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Foreword

This European Telecommunication Standard (ETS) has been produced by the Radio Equipment and Systems (RES) Technical Committee of the European Telecommunications Standards Institute (ETSI).

This ETS is a multi-part standard and will consist of the following parts:

- Part 1: "General network design".
- Part 2: "Air Interface (AI)".
- Part 3: "Inter-working", (DE/RES-06001-3).
- Part 4: "Gateways", (DE/RES-06001-4).
- Part 5: "Terminal equipment interface", (DE/RES-06001-5).
- Part 6: "Line connected stations", (DE/RES-06001-6).
- Part 7: "Security".
- Part 8: "Management services", (DE/RES-06001-8).
- Part 9: "Performance objectives", (DE/RES-06001-9).
- Part 10: "Supplementary services stage 1".**
- Part 11: "Supplementary services stage 2", (DE/RES-06001-11).
- Part 12: "Supplementary services stage 3", (DE/RES-06001-12).
- Part 13: "SDL Model of the Air Interface", (DE/RES-06001-13).
- Part 14: "PICS Proforma", (DE/RES-06001-14).
- Part 15: "Inter-working - Extended Operations", (DE/RES-06001-15).
- Part 16: "Gateways for Supplementary Services", (DE/RES-06001-16).

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1 Scope

This European Telecommunication Standard (ETS) defines the stage 1 specifications of the call hold (HOLD) supplementary service for the Trans-European Trunked RAdio (TETRA) as provided by European operators. Stage 1 is an overall service description from the users point of view but does not deal with the details of the human interface itself.

This ETS specifies the service description of the supplementary service and the procedures to be expected with successful and unsuccessful outcomes. In addition the ETS specifies the interactions with other TETRA supplementary services and inter-working considerations.

Charging principles are outside the scope of this ETS.

The HOLD supplementary service enables a user to interrupt communications on an existing call and then subsequently, if desired, re-establish communications.

2 Normative references

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

- [1] CCITT Recommendation I.130 (1988): "Method for the characterization of telecommunication services supported by an ISDN and network capabilities of an ISDN".
- [2] ITU-T Recommendation Z.100 (1993): "Specification and Description Language (SDL)".

3 Definitions and abbreviations

3.1 Definitions

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

bearer service: A type of telecommunication service that provides the capability for the transmission of signals between user-network interfaces.

served user: The user who places a call on hold. The served user may be either the calling user or the called user.

Supplementary Service (SS): A supplementary service modifies or supplements a bearer service or a teleservice. A supplementary service cannot be offered to a customer as a stand alone service. It should be offered in combination with a bearer service or a teleservice.

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

teleservice: A type of telecommunications service that provides the complete capability, including terminal equipment functions, for communication between users according to agreed protocols.

user B: The user placed on hold.

3.2 Abbreviations

3.2.1 General abbreviations

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

GTSI	Group TETRA Subscriber Identity
ISDN	Integrated Services Digital Network
ITSI	Individual TETRA Subscriber Identity
SDL	(Functional) Specification and Description Language
SS	Supplementary Service

NOTE: The abbreviation SS is only used when referring to a specific supplementary service.

SwMI	Switching and Management Infrastructure
TETRA	Trans-European Trunked RAdio

3.2.2 Supplementary service abbreviations

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

AL	Ambience Listening
DL	Discreet Listening
HOLD	Call Hold

4 SS-HOLD stage 1 specification

4.1 Description

4.1.1 General description

The served user shall be able to put individual calls on Call Hold (HOLD). Additionally the served user shall be able to put multipoint calls on HOLD if he is the call owner.

The maximum number of calls on hold at any one time shall be an operator option. The served user shall be informed at the stage when the maximum number of calls on hold has been reached.

4.1.1.1 Individual call

When the HOLD supplementary service is invoked, communication for the served user shall be interrupted and the resource on the served users side shall be released from use by the existing call. The resource of user B may be released from use depending on network implementation.

If the served user has more than one call on hold, he/she shall be able to switch from one call to another call as required, privacy being provided between the calls. The served user shall also be able to disconnect the active party, with the other parties still held, and shall be able to disconnect one of the held parties whilst communicating with an active party.

