

(19) World Intellectual Property Organization
International Bureau



(43) International Publication Date
10 March 2005 (10.03.2005)

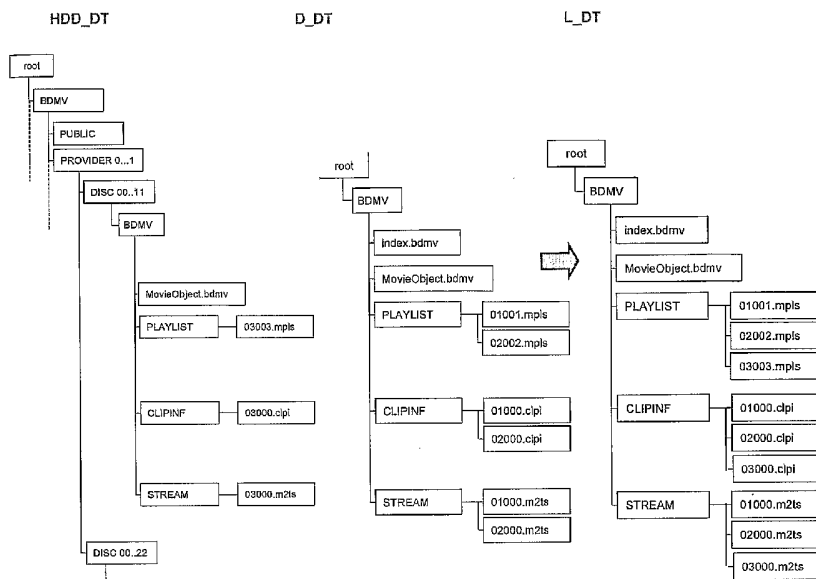
PCT

(10) International Publication Number
WO 2005/022537 A1

- (51) International Patent Classification⁷: **G11B 27/10**, 27/11, 27/32, G06F 17/30
- (74) Agent: **RITTNER, Karsten**; Deutsche Thomson- Brandt GmbH, European Patent Operations, Karl-Wiechert-Allee 74, D-30625 Hannover (DE).
- (21) International Application Number: PCT/EP2004/009392
- (81) Designated States (unless otherwise indicated, for every kind of national protection available): AE, AG, AL, AM, AT, AU, AZ, BA, BB, BG, BR, BW, BY, BZ, CA, CH, CN, CO, CR, CU, CZ, DE, DK, DM, DZ, EC, EE, EG, ES, FI, GB, GD, GE, GH, GM, HR, HU, ID, IL, IN, IS, JP, KE, KG, KP, KR, KZ, LC, LK, LR, LS, LT, LU, LV, MA, MD, MG, MK, MN, MW, MX, MZ, NA, NI, NO, NZ, OM, PG, PH, PL, PT, RO, RU, SC, SD, SE, SG, SK, SL, SY, TJ, TM, TN, TR, TT, TZ, UA, UG, US, UZ, VC, VN, YU, ZA, ZM, ZW.
- (22) International Filing Date: 23 August 2004 (23.08.2004)
- (25) Filing Language: English
- (26) Publication Language: English
- (30) Priority Data: 03090281.1 2 September 2003 (02.09.2003) EP
- (84) Designated States (unless otherwise indicated, for every kind of regional protection available): ARIPO (BW, GH, GM, KE, LS, MW, MZ, NA, SD, SL, SZ, TZ, UG, ZM, ZW), Eurasian (AM, AZ, BY, KG, KZ, MD, RU, TJ, TM), European (AT, BE, BG, CH, CY, CZ, DE, DK, EE, ES, FI, FR, GB, GR, HU, IE, IT, LU, MC, NL, PL, PT, RO, SE, SI, SK, TR), OAPI (BF, BJ, CF, CG, CI, CM, GA, GN, GQ, GW, ML, MR, NE, SN, TD, TG).
- (71) Applicant (for all designated States except US): **THOMSON LICENSING S.A.** [FR/FR]; 46 Quai A. le Gallo, F-92100 Boulogne-Billancourt (FR).
- (72) Inventors; and
- (75) Inventors/Applicants (for US only): **HÖRENTRUP, Jobst** [DE/DE]; Gabelsbergerstr. 18, 30163 Hannover (DE). **ADOLPH, Dirk** [DE/DE]; Wallbrink 2, 30952 Ronnenberg (DE). **KOCHALE, Axel** [DE/DE]; Beckerweg 1, 31832 Springe (DE). **OSTERMANN, Ralf** [DE/DE]; Oberstr. 17, 30167 Hannover (DE). **HERPEL, Carsten** [DE/DE]; Große Barlinge 61, D-30171 Hannover (DE).

