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(54) Title: CALL COMPLETION SERVICE IN CASE OF CALLED PARTY UNAVAILABILITY
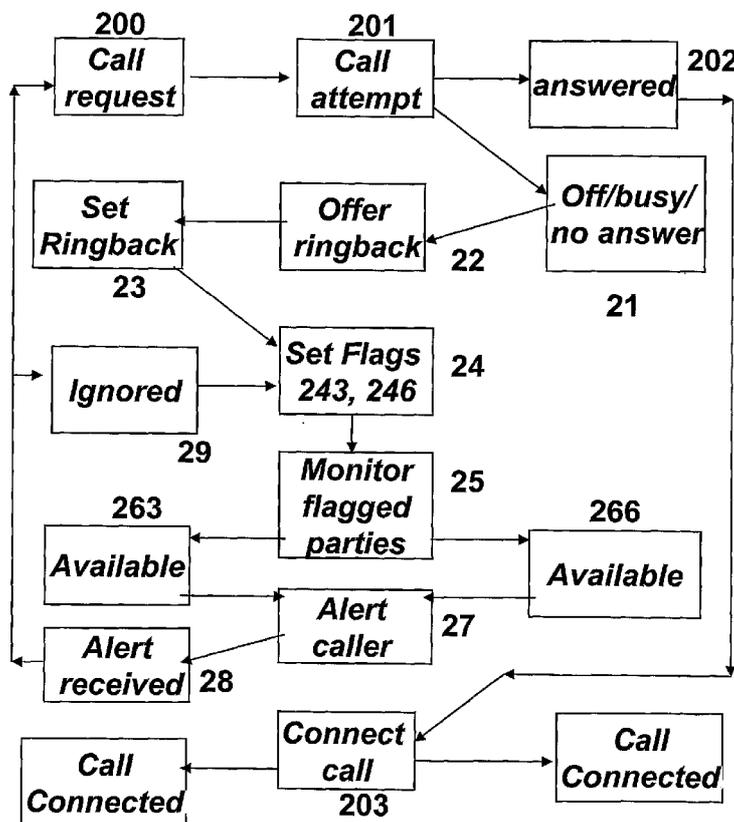
(57) Abstract: If an attempt by a first user (3) to contact another party (6) fails, a callback server (1) sets a flag (246). The callback server (1) monitors terminals that have such flags set (25) and is arranged to transmit an alert (27) to the calling party (3) when the called party (6) next becomes available. However, if at the time when the called party (6) becomes available, the calling party (3) is himself no longer available, being now switched off or busy, an additional flag (243) in the store (2), indicative of activity by the calling party (3), prevents a callback alert from being generated until the monitoring process (25) can obtain availability indications (263, 266) in respect of both parties (3, 69) simultaneously. Availability may be determined by factors such as available bandwidth or terminal capabilities. A callback may be initiated when a predetermined number of called parties become available to participate in a conference call.

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FR, GB, GR, HU, IE, IS, IT, LT, LU, LV, MC, NL, PL, PT, RO, SE, SI, SK, TR), OAPI (BF, BJ, CF, CG, CI, CM, GA, GN, GQ, GW, ML, MR, NE, SN, TD, TG).

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For two-letter codes and other abbreviations, refer to the "Guidance Notes on Codes and Abbreviations "appearing at the beginning of each regular issue of the PCT Gazette.

CALL COMPLETION SERVICE IN CASE OF CALLED PARTY UNAVAILABILITY

This invention relates to callback facilities in telecommunications systems.

It is well known to provide a facility in a telephone system to allow a caller,
5   on receiving an indication that a call attempt has failed, to be given the opportunity
to request notification of the availability of the called party, so that he can make a
further, hopefully more successful, attempt to place the call. The call failure mode
may be "busy" ("off hook"), "no answer" (remains "on hook" despite ringing) or, in
the case of a mobile telephone, "no contact" (switched off or not in range). The
10 notification of the availability of the called party is typically triggered by the called
party goes through the transition from an "off hook" state to an "on hook" state at
some time subsequent to the request for such notification. In the case of a "no
contact" situation, notification may be triggered by the called handset establishing
contact with a cellular base station when it is switched on or comes into range.

15   Such systems are very useful, but have limitations because the calling party
may not be in a position to place the desired call at the time the notification is
received. This may be simply because the calling party may himself now be "off
hook", unavailable or switched off. In such a situation the callback may fail, but
some systems are arranged to only attempt a "callback" when both parties are idle.

20   Systems of this general type are well-known - a typical example is described
in International Patent specification WO00/22802 (Templeton).

There are other circumstances when it might not be appropriate to act on a
callback notification, in particular if either or both parties are using a system which
allows a mobile user to use different communications modes according to availability.
25 For example, a user may have a handset which allows a broad bandwidth connection
to be made when in proximity to a suitable access point, but a narrower bandwidth
connection to be used when that is all that is available. The handset may also
interface with fixed equipment to allow enhanced communications when such
equipment is available. For example, the handset may default to the public cellular
30 network, but have wireless access ("WiFi") capability to allow the user to connect to
higher bandwidth systems and terminal equipment when they are available. This
variability of user experience may mean that when a user receives notification that a

called party is available, the calling party is no longer in a position to make the call because of current limitations in bandwidth and/or terminal equipment.

