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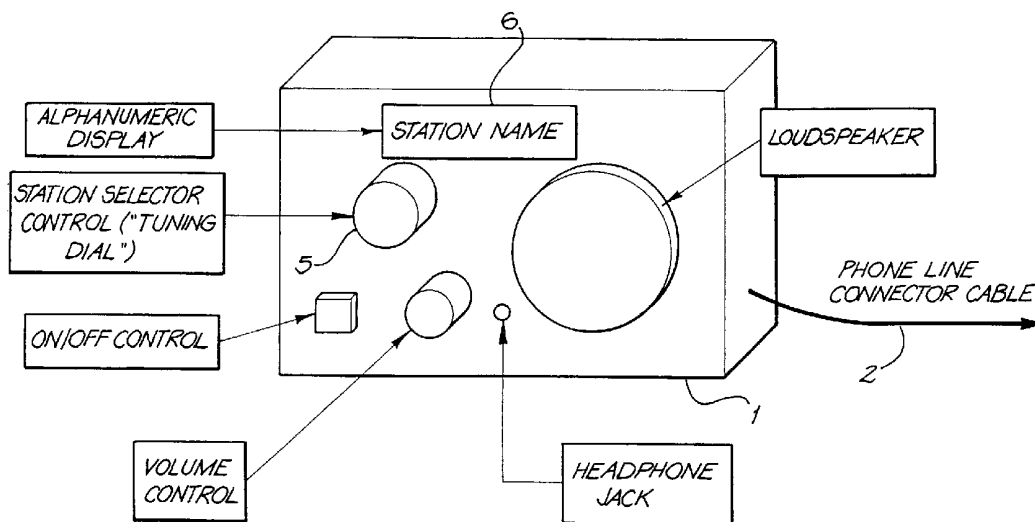
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- For two-letter codes and other abbreviations, refer to the "Guidance Notes on Codes and Abbreviations" appearing at the beginning of each regular issue of the PCT Gazette.*

(54) Title: AUDIO DISTRIBUTION AND PLAYBACK SYSTEM



(57) Abstract: A system for providing a personalized audio service, the system comprising: a server computer for serving audio streams to a receiver device; a receiver device, interconnected over a network to the server computer and adapted to receive the audio stream, the receiver device having a radio device appearance. The receiver device preferably can include an interconnected modem, audio decoder and digital to analog converter for providing audio output, each formed on the same integrated circuit. The server can be adapted to provide a customizable selection of audio stations for listening by a listener. The selection can be customized by telephoning the operator of the server computer or filling out a web page associated with the operator of the server computer.

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Audio Distribution and Playback System

Field of the invention

The present invention relates to the delivery of data in real time over a streaming environment.

5 Background of the invention

Streaming Media on the Internet is gaining in popularity. For example Real Networks Inc. of Seattle, WA, USA, has a very popular streaming audio system called "RealPlayer" that allows users to listen to audio, such as radio stations, in real-time - that is as the audio is created, it is streamed continuously across the pack switched Internet network. RealNetworks
10 supplies software for the source (server) end and also the receiver (client) end of the system. To listen to this content, users must have a computer workstation and at least a 28.8 kilobit-per-second connection to the Internet. RealNetworks claims more than 110 million people have the software installed on their computers. This development, and there are many other rival systems besides RealNetworks, means that people now have a much greater choice
15 and diversity of radio-like content (music, spoken word, talkback etc.) than ever before. No longer are people restricted to what comes over the local airwaves on AM or FM radio.

Further, normal radio type devices suffer the significant draw back in that spectrum bandwidth is extremely limited and utilisation in certain, high density populated areas can often be an extremely expensive undertaking as spectrum licences are often very costly. Further, radio
20 only provides limited opportunities for customisation for user preferences.

Unfortunately, the Internet packet switching infrastructure was not designed for this type of real-time transmission and even users with very fast connections to their ISP (Internet Service Provider) suffer audio break-up and lost connections. The route the audio must travel over the network can be tortuous and can change from moment to moment. A reliable
25 transmission, which runs continuously for hours at a time, requires an extremely rare set of circumstances to occur for that entire period.

Another drawback of existing streaming media systems is the need for an expensive computer workstation and modem or other connection to the Internet.

Internet Service Providers (ISPs) normally provide a server which is utilised by a number of browsers interconnected with the server utilizing a modem array or the like. For example, in Fig. 1, there is illustrated a standard ISP type arrangement. In this arrangement, an Internet service provider's computer 2 is interconnected to the Internet 3. The ISP computer 2 normally includes a pool of modem type devices for under its control. Each customer utilizing the ISP Computer 2 has their own modem 5 and a computer device 6 for browsing the Internet type environment. As a result, the ISP computer must service a large and indeterminate number of users who may be simultaneously browsing the Internet and who will have highly variable bandwidth demands. As a result, the real time requirements for audio streaming may not be guaranteed. Hence, the arrangement of Fig. 1 is often unsatisfactory in that audio streaming devices do not operate efficiently and "break up" often occurs.

Summary of the invention

It is the object of the present invention to provide an improved form of streaming environment for streaming audio or video or other form of real time information.

In accordance with a first aspect of the present invention, there is provided a method of streaming of real time data to a user's computer device over a limited bandwidth channel, the method comprising the steps of: (a) interconnecting the user's computer over the limited bandwidth channel, initially with a first browsing computer having indeterminate streaming capacity; (b) upon commencement of streaming activities, automatically disconnecting the user's computer device from the first browsing computer and interconnecting the user's computer device over the limited bandwidth channel with a streaming computer device, the streaming computer device having predetermined streaming capacity; and (c) streaming the real time data from the streaming computer device to the user's computer device.

