

Agenda Item: 9.0.2
Source: NTT DoCoMo
Title: Multicall Service
Document for: Discussion

1. Introduction

This document explains the Muticall service in IMT2000. The basic concept of Multicall is described in the documents UMTS 22.00. This contribution is to clarify Multicall service images.

2. Multicall : the service aspect

2.1 Basic Concept

The UTRAN & the phase 1 UMTS core network shall allow one mobile termination to handle more than one bearer service simultaneously and to have bearer services of different connection modes. It is nevertheless expected that the terminal and network capabilities will put some limitations on the number of bearer services that can be handled simultaneously. It shall be possible for each connection to have independent traffic and performance characteristics. It shall be possible for each connectionless message to have independent traffic and performance characteristics.

2.2 Definition of Multicall

Multicall service is a service that more than one active call is simultaneously held in a MT. A bearer (channel) need in order to make a call active. Therefore, Multicall service can be called multiple bearer (channel) service.

2.3 Relation between circuit switched (CS) call and packet session (PS)

CS call and PS can exist in a MT simultaneously and independently. Multiple CS calls and multiple PS can exist in a MT and the combination is totally free and it is totally operator dependent. This paper describes for the CS case and PS case respectively.

The number of maximum simultaneous calls can be set for each independent user or for each NW. The maximum numbers is set for CS calls and PS respectively. The number of acceptable simultaneous call depends on the wireless resource and user contract.

3 Multicall of CS

3.3 General

The process of Multicall is shown in Figure 1. In order to limit the complexity, the following parts are described on the assumptions that the number of maximum simultaneous calls is 2. When an additional call occurs during call (state B), user can form Multicall. State C is the state of a general Multicall. If additional call is an incoming call, user can indicate BUSY status to the network.

ANNEX-A

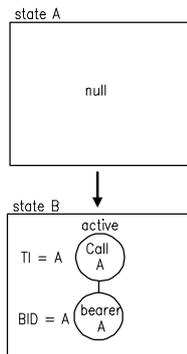
Assumption

The number of maximum simultaneous calls is 2.
CW, CH and MPTY are activated.

1) initial call setup

<initial call>

call A: speech or data



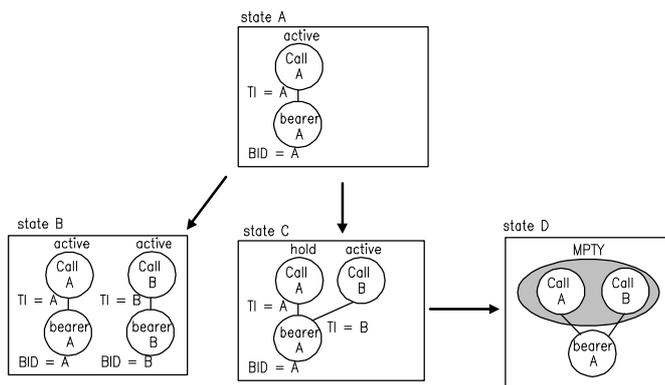
2.1) 2nd additional call setup

<existing call>

call A: speech

<additional call>

call B: speech or data



- When call-B is a speech, state-C can be transit to state-D.
- When call-B is an incoming call, user can return BUSY status.

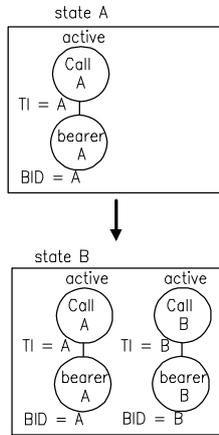
2.2) 2nd additional call setup

<existing call>

call A: data

<additional call>

call B: speech or data



a) When call-B is an incoming call, user can return BUSY status.