[Continued on next page]

(54) Title: METHOD FOR RETRIEVING DATA FROM FIRST AND SECOND STORAGE MEDIUM



(57) Abstract: A method for modifying data read from read-only media during playback time comprises logically merging the on-disc directory tree and an associated off-disc directory tree. A logical directory tree (L_DT) is constructed from the data retrieved from the read-only medium, wherein the structure of the logical directory tree is identical with the structure of the directory tree (D_DT) of the medium. The method allows replacing content on the disc through downloaded content, e.g. replacing an out-dated trailer stored on the disc through a downloaded trailer for a new movie. The method further allows complementing or upgrading content on the disc, e.g. by downloading a new subtitle track from the internet.

WO 2005/022537 A1



Published:

— *with international search report*

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.

Method for retrieving data from first and second storage medium

Field of the invention

5

This invention relates to a method for retrieving data from first and second storage medium.

Background

10

Data on read-only storage media may not be modified. One example of such read-only media are prerecorded discs, e.g. Blu-ray discs (BDP).

Storage media, particularly optical discs, have usually unique identification labels. It is common that disc players may have integrated harddisk drives (HDD). Within an optical disc player, a Playback Control Engine (PCE) processes the data read from the disc. The data scope of a PCE is the disc. The playback process is controlled by a so-called Movie Module, which via an application interface (API) is connected to the PCE.

The data on the disc usually structured in a directory tree that is often standardized. E.g. for BDP the directory tree of a particular movie contains one folder for the playlist, one folder with streaming data and one folder for the clipinfo, describing the stream data structure. AV data on a BDP disc are contained in streams, which are multiplexed into a so-called main multiplex.

30

In this application, the term "directory tree" is used for a complete directory structure as well as for a particular

branch of a directory structure, even hierarchical branches, when referring to rewritable media.

5 Summary of the Invention

For optical disc formats, it is desirable to be able to download content from the studios server to the local player. Basically, there are two applications for
10 downloaded content:

First, content on the disc shall be replaceable through downloaded content. A typical example is the replacement of an older or out-dated trailer that is stored on the disc through a downloaded trailer, e.g. for a new movie.

15 Second, content on the disc shall be completable or upgradable. A typical example is the download of a new subtitle track, e.g. in another language, which is not available on the disc.

There are two solutions to store downloaded content
20 locally: This can either be realized through equipping the player with a separate local rewritable storage medium, e.g. a HDD, or through some rewritable memory on the disc itself. The first case is preferred, since media for the latter case are more expensive, and players are often
25 equipped with a rewritable local storage medium.

When separate local storage is applied, i.e. integrated HDD, a mechanism is needed that combines or associates content on local storage with content on a disc. E.g. in
30 case of a downloaded subtitle track, the player needs information to which disc the track belongs, and more specifically, to what content on that disc the track is associated.

The present invention provides a mechanism to associate off-disc content, e.g. downloaded from the internet and stored on a HDD, with content on the disc, on-disc content.

5

The basic idea of the invention is to create a directory tree for each disc on the local storage device (off-disc directory tree). As soon as a disc is inserted into the player, the on-disc directory tree and the associated off-disc directory tree are logically merged. The association is provided through unique disc identifiers or unique content identifiers. Playback of content on the inserted disc involves the merged directory tree. In this way, content on local storage is seamlessly integrated.

15

Appropriate merge rules provide the possibility to update on-disc content with off-disc content. Technically, this is achieved through logically replacing an on-disc file with an off-disc file. The invention also allows supplementing on-disc content with off-disc content. This is achieved through logically adding an off-disc file to an on-disc directory. Two modes are possible for determining which on-disc file should be replaced by an off-disc file: either replacement is only done if the file names match exactly, or replacement is done if a particular mapping method is defined for mapping off-disc file names to on-disc file names, e.g. an off-disc file named "b.clpi" may replace an on-disc file named "a.clpi" if in the corresponding directories there is only one file available with the file name extension "clpi".