The step (c) preferably can include utilizing a predetermined bandwidth portion of the limited bandwidth channel for streaming activities and utilising a remaining portion of the limited bandwidth channel for providing information associated with the real time data.

The limited bandwidth channel can comprise two modem devices interconnected over a public service telephone network. The user's computer device can comprise a mobile phone device or a personal digital assistant. The real time data can comprise audio information and the

additional information can comprise localised advertising information, customised personal information, auxiliary data such as sports statistics, weather, stock market information etc.

Brief description of the drawings

Notwithstanding any other forms which may fall within the scope of the present invention, preferred forms of the invention will now be described, by way of example only, with reference to the accompanying drawings in which:

Fig. 1 illustrates the physical hardware xradio device of the preferred embodiment; and

Fig. 2 illustrates a functional block diagram of the preferred embodiment.

Fig. 3 illustrates schematically the incorporation of an xradio device in a networked environment;

Fig. 4 illustrates the steps involved in the operation of the xradio device;

Fig. 5 illustrates the division of the capacity of a channel into synchronous and asynchronous portions; and

Fig. 6 illustrates a prior art internet service provider arrangement.

Detailed description of the embodiments

In the preferred embodiment, there is provided a system for providing users with the ability to easily and cheaply enjoy the benefits of combining a radio type device with Internet-style streaming media from a variety of sources without the necessity for a personal computer system.

The system includes a unit, referred to as an Xradio, that allows the user to select the type of music and stations they want loaded into it, and then select on a dial those stations. The preferred embodiment provides the benefits of personalised streaming digital media from the Internet to people who may not have a PC, or who do not wish to use one for this purpose.

Turning initially to Fig. 1 there is illustrated a physical hardware device description of the Xradio device with Fig. 2 illustrating a functional block diagram of the functional components of the device. As shown in Fig. 1 and Fig. 2, the preferred embodiment consists of

1. A hardware device 1 that connects 2 to the user's phone line. The device contains a suitably constructed Digital Signal Processor (DSP) 3 and associated operating software.
2. A set of services provided by a service provider including software that runs on a service provider's computer systems 4..

The xradio hardware device 1 connects to a user's phone line. It is designed to resemble a portable radio. It has a station selector control 5 that allows the selection of stations, with the name of the selected station appearing on the display screen 6.

The hardware device internally contains a modem 6 and a digital compressed audio Decoder subsystem 7, as well as a means 8 to output an analog audio signal to a loudspeaker or headphones 9. The MODEM 6 and Decoder 7 and other portions such as controller 10 can be implemented on a single DSP chip, thereby making the whole system very inexpensive. The MODEM and Decoder protocols can be combined into a single modulation-demodulation system that allows very efficient use of the available bandwidth.

The server computers of the service provider stream audio to the xradio device upon a connection being established.

In Fig. 3, there is illustrated an example incorporation of the preferred embodiment in a networked environment. Initially, a user's xradio 3 makes contact with an ISP computer 12 via modems 13, 14 with the modems operating in the usual manner over a public switched telephone network (PSTN) 16. The arrangement is utilised to access data services over the Internet 18.

When it is desired to access an Internet type radio station or the like which provides audio streaming services, the steps as illustrated in Fig. 4 are undertaken by a preloaded application on the xradio 3. Initially, any software updates required (and that haven't been preloaded) are downloaded by the xradio. The audio application can be downloaded from the ISP computer or from another computer existing on the Internet 18. Upon activation of the audio browser application, initially, a unique identification number and modem phone number are downloaded by the xradio 3 over the Internet. The xradio 3 then disconnects the modem 13 from the modem 14 and dials the number downloaded by the xradio 3. The number provided by the xradio 3 is directed to a second modem 30 which is interconnected to a streaming audio

computer 31. The streaming audio computer 31 is designed to provide for real time down load capabilities and can stream at a predetermined rate so as to always be in a position to satisfy the bandwidth requirement for streaming from computer 31 via modems 30 and 13 over the PSTN 16 to xradio 3. The streaming audio computer 31 can further include as its input, a number of audio sources 33 and other information sources 34. The audio sources are streamed to the xradio 3 and the other information sources 34 are also provided in an asynchronous manner.

The streaming from the streaming computer 31 to the xradio 3 will include a channel having a first predetermined capacity. The arrangement of Fig. 3 provides the ability to apportion a certain part of the bandwidth to synchronous data as required by the streaming and a second portion of the data to asynchronous data. Hence, as illustrated in Fig. 5, the total capacity of the streaming channel is divided into a synchronous streaming portion 40 and an asynchronous portion 41. The asynchronous portion 41 can be utilised to provide various auxiliary capabilities to the audio streaming. For example, in one arrangement, the modems 30, 13 can comprise 56K-Bit modems and the streaming data can comprise MP3 streaming data. The asynchronous portion 41 is available for providing auxiliary services such as a Internet browsing capability. Alternatively, other data could be sent via asynchronous channel 41 and can include localised advertising or auxiliary data such as sports statistics, weather, traffic etc.

