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(71) Applicant(s): <b>Small Planet Technology Ltd (Incorporated in the United Kingdom) Technium, Kings Road, SWANSEA, SA1 8PH, United Kingdom</b>	(56) Documents Cited: <b>GB 2386517 A</b> <b>WO 2003/055183 A1</b> <b>DE 020100961 U</b> <b>US 20030045235 A1</b> <b>US 20030013411 A1</b> <b><a href="http://www.dogbone.co.uk/catalog/item411.htm">http://www.dogbone.co.uk/catalog/item411.htm</a></b> <b>[retrieved on 2003-11-19]</b>
(72) Inventor(s): <b>Brian Gerard Docherty Delme Christopher Thomas James Churchman</b>	(58) Field of Search: UK CL (Edition V ) <b>H4K, H4L</b> INT CL <sup>7</sup> <b>H04L, H04M</b> Other: <b>ONLINE: EPODOC, WPI, JAPIO</b>
(74) Agent and/or Address for Service: <b>Small Planet Technology Ltd Technium, Kings Road, SWANSEA, SA1 8PH, United Kingdom</b>	

(54) Abstract Title: **Telephone with bluetooth interface**

(57) A telephone 1 (that may include a standard corded handset) that includes a Bluetooth (RTM) radio system (7) to provide an audio interface (known as an audio gateway in the Bluetooth standard) for a Bluetooth headset 2 or other provisioned device requiring two way audio connection and optionally a "dial up networking" facility (15) for use with a PC (personal Computer) (3), allowing the user to initiate calls from a computer. The telephone will connect to the analogue PSTN or PBX or in some cases may use a digital connection method such as an ISDN or even an ADSL connection.

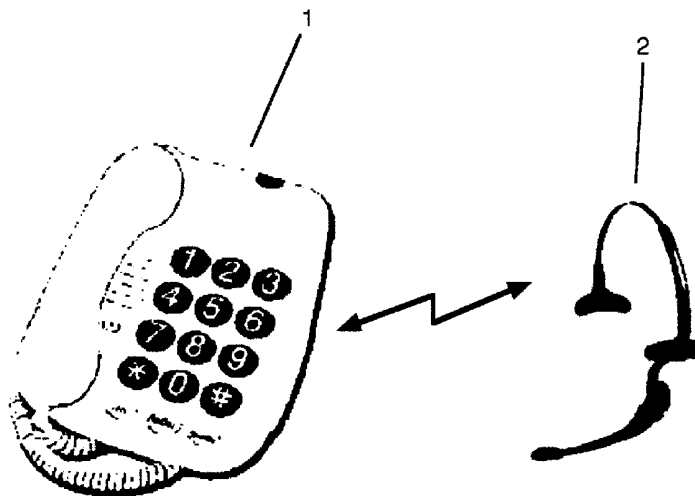


Figure 1

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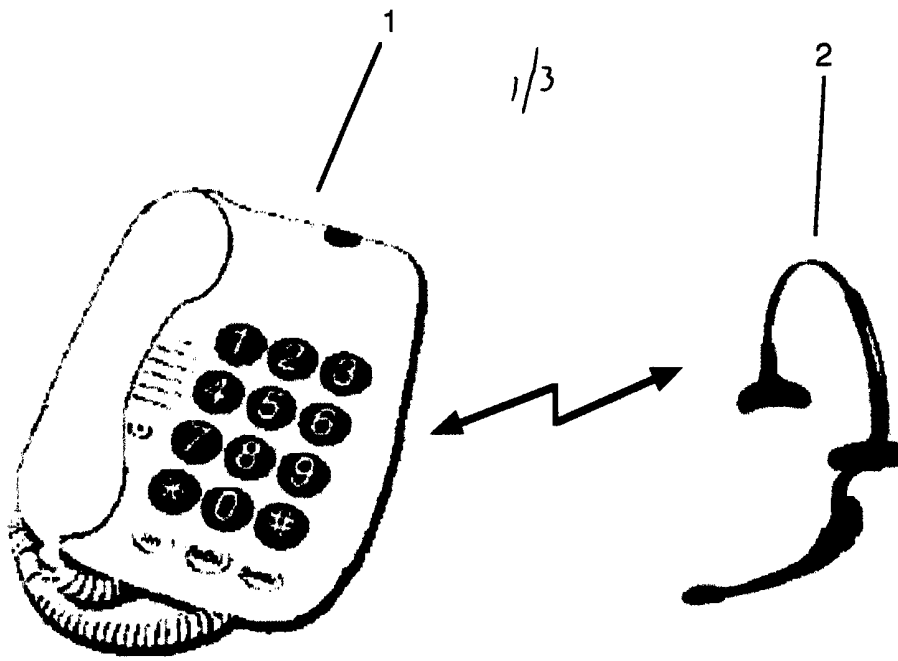


