Technical Specification Group Services and System Aspects
Meeting #7, Madrid, Spain, 15-17 March 2000

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Source: **TSG SA1**

Title: **CRs to 22.135 and 22.004 on MultiCall**

Document for: **Approval**

Agenda Item: **5.1.3**

Doc-1st-Level	Status-1st-Level	Spec	CR	Rev	Phase	Subject	Cat	Version-Current	Version-New
SP-000068		22.135	004		R99	Clarification of requirement for Multicall	F	3.1.0	3.2.0
SP-000068		22.004	003		R99	Introduction of Multicall as Supplementary Service	F	3.1.0	3.2.0

3GPP SA Working Group 1 Meeting #7
Sophia Antipolis, 17 Feb - 18 Feb 2000

Document* *S1-000168
e.g. for 3GPP use the format TP-99xxx
or for SMG, use the format P-99-xxx

CHANGE REQUEST

Please see embedded help file at the bottom of this page for instructions on how to fill in this form correctly.

22.135	**CR**	**004**	Current Version:	3.1.0

GSM (AA.BB) or 3G (AA.BBB) specification number ↑ *↑ CR number as allocated by MCC support team*

For submission to: TSG SA#7 *list expected approval meeting # here ↑*	for approval	X	strategic		*(for SMG use only)*
	for information		non-strategic		

Form: CR cover sheet, version 2 for 3GPP and SMG *The latest version of this form is available from: ftp://ftp.3gpp.org/Information/CR-Form-v2.doc*

Proposed change affects: *(at least one should be marked with an X)* (U)SIM [ ] ME [X] UTRAN / Radio [ ] Core Network [X]

Source: TSG SA1 **Date:** 9/2/00

Subject: Clarification of requirement

Work item: Multicall Supplementary Service Stage1

Category: *(only one category shall be marked with an X)*

F	Correction	X	**Release:**	Phase 2	
A	Corresponds to a correction in an earlier release			Release 96	
B	Addition of feature			Release 97	
C	Functional modification of feature			Release 98	
D	Editorial modification			Release 99	X
				Release 00	

Reason for change: To clarify the following points.
- Scope
- Relation between number of bearers and number of calls
- NDUB definition
- Interaction with other services
- Compatibility with future releases

Clauses affected: 1, 3, 4, 5, 6, 7

Other specs affected:

Other 3G core specifications	[ ]	→ List of CRs:
Other GSM core specifications	[ ]	→ List of CRs:
MS test specifications	[ ]	→ List of CRs:
BSS test specifications	[ ]	→ List of CRs:
O&M specifications	[ ]	→ List of CRs:

Other comments:


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1 Scope

The present document presents describes Multicall supplementary service ~~multicall scenarios and requirements~~ for UMTS phase 1 release '99.

The general aspects, including definitions and recommended provision, of the description of the 3GPP Supplementary Services are given in 3GPP TS 22.004.

~~Multicall feature specifies functionality and interactions related to usage of several simultaneous bearers between a terminal and a network. Multicall features allows both circuit switched call(s) and packet session(s) to exist simultaneously.~~

~~The case of an individual call with multiple bearers is out of the scope of this document and release '99.~~

~~Implementation of multicall is an optional service for both mobile terminal and network.~~

2 References

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

- References are either specific (identified by date of publication, edition number, version number, etc.) or non-specific.
- For a specific reference, subsequent revisions do not apply.

For a non-specific reference, the latest version applies.

~~2.1 Normative references~~

~~[1] TS 22.100UMTS Phase 1~~

~~[2] TS 22.129Handover Requirements between UMTS and GSM or other Radio Systems~~

~~[3] TS 22.060 General Packet Radio Service (GPRS); service description, stage 1.~~

~~2.2 Informative references~~

~~[4] GSM 02.01 Principles of telecommunication services supported by a GSM Public Land Mobile Network (PLMN)~~

[~~3~~1] 3G TS 22.001: "Principles of circuit telecommunication services supported by a Public Land Mobile Network (PLMN) "

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

[3] 3G TS 22.024: "Description of Charge Advice Information (CAI)"

[4] 3G TS 22.030: "Man-Machine Interface (MMI) of the Mobile Station (MS)"

[5] 3G TS22.100: "UMTS Phase 1 Release 99"

[6] 3G TS 22.129: "Handover Requirement between UMTS and GSM or other Radio Systems"

3 Definitions, symbols and abbreviations

3.1 Definitions

CS Call: Circuit switched call. A call routed through CS domain. CS call can be for example a speech call, fax call or data call. One call shall only use one bearer at the time.

Multiparty ~~call~~: ~~GSM~~ Supplementary Service for speech conference service.

~~**PS Session:** Packet switched session. A logical connection set by PDP context between terminal and PS domain for delivering data packets.~~

N_{cs} MO: Maximum number of simultaneous mobile originating CS calls. ~~The Value of N_{cs} **MO** is 7. If N_{cs} **MO**~~ has been reached, no more MO calls can be set –up.

N_{CS} MT: Maximum number of simultaneous mobile terminating CS calls. The value of N_{CS} MT is 7. If N_{CS} MT has been reached, additional MT call attempts shall fail without any indication to the called subscriber.

[Editors Note: This N_{cs} limitation reflects the current protocol limitation in 24.008. This may be removed after the discussion in the next N1 meeting (held 28/02-03/03 in Umea, Sweden)]

N_{br}: Maximum number of simultaneous CS bearers. The value of N_{br} is the smallest value within the N_{br} User, ~~,~~ N_{br} UE, and N_{br} SN.
N_{br} User: Maximum number of simultaneous CS bearers allowed, as defined by the user within the limits given by N_{br} SB.
N_{br} SB: Maximum number of simultaneous CS bearers allowed, defined by the service provider in the Multicall subscription.
N_{br} UE: Maximum number of simultaneous CS bearers supported by the UE.
N_{br} SN: Maximum number of simultaneous CS bearers supported by the serving network~~-~~.

