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(71) Applicant(s):
Burnside Telecom Limited
(Incorporated in the United Kingdom)
IPR House, 37 Guildford Road, SURREY, Lightwater,
GU18 5SA, United Kingdom

(72) Inventor(s):
Nigel Alexander Slater

(74) Agent and/or Address for Service:
R G C Jenkins & Co
26 Caxton Street, London, SW1H 0RJ,
United Kingdom

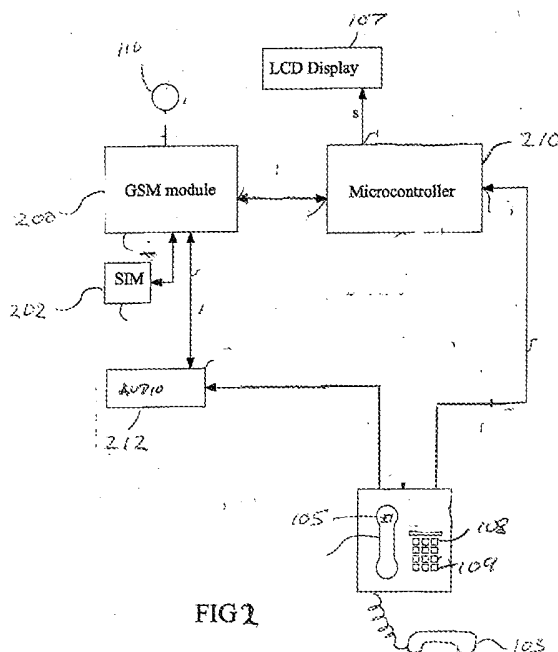
(51) INT CL:
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(56) Documents Cited:
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"Cisco IP 7912 Quick Reference", retrieved from <http://voip.concordia.ca/help/refmaterials/guides/quickref7912.pdf> on 14.06.2010
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(58) Field of Search:
INT CL H04M
Other: On-Line - EPODOC, INTERNET, WPI

(54) Title of the Invention: **Radio telephone apparatus with call transfer**
Abstract Title: **Radio telephone with hook switch invoked call transfer**

(57) A wireless telephone apparatus comprises a handset 103 an on/off-hook switch 105, a wireless communications module 200 for establishing first and second cellular telephone calls via a base station and means for generating an explicit call transfer command for sending to the base station in response to activation of the on-hook switch when the first and second wireless calls are established through the apparatus. The telephone's redial button may be used to enter into a call initiating mode for putting the first call on hold, initiating the second call and subsequently toggling between the first and second call and telephone may indicate the active and held calls (fig.6 — 600,601).



