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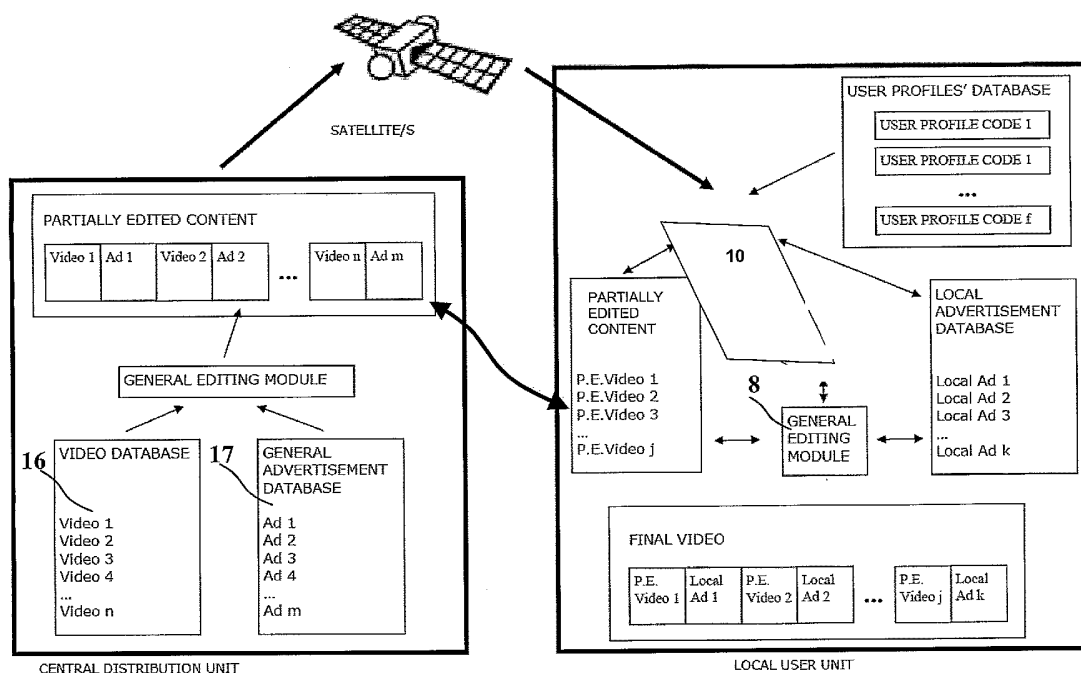
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For two-letter codes and other abbreviations, refer to the "Guidance Notes on Codes and Abbreviations" appearing at the beginning of each regular issue of the PCT Gazette.

(54) Title: VIDEO-ON-DEMAND SYSTEM AND RELATED MANAGING METHOD



(57) Abstract: Video-on-demand system (1) comprising a plurality of local user-units (2) in communication with a central distribution unit (3) apt to transmit to each local user-unit profile-based multimedial content packages, wherein each local user-unit comprises local means for editing and updating the contents, as well as restricting, validating and certifying contents access and fruition.

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Description

VIDEO-ON-DEMAND SYSTEM AND RELATED MANAGING METHOD

- [001] The present invention relates to a video-on-demand system and to a related managing method.
- [002] In particular, it relates to a system comprising a plurality of local user-units and a central distribution unit apt to transmit to each local user-unit multimedia contents such as videos and the like.
- [003] Several so-called 'video-on-demand' systems are known, wherein videos are transmitted by a central distribution unit to a plurality of local subscribed user units.
- [004] Although systems of this type are becoming more and more widespread, they are not wholly satisfactory in terms of efficiency and simplicity of managing and editing the information to be sent from the central distribution unit to the local user-units, and vice-versa, and in terms of versatility of the contents that can be transmitted from the central unit to the user units and that can then be provided from the latter to the actual final users.
- [005] The technical problem posed and solved by the present invention is thus to provide a video-on-demand system and a related managing method allowing to overcome the drawbacks just mentioned in conjunction with the known art.
- [006] Such a problem is solved by a system according to claim 1 and by a managing method according to claim 14.
- [007] Preferred features of the invention are provided for in the dependent claims.
- [008] The present invention provides some important advantages. In particular, due to the possibility of local editing, the invention provides a simple, efficient and versatile tool for implementing a video-on-demand system.
- [009] Moreover, it offers an efficient and versatile tool to make 'targeted advertising' on a large population.
- [010] The invention also has the further advantages that:
- users can choose desired programs, download and enjoy them whenever they want, without being dependent upon TV channels' schedule; and
 - users can receive targeted advertisements and information according to their own profile and interests.
- [011] The main advantage for the advertisers is that they can make 'targeted advertising' by sending customized messages according to different user profiles.
- [012] Furthermore, the possibility of editing the information at the level of the local units in order to select at such local level the contents to be provided to the final user allows

a more effective (multicast) management of satellite transmission, the availability of which in unicast applications with many users is generally more difficult and demanding.