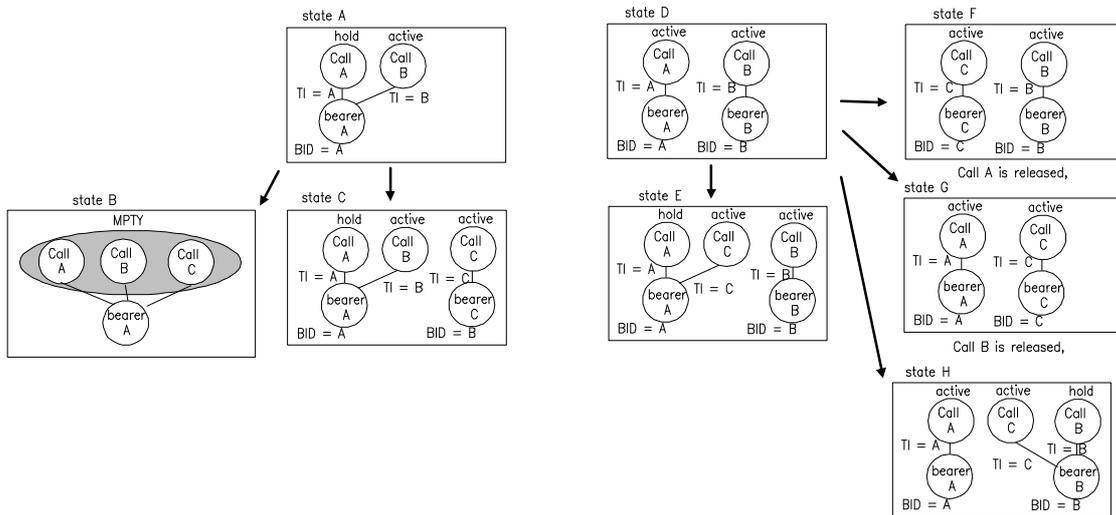
3.1) 3rd additional call setup

<existing call>

call A: speech, call B: speech

<additional call>

call C: speech or data



- When call-C is a speech, state-A can be transit to state-B
- MPTY can start from State-C
- When call-C is a speech, MPTY can start from State-C and State H.
- When call-C is an incoming call, user can return BUSY status.

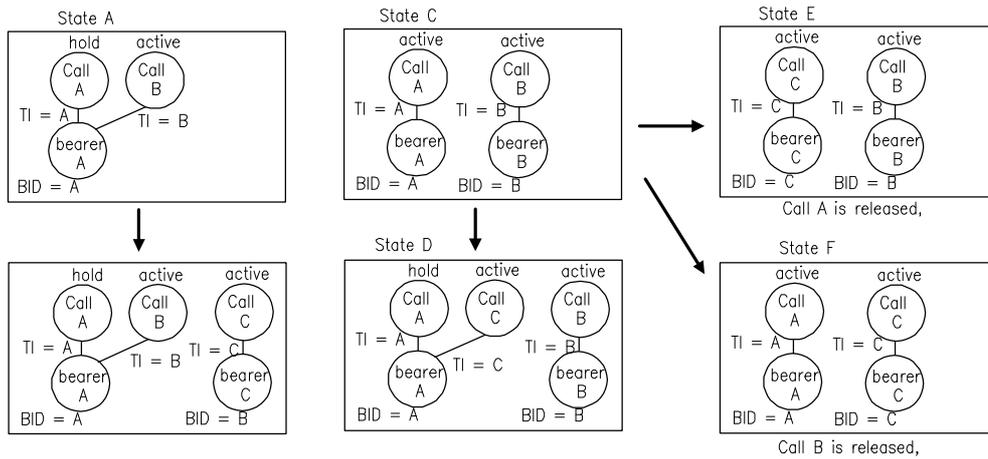
3.2) 3rd additional call setup

<existing call>

call A: speech, call B: data

<additional call>

call C: speech or data



- a) When call-C is a speech, MPTY can start from state-D.
- b) When call-C is an incoming call, user can return BUSY status.

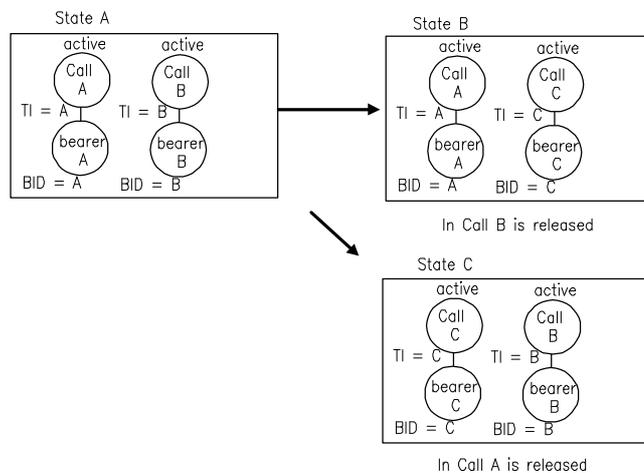
3.3) 3rd additional call setup

<existing call>

call A: data, call B: data

<additional call>

call C: speech or data



- a) When call-C is an incoming call, user can return BUSY status.