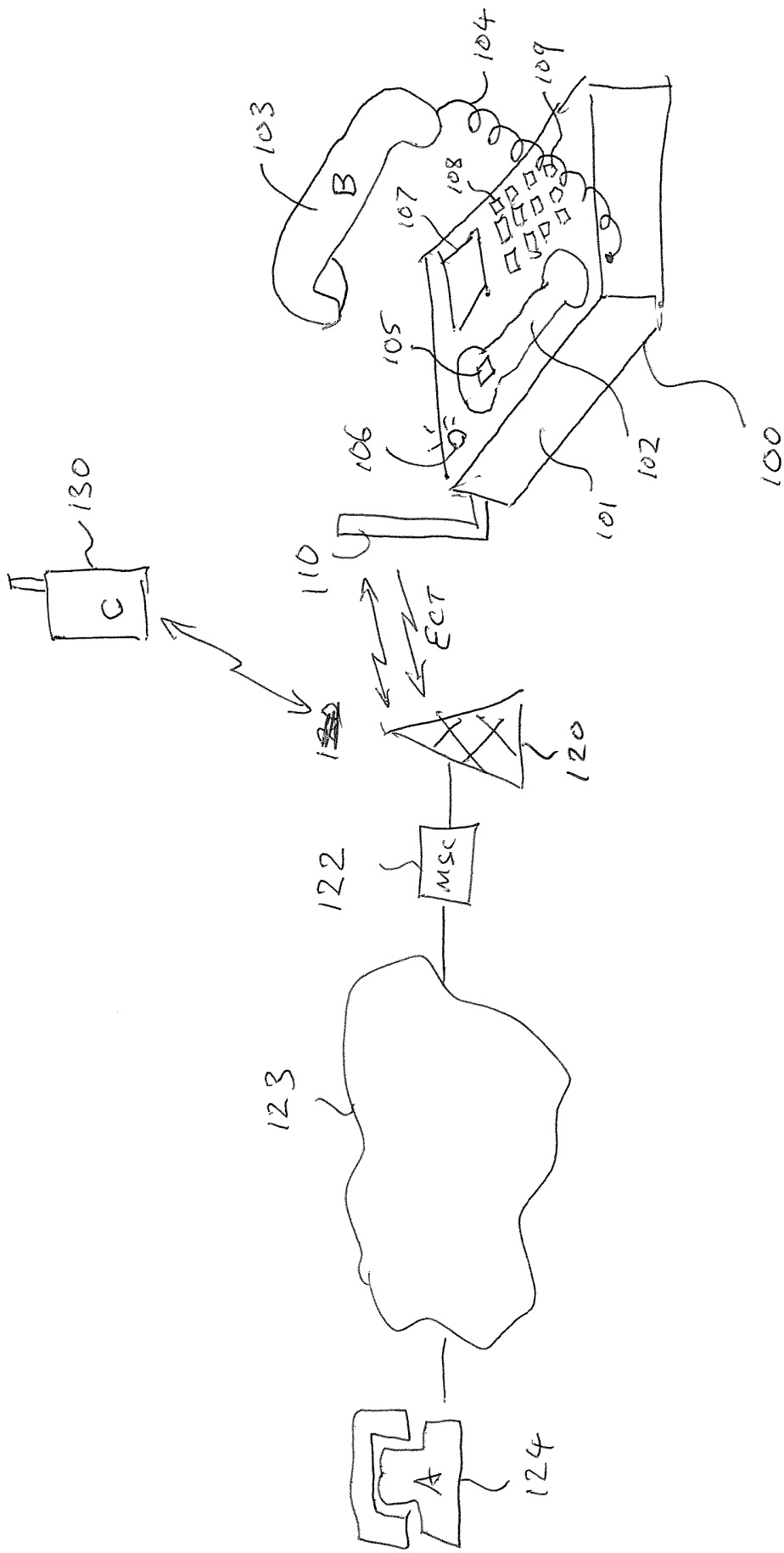


Fig. 1