[013] Other advantages, features and the application modes of the present invention will be evident by the following detailed description of some embodiments, shown by way of example and not for limitative purposes. Reference will be made to the figures of the enclosed drawings, wherein:

- Figure 1 shows a schematic representation of a first embodiment of a video-on-demand system according to the present invention;
- Figure 2 shows a block diagram of a central distribution unit of the system of Figure 1;
- Figure 3 shows a block diagram of a local user-unit of the system of Figure 1; and
- Figure 4 shows a schematic diagram showing the operation of the system of Figure 1.

[014] With initial reference to Figure 1, a video-on-demand system is designated as a whole with 1. System 1 comprises a plurality of local user-units, one of which schematically represented in Figure 1 and denoted by 2, and a central distribution unit 3 apt to store, assemble, elaborate and transmit multimedial contents to local units 2.

[015] In the present embodiment, system 1 is conceived to broadcast multimedia contents stored and assembled in the central distribution unit 3. Eventually, system 1 can also mirror standard TV broadcast, national and private (unencrypted) TV channels, as well as DTT (Digital Terrestrial Television) programs. System 1 is therefore suitable for a wide range of applications in the field of secure data transmission and/or customized commercial offers.

[016] More particularly, central distribution unit 3 can operate in two modes:

1. it can broadcast a predefined set of content packages, standardized and common for all the local units or possibly assembled according to standard user profiles memorized into unit 3 itself upon user subscription; and
2. it can broadcast contents upon a specific request from a local user-unit 2.

[017] As it will be described in greater detail later on, as mentioned above in mode (a) distribution unit 3 can assemble a general information package common for all the local units 2, which common package is then to be “filtered” by each local unit 2. In such mode (a), and also in mode (b), distribution unit 3 can also assemble a multimedial package specifically composed and aimed for a particular user profile. In this latter case, no or a limited discrimination of information at local user level will be required.

[018] As shown in Figure 1, each local user-unit 2 comprises a receiver decoder 4, apt to

receive and decode data from the distribution unit 3 through a satellite communication system. Satellite transmission can be unicast- or multicast- mode based, according to different needs. The decoder 4 is associated with a video display device 5, typically a television set.

[019] The central distribution unit 3 will be now described in greater detail by referring to Figure 2.

[020] In the present embodiment, the central distribution unit 3 comprises Editorial Offices and a Server Farm, in which multimedial contents and information are prepared and packaged for their transmission to the local units 2. In particular, the Editorial Offices work on the contents and define the daily schedule. As said above, depending on the mode of operation contents are packaged according to different user profiles or other general guidelines, allowing extremely customized advertising strategies to be implemented at central and/or local level. The Server Farm provides elaboration power for contents editing and transmission; every package is then forwarded to one or more satellite transponders, acting as a bridge towards end users of units 2. The Server Farm also provides for a standard unicast transmission mode, to satisfy specific user requests of multimedia contents.

[021] The Editorial Office and Server Farm of the distribution unit 3 are implemented by the components specified below.

[022] First of all, the distribution unit 3 comprises a control module 13 apt to control and interconnect all the components of the unit itself.

[023] The distribution unit 3 also comprises a database of videos and other multimedia contents 16 and a database of advertisements 17. The latter can be divided into two sub-databases, namely a first database containing the advertisements to be inserted in the videos during a first general editing within the central distribution unit itself and a second database containing the advertisements to be sent without modifications to the local user units 2 where a final editing can eventually take place. Accordingly, the unit 3 contains also a module 18 for video-editing and advertising insertion, which comprises memory means for storing a list of the current contents available in the distribution unit itself.

[024] Unit 3 also comprises a communication module 14, apt to receive queries and service data from local user-units 2 on a GSM/GPRS/UMTS network and to transmit requested contents to one or more satellites which forward the contents to the end users units 2.

[025] The distribution unit 3 further comprises means 15 for storing and updating user-profiles information.

[026] Each local unit 2 will be now described in detail by referring to Figure 3.

[027] First of all, each user unit 2 has a local processing and control means 10, which

controls directly or indirectly all components of the unit 2 itself.

[028] Each user unit 2 also comprises a communication module 6 able to receive contents from satellite for communicating with the distribution unit 3. More particularly, said module is apt to transmit/receive technical and service information (for example queries, content access and fruition information, payment bills and so on), for example on a GSM/GPRS/UMTS network by the means of an integrated SIM card, and to receive a continuous stream of multimedia contents from satellite to be decoded by satellite decoder device 4. To perform said two functions, communication module 6 comprises a first module 61 for preparing and sending requests and messages to central unit 3, through e.g. said GSM/GPRS/UMTS network, and a second module 62 for receiving multimedia contents from unit 3 through the satellite system.

[029] Communication module 6 and central distribution unit 3 can allow the transmission of videos in the streaming mode.

[030] Unit 2 also has:

- a removable/portable mass memory 7, which in the present embodiment is to be intended as an autonomous and portable device, arranged with a control chipset and a specific firmware allowing for a low level scrambling/encrypting of stored contents (as well as any other state-of-the-art form of data protection);
- a module for video editing and advertisements insertion 8;
- a gold wafer card reader 9 interacting with the control means 10 and apt to receive the aforementioned smart card associated with the respective unit 2;
- a power supply and control unit 11; and
- one or more devices 12 acting as user interface.