After HOLD invocation, the served user shall be free to send a request to the network in order to, for example:

- retrieve that call from hold;
- originate a new call;
- retrieve another call which is on hold;
- establish connection to an incoming call, e.g. a waiting call;
- invoke another supplementary service;
- interrogate the network.

4.1.1.2 Multipoint call

When the HOLD supplementary service is invoked, communication for the served user shall be interrupted and the air interface resource shall be released from use for the served user, if it is not required by other members of the multipoint call.

If the served user has more than one call on hold, he shall be able to switch from one call to another call as required, privacy being provided between the calls. The served user, who is the multipoint call owner, shall be able to disconnect the ongoing multipoint call, with the other calls still held, or he shall be able to disconnect one of the held calls whilst communicating with an ongoing multipoint call.

After HOLD invocation, the served user shall now be free to send a request to the network in order to:

- retrieve that call from hold;
- originate a new call;
- retrieve another call which is on hold;
- establish connection to an incoming call, e.g. a waiting call;
- invoke another supplementary service;
- interrogate the network.

4.1.2 Qualifications on applicability to telecommunication services

This supplementary service shall be applicable to all TETRA circuit mode teleservices and bearer services.

4.2 Procedures

4.2.1 Provision/Withdrawal

Provision of SS-HOLD shall be by pre-arrangement with the service provider or shall be generally available.

The provision of the service shall be on a per TETRA ITSI basis.

The supplementary service shall be withdrawn by the service provider at the request of the served user or for administrative purposes.

4.2.2 Normal procedures

4.2.2.1 Activation/Deactivation, Definition, Registration, Cancellation, Interrogation

4.2.2.1.1 Activation/Deactivation

The service shall be activated upon provision and deactivated upon withdrawal.

4.2.2.1.2 Definition

Not applicable.

4.2.2.1.3 Registration

Not applicable.

4.2.2.1.4 Cancellation

Not applicable.

4.2.2.1.5 Interrogation

The infrastructure may provide interrogation.

The SwMI response to an interrogation request shall for example provide the following information to the user:

- calls presently on HOLD.

4.2.2.2 Invocation and operation

4.2.2.2.1 Individual call

It shall be possible to place a call on HOLD:

- by the served user who is the calling user. The call on HOLD shall be placed on HOLD, within the infrastructure, at any time after the connection has been established, but before the call is terminated, or as a network option, after the call has been offered to the called user; and
- by the served user who is the called user. The call on HOLD shall be placed on HOLD, within the infrastructure, at any time after the connection has been established, but before the call is terminated.

The served user shall be able to request the HOLD supplementary service in order to interrupt communication of the ongoing call. If the network accepts this request, then communication on the call shall be interrupted and the served user may be informed. The network shall send a notification to the remote party indicating that the call has been placed on hold.

The served user shall now be free to make another request to the infrastructure.

When a call is on hold, either the calling user or called user shall be able to clear the call by the use of basic call procedures.

When the served user invokes HOLD he shall still be considered by the network as being in the busy state for that call instance. User B placed on HOLD shall also be considered as being in the busy state for that call instance.

If the served user has put calls on HOLD and then subsequently goes "on hook", the infrastructure shall re-establish a connection to the served user and offer the served user the last call put on HOLD. Should the served user fail to respond before the expiry of a time-out, then this call shall be disconnected, and the infrastructure shall attempt to offer the served user the previous call on HOLD and so on until either the served user answers or all the calls on HOLD are disconnected by the infrastructure. The served user shall receive a notification each time a call on HOLD has been disconnected. As an implementation option, when the served user goes "on-hook", the infrastructure may automatically disconnect all calls put on hold by the served user (providing that the served user is the call owner in the case of multipoint calls).

It shall be possible, that if multiple calls have been put on hold by the served user, he/she shall be able to selectively disconnect those calls, without the need of their retrieval.

When user B has been put on HOLD and subsequently disconnects himself/herself, the call shall be disconnected and user A shall receive a notification.

4.2.2.2.2 Retrieve request

If there are multiple calls on hold, the served user shall be able to select the appropriate call to be retrieved in the retrieve request.

If the infrastructure can satisfy the request, (e.g. air interface resources are available), the call shall be returned to the active phase; if it cannot, within a pre-defined time period, because resources are not available at this time, the request shall be rejected and the served user shall be notified. The served user may subsequently ask for another retrieve request even to the same call on HOLD.