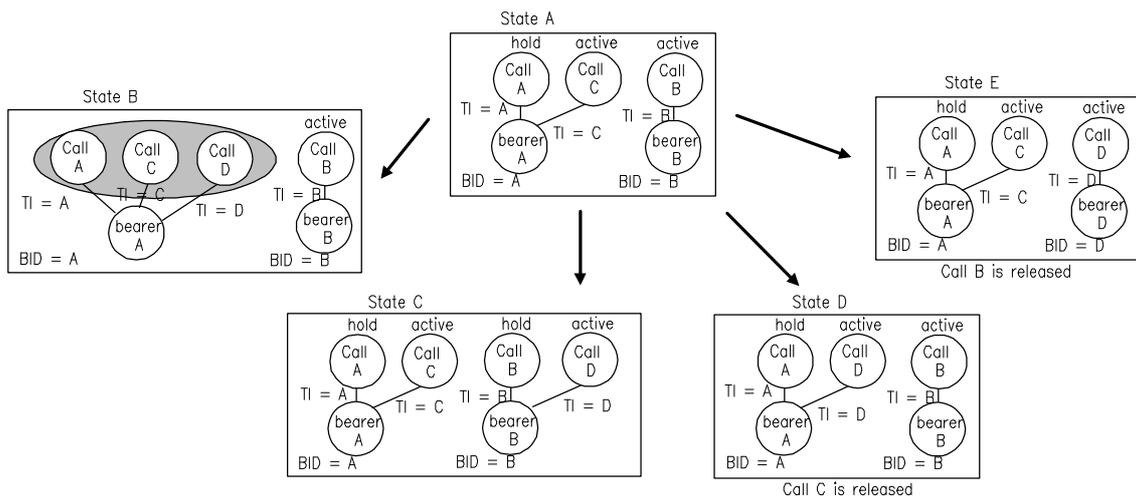
4.1) 4th additional call setup

<existing call>

call A: speech, call B: speech, call C: speech

<additional call>

call D: speech or data



- When call-D is a speech, state-A can be transit to state-B
- From state-C and state-E, MPTY can start by call-A and call-C.
- When call-D is a speech, MPTY can start by call-B and call-D from state-C and MPTY can start by call-A and call-D from state-D.
- When call-D is an incoming call, user can return BUSY status.

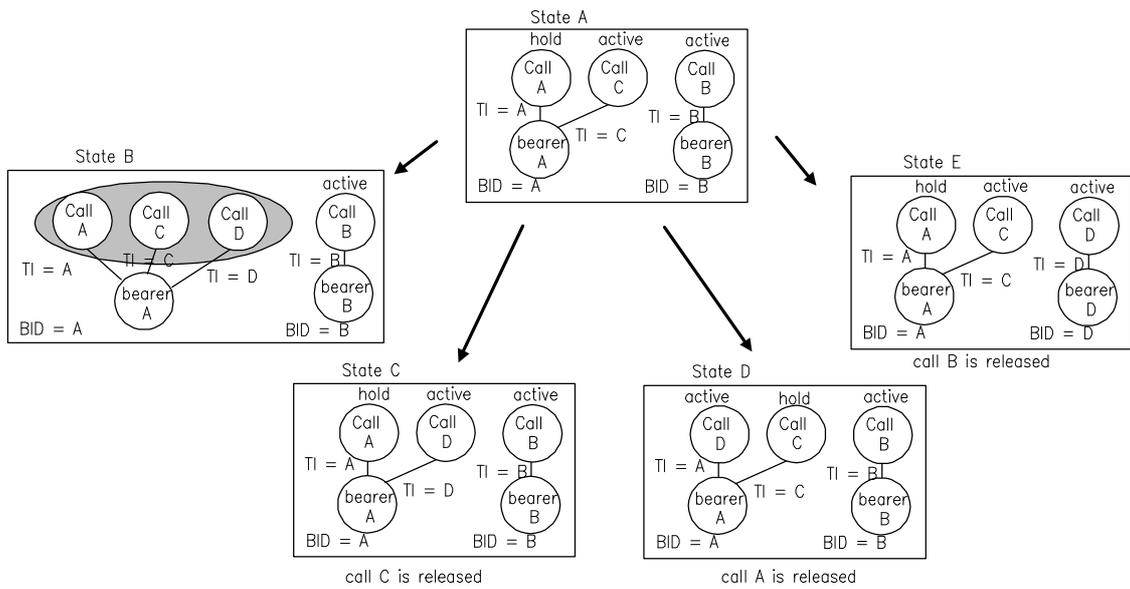
4.2) 4th additional call setup

<existing call>

call A: speech, call B: data, call C: speech

<additional call>

call D: speech or data



- a) When call-D is a speech, state-A can be transit to state-B
- b) When call-D is a speech, MPTY can be formed from state-C and state-D.
- c) MPTY can start from State-E
- d) When call-D is an incoming call, user can return BUSY status.

