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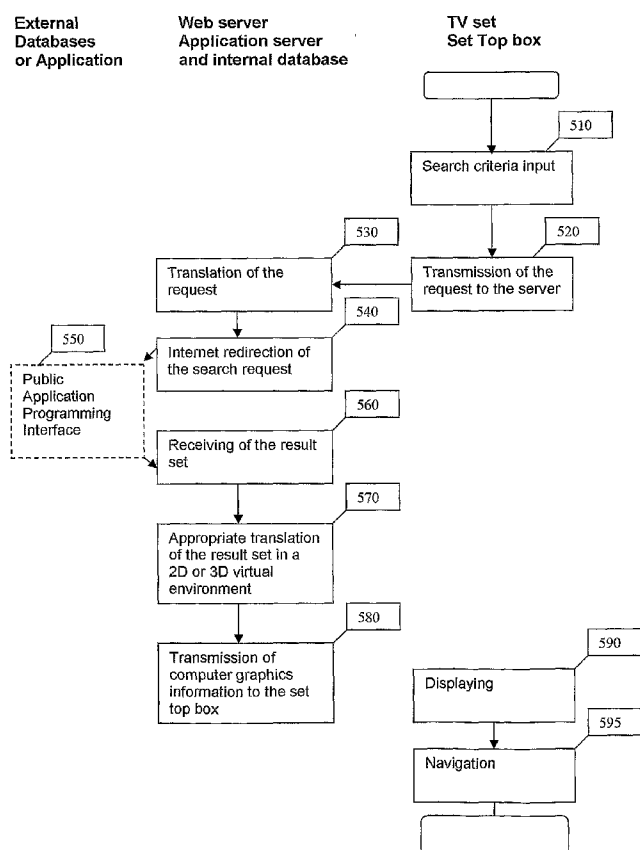
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(54) Title: SYSTEM AND METHOD TO CONSUME WEB CONTENT USING TELEVISION SET

Figure 5



(57) Abstract: The presented invented method realizes a converged communication system at home having the TV set as the main networked device for integrated content search, delivery and consumption. This method delivers online content from the Internet to TV, thus seamlessly integrating in one delivery channel the traditional consumption of TV broadcasting with searching, browsing and consumption of multimedia and non multimedia online resources.

SYSTEM AND METHOD TO CONSUME WEB CONTENT USING TELEVISION SET

TECHNICAL FIELD

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The invention relates to the Digital Video Broadcasting (DVB) television ecosystem. More particularly, it relates to an interactive television infrastructure that enables TV users to ask, search, choose and consume internet content using a TV set, a remote control or a voice recognition system, and a decoder or set top box.

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The invention relates to a client server infrastructure (like in Figure 1) comprising – as client – an hybrid decoder/set-top box receiver allowing broadcasting receiving (e.g. cable, satellite, terrestrial or IP) as well as accessing to the Internet network through a broadband IP connection, and – as server – a typical Internet application server (web server and J2EE or equivalent application server) managing the access to the multitude of web-based applications, databases and services. In the presented architecture the set top boxes could be substituted by a mini-pc.

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The invention also relates to a user interface for a consumer electronic product such as a television. The presented user interface allows a bimodal coexistence of the broadcasting ecosystem with an IP interactive environment (like in Figure 3). An additional interactive window enables to search web-content displaying retrieved information and functions in images or objects inside a virtual environment making the navigation compatible with the television (image based and fluent) and zapping (scrolling) paradigms, and making the presented web content consumables using a normal remote control.

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In particular the invention relates to a system to retrieve a list of data and related services or events on this data from the internet making this content interactive and consumables by TV users. Data can be common TV channels available within the broadcasting environment or any other content available within any web-based database. Interactivity with this data goes from the search and choose of the right information to the scrolling of the selected items and its consumption.

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BACKGROUND ART

Television viewing is a popular form of entertainment. Developments in television and digital video technologies allow viewers to watch a wide variety of high-resolution content and to record programs for later viewing.

While television programming provides a variety of information and content, it is largely bound by program scheduling. The Internet offers users an alternative source for many types of information, such as movies, music, commercial products, weather, financial information, etc. Moreover, users can access any type of web-based content at any time. Nonetheless, users must often interrupt their television viewing in order to access the Internet via a computing device. Additionally, accessing a preferred type of web-based content regularly can require users to spend time repeating navigation steps.

The increasing complexity of consumer electronic products such as televisions and of the systems in which these products are incorporated (e.g., cable and satellite television systems with hundreds of channels) make it more difficult for users to use the products and take full advantage of the functionality that these products provide. Operations of these products that in the past were relatively straightforward and simple have become more difficult.

For example, it can be difficult to channel "surf" or "browse" to find programs of interest when a television receives hundreds of channels. In addition, with the advent of digital channels, even the task of simply tuning to a channel can involve entering a channel and can take up to five or more key presses on a keypad of a remote control or a front panel. Thus, surfing from one channel to another by entering different channel numbers is time-consuming and prone to error since so many numbers must be entered to surf to a series of different channels. When there are hundreds of channels and each channel may involve both channel numbers, even remembering which channels to surf to can be a difficult task.

This problems are more urgent if, additionally to existing TV channels, new kind of content is made available to TV users, particularly if web-content is made available within the television ecosystem.

There is a constantly growth of Internet content that users would like to consume using TV set. TV and radio networks, already started putting more content on the Web — audio, video, etc. — and this allows people to choose what they wanted to watch using PCs and Web browsers. TV networks are doing what millions of other Web sites already do: offering content for people to choose from. There is conventional content today distributed over the Internet under the form of text, which interaction do not fit well with television interaction paradigms.

There's a good chance you have two connections coming into your home: One for television and one for the Internet. Your TV set is hooked up to one connection, and your cable/satellite provider gives you a list of channels to watch. A limited list. Your computer is hooked up to the other connection; your provider (maybe even the same company that provides your TV signal) lets you access an unlimited "list" of Web sites.

Video on the Internet is likely in the same format as what you get over a satellite or digital cable connection. It's called MPEG-2, and it's the same one used on DVDs as well. In other words, that same Internet connection you're using to view this Web page could be used to bring you full-size, DVD-quality video. In fact, some phone companies have acquired cable TV licenses and are delivering "IPTV" — digital television carried over phone lines, using Internet technology. It's indistinguishable from cable or satellite, except that the line coming into your living room looks like a phone cord, not a TV cable.

There's IPTV; so the technology exists to use the Internet infrastructure to carry television. There are faster and faster data pipes coming into your home. There's incredibly cheap storage; there are services that will let you download movies to watch on your PC. There are Media Center PCs, that let you watch and record television shows on your computer. There are legacy systems that let you interact with selected content in a predefined way.

Those are small steps to the on-demand finish line. A larger one is Microsoft's Media Center Extender Set-top Box. It connects your television to your PC,

so you can not only watch TV networks, channels and broadcasting shows; you can also access the music, photos, and video that are on your computer.

Concerning the usability, in today television environment the capacity to perform search operation over general content is almost unavailable, while the user satisfaction related to paradigms for moving between channels diminishes when the number of available channels augments. TV usage today is still a frustrating experience: TV as it own timing, Program Guides difficult to find, fragmented search features, difficult video recording programming, broadcaster video on demand offer difficult to find and buy.

Distributing multimedia content over Internet networks is based on the streaming technology. Streaming media technology market is still a chaos today. If an Internet user clicks on a video to watch it, there is no guarantee that he can watch it as he can easily watch a TV show after turning on a TV. Mostly due to the lack of local resources allocations, Video streaming is still a comparatively new technology. A video encoded in one technology usually cannot be played by another player, due to lack of content adaptation and uses awareness techniques. Technical architecture and low cost requirements of the set top box do not allow to integrate inside a unique Set Top Box different streaming players/viewers.

SUMMARY OF THE INVENTION

Accordingly, the invention seeks to provide an improved system for the consumption of web content using a TV set, and preferably seeks to mitigate, alleviate or eliminate one or more of the above disadvantages singly or in any combination.