If the retrieve request is successful, the network shall send a notification to the remote party indicating that the call has been retrieved.

Procedures applicable to a line station are detailed in annex A.

4.2.2.2.3 Reservation processing

- a) Mobile station:
not applicable.
- b) Line station:
refer to informative annex B.

4.2.2.2.4 Multipoint call

An ongoing multipoint call can be placed on HOLD by the served user who is the owner of the multipoint call. For the call owner, the call shall be placed on HOLD within the infrastructure, at any time after the connection has been established, but before the call is terminated, and the resource for the served user should be released from use if it is not required by other members of the multipoint call. The participants of the multipoint call may receive a notification that the call has been placed on HOLD, however they shall be able to continue communication. As an implementation option, HOLD may be invoked during the call set-up phase.

The served user shall now be free to make another request to the infrastructure.

When the served user invokes HOLD he/she shall still be considered by the network as being in the busy state. The multipoint call placed on HOLD shall be considered as being in the active state.

If the served user has put calls on HOLD and then subsequently goes "on hook", the infrastructure shall re-establish a connection to the served user and offer the served user the last call put on HOLD. Should the served user fail to respond before the expiry of a time-out, then this call shall be disconnected, and the infrastructure shall attempt to offer the served user the previous call on HOLD and so on until either the served user answers or all the calls on HOLD are disconnected by the infrastructure. The served user shall receive a notification each time a call on HOLD has been disconnected. As an implementation option, when the served user goes "on-hook", the infrastructure may automatically disconnect all calls put on hold by the served user (providing that the served user is the call owner in the case of multipoint calls).

It shall be possible, that if multiple calls have been put on hold by the served user, he/she shall be able to selectively disconnect those calls, without the need of their retrieval.

4.2.2.2.5 Retrieve request

If there are multiple calls on hold, the served user shall be able to select the appropriate call to be retrieved in the retrieve request.

If the infrastructure can satisfy the request, (e.g. air interface resources are available), the call shall be returned to the active phase; if it cannot, within a pre-defined time period, because resources are not available at this time, the request shall be rejected and the served user notified. The served user may subsequently ask for another retrieve request even to the same call on HOLD.

If the retrieve request is successful, and the served user is the multipoint call owner, the network may immediately send a notification to the remote parties indicating that the call has been retrieved.

Procedures applicable to a line station are detailed in annex A.

4.2.2.2.6 Reservation processing

- a) Mobile station:
not applicable.
- b) Line station:
refer to informative annex B.

4.2.3 Exceptional procedures

4.2.3.1 Activation/Deactivation, Definition, Registration, Cancellation, Interrogation

4.2.3.1.1 Activation/Deactivation

Not applicable.

4.2.3.1.2 Definition

Not applicable.

4.2.3.1.3 Registration

Not applicable.

4.2.3.1.4 Cancellation

Not applicable.

4.2.3.1.5 Interrogation

If the Switching and Management Infrastructure (SwMI) cannot accept an interrogation request, the interrogating user shall receive a notification that HOLD interrogation was unsuccessful. Possible causes for rejection can be:

- insufficient information.

4.2.3.2 Invocation and operation

If the user tries to hold a call while the supplementary service is not provided to that user or for some other reason the infrastructure cannot hold the call, an indication giving the reason for failure shall be provided to the user.

If the user tries to retrieve a previously held call and the infrastructure cannot perform this request, the user shall be informed of the reason for failure, (e.g. the call may be in the process of being cleared).

If user B is on HOLD and subsequently goes out of reach, then the call on HOLD shall be disconnected.

If the infrastructure cannot accept a disconnect request the served user shall receive a notification that disconnection was unsuccessful and the reason for rejection. Possible causes for rejection can be.

- call not existent.

4.3 Interactions with other supplementary services

Interactions with other TETRA supplementary services are specified below.

4.3.1 Calling line identification presentation

HOLD shall not have any interaction with calling line identification presentation.

4.3.2 Connected line identification presentation

HOLD shall not have any interaction with connected line identification presentation.

4.3.3 Calling/Connected line identification restriction

HOLD shall not have any interaction with calling/connected line identification restriction.

4.3.4 Call report

HOLD shall not have any interaction with call report.

4.3.5 Talking party identification

HOLD shall not have any interaction with talking party identification.