Figure 1

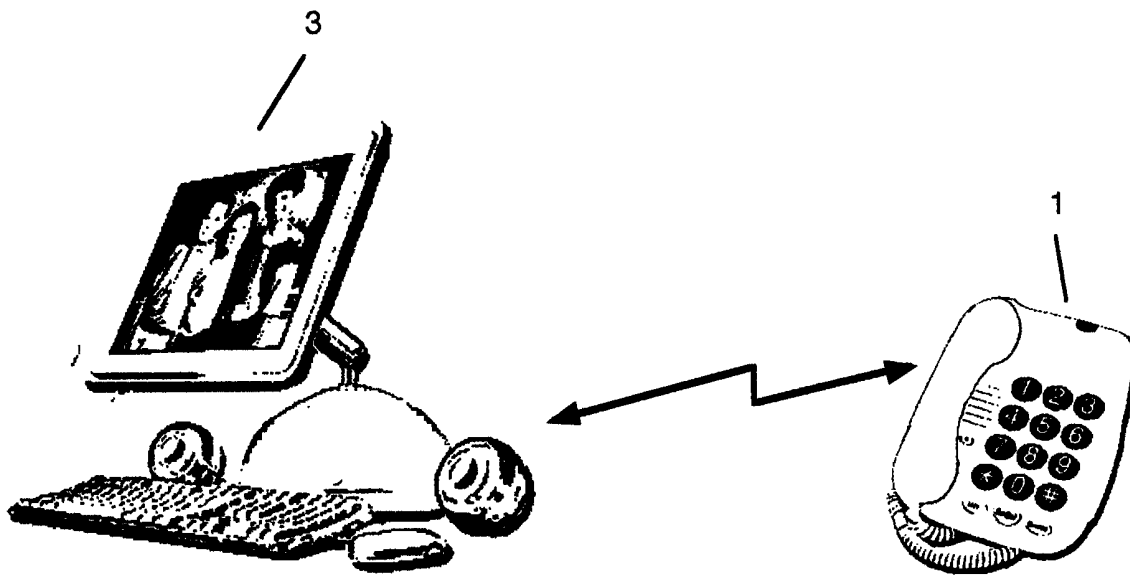


Figure 2

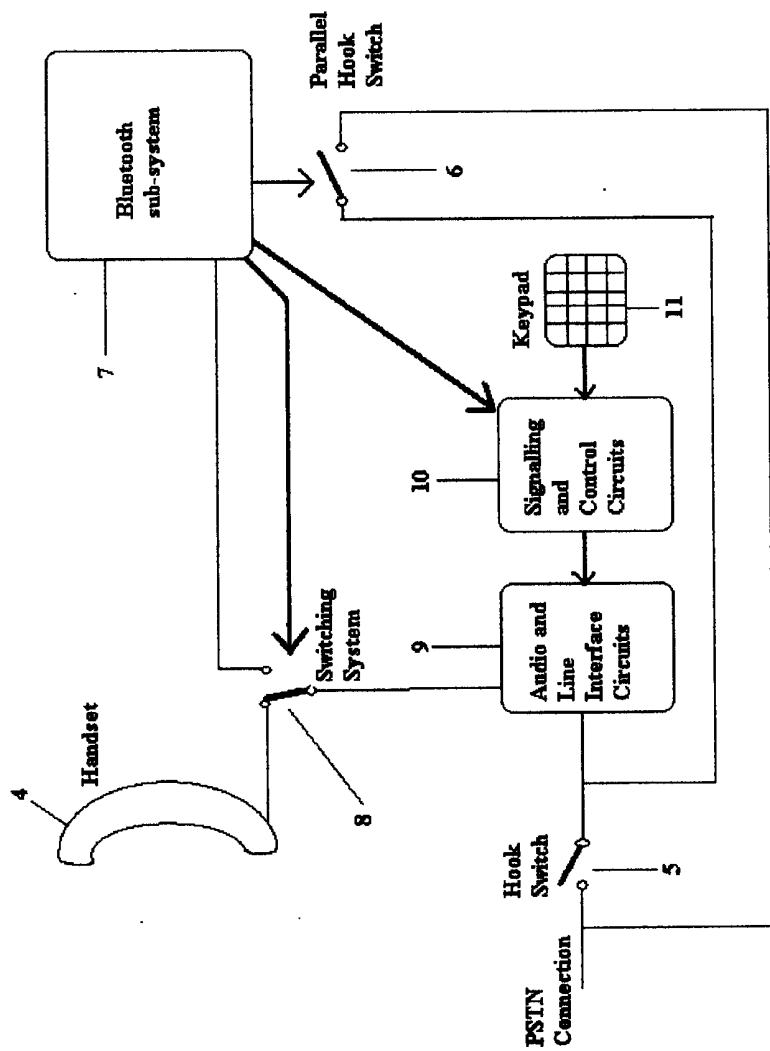


FIG 3

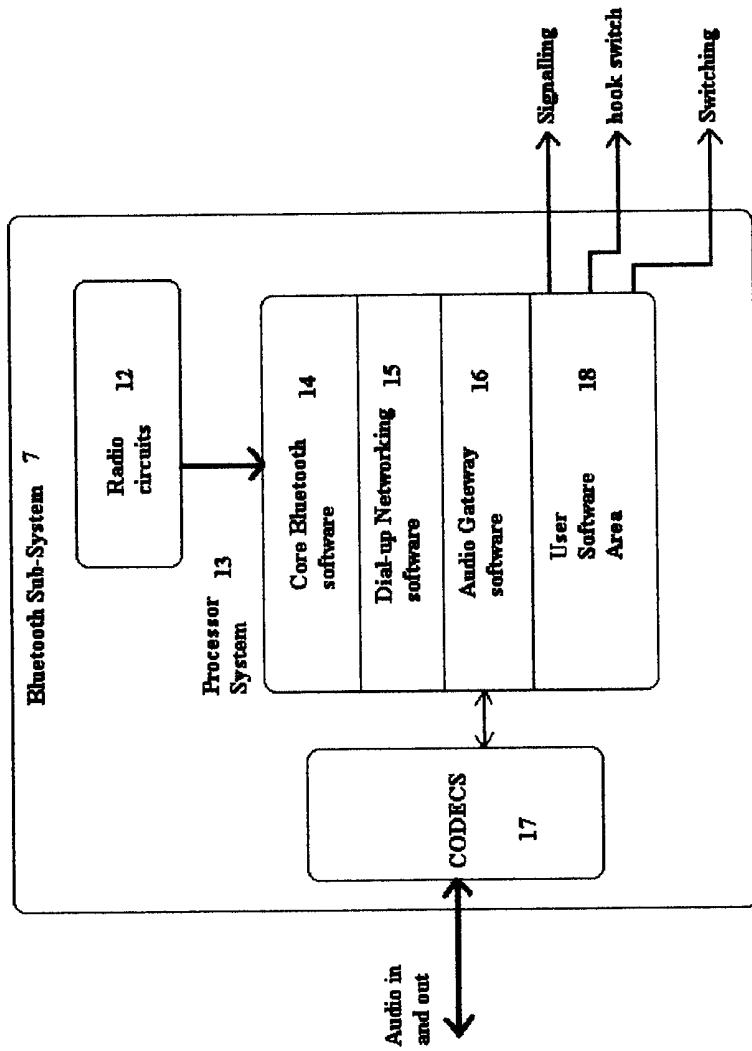


FIG 4

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## TELEPHONE WITH BLUETOOTH INTERFACE

(RTM)

This invention relates to a telephone with a Bluetooth<sup>1</sup> radio capability enabling its use with a Bluetooth cordless headset and optionally with a personal computer.