According to a first aspect of the invention, there is an interactive television system allowing TV users to search, choose and consume internet content using a TV set, a remote control and a set top box, where the user does not need to read text to completely understand the data retrieved and to interact with, but rather need only look at a three-dimensional animated landscape containing the complete answer in graphical form.

Presented, therefore is a computer system and method for transforming data, technical environments and paradigms enabling the coexistence of the broadcasting television consumption with the interaction with internet services, within a unique user interface possible.

5 Content can be classical TV content: channels, passed programmes, shows, movies, news, live broadcasting programs or future broadcasting offers. This content is made available searching real-time inside internet based electronic program guides (EPG). Passed shows and productions produced by TV networks are made available though the Internet network and consumed though a streaming flow. Present programs
10 are the traditional broadcasting offers, distributed and consumed through a broadcasting medium, while future programs could be linked to services or events to preset recording commands. Searching on channel type enable to implement advanced favourite channel lists based for example on the language or the geographic location of the TV network. Searching on live programs' content enable to implement other favourite channel lists
15 based on the content of the single programmes presenting for example only channels passing tennis games, thriller movies, news, etc. Interacting and selecting a single live program tune the TV set to that channel without entering any predetermined channel number.

 Content can also be classical internet content (movies, music clips, any kind
20 of products, auctions, additional content to single broadcasting events, electronic program guides) or any kind of user generated content (movies, music clips, texts or images). This content is made available searching real-time inside internet-based databases or applications.

 The interaction with the presented content, is made compatible with the TV
25 watching paradigms by transforming it in images (2D or 3D objects) inside 2D or 3D virtual environments, allowing the user an easy and intuitive navigation (scrolling) and consumption (selection). From the user's data query, a virtual world or environment is created and presented to the user that appropriately simulates the requested data in virtual objects in simulated realistic form. By performing these actions, the user is
30 effectively interacting with the internet data returned by the query.

 In some embodiments the three-dimensional environment is presented to a user on the TV set screen. In other embodiments, the user can interact with the presented

scene by a single click using a remote control. In other embodiments, interaction with the presented scene brings additional results from the original data query into the three-dimensional view.

According to a second aspect of the invention, the system comprises the translation of the interaction with a graphical environments in the correct API or web services calls according to the predetermined parameters stored in the system. The graphical user interfaces acts as a logic interfaces between the user cognitive understanding of the presented content and the complexity of the URLs knowledge necessary to interacts with the presented objects.

According to a third aspect of the invention, the presentation and the interaction with web content occurs in a bimodal user interface allowing to perform tasks while continuing watching conventional broadcasted content. The search and interaction process is implemented inside a bimodal user interface allowing the coexistence of the broadcasting technology with the on demand internet paradigms. The present invention describes an example interface that facilitates channel surfing and browsing while enables web-content delivery and consumption within the same user interface.

According to another aspect of the invention, the system comprises a trans-coding component enabling a cross translation of multimedia formats: from text queries result set to graphical environments, from text to sounds, from a video streaming format to another, although the used video trans-coding method is not part of the presented invention.

By way of example, a channel list is generated, for example, based on a real-time database search operation (i.e. thriller movies, tennis games, news, ..). An interface displays at least a portion of the channel list and allows for user-selection of a channel from the channel list so that the selected channel may be tuned.

By way of another example, the presented list of objects could be generated based on a real-time search result of movies to be consumed in streaming, or music clips, or books to be bought, or any other web-based available content to be consumed.

These and other features and advantages will be better and more completely understood by referring to the following detailed description of example embodiments in conjunction with the drawings.

BRIEF DESCRIPTION OF DRAWINGS

Figure 1 is a diagram illustrating the technical architecture of the presented system

5 Figure 2 illustrates the trans-coding features of the invented system

Figure 3 illustrates a typical broadcasting television user interface.

Figure 4 illustrates a bimodal (IP + broadcasting) user interface allowing the interact with web content while consuming broadcasting television.

10 Figure 5 is a flowchart of a method for translating an Internet search query and its related result set in graphical virtual environment according to an exemplary embodiment of the present invention.

Figure 6 is a flowchart of a method for transparently translating the interaction with a graphical user interface with internet web services calls for the consumption of the presented content.

15 Figure 7 illustrates an example for the presentation of some menu items in a graphical form.

Figure 8 is a flowchart of a method for translating of a scrolling operation in a navigation process according to an exemplary embodiment of the present invention.

20 Figure 9 illustrated the graphical representation of a result set of movies responding to a real-time search request.

Figure 10 illustrated the graphical representation of a result set of books responding to a real-time search request inside a virtual library.

25 **LIST OF PHYSICAL COMPONENTS REFERENCES**

010	Internet public APIs, web resources or services
020	Web Server / Application Server layer
025	Broadband IP connection
30 030	TV set + Set Top Box + client program
035	Broadcasting medium
040	TV networks

045 Remote control
 210 Algorithms for the translation of a user request in an API address
 230 Algorithms for the translation of a query result set in a graphical environment
 235 Algorithms for text to sound conversion
 5 240 Video trans-coding algorithms
 350 Passive broadcasting window
 455 Active interactive IP window

LIST OF FORMULAE

10
 F1 API-URL = F1(SCENE-ID, FUNCTION-ID)
 F2 RESULT-SET = F2(API-URL, SEARCH CRITERIA)
 F3 SCENE-ID = F2(USER-ID, FUNCTION-ID)
 F4 OBJECT-ID = F3 (SCENE-ID, DATAKIND-ID)

DETAIL DESCRIPTION OF THE INVENTION

The invention concerns a method for searching, browsing and consuming web-based content within a broadcasting environment (Figure 1).

20 The system includes a set-top box device (Figure 1 – 030) comprising at least a processor and a memory accessible to the processor. The system includes a client computer program embedded within the memory of the set top box and executable by its processor. The client computer program comprising instructions to input search criteria, to display, to browse (surf or navigate) and to interact with displayed data in a graphical
 25 form (vectors). The computer program comprising as well a streaming player able to decode at least single streaming format. The set-top box device is connected to the IP Internet network through a broadband connection (Figure 1 – 025). The set-top box device is also connected to at least a broadcasting medium 035 (cable, satellite, terrestrial or IP) (Figure 1 – 035) allowing conventional broadcasting consumption of
 30 live television programs.

The system also includes a server hardware and software platform (Figure 1 – 020) interfacing the invented architecture to the Internet (Figure 1 – 010). A software platform and a relational database runs inside the server managing all the necessary parameters, allowing graphical environments parameters to be translated in APIs or web services calls and allowing result set of database retrieval operations to be translated in 2D or 3D virtual environments. The server, with its predetermined parameters, acts as unique interface towards the multitude of web services, applications and databases hiding this complexity to client application and therefore to the TV user.

The server platform also includes a trans-coding component (smart edge) enabling the selected content to be transformed in a multimedia format in order to be consumables by TV users (Figure 2 – steps 030,035, 040) : from a list of items to a graphical environment, from text to sounds, from video streaming in one format to a video streaming in another format.

Start flow is a common broadcasting TV screen 350 on the screen with a common show received through a broadcasting medium 035.

The user starts the client program running inside a set top box opening an interactive window 455 beside the broadcasting window 350, implementing the physical coexistence of the passive broadcasting television consumption with the active interaction with IP-based internet content.

Start flow could also be a predefined user interface already initialized with the two presented windows 350 and 455: one dedicated to the broadcasting environment (Figure 4 - 350) , the other dedicated to the presentation of a real-time retrieve operation of web-based content (Figure 4 - 455).

Focusing the attention to the interactive window 455, the user can input a search criteria starting a retrieval operation of web-content (Figure 5) and can navigate (surf) inside the displayed content interacting with single displayed items (Figure 6).

Search and presentation flow

The logical process of the software functions necessities to search, retrieve and present of web-content is described in the main functional block diagram of Figure 5.

