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TECHNICAL SPECIFICATION

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Contents

Foreword

This Technical Specification has been produced by the 3rd Generation Partnership Project (3GPP).

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Version x.y.z

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x the first digit:

  1 presented to TSG for information;

  2 presented to TSG for approval;

  3 or greater indicates TSG approved document under change control.

y the second digit is incremented for all changes of substance, i.e. technical enhancements, corrections, updates, etc.

z the third digit is incremented when editorial only changes have been incorporated in the document.

0 Scope

The present document describes the Supplementary Services belonging to the group Call Completion Supplementary Services.

The general aspects, including definitions and recommended provision, of the description of Supplementary Services are given in specification TS 22.004 [2].

The group of Call Completion Supplementary Services is divided into the following two Supplementary Services:

- Call waiting (clause 1);

- Call hold (clause 2).

0.1 References

The following documents contain provisions which, through reference in this text, constitute provisions of the present document.

- References are either specific (identified by date of publication, edition number, version number, etc.) or non-specific.

- For a specific reference, subsequent revisions do not apply.

- For a non-specific reference, the latest version applies. In the case of a reference to a 3GPP document (including a GSM document), a non-specific reference implicitly refers to the latest version of that document *in the same Release as the present document*.

[1]   3GPP TR 21.905: "Vocabulary for 3GPP Specifications".

[2]   3GPP TS 22.004: "General on Supplementary Services".

[3]   3GPP TS 22.030: "Man-Machine Interface (MMI) of the Mobile Station (MS)".

[4]   3GPP TS 22.081: "Line identification Supplementary Services - Stage 1".

[5]   3GPP TS 22.084: "Digital cellular telecommunication system; MultiParty (MPTY) Supplementary Services - Stage 1".

[6]   3GPP TS 22.135: "Multicall Stage 1".

0.2 Abbreviations

Abbreviations used in the present document are listed in TR 21.905 [1].

1 Call Waiting (CW)

1.1 Definition

The Call Waiting Service permits a mobile subscriber to be notified of an incoming call (as per basic call procedures) whilst the traffic channel is not available for the incoming call and the mobile subscriber is engaged in an active or held call. Subsequently, the subscriber can either accept, reject, or ignore the incoming call.

1.2 Description

1.2.1 Description

This service operates when the traffic channel at the controlling subscriber B is not available and B is engaged in an active or held call.

When a third party (calling subscriber C) attempts to connect to that termination, the controlling subscriber B is given an appropriate indication of the waiting call. A notification that the call is waiting will be sent back towards the calling subscriber C.

The maximum number of waiting calls at one time per mobile access is one. This means that no further calls are offered to the subscriber while a call is waiting.

NOTE: As a network option this maximum number of waiting calls may be greater than one. This is considered as a possible future enhancement.

1.2.2 Applicability to telecommunication services

The applicability of this Supplementary Service to the ongoing call is defined in TS 22.004 [2]. The incoming, waiting, call may be of any kind.

1.2.3 Terminology

(Controlling) subscriber B

This is the subscriber who is provided by the network with the Call Waiting Service and who reacts to the Call Waiting.

Subscriber C

This is the subscriber who has originated a call to B which causes the Call Waiting Service to be invoked.

Subscriber A

This represents a subscriber who is engaged in a call with B, being either the calling or the called party.

T2; No answer time out

The duration of this time out is the time the network will wait for a response from subscriber B, to the offered call from subscriber C. The value of the timer is between 0.5 and 2 minutes at the service providers discretion.

1.3 Normal procedures with successful outcome

1.3.1 Provision

This Supplementary Service is provisioned for all Basic Services (BS) subscribed to and to which it is applicable, i.e. not provisioned to any subset of these BS.

1.3.2 Withdrawal

Withdrawal will be at the request of the subscriber or for administrative reasons.

1.3.5 Activation

This Supplementary Service will be activated either collectively for all applicable Basic Services or on a Basic Service group basis by the subscriber using a control procedure, as specified in TS 22.030 [3], or by the service provider. The controlling subscriber shall be informed by the network of the success or otherwise of her action.

1.3.6 Deactivation

The service will be deactivated either collectively for all applicable Basic Services or on a Basic Service group basis by the subscriber using a control procedure, as specified in TS 22.030 [3], or by the service provider. The controlling subscriber shall be informed by the network of the success or otherwise of her action.

1.3.7 Invocation

This service is invoked by the network on arrival of an incoming call if the service is active and the controlling subscriber B's traffic channel is not available, B is engaged in an active or held call and there is no other call currently waiting.