According to the present invention, there is provided a A telecommunications system providing a callback facility having means for detecting

5 an attempt made by a first party to make a call of a predetermined type to one or more other parties, means for detecting a failure of said call attempt, means for monitoring each party to the call attempt to determine whether they meet criteria indicating that they are capable of participation in a call of the type attempted, and means to generate a notification to the first party when the first party and one or

10 more of the other parties meet the capability criteria. The invention also provides a method of operating a telecommunications system providing a callback facility in which, in the event of failure of a call attempt of a predetermined type being made by a first party to one or more other parties, each party to the call attempt is monitored to determine whether they meet criteria indicating that they are capable of

15 participation in a call of the type attempted, and a notification is sent to the first party when the first party and at least one of the other parties meet the capability criteria. The capability conditions monitored may relate to availability or cost of predetermined bandwidth, or the capabilities of the terminal equipment currently available to each user.

20 In a preferred embodiment, the predetermined conditions may include temporal conditions. For example, a condition on bandwidth may be relaxed after a predetermined period, to ensure that should the required bandwidth not be available to the called party at any time within that period, a more limited contact is still made at the end of that period. Conditions may be made that are interdependent, for

25 example in a multi-party call, it may be arranged that notification is made when a predetermined number of the parties, or a specified sub-group of the total, meet the predetermined conditions.

An embodiment of the invention will now be described by way of example, with reference to the drawings, in which

30 Figure 1 is a schematic diagram of a communications system embodying the invention.

Figure 2 is a flow diagram illustrating the operation of the invention.

Figures 3, 4 and 5 are more detailed flow diagrams showing three embodiments of processes by which the availability of parties to a call attempt may be determined.

Figure 1 depicts a server 1 configured to operate according to the invention by controlling the callback facility. A register 2 is associated with the server: the register stores data corresponding to the stored conditions under which a callback alert should be generated.

A first party 3a, 3b is depicted as connected to the network 9 through different communications media 4, 5, at different times. For illustrative purposes it will be assumed that the same terminal equipment is used in both cases, but that the first medium 4 is of a greater bandwidth than the second medium 5.

A called user 6a is also depicted as connected to the network 9 through a medium 7. At other times the user of the terminal 6a may be connected to the network, through a connection 8, using either the same terminal or, as shown, through a different terminal 6b. The transition may be done by having this second user register his presence at the terminal 6b manually, or by means of a operative connection between the terminals 6a, 6b (e.g. "Bluetooth"). Again, for illustrative purposes it will be assumed that the first terminal 6a and/or connection 7 is of more limited capability than the second facility 6b, 8.

Referring to Figure 2, consider now a call request 200 made by the first user 3, who is connected to the network 9 using his terminal 3a by a high bandwidth connection 4, to communicate with the other user 6 (who may be connected through either connection 6a, 6b, or not at all). The call request is passed to the server 1, which attempts to contact the called party 6 (step 201). The call may be answered (202), in which case the connection can be completed (203). However, should the called party 6 currently be engaged on another call, or have his terminal switched off, or fail to answer the call (21), the callback server would, as in the conventional system, return a "call failed" message 22 from the network to the user 3, by transmitting a message prompting the user 3 to initiate a process 23 that sets a flag 246 in the store 2. The callback server 1 monitors terminals that have such flags set (25) and is arranged to transmit an alert 27 to the calling party 3 when the called party 6 next becomes available. Availability is conventionally identified by some action on the part of the called party 6, such as registering with the network 9 or, if

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already registered, when it next transitions from "off hook" to "on hook". (If a call attempt failed through "no answer", meaning the handset is already "on hook", the alert 27 is only generated once the user 6 has cycled to "off hook" and back to "on hook"). On receipt of the alert 28, the user 3 can make a second call attempt 200.

5   However, at the time when the called party 6 becomes available, it is possible that the calling party 3 is himself no longer available, being now switched off or busy. This problem is overcome in a first embodiment of the invention, as shown in Figure 2, by setting an additional flag 243 in the store 2, indicative of activity by the calling party 3. The callback alert is only generated when the 10 monitoring process 25 can obtain availability indications 263, 266 in respect of both parties 3, 6 simultaneously.

If the original cause of failure 21 of the original call attempt 200, 201 was "no answer" (line connected and on hook), this is indicative of a terminal that is sometimes unattended - this is of course more likely for a fixed terminal than a 15 mobile one. The indication of availability in such cases is the "off-hook"/"on-hook" cycle, but this is only a reliable indicator of availability for a short period after the "on-hook". In the event that the calling party 3 is itself unavailable when this cycle occurs at the called party 6, there is a possibility that the called party 6 will again be unattended when the calling party 3 next becomes available, resulting in a failure of 20 the callback. For this reason, availability indications 263, 266 generated by an "off-hook/on hook" cycle are arranged to time out after a predetermined period.