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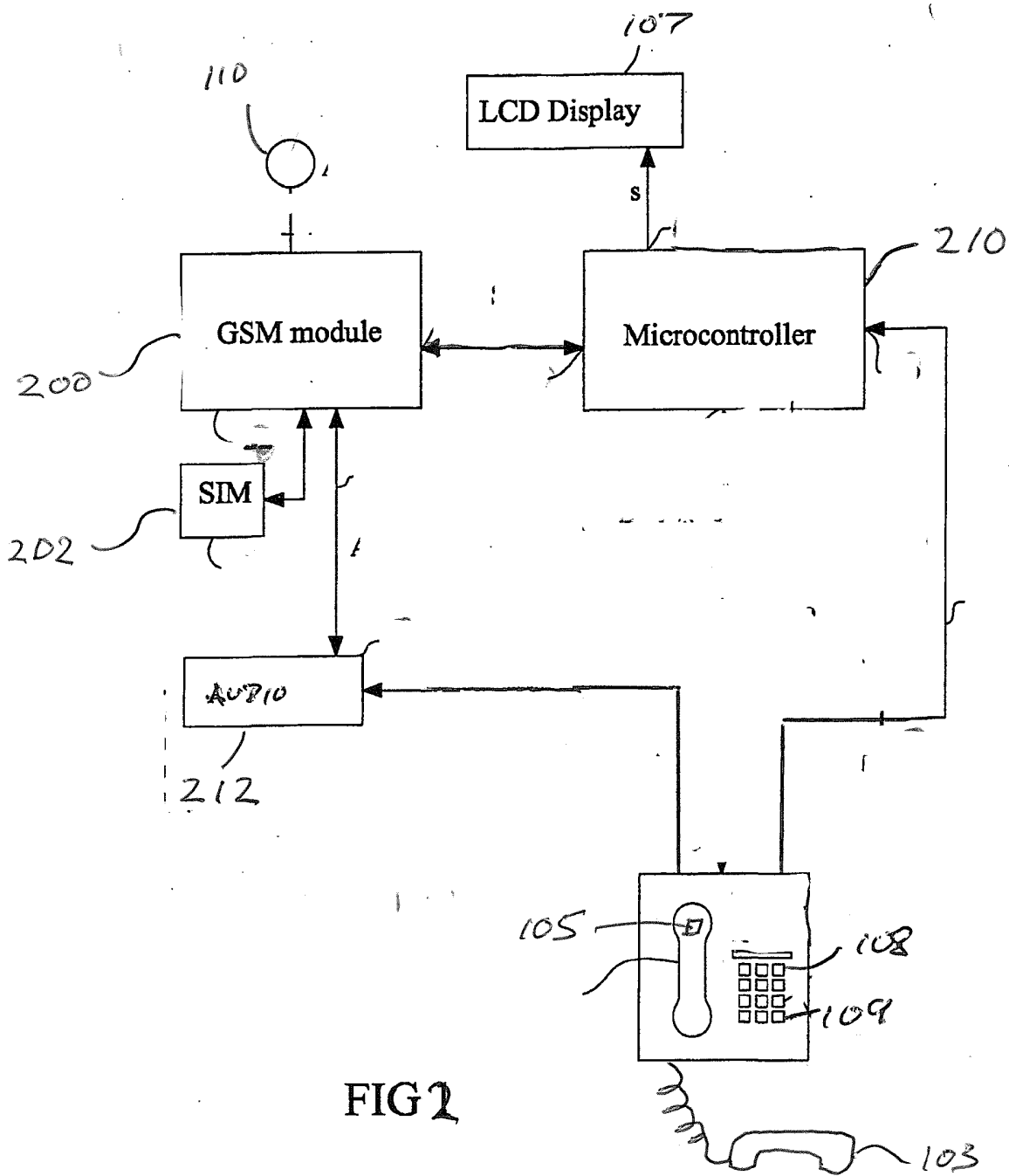