5 The process begins at step 510 where the user inputs search criteria using the remote control 045. Search criteria are given to the system using the T9 protocol (numbers from 0 to 9) in a similar way as SMS messages are written using mobile phones. Search criteria could also be given to the system by future available voice recognition systems.

10 The program running inside the set top box detects the search criteria and sends in step 520 a request to the Internet server 020 through the IP connection 025. The content the user is searching for depends from the user location inside the navigational virtual environments. To search about books the user must enter a books' store, to search about TV channels the user must enter a virtual EPG an so on. The user physical
15 location inside the virtual environments is translated in a SCENE-ID, then used by the server together with the search criteria to determine what the user is searching for.

Each request is characterized by a function internal descriptor (SCENE-ID), the interaction identifier (FUNCTION-ID) and the search criteria. In step 530 a server
20 program uses this information for the determination of the kind of request and therefore the determination of name or the address of the web service to be called using the formulae F1. The name of the program for each different combination is automatically retrieved interpreting predetermined parameters stored inside an internal database, avoiding programming activities necessary to extend the system to different external
25 data sources, thus making the system extendible to any kind of available data. The parameters allowing the correct execution of the above described formula by internal algorithms are manually stored and maintained during the configuration phase.

In step 540 the server platform redirects therefore dynamically a specific request to an external open existing web APIs (software system designed to support
30 interoperable Machine to Machine interaction over a network) using standard Web Services or proprietary protocols. In step 550 the called service 010 runs the database query and returns the information to the server, normally in XML format or any other

readable format. A typical result set of a search operation comprises a list of items, where for each selected item the following attributes are defined: an external item-ID, a name or a description, one or more URLs resources to be called while interacting with the item, and eventually one or more images URL associated with the selected item.

5 In step 560 the result set is received by the server 020. Step 570, based on the parameters stored into the server, gives a 2D or 3D aspect to each selected item, placing each object in an appropriate virtual environment and assigning to each object the defined services or events available to the users to interact with. The algorithms that transform received result sets in virtual environments are based on two different
10 formulae, one for the determination of the landscape (F3) and a second one for the determination of the objects shape to assign to each returned item (F4). F3 uses as parameter the USER-ID enabling the definition of user preferences so that the system allows different users to interact with the same content through different graphical representations. Formulae F3 uses the same FUNTION-ID parameter of formulae F1 to
15 allow the physical representation of different data sources inside different graphical landscapes (SCENE-ID). Formulae F4 gives each selected item a shape assigning a SHAPE-ID as a result of a combination of the SCENE-ID and a new DATAKIND-ID parameter. The DATAKIND-ID is any kind of data descriptor returned by the called web service inside the result set. Examples of DATAKIND-ID could be the sex of a
20 persons in case of a people database, the product type (book, disc, ..) of a shop, or any other external available item descriptor. The OBJECT-ID results of formulae F4 corresponds with a 3D model that is displayed as 3D object inside the landscape.

Received data (item-ID, descriptor, detail URLs, images URLs) are temporarily cached inside internal cache databases just for the time necessary to allow
25 the user a later interaction. Any other information is permanently stored in the server databases.

Step 580 sends the generated graphical information to the set top box 030 in in a streaming format through the IP broadband connection 025. A typical graphical scene descriptor comprises: scene-ID, scene-parameters, vector of 3D-objects, vector of
30 available function-IDs. The typical 3D-object comprises points and coordinates, image URLs, and the external item-ID to recognize items to interact with.

In step 590, the software running inside the set top box traduces graphical information (vectors and descriptors) in a visible virtual environment through generic 3D engine calls drawing a virtual environment inside the interactive IP window 455 of the TV screen. If a single displayed object is associated with an image file, the client
5 program 030 running inside the set top box reads the image directly from the internet using the received original URL and places the image as a texture over the 2D/3D model using typical computer graphics warp algorithms. An example of a graphic generated list of some selected movies is given in Figure 9, where each presented object represent a single movie. Another examples is illustrated in Figure 10 where a te result set of a
10 books search is depicted as galleries, which can be explored following a physical metaphor.

Using the remote control 045 the user can navigate or browse the single data items in the same way he normally performs zapping or channel surfing (for example pushing the P+ button to advance.

15 The logical process of the software functions necessities to navigate inside the displayed 2D or 3D virtual environments is described in the flow main diagram of Figure 8.

The logical process of the software functions necessities to interact with a retrieved list of objects is described in the flow main diagram of Figure 6.
20

Interaction Flow

Interacting with a presented item means the effectively interaction with an item returned by the search query, thus with internet data. In step 610 the client program
25 automatically selects and highlights single presented items while navigating inside the presented virtual environments. The user can start the associated service or event with a single click of a confirmation button of the remote control 045 (for example the OK button). If more services or events are available for the selected item/object, these options are displayed and can be highlighted and chosen (for example using the + or –
30 buttons of the remote control).

In step 620 the client program running inside the set top box sends the selected service request to the Internet server 020.

Selected objects could be TV channels. The selection of a TV channel starts the selected broadcasting transmission in the main window without any call to the internet server, but just redirecting selected broadcasting flow, received through the
5 broadcasting medium 035, to the screen. This method implements an innovative way to implement channel tuning based on a search retrieval operation without the need to enter fixed numbers with the remote control 045

Selected objects could be menu items. The interaction with menu items is
10 automatically translated in new search queries as described by the flowchart at Figure 5 without the need to manually enter search criteria, as each menu item contains implicit a predefined search criteria string. Consequently the selection of a menu item has as result the 2D/3D presentation of some objects resulting from a real-time inquiry of a specific database. This method allows to transparently generate search requests and therefore
15 new items presentation by simply on-click interactions with displayed objects. An example of a graphical presentation some menu items inside a virtual environment is illustrated in figure 7. Interacting the "TV channel" cube, will generate the presentation of all available TV channels, while the interaction of the "Movie" cube will dynamically display to the windows 455 the subset of the TV channels passing movies as illustrated
20 in the figure 9. Menu items are stored inside internal database at system 020. Menu items could be automatically generated by user preferences and passed search queries, or by system managers, allowing the system to dynamically grow and change following user behaviours and preferences.

Selected objects could be consumable objects physically available
25 somewhere over the Internet network.

In step 630 a server programs receives the request and traduces it in a program call or redirection to an item associated URL previously cached in step 570. The determination of the correct URL to call is done using predetermined server
30 parameters following the formulae F4, where the parameters item-ID (selected item) and function-ID (requested service or event) are sent to the server inside the interaction request.

Step 660 redirects, thus the invokes the selected URL, generating the consumption of some content related to the selected item: the streaming a movie/music clip (step 660), the real-time translation in sound of some text (step 675), the text display to the screen (step 670) or the intrinsic in the API operation included in the called web resource or service (buy, movie play, related detail text..) (step 650).

The streaming flow could be displayed inside the main broadcasting window 350, or inside the interactive window 455. This method implements an innovative way to implement a television on demand environment using internet available multimedia content and transforming the consumption of non multimedia content in a TV compatible experience (Figure 2 – steps 230, 235, 240).

Navigation and surfing flow

The logical process of the software functions necessities to navigate (data scrolling) inside the displayed 2D or 3D virtual environments is described in the flow main diagram of Figure 8. While navigating inside the presented virtual environments the user is effectively scrolling the data returned by the search query.

The user controls the navigation, thus the item's scroll, by single-click commands using the remote control 045. These could be the common P+, P- buttons normally used while zapping television channels (Figure 9 step 810).

To overcomes traditional 3D navigation problems, the navigation inside the displayed virtual environments is not free, but is imposed and limited by the parameters stored in the scene. In step 810, depending on an environment parameter the system decides, whether to rotate the scene (step 820) or whether to simulate a user's advancement in the scene (step 830).

Depending on a second parameters, the system decides whether to start an automatic and passive endless movement (rotation or advancement) or to make a single object's scroll, thus rotating and highlighting the next displayed object or advancing and highlighting to the next displayed object. Movements and rotations simulate a movie-like animation on the screen compatible with the watching paradigms of the television.

