(54) Title: RECORDING OF BROADCASTING ENHANCEMENT SERVICES

(57) Abstract: Metadata transmitted in parallel to the broadcast information shall be made accessible independent of Internet availability. Therefore, it is proposed to download and store the data located on an Internet address pointed at by metadata link information. The storage is performed in parallel to the recording and is typically done onto the same media; i.e. DVR, hard disk, etc. By playing back the recorded data it is possible to access the complete data including all Internet pages pointed at.
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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.
Recording of broadcasting enhancement services

The present invention relates to a method and device for processing broadcast data including user data, preferably audio data and/or video data, and additional information including linking information pointing to a data source, with receiving means for receiving the broadcast data and receiving supplementary data from the data source and storing means for storing the user data.

Background

Nowadays an increasing number of broadcasting services provide additional information (metadata), which is sent besides the basic information like television or radio on the broadcasting channels. In the past such additional information has been completely embedded within the broadcast signal (e.g. teletext) and could be used on special decoding devices. In the meantime the form of additional information changes in that not all data are available any more on the same channel or even same service. An increasing number of broadcasting services also provide information links for an Internet address instead, to be used by a separate or integrated Internet browser device to download and display the information referenced by the links.

If a broadcasting service is conventionally recorded on a DVR for example, the recording encompasses only data available within the broadcasting service, but it lacks those additional information that are only being referenced and are not present within the broadcast service, like Internet content. In principle the Internet address link
could be used when retrieving the recorded information by following the link and downloading the data at playback time. The disadvantage of this solution is the loss in validity of the Internet address when playing back the record after a long time period. If the content of the Internet address has changed or is not valid any more, the original information is lost and the link information has become worthless.

In view of that it is the object of the present invention to provide a device and method which enable improved capabilities for retrieving additional information, linking information of broadcast data points to.

Invention

The invention, therefore, provides a device for processing broadcast data including user data preferably audio data and/or video data and additional information including linking information pointing to a data source, with receiving means for receiving said broadcast data and receiving supplementary data from said data source and storing means for storing said user data wherein said storing means being capable of storing said supplementary data together with said user data.

Furthermore, the present invention provides a method for processing broadcast data including user data, preferably audio data and/or video data, and additional information including linking information pointing to a data source, by receiving said broadcast data and receiving supplementary data from said data source and storing said user data, wherein storing said supplementary data together with said user data.
Thus it is possible to download and store the data located on an Internet address pointed at by broadcast information. The storage is done onto the same media (e.g. DVR, hard disk, etc.). By playing back the recorded material it is possible to access the complete data including all Internet pages pointed at. The retrieval becomes independent from any service availability i.e. it can be used offline.

Additionally, the storage of Internet address content can be adapted to the user's preferences by additionally storing further Internet address content pointed at by the initial one (hierarchical storage). This may be done recursively until the users preferred storage depth has been reached.

The Internet address content stored on the disc can be retrieved independent from the broadcast information.

By an editing process it becomes possible to add further links within the additional and basic data. The added links may create connections between any arbitrary stored Internet address contents or between arbitrary broadcast information only.

A special analysis during loading and storage of Internet address content can detect already stored information and skip it rather than store it a second time. This can be done for redundancy avoidance. The analysis could also provide an update for an obsolete Internet address content.

**Drawing**

An exemplary embodiment of the invention is illustrated in the drawing and is explained in more detail in the following
description. The drawing shows the principle data structure of broadcast data.

Exemplary embodiments

Accompanying the introduction of digital broadcasting an ascending amount of enhancement services like Electronic Program Guide and other additional information further on called metadata is broadcast. "Metadata" is a term that is used for a huge number of different kinds of data. There are metadata for managing information resources, for describing technical functions of systems as well as the level and type of use of information resources or for similar purposes. The sources and characteristics of metadata are very diverse as well. Moreover, metadata does not have to be digital.

These metadata are not any longer completely embedded within the transmitted broadcasting channel but also encompass linking information to different services like Internet web addresses and web pages (see drawing). The broadcast linking information (metadata links) is used for the retrieval and display of the referenced Internet metadata by special browser devices. The Internet provides a wide range of enhancement services accompanying and also in addition to the broadcast information. Summaries, prosecute articles, news etc. are available on the Internet and can be viewed by the user. These Internet data can be of persistent interest for the user and are intended to be available permanently.

As depicted in the drawing, a broadcast signal contains metadata and assets. The term "assets" is chosen here for any kind of user data like video and/or audio data, e.g. television or radio signals.
The metadata contains controlling information for additional service like the Electronic Program Guide (EPG). Furthermore, the metadata of the present embodiment includes teletext or videotext, respectively. The metadata may include further information being completely embedded therein.

Besides, these metadata being completely embedded in the broadcast signal, metadata may contain linking information as control data. Such control data serve to establish contact to external data sources like the Internet, any Intranet, internal or external memory devices or transmission channels of other providers.

As shown in the Figure, the metadata contains Internet addresses 1 to N. Thus, there is a link from the broadcasting service to the Internet service. The internet address points to a web page containing links to other web pages itself.

Metadata may also contain controlling information or formatting information as typically used in headers. Such controlling information may serve to control display devices like personal computers etc.