4.3.6 Call forwarding unconditional

HOLD shall not have any interaction with call forwarding unconditional.

4.3.7 Call forwarding on busy

HOLD shall not have any interaction with call forwarding on busy.

4.3.8 Call forwarding on no reply

HOLD shall not have any interaction with call forwarding on no reply.

4.3.9 Call forwarding on not reachable

HOLD shall not have any interaction with call forwarding on not reachable.

4.3.10 List search call

HOLD shall not have any interaction with list search call.

4.3.11 Call authorized by dispatcher

HOLD shall not have any interaction with call authorized by dispatcher.

4.3.12 Short number addressing

HOLD shall not have any interaction with short number addressing.

4.3.13 Area selection

HOLD shall not have any interaction with area selection.

4.3.14 Access priority call

HOLD shall not have any interaction with access priority call.

4.3.15 Priority call

HOLD shall not have any interaction with priority call.

4.3.16 Call waiting

HOLD shall not have any interaction with call waiting.

4.3.17 Call hold

Not applicable. If the HOLD supplementary service is provided to both users involved in the same call, each of these users can hold and retrieve the call independently from these operations being carried out by the other user.

4.3.18 Call completion to busy subscriber

HOLD shall not have any interaction with call completion to busy subscriber.

4.3.19 Late entry

User B shall be able to receive Late Entry messages whilst on HOLD. The served user shall be able to receive Late Entry messages whilst he/she has calls on HOLD.

4.3.20 Transfer of control

Not applicable. A served user shall be in a call before he can invoke the SS-TC.

4.3.21 Pre-emptive priority call

If user B can be pre-empted, then the user B shall be taken away for the PPC call and the call on HOLD shall be returned to idle. SS-HOLD shall not have any interaction with PPC if the served user is called to a PPC call whilst he has calls on HOLD.

4.3.22 Include call

The served user shall be able to include his/her call on HOLD into an active call and the HOLD is removed.

4.3.23 Advice of charge

HOLD shall not have any interaction with advice of charge.

4.3.24 Barring of outgoing calls

HOLD shall not have any interaction with barring of outgoing calls.

4.3.25 Barring of incoming calls

HOLD shall not have any interaction with barring of incoming calls.

4.3.26 Discreet listening

HOLD shall not have any interaction with Discreet Listening (DL). A DL call may be put on hold by the user who has established the DL call.

4.3.27 Ambience listening

HOLD shall not have any interaction with Ambience Listening (AL). An AL call may be put on hold by the user who has established the AL call.

4.3.28 Dynamic group number assignment

HOLD shall not have any interaction with dynamic group number assignment.

4.3.29 Call completion on no reply

HOLD shall not have any interaction with call completion on no reply.

4.3.30 Call retention

HOLD shall not have any interaction with call retention.

4.4 Inter-working considerations

The service shall be available across the inter system interface.

The operation of this supplementary service shall not be affected by the nature of the far end connection.

4.5 Overall SDL

Figure 1 contains the dynamic description of SS-HOLD using the Specification Description Language (SDL) defined in ITU-T Recommendation Z.100 [2]. The SDL process represents the behaviour of the network in providing SS-HOLD.