Therefore, because the search results are depicted in an environment with which the user is immediately comfortable, this presentation allows a useful dialog between the user and the presented content, by using natural movement and exploration functions of a virtual three-dimensional world.

5 The cited scene parameters are send from the server to the client as described in Figure 5 step 580.

Trans-coding features

10 In order to allow the end user to transparently consume different multimedia contents' formats the server platform 020 comprises also a multimedia trans-coding format block (Figure 2). This is a smart platform enabling processing and inserting of personalized content to end users. In step 570 / 230 search result sets are real-time traduced in graphical environments, in step 235 texts are traduced in sounds, and a
15 video streaming trans-coding step 240 changes the coding of a selected stream in order to be decoded and played by a unique player included in the client program. In this scenario, the server logic of the systems 020 acts as a trans-coding platform, dealing with on-the-fly different Trans-rating and trans-coding techniques and different physical encapsulation to fit different IP networks. This features, allows to implement
20 inside the STB a single player/viewer allowing the platform to be integrated to different content encoded content types.

BEST MODE FOR CARRYING OUT THE INVENTION

25 The following description is presented solely for the purpose of disclosing how the present invention may be made and used. The scope of the invention is defined by the claims.

 The best way to carry out the invention is to define an end-to-end open infrastructure and to develop any form of software able to freely deliver and consume
30 web-based content to TV, making it consumable in an on demand way by TV users.

 Figures 9 and 10 illustrate the final result obtained from an application prototype applying the invented method for the interaction with a movie database and a

book-shop database. Figure 10 also empathizes the bimodality of the proposed television user interface, where the interaction with a web based virtual library occurs over a conventional broadcasting consumption window in a picture-in-picture modality.

One architectural advantage of the proposed invention is to enable the delivery of web-content to TV users without the need of any PC. This is done transforming the set top box in a networked hybrid device, enabling the connection to the IP Internet network while still receiving and decoding DVB digital broadcasting signals.

An advantage of the proposed application is to simplify the consumption of web-content within an open infrastructure and platform where the content is not imposed chosen an predefined by a legacy system, operator content provider or TV operator, but is freely chosen from a multitude of internet applications, databases and services.

An advantage of the proposed application is to simplify the consumption of TV content (channels) implementing search features over an internet based electronic program guide. Figure 9 shows an example of a graphic television channels surfing and tuning process, while figure 10 shows how this process occurs keeping the broadcasting windows active over the TV screen, thus while watching television.

An advantage of the proposed user interface is to integrate in a unique and bimodal interface the passive consumption of TV content (broadcasting) with the active interaction with web-based content within an immersive and multimedia experience.

The software form, the programming language, the operating system, the standard user interface, the 3D engine used, the development technique and tools of this software infrastructure aren't important because the invented method concerns only the form of dialog between a TV user and any accessible web-based database. The user formulates an inquiry and the software (developed applying the invention) redirects the query to a specific database and translates the list of data resulted from the inquiry in an animated and controllable 2D or 3D image of a simulated virtual space. The user needs any form of scroll in the data resulted from the inquiry and the software performs an appropriate movement in the 3D space simulating a navigation or a scroll operation within the result set.

INDUSTRIAL APPLICABILITY

The primary commercial application of this method is the development of a software platform able to delivery and distribute TV content and web-content in an on demand way to TV users. TV content could be an internet based electronic program guide. TV content could be past aired TV shows and programmes stored by TV networks inside internet based databases. Web content could be all internet based content that users could have interest to consume using the TV set: movies and multimedia content today not distributed by broadcasting TV networks, auctions, books, music clips, any kind of product of internet offer, additional content to single broadcasting events, electronic program guides (EPG) or any kind of user generated content (movies, clips, texts or images).

Other commercial application of this method is to boost the development of advanced networked set top boxes enabling TV users to buy a retail product outside legacy realities enabling the consumption of on demand content within a television environment.

Under the strict application of the invented method, the TV user experience could be transformed in an on demand environment making enhanced TV a reality.

CLAIMS

What is claimed is :

- 5 **1. A method to search and display web-content in a digital TV environment, comprising :**
- (a) providing a set top box which is connected to the IP broadband network (Internet) as well as to one or more broadcasting medium (cable, satellite, terrestrial, IP),
 - 10 (b) providing a remote control or a voice recognition system which sends commands to said set top box,
 - (c) providing a character input means which a TV user can use to query the system,
 - (d) providing a TV set which is operatively connected to said set top box,
 - (e) providing a software client program which is running inside said set top box,
 - 15 (f) providing an Internet application server acting as an interface between said set top box and the Internet network,
 - (g) providing a server software platform (series of software programs and databases) running inside said Internet application server,
 - (h) providing one or more web APIs provided by third parties,
 - 20 (i) providing a result set of a generic search query based on the said search criteria,
 - (j) providing an internet based Electronic Program Guide,

whereby a TV user input said character input using said remote control, the client program detects the character input, the client program sends a request to said

25 Internet application server, said server software platform transforms the received request in an API call using predetermined internally stored parameters, the API runs a database query, said result set is returned to the Internet application server, the server software platform transforms the result set real-time in a graphical list of 3D models inside a virtual environment using predetermined internally stored

30 parameters, the software platform caches different URLs relating to each returned data item for later interaction, the server software platform sends graphical and descriptor information to the client program, the client program displays said

graphical environment to said TV screen and - if requested - reads images from received URLs and places the read images on the 3D objects, and
whereby a TV user can search and visualize web content in an easy and intuitive way, without the use of PCs, keyboards, without worrying about URLs of the multitude
5 of web resources and without recurring to any text reading operation, and
whereby the system transforms the interaction with non multimedia web-based content in a multimedia experience, making it consumable in a TV compatible way within said TV set using said remote control, and
whereby the system simplifies the distribution and delivery of web content to TV users,
10 and
whereby the complexity to generate 3D graphic models and virtual environments, and the knowledge of the external Internet URLs of all the necessary internet available APIs to be called lies in said server software platform only.

15

2. A method to search and display live TV content in a digital TV environment, comprising :

- 20 (a) providing a set top box which is connected to the IP broadband network (Internet) as well as to one or more broadcasting medium (cable, satellite, terrestrial, IP),
(b) providing a remote control or a voice recognition system which sends commands to said set top box,
(c) providing a character input means which a TV user can use to query the system,
25 (d) providing a TV set which is operatively connected to said set top box,
(e) providing a software client program which is running inside said set top box,
(f) providing an Internet application server,
(g) providing a server software platform (series of software programs and databases) running inside said Internet application server,
30 (h) providing one or more web Electronic Program Guide APIs (software system designed to support interoperable Machine to Machine interaction over a network) provided by third parties,

whereby a TV user input said character input using said remote control, the client program detects the character input, the client program sends a request to said Internet application server, said server software platform transforms the received request in an API call using predetermined internally stored parameters, the API runs a database query, said result set is returned to the Internet application server, the server software platform transforms the result set real-time in a graphical list of 3D models inside a virtual environment using predetermined internally stored parameters, the software platform caches different URLs relating to each retuned data item for later interaction, the server software platform sends graphical and descriptor information to the client program, the client program displays said graphical environment to said TV screen and, when requested, reads images from received URLs and places the read images on the 3D objects, and whereby a TV user can search and visualize TV channels, which information stored inside said Electronic Program Guide matches said character input, and whereby the system simplifies the search and the finding of TV channels of interest.

