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(57) Abstract

A method of identifying a time–variable component (such as a song) of a broadcast signal, and thus identifying for example the tittle of the song or the performing artist of the song being broadcast. The required information is encoded on to the broadcast signal and is changed for example each time the song being transmitted is changed. The information is extracted from the received broadcast signal, and is then stored for later retrieval – for instance, a person hearing a song might press a storage button on a receiver which then stores the name of the song and the artist ready for recall subsequently by that person.

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BROADCAST SIGNALS

This invention relates to methods of identifying components of broadcast signals. This invention further relates to apparatus for storing items of information identified from broadcast signals.

Music is widely broadcast so that people can listen to it whist undertaking various activities, quite apart from when people deliberately set out to listen to various works, such as may be the case at a concert. The music may be broadcast in an immediately audible form, such as from loudspeakers so that anyone in the vicinity of the loudspeakers can hear it, or it may be broadcast electronically, optically or with electro-magnetic radiation, for reception, decoding and driving a suitable transducer having an audio output which again can be heard by someone in the vicinity of the transducer. Without limitation, examples of electronic broadcasting include the dissemination along wires of electronic signals suitably modulated with audio data, of optical broadcasting the transmission of optical signals along optical fibres or the dissemination of infra-red signals in either case modulated with audio data, and of electro-magnetic radiation broadcasting the dissemination of radio-frequency signals modulated with audio data; in each of these cases a suitable receiver is required to recover the audio data from the broadcast signal.

The audio content of a broadcast music signal is time-variable, firstly from moment to moment consequent upon the music itself and secondly from one time period to another dependent upon the program material being broadcast – that is, the work and version (i.e. the artist, group, band or orchestra performing and the particular recording) being broadcast. The present invention is concerned with identifying the latter.

When music is broadcast, it very frequently happens that a listener wishes to know the name of both the work itself and the artist (which term will hereinafter be used to refer to either the performing artist or the group, band, orchestra or the like performing the work, as appropriate). Unfortunately, it also very often is the case that the listener does not hear the desired information, because it was mentioned before the work was broadcast, and so before the listener realised he wished to know the name of the artist and work, and was not repeated after the work. Even if the information is given out after the work

has been broadcast, the listener still may not hear it perhaps due to being distracted at the crucial moment, a lack of understanding of the information, or to a temporary loss or distortion of the broadcast signal, such as may occur when listening to a radio in a motor vehicle, or if the signal is in a foreign language.

It further happens that even when a listener hears and understands information concerning a particular work of interest, the listener cannot immediately commit that information to paper, for example to permit the subsequent purchase of a recording of the work. Then, some time later, the listener may not be able to recall the name of the artist and of the work.

To address the above problems, most radio stations maintain play-lists, in which are recorded details of all the works broadcast each day and the approximate time of broadcast. The information in those lists is made available to the public so that a listener may be informed of the name of a work and of the artist if he calls the station and says when and on what program the work was transmitted. Though this may be helpful to some, few do call and it is known that many more listeners might buy a work if they could more easily do so.

It is a principal aim of the present invention to facilitate the identification of a broadcast work, for example to enable an interested party to purchase a recording of that work.

According to yet another aspect of this invention, there is provided a method of identifying a time-variable component of a broadcast signal, comprising encoding on the broadcast signal time-variable information the instantaneous value of which identifies said component of the signal, receiving the signal and extracting therefrom the time-variable information, and storing selected instantaneous values of said information for later retrieval.

According to a further, alternative aspect of this invention, there is provided a method of identifying a time-variable component of a broadcast signal, comprising broadcasting an audio time-variable component, simultaneously broadcasting a signal by means of a different medium which signal contains time-variable information the instantaneous value of which identifies said audio time-variable component, receiving the signal and

extracting therefrom the time-variable information, and storing selected instantaneous values of said information for later retrieval.

According to yet another aspect of this invention, there is provided apparatus for storing selected items of information, comprising a receiver for a broadcast signal having a time-variable component, said signal carrying encoded time-variable information the instantaneous value of which identifies said component of the signal, a decoder to extract from the signal the time-variable information, a store for extracted information, and a manually operable control to cause selected information to be placed in the store for later retrieval.

It will be appreciated that the broadcast signal may comprise any signal which is distributed for use by the general public; it may thus be (without limitation) any one of an audible acoustic signal, an optical or infra-red signal propagated along a suitable carrier such as an optical fibre or transmitted as electromagnetic radiation, a radio transmission or an electronic signal carried on wires. The time-variable component of that signal will ordinarily be a musical work of one kind or another, though it could take some other form, such as the spoken word or a video signal, but the latter will ordinarily include at least part of a musical work. The time-variable component could also comprise pure alpha-numerical information.