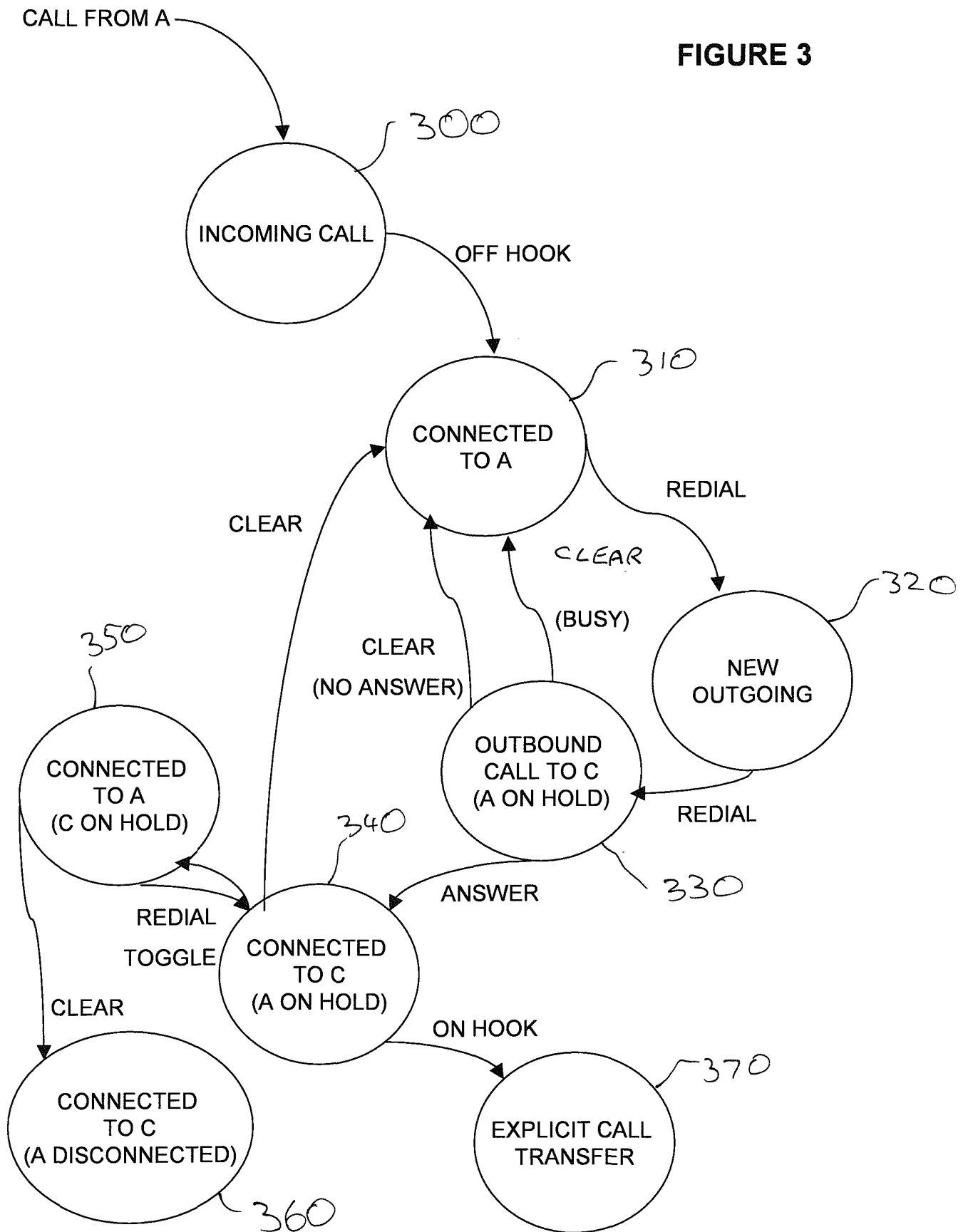