In the event that an alert 27 is generated and not acted upon by the calling party 3, despite being both switched on and "on hook" (step 29), the flag 243 is re¬ set with the availability criterion 261 for the calling party 3 arranged to monitor for 25 the next "off-hook/on hook cycle" 261, again with a timeout applied. An alert 28 will therefore be generated when the following conditions are met:

1. both terminals are switched on and connected

2. both terminals are "on hook"

If the initial call attempt, or a subsequent callback attempt, fails as a result of one 30 party failing to answer a call attempt or callback alert, a third condition is applied in respect of that party before a new alert is generated:

3. the terminal has been "off hook" within a predetermined timeout period.

The process 25 for determining availability of the users 3, 6 operates as shown in Figure 3. The status of both the calling party 3 and called party 6 are checked from time to time (either periodically 30 as represented in Figure 3, or by simply cycling through all callback requests in turn). Both ,the calling party 3 and

5   called party 6 are checked to determine whether the user is connected (31 3, 3 16) and on hook (333, 336). If a "timeout" flag has been set (343, 346) a further check is made (353, 356) to determine if the user has gone from "off hook" to "on hook" within the predetermined timeout period. If all the checks 3 13, 3 16, 333, 336 and (if applied) 353, 356 are positive, the callback alert 27 is sent to the calling party 3,

10   which initiates a new call attempt 200, as shown in Figure 2.

In the event that the calling party 3 fails to respond to the alert 27, the timeout flag 243 is set (383) so that on future cycles an alert 27 is only generated if the calling party has used the terminal 3 within a predetermined period. Similarly, if the call attempt is made and no response is received (21) from the called party 6, the

15   timeout flag 246 is set for that party.

This embodiment increases the likelihood that a callback alert is only sent when it is likely to succeed in connecting the parties. However, at the time of the call attempt, the second user 6 may be connected to the network (not busy or switched off) but using a terminal 6a and/or connection 7 having limited capabilities.

20   If the first user 3a attempts to send the other user 6a a large quantity of data which would take a very long time to download, or to attempt to discuss visual data not readable on the terminal 6a, the call, although connected, will be unsuccessful in achieving the intentions of the caller 3a. It would be preferable for the user 3 to wait until the called party 6 is using a more suitable terminal 6b and or connection 8.

25   There is also the possibility that when these conditions are met, the caller himself may have moved to a less suitable connection 3b.

Figure 4 illustrates an improved callback process which improves the success of the call attempts by ensuring that both users are connected by way of terminals and connections suitable for the proposed task. In this process the

30   availability criteria 263, 266 are modified to include physical characteristics of the connection such as the type of terminal in use, and the available bandwidth (tests 323, 326) These criteria may be set by the calling party according to the nature of the communication required. For example, if the caller wishes to transmit a large data

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file, but it is not urgent, a callback may be requested for a time when both parties are connected to high bandwidth connections 4, 8. (It may also be appropriate to require that the called party's terminal 6b has sufficient memory to accept the data). If a video conference is required, a callback may be requested for a time when both

5   parties are connected to terminals 3b, 6b having audio-visual capability, and appropriate bandwidth to support it.

The criteria for callback may be set up by the user to meet a "least-cost" principal, for instance a call may be set up between the parties only if both user terminals are connected to the same network, or a call may be set up only if neither

10   party is on a cellular (GSM) connection.

The criteria may have a time element - for example they may be relaxed after a predetermined time, in order that limited contact can be made between the parties if it has not proved possible to establish a connection with the desired characteristics, or so that connection using a network with a time-variable tariff may

15   be permitted at times when the tariff is below a specified threshold.

In embodiments described so far there are only two parties to the attempted call, but the invention may also be used to facilitate multiple-party calls (conference calls). Again, the criteria set by the calling party can allow a call attempt to be made when any one of the called parties, or a predetermined number of them, are

20   identified as available. Figure 5 illustrates such an arrangement. In this arrangement, a call alert is sent to the calling party 3 provided that at least one of the called parties (identified as 6, 6a), and the calling party 3 itself, meet the availability criteria prevailing at the time. The process is as for Figure 4, except that if the called party 6 fails one of the tests 316, 326, 336, 356, the same tests 316a, 326a, 336a, 356a

25   are applied to the other called party, and a call alert 27 is generated if either of them meet the specified criteria. Variations will be apparent to the person skilled in the art, for example a call alert may be generated if a predetermined number of the called parties (one, some, or all) meet the criteria.

The parties may be tested .in parallel or, as shown in Figure 5 for simplicity,

30   the parties may be tested sequentially. A call alert is placed when any of the called parties is identified as available, so the status of any such parties not recently tested (in the current cycle if they are tested sequentially as shown in Figure 5) is unknown. If it is desired to contact as many parties as possible, the resulting call attempt 200

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may be sent to the called party 3 identified as available and also to any party 3a whose status has not been determined. However, if the calling party 3 only wishes to contact one of the called parties 3, 3a, - rather than as many of them as possible - he may instead choose to configure the system to contact only the first called party 3, 3a to meet the criteria.