4 Description

4.1 Description of multicall

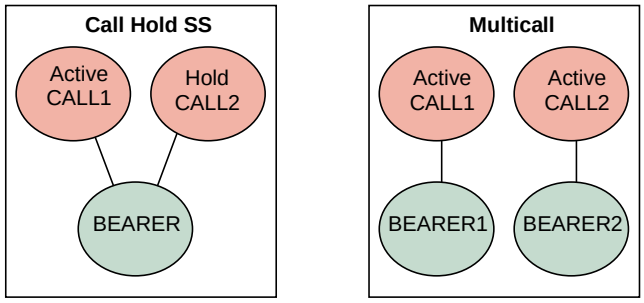
~~Multicall feature specifies functionality and interactions related to usage of several simultaneous bearers between a terminal and a network. Multicall features allows both circuit switched call(s) and packet session(s) to exist simultaneously.~~
The Multicall supplementary service enables a mobile subscriber to have several simultaneous CS calls, each call using its own dedicated bearer.
Only one CS bearer can used for speech at any one times.
A speech call is one of TS11 (Telephony), TS12 (Emergency Calls), and TS61 (Alternate speech/fax). If the bearer capability information is not available, e.g. the call is originated/transited by a PSTN, the basic service cannot be deduced and the network shall, for multicall purposes, handle the call as telephony.
A held call shall be regarded as using the bearer used while the call was active.

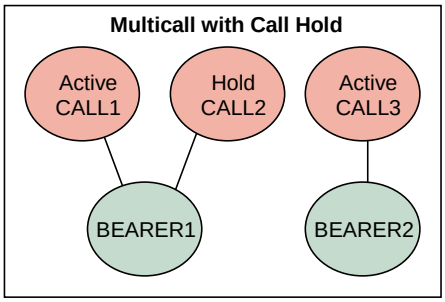
Note: The protocol architecture in GSM allows several parallel CS calls, the limitation being that there is only one traffic channel, which the different CS calls share. This is facilitated by e.g. the Call Waiting, Call Hold, Call Transfer and Multiparty ~~Sss~~Supplementary services. Call configurations related to GSM supplementary services are not considered as Multicall. See section 7~~6~~ for ~~interworking~~interaction.

It shall be possible for each CS call ~~/ PS session~~ to ~~have~~ use a dedicated bearer of independent traffic and performance characteristics~~,~~. It shall be possible to release~~that~~ each active CS call independently of any other CS call~~and PS session shall be terminated individually~~.
~~It shall be also possible that each of the CS calls and PS sessions have different priorities.~~

~~Note: Priority mechanism for CS calls and PS sessions at release 1999 is for further study.~~

~~The basic idea with CS multicall is that each CS call may have one dedicated bearer, i.e. it is possible that each new call (MO and MT) generate a new bearer.~~





~~Figure 1: Multicall concept~~

~~It is a requirement, that the current GSM supplementary services are preserved when suitable. Support of UMTS-GSM interworking and handovers, GSM evolution, GSM user conventions etc. are reasons for this requirement.~~

4.2 Multicall service scenarios

4.2.1 Terminating CS call

The indication of terminating CS call to mobile terminal will be done until the maximum number of total CS calls (N_{cs}) has been reached.
If the maximum number to total CS- call has been reached an- additional terminating call (N_{cs}+1) will be only indicated to the user if the user have the SS-Call Waiting active. (N_{cs} is specified in chapter 5.2.) See chapter 6.4.2 for interworking with Call Waiting SS. The maximum value for Ncs=7 and no more calls may be supported, irrespective of whether the SS-Call Waiting is active or not, once this has been reached.
If the N_{cs} is not been reached- and a terminating call is indicated to the user she may reacted in the following way:

a) accepting the terminating call

- the user/user applications shall have the possibility to allocate a new bearer for the terminating call
- the user/user applications shall have the possibility to reuse/share an already established bearer (e.g. release existing calls or- put an speech on hold and accept the terminating call.

b) rejecting the terminating call

If the user/user application rejects the terminating call the call shall be released in a normal way

c) ignoring the incoming call

If the user/user application ignores the indication of the terminating call (i.e. not accepts nor rejects) the terminating call the normal call handling shall apply, e.g.. after the Alerting Timer expires the call will be released.

4.2.2 Originating CS call

If the N_{cs} is not reached already and the user/user application wants to establish a new originating CS call she may act in the following way:

a)allocate a new bearer for the originating call

b)reuse/share an already established bearer (e.g. to put an speech on hold and set-up a new call.

4.2.3 PS sessions

It shall be possible to have several PS sessions active simultaneously. See TS22.060 for further details.
PS sessions shall be handled independently of any CS calls.

Note: There are no new PS related requirements from TS 22.060 point of view but there might be issues related to stage 2 and stage 3 that need to be considered.

4.2.4 Connectionless traffic

Multicall shall not impact the usage of SMS-PP, SMS-CB and USSD.

4.4 Charging aspects

It shall be possible to charge each call / session independently.

4.2 Applicability to telecommunication services

The applicability of this Supplementary Service is defined in 3GPP TS 22.004.