[031] The aforementioned decoder 4 for decoding digital signals from satellite or the control means 10 has memory means for storing user identification information and sensible user data, for example codes and/or identification numbers, associated with the subscriber user profile. Alternatively or in addition, such information can be stored on a smart (e.g. gold wafer) card and also in mass memory 7. This redundancy in the storage means can allow a more reliable codes checking procedure, permitting content access restriction and validation.

[032] A same local unit 2 can also manage different user profiles.

[033] Each user unit 2 can also provide for other components that allow stored contents protection and provide restricted access to selected parts of the data. For example, each local unit 2 can comprise means to secure and restrict access to stored contents and fruition modes, according to locally-stored user profiles and validation codes. Such means can for example be incorporated into the control means 10, and/or they can include said smart card and smart card reader 9.

- [034] With reference now also to Figure 4, the modes of operation of system 1 will be described in greater detail.
- [035] First of all, when a new user subscribes to system 1, he/she releases his own personal data to the administrative departments of a service provider which manages system 1 itself.
- [036] According to the data, a user profile is created and a series of codes is generated by assigning to each personal information a string of alphanumeric characters. Such user profile is stored in updating means 15 of the central unit 3, and also sent to a corresponding, possibly new local unit 2 and/or in a smart card provided to the user for local storage. Therefore, the local unit 2 is remotely updatable with personal profile codes according to the given data and eventually to additional packages/profiles subscribed by the user.
- [037] In the present embodiment, the distribution unit 3 operates in the following way in order to obtain a package of contents to be sent to a user at a local unit 2. The editing module 18 operates a first partial editing of the videos, performing the merging of the advertisements into the video data stream. Markers can be introduced to define advertisement insertion points. Such markers also provide for an easy way to eventually edit/remove advertisements at local user-unit level, according to the subscribed user profile (e.g. in case of pay-per-view users and so on).
- [038] Each assembled package is broadcast with a different package identification code, for example a numeric string, allowing discrimination procedures at receiver local unit level.
- [039] When, in the aforementioned mode (a), the package is to be filtered at the level of each local unit, the whole contents schedule is broadcast by the distribution unit 3 to the local units 2, through the satellite transponders: the central unit 3 broadcasts every preassembled content package to each local user-unit 2, without making any discrimination on the subscribed profile.
- [040] Said discrimination on incoming contents is then implemented at local user unit-level, by the local control means 10, which are apt to check the codes of the received content packages and to compare them with the user profile codes and service data stored at local level, for example, as said above, on smart card or on any other state-of-the-art device for secure personal data storage.
- [041] Thus, received contents packages are edited locally, and only allowed or preferred ones are continuously stored/encrypted on local mass memory 7.
- [042] In particular, the decoder 4 and/or control means 10 of each local unit 2 decode digital signals from satellite by filtering incoming transmissions from module 62 according to the user identification information stored in the unit itself and/or in the smart card. The so-acquired multimedia contents are stored on mass storage memory 7.

- [043] A further, local editing can then be performed by module 8, which is in communication with memory 7, based on each peculiar user profile features. For example, module 8 is apt to perform advertisement insertion. In particular, at local level contents can also be edited by inserting or removing advertisements. In this respect, specific advertisement packages can be sent from the distribution unit 3 to the local units 2, and selectively introduced in the video stream at such local level.
- [044] Each local user unit 2, at the processing and control means 10 level, analyzes the package identification code of the incoming contents and compares them with those contained in a list of local contents stored in mass memory 7 or in means 10 itself. In this way, an automatic mode can be provided, so that the unit 2 can download new contents automatically. A list of received and stored contents can also be created and continuously updated, based on the identification codes of contents received from the satellite, also reporting the quantity of the occupied memory and the quantity of the available memory.
- [045] Moreover, the local unit 2 provides for the creation of control code, and specifically of a numeric string, having a first portion which contains an identifier of the contents stored at the level of the specific local unit 2 itself and a second portion which contains an identifier of the local user-unit. The string worked out in the present embodiment includes:
- an identifier of the decoder, in particular the serial number thereof;
 - an identifier of the firmware residing in the local unit, in particular the serial number thereof;
 - an identifier of the version of the contents list which is present in the local memory;
 - an identifier of the smart card used to send queries, in particular the serial number thereof.
- [046] Such control code is then sent to the distribution unit 3 for verification purposes concerning the contents selected by the local unit among those initially sent from the distribution unit. Therefore, in this way the local unit sends to the central unit 3 certified information on contents access and fruition by the local user.
- [047] Preferably, the local unit 2 is configured so that the verification procedure is automatically triggered upon each activation of the decoder, so as to communicate to the central distribution unit all the data related to its own status.
- [048] Alternatively or in addition to the aforementioned automatic mode of extracting new contents among those sent from the distribution unit, a manual mode of operation can be provided wherein the user is able to perform a range of operations on stored contents, for example:
- [049] - removal of advertisement contents (for example in case of pay-per-view