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CLAIMS

1.   A telecommunications system providing a callback facility having means for detecting an attempt made by a first party to make a call of a predetermined type to one or more other parties, means for detecting a failure of said call attempt, means for monitoring each party to the call attempt to determine whether they meet criteria indicating that they are capable of participation in a call of the type attempted, and means to generate a notification to the first party when the first party and one or more of the other parties meet the capability criteria.

2.   A system according to claim 1, comprising means to monitor the bandwidth available to each party, and to generate the said notification when the bandwidth for one or more parties meets a predetermined value.

3.   A system according to claim 1 or 2, comprising means to identify the capabilities of the terminal available to each party, and to generate the said notification when the terminals for one or more parties satisfy predetermined capability conditions.

4.   A system according to claim 1, 2 or 3 comprising means to generate the said notification when a predetermined number of the other parties meet the predetermined capability criteria.

5.   A system according to claim 1, 2, 3, or 4 comprising means to vary the predetermined capability criteria with time.

6.   A system according to claim 1, 2, 3, 4 or 5, comprising means for changing the criteria for generating a callback alert if a first alert fails to result in a completed call.

7.   A method of operating a telecommunications system providing a callback facility in which, in the event of failure of a call attempt of a predetermined type being made by a first party to one or more other parties, each party to the call

attempt is monitored to determine whether they meet criteria indicating that they are capable of participation in a call of the type attempted, and a notification is sent to the first party when the first party and at least one of the other parties meet the capability criteria.

5

8.   A method according to claim 1, wherein the bandwidth available to each party is monitored, and the said notification is generated when the bandwidth for one or more parties meets a predetermined value.

10   9.   A method according to claim 7 or 8, wherein the capabilities of the terminal available to each party is monitored, and the said notification is generated when the terminals for one or more parties satisfy predetermined capability conditions.

10.   A method according to claim 7, 8 or 9, wherein said notification to the first party is generated when a predetermined number of other parties meet the predetermined capability criteria.

