 77: ST_RADIO_FIELD_IND

Information element	Length	Comment
Codop	2	
Radio_field_level_indication	1	

4.9.7. ST_REGISTRATION_STATE

Direction: ST ⇨ TCE

Short description: This PDU shall indicate the registration state of the ST.

Table 78: ST_REGISTRATION_STATE

Information element	Length	Comment
Codop	2	
Registration_type	1	
R_base_network	2	
Base_network_identifier	1	
RSW_identifier	1	
BS_identifier	1	
Boolean	1	

Boolean indicates whether a resynchronisation is going. In this case any further transaction initiated by TCE may be refused until the end of resynchronisation.

4.9.8. TCE_ATTACH_REQ

Direction: ST ⇦ TCE

Short description: This PDU shall request ST to process an attach transaction with SwMi . It should be done once the TCE has selected or deselected a MOCH or a talkgroup as it could have been asked by network (Attach.boolean in the list of type of group communication). This request is unused for group call or ECH. For scanning the request is related to the main communication.

Table 79: TCE_ATTACH_REQ

Information element	Length	Comment
Codop	2	
Action_attach	1	
Info_attach	1	
Call_type_attach	1	
COV_identifier	1	
OG_identifier	2	
Reserved : 0xFF	1	

Action_attach shall be to memorise and to send to SwMi.

Info_attach differentiates selection and deselection.

Call_type_attach indicates whether attach transaction concerns a MOCH or a talkgroup.

4.9.9. TCE_CUSTOMER_TALKGROUP_PER_ST

Direction: ST ⇦ TCE

Short description: This PDU shall provide customer talkgroups to the ST via the TCE source, instead of air interface distribution. This PDU shall be unused by dispatchers. This distribution shall be confirmed by the PDU ST_DELIVERED_TALKGROUP_PER_ST. The COV are unknown by TCE so are not delivered to the ST.

Table 80: TCE_CUSTOMER_TALKGROUP_PER_ST

Information element	Length	Comment
Codop	2	
Number	1	Number of OG of the list
OG_identifier[]	2 x CUST_TALKGROUP_MAXNB	Customer OG list

A range of values is reserved for customer OG.

The customer talkgroups which have been downloaded into the ST are indicated by ST_TALKGROUP_PER_ST.

4.9.10. TCE_CONFIG_ST

Direction: ST ⇦ TCE

Short description: This PDU shall request to configure dynamically the monitoring function of ST.

Table 81: TCE_CONFIG_ST

Information element	Length	Comment
Codop	2	
Config_type = CONFIG_TYPE_MONITORING	1	Type
Length	1	Length for TLV « Monitoring »
Monitoring[]	Length	Value(s) for TLV « Monitoring »
Config_type = CONFIG_TYPE_CALL_BEHAVIOUR	1	Type
Call_behaviour	1	Value for TV call_behaviour
Config_type = CONFIG_TYPE_NSIGN	1	

The information element in this PDU shall be encoded according to Type-Value or Type-Length-Value format.

The TCE shall use the following rules :

- Type and Length are encoded on 1 byte each,
- if the information element is TV-encoded, the most significant bit of Type shall be set to 0 ; on the contrary, if the information element is TLV-encoded, the most significant bit of the type shall be set to 1,
- Length is counted in number of bytes of « Value »,
- in TV format encoding, since no indication of length is given, Value is encoded on one byte, to allow compatibility between increasing versions of interface.

Only config_type = CONFIG_TYPE_NSIGN is mandatory to indicate the PDU end.

Monitoring indicates if ST is used for monitoring CCH. This function consists to transmit to the TCE all information broadcast on CCH. A not monitoring ST transmits only the information relative to itself. Table 86 represents a monitoring config_type used for an interface version 3, for a version lower than 3, this element is encoded in TV format. Format of the element could be recognized as his value config_type (0x00 : TV format, 0x80 : TLV format).

Bit 0 of Call_behaviour indicates if incoming calls shall be accepted.

4.9.11. TCE_DEACTIVATE_REQ

Direction: ST ⇦ TCE

Short description: This PDU shall request ST to clear any security parameters and to suicide.

Table 82: TCE_DEACTIVATE_REQ

Information element	Length	Comment
Codop	2	

4.9.12. TCE_FORCED_REGISTRATION

Direction: ST ⇦ TCE

Short description: This PDU shall select the cell where the ST shall register so that the ST roaming capability is disabled. TCE shall control that it is sent to a radio ST.

Table 83: TCE_FORCED_REGISTRATION

Information element	Length	Comment
codop	2	
R_base_network	2	
RSW_identifier	1	
BS_identifier	1	

4.9.13. TCE_FORWARD_REQ

Direction: ST ⇦ TCE

Short description: This PDU shall modify the forward parameters of the ST.

Table 84: TCE_FORWARD_REQ

Information element	Length	Comment
Codop	2	
Action	1	
Address	5	host address

Action indicates whether the forwarding service is activated or deactivated.

The host address is used for calls to be forwarded-to.

4.9.14. TCE_INIT_ST

Direction: ST ⇦ TCE

Short description: This PDU shall be sent upon initialisation of the ST in a window of T1 secs to indicate the different parameters of this applicative connection otherwise ST suicides.

Table 85: TCE_INIT_ST

Information element	Length	Comment
Codop	2	
Interface_version	1	
Working_mode	1	
Polling_timer_duration	1	
Boolean	1	
Reserved	1	
TCE_type	1	
Monitoring	1	

Interface_version indicates the version of the interface that TCE supports. If ST cannot support this version, it sends a message ST_ALARM_IND.

If a Working_mode different from nominal is required, ST resets.

TCE guarantees the sending of any PDU at least every Polling_timer_duration seconds. By default it is set to T2 seconds.

Boolean indicates if interface ST-TCE deals with the call reference.

Monitoring indicates if ST is used for monitoring CCH. This function consists in transmitting to the TCE all information broadcast on CCH. A not monitoring ST transmits only the information relative to itself.

The reserved field is supplied for compatibility.

4.9.15. TCE_LOUDSPEAKER_REQ

Direction: ST ⇦ TCE

Short description: This PDU shall request to activate or deactivate loudspeaker

Table 86: TCE_LOUDSPEAKER_REQ

Information element	Length	Comment
Codop	2	
Loudspeaker_state	1	

Loudspeaker_state indicates whether loudspeaker should be activated or not.

4.9.16. TCE_LOUDSPEAKER_VOL_REQ

Direction: ST ⇦ TCE

Short description: This PDU shall request to increase or decrease loudspeaker volume. ST ignores this PDU if loudspeaker has not been activated.

Table 87: TCE_LOUDSPEAKER_VOL_REQ

Information element	Length	Comment
Codop	2	
Volume	1	speech volume
Volume	1	tone volume

Volumes indicate the volume levels requested from the ST.

4.9.17. TCE_MAINTENANCE

Direction: ST ⇦ TCE

Short description: This PDU shall be sent for maintenance purpose

Table 88: TCE_MAINTENANCE

Information element	Length	Comment
Codop	2	
Command	1	
Debug_flag	1	
Debug_class	1	

Command may indicate to change Debug_flag and Debug_Class or ask for debug reset.

4.9.18. TCE_PRESENCE_ST

Direction: ST ⇦ TCE

Short description: This PDU shall be sent to supervise the link between the ST and the TCE. No applicative answer is needed, the absence of ST will be detected by the link layer. ST is waiting for a PDU from the TCE at least every polling_timer_duration seconds.

When the ST detects that TCE is no longer present, it remains in the current communication, if any, until a network release. No new incoming communication is accepted by the ST. The ST maintains this minimal service till the TCE is present again, and sends the PDU TCE_RESET. In this working state, no other PDU shall be sent by the TCE before TCE_RESET. At the reception of this PDU, the ST resets from scratch, and the TCE shall run the complete init process.

Table 89: TCE_PRESENCE_ST

Information element	Length	Comment
Codop	2	

4.9.19. TCE_RESET

Direction: ST ⇦ TCE

Short description: This PDU shall request the ST to suicide and restart. This PDU may be used to allow restart after detecting ST-SADP disconnection.

Table 90: TCE_RESET

Information element	Length	Comment
codop	2	
Reset_type	1	

4.9.20. TCE_SUICIDE

Direction: ST ⇦ TCE

Short description: This PDU shall request the ST to suicide. This PDU may be used to exit from state of alarms or problems. Except in these latest case the power shall have to be maintain on for T3 in order that the ST can process an detach transaction.

Table 91: TCE_SUICIDE

Information element	Length	Comment
codop	2	

4.9.21. TCE_TONE

Direction: ST ⇦ TCE

Short description: This PDU shall request the ST to generate a tone.

Table 92: TCE_TONE

Information element	Length	Comment
Codop	2	
Tone_type	1	

A Tone_type value is reserved to request to stop to generate a tone.

5. Interpretation and coding of information elements

5.1. Dimensionning parameters

The following parameters are dimensionning parameters for the interface between the ST and the TCE.