Fig. 3 illustrates one network arrangement of one embodiment of the present invention. Obviously, other forms of implementation are possible. For example, in a mobile phone environment, the same arrangement can be provided in a more seamless manner wherein the xradio unit can be adapted to be a mobile phone device. The mobile phone device initially makes contact with a first ISP type computer and a similar arrangement is provided such that when audio streaming is to be utilised, the mobile phone device connects with a streaming audio computer which is adapted to provide the bandwidth requirements of the audio stream in real time.

As the streamed audio is completely programmable, flexible degrees of customisation can be incorporated into the audio stream. With suitable programming, the system can provide the following facilities:

-Users can call in to service centre and ask for stations to be 'loaded' into their hardware unit. When they next connect (by turning the hardware unit on) the stations are loaded into the

list in the unit and can be selected from the dial 5. Alternative, setup systems, such as a web page system running on a separate server could also be provided.

-The system can be setup so that services are delivered at preset times. For example, wake up calls can be provided.

5 -The user can ask for certain Internet streaming sites to be made available on their hardware unit with the server streaming those sites to the hardware unit.

-In a modified embodiment, the hardware unit can have a 'BUY IT NOW' button which allows products such as the song (or the album from which the song comes) to be purchased and sent to them.

10 -The hardware unit can have a 'NEWS' button which will play the latest news on demand. The same feature can be used to play the weather.

-The user can provide demographic & location details to the service provider and advertising can be targeted at the user. Certain advertising time slots can be allocated on the service and appropriate advertising can be assigned and played to the user.

15 -The user may join 'community groups' where users in that group can send messages to each other over the network (by calling into a phone number for example), allowing certain advertising or content slots to be made available for community messages. The user could be constantly reminded by a flashing light or a continuously played message until they pushed the 'got it' button.

20 The network connection provides the ability for complete monitoring of the uses listening preferences and targeted content can be evolved on a personalised basis.

Various modified embodiments may also be provided. For example, a compressed video transmission system could be provided for allowing video downloads at a framerate sustainable by the interconnection. Further, the system could be adapted to mobile phone utilization. Other
25 audio and graphic downloads could be supported. For example, Shockwave formatted content. Further, a video interface via a video out link to a Television set could also be provided.

Various buttons could also be provided for two way communications such as communication for chat rooms and games or 'quiz shows'.

The services can be provided on a subscription basis with a monthly charge being rendered on say, a user's phone bill.

Further, various speech synthesised prompts can be automatically provided, for example, to confirm station selection or purchases.

5 Further a computer interconnection can be provided for saving audio files, set up, simultaneous Internet access with streaming over same phone line.

In a further modified embodiment, a phone and/or answering machine service can also be provided. The keypad can have the dual use for entering data (like credit card numbers) and additional voice messaging services could be provided.

10 The system of the preferred embodiment is well suited to providing: Cricket scores, general scoring of games, Audio teletext (for exchange rates, stock process etc.), Voting applications, Real time based applications, Locally-based music types, User-configured advertising / community announcements, Streaming contents off the Internet.

15 It will be understood that the invention disclosed and defined herein extends to all alternative combinations of two or more of the individual features mentioned or evident from the text or drawings. All of these different combinations constitute various alternative aspects of the invention.

20 The foregoing describes embodiments of the present invention and modifications, obvious to those skilled in the art can be made thereto, without departing from the scope of the present invention.

Claims

1. A system for providing a personalized audio service, the system comprising:
a server computer for serving digital audio streams to a receiver device;
a receiver device, interconnected over a telecommunications network to said server
5 computer, and adapted to receive said digital audio stream, said receiver device having a radio
device appearance; and said receiver device translating said digital audio stream into a
corresponding analog stream for output via a speaker device.
2. A system as claimed in claim 1 wherein the receiver device includes an
interconnected modem, audio decoder and digital to analog converter for providing audio
10 output, each formed on the same integrated circuit.
3. A system as claimed in any previous claim wherein said server is adapted to
provide a customizable selection of audio stations for listening by a listener.
4. A system as claimed in claim 3 wherein said selection can be customised by
telephoning the operator of said server computer or filling out a web page associated with said
15 operator of said server computer.
5. A system as claimed in any previous claim wherein said system can be adapted to
deliver predetermined services at predetermined times, customizable by said listener.
6. A system as claimed in any previous claim wherein said receiver device includes
a purchase activation button for activating the purchase of items currently streamed by said
20 server computer.
7. A system as claimed in any previous claim wherein said receiver device includes
a news or weather button to provide substantially instant news or weather information.
8. A system as claimed in any previous claim wherein said system provides
customised advertising to a user.
- 25 9. A system as claimed in any previous claim wherein said receiver device is
adapted to send messages to other receiver devices.
10. A system as claimed in any previous claim wherein said receiver device acts as a
messaging storing and forwarding facility.

11. A system as claimed in claim 1 wherein the audio stream transmitted to said receiver device includes a predetermined synchronous bandwidth and a residual asynchronous capacity.

12. A method for a streaming of real time data to a user's computer device over a limited bandwidth channel, the method comprising the steps of:

5 (a) interconnecting said user's computer over said limited bandwidth channel, initially with a first browsing computer having indeterminate streaming capacity;

(b) upon commencement of streaming activities, automatically disconnecting said user's computer device from said first browsing computer and interconnecting said user's computer device over said limited bandwidth channel with a streaming computer device, said streaming
10 computer device having predetermined streaming capacity; and

(c) streaming said real time data from said streaming computer device to said user's computer device.