3. A computer implemented method to interact with and consume web-content in a digital TV environment, comprising:

- (a) providing a set top box which is connected to the IP broadband network (Internet) as well as to one or more broadcasting medium (cable, satellite, terrestrial, IP),
- (b) providing a remote control or a voice recognition system which sends commands to said set top box,
- (c) providing a TV set which is connected to said set top box,
- (d) providing a software client program which is running inside said set top box,
- (e) providing an Internet application server,
- (f) providing a server software platform (series of software programs and databases) running inside said Internet application server,
- (g) providing one or more web APIs (software system designed to support interoperable Machine to Machine interaction over a network) provided by third parties,

whereby a TV user interacts with said 3D objects of claim 1 or of claim 2, using said remote control, said client program detects the request, the client program redirects the request to said Internet application server, said server software platform transforms the request in said API or URL call using a previously cached URL or API address cached, the server platform calls the API or URL, said API or URL redirects some multimedia output to the client program that generates some perceptible multimedia output to the TV set, and

10 whereby the user interaction with menu options starts a new search request as of claim 1 or 2 with a transparent for the user search criteria, and

whereby the user interaction with a displayed object of claim 1 simplifies the consumption of internet content related to a multitude of web applications and services in an intuitive way (video streaming, text display, music play...), or to

15 activate a service related to said object (reservation, buy request, ..), and whereby the interaction with said 3D models of claim 2 (TV channels), simplifies the tuning of the selected TV channel without having to enter predefined channels numbers with said remote control.

20 **4. A computer implemented method to scroll web-content in a digital TV environment, comprising:**

- (a) providing a set top box which is connected to the IP broadband network (Internet) as well as to one or more broadcasting medium (cable, satellite, terrestrial, IP).
- 25 (b) providing a remote control or a voice recognition system which sends commands to said set top box,
- (c) providing a TV set which is connected to said set top box
- (d) providing a software client program which is running inside said set top box
- (e) providing an Internet application server,
- 30 (f) providing a server software platform (series of software programs and databases) running inside said Internet application server

(g) providing one or more web APIs (software system designed to support interoperable Machine to Machine interaction over a network) provided by third parties,

whereby a TV user interacts with said virtual environment of claim 1 or 2, using said
5 remote control, said client program changes (moving or rotating) the graphical environment point of view and changes the graphical representation of the virtual environment on the said TV screen, simulating a navigation inside the scene, thus a scroll operation of the displayed 3D objects of claim 1 (web content) or of claim 2 (TV channels), and

10 whereby the navigation is guided from predetermined parameters stored in the scene overcoming traditional 3D navigation problems, and

whereby the scrolling of the said selected 3D objects of claim 1 or of claim 2 occurs in an intuitive way simulating natural movements inside a scene.

15 **5. A computer implemented method to allow the bimodal consumption of broadcasting live television and web content, comprising:**

(a) providing a set top box which is connected to the IP broadband network (Internet) as well as to one or more broadcasting medium (cable, satellite, terrestrial, IP),

20 (b) providing a remote control or a voice recognition system which sends commands to said set top box,

(c) providing a TV set which is connected to said set top box,

(e) providing a software client program which is running inside said set top box,

(f) providing an Internet application server,

25

(g) providing a server software platform (series of software programs and databases) running inside said Internet application server,

(h) providing one or more web APIs (software system designed to support interoperable Machine to Machine interaction over a network) provided by third parties,

30 whereby a user interacts with a windows as described in the claims 1 or 2 or 3 or 4 while a second window on the same said TV set displays a live TV program received by a broadcasting medium, and

whereby a TV user can search, choose and consume web content as described in claims 1 or 3 or 4 while watching live broadcasting television, and

whereby a TV user can interact with TV content as described in the claim 2 or 3 or 4, while watching live broadcasting television, and

5 whereby the user can switch from a passive broadcasting TV consumption to the IP based web content consumption paradigms of anything, anytime anywhere paradigm, and

whereby the system seamlessly integrates (from the user's perspective) in one delivery channel the traditional consumption of TV broadcasting with browsing and search
10 of multimedia online resources.

6. A computer implemented method to allow the consumption of different multimedia streaming files through a unique bimodal user interface, comprising:

15

(a) providing a set top box which is connected to the IP broadband network (Internet) as well as to one or more broadcasting medium (cable, satellite, terrestrial, IP),

(b) providing a remote control or a voice recognition system which sends commands to said set top box,

20 (c) providing a TV set which is connected to said set top box,

(d) providing a software client program which is running inside said set top box,

(e) providing one or more streaming players which is/are running inside said set top box,

(f) providing an Internet application server,

25 (g) providing a server software platform (series of software programs and databases) running inside said Internet application server,

(h) providing one or more web APIs (software system designed to support interoperable Machine to Machine interaction over a network) provided by third parties,

(i) providing a multimedia trans-coding platform,

30

whereby a TV user interacts as described in claim 3 with said 3D objects of claim 1 or 2, and, if said called API of claim 3 generates a streaming flow, this is redirected to

said multimedia trans-coding platform, the multimedia trans-coding platform transform the input data in a different multimedia format, redirects the output streaming flow to said client program, the client program displays it to said TV set, and

5 whereby the user interaction with multimedia content in a multitude of formats can displayed to said TV set by said one or more streaming players.

10

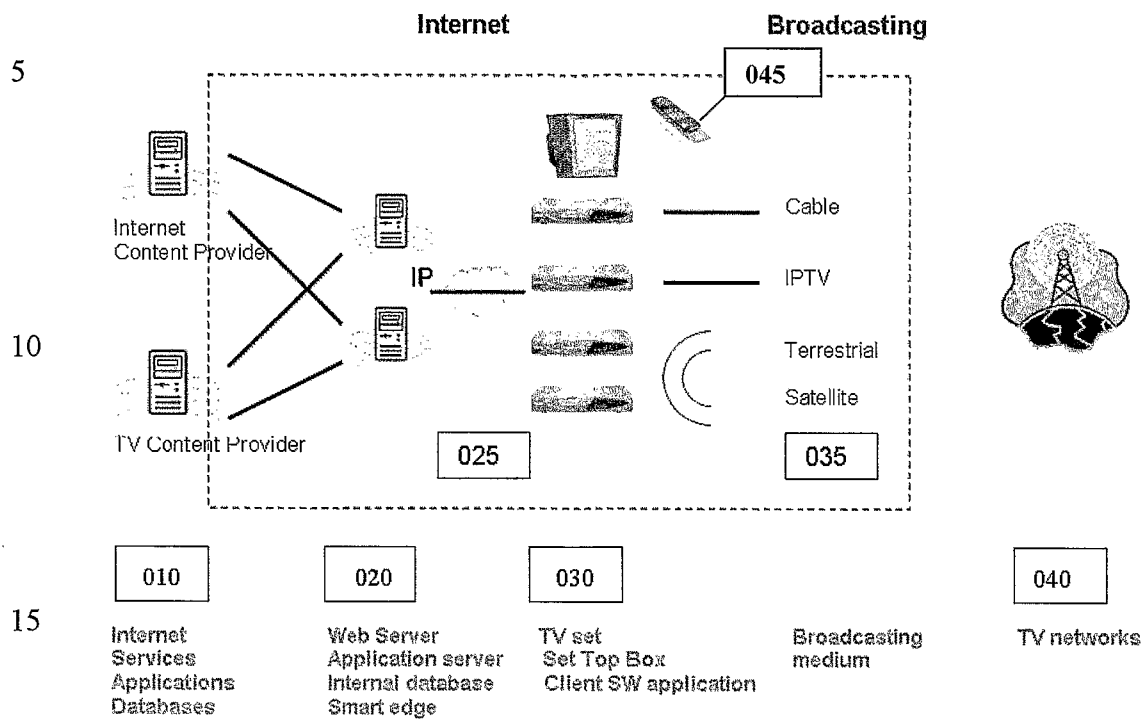
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1/8