ADR_MAXNB	4
ALARM_MAXNB	20
CALL_PER_SCAN_MAXNB	6
CAUSE_LENGTH	39
CUST_TALKGROUP_MAXNB	6
DISTRICT_COV_MAXNB	23
DISTRICT_MOCH_MAXNB	23
DM_DATA_MAXLENGTH	16
ECH_MAXNB	11
INTERFACE_VERSION	3
MOCH_MAXNB	46
MOCH_PER_SEGMENT_MAXNB	15 (in ST_MOCH_PER_ST)
OG_MAXNB	10
RN_LENGTH	2
SUBADDRESS_QUARTET_MAXLENGTH	15 (quartets)
SUBADDRESS_BYTE_MAXLENGTH	8
T1	10 seconds
T2	10 seconds
T3	1 second
TRAP_MAXNB	20
UMBRELLA_COV_MAXNB	23
UMBRELLA_MOCH_MAXNB	23

COV_MAXNB	DISTRICT_COV_MAXNB + UMBRELLA_COV_MAXNB
LOC_TALKGROUP_MAXNB	TALKGROUP_MAXNB
LOC_OG_MAXNB	OG_MAXNB
TALKGROUP_MAXNB	OG_MAXNB
NAT_TALKGROUP_MAXNB	TALKGROUP_MAXNB
NAT_OG_MAXNB	OG_MAXNB
SIMPLE_OG_MAXNB	OG_MAXNB

5.2. Coding of information elements

5.2.1. Action

Purpose: This element indicates the action requested by TCE

Length: 1

Values:

DEACTIVATE	0x00
ACTIVATE	0x01

5.2.2. Action_attach

Purpose: This element indicates the action requested by attach from TCE

Length: 1

Values:

MEMO_AND_SEND	0x02

5.2.3. Activation_mode

Purpose: This element defines the type of group communication, is identical to the following air interface information elements: Activation_Mode.

Length: 1

Values: Same type as on the Air Interface, with a combination of the following bitmap masks

MOCH_ACTIVATION	0x00 for multisite open channel
INTERNAL_ACTIVATION	0x01 for a call to a group by a group member
BROADCAST_ACTIVATION	0x02 for broadcast call
EXTERNAL_ACTIVATION	0x03 for a call to a group by a non-group-member

5.2.4. Address

Purpose: An individual address identifies a potentiallly forwarded-to terminal, a calling party, a called party, a terminal registration originator, a transferred-to terminal.

Length: 5

Values: As defined in the TETRAPOL addressing plan for individual RFSI addresses

5.2.5. Alarm

Purpose: internal, manufacturer reserved ST alarm index. The value is linked with the « Reserved terms » of the information element Alarm_cause.

Length: 2

Values: any, context dependent.

5.2.6. Alarm_cause

Purpose: This element indicates the cause of alarms

Length: CAUSE_LENGTH

Values: string

the values are associated with alarm_type.

FATAL_ALARM	Reserved terms	
FATAL_PROBLEM	Reserved terms	
ORDINARY_ALARM	«60»	(Failed link)
	«61»	(ST-TCE link failure occured)
ORDINARY_PROBLEM	«70»	(Not checked)
	«71»	(Disabled traffic)
	«72»	(Enabled traffic)
	«73»	(Out of window)
MAINTENANCE	«80»	(Adjust pilot)
	«81»	(Change RAM battery)
	«82»	(Alert level)

5.2.7. Alarm_type

Purpose: This element defines the type of alarms of the system terminal

Length: 1

Values:

FATAL_ALARM	0x00
ORDINARY_ALARM	0x01
FATAL_PROBLEM	0x02
ORDINARY_PROBLEM	0x03
MAINTENANCE	0x04

5.2.8. Answer

Purpose: Answer to presence check/ call presentation on implicitly addressed call

Length: 1

Values:

CALL_ACCEPTATION	0x00
CALL_REFUSAL	0x01

5.2.9. Application_type

Purpose: This element defines the service access point for the application in the system terminal

Length: 1

Values:

GROUP_COMMUNICATION_SAP	0x05
ECH_SAP	0x06

5.2.10. Band_identifier

Purpose: Identification of the radio band for direct mode operations.

Length: 1

Values: Any

5.2.11. Base_network_identifier

Purpose: identifies of a base network

Length: 1

Values: As defined by the network

5.2.12. Behaviour_on_incoming_call

Purpose: Defines the expected called ST behaviour, at the reception of the incoming call.

Length: 1

Values: Behaviour_on_incoming_call is a bitmap mask. The use of the bits is :

bit 7 to bit 2 :	0 (unused)
bit 1 :	1 : NO_RING_ON_INCOMING_CALL
	0 : RING_ON_INCOMING_CALL
bit 0 :	1 : AUTOMATIC_INCOMING_CALL_ANSWER
	0 : MANUAL_INCOMING_CALL_ANSWER

The only combinations of values of bits 0 and 1 accepted by the ST are (MANUAL_INCOMING_CALL_ANSWER, RING_ON_INCOMING_CALL) and (AUTOMATIC_INCOMING _CALL_ANSWER, NO_RING_ON_INCOMING_CALL).

Any other combination of these bits will provoque the transmission of a PDU ST_DEBUG_IND.

5.2.13. Boolean

Purpose: Boolean information element

Length: 1

Values:

FALSE, REFUSAL	0x00
TRUE, ACCEPTATION	0x01

5.2.14. BS_identifier

Purpose: identifies a base station connected to a RSW in a base network

Length: 1

Values: As defined by the network

BS_NSIG	0xFF

5.2.15. Call_behaviour

Purpose: Management of the communications

Length: 8 bits (bitmap)

Values:

Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
Unsued	Unsued	Unsued	Unsued	Unsued	Unsued	Unsued	Incoming calls

Bit 0 is set to 1 if calls are to be accepted.

Bit 0 is set to 0 if calls are not to be accepted.

5.2.16. Call_identifier

Purpose: Call identifier for transactions between ST and the SwMI, allocated by the SwMI

Length:1

Values: Any

5.2.17. Call_priority

Purpose: External call set-up priority or activation priority

Length: 1

Values:

NSIG_PRIO	00000000b
ROUTINE_PRIO	00000010b
URGENT_PRIO	00000100b
FLASH_PRIO	00000110b
BROADCAST_PRIO	00001000b
CRISIS_PRIO	00001010b
EMERGENCY_PRIO	00001100b

5.2.18. Call_reference

Purpose: Call reference for transactions between ST and TCE as allocated by the ST.

Length:1

Values: any

NSIG_CALL_REF	0x00

5.2.19. Call_state

Purpose: State of a call

Length: 1

Values:

INACTIVE_CALL	0x00
ACTIVE_CALL	0x01

5.2.20. Call_type

Purpose: Type of TETRAPOL call

Length: 1

Values:

PRIVATE_CALL_TYPE	0x00
PABX_CALL_TYPE	0x01
MOCH_TYPE	0x02
ECH_TYPE	0x03
BROADCAST_TYPE	0x04
PRIVATE_INTRUSION_TYPE	0x0B
MOCH_INTRUSION_TYPE	0x0C
ECH_INTRUSION_TYPE	0x0D

DISPATCH_POSITION_CALL_TYPE	0x0F
TALKGROUP_TYPE	0x20
SEQUENTIAL_LISTENING_SCAN_TYPE	0x21
PRIORITY_SCAN_TYPE	0x22

5.2.21. Call_type_attach

Purpose: Type of call which is attached to SwMi

Length: 1

Values:

MOCH_TYPE_ATTACH	0x01
TALKGROUP_TYPE_ATACH	0x02

5.2.22. Cause

Purpose: Cause

Length: 1

Values:

Cause indications from the ST

PROTOCOL_CAUSE	0x00 to 0X04	failure
INTERNAL_APPLI_CAUSE	0x00 to 0x1F	failure
	0x20	normal
	0x21 to 0x28	failure
	0x29	transfer OK
	0x2A to 0x2B	encryption error
	0x60	forwarding accepted
	0x61	
	0x62	already forwarded
	0x63	already not forwarded
	0x64 to 0x69	error
	0x90	ST busy
	0x91	erroneous information element
	0x92	inconsistent information element

EXTERNAL_APPLI_CAUSE	COMMON CAUSES	- 00 -	normal
		- 01 -	abnormal release
		- 02 -	terminal pre-emption
		- 03 -	resource pre-emption
		- 04 -	insufficient TCH quality
		- 05 -	cleared by user
		- 06 -	power supply failure
		- 07 -	application event
		- 08 -	identification error
		- 09 -	unknown calling party
		- 0A -	service barred calling party
		- 0B -	service barred called party
		- 0C -	software fault
		- 0D -	service not implemented
		- 0E -	lack of resources

	- 0F -	operator decision
	- 10 -	protected call
	- 11 -	end of ringing
	- 12 -	voice inactivity
	- 13 -	host address not valid
	- 14 -	double forwarding
	- 15 -	inconsistent address
	- 16 -	network event
	- 17 -	key error
	- 18 -	intrusion
	- 19 -	encryption error
	- 1A -	terminal not configured
	- 1B -	remote ST synchronisation
	- 1C -	coverage fault
	- 1D -	unreachable master switch
	- 20 -	unknown PDU
	- 21 -	missing mandatory IE
	- 22 -	missing conditional IE
PRIVATE CALL	- 40 -	no reply from called party
	- 41 -	called party absent
	- 42 -	called party busy
	- 43 -	unreachable remote terminal
	- 44 -	unknown called user
	- 45 -	double forwarding
	- 46 -	all called parties rejected
	- 47 -	transfer failure
	- 48 -	user refusal
	- 49 -	called terminal not configured
	- 4A -	address cannot be parsed
	- 4B -	unknown sub-address field
	- 4C -	PABX subscriber busy
	- 4D -	internal ST-TCE link fault
	- 4E -	TCE fault
	- 4F -	internal ST-TCE link re-establishment
	- 50 -	TCE re-establishment
	- 51 -	transfer
GROUP COMMUNICATION	- 80 -	open channel not created
	- 81 -	open channel already set-up
	- 82 -	unknown open channel
	- 83 -	open channel cannot be set-up
	- 84 -	coverage not guaranteed
	- 85 -	open channel number not valid
	- 86 -	cell out of coverage
	- 87 -	maximum open channel duration reached
	- 88 -	maximum activation time reached
	- 89 -	communication change
EMERGENCY OPEN CHANNEL	- AO -	emergency open channel call
KEY	- BO -	authentication error
	- B1 -	home switch access fault
REGISTRATION	- E0 -	ST not valid
	- E1 -	inconsistent ST
	- E2 -	unreachable HRSW
	- E3 -	non-explicit address
	- E4 -	ST registration disabled
	- E5 -	SwMI database updating

- E6 - ST assigned to an attachment cell
- E7 - ST cannot be authenticated
- E8 - congestion
- E9 - RSW saturation
- EA - MSW saturation
- EB - HRSW saturation
- EC - out of window
- ED - ST registration filtered

5.2.23. Cause_type

Purpose: Type of cause

Length: 1

Values:

PROTOCOL_CAUSE	0x00
INTERNAL_APPLI_CAUSE	0x01
EXTERNAL_APPLI_CAUSE	0x02

5.2.24. Cell_type

Purpose: Differentiate between district cells and umbrella cell in case of double coverage

Length: 1

Values:

DISTRICT_CELL	0x00
UMBRELLA_CELL	0x01

5.2.25. Channel_identifier

Purpose: Channel identifier for direct mode operations.