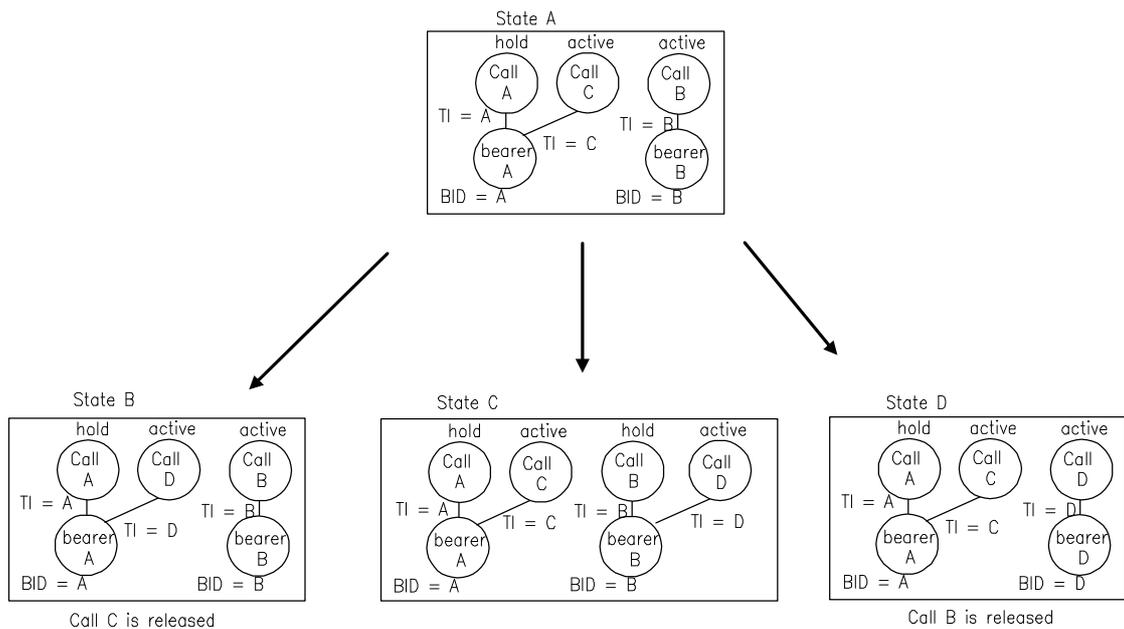
4.3) 4th additional call setup

<existing call>

call A: speech, call B: speech, call C: data

<additional call>

call D: speech or data



- a) When call-D is a speech, MPTY can be formed from state-B.
- b) When call-D is a speech, MPTY can be formed by call-B and call-D.
- c) When call-D is an incoming call, user can return BUSY status.

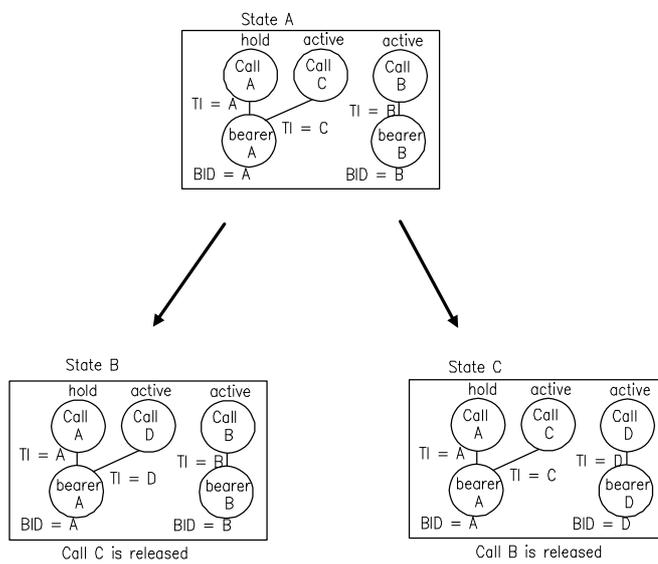
4.4) 4th additional call setup

<existing call>

call A: speech, call B: data, call C: data

<additional call>

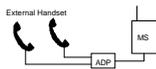
call D: speech or data



- a) When call-D is a speech, MPTY can be formed from state-B.
- b) When call-D is an incoming call, user can return BUSY status.

