

## DATA STORAGE AND ACCESS SYSTEMS

### CROSS-REFERENCES TO RELATED APPLICATIONS

5 [0001] This application is a continuation of U.S. Patent Application No. 11/336,758, filed on January 19, 2006; which is a continuation of U.S. Patent Application No. 10/111,716, filed on September 17, 2002, which application is a national stage application under 35 U.S.C. 371, claiming the priority of international PCT Application No. GB00/04110, filed on October 25, 2000; which claims priority to UK Application No. 9925227.2 filed on October 25, 1999, each of which is incorporated by reference in its entirety for all purposes.

### 10 BACKGROUND OF THE INVENTION

[0002] This invention is generally concerned with data storage and access systems. More particularly, it relates to a portable data carrier for storing and paying for data and to computer systems for providing access to data to be stored. The invention also includes corresponding methods and computer programs. The invention is particularly useful for  
15 managing stored audio and video data, but may also be applied to storage and access of text and software, including games, as well as other types of data.

[0003] One problem associated with the increasingly wide use of the internet is the growing prevalence of so-called data pirates. Such pirates obtain data either by unauthorized or legitimate means and then make this data available essentially world-wide over the internet  
20 without authorization. Data can be a very valuable commodity, but once it has been published on the internet it is difficult to police access to and use of it by internet users who may not even realize that it is pirated. This is a particular problem with audio recordings, and, once the bandwidth becomes available, is also likely to be evident with video.

[0004] Over the past three or four years compressed audio sources have become  
25 increasingly widely available on web pages. One widely used audio data compression format is MP3 (MPEG - Audio Layer 3 of the MPEG1 compression algorithm), which is an internationally defined standard including a definition of compressed audio information such as speech or music. It relies on psycho-acoustic properties of human hearing to achieve very large data compression factors. It is thus feasible to download usefully long passages of  
30 music in a practically convenient short time. Pirate data suppliers have not been slow to realize the potential of this, and many unauthorized websites have sprung up offering popular

industry considerable concern and there is an urgent need to find a way to address the problem of data piracy.

#### SUMMARY OF THE INVENTION

5 [0005] According to the present invention there is therefore provided a method of providing portable data comprising providing a portable data storage device comprising downloaded data storage means and payment validation means; providing a terminal for internet access; coupling the portable data storage device to the terminal; reading payment information from the payment validation means using the terminal; validating the payment information; and downloading data into the portable storage device from a data supplier.

10 [0006] Another aspect of the invention provides a corresponding mobile data retrieval device for retrieving and outputting data such as stored music and/or noise from the data storage device.

15 [0007] The payment validation means is, for example, means to validate payment with an external authority such as a bank or building society. The combination of the payment validation means with the data storage means allows the access to the downloaded data which is to be stored by the data storage means, to be made conditional upon checked and validated payment being made for the data. Binding the data access and payment together allows the legitimate owners of the data to make the data available themselves over the internet without fear of loss of revenue, thus undermining the position of data pirates.

20 [0008] A further advantage of the system is that it allows users under the age of 18 to make internet purchases. Currently internet users pay for goods and/or services by credit card. Since credit cards cannot legitimately be used by persons under the age of 18 (at least in the UK), a significant fraction of adventurous internet users are excluded from e-commerce, one of the most significant predicted uses of the internet. In one embodiment of the invention, however, the payment validation means comprises e-cash; that is, the payment validation means stores transaction value information on a cash value of transactions validatable by the data storage means. In simple terms, the data storage means can be a card which is charged up to a desired cash value (if necessary limited to a maximum value) at a suitable terminal. This might be an internet access terminal but could, more simply, be a device to accept the data storage card and to receive and count money deposited by the user to charge the card, writing update cash value information onto the card. More sophisticated ways of updating the cash value on the card are also possible, such as direct bank transfer. Since, with this type

of embodiment, the data storage means is, essentially, precharged with cash rather than acting as a credit card, it can be used by young people without the risk of their incurring large debts.

[0009] In one embodiment the data storage means is powered by the retrieval device when it is connected to the device and retains a memory of the downloaded data when it is

5 unpowered. This can be achieved by the use of Flash RAM or, more generally, any form of programmable read-only memory. Alternatively the data storage means may incorporate a rechargeable cell or capacitor and store information in battery backed-up static RAM.

[0010] The downloaded data may be entered into the data storage device by means of an interface such as a magnetically or capacitatively coupled connection or an optical

10 connection, but preferably the interface comprises contacts for direct electrical connection to the storage means. The payment validation means may likewise have one of a variety of interfaces but again preferably comprises a set of electrical contacts. The payment validation means could, however, comprise a magnetic or holographic data-strip such as is known for use with credit cards and phone cards. The interface to receive the downloaded data may be

15 separate from the interface to the payment validation means, to facilitate separate and simultaneous access to both these systems. In other embodiments a single interface may serve for both data storage and payment. Advantageously the payment validation means includes a memory storing information to identify the person who is paying for the downloaded data.