Length: 2

Values: any

5.2.26. Codop

Purpose: The code of operation between ST and TCE is the first element of each applicative message.

Length: 2

Values:

ST_MSG	0x7900
TCE_MSG	ST_MSG+0X30

ST_INIT	ST_MSG+0x00
ST_REGISTRATION_STATE	ST_MSG+0x01
ST_END_RESYNCHRO	ST_MSG+0x02
ST_TRANSMIT_IND	ST_MSG+0x03
ST_FORWARD_STATE	ST_MSG+0x04
ST_ALARM_IND	ST_MSG+0x05
ST_MOCH_PER_ST	ST_MSG+0x06
ST_ECH_PER_ST	ST_MSG+0x07
ST_ACTIVATION_IND	ST_MSG+0x08
ST_EMERGENCY_NOTIFICATION	ST_MSG+0x09
ST_STATUS_IND	ST_MSG+0x0A
ST_PRESENCE_CHECKING	ST_MSG+0x0B
ST_HOOK_ON_INVITATION	ST_MSG+0x0C
ST_INCOMING_SETUP	ST_MSG+0x0D
ST_ALERTING	ST_MSG+0x0E
ST_CONNECT	ST_MSG+0x0F
ST_CALL_SUSPEND	ST_MSG+0x10
ST_END	ST_MSG+0x11
ST_CALL_SWITH	ST_MSG+0x12
Reserved	ST_MSG+0x13
ST_DEFAULT_CALL_IND	ST_MSG+0x14
STATUS_CONF	ST_MSG+0x15
ST_ DELIVERED _OG_PER_ST	ST_MSG+0x16
ST_DELIVERED_TALKGROUP_PER_ST	ST_MSG+0x17
ST_COV_PER_CELL	ST_MSG+0x18
ST_ENCRYPTION_MODE	ST_MSG+0x19
ST_CALL_REFERENCE	ST_MSG+0x1A
ST_DEBUG_IND	ST_MSG+0x1B
ST_RECEIVE_DETECTION	ST_MSG+0x1C
ST_CELL_ACTIVATION_IND	ST_MSG+0x1D
ST_DM_ACTIVITY_NOTIFICATION	ST_MSG+0x1E
ST_DM_CONNECT	ST_MSG+0x1F
ST_DM_CALL_STATE_IND	ST_MSG+0x20
ST_INCOMING_GROUP_CALL	ST_MSG+0x21
ST_TALKGROUP_PER_ST	ST_MSG+0x22
ST_DM_DATA_IND	ST_MSG+0x23
ST_RADIO_FIELD_IND	ST_MSG+0x24
ST_TRANSFER_IND	ST_MSG+0x25
ST_DM_DATA_CONF	ST_MSG+0x26
ST_PTT_REQUEST_IND	ST_MSG+0x27
ST_PTT_RELEASE_IND	ST_MSG+0x28
ST_CRISIS_NOTIFICATION	ST_MSG+0x29
ST_BROADCAST_CALL_NOTIFICATION	ST_MSG+0x2A

TCE_INIT_ST	TCE_MSG+0x00
TCE_FORWARD_REQ	TCE_MSG+0x01
TCE_PRESENCE_ST	TCE_MSG+0x02
TCE_SUICIDE	TCE_MSG+0x03
TCE_TONE	TCE_MSG+0x04
TCE_MAINTENANCE	TCE_MSG+0x05
TCE_STATUS_REQ	TCE_MSG+0x06
TCE_PRESENCE_CHECKING_RESP	TCE_MSG+0x07
TCE_OUTGOING_SETUP	TCE_MSG+0x08
TCE_CALL_ANSWER	TCE_MSG+0x09
TCE_WITHDRAWAL	TCE_MSG+0x0A
TCE_MOCH_SETUP	TCE_MSG+0x0B
TCE_MOCH_RELEASE	TCE_MSG+0x0C
TCE_INTRUSION	TCE_MSG+0x0D
TCE_REMOTE_CALL_CLEARING	TCE_MSG+0x0E
TCE_TRANSFER	TCE_MSG+0x0F
TCE_ECH_SETUP	TCE_MSG+0x10
TCE_ECH_RELEASE	TCE_MSG+0x11
TCE_DEFAULT_CALL_ENTER	TCE_MSG+0x12
TCE_DEFAULT_CALL_RESP	TCE_MSG+0x13
TCE_DEFAULT_CALL_WITHDRAWAL	TCE_MSG+0x14
TCE_SET_MANUAL_KEY	TCE_MSG+0x15
TCE_USE_MANUAL_KEY	TCE_MSG+0x16
TCE_SET_DEFAULT_CALL	TCE_MSG+0x17
TCE_SCAN_RESUME	TCE_MSG+0x18
TCE_FALLBACK_MOCH_ENTER	TCE_MSG+0x19
TCE_FORCED_REGISTRATION	TCE_MSG+0x1A
TCE_CUSTOMER_TALKGROUP_PER_ST	TCE_MSG+0x1B
TCE_DM_ENTER	TCE_MSG+0x1C
TCE_DM_LISTEN	TCE_MSG+0x1D
TCE_DM_WITHDRAWAL	TCE_MSG+0x1E
TCE_PTT_REQUEST	TCE_MSG+0x1F
TCE_PTT_RELEASE	TCE_MSG+0x20
TCE_OUTGOING_GROUP_CALL	TCE_MSG+0x21
TCE_LOUDSPEAKER_REQ	TCE_MSG+0x22
TCE_LOUDSPEAKER_VOL_REQ	TCE_MSG+0x23
TCE_ATTACH_REQ	TCE_MSG+0x24
TCE_DEACTIVATE_REQ	TCE_MSG+0x25
TCE_DM_DATA_REQ	TCE_MSG+0x26
TCE_CONFIG_ST	TCE_MSG+0x27
TCE_RESET	TCE_MSG+0x28
TCE_ECH_SETUP_DP_RESP	TCE_MSG+0x29
TCE_REMOTE_PTT_ REQUEST	TCE_MSG+0x2A
TCE_DM_ENCRYPTION	TCE_MSG+0x2B
TCE_PTT_PRIORITY_CHANGE_REQ	TCE_MSG+0x2C

5.2.27. Command

Purpose: Maintenance command

Length: 1

Values:

ST_RESET	0
CLEAR_ST_MEMORY	1
CHANGE_DEBUG_CLASS	2
REGISTER	3
CLEAR_ST_ALERT_RECORDER	4
PERSO_MODE_RESET	5
DEBUG_MODE_RESET	6
DEBUG_MODE_DELAYED_RESET	7
CLEAR_COUNTER_SOFTVERSION	8

5.2.28. Config_type

Purpose: Defines the element of configuration requested by TCE

Length: 1

Values:

The element of configuration shall be encoded in TV or TLV format. The most significant bit of Config_type shall differentiate the two formats :

- if MSB Config_type = 0 the element shall be encoded in TV format and shall use one octet.

- if MSB Config_type = 1 the element shall be encoded in TLV format and the next octet shall therefore include the length except in case of CONFIG_TYPE_NSIGN that is reserved value.

CONFIG_TYPE_MONITORING	0x00
CONFIG_TYPE_CALL_BEHAVIOUR	0x01
CONFIG_TYPE_MONITORING	0x80
CONFIG_TYPE_NSIGN	0xFF

According to Interface version, CONFIG_TYPE_MONITORING will be used with two values (0x00 or 0x80).

CONFIG_TYPE_MONITORING equals 0x00 for an Interface version lower than 3, it was encoded in TV format and the length value is one byte.

For an Interface version of 3 and above, CONFIG_TYPE_MONITORING equals to 0x80 (in this case it is encoded in TLV format).

5.2.29. Data

Purpose: byte-formatted information ; the content is given by the TCE.

Length: 1

Values: Any, context dependent.

5.2.30. Debug_class

Purpose: Proprietary debug class

Length: 1

Values:

CLASS_DEBUG_0	0x01
CLASS_DEBUG_2	0x04
CLASS_DEBUG_3	0x08
CLASS_DEBUG_4	0x10
CLASS_DEBUG_5	0x20
CLASS_DEBUG_6	0x40
CLASS_DEBUG_7	0x80

5.2.31. Debug_flag

Purpose: Proprietary debug flag

Length: 1

Values:

FLAG_ON	0x39
FLAG_OFF	0x45

5.2.32. Direct_mode_operation_mode

Purpose: Defines operational mode.