Figure 1

2/8

Figure 2

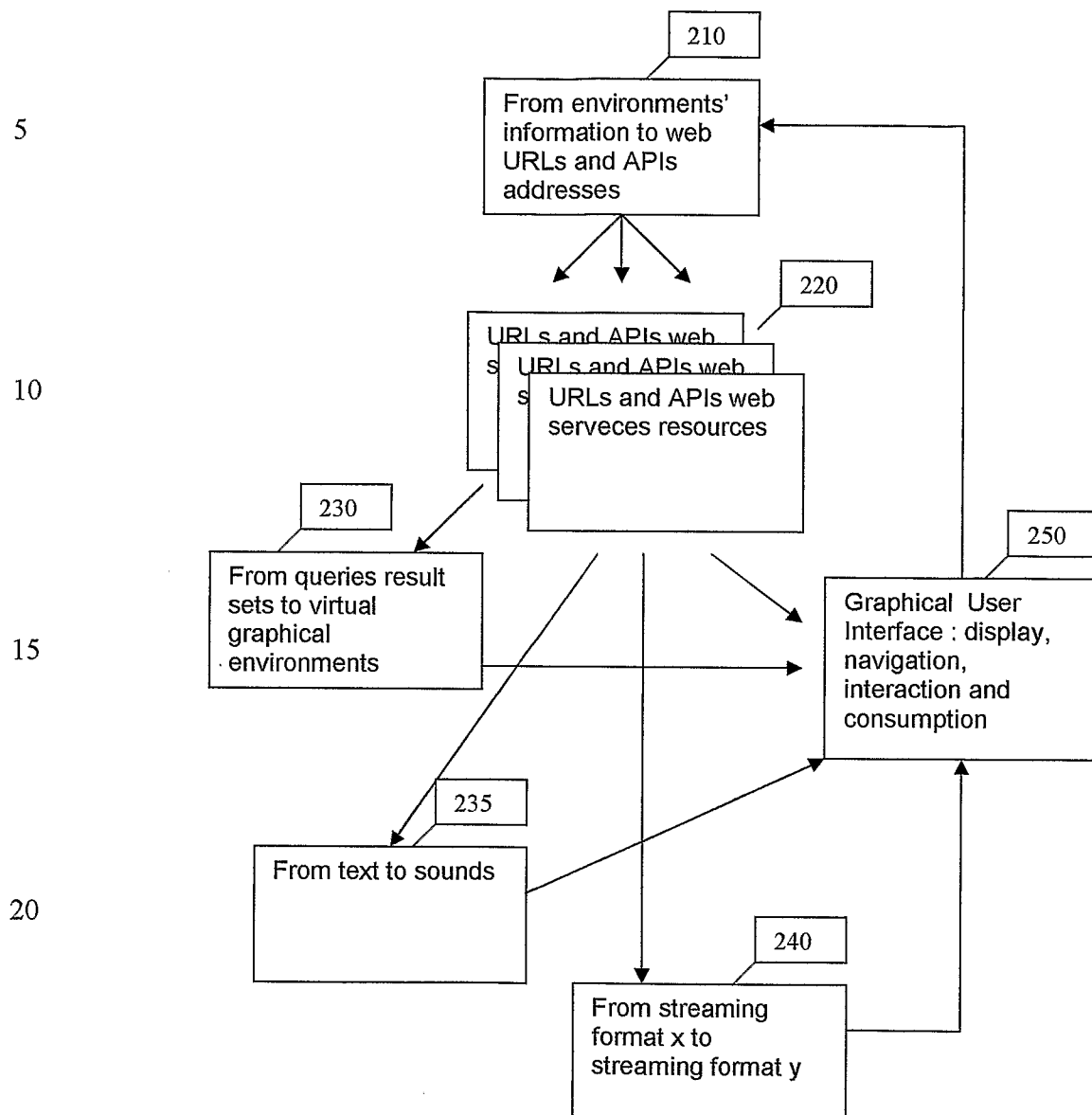
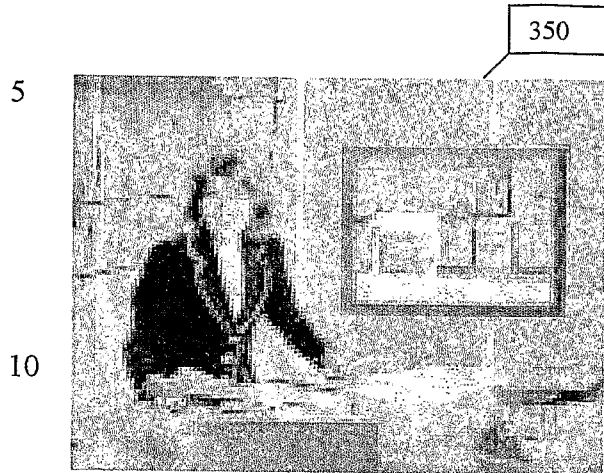


Figure 3



15 **Figure 4**

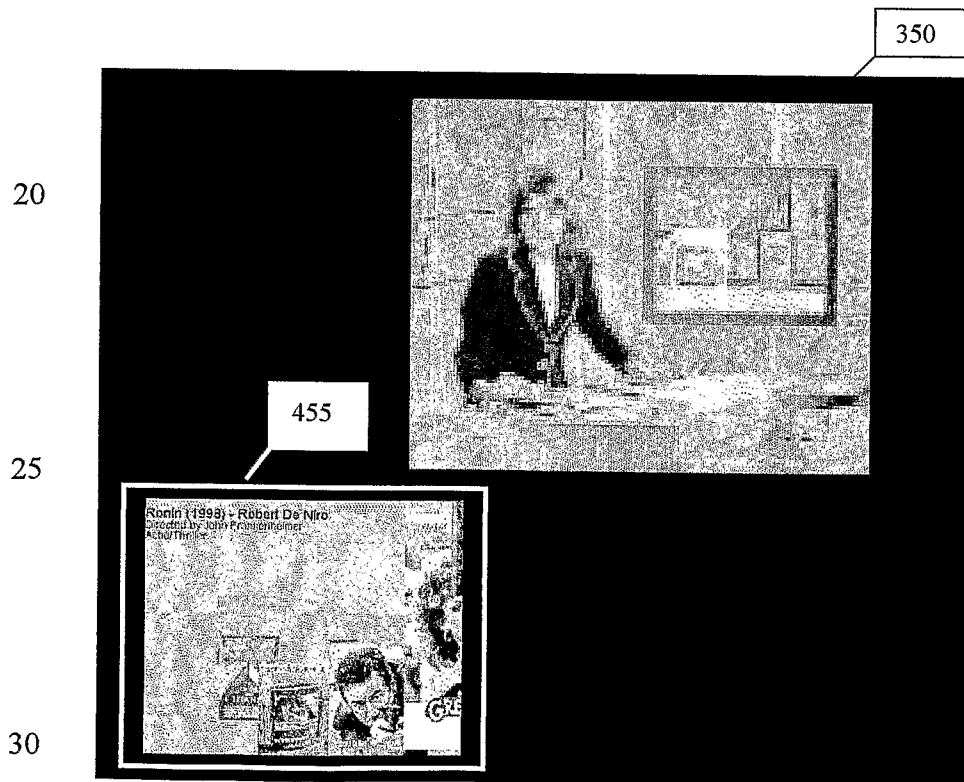
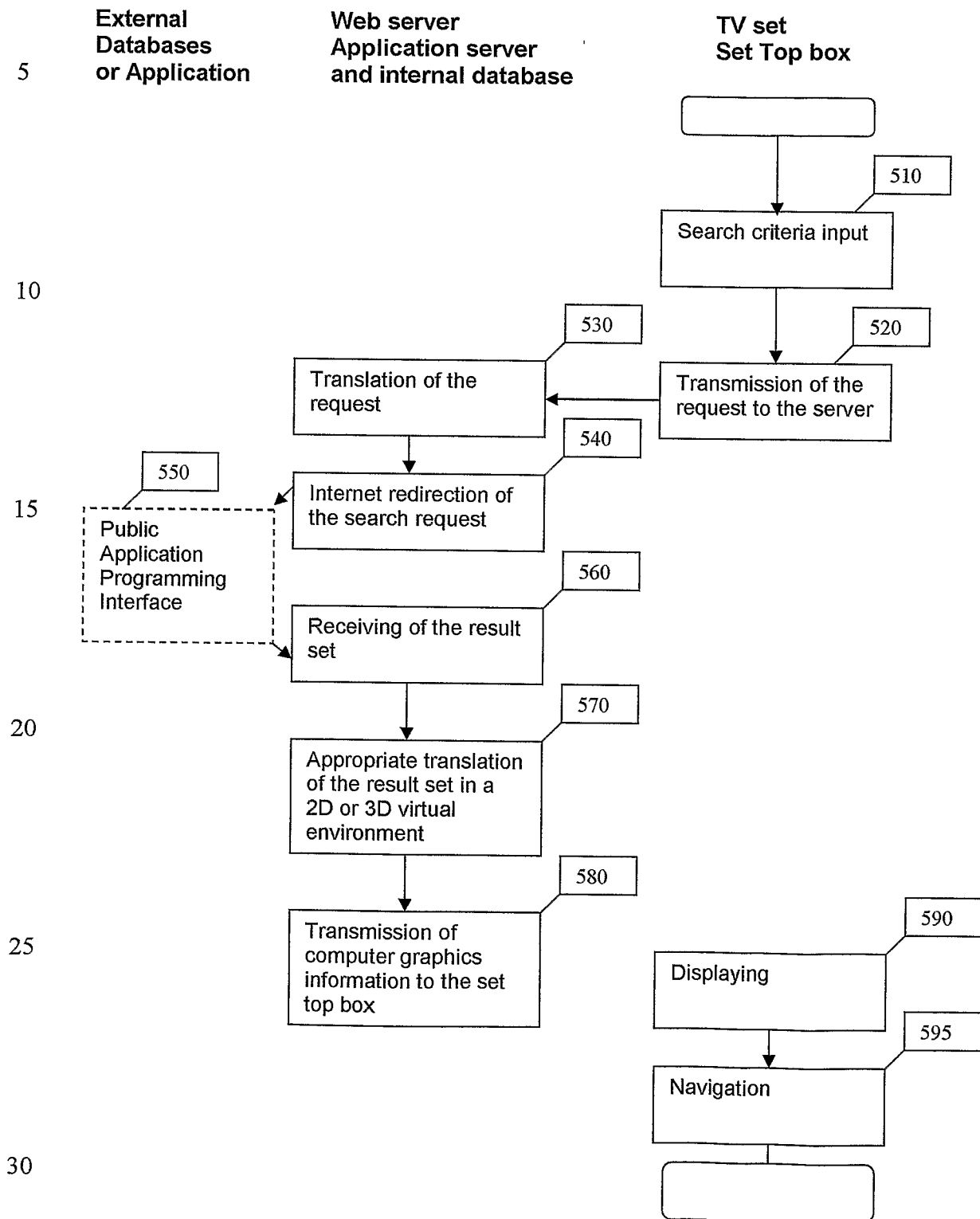