~~5 Functional requirements~~

~~5.1 Provision and withdrawal~~

~~5.1.1 Provision~~

~~The provision of multicall is provided by prior arrangement with home environment. If the multicall service is provisioned the limits for N_{cs} and N_{ps} shall be set as subscription options. . Ncs is equal to the number of bearers that a user is allowed when Call Hold or Call Waiting are not invoked.~~

~~5.1.2 Withdrawal~~

~~The multicall service subscription will be withdrawn on subscribers request or at administrative reasons.~~

~~5.2 Limiting the number of multicalls~~

~~Regarding CS Domain. it should be possible for the number of active calls supported simultaneously to be restricted and selected by network operator, by the capabilities of the used terminal, by user subscription. It shall be possible to have one or more CS calls simultaneously with one or more parallel PS sessions.~~
~~Standard shall be able to support up to 7 simultaneous CS Calls (N_{cs}). This is equal to the number of bearers when the Call Hold or Call Waiting are not invoked.~~
~~Terminals and networks may support any number of CS calls within this limit.~~

~~It shall be possible to limit the maximum number of simultaneous bearers for CS calls to one, at this case GSM rel'98 functionality shall be shall provided.~~
~~The value of the maximum number of active speech calls is 1. Network shall not allow more than bearers allocated for speech.~~

~~5.7 Busy Definition~~

~~NDUB (Network Determined User Busy) occurs when:~~
~~1. The maximum number of calls has been reached. In the case where Call Waiting or Call Hold are not subscribed to, this is equal to maximum number of bearers. In the case with Multiparty this can occur even if bearers are still available.~~
~~2. In the case where Call Waiting or Call Hold are subscribed to, the maximum number of bearers is reached, and the maximum number of both waiting and held calls has been reached.~~
~~NOTE: This implies that CFB according to NDUB will only be invoked if the maximum number of CS calls is reached.~~

~~For User Determined User Busy (UDUB) condition see GSM 02.01 Annex C.~~

~~5.8 Exceptional procedures or unsuccessful outcome~~

~~Roaming into networks not supporting multicall shall be possible and at this case GSM rel'98 functionality shall apply . In case there is a difference between the maximum numbers (N_{cs},) , supported by the serving network, by the capabilities of the used terminal and/or by the user subscription options, the smallest value should be applied as the maximum number.~~

5 Normal procedures with successful outcome

5.1 Provision

Multicall is provided by prior arrangement with the service provider.
Multicall shall be provisioned for all Basic Services (BS) subscribed to and to which it is applicable, i.e. not to any subset of these BS.
When the Multicall supplementary service is provisioned the maximum number of simultaneous CS beares available to the subscriber (N_{br} SB) shall be defined as part of the subscription. The value for N_{br} SB shall in the range from 2 up to 7.

5.2 Withdrawal

It shall be possible to withdraw the Multicall supplementary service subscription on request of the subscriber or for

administrative reasons.

5.3 Registration

The user shall be able to modify the maximum number of CS bearers available (N_{br} User) within the limitations set by the service provider. (N_{br} SB).
If the subscriber attempts to register a value for N_{br} User that is higher than the value of (N_{br} SB), the request shall be rejected and the subscriber shall be informed on the unsuccessful outcome on the request.

5.4 Erasure

Data related to the Multicall supplementary service shall be erased by the service provider as a result of withdrawal.

5.5 Activation

The Multicall supplementary service shall be activated by the service provider as a result of provision.

5.6 Deactivation

The Multicall supplementary service shall be deactivated by the service provider as a result of withdrawal.

5.7 Invocation

The Multicall supplementary service shall be invoked by the system when at least one call is in progress and another call with a dedicated bearer is to be set up. The Multicall service applies to mobile originating and mobile terminating calls.

5.8 Interrogation

The user shall be able to interrogate the network for the values of N_{br} User, N_{br} SB and N_{br} SN.

5.9 Call related procedures

5.9.1 Terminating CS call

The indication of a terminating CS call to the mobile terminal will be done by the Multicall supplementary service until either the maximum number of bearer (N_{br}) or the maximum number of CS mobile terminating calls (N_{cs} **MT**) has been reached.
If the maximum number of terminating calls (N_{cs} MT) has been reached, and additional terminating call shall be reject without any indication to the subscriber.
If the maximum number of bearers (N_{br}) has been reached an additional terminating call will be only indicated to the user if the user has the Call Waiting supplementary service active, see chapter 7.4.2 for interactions with Call Waiting.
If N_{br} and N_{cs} MT have not been reached, a terminating call is indicated to the user and she may react in the following way:

a) Accept the terminating call

- The user/user applications shall have the possibility to allocate a new bearer for the terminating call
- If the user has the Call Hold SS active, the user shall have the possibility to reuse/share an already established bearer (e.g. release existing calls or put an speech on hold and accept the terminating call.)

b) rejecting the terminating call

- If the user rejects the terminating call the call shall be released in a normal way.

c) Ignore the incoming call

- If the user ignores the indication of the terminating call (i.e. neither accepts nor rejects it), the normal call handling shall apply, e.g. after the Alerting Timer expires the call will be released.

If there is a terminating speech call attempt and an ongoing speech call (active or held), the terminating call shall not be indicated to user –by the Multicall service. The Call waiting call SS shall be invoked if applicable, see chapter 7.4.2 for interactions with Call Waiting SS.

The user can have possibility to reuse/share a bearer only when she is provisioned for Call Hold SS. See section 7.4.1 for interaction with Call Hold SS.

5.9.2 Originating CS call

If neither N_{br} nor N_{cs} MO have not been reached and the user wants to establish a new originating CS call she may act in the following way:

a) allocate a new bearer for the originating call

b) reuse/share an already established bearer (e.g. to put an speech on hold and set-up a new call)

The user can have possibility to reuse/share a bearer only when she is provisioned for Call Hold SS. See section 7.4.1 for interaction with Call Hold SS. The mobile terminal shall not originate a speech call requesting a new bearer when there is already an active speech call.

5.10 Charging requirements

Each of the calls using a dedicated bearer shall be charged individually.
Allocation of a dedicated bearer shall be visible in the charging data.

6 Exceptional procedures or unsuccessful outcome

6.1 Exceptional operation or unsuccessful outcome

The number of simultaneous CS bearers supported by the system may vary in different regions. For instance, after handover the number of simultaneous bearers available to the served subscriber may be lower than the number of already established bearers. Such events shall trigger changes to individual calls in any multicall scenario.