Length: 1

Values: DM_MODE 0x01

5.2.33. Dm_action

Purpose: Defines DM listening.

Length: 1

Values: Dm_action is a bitmap mask. The use of the bits is :

bit 7 to bit 2 :	0 (unused)
bit 1 :	1 : DM_LISTEN_TYPE_DMNM
	0 : DM_LISTEN_TYPE_CHANNEL_WATCHOVER
bit 0 :	1 : DM_LISTEN_BEGIN
	0 : DM_LISTEN_END

5.2.34. Encryption_state

Purpose: Encryption state of a call

Length: 1

Values:

CLEAR_SPEECH	0x00
NETWORK_ENCRYPTION	0x01
MANUAL_ENCRYPTION	0x02

Erreur! Signet non défini. **Family_cause**

Purpose: Family_cause of error. This cause is regrouping and transcription of internal cause managed by the TETRAPOL system.

Length: 1

Values:

Family_cause	label	Comment
- 00 -	call over	No error. Normal cause of end of a transaction
- 01 -	forward processed	for forward request
- 02 -	forward canceled	for forward cancel request
- 03 -	transfer accepted	for transfer request
	SwMI error causes	Error causes. Request is rejected and/or abandoned
- 40 -	network failure	
- 41 -	network overload	lack of resources in SwMI
- 42 -	remote link failure	error detected on called terminal link to SwMI
- 43 -	link failure	error detected on AG link to SwMI
- 44 -	lost station	link to LABS is lost
- 45 -	distant preempted	distant terminal preempted by an incoming call
- 46 -	no_answer	all terminals reject the call (call later)
- 47 -	unknown number	composed address unknown in adressing plan
- 48 -	not registered	requesting AG not registered
- 49 -	forbidden service	service permanently forbidden
- 4A -	refused service	conditions for service are not fulfilled
- 4B -	called terminal busy	
- 4C -	already forwarded	double forwarding request
- 4D -	open channel already setup	for MOCH, EMOCH, Broadcast call, ECH
- 4E -	maximum OG exceeded	for broadcast call
- 4F -	roaming station	release because of change of registering station
- 50 -	priority message	preemption of ongoing service because of data message
- 51 -	priority incoming	preemption of ongoing service because of incoming voice communication
- 52 -	priority application	preemption of ongoing service because of network application
- 53 -	notified call	failure to setup an individual call to an operator with notification of the operator
	AG error causes	

- A0 -	AG busy	AG is busy in an ongoing service
- A1 -	bad parameter value for AG	
- A2 -	forbidden service for AG	

5.2.35. Forward_state

Purpose: Forward state of a terminal or an access gate

Length: 1

Values:

NOT_FORWARDED	0
FORWARDED	1

5.2.36. Group_call_type

Purpose: Type of group call

Length: 1

Values:

INTERN_GROUP_CALL	0x00
EXTERN_GROUP_CALL	0x01

5.2.37. Info_activation

Purpose: Information on activation being performed : begin, end or fail

Length: 1

Values:

INFO_ACTIVATION_START	0x00
INFO_ACTIVATION_END	0x01
INFO_CHANNEL_BUSY	0x02
INFO_UNKNOWN_CALL	0x03
INFO_NO_CHANNEL_AVAILABLE	0x04
INFO_TIMEOUT_PENDING_ACTIVATION	0x05
INFO_ALREADY_ACTIVE_CALL	0x06
INFO_UNKNOWN_KEY_INDEX	0x07
INFO_UNCONSISTENT_KEY_INDEX	0x08

5.2.38. Info_attach

Purpose: Information sent to SWMI by the attach transaction

Length: 1

Values:

BEGIN_USER_CHOSEN_COMMUNICATION	0x01
END_USER_CHOSEN_COMMUNICATION	**0x02**

5.2.39. Info_segmented_list

Purpose: Management of a list of segmented data: the last segment of a list is valued with END_OF_LIST, others with PARTIAL_LIST

Length: 1

Values:

END_OF_LIST	0x00
PARTIAL_LIST	0x01

5.2.40. Interface_version

Purpose: version of system terminal control interface

Length: 1

Values:

INTERFACE_VERSION	0x03

5.2.41. Intrusion_type

Purpose: type of the intruded communication.

Length: 1

Values:

PRIVATE_INTRUSION_TYPE	0x0B

5.2.42. Key_reference

Purpose: As an encryption key index, over this interface the key_reference information element does not contain any actual encryption key, but assumes key_type=0 and indicates whether clear speech applies or whether the encryption mode is decided by the network.

Length: 1

Values:

NETWORK_SELECTED_INDEX	0xFF
CLEAR_SPEECH_INDEX	0x00

5.2.43. Length

Purpose: Octet length

Length: 1

Values: Context dependent

5.2.44. Loudspeaker_state

Purpose: State of the external loudspeaker

Length: 1

Values:

LOUDSPEAKER_OFF	0x00
LOUDSPEAKER_ON	0x01

5.2.45. Manual_encrypted_communication_index

Purpose: this information element indicates which communication of a list is concerned by manual encryption.

Length: 1

Values: Any between 1 and the number of communications of the list.

NO_MANUAL_ENCRYPTED_COMMUNICATION 0xFF

5.2.46. Manual_key_modifier

Purpose: Key modifier for a manual encryption

Length: 4

Values: Any

5.2.47. Manual_key_modifier_index

Purpose: index of an element among the manual key modifiers

Length: 1

Values:

Manual_key_modifier_index is significant between MANUAL_KEY_MIN and MANUAL_KEY_MAX

NSIG_MANUAL_KEY	0xFF
MANUAL_KEY_MIN	0
MANUAL_KEY_MAX	9

5.2.48. Monitoring

Purpose: Monitoring indicates for which PDUs the ST is used for CCH monitoring. This information is a member of a TLV.

Length: 1

Values:

Monitoring is a bitmap indicating the PDUs that the ST is expected to transmit to the TCE, among these ones :

MONIT_ST_MOCH_PER_ST	0x01
MONIT_ST_ECH_PER_ST	0x02
MONIT_ST_EMERGENCY_NOTIFICATION	0x04
MONIT_ST_COV_PER_CELL	0x08
MONIT_ST_CELL_ACTIVATION_IND	0x10
MONIT_ST_CRISIS_NOTIFICATION	0x20
MONIT_ST_BROADCAST_CALL_NOTIFICATION	0x40
MONIT_ST_STATUS_IND	0x80

5.2.49. MOCH/COV_identifier

Purpose: MOCH identifier or coverage identifier

Length: 1

Values: As defined by the network

COV_NSIG	0x00

5.2.50. Number

Purpose: Number of elements in a list, number of one element of a list.

Length: 1

Values: Allowed range of values is context dependent, 0-255 is default range of values

5.2.51. OG_identifier

Purpose: Operational group identifier

Length: 2

Values: As defined in the external addressing plan for operational groups.

ALL_OG	0x0FFF

5.2.52. Organization

Purpose: In a multi-organization context, this information element indicates the organization concerned by a PDU.

Length: 1

Values: Any.

5.2.53. Polling_timer_duration

Purpose: Timer duration in secs

Length: 1

Values: Any. The default value is 5 seconds. It shall be used if TCE_ST_INIT indicates 0 for polling_timer_duration.

5.2.54. PTT_on_CCH_communication_index

Purpose: this information element indicates which communication of a list shall be activated on a PTT request when the ST is on CCH.

Length: 1

Values: Any between 1 and the number of communications of the list.

NO_PTT_ON_CCH_COMMUNICATION	0xFF

5.2.55. PTT_priority

Purpose: New expected PTT priority

Length: 1

Values:

PTT_PRIORITY_MIN	0x00
PTT_PRIORITY_MAX	0x0F
PTT_PRIORITY_NULL	0x00
PTT_PRIORITY_NORMAL	0x01

5.2.56. Process_identifier

Purpose: Proprietary debug information

Length: 1

Values: any

5.2.57. Power

Purpose: Indicates the power, in dBm, requested for data sending on direct radio channel. The value of this information element shall belong to the range given below ; but all the values of this range are not available for all ST types. The real emission power given by the ST against this information element depends on the ST type.

Length: 1

Values: between POWER_MIN and POWER_MAX.

POWER_MIN	10
POWER_MAX	40

5.2.58. R_base_network

Purpose: Identifier of a base network in the individual addressing plan

Length: RN_LENGTH

Values: 000 to 999 binary coded decimal, in the lower quartets as defined in the TETRAPOL addressing plan

5.2.59. Radio_field_level_indication

Purpose: Indication of the level of the BS radio field

Length: 1

Values:

RADIO_FIELD_LEVEL_1	0x01
RADIO_FIELD_LEVEL_2	0x02
RADIO_FIELD_LEVEL_3	0x03
RADIO_FIELD_LEVEL_4	0x04

(As an indication :

RADIO_FIELD_LEVEL_1	received BS radio field weakest then -110 dBm
RADIO_FIELD_LEVEL_2	received BS radio field between -110 and -100 dBm
RADIO_FIELD_LEVEL_3	received BS radio field between -100 dBm - 80 dBm
RADIO_FIELD_LEVEL_4	received BS radio field strongest then -80 dBm)

5.2.60. Reception_Info

Purpose: Miscellaneous information on speech reception state

Length: 1

Values:

RECEPTION_END	0
RECEPTION_BEGIN	1
NO_RECEPTION	2
TPI	3

5.2.61. Reference

Purpose: Message identificator

Length: 2

Values: any, between 0 and 65535.