Figure 5



5/8

Figure 6

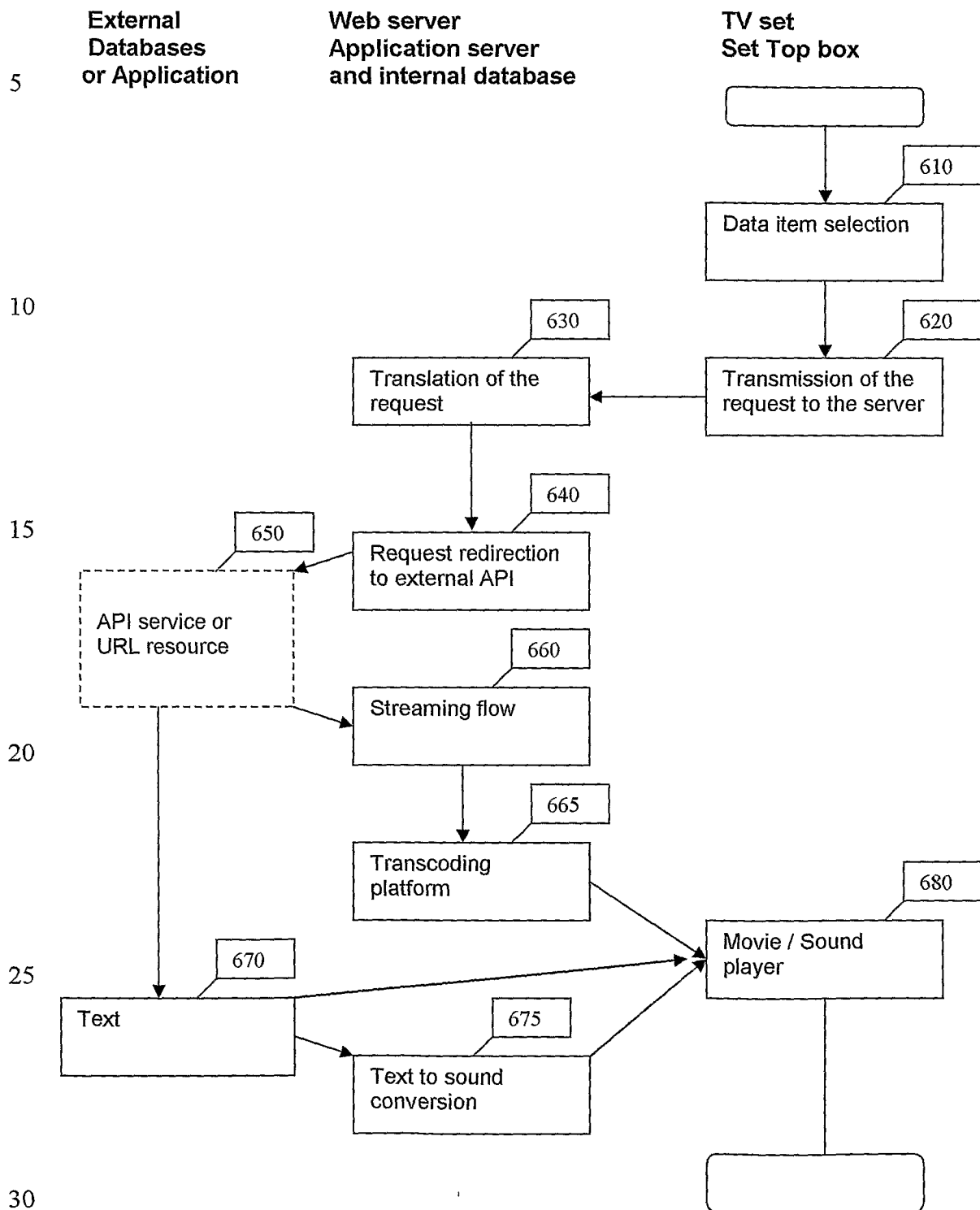
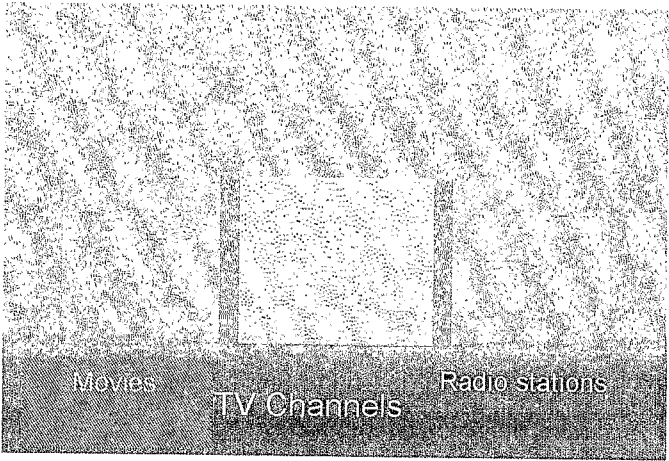