13. A method as claimed in claim 12 wherein said step (c) includes utilizing a predetermined bandwidth portion of said limited bandwidth channel for streaming activities and
15 utilising a remaining portion of said limited bandwidth channel for providing information associated with said real time data.

14. A method as claimed in any previous claim 12 or 13 wherein said limited bandwidth channel comprises two modem devices interconnected over a public service telephone network.

20 15. A method as claimed in claim 12 or claim 13 wherein said user's computer device comprises a mobile phone device.

16. A method as claimed in claim 12 or claim 13 wherein said user's computer device comprises a personal digital assistant.

25 17. A method as claimed in any previous claim 12 to claim 16 wherein said real time data comprises audio information.

18. A method as claimed in claim 13 wherein said additional information comprises localised advertising information.

19. A system when implementing the method of any of claims 12 to 18.

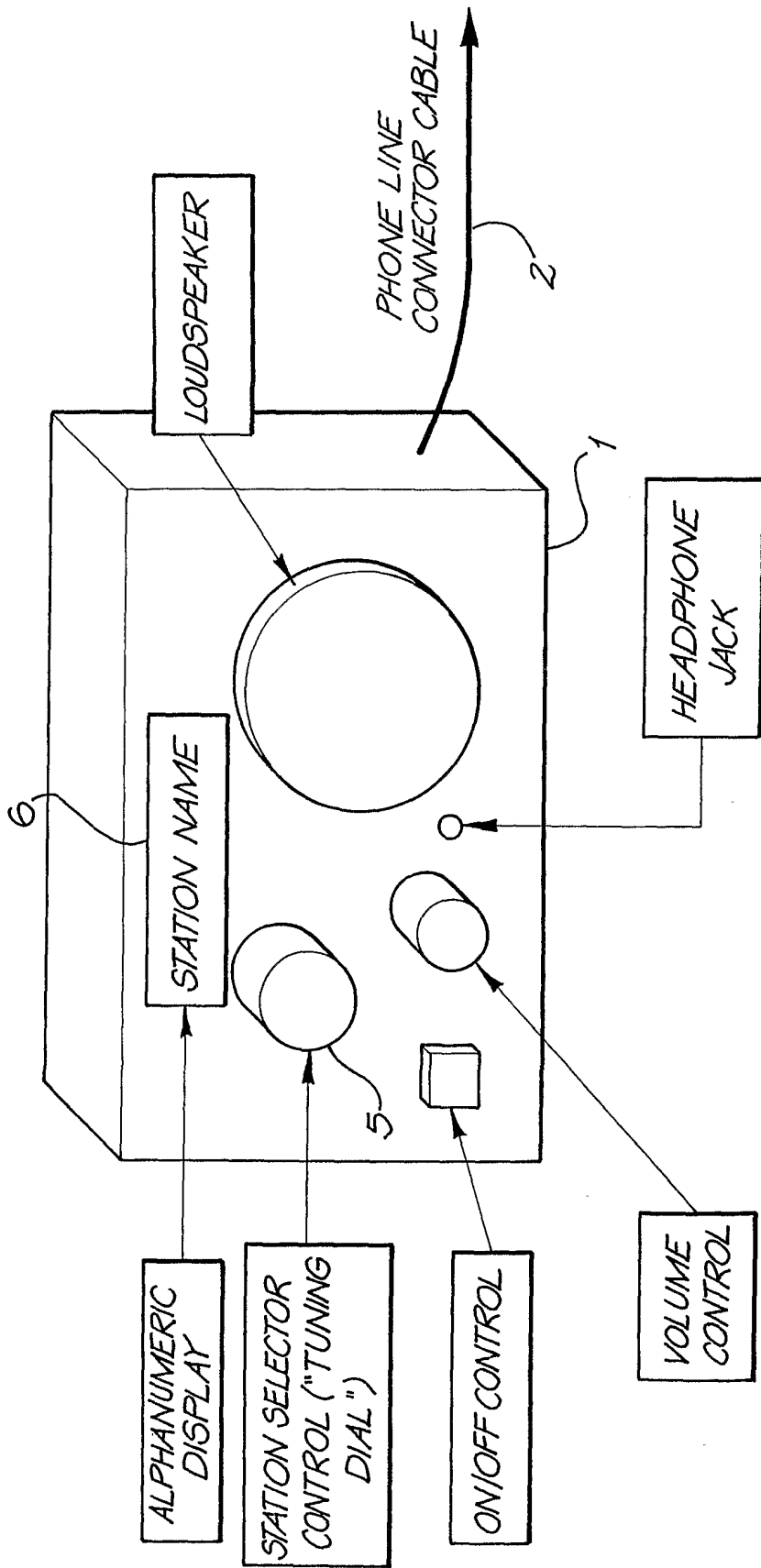


FIG. 1

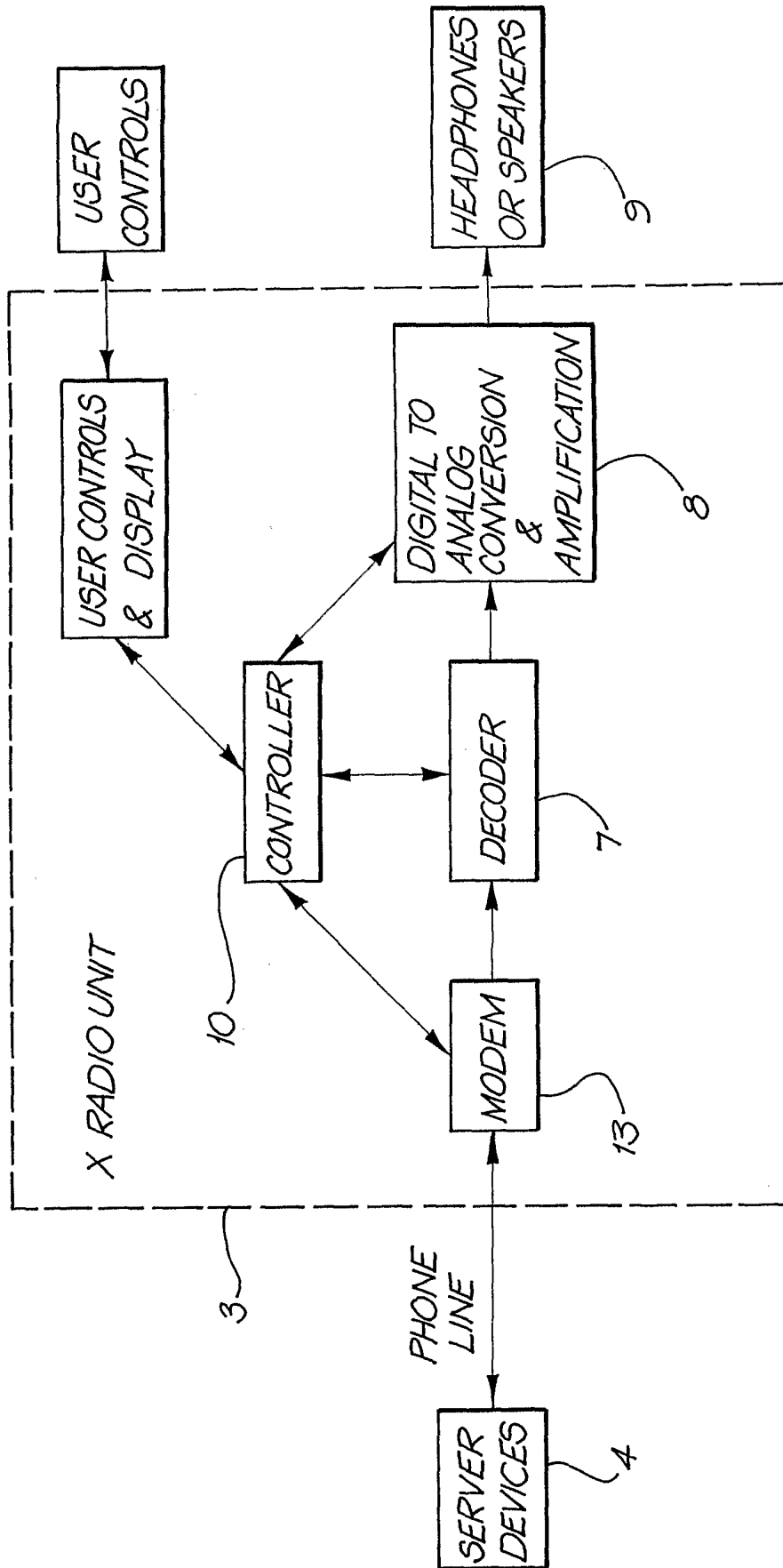


FIG. 2

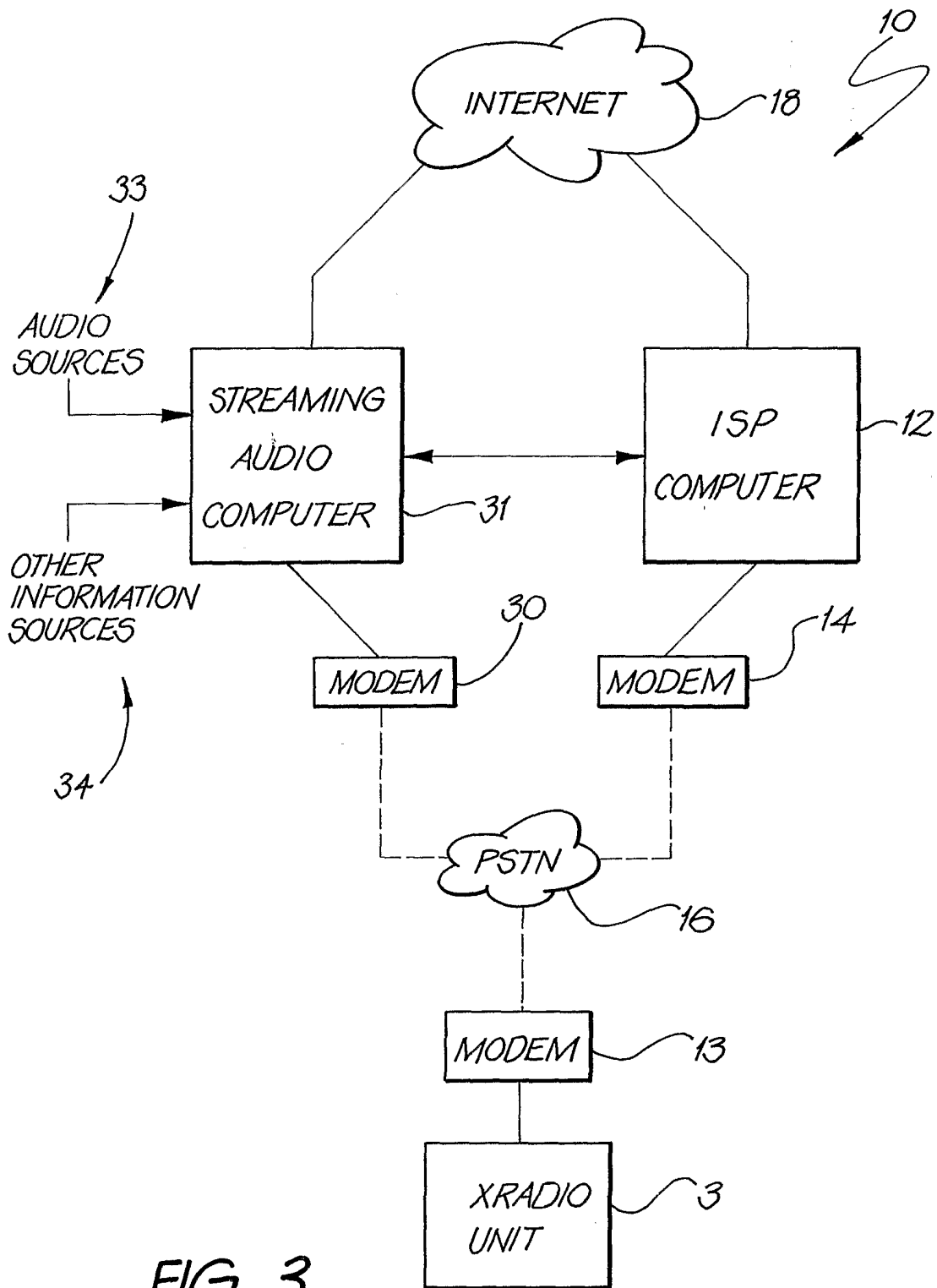


FIG. 3

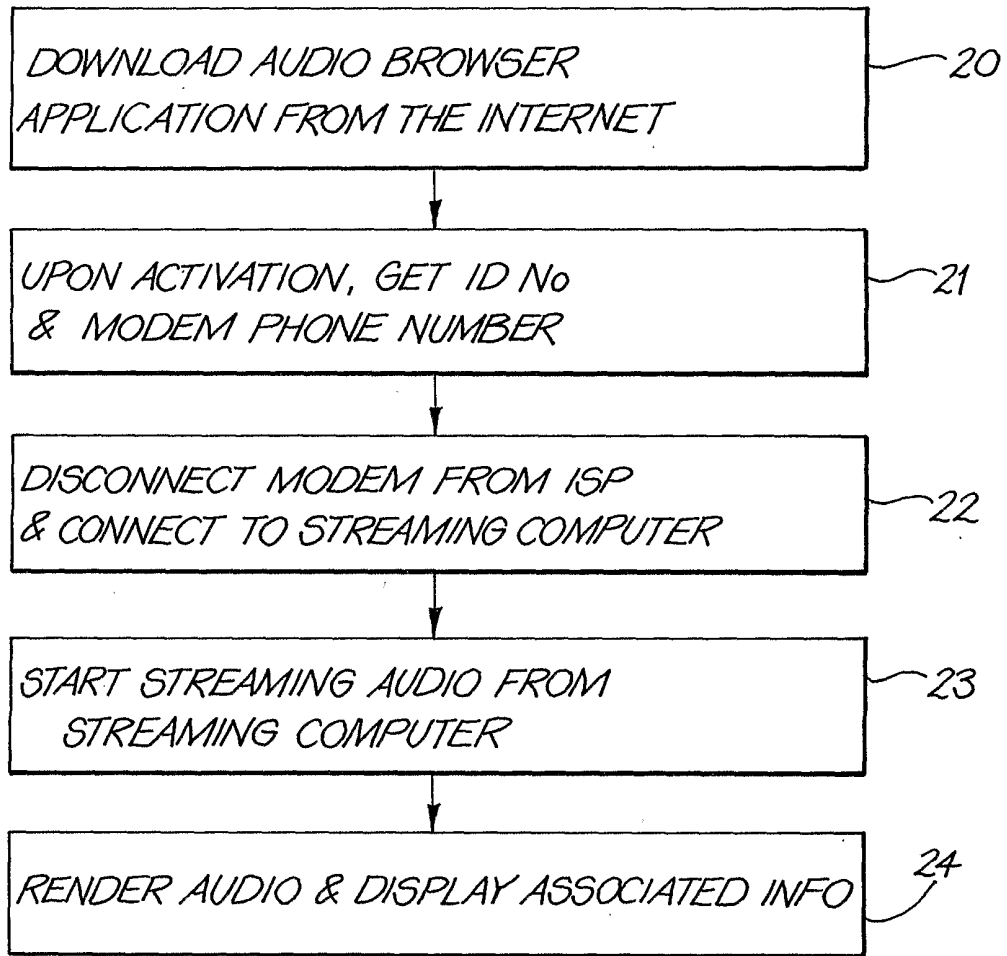


FIG. 4

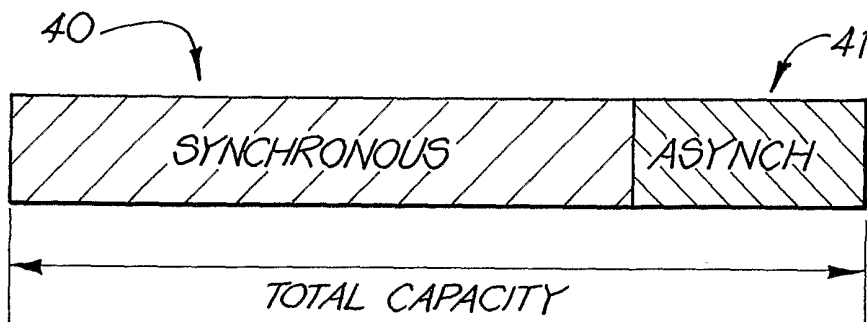


FIG. 5

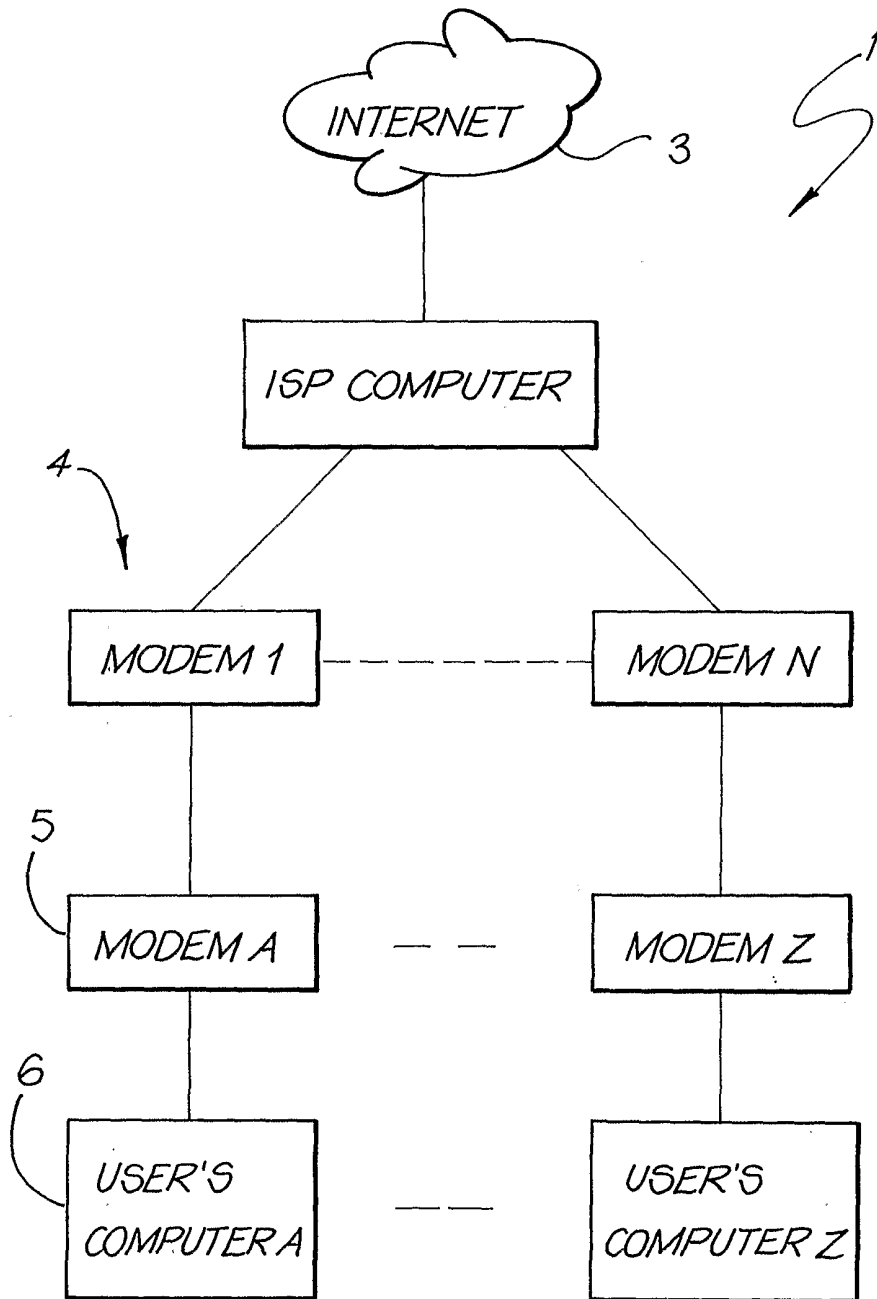
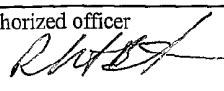