5.2.62. Reference_type

Purpose: Type of a call reference

Length: 1

Values:

CURRENT_REF	0x00
NEW_REF	0x01

5.2.63. Registration_type

Purpose: Registration type

Length: 1

Values:

BSC_FALLBACK_REG_FBM32	0x00
REG	0x01
NOT_REG	0x02
BS_FALLBACK_REG_FBM31	0x03
IDR_REG	0x04
CELL_RESELECT_NOT_REG	0x05
DEFERRED_REG	0x06
MAIN_SWITCH_FALLBACK_REG_FBM2	0x07
NULL_REG	0xFF

BSC_FALLBACK_REG_FBM32 is used for BSC-disconnected mode.
REG is used when ST is registered.
NOT_REG is used when ST is selecting a CCH.
BS_FALLBACK_REG_FBM31 is used for radioswitch disconnected mode.
IDR_REG is used when ST communicates via an Independent Digital Repeater
CELL_RESELECT_NOT_REG is used when ST is reselecting a CCH.
DEFERRED_REG indicates a saturation
MAIN_SWITCH_FALLBACK_REG_FBM2 is used for a main switch disconnected mode
NULL_REG is set by default.

5.2.64. Reset_origin

Purpose: indicates the origin of System terminal reset

Length: 1

Values:

POWER_ON	0x00
ALARM	0x01 or 0x10
TRAP	0x02
SOFTWARE_WATHDOG	0x03
POWER_FAILURE	0x04
HARDWARE_WATHDOG	0x05
POWER_INIT	0x06

5.2.65. Reset_type

Purpose: extra information about the reset requested by TCE.

Length: 1

Values: any ; the reserved values are the following :

RESET_TYPE_NORMAL	0x00

5.2.66. Result

Purpose: Result of transactions : status emission, data transmission on a direct channel, resynchronization

Length: 1

Values:

OK	0x01
NOK	0x00

5.2.67. RSW_identifier

Purpose: Identify a radio switch

Length: 1

Values: As defined by the network

RSW_NSIG	0xFF

5.2.68. Software_version

Purpose: Software version for proprietary usage

Length: 10

Values: Manufacturer specific

5.2.69. ST_Range

Purpose: ST Range

Length: 1

Values: Any, the following values are Matra Nortel Communications reserved.

ST_RANGE_2600	0x00
ST_RANGE_2600A	0x03
ST_RANGE_2600I	0x05
ST_RANGE_9600	0x09
ST_RANGE_9600E	0x0E
ST_RANGE_NSIG	0xFF

5.2.70. ST_serial_number

Purpose: Equipment serial number

Length: 4

Values: Manufacturer specific

5.2.71. ST_type

Purpose: radio connection or line connection to SwMI

Length: 1

Values:

LINE	0x01
RADIO	0x00

5.2.72. Status_code

Purpose: Type of status sent

Length: 1

Values: any from 0x01 to 0xBF, and the following reserved values :

STATUS_EMERGENCY_STATUS	0xC0
STATUS_DISPATCHER_CALL	0x00
Reserved	0xC1
Reserved	0xC2
Reserved	0xC3
Reserved	0xC4
Reserved	0xC5
Reserved	0xC6
Reserved	0xC7
Reserved	0xC8
Reserved	0xC9
Reserved	0xCA
Reserved	0xCB
Reserved	0xCC
Reserved	0xCD
Reserved	0xCE
Reserved	0xCF
Reserved	0xD0
Reserved	0xD1
Reserved	0xD2
Reserved	0xD3
STATUS_EMERGENCY_SETUP_REQ	0xD4
STATUS_EMERGENCY_SETUP_IND	0xD5
STATUS_CRISIS_CALL_SETUP_REQ	0xD6
STATUS_CRISIS_CALL_SETUP_IND	0xD7
STATUS_DISPATCHER_EMERGENCY_CALL	0xD8
STATUS_DISPATCHER_CALL_FAILURE_IND	0xD9

5.2.73. Status_info

Purpose: Additional free use information

Length: 1

Value : Consistent values of this information element depend on the value of the information element Status_code :

For the following values of Status_code :

STATUS_EMERGENCY_SETUP_REQ
STATUS_EMERGENCY_SETUP_IND
STATUS_CRISIS_CALL_SETUP_REQ
STATUS_CRISIS_CALL_SETUP_IND
STATUS_DISPATCHER_EMERGENCY_CALL
STATUS_DISPATCHER_CALL_FAILURE_IND

Status_info equals the organization of the status sender.

For Status_code value STATUS_EMERGENCY_STATUS, Status_info shall be set to :

STATUS_INFO_NSIG	0x00

For other values of Status_code, the value of Status_info is user free.

5.2.74. Status_type

Purpose: Status type

Length: 1

Values:

TERMINAL_STATUS_TYPE	0x00
DISPATCHER_STATUS_TYPE	0x01

5.2.75. Subaddress

Purpose: subaddress for a PABX call

Length: SUBADDRESS_BYTE_MAXLENGTH

Values: as defined in the addressing plan

5.2.76. Subaddress_quartet_length

Purpose: this element information indicates the number of significant quartets in a subaddress.

Length: 1

Values: Any, from 1 to SUBADDRESS_QUARTET_MAXLENGTH, depending on the context.

5.2.77. Target_ST_mode

Purpose: Defines other informations about the state of the target ST, during a forced transmission on voice circuit.

Length: 1

Values: Target_ST_mode is a bitmap mask. The use of the bits is :

bit 7 to bit 1 :	0 (unused)
bit 0 :	1 : TARGET_ST_KEYBOARD_NOT_LOCKED 0 : TARGET_ST_KEYBOARD_LOCKED

5.2.78. TCE_type

Purpose: indicates the type of terminal control equipment connected

Length: 1

Values:

SADP	0x00
DAC	0x01
OBC	0x02

5.2.79. Tone_type

Purpose: Type of tone

Length:

Values:

RING_TONE	0x00
EMERGENCY_RING_TONE	0x01
PROCEEDING_TONE	0x02
BUSY_TONE	0x03
END_TONE	0x0A

5.2.80. Transmission_duration

Purpose: indicates the duration during which the target ST of a TCE_REMOTE_PTT_REQUEST PDU is expected to transmit on voice circuit.

Length: 1

Values:

NSIG_TRANSMISSION_DURATION	0X00
4_SECOND_TRANSMISSION_DURATION	0x01
8_SECOND_TRANSMISSION_DURATION	0x02
12_SECOND_TRANSMISSION_DURATION	0x03
16_SECOND_TRANSMISSION_DURATION	0x04
20_SECOND_TRANSMISSION_DURATION	0x05
24_SECOND_TRANSMISSION_DURATION	0x06
28_SECOND_TRANSMISSION_DURATION	0x07

5.2.81. Transmission_Info

Purpose: Miscellaneous information on speech transmission state

Length: 1

Values:

TRANSMISSION_END	0
TRANSMISSION_BEGIN	1
END_TOO_LONG_TRANSMISSION	2-- anti-gossip timeout
DISCREET_TRANSMISSION_END	3
DISCREET_TRANSMISSION_BEGIN	4

5.2.82. Trap_Identifier

Purpose: Proprietary debug information

Length: 2

Values: any

5.2.83. Volume

Purpose: indicates the volume requested on the loudspeaker.

Length: 1

Values: Volume is set between

VOLUME_MIN	0x00
VOLUME_MAX	0x07

5.2.84. Working_mode

Purpose: Working mode of the ST. TCE uses only the normal mode.

Length: 1

Values:

NORMAL	0x00
DEBUG	0x01
PERSO	0x02

6. Applicative protocol procedures

The purpose of this chapter is to highlight some significant data flows diagrams between the ST and the TCE.

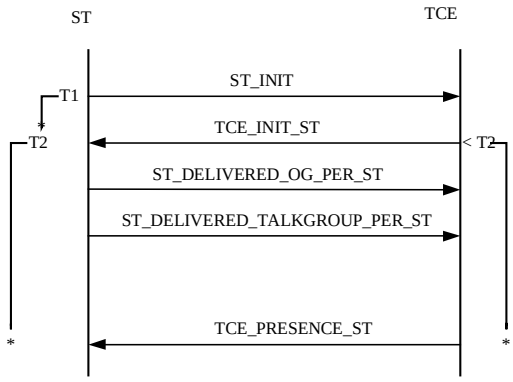
Every chapter presents basic procedures then shows more complex data flows diagrams.

Some applicative STCP exchanges may be dependant of the configuration of ST (CCH monitoring, linked with OBC). They are shown with dotted lines.

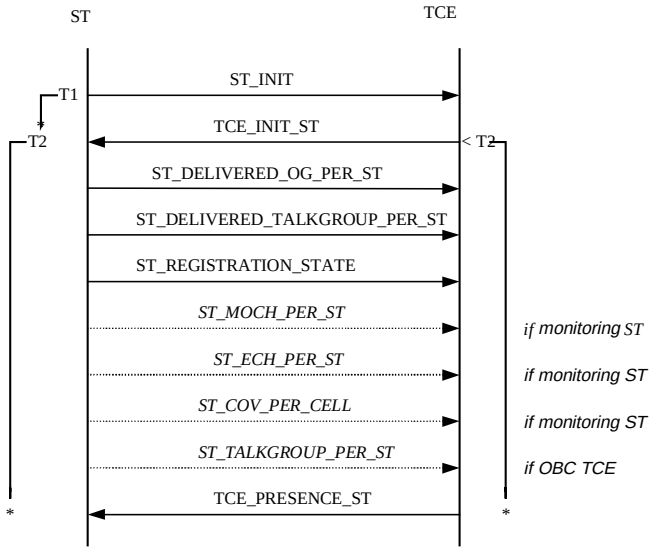
The presence indication and the associated timer (T2) are only shown in the chapter about supervision (6.1).