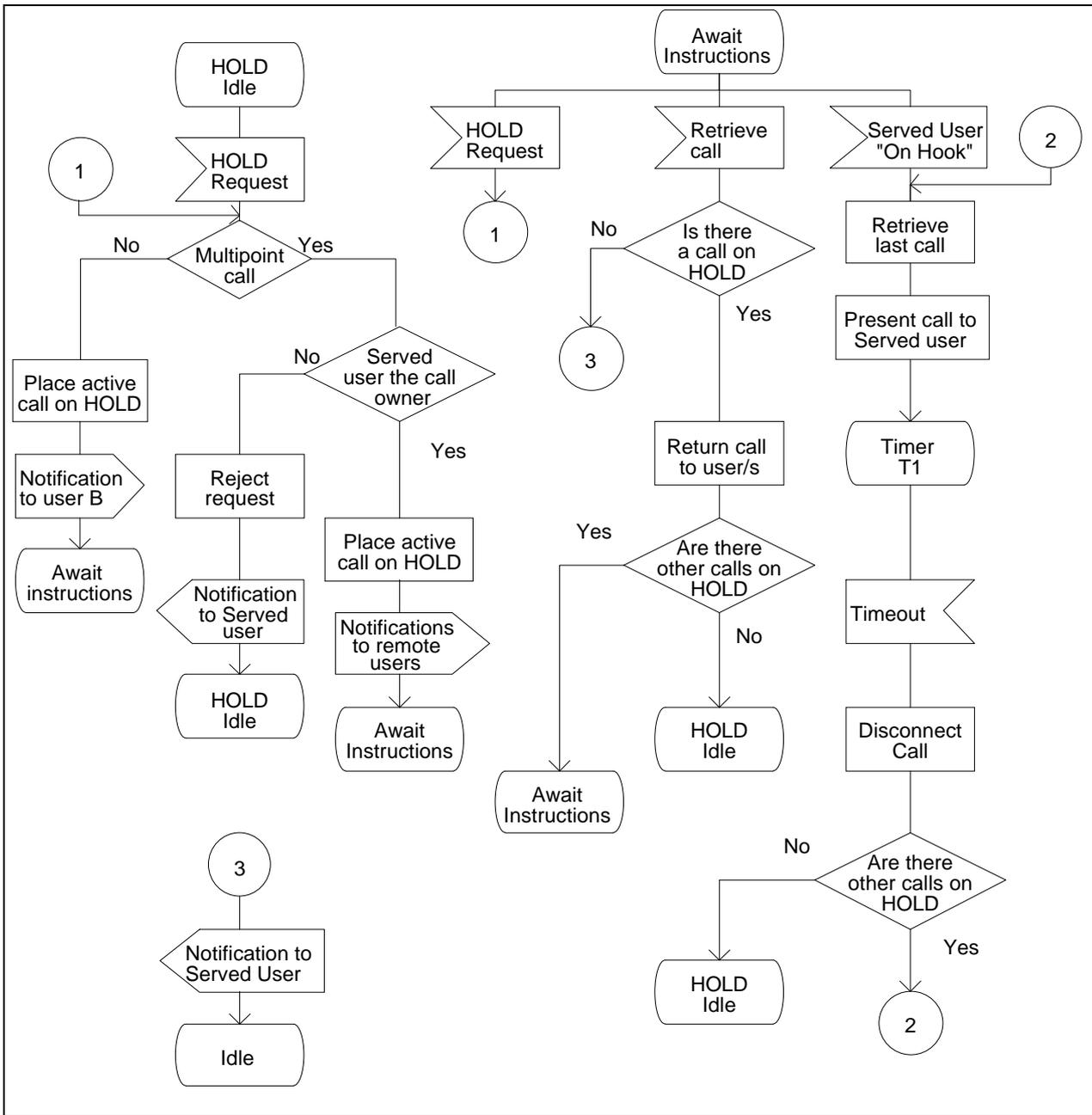


Figure 1: SS-HOLD, overall SDL

Annex A (informative): Retrieve request - line station

The served user can indicate a B-channel selection parameter in the retrieve request. The parameter can indicate:

- 1) any B-channel is acceptable;
- 2) a specified B-channel is preferred; or
- 3) a specified B-channel is exclusively required.

If the service provider can satisfy the request, the call can be returned to the active phase; if it cannot, the request may be rejected with the appropriate indication returned to the served user.

If the retrieve request is successful, the network can immediately send an notification to the remote party indicating that the call has been retrieved.

Annex B (informative): Reservation processing - line station

When a call is placed on hold, a B-channel on the user's interface can be reserved for use by the terminal.

If more than one call is placed on hold from that terminal by repeated requests for the HOLD supplementary service, then only a single B-channel can be reserved and the calls on hold may be associated with that reservation.

Furthermore the following conditions concerning channel reservation apply:

- 1) when a call is retrieved, any reservation associated with that call can be cleared, independent of the B-channel used to retrieve the call;
- 2) when a call is cleared, any reservation associated with the call can be cleared, and the service provider can continue to reserve a B-channel for the terminal until there are no more held calls associated with the terminal;
- 3) when reservations for a terminal are cleared, normal B-channel allocation procedures apply;
- 4) when any reservation is outstanding for a user (as identified by a terminal) and that user is not using a B-channel for an active call, then the network can consider a B-channel as "unavailable" for that user for subsequent incoming calls.

History

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