30

According to the invention, data are retrieved from a first and a second storage medium and combined, or merged, such

that a logical directory tree is generated that contains the data of both media. The logical directory tree contains files that are available only in the first or the second directory tree, and for files that are available in both
5 directory trees the version available from the second directory tree.

Particularly, the disclosed method for retrieving data from first and second storage medium, wherein the data on the
10 first storage medium are stored as files structured in a first directory tree, and the data stored on the second storage medium are stored as files structured in a second directory tree, comprises that the first storage medium has an identification label attached, and a branch of the
15 second directory tree stored on the second storage medium refers to the identification label, further that the branch of the second directory tree is a subset of the first directory tree, or identical with the first directory tree, further that a logical directory tree is constructed from
20 the retrieved data, wherein the structure of the logical directory tree is identical with the structure of the first directory tree, further that files that are available only in the first or the second directory tree are also available in the logical directory tree, and finally that
25 for files that are available in the first and the second directory tree, the version available from the second directory tree is available in the logical directory tree.

An apparatus that utilizes the method is disclosed in claim
30 8.

Advantageous embodiments of the invention are disclosed in the dependent claims, the following description and the figures.

5

Brief description of the drawings

Exemplary embodiments of the invention are described with
10 reference to the accompanying drawings, which show in

Fig.1 the structure of an exemplary directory tree for BDP;
Fig.2 the structure of an exemplary local storage
directory;

15 Fig.3 an exemplary merge operation;

Fig.4 and example for binding information carried in file
names;

Fig.5 an example for binding information carried in folder
names.

20

Detailed description of the invention

Data on optical discs are usually organized in files, which
25 in turn are organized in a standardized directory tree, the
on-disc directory tree. The file system provides an
abstraction from the underlying storage medium. An
exemplary standardized on-disc directory tree is shown in
Fig.1. It contains for a certain movie object MO a playlist
30 folder PF, a clipinfo folder CF and a data stream folder
SF. Each of these folders contains files with file
extensions that identify the file type, e.g. "mpls" for
playlist files.

The basic idea of the invention is to create a directory tree for a disc on a rewritable local storage device, so that an off-disc directory tree is created. As soon as a disc is inserted into the player, the on-disc directory tree is merged with the associated off-disc directory tree. In case there is no off-disc directory tree on the local storage device, e.g. when the disc is inserted into the player for the first time, an empty off-disc directory tree is created, according to the employed standard.

Any disc provides a unique identifier. This can either be a unique disc ID or a unique content ID. There may be several directory trees provided on the local storage device for various discs, e.g. one branch for each disc that was ever inserted into the player. The local storage device holds additional information, which associates one of the directory trees, or rather one branch of the directory tree of the local storage device, with a disc. Preferably, the off-disc directory tree's top-level name is derived from the disc ID. In the simplest case, the name directly corresponds to the ID.

In general, the structure of the off-disc-tree is arbitrary. Additional rules specify, how each off-disc-folder is merged into the on-disc-tree. Preferably for simplicity and practical reasons, the off-disc directory tree is similarly structured as the on-disc directory tree.

An option to further speed-up the search for off-disc content is possible through the usage of unique provider identifiers. In addition to the unique disc/content identifier, this unique identifier is also provided with

the disc. For each provider, or each provider from which the player ever read a disc, there is a directory created on the local storage device. The corresponding folder name is derived from the provider ID. In the simplest case, the name directly corresponds to the ID. Any off-disc-tree is then created as a subdirectory in the associated provider directory. This grouping has the advantage of speeding up the search process to find off-disc content, as only the provider's directory has to be searched for off-disc content. An exemplary directory structure is shown in Fig.2. The data referring to a disc from a certain provider are stored in a disc folder DF which in turn is stored in a provider folder PRF.

In a scenario where applications need a direct and explicit application programming interface (API) to local storage, this structure has additional advantages. Particularly, the proposed hierarchical structure can easily serve as a basis for access rights management. Simple rules can be established that restrict an applications access to local storage.

For example, a possible rule could allow an application on a disc labelled XY, published by a provider named Z, to read and write to the associated off-disc directory named XY, and read, but not write, from any other directories within publisher Z's directory tree, while access to any other directories on local storage is forbidden.