6.1. Connection establishment and supervision

6.1.1. Applicative connection



6.1.2. Initalisation and registration



6.2. Private call

The private call procedure apply to the following basic services : individual call and multi-party call

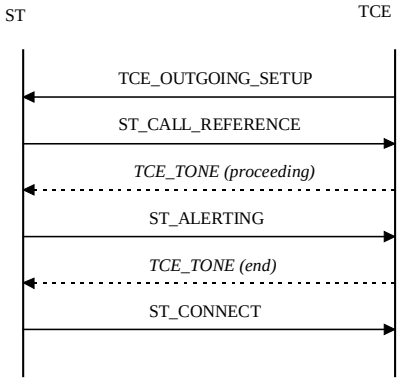
6.2.1. Outgoing private call set-up

On receipt of the set-up request, the ST, shall allocate a call reference over STCP interface. The TCE is informed when the call party is located and rung with ST_ALERTING. Upon receipt of ST_CONNECT, the TCE is informed that the call is established.

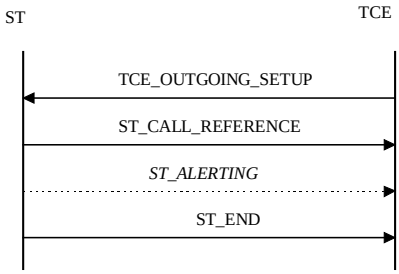
In case of unsuccessful set-up on SwMI side ST_END that indicates the cause is transmitted to TCE. TCE shall not withdraw from the call before having received the call reference.

The tone requests that are indicated below are indicative and optional.

6.2.1.1. Successful case



6.2.1.2. Unsuccessful case



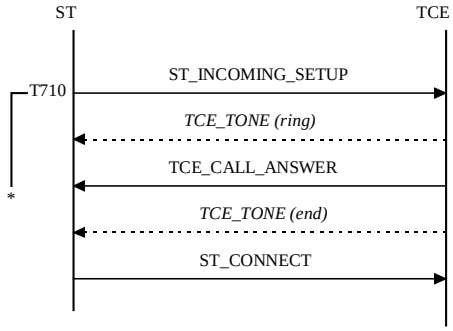
ST_ALERTING may not be transmitted

6.2.2. Incoming private call set-up

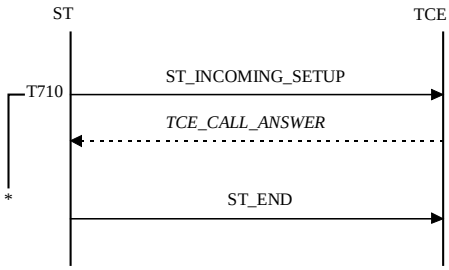
The TCE is informed of the call set-up which ST_INCOMING_SETUP that contains a call reference. Upon completion of the call establishment ST shall send ST_CONNECT.

In case of unsuccessful set-up either on SwMI side either on TCE side (no answer), the TCE shall be informed by ST_END that contains the cause of failure.

6.2.2.1. Successful case

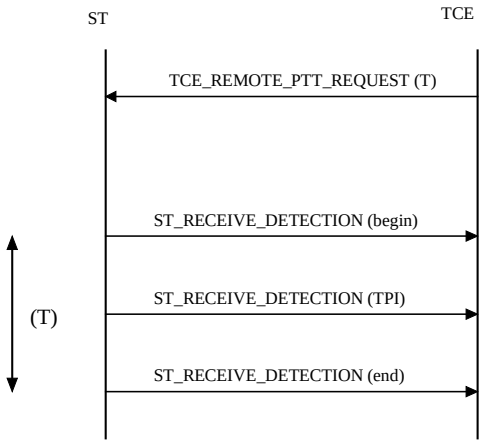


6.2.2.2. Unsuccessful case



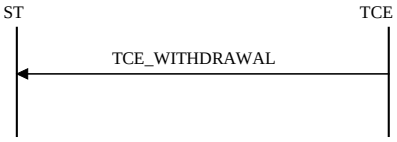
6.2.3. Remote PTT request - successful case

If the request succeeds, the target ST shall transmit on voice circuit during T.



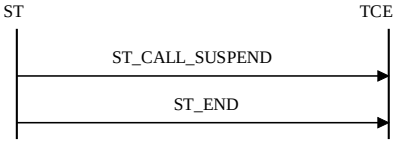
6.2.4. Withdrawal

The withdrawal request shall always succeed from the TCE point of view, so that ST turns to idle



6.2.5. Release

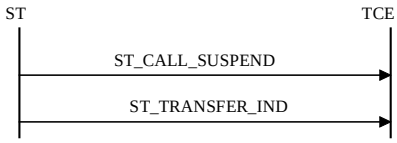
ST_CALL_SUSPEND informs the TCE the ST returns to CCH. The ST shall provide in ST_END the cause and deallocate the call reference.



6.2.6. Release due to the transfer of the distant talking party ST by the SwMI (following an outgoing private call only), and setup of a « new » communication, with another distant talking party ST.

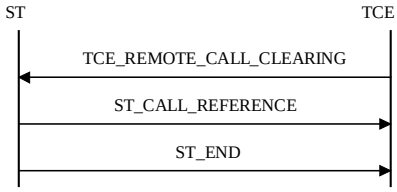
ST_CALL_SUSPEND informs the TCE the ST returns to CCH.

ST_TRANSFER_IND indicates the new talking party address, and the attributes of the new communication.



6.2.7. Remote call clearing

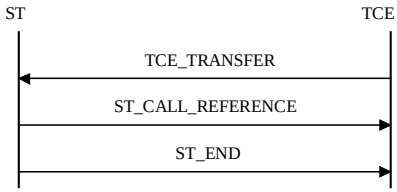
The scenario applies to a private call to which the TCE does not participate. The result of the transaction shall be provided in ST_END.



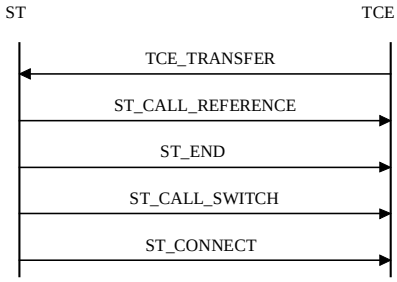
6.2.8. Transfer

The TCE may request the SwMI to transfer an ongoing call to another ST. The result of the request shall be provided in ST_END. In unsuccessful case, the ST shall automatically return to the ongoing call.

6.2.8.1. Successful case



6.2.8.2. Unsuccessful case

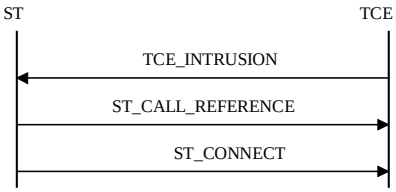


6.2.9. Intrusion

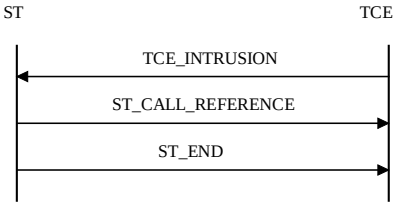
The call identity supplied by TCE shall be the private call calling address. The procedure for withdrawal and for release shall be similar to those for a private call.

The result of request and the cause if it is relevant shall be supplied in ST_END.

6.2.9.1. Successful case



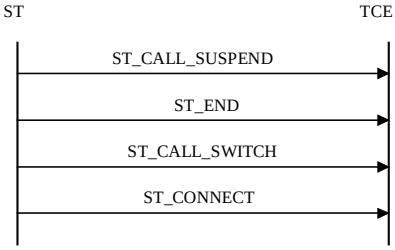
6.2.9.2. Unsuccessful case



6.2.10. Data flow Diagrams

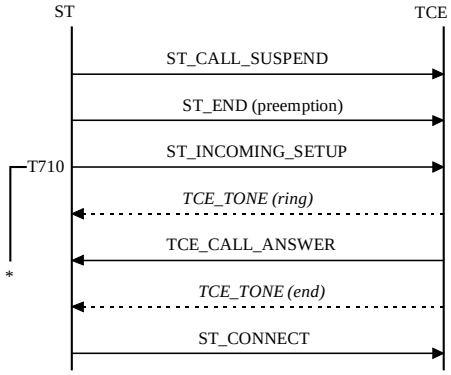
6.2.10.1. Successful setup preempting an ongoing private call

ST is on TCH private call. ST withdraws from the current call with ST_END and informs TCE of the call switch with ST_CALL_SWITCH that contains a call reference. Upon completion of the call establishment ST shall send ST_CONNECT.