If a multicall configuration is to be handed over and the target cell cannot support all the calls, the following rules shall be applied to determine which call(s) will not be handed over.

1. **A teleservice emergency call shall take precedence over all other calls.**
2. **If calls have different priorities, a call with higher priority shall take precedence over a call with lower priority.**
3. **If calls have equal priorities, a call of teleservice telephony shall take precedence over a call of any other teleservice or bearer service.**

If the application of these rules does not determine unambiguously which call(s) will not be handed over, the selection of the call(s) which will not be handed over made is according to the rules defined by the network operator.

Note: If handover is to a GSM system, then only one call can be handed over.

6.2 Registration

If the system cannot accept a registration request, the served mobile subscriber shall receive a notification that Multicall registration was not successful. Possible causes are:

- service not subscribed to;
- N_{br} User > N_{br} SB;
- insufficient information;

6.3 Erasure

No exceptional operation identified.

6.4 Activation

No exceptional operation identified.

6.5 Deactivation

No exceptional operation identified.

6.6 Invocation

If the served subscriber attempts to set up a new call with a dedicated bearer while the maximum number of bearers available to the subscriber (N_{br}) has been reached, the call attempt shall be rejected by normal procedures, indicating that no more bearers are available.

6.7 Interrogation

When a mobile subscriber who is not provided with the Multicall supplementary service interrogates the service data of the Multicall supplementary service, she shall be notified that she is not subscribed to the service.

6.8 Roaming in non-supporting networks

Roaming into networks not supporting the Multicall supplementary service shall be possible. The served subscriber will not have any access to the Multicall supplementary service and the system should behave accordingly.
When the served subscriber performs any procedure related to Multicall service as described in the clauses above while roaming in a non-supporting network, she shall be notified that the service is not available.

7~~6~~ Interaction with other supplementary services

~~6.1 General on Supplementary Services~~

~~Relation between multicall and supplementary services are considered only for CS calls. .~~

7.1~~6.2~~ Line Identification

7.1.1~~6.2.1~~ Calling Line Identification Presentation (CLIP)

No impact

7.1.2~~6.2.2~~ Calling Line Identification Restriction (CLIR)

No impact

7.1.3~~6.2.3~~ Connected Line Identification Presentation (COLP)

No impact

7.1.4~~6.2.4~~ Connected Line Identification Restriction (COLR)

No impact

7.2~~6.3~~ Call Forwarding

7.2.1~~6.3.1~~ Call Forwarding Unconditional (CFU)

No impact.

7.2.26.3.2 Call Forwarding on Busy (CFB)

No impact.

NOTE: CFB shall be invoked when the network detects a NDUB condition. The maximum number of bearers available to the subscriber (N_{br}) affects the NDUB condition. For the NDUB definition specific for Multicall, see annex A.

This means that for the case of N_{br} = 1, the system behaviour shall be the same as for a subscriber who is not provided with the Multicall service.

7.2.36.3.3 Call Forwarding on No Reply (CFNRy)

No impact.

7.2.46.3.4 Call Forwarding on Not Reachable (CFNRc)

No impact.

7.36.4 Call Completion

7.3.16.4.1 Call Hold (CH)

No impact, i.e. it shall be possible to put -an established speech call on hold.
Irrespective of whether the maximum number of CS bearers (N_{br}) is reached or not, and a terminating call is indicated to the user, she shall be able to accept the terminating call by applying the Call Hold service to an active speech call. By that she makes the bearer of the held call available to the new call.

NOTE 1: This means that for the case of N_{br} = 1, the system behaviour shall be the same as for a subscriber who is not provided with the Multicall service.

NOTE 2: There is no change to the maximum number of held calls allowed for the Multicall supplementary service. The maximum number of held calls is still 1 per a subscriber.

7.3.26.4.2 Call Waiting (CW)

~~The indication of a terminating CS call within the maximum number of calls is done by multicall feature; whereas the indication of a terminating call to the user / terminal by Call Waiting function is done when multicall limit (N_{es}) has been reached and the subscriber has CW active. When the supplementary service "Call Waiting" is applicable the maximum number of calls is M+ N_{es} , where M is maximum number of waiting calls, which is specified in 22.083.~~
When the subscriber has at least one ongoing call and a new terminating call is speech; then Call Waiting shall be invoked if

1) There is an active speech call and Call Waiting is active and operative for speech or,
2) There is a held speech call, with no active call on the same bearer, and Call Waiting is active and operative for speech or,
3) There is a held speech call, with an active non-speech call on the same bearer, and Call Waiting is active and operative for that non-speech basic service or,
4) There are no speech calls (including a call on hold), the maximum number of bearers (N_{br}) has been reached and Call Waiting is active and operative for at least one of the basic services currently in use.

When the subscriber has at least one ongoing call and a new terminating call is not speech; then Call Waiting shall be invoked if the maximum number of bearers (N_{br}) has been reached and Call Waiting is active and operative for at least one of the basic services currently in use.

NOTE: ~~Due to that t~~There is no change to the maximum number of waiting calls allowed for~~required from~~ the M~~m~~ulticall service. ~~t~~The maximum number of waiting calls is still 1 per a subscriber.

7.46.5 Multi Party (MPTY)

No Impact.
The number of MPTY member may be limited by N_{cs} MO and N_{cs} ~~because of number of existing CS calls.~~

7.5~~6.6~~ Closed User Group (CUG)

No impact.

7.6~~6.7~~ Advice of Charge (AoC)

The subscriber shall receive the AoC indication individually for each CS call.
For the AoCC service, the ACM (Accumulated Call Meter as defined in TS 22.024) shall reckon the sum of the charge generated by all simultaneous CS calls.
~~It shall be possible for network to indicate the AoC parameters for each CS call.~~
~~It shall be possible for mobile terminal to count each CS Call charges respectively and to have overall ACM (Accumulated Call Meter as defined in 22.024) for all the calls.~~

7.7~~6.8~~ Call Barring

No impact.