- subscribers);
- [050] - activation/deactivation of fast forward and other stream control features;
- [051] - indexing and validation of stored contents (access restriction/validation, customizable favorites menus and so on);
- [052] - stored contents management (customizable schedules for keeping/refreshing of contents).
- [053] It will be appreciated at this point that the redundancy in the storage means used at local unit level for storing user identification information allows a cross-check of such codes. The latter can be stored, besides or in addition to the storing in the gold wafer card and in the control means memory, also in mass memory 7. In this latter case, the cross-check control scheme of the codes provides for access control on the mass storage device 7 even when it's removed from the original local user-unit and attached to another one. In this case the GSM/GPRS/UMTS module 61 of the new local-user device will forward an identification query to the central distribution unit 3 according to the codes stored on the currently attached mass storage memory, to be compared with the user profile archived on the Server Farm database.
- [054] At this point it will also be better appreciated that the system and the method of the invention allow making easy and immediate the updating of local contents, improving the efficiency of the interactive TV.
- [055] System 1 described above allows also to the users to decide for which of the stored contents they want the access to be activated, thus engaging an automatic hardware/software decryption procedure that will grant fruition of the selected data, eventually allowing advertisement editing/removal according to the subscribed profiles.
- [056] The device can be arranged with standard Communication Interfaces (USB, Firewire etc.) granting a fast and easy connection to other hardware devices supporting such channels (PC, Consoles etc.)
- [057] The invention provides also a managing method of a video-on-demand system as described above, wherein multimedial contents sent from the distribution unit are stored in each user-unit, contents sent from the distribution unit are edited in each user-unit, and wherein each local unit sends to the distribution unit information on contents access and fruition by the local user.
- [058] In particular, the method provides for an automatic verification procedure of contents stored in each local unit upon each activation of such local unit. This verification procedure comprises a first step of analyzing the files on board the local decoder, a second step of coding the list of the present files, a third step of coding the amount of employed memory and of the memory available at local level and a fourth step of generating a data string containing the codes generated. The verification procedure can also provide a control of data access restriction and validation in the

form of a cross check between codes stored in two or more of the following local components:

1. a portable/removable mass storage memory, arranged with an internal control chipset;
2. a gold wafer card;
3. GSM/GPRS/UMTS module for query/information submission; and
4. a control chipset managing control and management procedures on such (a, b, c) devices.

[059] It is of course understood that the features of the verification procedures just described in conjunction with the method of the invention can also be implemented in system 1 described above.

[060] The present invention has been so far described by referring to preferred embodiments. It is to be meant that other embodiments belonging to the same inventive core may exist, all however comprised within the protective scope of the herebelow reported claims.

Claims

- [001] A video-on-demand system (1) comprising a plurality of local user-units (2) and a central distribution unit (3) apt to transmit videos to said local user-units, wherein each of said local user-units comprises: local storage means (7) apt to store multimedial contents sent from said distribution unit (3); local editing means (8, 10) apt to edit contents sent from said central distribution unit (3); and bilateral communication means (6, 10) apt to communicate with said central distribution unit (3) and to send to the latter information on contents access and fruition by the local user.
- [002] The system according to claim 1, wherein said local editing means (8, 10) are apt to insert advertisements in the video data sent from the distribution unit (3).
- [003] The system according to claim 1 or 2, wherein each of said local units (2) comprises means (4, 10, 7) for filtering contents received from the distribution unit according to locally-stored user profiles.
- [004] The system according to any of the preceding claims, wherein each local unit (2) comprises control means (10) apt to work out a data string to be sent to said distribution unit (3) and comprising a first portion which contains an identifier of the contents stored at the level of the specific local unit and a second portion which contains an identifier of the local user-unit itself.
- [005] The system according to the preceding claim, wherein said second string portion contains an identifier of the firmware residing in the local user-unit (2).
- [006] The system according to any of the preceding claims, wherein said communication means (6) comprises a SIM card to send queries and/or data to said central distribution unit (3).
- [007] The system according to claim 4 or 5 and according to the preceding claim, wherein said second string portion contains an identifier of said SIM card of the local user-unit (2).
- [008] The system according to any of the preceding claims, wherein each local user-unit (2) comprises a decoder (4).
- [009] The system according to any of the claims 4 to 7 and according to the preceding claim, wherein said second string portion contains an identifier of said decoder (4) of the local user-unit (2).
- [010] The system according to any of the preceding claims, wherein said bilateral communication means (6, 10) comprises a module selected in a group comprising GSM, GPRS and UMTS modules.
- [011] The system according to any of the preceding claims, wherein said communication means (6) of each local user-unit and said central distribution unit (3)