For any downloaded type of content, the storage location on local storage is specified and the player knows where additional downloaded content can be found on the local storage device. When downloading streams, the stream itself

and also corresponding information about the stream file is stored.

Merging the off-disc directory tree with the on-disc
5 directory tree allows the unified handling of off-disc content and on-disc content within the player at playback.

An exemplary merge operation is shown in Fig.3. Data from a directory tree HDD_DT from a HDD and data from a directory
10 tree D_DT from a read-only disc are merged to a logical directory tree L_DT that is used by the PCE of the player. The logical directory tree L_DT is constructed temporarily at run-time.

The inventive method has the particular advantage that the
15 interface between the Movie Module and the PCE may remain unchanged as compared to today's standard. The merge operation rules are as follows:

When merging two directories, files in the off-disc directory are added to the files in the on-disc directory.
20 This allows adding content at playback time.

When merging two directories, and the same file exists in the off-disc directory as well as in the on-disc directory, the file in the off-disc directory takes precedence. This allows replacing content from the disc by other data at
25 playback time, e.g. new subtitles or an enhanced audio stream.

The application of downloading additional A/V components, e.g. audio or subtitle tracks, requires additional
30 information. Binding information is needed to associate the downloaded track not only with the disc, but also with the corresponding main multiplex on the disc.

It is assumed that the downloaded off-disc stream and the associated on-disc main multiplex have the same length on the timeline. In other cases additional information needs to be provided that describe where on the timeline the
5 downloaded track is associated with the main multiplex.

To associate the off-disc component with the main on-disc multiplex, two methods are described in the following:

10 Method 1:

The off-disc components file name obey the following rules:

- The first part identifies the main multiplex and associates the component with it. It is thus the same for all associated components.
- 15 - The second part, preferably separated from the first part through an underscore, must be unique among all additional components of the main multiplex.
- Information files are also stored in a separate folder, whose names are derived from the off-disc
20 component.

An example is shown in Fig.4. The first part 0300 of the clipinfo file and the stream file associates the files with the main multiplex, while the second part 001 is unique
25 among the two shown additional components.

Method 2:

In this method, binding information is provided through the use of appropriate sub-directories

- 30 - Off-disc components associated with an on-disc multiplex are stored in a separate folder, whose name is derived from the main multiplex on the disc.

- All off-disc information files are also stored in a separate folder, whose name is derived from the main multiplex on the disc.
- File names must be unique among all additional
5 components of the main multiplex.

An example is shown in Fig.5. A clipinfo file 001.clpi and a stream data file 001.m2ts are stored in subdirectories 03000, being subdirectories of the clipinfo folder and the
10 stream folder respectively. The file names 001 are derived from the main multiplex on the disc.

The inventive method may use any type of rewritable media to add data to any type of read-only media. Examples for
15 rewritable media are magnetic storage devices, such as HDDs, floppies, RAM modules or the like. Examples for read-only media are DVD-R/+R or prerecorded Blu-ray discs (BDP).

In principle, the disclosed method is also suitable for
20 updating or complementing data stored on a read-only medium by data from another read-only medium.

As a preferred embodiment, data stored on a BDP may be updated or complemented by data stored on a HDD.

Claims

1. A method for retrieving data from first and second storage medium, wherein the data on the first storage medium are stored as files structured in a first directory tree (D_DT), and wherein the data stored on the second storage medium are stored as files structured in a second directory tree (HDD_DT), **characterized in** that
- 10 - the first storage medium has a first and a second identification label attached, and a first branch (PROVIDER 0...1) of the second directory tree (HDD_DT) on the second storage medium refers to the first identification label and a second branch (DISC 00...11) being a subbranch of said first
15 branch (PROVIDER 0...1) refers to the second identification label;
 - the second branch (DISC 00...11) of the second directory tree (HDD_DT) is a subset of the first
20 directory tree (D_DT), or identical with the first directory tree (D_DT);
 - a logical directory tree (L_DT) is constructed from the retrieved first and second directory tree data, wherein the structure of the logical
25 directory tree (L_DT) is identical with the structure of the first directory tree (D_DT);
 - files (index.bdmv, 03003.mpls) that are available only in the first or the second directory tree are also available in the logical directory tree; and
 - 30 - for files that are available in the first and the second directory tree (MovieObject.bdmv), the version available from the second directory tree

(HDD_DT) is available in the logical directory tree.