FIG. 6

INTERNATIONAL SEARCH REPORT

International application No.
PCT/AU01/00308

A. CLASSIFICATION OF SUBJECT MATTER		
Int. Cl. ⁷ : H04L 12/56, H04H 5/00, G06F 13/12		
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) WHOLE IPC		
Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched AU IPC AS ABOVE		
Electronic data base consulted during the international search (name of data base and, where practicable, search terms used) WPAT, INSPEC, IPOS(SurfIP), USPTO, WEB - streaming, live, real time, MP3, ISP, Network, Internet, web, www, audio peripheral, sound peripheral, computer		
C. DOCUMENTS CONSIDERED TO BE RELEVANT		
Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
P,X	WO 00/23899 A1 (Qureshey) 27 April 2000 Please refer to the entire document	1 to 11
X	MACWORLD, C. Breen, "MP3 to go", February 2000, pg. 86 to 91 Please refer to page 90-91 -Alternative music.	1, 3-5, 8
X	IEEE MICRO, Hagiwara et al, "Sega Dreamcast: Creating a Unified Entertainment World", November-December 1999, pg.29-35. Please refer to pg.31 first paragraph, pg.33-Modem, pg.34-System Environment, and Final performance.	1 to 11
<input checked="" type="checkbox"/> Further documents are listed in the continuation of Box C <input checked="" type="checkbox"/> 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	"T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention
"E"	Earlier application or patent but published on or after the international filing date	"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
"L"	Document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)	"Y" 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 documents, such combination being obvious to a person skilled in the art
"O"	Document referring to an oral disclosure, use, exhibition or other means	"&" document member of the same patent family
"P"	Document published prior to the international filing date but later than the priority date claimed	
Date of the actual completion of the international search 23 May 2001		Date of mailing of the international search report 30 MAY 2001
Name and mailing address of the ISA/AU AUSTRALIAN PATENT OFFICE PO BOX 200, WODEN ACT 2606, AUSTRALIA E-mail address: pct@ipaaustralia.gov.au Facsimile No. (02) 6285 3929		Authorized officer  ROBERT BARTRAM Telephone No : (02) 6283 2215

INTERNATIONAL SEARCH REPORT

International application No.

PCT/AU01/00308

C (Continuation). DOCUMENTS CONSIDERED TO BE RELEVANT		
Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	US 5881317 A(Hampsten et al) 9 March 1999 Please refer to col.3 ln.61 to col.4 ln.25, col.6 ln.50 to col.7 ln.6, and figs.1 and 11.	1 to 11
X	US 5838384 A (Schindler et al) 17 November 1998 Please refer to col.2 lns.48 to 55col.20 lns.1 to 18 and fig.15	1 to 11
X	US 5778187 A(Monteiro et al) 7 July 1998 Please refer to the entire document.	1 to 11
X	US 5414773 A(Handelman) 9 May 1995 See the entire document.	1-3, 5, 7, 8

INTERNATIONAL SEARCH REPORT

International application No.

PCT/AU01/00308

Box I Observations where certain claims were found unsearchable (Continuation of item 2 of first sheet)

This international search report has not been established in respect of certain claims under Article 17(2)(a) for the following reasons:

1. Claims Nos :
because they relate to subject matter not required to be searched by this Authority, namely:

2. Claims Nos :
because they relate to parts of the international application that do not comply with the prescribed requirements to such an extent that no meaningful international search can be carried out, specifically:

3. Claims Nos :
because they are dependent claims and are not drafted in accordance with the second and third sentences of Rule 6.4(a)

Box II Observations where unity of invention is lacking (Continuation of item 3 of first sheet)

This International Searching Authority found multiple inventions in this international application, as follows:

See extra sheet

1. As all required additional search fees were timely paid by the applicant, this international search report covers all searchable claims
2. As all searchable claims could be searched without effort justifying an additional fee, this Authority did not invite payment of any additional fee.
3. As only some of the required additional search fees were timely paid by the applicant, this international search report covers only those claims for which fees were paid, specifically claims Nos.:

4. No required additional search fees were timely paid by the applicant. Consequently, this international search report is restricted to the invention first mentioned in the claims; it is covered by claims Nos.: **1 to 11**

Remark on Protest The additional search fees were accompanied by the applicant's protest.
 No protest accompanied the payment of additional search fees.

INTERNATIONAL SEARCH REPORT

International application No.

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Supplemental Box

(To be used when the space in any of Boxes I to VIII is not sufficient)

Continuation of Box No: II

The claims do not relate to one invention only (or to a group of inventions so linked as to form a single general inventive concept). In assessing whether there is more than one invention claimed, I have given consideration to those features which can be considered to be "special technical features". These are features which potentially distinguish the claimed combination of features from the prior art. Where different claims have different special technical features they define different inventions. I have found that there are different inventions as follows:

- (1) Claims 1 to 11 are directed towards a system for providing personalized audio service over a telecommunications network between a server computer and a receiving device. It is considered that the system for providing personalized audio service over a telecommunications network between a server computer and a receiving device comprises a first "special technical feature".
- (2) Claims 12 to 19 are directed towards a method for a streaming of real time data to a user's computer device over a limited bandwidth channel by firstly connecting a browsing computer having an indeterminate streaming capacity and then upon streaming commencement switching to a streaming computer device for the down-loading of the data. It is considered that the method for a streaming of real time data to a user's computer device over a limited bandwidth channel by firstly connecting a browsing computer having an indeterminate streaming capacity and then upon streaming commencement switching to a streaming computer device for the down-loading of the data comprises a second "special technical feature".

INTERNATIONAL SEARCH REPORT

International application No. PCT/AU01/00308
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This Annex lists the known "A" publication level patent family members relating to the patent documents cited in the above-mentioned international search report. The Australian Patent Office is in no way liable for these particulars which are merely given for the purpose of information.

Patent Document Cited in Search Report	Patent Family Member		
WO 200023899	AU 200012079		
US 5881317	NONE		
US 5838384	CA 2226499	EP 839349	HK 1010595
	US 5675390	US 5867223	WO 9736391
US 5778187	AU 30020/97	EP 965087	WO 9742582
	US 5983005	US 6119163	
US 5414773	AU 70357/94	CA 2130392	EP 639918
	IL 106746	JP 7212328	US 5715315
END OF ANNEX			