Mobile telephones with cordless headsets are well known and many are available on the market. See for instance WO03055183. Such devices usually communicate using the Bluetooth radio standard and this capability is now built into many mobile telephones. With new legislation due shortly in the UK, banning the use of mobile telephone handsets while driving, the number of Bluetooth headsets in use has increased and is still increasing dramatically. As users become more used to the advantages offered by hands free use of their mobile phones and as more of the headsets appear in the market, they may welcome the ability to use these headsets with a corded phone that connects to a PBX (Private Branch Exchange) or to the PSTN (Public Switched Telephone Network).

Accordingly, the present invention provides a telephone (that may include a standard corded handset) that includes a Bluetooth radio system to provide an audio interface (know as an audio gateway in the Bluetooth standard) for a Bluetooth headset or other Bluetooth provisioned device requiring two way audio connection and optionally a "dial up networking" facility for use with a PC (personal computer) or Personal Digital Assistant (PDA), allowing the user to initiate calls from a computer. The telephone will connect to the analogue PSTN or PBX or in some cases may use a digital connection method such as an ISDN or even an ADSL connection.

A specific embodiment of the invention will now be described by way of non-limiting example. It refers to the accompanying drawings:

Figure 1 shows the telephone in use with a Bluetooth cordless headset

Figure 2 shows the telephone being controlled from a PC via a Bluetooth link

Figure 3 shows a block diagram of the internal workings of the telephone.

Figure 4 shows a block diagram of the Bluetooth sub-system.

Referring to the drawings, in Fig1 the telephone 1 connects to the PSTN and the user can accept calls by pressing a button on the headset 2 or by lifting the handset. The user can originate calls by pressing a button on the headset 2 and dialling, or by lifting the handset and dialling.

In Fig 2 the telephone 1 may be commanded to originate a call to a particular destination over the Bluetooth link by a personal computer (PC) 3.

In Fig3 the internal arrangement of the phone is shown in functional block diagram form. The telephone consists of a handset 4, a normal hook switch 5 that operates when the handset 4 is lifted, a parallel hook switch 6 that operates when commanded by the Bluetooth sub-system 7. It also contains a switching system 8 also controlled by the Bluetooth sub-system 7 that routes audio signals to and from the telephone audio and line interface circuit block 9 to the handset 4 or the audio inputs and outputs of the Bluetooth sub-system 7. This audio and line interface circuit block 9 also sends to and receives from the PSTN, audio signals. The telephone also contains signalling and control circuits 10 that receive commands from the keypad 11 and send pulse or tone dialling signals (DTMF) to the telephone line via the telephone audio and line interface circuits 9. Optionally the Bluetooth sub-system 7 may send commands to the telephone signalling and control circuits to cause pulse or tone dialling signals to be sent to the telephone line as commanded by a PC 3 via the Bluetooth link.

When using the telephone 1 with a Bluetooth headset 2 the normal sequence of events when receiving a call is as follows:

- 1 The telephone 1 rings
- 2 The user presses the button on the headset 2
- 3 Parallel hook switch 6 is closed under the control of the Bluetooth sub-system 7.
- 4 The user converses with the caller using the headset 2.
- 5 To end the call the user presses the button on the headset 2
- 6 The Bluetooth sub-system 7 opens the parallel hook switch 6 and the call is ended.

When originating calls the sequence is as follows:

- 1 The user presses the button on the headset 2
- 2 Parallel hook switch 6 is closed under the control of the bluetooth sub-system 7.
- 3 The user hears dial tone and dials the number required on keypad 11.
- 4 The user converses with the called party using the headset 2.
- 5 To end the call the user presses the button on the headset 2
- 6 The Bluetooth sub-system 7 opens the parallel hook switch 6 and the call is ended.

In the circumstances where the telephone 1 is being controlled by the computer 3 then a command is sent via the Bluetooth radio link, to the Bluetooth sub-system 7 to loop the line and dial a number. The Bluetooth sub-system 7 closes parallel hook switch 6 and controls the signalling and control circuits 10 to generate the dialling tones (or pulses) which, in the case of tone are sent via the telephone audio and line interface block 9 to the PSTN. The computer 3 can also send a command to the Bluetooth sub-system 7 to release the line and end the call. In this case the Bluetooth sub-system will open the parallel hook switch 6.