- 5 2. Method according to claim 1, wherein data from first and second medium are retrieved simultaneously.
- 10 3. Method according to claim 1 or 2, wherein the first storage medium is provided by a provider, and the first identification label (PROVIDER 0...1) refers to the provider and is unique for the provider, and the second identification label (DISC 00...11) is unique for the first storage medium or the content stored on the first storage medium.
- 15 4. Method according to any of claims 1-3, wherein the first storage medium is an optical disc and the second storage medium is rewritable, and the data files contain audio and/or video and/or subtitle data.
- 20 5. Method according to any of claims 1-4, wherein the logical directory tree (L_DT) is constructed temporarily at run-time.
- 25 6. Method according to any of claims 1-5, wherein for deciding if a file is available a mapping method is defined for mapping file names retrieved from the first directory tree with file names retrieved from the second directory tree.
- 30 7. Method according to any of claims 1-6, wherein a third storage medium may access data from said first branch (PROVIDER 0...1) of the second storage medium

if the third storage medium has two labels attached and the first of the two labels equals said first label of the first storage medium.

- 5 8. Apparatus for retrieving data from a first and a
second storage medium, wherein the data on the first
storage medium are stored as files structured in a
first directory tree (D_DT) and the data stored on
10 the second storage medium are stored as files
structured in a second directory tree (HDD_DT),
characterized in that it comprises
- means for reading first directory tree structure
(D_DT), first data files and first and second
15 identification label from said first storage
medium;
 - means for reading second directory tree structure
(HDD_DT) and second data files from said second
storage medium, wherein the second directory tree
structure contains first subbranch (PROVIDER 0...1)
20 and second subbranch (DISC 00...11) being a
subbranch of said first subbranch (PROVIDER 0...1);
 - means for comparing file names of the first and
second data files;
 - means for comparing the first identification label
25 of the first storage medium with an identifier for
the first subbranch (PROVIDER 0...1) of the second
storage medium, and for comparing the second
identification label of the first storage medium
with an identifier for the second subbranch
30 (DISC 00...11) of the second medium, and for
signaling correspondence; and
 - means for creating a logical directory tree upon
said correspondence, wherein files (index.bdmv,

03003.mpls) that are available only in the first (D_DT) or the second (HDD_DT) directory tree are also available in the logical directory tree, and for files that are available in the first and the second directory tree (MovieObject.bdmv), the version available from the second directory tree (HDD_DT) is available in the logical directory tree.

- 5
- 10 9. Apparatus according to claim 8, wherein the first storage medium is provided by a provider, and the first identification label (PROVIDER 0...1) refers to and is unique for the provider, and the second identification label (DISC 00...11) refers to and is
- 15 unique for the first storage medium, or the content stored on the first storage medium.
- 20 10. Apparatus according to claim 8 or 9, further comprising means for mapping file names retrieved from the first storage medium with file names retrieved from the second storage medium according to a predefined mapping method.