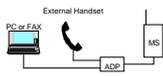
[Multicall Connection Images]

(1) Voice + Voice



Ex.) for bus, train etc. like public phone

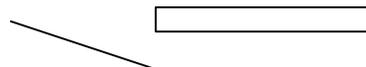
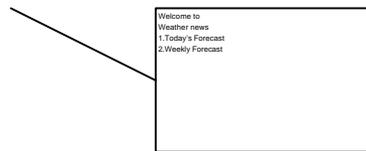
(2) Voice + Data



Ex.) Web browsing / FAX + telephony

(3) Data + Data

PC



Ex.) FTP + Information delivery

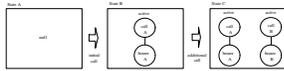


Figure 1 Multicall Process for CS

3.2 Relation with Multicall and Supplementary Services

With a Muticall, supplementary services such as CW, CALL HOLD and MPTY services can be offered simultaneously. CW and CALL HOLD will be offered by using relevant bearers. Both (CW and CH) of the services result in the same state. Refer Figure 2, Figure 3 and Figure 4.

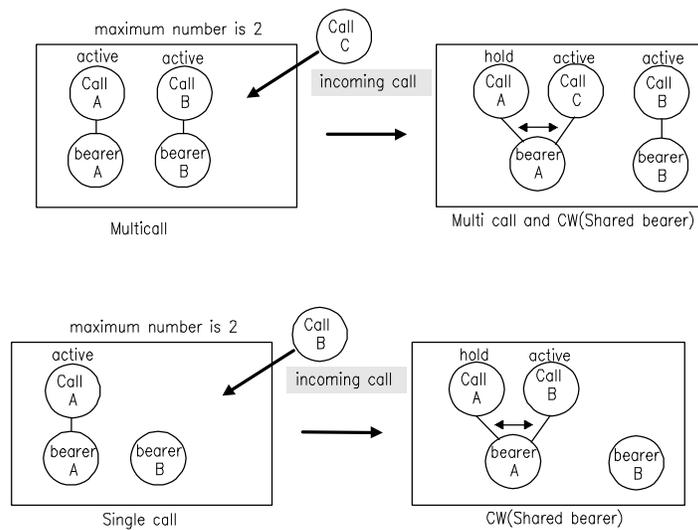


Figure 2 Call Waiting

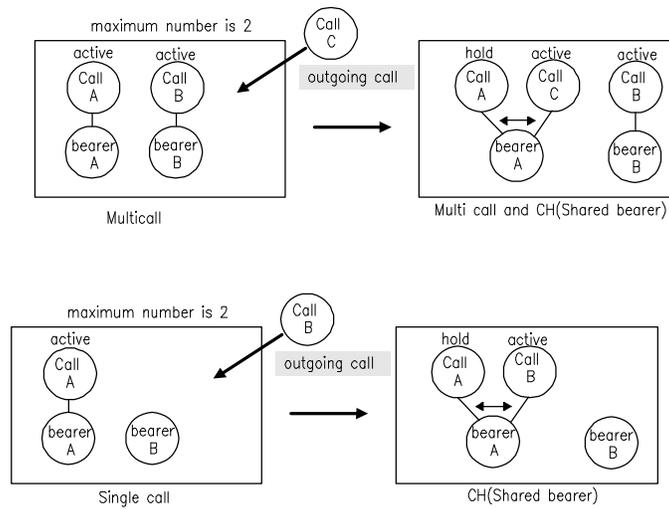


Figure 3 Call Hold

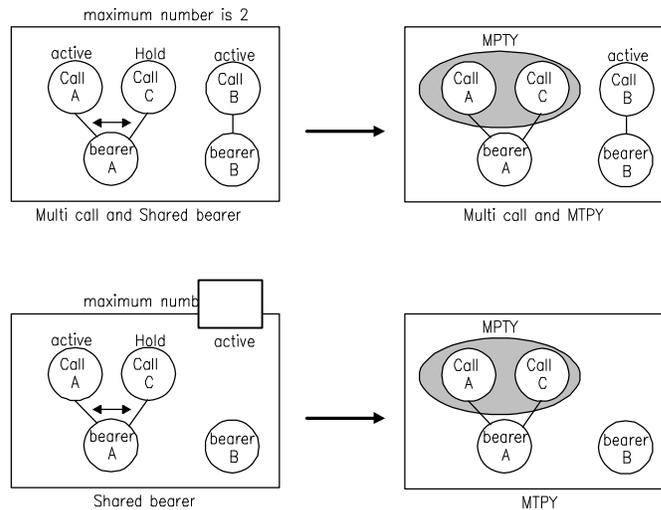


Figure 4 Multi Party

Note: Shared Bearer

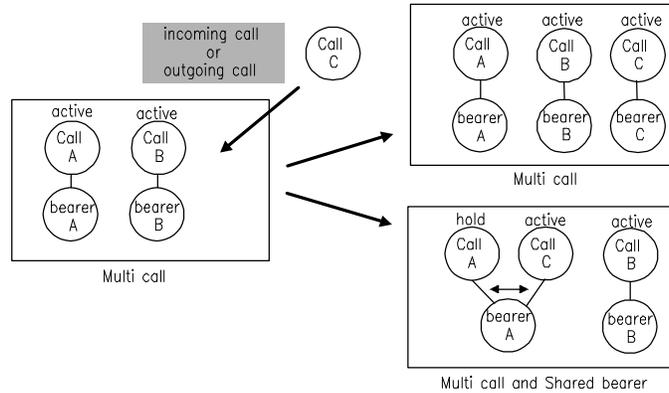
“Shared Bearer” can be defined as a service that multiple calls (only one active call in the multiple call) share a bearer. Such shared bearer will be mainly used for voice calls. But, GSM supplementary services allow the non-voice-call reception during an active voice call by holding the voice call. IMT2000 will provide the similar service, such as accept two calls request which have different bearer types. However, we suppose that the description for Multicall has NOT included the description of this requirement, because this is NOT a new requirement for Multicall.

Other supplementary services such as Call Forwarding, Call Transfer and Call Barring services can be applied independently for each call. For Call Forwarding service, BUSY status in Multicall need to be defined.