The company Ericsson originally developed the Bluetooth system and the standard is now maintained by the Bluetooth special interest group (SIG). The latest version of the specifications Bluetooth V1.1 Core Specification and Bluetooth V1.1 Profile specifications are available from [www.bluetooth.org](http://www.bluetooth.org). The web site is maintained by the SIG.

The Bluetooth sub-system is shown in Fig 4. It has a radio section 12 that provides the two-way radio link to other Bluetooth devices. In this case, the headset 2 or the computer 3. It has a processor 13 running Core Bluetooth software and some Bluetooth profiles shown here as Dial up Networking 15 and Audio Gateway 16. The Audio gateway 16 is required for the headset application and the Dial up Networking 15 by the computer controlled application. Also included in the sub-system 7 are codecs 17 to provide analogue to digital and digital to analogue capability so that analogue audio in and out signals to the rest of the phone circuits can be connected to the Bluetooth system. There is also a user program area 18 in the processor. This program accepts input from the profiles 15 and 16 and generates controls for operating the parallel hook switch 6 and controlling the control and signalling circuits 10.

**CLAIMS**

- 1 A telephone (that may include a standard corded handset) that includes a Bluetooth radio system to provide an audio interface (know as an audio gateway in the Bluetooth standard) for a Bluetooth compatible device requiring audio signals to be received from and sent to the telephone
- 2 A telephone as claimed in claim 1 that provides audio connections to a cordless Bluetooth headset.
- 3 A telephone as claimed in claim 1 or claim 2 whereby calls can be made and received via an analogue connection to the public switched telephone network (PSTN).
- 4 A telephone as claimed in claim 1 or claim 2 whereby calls can be made and received via a digital interface such as ISDN or ADSL, to the public switched telephone network (PSTN) or to the Internet
- 5 A telephone as claimed in claim 1 or claim 2, where the telephone is connected to a Private Branch Exchange (PBX).
- 6 A telephone as claimed in claim 1 or claim 2 and claims 3, 4 and 5 where the Bluetooth interface is used to permit calls to be set up (Line looped and digits dialled) using a personal computer (PC) or Personal Digital Assistant (PDA) via the Bluetooth link
- 7 A telephone substantially as described herein with reference to Figures 1-4 of the accompanying drawings.



Amendments to the claims have been filed as follows

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CLAIMS

1 A corded telephone designed to connect to the analogue Public Switched telephone System (PSTN) or to a suitable Private Branch Exchange (PBX) and including a standard corded handset and keypad and also including a Bluetooth radio system to provide a wireless audio interface (know as an Audio Gateway in the Bluetooth standard) for a Bluetooth compatible device requiring audio signals to be received from and sent to the telephone and to receive call control signals from a remote bluetooth device and to use theses signals to connect to or disconnect from the telephone line.

2 A telephone as claimed in claim 1 that provides wireless audio connections to and receives call control signals from a Bluetooth headset.

3 A telephone substantially as described herein with reference to Figures 1-4 of the accompanying drawings.



INVESTOR IN PEOPLE

**Application No:** GB 0321537.3  
**Claims searched:** 1 to 7

**Examiner:** Andrew Courtenay  
**Date of search:** 20 November 2003

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## 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 to 6	US 2003/0013411 A1 (UCHIYAMA) See figure 1 and paragraph 33 especially.
X	1 to 6	US 2003/0045235 A1 (MOONEY ET AL) See figure 1 and paragraph 61 especially.
X	1 to 6	GB 2386517 A (VTECH) See figure 1 especially.
X	1 to 6	WO 2003/055183 A1 (MATSUSHITA ELECTRIC)
X	1 to 3	DE 20100961 U (PROJYE INT CO LTD) See English language abstract.
X	1 to 6	<a href="http://www.dogbone.co.uk/catalog/item411.htm">http://www.dogbone.co.uk/catalog/item411.htm</a>

### 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<sup>v</sup>:

H4K; H4L

Worldwide search of patent documents classified in the following areas of the IPC<sup>7</sup>:

H04M, H04L

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

EPODOC, WPI, JAPIO