20 [0011] For additional security the downloaded data may be encrypted. In this case data decryption may be necessary at some stage, either in the data storage means or in the retrieval device or in an information delivering apparatus such as a data access terminal. Alternatively the data decryption function can be shared amongst one or more of these devices. The skilled person will be aware of a range of suitable encryption/decryption techniques, including Pretty

25 Good Privacy (Registered Trade Mark) and PKI (Public Key Infrastructure). Normally when the downloaded data is encrypted a decryption key must be supplied. This can be generated automatically by the data access terminal or data access service provider or it can be entered by the user into the data access terminal or into the mobile data retrieval device.

[0012] The data storage means and/or the retrieval device can be provided with access

30 control means to prevent unauthorized access to the downloaded data. Additionally or alternatively, use control means can be provided to stop or provide only limited access of the user to the downloaded data in accordance with the amount paid. These access and use

control functions may in some embodiments be combined, permitted use controlling access or permitted access controlling use. Thus, for example, a complete set of data information relating to a particular topic, a particular music track, or a particular software package might be downloaded, although access to part of the data set might thereafter be controlled by payments made by a user at a later stage. In this way, a user could pay to enable an extra level on a game or to enable further tracks of an album.

5 [0013] In embodiments where the access or use control means is responsive to the payment validation means, access or use control information may be stored with the downloaded data or in a separate storage area, for example in the payment validation means. The user's access to the downloaded data could advantageously be responsive to the payment validation means, for example, by means of a control line coupling the payment validation means with a memory access or decryption control element.

[0014] In one embodiment the data storage means comprises an electronic memory card or smart card and the mobile data retrieval device is provided with a slot to receive the card. Preferably the card is a push-fit within the retrieval device, and retention of the card may be effected by pressure from electrical interface connections and/or resilience of the housing, or by using a resilient retaining means. In a preferred embodiment the retrieval device includes an audio output and a display, to play a downloaded track and to show information about the track and/or an accompanying video.

15 [0015] To download data onto the data storage means the user can employ a data access terminal coupled to the internet. The terminal can directly validate payment; for example in the case of a smart card charged with electronic cash it can deduct a cash value from the card. Alternatively it can communicate with a bank or other financial services provider to control payment. In a preferred embodiment, however, the terminal connects to a data access service provider which provides a portal to other sites and which validates payment and then forwards data from a data supplier to the user's local access terminal. The data access service provider may alternatively forward payment validation information and/or information from the payment validation authority to the data supplier for control by the supplier of the data supplied. Thus, access to the payment validation system and/or data for downloading may be entirely controlled by the data supplier.

20 [0016] Data held on the data storage means may advantageously include data relating to the user's or payer's usage of the system. This information may include, for example,

information on a user's spending pattern, information on data suppliers used and information on the downloaded data. This information may be accessed by the data supplier and/or data access service provider and can be used for targeted marketing or loyalty-based incentive schemes such as air miles or the like.

5 [0017] The data access terminal may be a conventional computer or, alternatively, it may be a mobile phone. Wireless Application Protocol (WAP) and i-mode allow mobile phones to efficiently access the internet and this allows a mobile phone to be used to download data to the data storage means, advantageously, directly. The data storage means can, if desired, incorporate the functionality of a mobile phone SIM (Subscriber Identity Module) card,  
10 which cards already include a user identification means, to allow user billing through the phone network operator.

[0018] In a preferred embodiment the downloaded data is MP3 or other encoded audio data, but the system finds more general application for other data types. For example, download data can include software, and particularly games, share price information, current  
15 news information, transport timetable information, weather information and catalog shopping information. The downloaded information may also include compressed video data. The storage capacity of the data storage means is adaptable to suit the type of data intended to be downloaded; for example, 32 megabytes is sufficient for CD quality music, but for video it is preferable that the data storage means has a capacity of 128 megabytes or greater.

20 [0019] In another aspect, the invention provides a portable data carrier comprising an interface for reading and writing data from and to the carrier; non-volatile data memory, coupled to the interface, for storing data on the carrier; non-volatile payment data memory, coupled to the interface, for providing payment data to an external device.

[0020] These features allow the data carrier to store both payment data and content data,  
25 thus providing the advantages outlined above. Depending upon the payment system used, the payment data memory may also store code for validating or confirming a payment to an external payment system. The payment data will normally be linked to a card or card holder identification data for payment by the card holder. The non-volatile memory ensures that stored content and payment data is retained in the data carrier when the data carrier is not  
30 receiving power from an external source. Thus "non-volatile" encompasses, for example, low-power memory whose contents are retained by a battery back-up system. In one embodiment the payment data memory comprises EEPROM and the content data memory

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