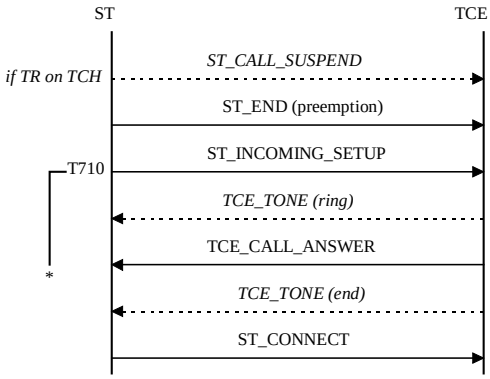
6.2.10.2. Successful preempting a group call

ST participates to a group call and receives a incoming private call with higher priority

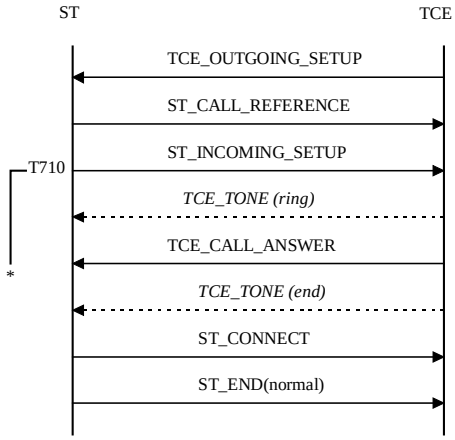


6.2.10.3. Successful preempting a MOCH

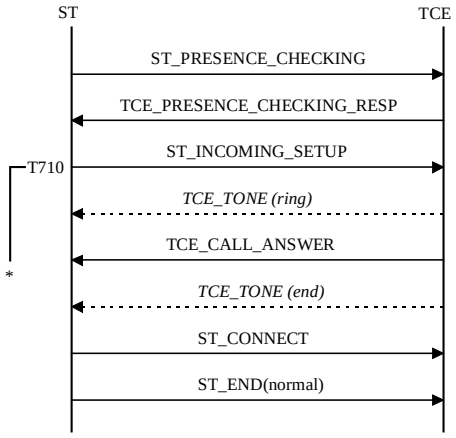
ST participates in a multisite open channel and receives a incoming private call with higher priority



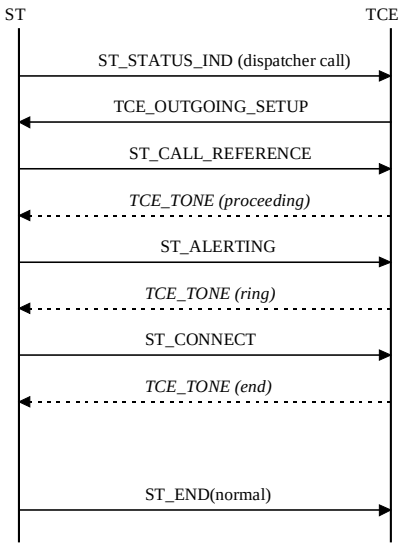
6.2.10.4. Collision : priority to incoming call



6.2.10.5. Advertising and incoming private call



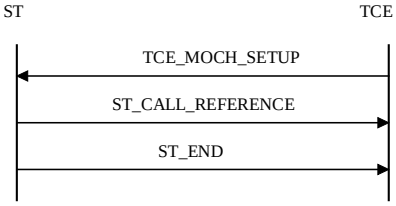
6.2.10.6. Dispatcher call



6.3. Multisite open channel

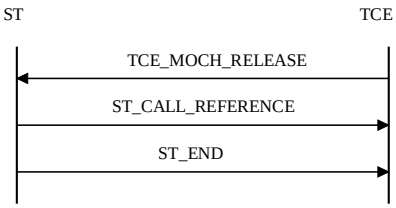
6.3.1. MOCH set-up

The TCE may request to set-up a MOCH. A call reference is allocated and the result of the request shall be provided in ST_END.



6.3.2. MOCH release

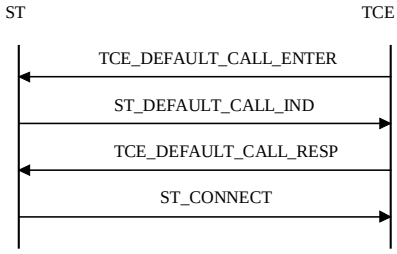
The TCE may request to release a MOCH. A call reference is allocated and the result of the request shall be provided in ST_END.



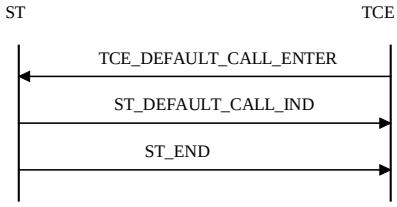
6.3.3. MOCH Participation

As every default communication the MOCH definition and clearing may not be linked with a communication. TCE may request to participate through a ST into a multisite open channel if it is established and accessible to ST. Once received ST_DEFAULT_CALL_IND the default communication becomes the current communication and a call reference is allocated.

6.3.3.1. Successful case



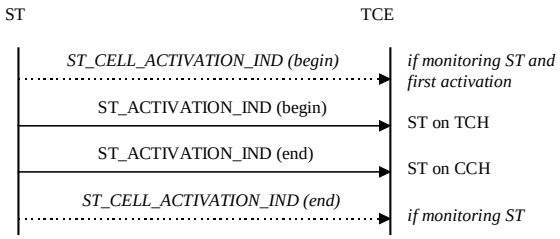
6.3.3.2. Unsuccessful case



6.3.4. Withdrawal

6.3.5. MOCH Activation

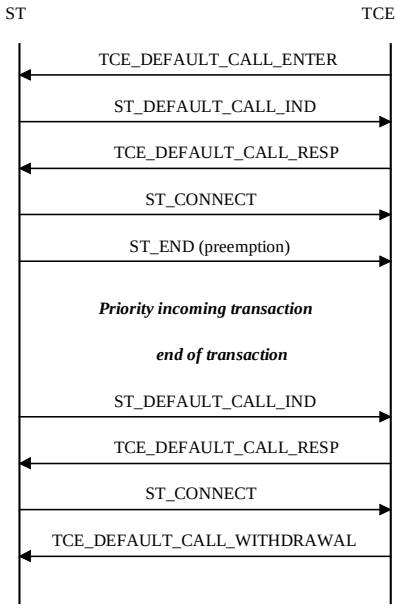
The first default call activation is indicated by a ST in monitoring mode to TCE : ST_CELL_ACTIVATION_IND. If the activation applies to the current communication TCE receives the also the indications of TCH and CCH switch.



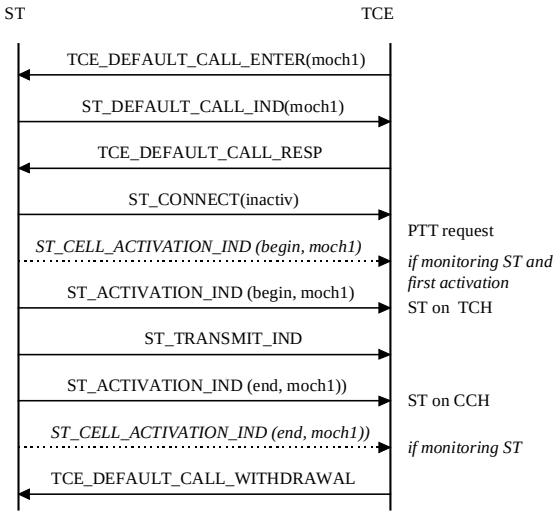
6.3.6. Data flow diagrams

6.3.6.1. Switch in MOCH

ST enters in a MOCH and is preempted by an higher priority transaction. Once this transaction ended, ST switches in the MOCH (default call) unless TCE have sent TCE_DEFAULT_CALL WITHDRAWAL.



6.3.6.2. Participation

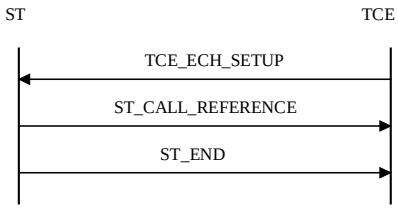


6.4. Emergency open channel

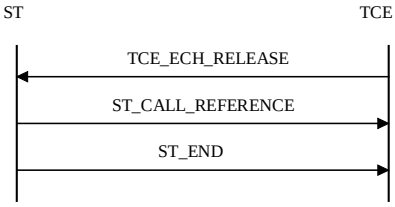
An emergency open channel may be set-up or release in a cell upon TCE initiative. A call reference is allocated and the result shall be supplied by ST_END.

Upon ECH set-up if TCE is connected with a ST in monitoring mode an in the coverage of ECH, it may be informed of the ECH set-up by an notification (ST_EMERGENCY_NOTIFICATION) .

6.4.1. ECH set-up

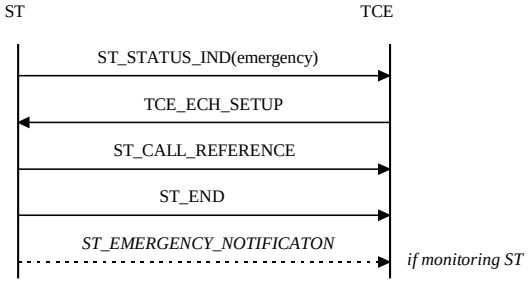


6.4.2. ECH release

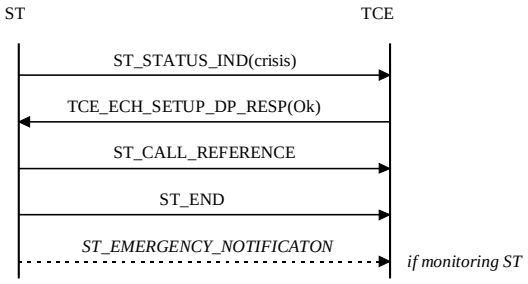


6.4.3. Data flow diagrams

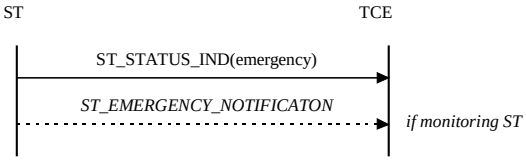
6.4.3.1. Notification and set-up by dispatcher