15

11.   A method according to claim 7, 8, 9 or 10, in which the capability criteria are allowed to vary with time.

20

12.   A method according to claim 7, 8, 9, 10 or 11, wherein the criteria for generating a callback alert are modified if a first alert fails to result in a completed call.
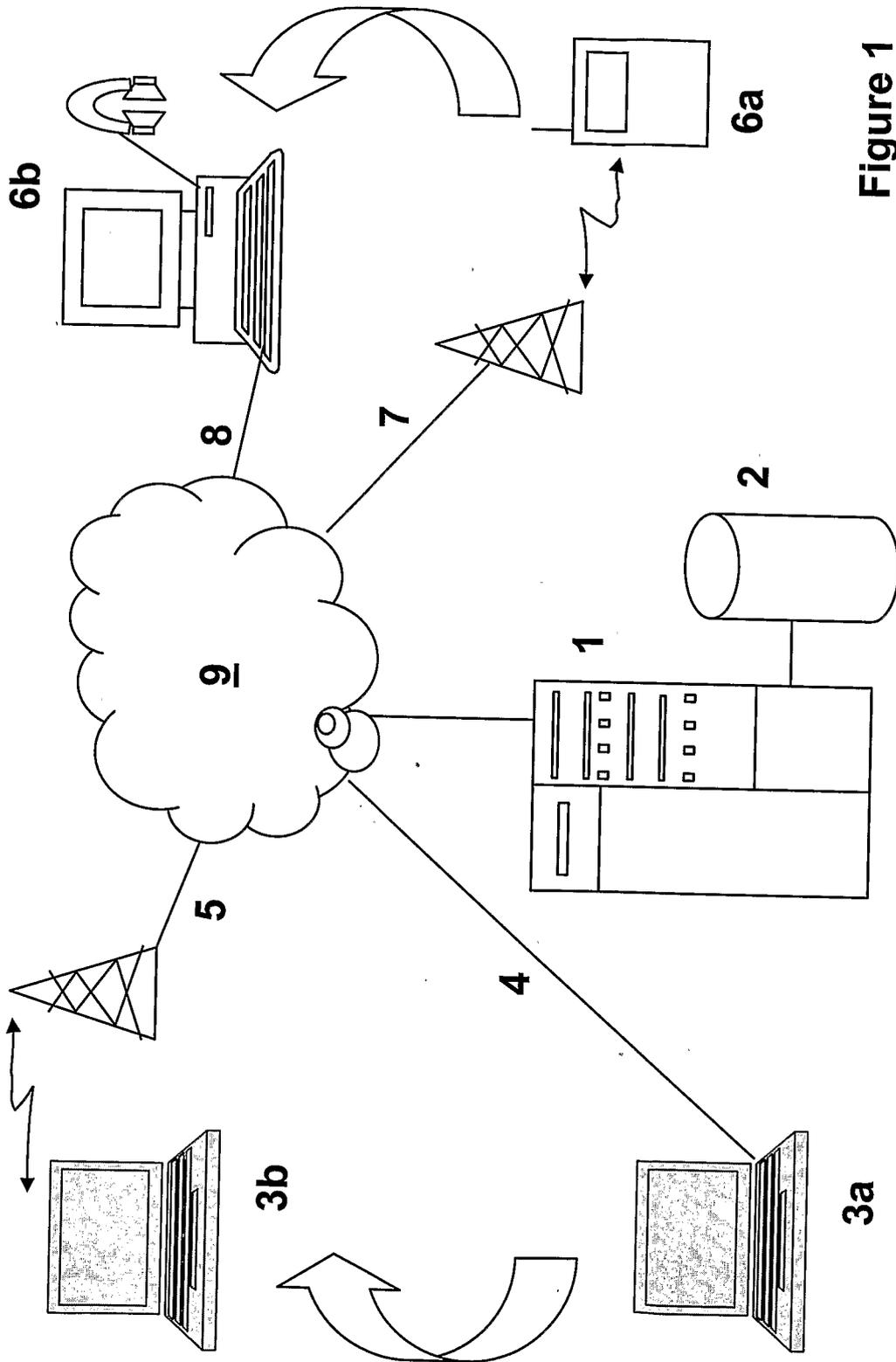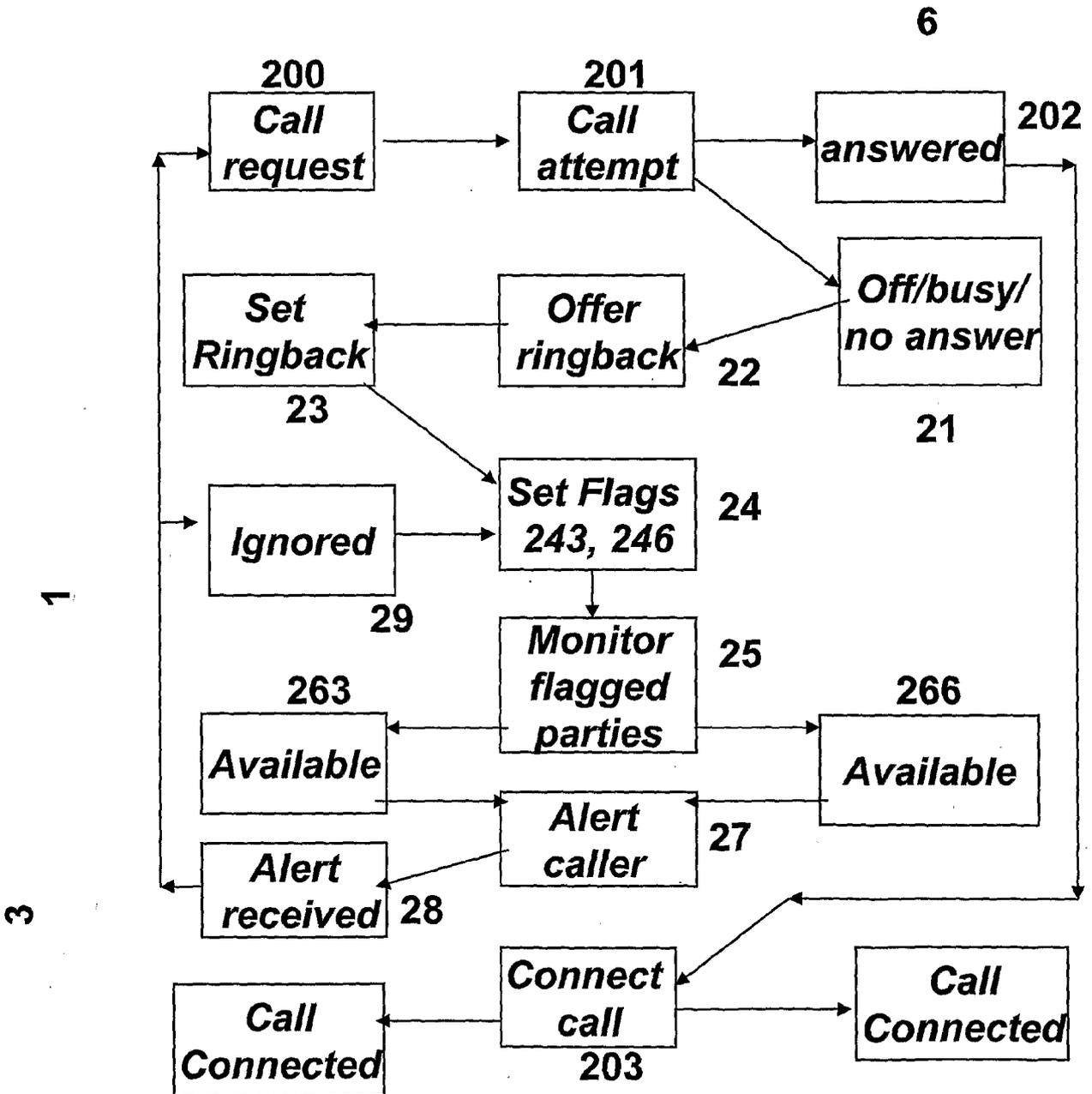
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Figure 1