The time-variable information transmitted with the broadcast signal preferably is a unique identifier for or associated with the time-variable component of the broadcast signal. Thus, to take the case of the time-variable component being a musical work, the time-variable information should be a unique identifier for the work itself, taking into account (for instance) the name of the artist, the title of the work, and – if appropriate – the recording details. Thus, it is envisaged that every new recording should be assigned a new and unique data identifier which is logged into appropriate databases to include the relevant information for that work, such that the work may subsequently be identified from the database, when one has knowledge of the identifier. Moreover, it should be possible to assign such identifiers to all existing recorded works, and thus build up a complete catalogue of all recorded works together with unique identifiers.

Such a project is facilitated by the ability of modern digital computers to store and rapidly process very large amounts of data. Despite the huge number of recorded works currently available and the anticipated increase in that number over the coming years, no undue problem should arise from the quantity of data to be handled. The mass storage capacity and processing power of modern desk-top personal computers would be able to handle the quality of data without difficulty; and the expansion in mass storage capacity and processing power of such computers has risen significantly faster in recent years than the rate of increase in issued recordings of audio and video works.

The time-variable information typically will be in the form of a binary data signal. A 64-bit binary signal has approximately 1.8×10^{17} unique values, and that should be more than sufficient to identify all existing recorded works as well as those likely to be recorded for a very large number of years, even allowing for a hierarchical data structure to be employed. However, greater flexibility may be obtained by a larger signal, perhaps of up to 2048 bits or even more.

The time-variable information may be encoded on the broadcast signal in any of a number of well-known and understood different ways. For example, in the case of an FM radio broadcast transmission, the time-variable information may be carried by that broadcast in the form of a sub-carrier. In the case of an amplitude modulation transmission such as is used for analogue PAL and other television systems, as well as in the case of an acoustic signal, the time-variable information may be carried in a brief tone burst the duration of which is below the limit of human perceptibility. If the time-variable information requires a transmission time which is too great to be inserted imperceptibly, it may be broken into a number of segments which are transmitted at spaced intervals and subsequently re-assembled to reconstruct the time-variable information.

With digital systems, the time-variable information may be inserted into the digital data stream in any convenient manner; most such digital schemes have a measure of redundancy built into them as well as spare channels, depending upon the system employed and there should be no problem encoding the information into the data stream.

The extraction regime to obtain the time-variable information at the time of reception of the time-variable component of the transmitted signal obviously will depend upon the nature of the transmitted signal and the encoding mechanism. For example, in the case of an FM radio broadcast, a suitable decoder may be inserted in the signal path of an existing receiver or a receiver may be constructed *ab initio* with the decoder built into the original circuitry. Either way, the receiver should have a time-variable information output which is available for storing in the event that a listener to the time-variable component wishes to record that information for later recall. Another possibility is for the receiver of the broadcast signal not to have an output for the time-variable component; in such a case the receiver may be arranged solely to extract the time-variable information for selective storage. This is particularly so for a case where the time-variable information is carried by or transmitted simultaneously with an acoustic signal which is immediately audible by a listener, without the need for any kind of receiver.

Preferably, the receiver has a relatively simple control which causes the time-variable information currently being broadcast to be stored in memory device for later recall. In the case of a small portable (and typically pocketable) receiver, a push-button may be provided on the receiver which, when depressed, enables the storage of the time-variable information. In the case of a fixed installation such a domestic television receiver, it may be convenient to provide the control on a remote control unit, so that storage may be enabled within the fixed installation from some other point in the vicinity of that installation. Yet another possibility is to build the receiver into the remote control unit of a fixed installation, along with the activating control for the identifying code. The receiver may also be combined with a traditional identifying mechanism, such as a bar-code reader, allowing the receiver to act as a conduit for both direct time variable and time invariant information.

The store for time-variable information in the receiver preferably is resettable, whereby once stored information has been read from the store, the previously stored information may be erased to permit the storage of further information. Of course, the store may be arranged to permit the storage of several or even many distinct items of information.

In the case of a portable receiver, it may be especially constructed for the purpose of extracting time-variable information and storing the same, though it could be built into some other portable equipment. A particularly preferred arrangement is for the device to be built into a mobile telephone, especially for the case of a device intended to receive an acoustic audio signal, such as may be encountered in a discotheque; a typical mobile telephone includes a microphone for reception of acoustic information and also significant processing power which could run a program adapted to extract the time-variable information. The store could be built into the battery packs of the telephone, and so could be interrogated by disconnecting the battery and coupling the pack to a computer system.

The receiver may be capable of communication with a transmitter for the time-variable information, especially in an area where an audio signal is transmitted and listeners directly hear that signal, such as may occur in a discotheque or in a shop. The transmitter may interrogate the receiver to see what time-variable information has already been stored and then adjust the transmitted time-variable component of the signal dependent thereupon. Alternatively, or perhaps in addition, the listener may give the receiver device a personality, pre-storing therein the kind of music that the listener likes, or perhaps the kind of product in which that person has an interest. Then, on interrogating the receiver device, the transmitter may take appropriate action, possibly by averaging the wishes and likes of a number of people in the listening area.