- allow the transmission of videos in the streaming mode.
- [012] The system according to any of the preceding claims, wherein said central distribution unit (3) comprises means (18) for inserting advertising in the videos to be transmitted to the local user-units (2).
- [013] The system according to any of the preceding claims, wherein each of said local units (2) comprises means (10) to secure and restrict access to stored contents and fruition modes according to locally-stored user profiles.
- [014] A managing method of a video-on-demand system comprising a plurality of local user-units (2) in communication with a central distribution unit (3) apt to transmit videos to said local user-units (2), wherein multimedial contents sent from the distribution unit (3) are stored in each user-unit (2); contents sent from the distribution unit (3) are edited in each user-unit (2), and wherein each local unit (2) sends to the distribution unit (3) information on contents access and fruition by the local user.
- [015] The method according to claim 14, wherein each user-unit (2) inserts advertisements in the video data received from the distribution unit (3).
- [016] The method according to claim 14 or 15, wherein each user-unit (2) filters contents received from the distribution unit (3) according to locally-stored user profiles.
- [017] The method according to any of claims 14 to 16, wherein each local unit (2) works out a data string to be sent to said distribution unit (3) and comprising a first portion which contains an identifier of the contents stored at the level of the specific local unit and a second portion which contains an identifier of the local user-unit itself.
- [018] The method according to the preceding claim, wherein said second string portion contains an identifier of the firmware residing in the local user-unit (2).
- [019] The method according to claim 17 or 18, wherein said second string portion contains an identifier of a SIM card of the local user-unit (2).
- [020] The method according to any of claims 17 to 19, wherein said second string portion contains an identifier of a decoder (4) of the local user-unit (2).
- [021] The method according to any of claims 14 to 20, wherein data are sent from the distribution unit (3) to the local units (2) in the streaming mode.
- [022] The method according to any of claims 14 to 21, wherein the central distribution unit (3) inserts advertising in the videos to be transmitted to the local user-units (2).
- [023] The method according to any of claims 14 to 22, wherein each of the local units (2) secures and restricts access to stored contents and fruition modes according to locally-stored user profiles.

- [024] The method according to any of claims 14 to 23, wherein multimedial contents stored at the level of the local units (2) comprises a frequent-updating portion and an occasional-updating portion.
- [025] The method according to any of claims 14 to 24, which provides for an automatic verification procedure of contents stored in each local unit (2) upon each activation of such local unit (2).
- [026] The method according to the preceding claim, wherein said verification procedure comprises a first step of analyzing the files on board a local decoder, a second step of coding the list of the present files, a third step of coding the amount of employed memory and of the memory available at local level and a fourth step of generating a data string containing the codes generated.
- [027] The method according to claim 25 or 26, wherein said verification procedure provides a control of data access restriction and validation in the form of a cross check between codes stored in two or more of the following local components: (a) a portable/removable mass storage memory, arranged with an internal control chipset; (b) a gold wafer card; (c) GSM/GPRS/UMTS module for query/information submission; and (d) a control chipset managing control and management procedures on such (a, b, c) devices.