7.7.1~~6.8.1~~ Barring of all outgoing calls

No impact.

7.7.2~~6.8.2~~ Barring of outgoing international calls

No impact.

7.7.3~~6.8.3~~ Barring of outgoing international calls except those directed to the HPLMN country

No impact.

7.7.4~~6.8.4~~ Barring of all incoming calls

No impact.

7.7.5~~6.8.5~~ Barring of incoming calls when roaming

No impact.

7.8~~6.9~~ Explicit Call Transfer (ECT)

No impact.

7.9~~6.10~~ Completion of Call to Busy Subscriber (CCBS)

~~No impact.~~
The definition of the IDLE state of subscriber A and destination B is not modified, i.e. a subscriber is considered to be IDLE when all the bearers (calls) for her have been released.
A subscriber to whom CCBS can be invoked shall be regarded as NDUB under the specific NDUB condition for Multicall (See Annex A)

7.10~~6.11~~ Multiple Subscriber Profile (MSP)

No impact.

7.11~~6.12~~ Calling Name Presentation (CNAP)

No impact.

7.12~~6.13~~ User-to-User Signalling (UUS)

No Impact

7.136.14 enhanced Multi-Level Precedence and Pre-emption service (eMLPP)

No impact.

7.146.15 Call Deflection (CD)

No impact.

8 Interaction with other network features and services

8.1 CAMEL

No impact.

8.2 IST

No impact.

8.3 ODB

No impact.

8.4 Emergency Calls

The network shall handle emergency call at first priority. When a user originates an emergency call, the UMTS network shall behave as follows;

- The UMTS network, which supports Multicall, shall accept the emergency call within the serving network capability regardless of Multicall subscription limitation to the user.
- The UMTS network, which supports Multicall, shall accept the emergency call after tearing down existing call(s) if necessary.
- The MS shall ensure that an emergency call setup request is acceptable to a serving network which does not support multicall, if necessary by releasing one or more existing call.

~~7 Cross Phase Compatibility for R99~~

~~This section details the cross phase compatibility requirements relating to the service requirements in this document. Note: when a change is introduced which affects the 3GPP specifications, it is said to be 'backward compatible' if existing equipment can continue to operate and perform correctly with equipment that conforms to the new implementation.~~

~~7.1 Compatibility With Existing Standards~~

~~Where the service and operational requirements in this document relate to a core network functionality, compatibility is required.~~

~~Multicall mechanisms is not applicable for GSM BSS.~~

~~7.2 Compatibility With Future Releases~~

~~It is envisaged that 3GPP standards will evolve beyond R99, for example with the addition of new service requirements. The standards which define the technical implementation of R99 should be developed in such a way that it is practical to add the requirements in this section in a backward compatible manner.~~

~~Following chapters include requirements that are foreseen for future release.~~

~~7.2.1 Multicall configuration~~

~~When having one active CS call and one held call on the same bearer. It shall be possible to create a new CS bearer and to move one of the calls to the new bearer, resulting both calls being active within the limits set by the operator/user and within the capability of the terminal. See figure 2: Split of bearer.~~

~~When having two calls (multicall) on the separate bearers. It shall be possible to join both calls to one of the two bearers, put the one of the calls to hold and to release unused CS bearer. It shall be possible to select which call to put on hold. See figure 2: Combination of bearers. *(Note: there is no clear end-user service requirement for this feature at time being.)*~~

NOTE: Due to that only speech calls can be put on hold, so one of the two active Cs calls has to be a speech call

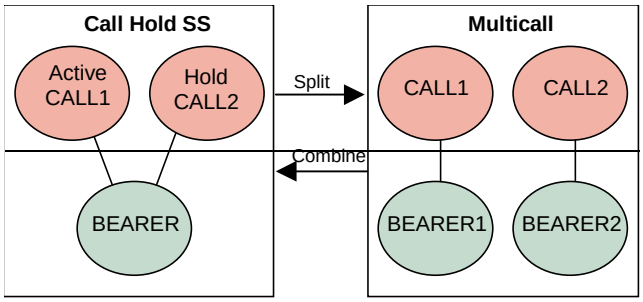


Figure2: Illustration for split of bearer and combination of bearers.

7.2.2 Several simultaneous speech calls / bearers

Key requirements for multicall is to allow several simultaneous CS call. The most important usage scenario is to allow several CS data bearers to be bind at application level resulting to higher than 64kbits/s data rates. Other important feature is just general flexibility allowing e.g. simultaneous speech and data call. It's been also required to have several simultaneous active speech calls.

It's been proposed that the multicall feature could be introduced in a phased manner, meaning that in the first phase, i.e. UMTS phase 1, release 99 only one active speech call would be supported. However, Call control should not prohibit a complete set of multiple speech bearer services in future releases and UTRAN shall be designed in a flexible way to support multiple speech bearers. In Release 99, GSM SS Call Wait, Multiparty and Call Hold are used to offer simultaneous speech calls to user.

If multiple simultaneous voice calls are supported then the Call Hold service shall be used to reconfigure the number of bearers supporting voice calls if required during handover. e.g. in the case of handover to GSM where only one voice call can be active at a time. This requirement is dependent on the user subscribing to Call Hold.

7.2.3 CCBS

At release 1999 CCBS no enhancements for CCBS is required.

In the future releases the definition of IDLE state of subscriber A and destination B should be modified in away that the IDLE state is reach even if there are active CS calls but the maximum limit of CS calls is not reached.

7.2.4 Registration

User shall be able to modify the maximum number of CS calls within the limitations set at provision of the service.

If the subscriber requests to set the limits of N_{cs} to higher values as allowed according to the provision (subscription option), this request shall be rejected and the subscriber shall be informed on the unsuccessful outcome of the request.