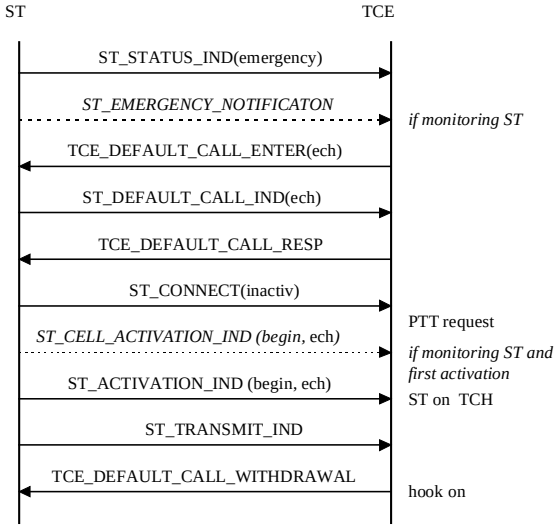
6.4.3.2. Notification and set-up authorization given by the dispatcher



6.4.3.3. Set-up by distant



6.4.3.4. Participation



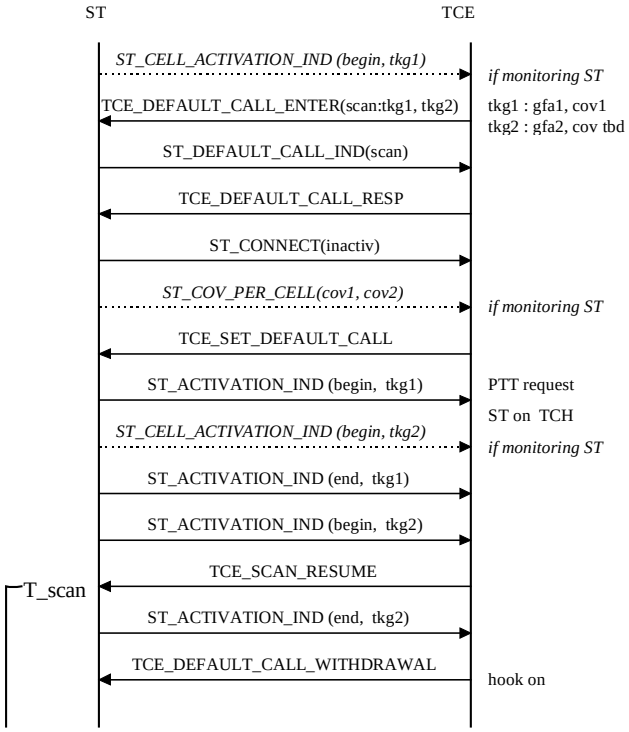
6.5. Scanning

6.5.1. Scanning in sequential listening mode

The TCE may send a PTT request in order to talk in the currently active communication of the scanning service.

An active communication cannot be pre-empted by a new communication that is being activated.

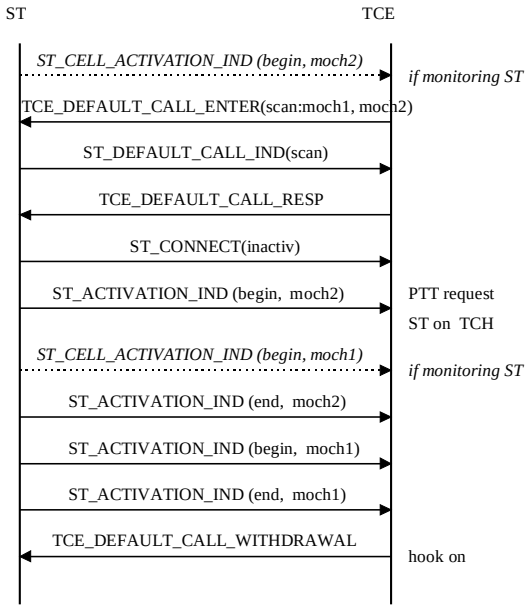
Furthermore when no communication is active from a list for a scanning service, then a push to talk request shall activate the first communication from the scanned list. The order of the communication in the list may be changed by using TCE_SET_DEFAULT_CALL.



6.5.2. Scanning in priority mode

The TCE may send a PTT request in order to talk in the priority communication of the scanning service. If this communication is not accessible, request is ignored.

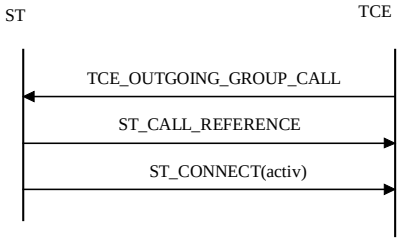
The activation of the priority communication interrupts any other active communication defined by the scanning.



6.6. Group call

6.6.1. Outgoing group call

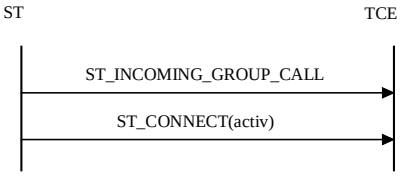
A successful group call set-up implies immediate participation to the group call. in case of unsuccessful set-up the cause shall be shall be supplied in ST_END.



6.6.2. Incoming group call

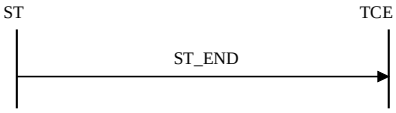
If ST is configured in group call mode any group activation from SwMi received on idle implies the participation in the communication.

When TCE withdraws from a group call ST save the activation parameter to avoid a return in the group call upon receipt of activation indication from SwMi.

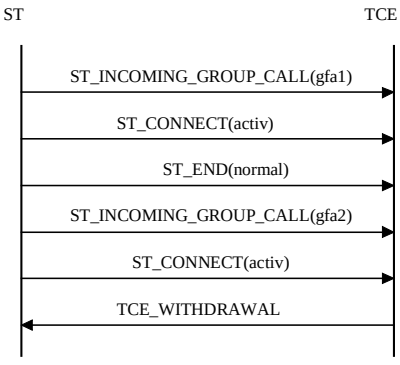


6.6.3. Withdrawal

6.6.4. Release

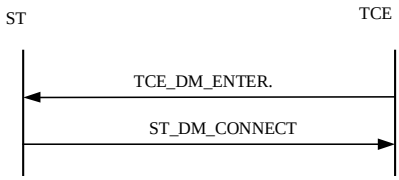


6.6.5. Participation



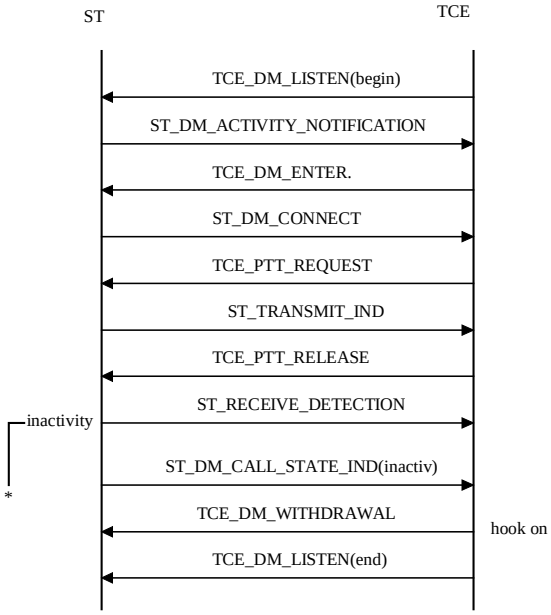
6.7. Direct mode communication

6.7.1. Set-up

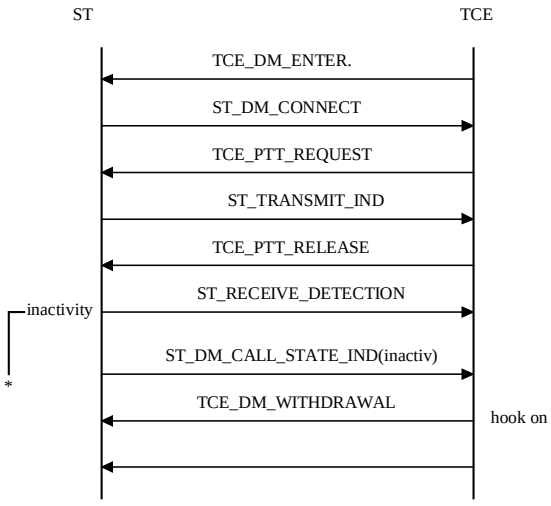


6.7.2. Withdrawal

6.7.3. Monitoring and participation



6.7.4. PTT request on direct mode



7. Annexe A (Informative): Interface TCE - ST on serial line

7.1. Physical level

Physical level is enabled by a serial line in asynchronous mode according to V28/V24 ITU specification. The only signals handled are « send data » (SD) and « receive data » (RD).

The asynchronous features are listed below :

- Transmission speed : 4800 bauds
- 8 bit character mode
- No parity
- One START bit
- One STOP bit

7.2. Link level : Mobile PC Asynchronous Protocol (MPAP)

The application level uses the link level MPAP services to exchange applicative information between ST and TCE.

The data transmitted to the link level are formatted as below :

Application_Identifier	1
Information elements	

The Application_identifier is used for applicative routing. For STCP Application_identifier is set to STCP_APPLI_ID = 0X00

The information elements contains the messages described above.

History

Document history		
Date	**Status**	**Comment**
12 November 1997	Version 0.0.1	First version
30 November 1997	Version 0.0.2	Editorial Update
18 December 1997	Version 0.1.0	Update following review
30 January 1998	Version 1.0.0	TETRAPOL Forum approval
10 July 1998	Version 1.0.1	Update : PTT on distant System Terminal, direct mode data transmission, crisis calls...
14 August 1998	Version 1.1.0	Update following review
17 January 2000	Version 1.2.0	Correction of failures + update following System Technical Issues
20 April 2000	Version 2.0.0	TETRAPOL Working Group Approval