FIG 2

3/5

FIGURE 3



4/5

23 MAR 18:34

□三

02-UK

FIG 4

23 MAR 18:15

□三

02-UK

0123456789

FIG 5

5/5

23 MAR 18:16



02-UK

600



0123456789



DAVID HOME

601

FIG 6

23 MAR 18:16



02-UK

0123456789



DAVID HOME

FIG 7

RADIO TELEPHONE APPARATUS WITH CALL TRANSFER

Field of the Invention

- 5 This invention relates to the field of radiotelephones and to the provision of private branch exchange (PBX) and other functionality in telephones.

Background to the Invention

- 10 A private branch exchange (PBX) is widely used to provide telephone communications to people in organisations of all sizes and types. Such PBXs typically have to use a dedicated wire cable from a central switch to each person's desk telephone extension. However to provide added flexibility and mobility to the extension user, many PBXs also support the use of cordless phones. The most common type of which is the DECT phone. The problem is that
15 such phones only allow communication within a limited range of the DECT base station and prevent the user from using the same phone terminal to roam onto other networks. So, for example, it would not be possible for the cordless extension phone user to get service outside of their immediate building. In addition many extension users prefer the ease of use and comfort of a desktop phone particularly when transferring calls to other extensions.

20

- PCT application publication number WO 2005/004508 describes an apparatus for providing telephone communications in locations where there are no landlines or where it is inconvenient to provide landlines, using the cellular GSM network. The apparatus described in that document comprises a radiotelephone terminal device with a GSM radiotelephone
25 module, and a telephone apparatus connected thereto via a telephone cord.

- In order to overcome the lack of range, inability to roam onto other networks and to reduce overall communication costs private mobile networks (PMNs) are now being deployed to replace the use of conventional PBX based networks. Such PMNs typically use a low cost
30 wireless picocell base station connected to a base station controller (BSC). These systems provide all the features of a mobile network and provide roaming capability onto public mobile networks and fixed networks via a high speed landline backhaul link. Users need to

use only one telephone in order to stay in touch with members of their own organisation or anyone else on any other network. The phone can now be used anywhere else in the world as long as roaming capabilities are provided by the local mobile network.

- 5 The Burnside P350/P390 desktop mobile phone is an integrated telephone and GSM radiotelephone module. In connection with the Burnside P350/P390 it has been described that when a call comes in but is not for the called party, the operator can press “hold” and can dial the other person’s number and press “hold” again. This operation will affect a call transfer.
- 10 One of the most important functions of a PBX is its ability of its extensions to transfer calls to other parties. Although in general PMNs are able to support call transfer to other phones, most mobile phones are incapable of performing such transfers. Even those few that have a call transfer capability their user interface is so difficult to operate that most normal users abandon the task.
- 15 There is a need for a desktop apparatus that allows an easy-to-use and intuitive call transfer for even the most naive operator.

Summary of the Invention

- 20 In accordance with a first aspect of the invention, a wireless telephone apparatus is provided comprising: a handset; an on/off-hook switch; a wireless communications module for establishing first and second cellular telephone calls via a base station; and means for generating an explicit call transfer command for sending to the base station in response to
- 25 activation of the on-hook switch when the first and second wireless calls are established through the apparatus.

The apparatus preferably comprises a body having a cradle for the handset, wherein the on/off hook switch operates in response to placing the handset in the cradle.

- 30 Preferably call receiving means are provided for receiving a first call from a calling party, call initiating means are provided for entering a call initiation mode, in response to activation of a

first predetermined button, for initiating the second call; and transfer means are provided for putting said first call on hold, initiating said second call, and toggling, in response to activation of the first predetermined button, between said first and second calls.

- 5 The first predetermined button is preferably a redial button. The transfer means may toggle between the first and second calls by putting either said first or said second call on hold. A phonebook lookup operation may be enabled when in the call initiation mode. The call initiation mode and dialling mode may be entered using the same button.
- 10 A second predetermined button, e.g. a clear button, may be provided to end an active call and revert to a call on hold.

In accordance with a further aspect of the invention, a method of effecting a call transfer is provided. The method comprises establishing first and second cellular telephone calls at a
15 wireless telephone apparatus, and generating an explicit call transfer command for sending to a base station in response to activation of an on-hook switch.

Brief Description of the Drawings

Fig. 1 illustrates a wireless communications network which includes the wireless telephone
20 apparatus of the present invention;

Fig. 2 illustrates a functional block diagram of a wireless telephone apparatus according to the present invention;

Fig. 3 illustrates a software state diagram showing the processes implemented by the apparatus in Figure 2;

25 Fig. 4 illustrates the LCD display of the device in Figure 2 when the device is in an on hook position;

Fig. 5 illustrates the LCD display of the device in Figure 2 when in an off hook position after receiving a call from an unknown party;

Fig. 6 illustrates the LCD display of the device in Figure 2 when a call with an unknown
30 party is on hold and a call is being made to a known party; and

Fig. 7 illustrates the LCD display of the device in Figure 2 when the device is in an active call with an unknown party and a call with a known party is on hold.