- (1) CW is activated and a user indicates BUSY status to the network when additional incoming call occurs.
- (2) CW is not activated and the acceptable number of Multicall by user's contract or the wireless resource limitation is exceeded.

3.3 Example of the combination of Multicall and Shared Bearer service

When an additional incoming or outgoing call is initiated, the user can select to form a Multicall (multiple bearers) or a shared bearer (Figure 5). If there are multiple bearers, the user can select which bearer to be formed as a shared bearer (Figure 6). Here the number of maximum



simultaneous calls is 3.

Figure 5 Selection of Multicall or Shared Bearer

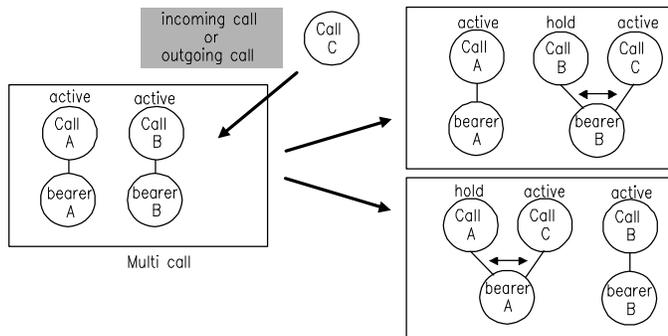


Figure 6 Selection of Shared Bearer

In ANNEX-A shows a possible CALL status on a MT when CW, CH and MTPY are active with the maximum number of acceptable bearer is 2.

4. Multicall of PS

4.1 General

A fundamental view of Multicall of PS is the same as CS. The process of Multicall is shown in Figure 7. In order to limit the complexity, the following parts are described on the assumptions that the number of maximum simultaneous sessions is 2. When an additional session is initiated in state B, user can form Multicall. State C is the state of a general Multicall.



Figure 7 Multicall process for PS

When additional session is initiated, it is possible to use the concept of Multi-Link. Multi-Link can be defined as a service that multiple packet links share the same bearer. All the packet links that are sharing the same bearer are active.

5. Conclusion

Multicall service images are clarified in this document. This will be used as ANNEX of baseline document to help understanding Multicall service image, if necessary. Multicall connection images are also shown in ANNEX-A.