Yet another possibility is for the listener to have control of when his device is interrogated, or to permit his device to transmit to the time-variable component transmitter only when he so wishes. For this purpose, the device may have a *profile* control, which when operated transmits information to a central point.

An advantage of incorporating stored information in the case of a radio transmission receiver of this invention is that the stored information may be used to modify the operation of the receiver itself. Thus, the receiver may be arranged to search through all the transmissions it is receiving for occurrences of the work the time-variable information (unique identifier) of which has been

stored. This operation may be yet further modified, for example to have the receiver tune in to a transmission broadcasting a work by the same artist or the same tune by another artist, if it cannot locate exactly the same work.

The principal purpose for the storage of the information is for a listener to be able to identify and obtain a recording of the work which attracted the listener's attention. For this purpose, a stored item of time-variable information (the unique identifier of the work in question) must be available for subsequent recall and decoding. In the case of a small portable device, this may be taken to a source of recorded works such as a record store and the device interrogated there by suitable equipment such as a computer having a an interface to which the device may be connected. In the case of a fixed installation, there may be a removable memory module which similarly can be taken to a record store, for interrogation. Yet another possibility is for a home computer to have access to the database and an interface for the device, whereby the device may be interrogated by the computer at the listener's home and the name of the work and other relevant information retrieved from the database. Of course, the database may be maintained centrally and accessed *via* the Internet, from the listener's computer. Equally, therefore, the music may be purchased through the Internet, either for delivery by the postal services of a CD or other music carrier, or for downloading from a music site on the Internet, using one of the protocols for that purpose such as MP3. In the latter case, the centrally-maintained database may provide a link directly to the appropriate music source site.

The format for the time-variable information may include unused bits into which further information may be inserted. For example, a work may have assigned to it a unique identifier which is transmitted with the time-variable information, but the transmitter of that information may add to the unique identifier an further code identifying the transmitter, and so the source of the time-variable information being stored. This will give a kind of "audit trail" which has the combined advantage of giving more information about the habits of customers and also discouraging piracy or casual copying of copyright works, since the source can be traced.

CLAIMS

1. A method of identifying a time-variable component of a broadcast signal, comprising encoding on the broadcast signal time-variable information the instantaneous value of which identifies said component of the signal, receiving the signal and extracting therefrom the time-variable information, and storing selected instantaneous values of said information for later retrieval.

2. A method as claimed in claim 1, wherein said time-variable component comprises a musical or video work, and the time-variable information comprises a unique identifying code for that work.

3. A method as claimed in claim 1 or claim 2, wherein the broadcast signal is transmitted by electro-magnetic radiation and the time-variable information is superposed on the transmitted signal.

4. A method as claimed in claim 3, wherein the time-variable information is encoded into a sub-carrier of the broadcast signal.

5. A method as claimed in claim 4, wherein the time-variable information is impressed on the broadcast signal by including a tone-burst of relatively short duration in the broadcast signal, which tone burst carries the time-variable information.

6. A method as claimed in any of the preceding claims, wherein the time-variable information is digitally encoded for broadcasting with the time-variable component.

7. A method as claimed in claim 1 or claim 2, wherein the broadcast signal is an audio signal and the time-variable information is impressed on the broadcast signal.

8. A method of identifying a time-variable component of a broadcast signal, comprising broadcasting an audio time-variable component, simultaneously broadcasting a signal by means of a different medium which signal contains time-variable information the instantaneous value of which identifies said audio time-variable component, receiving the signal and extracting therefrom the time-variable information, and storing selected instantaneous values of said information for later retrieval.

9. A method as claimed in claim 8, wherein the time-variable information is broadcast by one of infra-red or electro-magnetic radiation.

10. A method as claimed in any of the preceding claims, wherein the time-variable information is repeatedly broadcast during the broadcasting of the time-variable component of the broadcast signal.

11. A method as claimed in claim 10, wherein the time-variable information is broadcast at regular pre-determined intervals.

12. A method of identifying a time-variable component of a broadcast signal and substantially as hereinbefore described.

13. Apparatus for storing selected items of information, comprising a receiver for a broadcast signal having a time-variable component, said signal carrying encoded time-variable information the instantaneous value of which identifies said component of the signal, a decoder to extract from the signal the time-variable information, a store for extracted information, and a manually operable control to cause selected information to be placed in the store for later retrieval.

14. Apparatus as claimed in claim 13, wherein the receiver is wholly self-contained and is readily portable.

15. Apparatus as claimed in claim 14, wherein the receiver is built into a mobile telephone.

16. Apparatus as claimed in any of claims 13 to 15, wherein the receiver is able to yield stored time-variable information to a provider of broadcast signals.

17. Apparatus as claimed in any of claims 13 to 16, wherein the receiver permits the entry of personalised information which may be transmitted on demand to a provider of broadcast signals.

18. Apparatus as claimed in any of claims 13 to 17 and substantially as hereinbefore described.