1.3.8 Normal operation with successful outcome

1.3.8.1 Incoming call from C

When an incoming call from subscriber C arrives, the served mobile subscriber is connected to - at least - one call (active or held) and a NDUB (Network Determined User Busy) condition does not exist, then the CW service shall be invoked and the call shall be offered to subscriber B with an appropriate indication, e.g. with a "Call Waiting Tone".

If a response to the offered call is received from the mobile termination at B, then the subscriber C shall be given an indication (e.g. ringing tone) that the called subscriber is being informed of the incoming call and, if possible, that call waiting is in operation.

1.3.8.2 Terminating call by A or B

If either subscriber A or subscriber B requests that the call is terminated, then this call shall be terminated as for basic call (see TS 22.030 [3] for more information). Subscriber B shall then be given the normal notification that there is a new call to her, as for a normal terminating call. The network shall continue to indicate; e.g. ringing tone towards subscriber C as for a normal call. B can then accept the call from C before the expiry of T2.

Subscriber B can also free resources by using the Call Hold Supplementary Service. Subscriber B shall then be able to accept the waiting call from subscriber C before the expiry of T2.

Alternatively, subscriber B may specifically request release or hold of the connection to A and accept the waiting call as one action (see TS 22.030 [3]). In this case, the network connects subscriber B to subscriber C with no further notifications to either subscriber. This must be done before the expiry of T2.

1.3.11 Interrogation

Status check

The controlling subscriber may interrogate the network by the use of a control procedure, as specified in TS 22.030 [3]. The network shall respond with an appropriate indication telling the subscriber whether the service is supported in this network and, if so, provide a list of all Basic Service groups to which the Call waiting Supplementary Service is active.

1.4 Exceptional procedures or unsuccessful outcome

1.4.1 Incoming call from subscriber C ignored by subscriber B

If no response is received by the network from controlling subscriber B before the expiry of T2, then the network shall inform the controlling subscriber B that the call is no longer waiting. Subscriber C shall then be given a no reply indication, unless e.g. Call Forwarding applies. The call waiting service is then made available for a subsequent incoming call.

1.4.2 Incoming call from subscriber C is indicated as UDUB by subscriber B (or terminal B)

If the waiting call is indicated as UDUB by B before the expiry of T2 the subscriber C shall be given a busy indication, unless e.g. Call Forwarding applies. The call waiting service is then made available for a subsequent incoming call.

1.4.3 Release by subscriber C within the specified period

If calling subscriber C terminates the call attempt to subscriber B before the expiry of T2, the call attempt from C shall be terminated, as for basic call, and subscriber B shall be notified.

1.4.4 Incoming call from subscriber C is rejected by subscriber B

If the waiting call is explicitly rejected by B before the expiry of T2, the subscriber C shall be given a reject indication. The call waiting service is then made available for a subsequent incoming call.

1.5 Alternate procedures

None identified.

1.6 Interactions with other Supplementary Services

1.6.82.1 Call forwarding unconditional

If call forwarding unconditional has been activated, it takes precedence over call waiting. Call forwarding unconditional can be activated while a call is waiting without changing the state of the waiting call.

1.6.82.2 Call forwarding on mobile subscriber busy

No impact, i.e. neither Supplementary Service shall affect the operation of the other Supplementary Service.

The following text clarifies the situation: If user B is NDUB (Network Determined User Busy), Call Forwarding shall take place, and the call is not offered to B. If B is not NDUB, the call shall be offered to B, and if the UDUB (User DUB) condition occurs, then the Call Forwarding shall take place.

1.6.82.3 Call forwarding on no reply

If the CFNRy is active and operative for the called subscriber then a waiting call shall still be offered as described in subclause 1.3.8.1 (call waiting indication). If no response is received to this call before the expiry of the No Reply Condition timer, then the call forwarding on no reply service becomes invoked and the call is forwarded as per that call forwarding on no reply service description.

1.6.83.2 Call hold

The served user may use the Call Hold service to answer subsequently a waiting call from C.

If the served mobile subscriber has an active call and a call one hold the network can still offer an incoming call with the waiting indication i.e. the NDUB condition is not used the normal way (n=2 not 1).

> NOTE: Although the call is offered to the subscriber, she cannot accept the call as long as she has one active call and one call on hold.

If the served mobile subscriber has a call on hold and no active call, an incoming call is offered as a waiting call.

1.6.81.1 Calling line identification presentation

See TS 22.081 [4]

1.6.84.2 MultiParty

See TS 22.084 [5] .

1.6.88.6 Barring of all incoming calls

Invocation of Barring of Incoming Calls takes precedence over invocation of Call Waiting.