When recording the broadcast signal on a DVR or a hard disc, a standard recorder is saving the broadcast signal including all broadcast metadata, but those metadata only referenced are missing. Therefore, when playing back the recorded material at a later time the request for metadata links will cause the loading of the missing additional metadata via the Internet, which might fail due to updates and/or changes in the remote resources.
As mentioned above, the Internet data being addressed by the Internet addresses of the metadata shall be available permanently. Thus, according to the present invention, it is suggested to download and store metadata referenced by broadcast metadata links. Due to the storing of the complete data and not only storing links to these data, they are available for the user at any time he wants independent of any changes in the Internet or the respective data source. The storage of the complete data includes the adaption of the links within the recorded metadata to point to data on a local disc or distributed storage devices.

According to a preferred embodiment the recording of Internet metadata may be individually adapted to preferences defined by the user. For this the user may define a storage depth for hierarchically storing; i.e. further Internet content pointed at by the initial one recursively may be stored until the hierarchy depth is reached.

Another possibility of adapting the recording of Internet metadata may be to determine the Internet content to be updated or preserved when there are changes in the web. Furthermore, during the recording process, duplicates of the Internet content may be determined in order to avoid redundant storage. Moreover, any filter may be introduced for recording metadata.

After recording these metadata there is provided a visualisation of and navigation in the stored referenced metadata. This can be performed independently of the broadcast content. The surfing in these metadata is possible independently of the Internet, i.e. offline, while remaining within the stored hierarchy depth. It is switched back to the Internet service, i.e. online, when the storage
hierarchy depth is exceeded.

The user is able to edit the additional stored metadata by adding further links and/or storing further metadata from the Internet. This can be done by creating user-defined collections, annotations or short cuts. The editing also includes the adding of further self-generated information (assets) like pictures, videos, audios, etc. Thereby, the links may connect asset data with metadata, metadata with metadata and/or asset data with asset data.

Additionally, there is provided a tool for searching within metadata stored on a digital video recorder (DVR) or hard disk. Once stored on a storing medium the search within metadata is possible on every device, because the removable storing medium is carrying all metadata.

Summarising the above, the present invention makes accessible all the metadata independent of Internet availability due to additional storage of metadata link contents parallel to the broadcast information.
Additionally, there is provided further editing capabilities for the user-defined collections, annotations and short cuts.
Claims

1. Device for processing broadcast data including user data preferably audio data and/or video data and additional information including linking information pointing to a data source with receiving means for receiving said broadcast data from a broadcast source and receiving supplementary data from said data source and storing means for storing said user data, characterised in that said storing means being capable of storing said supplementary data together with said user data.

2. Device according to claim 1, wherein the data source is the Internet web, an intranet, an internal or external memory device and/or transmission means like a broadcast channel or said broadcast source.

3. Device according to claim 1 or 2, wherein said storing means is a digital video recorder or a hard disc.

4. Device according to one of the claims 1 to 3, wherein said user data includes metadata links being adaptable by said storing means to point to locally stored supplementary data.

5. Device according to one of the claims 1 to 4, wherein the supplementary data contains linking information
pointing to at least second level supplementary data and said storing means being able to also store said second level supplementary data.

6. Device according to claim 5, further including controlling means for hierarchically storing said supplementary data and said second level supplementary data on said storing means.

7. Device according to one of the claims 1 to 6, further including retrieving means for retrieving user data, supplementary data and/or second level supplementary data from said storing means.

8. Device according to one of the claims 1 to 7 further including editing means for editing said user data, said supplementary data and/or said second level supplementary data.

9. Device according to claim 8, wherein said editing means enables adding of further linking information.

10. Device according to one of the claims 1 to 9, further including analysing means for analysing said broadcast data during receiving in order to avoid redundant storage.

11. Method for processing broadcast data including user data, preferably audio data and/or video data, and additional information including linking information pointing to a data source by receiving said broadcast data from a broadcast source and receiving supplementary data from said data source
and

storing said user data,

characterised by

storing said supplementary data together with said user data.

12. Method according to claim 11, wherein the data source is the Internet web, an intranet, an internal or external memory device or transmission means like a broadcast channel or said broadcast source.

13. Method according to claim 11 or 12, wherein metadata links being included in said user data are adapted to point to locally stored supplementary data.

14. Method according to one of the claims 11 to 13, wherein said supplementary data contains linking information pointing to at least second level supplementary data and storing said second level supplementary data together with said user data and supplementary data.

15. Method according to claim 14, wherein said user data, supplementary data and second level supplementary data are hierarchically stored according to predetermined controlling information.

16. Method according to one of the claims 10 to 15, characterised by individually retrieving said user data, supplementary data and/or second level supplementary data from storing means.
17. Method according to one of the claims 10 to 16
classified by editing said user data, supplementary
data and/or second level supplementary data.

18. Method according to claim 17, wherein said editing
includes adding of further linking information.

19. Method according to one of the claims 10 to 18,
classified by an analysing the content of said
broadcast data during receiving in order to avoid
redundant storage.
broadcast signal contains:

metadata

Assets e.g. television, radio

EPG

Teletext...

Internet address 1...

Internet address N

completely embedded metadata

metadata links

Internet Service

webpages:

Fig. 1
INTERNATIONAL SEARCH REPORT

A. CLASSIFICATION OF SUBJECT MATTER
IPC 7 H04N6/92

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)
IPC 7 H04N

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practical, search terms used)
EPO-Internal

C. DOCUMENTS CONSIDERED TO BE RELEVANT

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<th>Citation of document, with indication, where appropriate, of the relevant passages</th>
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