7.2.5 Interrogation

User shall be able to interrogate the maximum number of CS calls set by user.

User shall be able to interrogate the maximum number of CS calls supported by serving network.

Annex A. (~~informative~~normative) :

Busy definition

NDUB (Network Determined User Busy) occurs when:

1. The maximum number of mobile terminating calls (N_{cs} **MT**) has been reached (NOTE 1),
2. The maximum number of bearers (N_{br}) has been reached and the maximum number of waiting calls has been reached (NOTE 2, NOTE3).

NOTE 1: This can occur even if bearers are still available, e.g. when the MS is engaged in MPTY SS. If the maximum number of mobile terminating calls (N_{cs} MT) has been reached, the -Call Waiting SS cannot be invoked.

NOTE 2: If Call Waiting is provisioned and activated, and when the maximum number of bearers has been reached the Call Waiting SS can be invoked. This case is not regarded as NDUB. See section 7.3.2 for interaction with Call Waiting SS.

NOTE 3: According to the speech bearer number limitation, the incoming speech call shall be regarded as encountering NDUB when the MS is engaged in a speech call (including a held call) and Call Waiting SS is not provisioned and activated for the user, irrespective of the further availability of bearers for the user. For the condition under which Call Waiting SS shall be invoked in this case, see section 7.3.2.

For User Determined User Busy (UDUB) condition see TS 22.001 Annex C.

[Editors Note: This N_{cs} limitation reflects the current protocol limitation in 24.008. This may be removed after the discussion in the next N1 meeting (held 28/02-03/03 in Umea, Sweden)]

Annex B. Cross Phase Compatibility for R99 (informative)

This section details the cross phase compatibility requirements relating to the service requirements in this document.

Note: when a change is introduced which affects the 3GPP specifications, it is said to be 'backward compatible' if existing equipment can continue to operate and perform correctly with equipment that conforms to the new implementation.

B.1 Compatibility With Existing Standards

Where the service and operational requirements in this document relate to core network functionality, compatibility is required.

Multicall mechanisms are not applicable for GSM BSS.

B.2 Compatibility With Future Releases

It is envisaged that 3GPP standards will evolve beyond R99, for example with the addition of new service requirements. The standards which define the technical implementation of R99 should be developed in such a way that it is practical to add the requirements in this section in a backward compatible manner.

Following chapters include requirements that are foreseen for future release.

B.2.1 Multicall configuration

When having one active CS call and one held call on the same bearer. It shall be possible to create a new CS bearer and to move one of the calls to the new bearer, resulting both calls being active within the limits set by the operator/user and within the capability of the terminal. See figure 2: Split of bearer.

When having two calls (multicall) on the separate bearers. It shall be possible to join both calls to one of the two bearers, put the one of the calls to hold and to release unused CS bearer. It shall be possible to select which call to put on hold. See figure 2: Combination of bearers. *(Note: there is no clear end-user service requirement for this feature at time being.)*

NOTE: Due to that only speech calls can be put on hold, so one of the two active Cs calls has to be a speech call

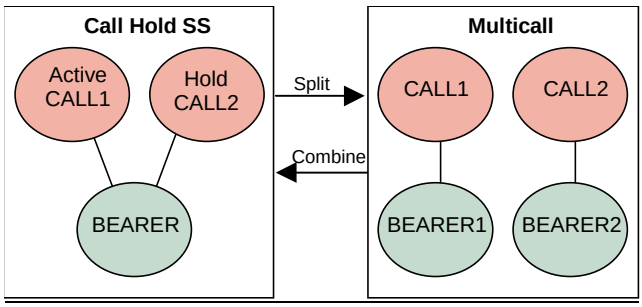


Figure2: Illustration for split of bearer and combination of bearers.

B.2.2 Several simultaneous speech calls / bearers

A Key requirements for multicall is to allow several simultaneous CS calls with dedicated bearers. The most important usage scenario is to allow several CS data bearers to be bind at application level resulting to higher than 64kbits/s data rates. Another important feature is to allow simultaneous speech and data calls.
It's been proposed that the multicall feature could be introduced in a phased manner; meaning that in the first phase, i.e. UMTS release 99 does only support one active speech call at a time. However, Call control should not prohibit a complete set of multiple speech bearer services in future releases and UTRAN shall be designed in a flexible way to support multiple speech bearers. The specific NDUB definition for speech call shall be removed when multiple speech call is supported. In release 99, Supplementary Services Call Waiting, Multiparty and Call Hold are used to offer simultaneous speech calls to user.
N_{cs} may be extended in R00 or further releases.
If multiple simultaneous speech calls are supported in the future then the Call Hold service may be used to reconfigure the number of bearers supporting speech calls if required during handover. e.g. in the case of handover to GSM where only one speech call can be active at a time. This requirement is dependent on the user subscribing to Call Hold.

B.2.3 CCBS

At release 1999 CCBS no enhancements for CCBS is required.
In the future releases the definition of IDLE state of subscriber A and destination B should be modified in away that the IDLE state is reach even if there are active CS calls but the maximum limit of CS calls is not reached.