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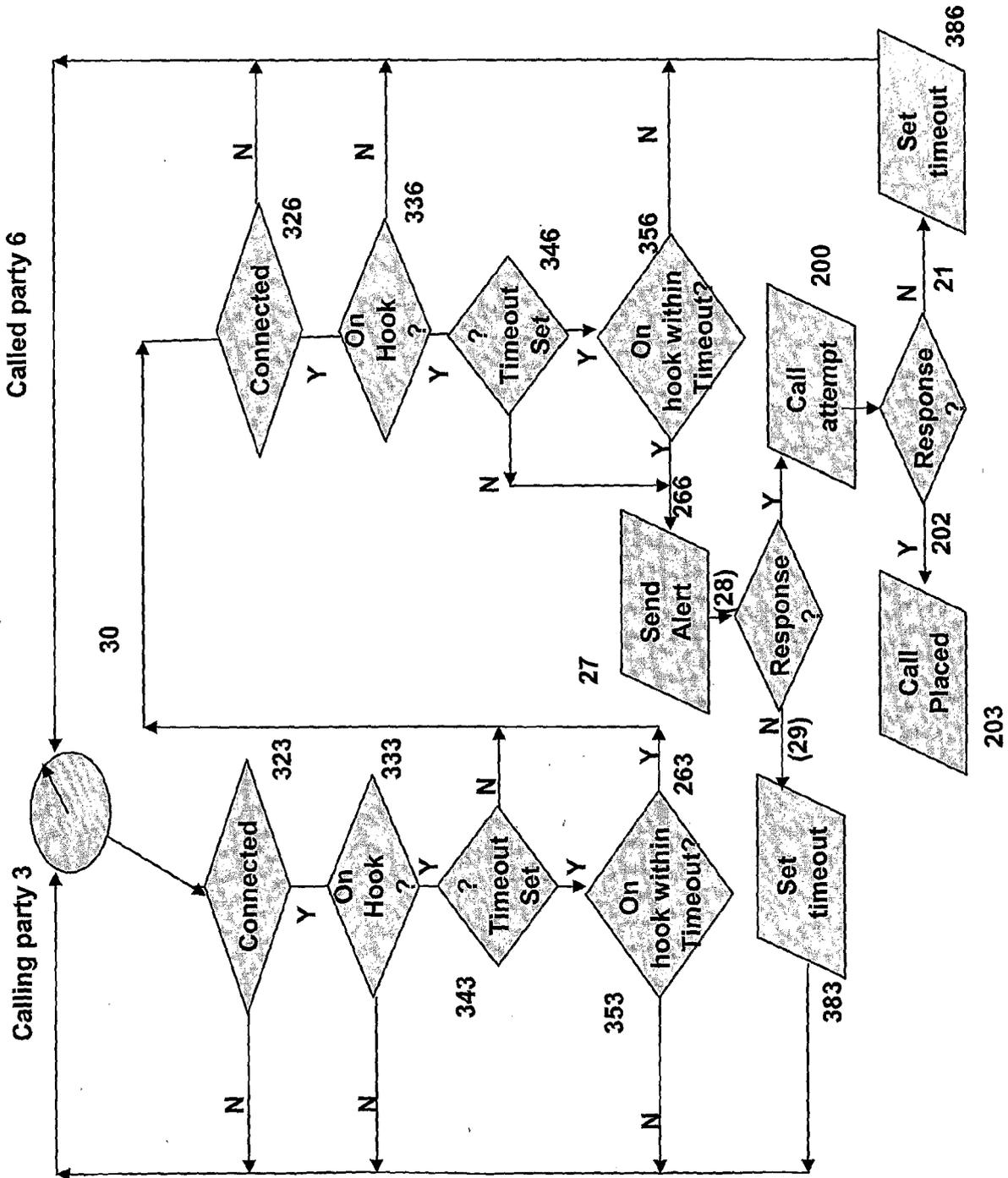