Detailed Description

5

Referring to Fig. 1, a desktop mobile phone 100 is shown comprising a body or housing 101 having a receiver cradle 102 and a receiver connected to the body 101 via a cord 104 (although the cord can be replaced with a Bluetooth or other wireless connection). The cradle 102 has an on/off hook switch 105. The body 101 has an on/off hook light 106, a display 107
10 and a keypad having at least a redial button 108 and a clear button 109. An antenna 110 is connected. The antenna communicates with a base station 120, which is in communication with a mobile switching centre 122, connected to a telephone network 123. A calling party (party A) 124 is shown connected to the network 123. Also shown is a mobile phone 130 (belonging to party C). The on/off hook switch 105 comprises a button (preferably on the
15 cradle but alternatively on the handset) or may comprise a proximity switch.

Details of the desktop mobile phone 100 are shown in Fig. 2. In addition to the elements already shown in Fig. 1, the apparatus comprises a GSM radio telephone module 200 having a subscriber identity module (SIM) 202 connected thereto, as well as a microcontroller 210
20 connected to the display 107 and the keypad with keys 108 and 109. Audio circuitry 212 is connected between the handset 103 and the GSM module 200.

Operation of the apparatus will be described with reference to the state diagram of Fig. 3. This diagram shows elements of a computer program operating on microcontroller 210. The
25 program comprises an incoming call process 300, a first call connection process 310, a call initiation process 320, a call dialling process 330, a second call connection process 340, further call connection processes 350 and 360 and an explicit call transfer process 370. Operation will be described with reference to a calling party A calling from telephone apparatus 124 to called party B at apparatus 100.

30

Referring to Fig. 3, an incoming call from calling party A initiates the incoming call process 300 and, when the operator of the apparatus 100 lifts the handset, the off hook switch 105

causes the process to proceed to process 310, at which point party B is connected to party A.. Party A's caller identification (ID), if sent, is shown on screen 107. Activating the off-hook switch (by picking up the handset or pressing a hands free key) causes the call lamp 106 to illuminate. At this point, party B can talk to party A and, for example, can tell party A that

5 the call will be transferred to party C.

To call party C, party B presses the redial button 108. A redial button is present on most ordinary desktop telephones. This causes the process to proceed to call initiation process 320. At this point, various processes can be activated, including a phonebook lookup and an

10 ordinary dialling process, to allow party B to dial the mobile telephone number of party C. When party C's number has been identified (and, for example, appears in display 107), party B again presses the redial button 108, causing the process to proceed to process 330. At this point, GSM module 200 initiates an outbound call to party C. In the meantime, party A is connected and is on hold. Note that GSM module 200 has the ability to handle at least two

15 simultaneous mobile telephone calls.

If party C fails to answer, party B can press the clear button 109 and this will cause the process to return to process 310, at which point only the connection to party A remains. Similarly, if party C is engaged, party B can press the clear button to return to process 310.

20 (Alternatively or in addition, it can be arranged that the redial button 108 causes process 330 to return to process 310 in one or both cases of an engaged or non-answering called party.) Note the convenience of the clear button 109 to revert to the "on hold" party. This avoids confusion on the part of the operator.

25 While in process 330, when party C's phone is ringing, party C's caller ID (or name, if stored in the phonebook of apparatus 100) as well as party A's caller ID are both shown on the screen 107. This will be described further in relation to Figs. 6 and 7.

If party C answers, the process proceeds to process 340, at which point party B is connected

30 to party C, with party A on hold. An audio connection proceeds between handset 103 through audio circuitry 212 and GSM module 200 to base station 120, MSC 122 and back through base station 120 to mobile telephone 130.

From process 340, the operator (party B) can press the clear button 109 to hang up party C and revert to process 310, at which party B is merely connected to party A. Alternatively, by pressing redial button 108, party B can toggle to process 350 at which party B is connected by audio to party A, with party C on hold. Party B can toggle between parties A and C by repeatedly pressing the redial button 108. Note again the ergonomic simplicity of the arrangement. The same button (redial button 108) has been used to proceed from processes 310 to 320 to 330 and (after an automatic step to process 340) the same button is used to toggle between parties A and C.