Annex C. (informative) : Change history

Change history					
SMG No. / TSG SA#	**TDoc. No.**	**CR. No.**	**Section affected**	**New version**	**Subject/Comments**
TSG SA#5	SP99-433			Version 3.0.0	Approved
TSGT SA#6	SP99-523	001	5.6	Version 3.1.0	Transfer of Handover chapter to 22.129
TSGT SA#6	SP99-523	002	4.2.1, 5.1.1, 5.4, 5.7, 7.2.2	Version 3.1.0	Clarification on handling of multiple bearers
TSGT SA#6	SP99-554	003	3, 5, 7	Version 3.1.0	Registration, Interrogation and Restriction of Packet Domain

History

Document history		
Date	**Version**	**Comment**
19 Mar. 1999	0.0.1	First draft by the editor (Tommi Kokkola / Nokia)
30 Mar. 1999	0.1.0	Output from S1 Multicall ad hoc
6 Apr. 1999	0.1.0	Minor modifications by the editor. Proposed version 1.0.0
19 Apr. 1999	1.0.0	For information to 3GPP TSG SA#3
10. Jun. 1999	1.1.0	Draft from editor for the email meeting.
18. Jun. 1999	1.1.1	Draft during the email meeting.
24. Jun .1999	1.2.0	Result of email discussions. For some issues status still unstable.
1. Jul .1999	1.2.1	Comments from TSGN & TSGS Multimedia and Multicall joint meeting included. (Revisions included from version 1.1.0)
8. Jul. 1999	1.3.0	Results from S1 Plenary. Drafting continues at S1_Multicall mailing lists. Contributions expected on: -Busy, Idle, Active states –Busy definition –Supplementary service interactions incl. related CR to appropriate SS when needed. (Specifically 02.83 need to be studied.) – all topics marked with FFS…
28. Sep. 1999	1.4.0	Output from S1 Multicall ad hoc, Germany.
1.Oct. 1999	1.6.0	Proposed version 2.0.0
10. Oct 1999	2.0.0	Version 2.0.0
October 99	3.0.0	Stage 1 approved at SA#5, Kyongju, Korea
December 199	3.1.0	Inclusion of CRs approved at SA#5, Nice, France

TSG-SA Working Group 1 (Services) meeting #7 **TSG S1 (00) 154**
Sophia Antipolis, France 9 - 11 February 2000 **Agenda Item: 5.15**

CHANGE REQUEST

Please see embedded help file at the bottom of this page for instructions on how to fill in this form correctly.

22.004	CR	003	Current Version:	3.1.0

GSM (AA.BB) or 3G (AA.BBB) specification number ↑ *↑ CR number as allocated by MCC support team*

For submission to: TSG SA#7 *list expected approval meeting # here ↑*

for approval [X] for information [ ]

strategic [ ] non-strategic [ ] *(for SMG use only)*

Form: CR cover sheet, version 2 for 3GPP and SMG *The latest version of this form is available from: ftp://ftp.3gpp.org/Information/CR-Form-v2.doc*

Proposed change affects: *(at least one should be marked with an X)* (U)SIM [ ] ME [X] UTRAN / Radio [ ] Core Network [X]

Source: TSG SA1 **Date:** 02/02/00

Subject: Introduction of Multicall as Supplementary Service

Work item: Multicall

Category: *(only one category shall be marked with an X)*

F	Correction	[X]
A	Corresponds to a correction in an earlier release	[ ]
B	Addition of feature	[ ]
C	Functional modification of feature	[ ]
D	Editorial modification	[ ]

Release:

Phase 2	[ ]
Release 96	[ ]
Release 97	[ ]
Release 98	[ ]
Release 99	[X]
Release 00	[ ]

Reason for change: Updates to 22.004 due to introduction of Multicall as Supplementary Service

Clauses affected: 1.1; 2; Annex A

Other specs affected:

Other 3G core specifications	[ ]	→ List of CRs:
Other GSM core specifications	[ ]	→ List of CRs:
MS test specifications	[ ]	→ List of CRs:
BSS test specifications	[ ]	→ List of CRs:
O&M specifications	[ ]	→ List of CRs:

Other comments:

help.doc

<--------- double-click here for help and instructions on how to create a CR.

1.1 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.
- For this Release 1999 document, references to GSM documents are for Release 1999 versions (version 8.x.y).

[1] GSM 01.04: "Digital cellular telecommunication system (Phase 2+); Abbreviations and acronyms".

[2] GSM 02.01: "Digital cellular telecommunication system (Phase 2+); Principles of telecommunication services supported by a GSM Public Land Mobile Network (PLMN)".

[3] TS22.002: "Bearer Services (BS) supported by a Public Land Mobile Network (PLMN)".

[4] GSM 02.03: "Digital cellular telecommunication system (Phase 2+); Teleservices supported by a GSM Public Land Mobile Network (PLMN)".

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

[6] TS 22.067: " enhanced Multi-Level Precedence and Pre-emption service (eMLPP) - Stage 1".

[7] TS 02.081: " Line identification supplementary services - Stage 1".

[8] TS 22.082: "Call Forwarding (CF) supplementary services - Stage 1".

[9] TS 22.083: " Call Waiting (CW) and Call Hold (HOLD) supplementary services - Stage 1".

[10] TS22.084: "MultiParty (MPTY) supplementary services - Stage 1".

[11] TS 22.085: "Closed User Group (CUG) supplementary services - Stage 1".

[12] TS 22.086: "Advice of Charge (AoC) supplementary services - Stage 1".

[13] TS 22.088: "Call Barring (CB) supplementary services - Stage 1".

[14] TS 22.072: "Call Deflection (CD) - Stage 1".

[15] TS 22.087: "User-to-user signalling (UUS) - Stage 1".

[16] TS 22.091: "Explicit Call Transfer (ECT) supplementary services - Stage 1".

[17] TS 22.093: "Call Completion to Busy Subscriber (CCBS) - Stage 1".

[18] TS 22.096: "Calling Name Presentation (CNAP) - Stage 1".

[19] TS 22.135: “Multicall (MC) – Stage 1”

[2019] TS 23.011: "Technical realization of supplementary services".

[210] TS 24.010: "Mobile radio interface layer 3 Supplementary services specification General aspects".

[221] TS 24.080: "Mobile radio interface layer 3 supplementary services specification Formats and coding".

[232] ITU-T Recommendation I.210: "Principles of telecommunication services supported by an ISDN and the means to describe them".

[243] TS 22.101: "UMTS Service Principles".

[254] TS 22.105: "Services and service capabilities".