Figure 2
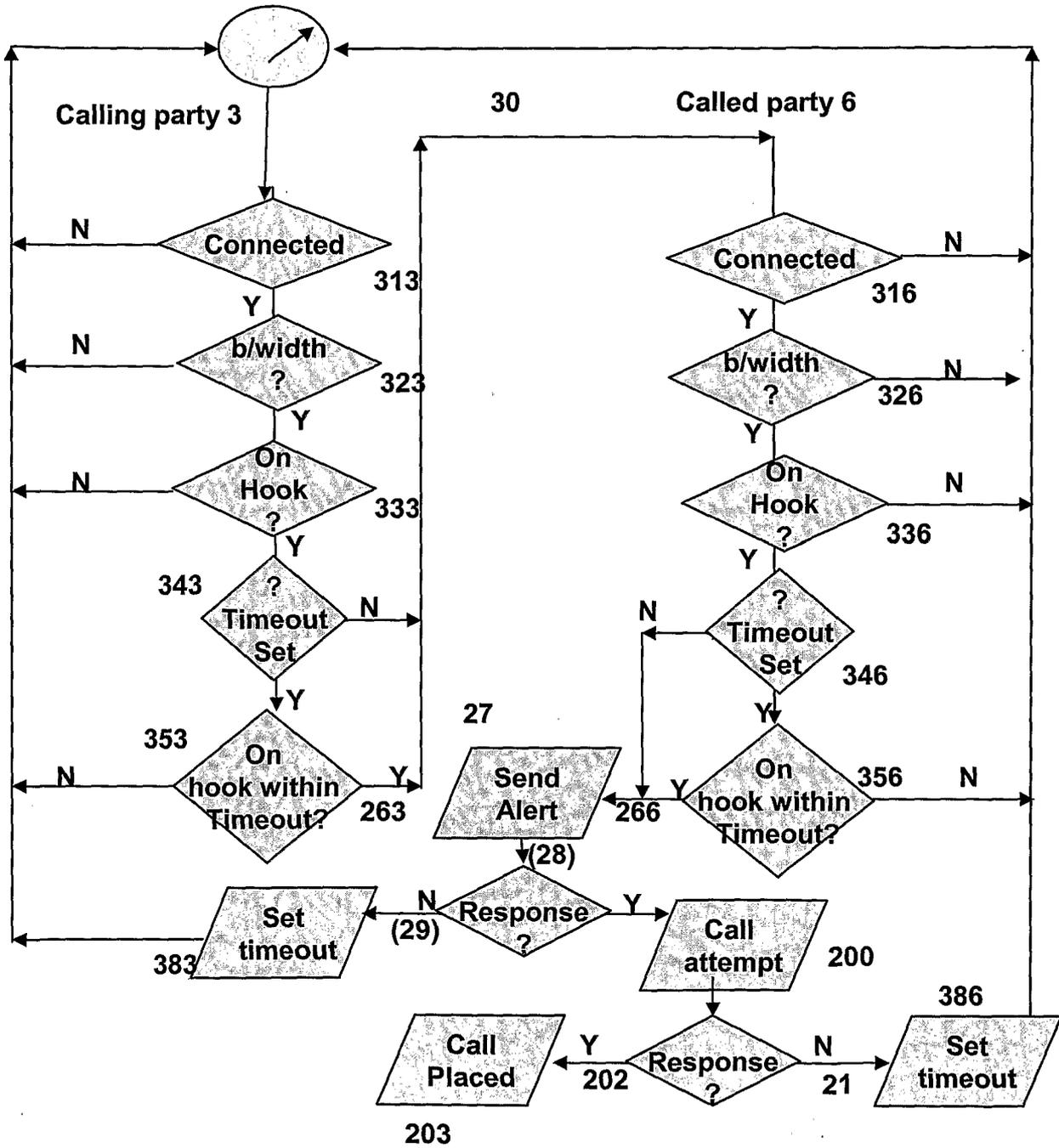
3/5

Calling party 3 | Called party 6

Connected 323
On Hook ? 333
Timeout Set ? 343
On hook within Timeout? 353
263

Connected 326
On Hook ? 336
Timeout Set ? 346
On hook within Timeout? 356
266

Send Alert (28) 27

Response ? (29)