Call waiting cannot be activated if barring of incoming calls is activated. The mobile subscriber requesting for call waiting shall be informed of this Supplementary Service incompatibility. The activation of barring of incoming calls does not affect any currently waiting calls.

1.6.88.7 Barring of incoming calls when roaming outside the home PLMN country

When active and operative, same as interaction with Barring of All Incoming Calls.

1.7 Interactions with other services

1.7.1 Multicall

See TS 22.135 [6].

1.8 Interworking considerations

Calls originating from outside the ISDN/PLMN can undergo call waiting at B.

A special in-band indication may be provided to the calling subscriber instead of the normal indication.

2 Call hold

2.1 Definition

The call hold service allows a served mobile subscriber, who is provisioned with this Supplementary Service, to interrupt communication on an existing active call and then subsequently, if desired, re-establish communication. The traffic channel remains assigned to the mobile subscriber after the communication is interrupted to allow the origination or possible termination of other calls.

2.2 Description

2.2.1 Description

When the call hold service is invoked, communication is interrupted on the traffic channel and the traffic channel is released from the existing call. The traffic channel is reserved for the served mobile subscriber invoking the call hold service. The served mobile subscriber can only have one call on hold at a time.

One traffic channel should be reserved for the served mobile subscriber as long as the subscriber has one call on hold and is currently not connected to any other call, i.e. the network should not reserve more than one traffic channel for a mobile station.

If the served mobile subscriber has a call on hold and is not connected to an active call, she can:

> 1) Retrieve the held call.

> 2) Set up another call.

3) Disconnect the held call.

If the served mobile subscriber has a call on hold and is not connected to an active call she can not receive a call, except when using the Call Waiting Supplementary Service. For additional information, see subclause 2.6.83.1 (Interaction with Call Waiting Supplementary Service).

If the served mobile subscriber is connected to an active call and has another call on hold, she can:

1) Alternate from one call to the other.

2) Disconnect the active call.

3) Disconnect the held call.

4) Disconnect both calls.

If the served mobile subscriber is connected to an active call and has another call on hold, she can not receive a call. For additional information, see subclause 2.6.83.1 (Interaction with Call Waiting Supplementary Service).

2.2.2 Applicability to telecommunication services

The applicability of this Supplementary Service is defined in TS 22.004 [2].

NOTE: If the served mobile subscriber has a call on hold she may set up another call using a different telecommunications service.

2.3 Normal procedures with successful outcome

2.3.1 Provision

This Supplementary Service is provisioned for all basic services subscribed to and to which it is applicable, i.e. not provisioned to any subset of these BS.

2.3.2 Withdrawal

The service will be withdrawn at the subscriber's request or for administrative reasons.

2.3.5 Activation

The Supplementary Service will be activated by the service provider as a result of provision.

2.3.6 Deactivation

The Supplementary Service will be deactivated by the service provider as a result of withdrawal.

2.3.7 Invocation

Call hold will be invoked by the served mobile subscriber by use of a control procedure as described in TS 22.030 [3].

2.3.8 Normal operation with successful outcome

Hold request

The served mobile subscriber indicates to the network that communication on the interface is to be interrupted. A call may be placed on hold:

- on the served calling subscriber's interface by her at any time after the call has been answered and before call clearing has begun.

- on the served called subscriber's interface by her at any time after the call has been answered and before call clearing has begun.

The communication on the connection is then interrupted An acknowledgement shall be given to the served mobile subscriber, and the traffic channel is now available for other uses. A notification shall be sent towards the held party indicating that the call has been placed on hold.

Disconnect

If at any time a call is in the held state, either party may disconnect from that call.

Unidirectionality

Assume that subscriber A and B are connected to a call and both have subscribed to the call hold services. The call hold service is unidirectional, so it is possible for:

1) only party A to have party B on hold;

   For party A the call is on hold, for the held party B the call is active.

2) only party B to have party A on hold;

   For party B the call is on hold, for the held party A the call is active; or

3) each party to have the other on hold.

   For party A and party B the call is on hold.

Handling of call hold service within a call

The served mobile subscriber may control the call hold service by use of the control procedures as described in TS 22.030 [3].

If the served mobile subscriber has a call on hold and is not connected to an active call, she can:

1) Retrieve the held call.

   A notification shall be send towards the previously held party that the call has been retrieved.

2) Set up another call.

   Results in the served mobile subscriber being engaged in that new call and still holding the other call.

3) Disconnect the held call (as for basic call).

If the served mobile subscriber is connected to an active call and has another call on hold, she can:

1) Alternate from one call to the other.