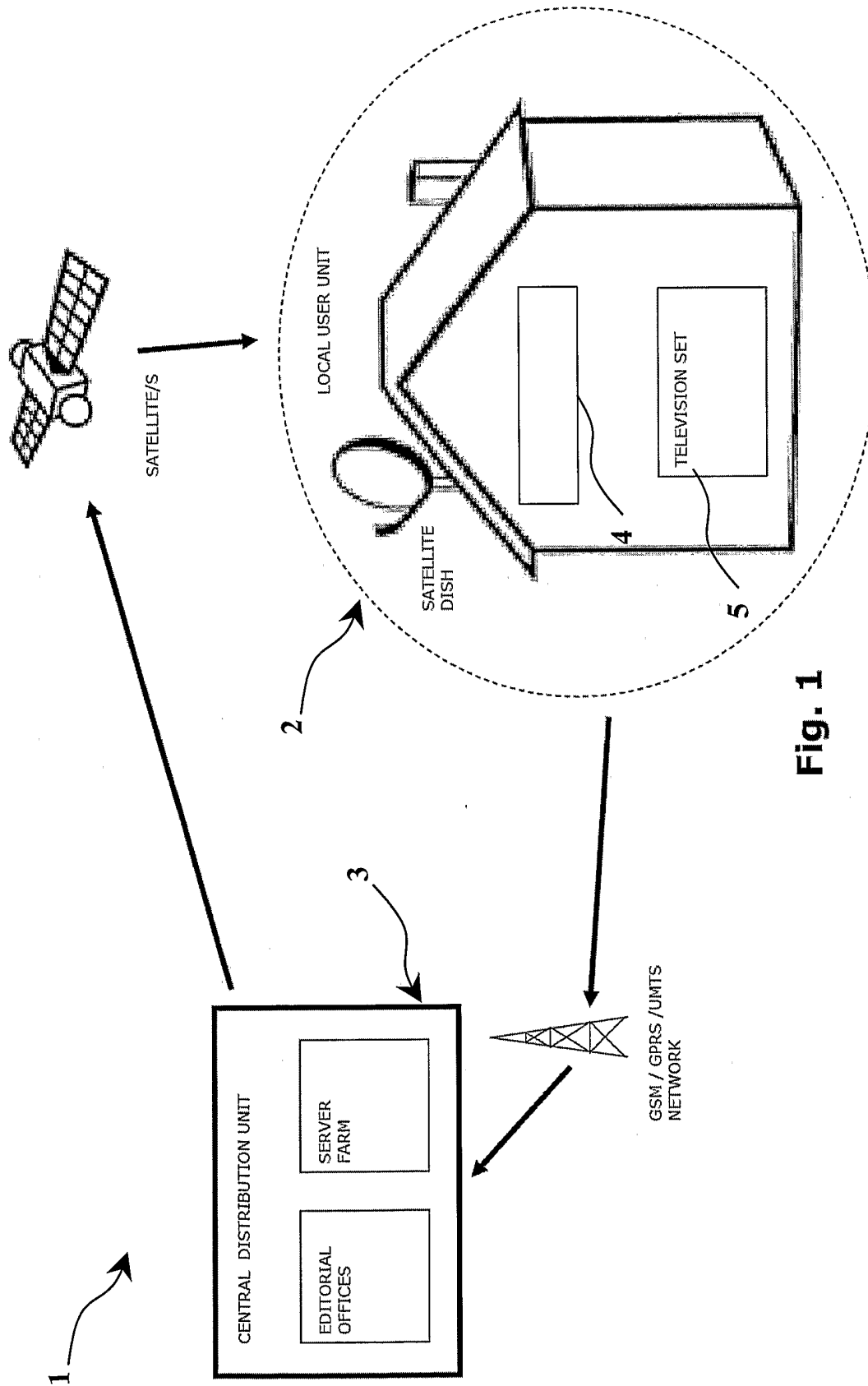


Fig. 1

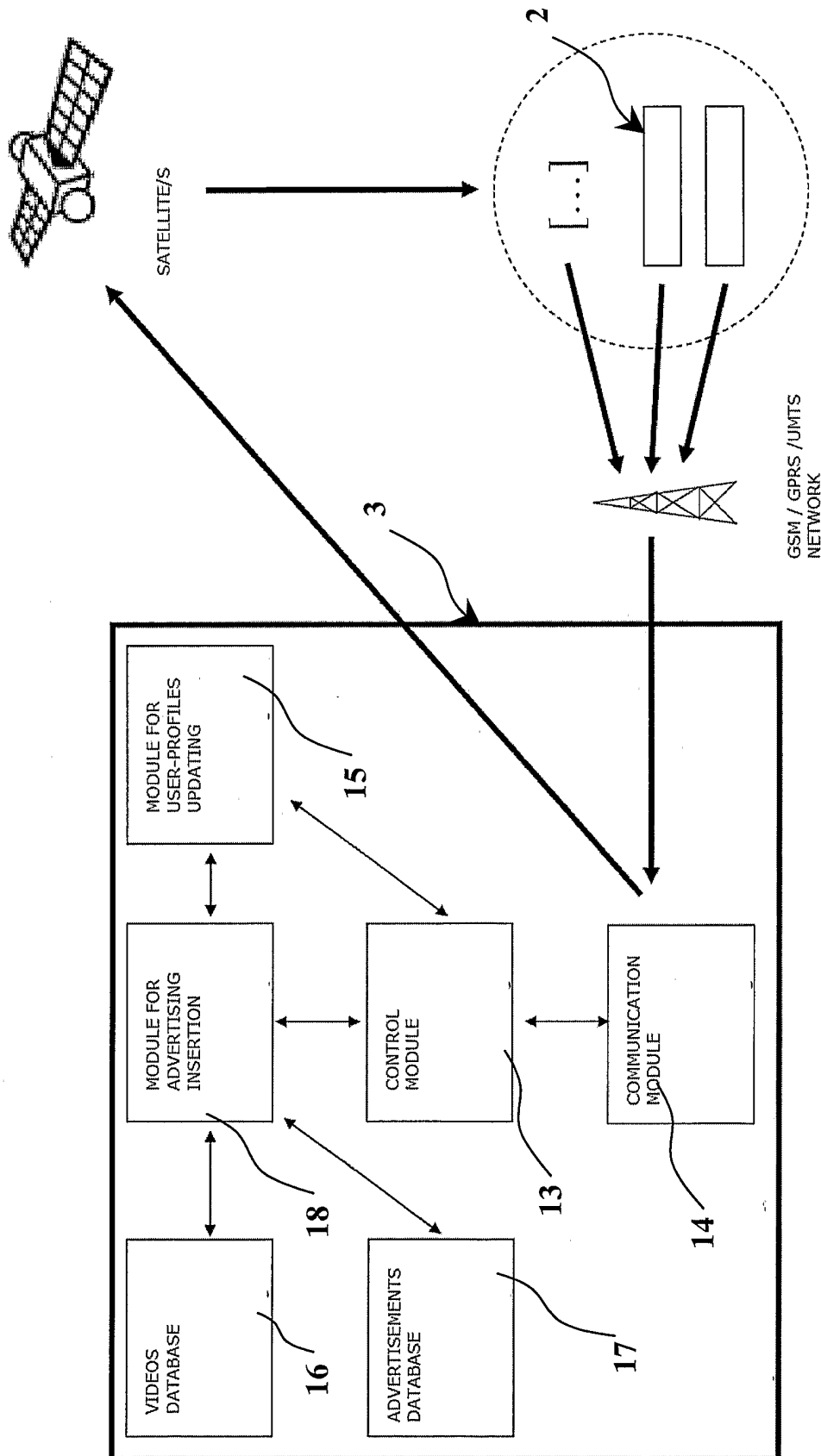


Fig. 2

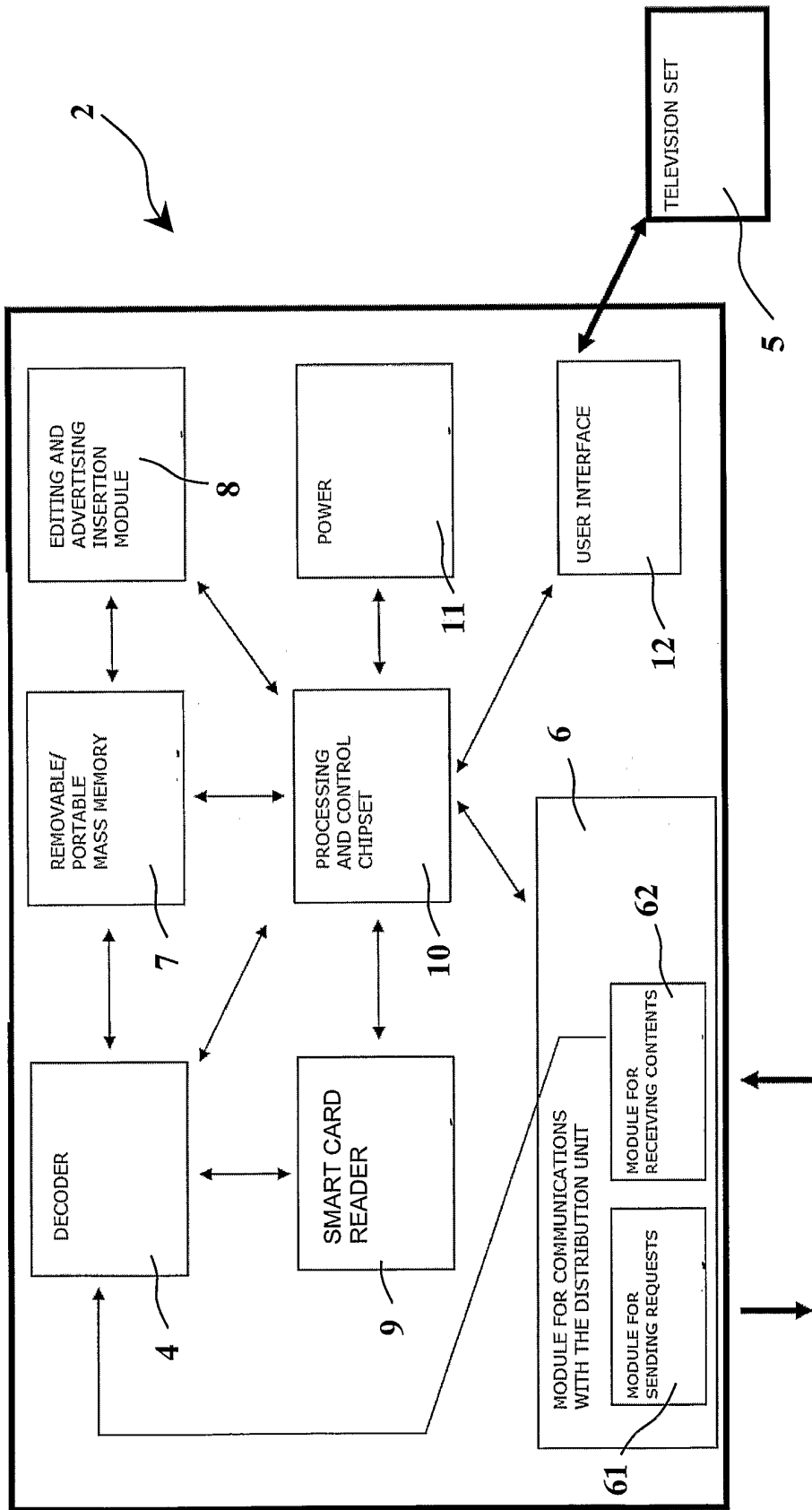


Fig. 3

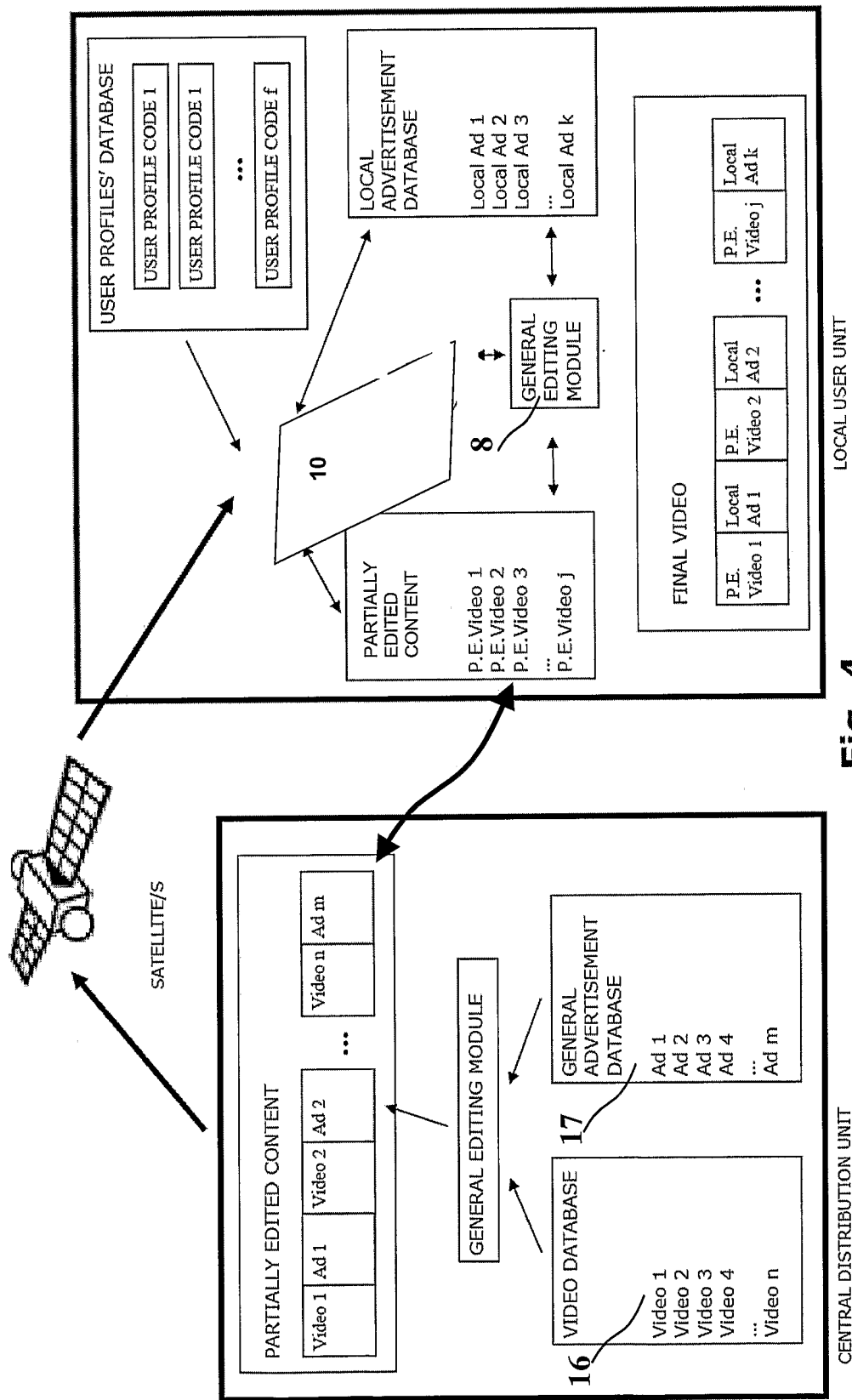


Fig. 4

INTERNATIONAL SEARCH REPORT

International Application No
PCT/EP2004/051182

A. CLASSIFICATION OF SUBJECT MATTER
IPC 7 H04N7/173

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, WPI Data, PAJ

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	US 2002/178447 A1 (PLOTNICK MICHAEL A ET AL) 28 November 2002 (2002-11-28)	1-3,5,7, 8,11-16, 18,19, 21-23
Y	paragraph '0080! paragraph '0090! paragraph '0117!	4,6,9, 10,17, 20,25
X	US 2003/149975 A1 (ELDERING CHARLES ET AL) 7 August 2003 (2003-08-07) the whole document	1-3, 14-16
Y	US 2002/083434 A1 (BACSO STEPHEN R ET AL) 27 June 2002 (2002-06-27)	4,6,9, 17,20
A	paragraph '0044! - paragraph '0047! -/--	1,14

Further documents are listed in the continuation of box C.

Patent family members are listed in annex.

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Date of the actual completion of the international search

22 February 2005

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Name and mailing address of the ISA

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INTERNATIONAL SEARCH REPORT

Int'l Application No
PCT/JP2004/051182

C.(Continuation) DOCUMENTS CONSIDERED TO BE RELEVANT		
Category *	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	WO 02/069088 A (VESTA BROADBAND SERVICES, INC) 6 September 2002 (2002-09-06) page 6 page 13 - page 14 page 33 -----	1-3, 14-17
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A	the whole document -----	14
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A	the whole document -----	1

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International Application No
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