10 The button used need not explicitly be the redial button. An alternative dedicated button may be used for this purpose, but it is advantageous that it is the same button for each of these steps. From step 340 (or indeed from step 350 – not shown), activation of the on hook switch 105 causes the process to proceed to process 370.

15 At process 370, an explicit call transfer command (see GSM Technical Specification 02.91) is generated by microcontroller 210 and sent through GSM module 200 over a control channel to the base station 120 and ultimately to the mobile switching centre 122. The mobile switching centre recognises this command and acts upon it to cause an automatic call transfer from party B to party C, so that the GSM connection between base station 120 and apparatus 20 100 is terminated, leaving party A connected direct to party C. This arrangement has the benefit of causing the call transfer in the network and freeing up B's terminal. Indeed, not only is the connection between A and B freed up, but also the connection between B and C. Instead of two connections, no connections are necessary, removing the cost burden from party B.

25

If, from step 350, the clear button 109 is pressed, the process proceeds to step 360, at which party A is disconnected and the connection continues between parties B and C.

Note that the use of "clear" ceases either an active or ringing call to revert to the call on hold.

30 If party A is on hold and party B is calling party C and party C is busy, the active call fails and only party A's caller ID is shown on the screen as being on hold. In these circumstances the clear button will cause the process to return to step 310.

Fig 4. shows the display 107 of apparatus 100 in the “on hook” condition, waiting for an incoming call. All that is shown is the date and time and signal strength.

Fig. 5 shows the display after party A (having the telephone number 01234 56789) has dialled
5 and party B has lifted the receiver to accept the call. The display shows the telephone number of party A.

Fig. 6 shows the display after process 320 has selected the telephone number for “David home” (party C) and party B has pressed the redial button 108. It can be shown that party A
10 is on hold (two vertical bars provide an icon 600 that show that party A is on hold). A second icon 601 represents the handset “on hook” and shows that the call to party C is active.

Fig 7. shows the display after toggling between processes 340 and 350 using the redial button 108. It is shown that party C is now on hold by icon 600 and that the call with party A is
15 active by icon 601, the icons having switched places from that shown in Fig 6.

Other modifications of detail can be made by one skilled in the art without departing from the scope of the invention as defined in the appended claims. For example, the elements of Fig. 2 described as housed within the body 101 may instead all be housed within the handset 103 in
20 the manner of a mobile phone or a cordless phone. In this arrangement, the “off-hook” switch is a button that has two functions. Its first function is to hang up any ongoing call when there is just one party connected – e.g. from process 310 of Fig. 3. Its second function is to cause an explicit call transfer command to be sent to the MSC 122 when there are two ongoing calls, as in processes 340 and 350. (It may have other functions, such as “power-down” when
25 pressed for more than a certain number of seconds and “power-up” when in an off mode.) In this arrangement, there may nevertheless be a body 101 with a cradle 102, but the body 101 may comprise little more than a power source for recharging a battery in the handset. In this arrangement, the on-hook switch may also operate in response to placing the handset in the cradle or simply upon pressing of the switch.