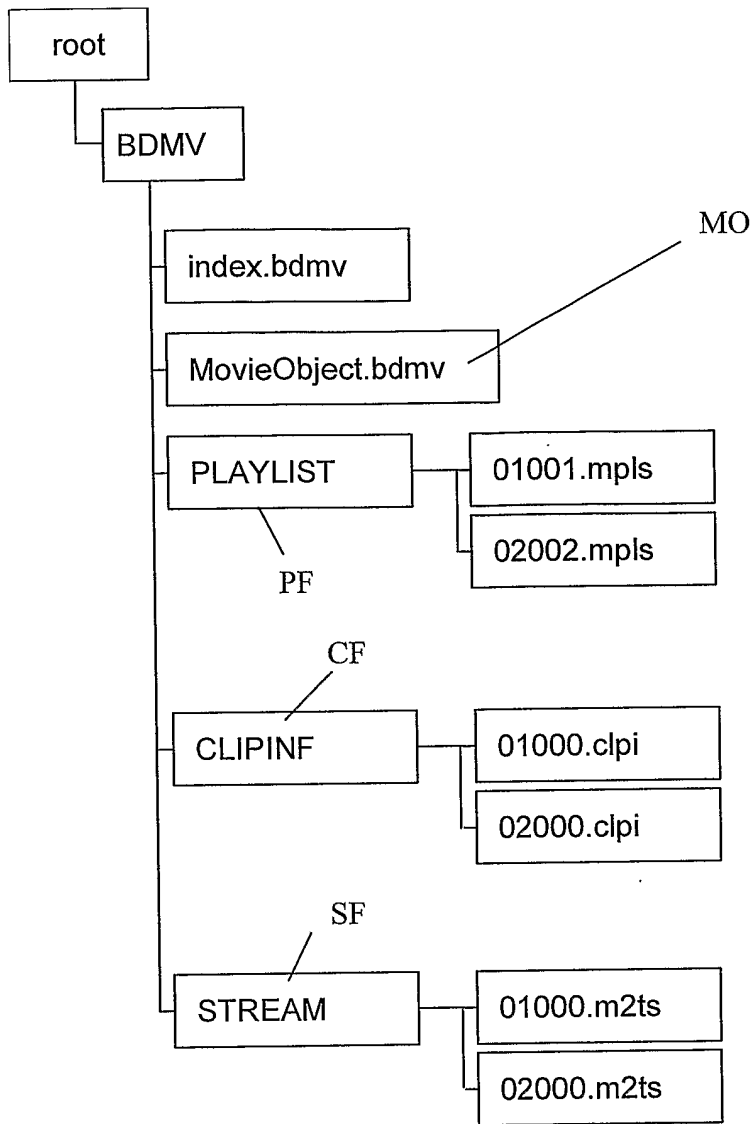


Fig. 1

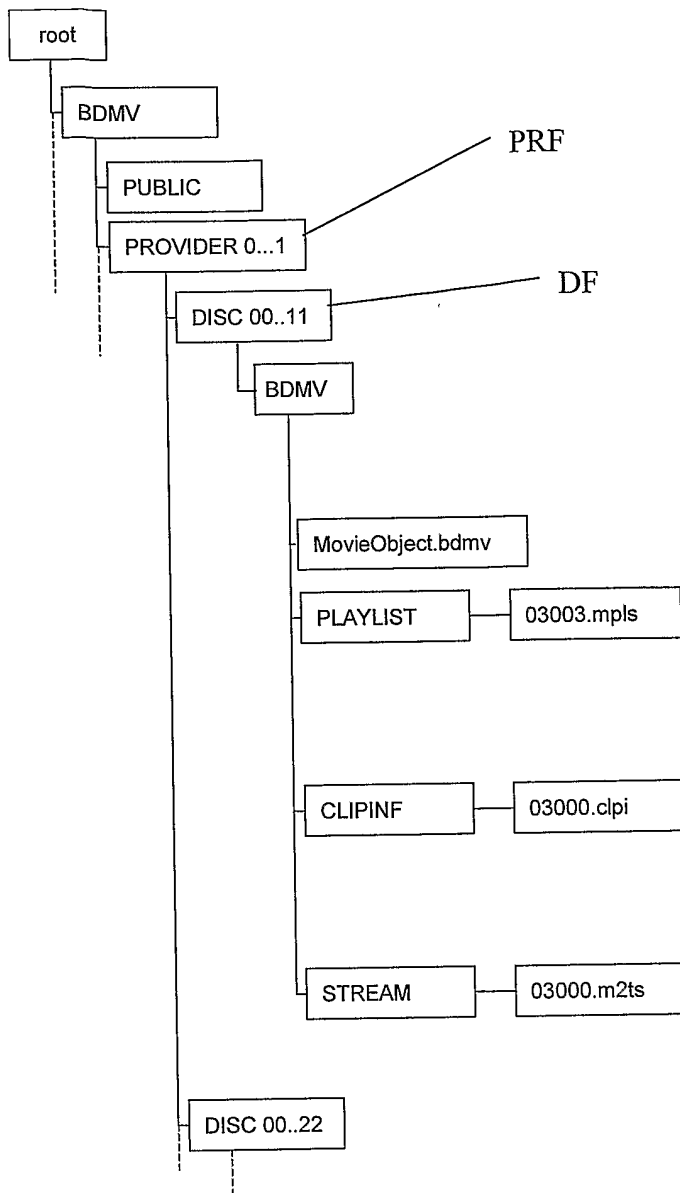


Fig. 2

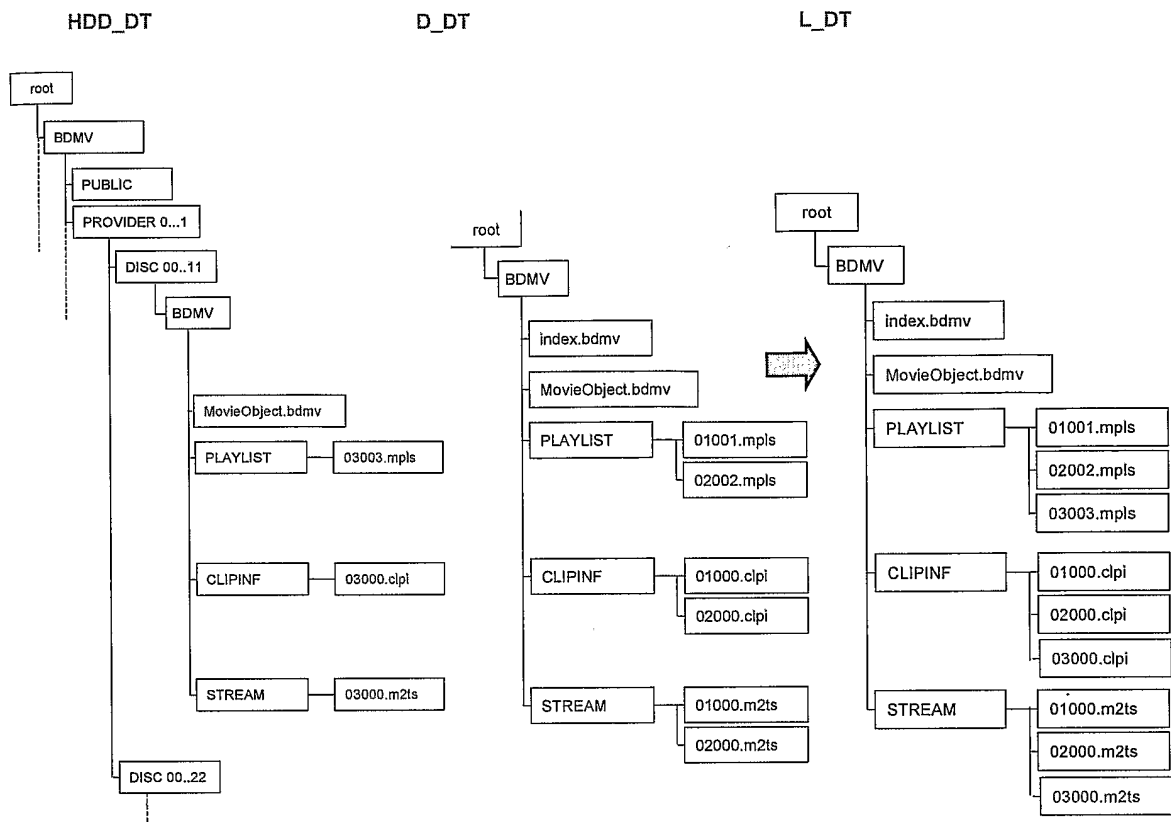


Fig. 3

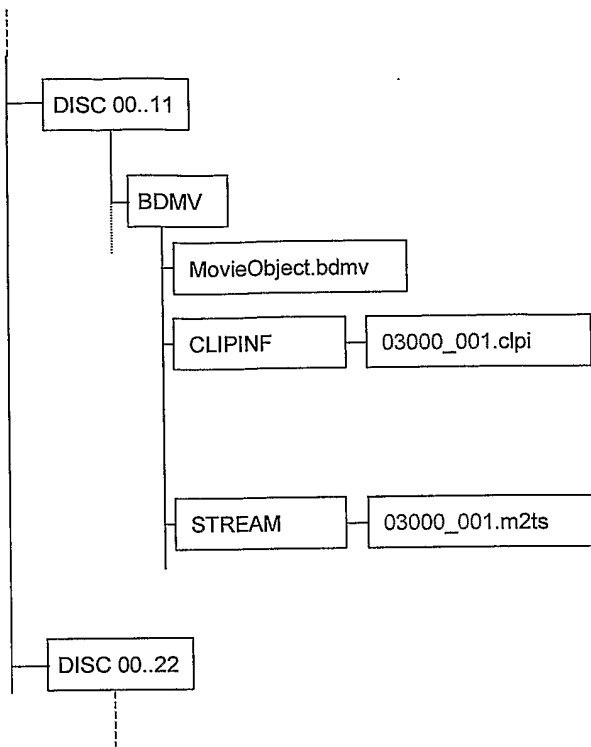


Fig. 4

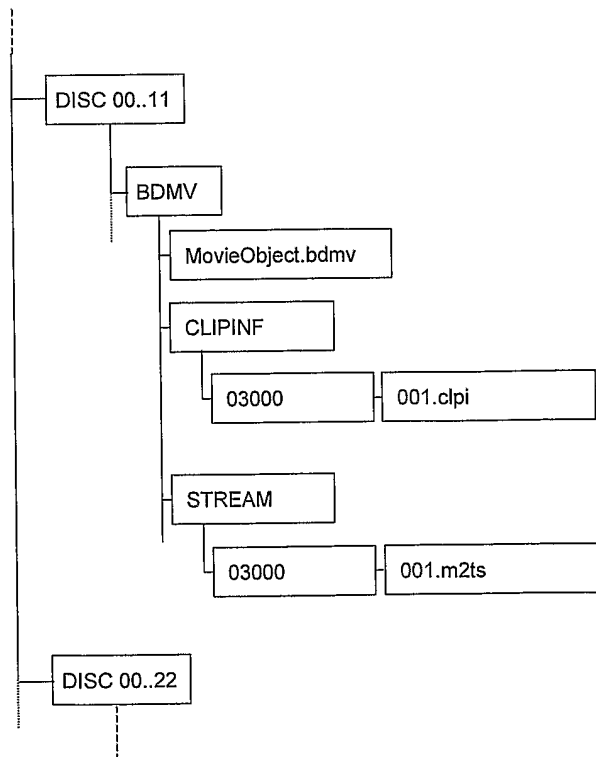


Fig. 5

INTERNATIONAL SEARCH REPORT

Internationa Application No PCT/EP2004/009392
--

A. CLASSIFICATION OF SUBJECT MATTER
 IPC 7 G11B27/10 G11B27/11 G11B27/32 G06F17/30

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 G11B H04N G06F

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, WPI Data, PAJ, INSPEC

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category °	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	US 5 644 782 A (BERGER JEFFREY K ET AL) 1 July 1997 (1997-07-01) the whole document	1-10
X	US 6 604 236 B1 (COLLINS BRIAN JAMES ET AL) 5 August 2003 (2003-08-05) abstract	1-10