[265] TR 21.905: "Vocabulary for 3GPP Specifications"

4. Supported supplementary services

Table 4.1/ TS 22.004: Supported Supplementary Services

Supplementary Service							
Spec/section		Reg	Eras	Act	Deact	Inv	Int
22.067	eMLPP	a/s	w/r	-	-	n	dr
22.072, Call Deflection SS							
	CD	-	-	p	w	u	-
22.081. Number Identif. SS							
	CLIP	-	-	p	w	n	s
	CLIR	-	-	p	w	n	dr
	CoLP	-	-	p	w	n	s
	CoLR	-	-	p	w	n	s
22.082. Call Offering SS							
	CFU	a/s	w/r/s	r/s	e/s	n	dr
	CFB	a/s	w/r/s	r/s	e/s	n	dr
	CFNRy	a/s	w/r/s	r/s	e/s	n	dr
	CFNRc	a/s	w/r/s	r/s	e/s	n	dr
22.083. Call Completion SS							
	CW	-	-	a/s	a/s	n	s
	HOLD	-	-	p	w	u	-
22.084. Multi Party SS							
	MPTY	-	-	-	-	u	-
22.085. Comm. of Interest SS							
	CUG	-	-	p	w	u/n	-
22.087. User-to-User SS							
	UUS	-	-	s	c	u/n	-
22.086. Charging SS							
	AoCI	-	-	p	w	n	-
	AoCC	-	-	p	w	n	-
22.088. Call Restriction SS							
	BAOC	a/s	w/r	a/s	s/a	n	dr
	BOIC	a/s	w/r	a/s	s/a	n	dr
	BOIC-exHC	a/s	w/r	a/s	s/a	n	dr
	BAIC	a/s	w/r	a/s	s/a	n	dr
	BAIC-Roam	a/s	w/r	a/s	s/a	n	dr
22.067	eMLPP	a/s	w/r/s	-	-	u/n	s/dr
22.091. Call Transfer SS							
	ECT	-	-	p	w	u	-
22.093. Completion of Calls to Busy Subscribers							
	CCBS SS	-	-	p	w	n	
	CCBS Requests			s	s/a/w		dr
22.096 Name Identification SS							
	CNAP	-	-	p	w	n	s
22.135 Multicall							
	MC	a/s	w	p	w	U/n	dr

Abbreviations used for the Supplementary Services:

CD	Call Deflection
CLIP	Calling Line Identification Presentation
CLIR	Calling Line Identification Restriction
CoLP	Connected Line Identification Presentation
CoLR	Connected Line Identification Restriction
CFU	Call Forwarding Unconditional
CFB	Call Forwarding on Mobile Subscriber Busy
CFNRy	Call Forwarding on No Reply
CFNRc	Call Forwarding on Mobile Subscriber Not Reachable
CNAP	Calling Name Presentation - (CNAP)
CW	Call Waiting
HOLD	Call Hold
MPTY	Multi Party Service
MC	Multicall
CUG	Closed User Group
AoCI	Advice of Charge (Information)
AoCC	Advice of Charge (Charging)
UUS	User-to-user signalling
BAOC	Barring of All Outgoing Calls
BOIC	Barring of Outgoing International Calls
BOIC-exHC	Barring of Outgoing International Calls except those directed to the Home PLMN Country
BAIC	Barring of All Incoming Calls
BIC-Roam	Barring of Incoming Calls when Roaming Outside the Home PLMN Country
ECT	Explicit Call Transfer
eMLPP	enhanced Multi-Level Precedence and Pre-emption
SPNP	Support of Private Numbering Plan - (SPNP)
CCBS	Completion of calls to busy subscribers.- (CCBS)

Annex A (normative): Applicability of Supplementary Services to Telecommunication Services

Table A.1 gives the applicability of Supplementary Services to telecommunication services.

Table A.1/TS 22.004: Applicability of SSs to telecommunication services

SS	Telephony	Emergency Call	SMS PTP		SMS-CB	Fax	cct Data	GPRS	Voice Group
	TS11	TS12	TS21	TS22	TS 23	TS 6x	BS2x, BS3x	BS 70	TS 91
eMLPP	Yes	Yes[9]				Yes	Yes		Yes
CD	Yes					Yes	Yes		Yes[6]
CLIP	Yes					Yes	Yes		Yes
CLIR	Yes					Yes	Yes		Yes
COLP	Yes					Yes	Yes		Yes
COLR	Yes					Yes	Yes		Yes
CFU	Yes					Yes	Yes		Yes[6]
CFB	Yes					Yes	Yes		Yes[6]
CFNRy	Yes					Yes	Yes		Yes[6]
CFNRc	Yes					Yes	Yes		Yes[6]
CW[1]	Yes					Yes	Yes		Yes[6]
HOLD[2]	Yes								Yes[6]
MPTY	Yes								Yes[6]
CUG	Yes					Yes	Yes		Yes[6]
AoCI	Yes					Yes	Yes		
AoCC	Yes					Yes	Yes		
UUS	Yes					Yes	Yes		[7]
BAOC	Yes		Yes[3]	Yes		Yes	Yes		Yes[6]
BOIC	Yes		Yes[3]	Yes		Yes	Yes		Yes[6]
BOIC-exHC	Yes		Yes[3]	Yes		Yes	Yes		Yes[6]
BIC	Yes		Yes	Yes[3]		Yes	Yes		Yes[6]
BIC-Roam	Yes		Yes	Yes[3]		Yes	Yes		Yes[6]
ECT	Yes								Yes[6]
CCBS	Yes					Yes	Yes		Yes[10]
SPNP	Yes		Yes[5]	Yes[5]		Yes	Yes		
CNAP	Yes		[8]	[8]					Yes[3]
MSP	Yes		Yes	Yes		Yes	Yes		Yes
MC	Yes	Yes				Yes	Yes		-