Set timeout 383

Set timeout 386

Call attempt 200

Response ? 21

Call Placed 203

30

Figure 3

4/5

Figure 4

5/5
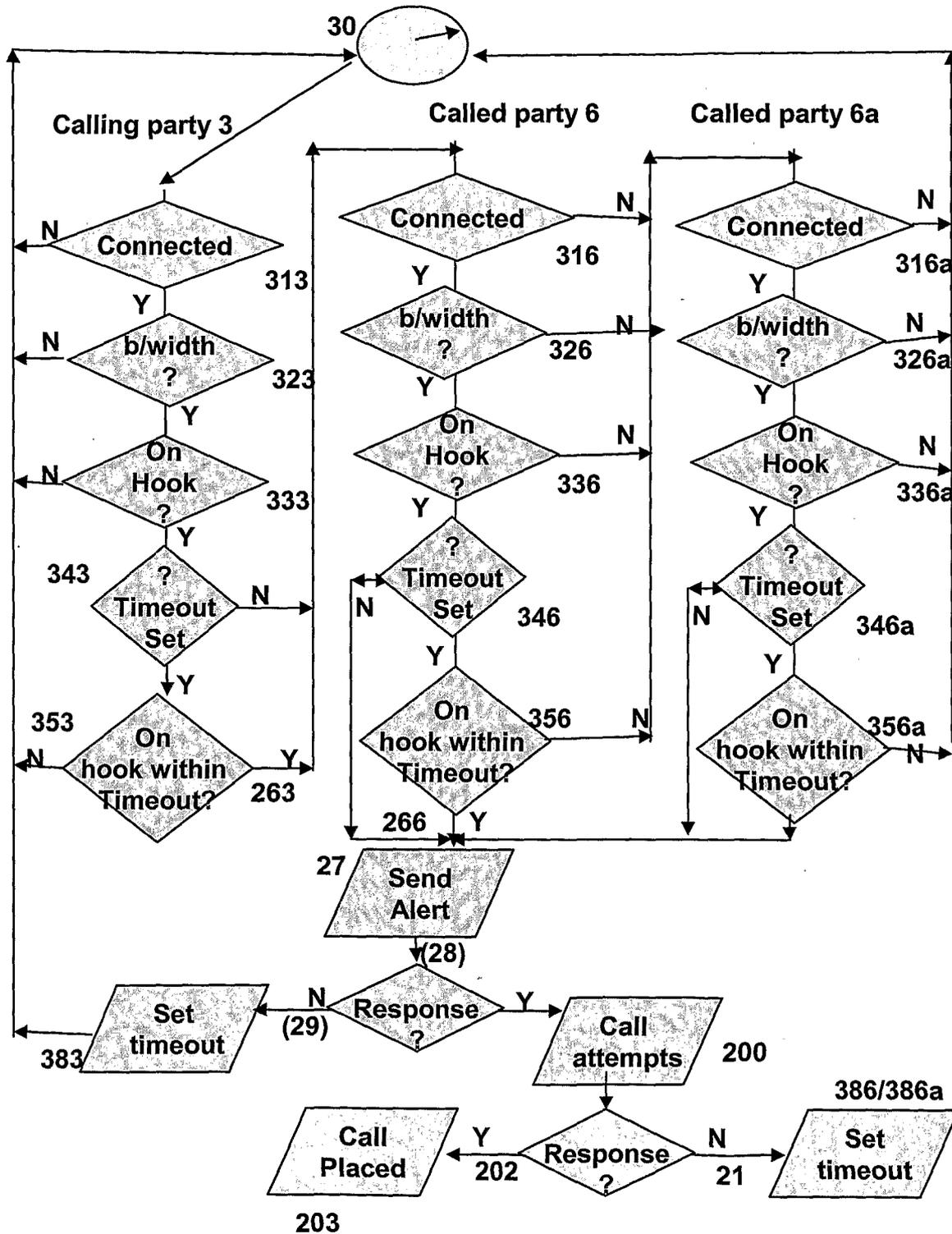
Figure 5

INTERNATIONAL SEARCH REPORT

A. CLASSIFICATION OF SUBJECT MATTER
INV.   H04M3/48

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)

H04M

Documentation searched other than minimum documentation to the extent lhal such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and where practical, search terms used)

EPO-Internal

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document with indication where appropriate, of the relevant passages	Relevant to claim No
X	US 2001/053213 A1 (TRUONG HONG LINH ET AL) 20 December 2001 (2001-12-20) abstract paragraph [0012] - paragraph [0018] paragraph [0023] - paragraph [0026] paragraphs [0030], [0031], [0040] - [0042] paragraph [0048] - paragraph [0077] ————	1-12
X	US 2004/066927 A1 (HORVATH ERNST ET AL) 8 April 2004 (2004-04-08) abstract; figure 2 paragraphs [0001] - [0015], [0025] ————	1,3,5,7, 9,11
X	US 2004/213208 A1 (BARATZ YARON ET AL) 28 October 2004 (2004-10-28) abstract; figures 1,2 paragraphs [0013], [0014], [0023] ————	1,7
	–/––	

[X] Further documents are listed in the continuation of Box C

[K] See patent family annex

* Special categories of cited documents

"A" document defining the general state of the art which is not considered to be of particular relevance

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"P" document published prior to the international filing date but later than the priority date claimed

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"X" document of particular relevance, the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone

"Y¹ document of particular relevance, the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such docu—ments, such combination being obvious to a person skilled in the art

'&" document member of the same patent family

Date of the actual completion of the international search	Date of mailing of the international search report
20 March 2007	29/03/2007

Name and mailing address of the ISA/	Authorized officer
European Patent Office, P B 5816 Patentlaan 2 NL - 2280 HV RiJSWiJk Tel (+31-70) 340-2040, Tx 31 651 epo nl, Fax (+31-70) 340-3016	Domingos , Lui s

Form POT/I SA/21 0 (second sheet) (April 2005)

C(Continuation).   DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	WO 00/22802 A (TEMPLETON, BRADLEY, S) 20 April 2000 (2000-04-20) cited in the application abstract; figures 5,6,9(d) page 2 , line 8 - line 24 ----	1,7
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INTERNATIONAL SEARCH REPORT

Information on patent family members

International application No

PCT/GB2007/000469

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