   Results in the previously active call being held and the previously held call becoming active. Privacy is provided between the two calls. A notification shall be sent towards the previously held party that the call has been retrieved and another notification shall be sent towards the party being put on hold.

2) Disconnect the active call.

   Results in the traffic channel being available for the served mobile subscriber and the other call being still on hold. The served mobile subscriber shall be notified that she has a call on hold. The disconnected party shall be notified as for a basic call.

   NOTE: The notification about the held call towards the served mobile subscriber is given by the MS, not by the network.

3) Disconnect the held call.

   The disconnected party shall be notified as for a basic call.

4) Disconnect both calls (as for basic call).

If the served mobile subscriber is connected to an active call and has another call on hold, and the active call is disconnected by the other party; then the served mobile subscriber shall be notified that she has a call on hold.

NOTE: The notification about the held call towards the served mobile subscriber is given by the MS, not by the network.

2.4 Exceptional procedures or unsuccessful outcome

2.4.1 Exceptional operation or unsuccessful outcome

If the network cannot retrieve a previously held call, the mobile subscriber will be informed of the reason of the failure. (For example, the call may be in the process of being cleared). The call state is not affected.

If the network cannot alternate between two calls, the mobile subscriber will be informed of the reason for the failure. The call states are not affected.

2.4.6 Invocation

Hold

If a mobile subscriber tries to invoke the hold service while not subscribed to the service or for some other reason, the service provider cannot provide the hold service, an indication will be provided to the mobile subscriber with the reason of failure. The call state is not affected.

2.5 Alternate procedures

None identified.

2.6 Interactions with other Supplementary Services

2.6.83.1 Call waiting

See subclause 1.6.83.2.

2.6.84.2 MultiParty

See TS 22.084 [5]

2.7 Interactions with other services

2.7.1 Multicall

See TS 22.135 [6].

2.8 Interworking considerations

The operation of this Supplementary Service is not affected by the nature of the far end of the connection.

NOTE: In some networks the indication to the distant user about the held or retrieve state of the call may not be supported.

Annex A (informative):
Change history

TSG SA#	SA Doc.	SA1 Doc	Spec	CR	Rev	Rel	Cat	Subject/Comment	Old	New	WI
Jun 1999			GSM 02.83					Transferred to 3GPP SA1	7.0.0		
SA#04			22.083			R99		Transferred to 3GPP SA1		3.0.0	
SP-05	SP-99479	S1-99630	22.083	001		R99	D	Editorial changes for alignment	3.0.0	3.0.1	Editorial changes
SP-05	SP-99449	S1-99854	22.083	002		R99	B	Multicall	3.0.0	3.1.0	Multicall
SP-11	SP-010065	S1-010258	22.083			Rel-4		Transferred to 3GPP Release 4	3.1.0	4.0.0	
SP-15	SP-020045	S1-020457	22.083	003	-	Rel-4	F	Editorial CR to correct terms and references	4.0.0	4.1.0	CORRECT
SP-16	SP-020267	S1-021043	22.083			Rel-5		Updated from Rel-4 to Rel5	4.1.0	5.0.0	
SP-26	SP-040744	S1-040997	22.083			Rel-6		Updated from Rel-5 to Rel-6	5.0.0	6.0.0	
SP-36			22.083			Rel-7		Updated from Rel-6 to Rel-7	6.0.0	7.0.0	
SP-42	-	-				Rel-8		Updated from Rel-7 to Rel-8	7.0.0	8.0.0	
SP-46	-	-	-	-	-	-	-	Updated to Rel-9 by MCC	8.0.0	9.0.0	
2011-03	-	-	-	-	-	-	-	Update to Rel-10 version (MCC)	9.0.0	10.0.0	
2012-09	-	-	-	-	-	-	-	Updated to Rel-11 by MCC	10.0.0	11.0.0	
2014-10	-	-	-	-	-	-	-	Update to Rel-12 version (MCC)	11.0.0	12.0.0	
2015-12	-	-	-	-	-	-	-	Updated to Rel-13 by MCC	12.0.0	13.0.0	
2017-03	-	-	-	-	-	-	-	Updated to Rel-14 by MCC	13.0.0	14.0.0	
2018-06	-	-	-	-	-	-	-	Updated to Rel-15 by MCC	14.0.0	15.0.0	
SA#88e	-	-	-	-	-	-	-	Updated to Rel-16 by MCC	15.0.0	16.0.0	
2022-03	-	-	-	-	-	-	-	Updated to Rel-17 by MCC	16.0.0	17.0.0	

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