A	WO 01/90860 A (WIND UP ENTERTAINMENT INC ;KIANG EDWARD M (US); SCHWARTZ SANFORD K) 29 November 2001 (2001-11-29) abstract	1-10

Further documents are listed in the continuation of box C. Patent family members are listed in annex.

° Special categories of cited documents :

<p>*A* document defining the general state of the art which is not considered to be of particular relevance</p> <p>*E* earlier document but published on or after the international filing date</p> <p>*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)</p> <p>*O* document referring to an oral disclosure, use, exhibition or other means</p> <p>*P* document published prior to the international filing date but later than the priority date claimed</p>	<p>*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</p> <p>*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</p> <p>*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.</p> <p>* & * document member of the same patent family</p>
--	--

Date of the actual completion of the international search 3 December 2004	Date of mailing of the international search report 14/12/2004
---	---

Name and mailing address of the ISA European Patent Office, P.B. 5818 Patentlaan 2 NL - 2280 HV Rijswijk Tel. (+31-70) 340-2040, Tx. 31 651 epo nl, Fax: (+31-70) 340-3016	Authorized officer Mourik, J
--	--

INTERNATIONAL SEARCH REPORT

Internationa Application No
PCT/EP2004/009392

Patent document cited in search report		Publication date	Patent family member(s)	Publication date
US 5644782	A	01-07-1997	NONE	
US 6604236	B1	05-08-2003	EP 0994425 A2	19-04-2000
WO 0190860	A	29-11-2001	AU 7496201 A WO 0190860 A2	03-12-2001 29-11-2001