CLAIMS

1. A wireless telephone apparatus comprising:
5 a handset;
an on/off-hook switch;
a wireless communications module for establishing first and second cellular telephone calls via a base station; and
means for generating an explicit call transfer command for sending to the base station
10 in response to activation of the on-hook switch when the first and second wireless calls are established through the apparatus.
2. The apparatus of claim 1, further comprising a body having a cradle for the handset, wherein the on/off hook switch operates in response to placing the handset in the cradle.
15
3. The apparatus of claim 1, 2 or 3, further comprising:
call receiving means for receiving a first call from a calling party;
call initiating means for entering a call initiation mode, in response to activation of a first predetermined button, for initiating a second call; and
20 transfer means for putting the first call on hold, initiating the second call, and toggling, in response to activation of the first predetermined button, between the first and second calls.
4. The apparatus of claim 3, wherein the first predetermined button is a redial button.
- 25 5. The apparatus of claim 3 or 4, wherein the transfer means toggles between the first and second calls by putting either the first or the second call on hold.
6. The apparatus of any one of claims 3 to 5, further comprising means for enabling a phonebook lookup operation when in the call initiation mode.
30
7. The apparatus of any one of claims 3 to 6, wherein the call initiation mode and a dialling mode are entered using the first predetermined button.

8. The apparatus of any one of the preceding claims, further comprising display means for displaying first and second icons adjacent information relating to the first and second calls respectively, the first and second icons being adapted to switch when toggling between calls.

5 9. The apparatus of claim 8, further comprising selection means for selecting information displayed on the display means.

10. The apparatus of claim 8 or 9, wherein the transfer means is adapted to initiate a call to a second party whose information is displayed on the display means.

10

11. The apparatus of any one of claims 3 to 10, further comprising a second predetermined button which ends an active call and reverts to a call on hold.

12. The apparatus of claim 11, wherein the second predetermined button is a clear button.

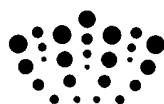
15

13. A method of effecting a call transfer comprising:
establishing first and second cellular telephone calls at a wireless telephone apparatus,
and

generating an explicit call transfer command for sending to a base station in response
20 to activation of an on-hook switch.

14. A communication apparatus as substantially herein before described with reference to the accompanying drawings in Figures 1 to 7.

25



Application No: GB1005036.7

Examiner: Mr Jared Stokes

Claims searched: 1 to 14

Date of search: 14 June 2010

Patents Act 1977: Search Report under Section 17

Documents considered to be relevant:

Category	Relevant to claims	Identity of document and passage or figure of particular relevance
X	1-13	Burnside Telecom, "P350/P390 desktop mobile phone user guide", created 09.11.2007, retrieved from http://burnsidetelecom.com/files/UserGuide_P350.pdf on 14.06.2010 See pages 10-11, "Managing more than one call", especially reference to "Transfer" function on page 11
Y	1-13	Tech-invite, "3GPP Specifications -- GSM-only --02 Series: Service Aspects - Stage 1", retrieved from http://www.tech-invite.com/Ti-3gpp-standards-gsm02.html on 14.06.2010 See section GSM TS 02.91 Explicit Call Transfer (ECT)
Y	1-13	WO2005/004508 A1 (Robson et al.) See figure 1, abstract
Y	1-13	"Cisco IP 7912 Quick Reference", retrieved from http://voip.concordia.ca/help/refmaterials/guides/quickref7912.pdf on 14.06.2010 See section "Transfer a Call"
A	-	"NMS - Support of Explicit Call Transfer on ETSI", retrieved from http://www.nmscommunications.com/DevPlatforms/Support/Troubleshooting/TechNotes/Articles/SupportofExplicitCallTransferonETSI.htm on 14.06.2010 See Implicit Linkage Procedure

Categories:

X	Document indicating lack of novelty or inventive step	A	Document indicating technological background and/or state of the art.
Y	Document indicating lack of inventive step if combined with one or more other documents of same category.	P	Document published on or after the declared priority date but before the filing date of this invention.
&	Member of the same patent family	E	Patent document published on or after, but with priority date earlier than, the filing date of this application.

Field of Search:

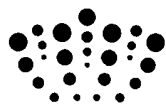
Search of GB, EP, WO & US patent documents classified in the following areas of the UKC^X:

Worldwide search of patent documents classified in the following areas of the IPC

H04M

The following online and other databases have been used in the preparation of this search report

EPODOC, INTERNET, WPI



International Classification:

Subclass	Subgroup	Valid From
H04M	0003/58	01/01/2006