Figure 7

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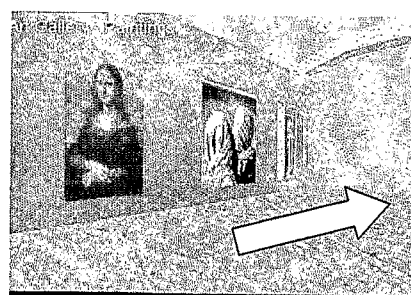
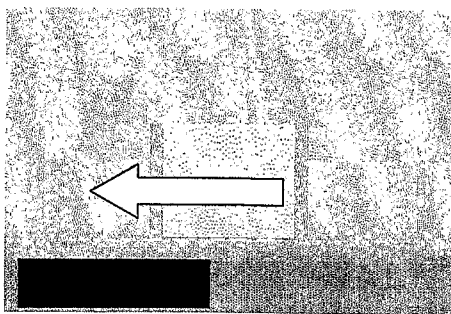
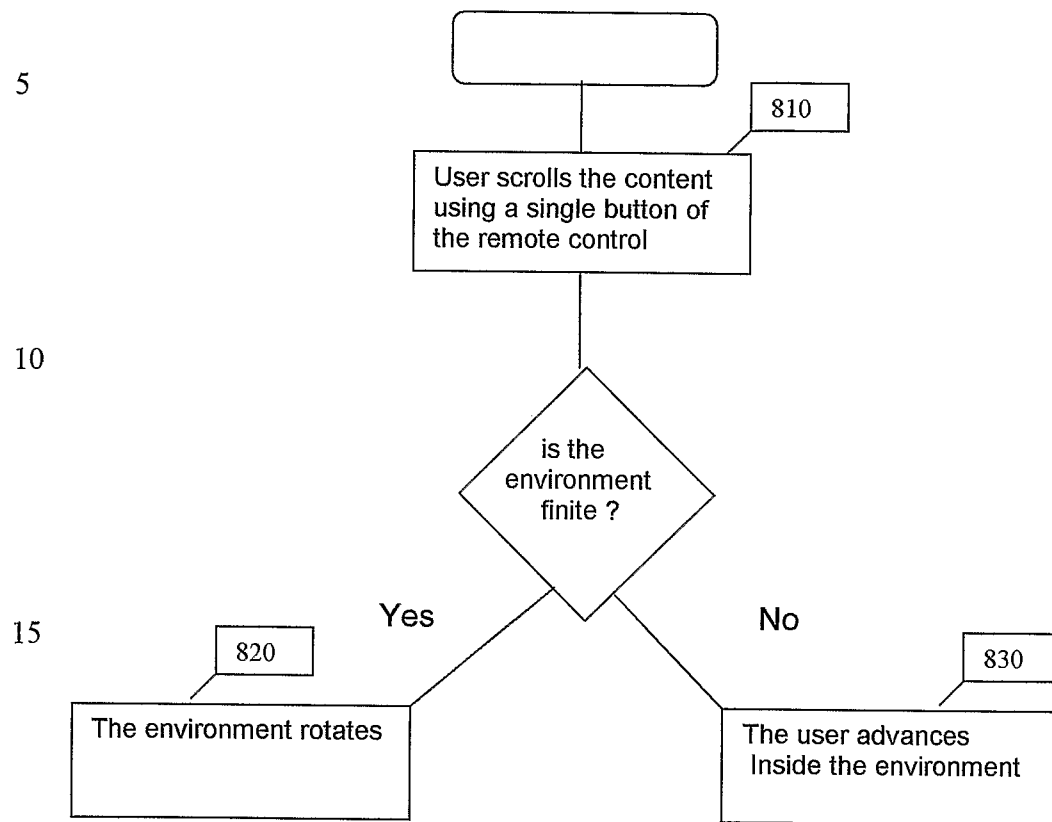
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7/8

Figure 8



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Figure 9

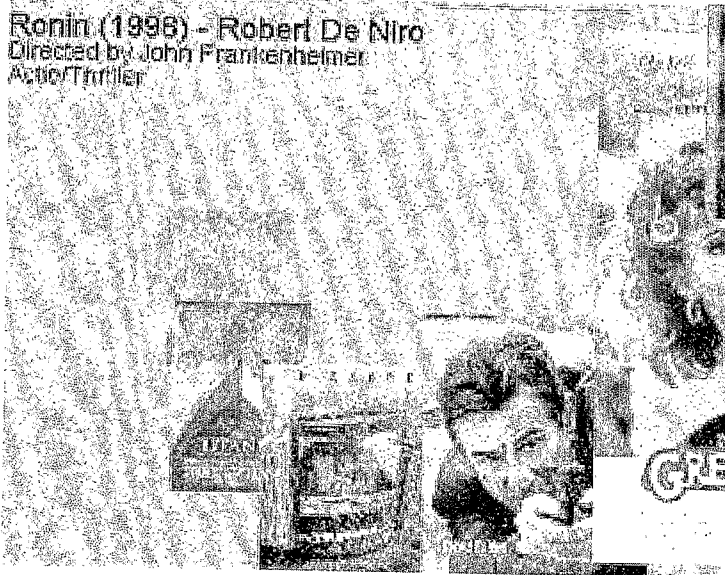
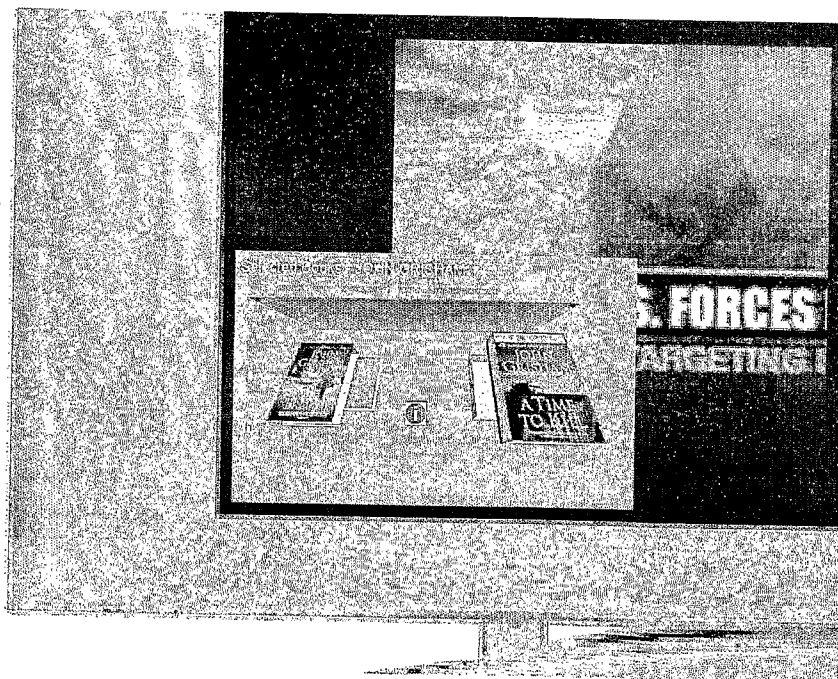


Figure 10



INTERNATIONAL SEARCH REPORT

International application No
PCT/IB2007/001396

A. CLASSIFICATION OF SUBJECT MATTER
INV. H04N7/173 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)
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, INSPEC

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
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Y	----- PORETTI GIACOMO, SOLLBERGER ALBERTO: "An entertaining way to access web content"[Online] 10 May 2005 (2005-05-10), pages 1-6, XP002478846 Retrieved from the Internet: URL: http://web.archive.org/web/20050510205615/www.3denter.com/html/Paper.pdf [retrieved on 2008-04-16] the whole document	1-6
A	----- EP 1 722 551 A (UNITED VIDEO PROPERTIES INC [US]) 15 November 2006 (2006-11-15) abstract	1,2
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☒ Further documents are listed in the continuation of Box C.

☒ See patent family annex.

* Special categories of cited documents:

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Date of the actual completion of the international search

30 April 2008

Date of mailing of the international search report

23/05/2008

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INTERNATIONAL SEARCH REPORT

International application No

PCT/IB2007/001396

C(Continuation). DOCUMENTS CONSIDERED TO BE RELEVANT

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A	"Zukunft entwickeln - Arbeit erfinden" ECULTURE TRENDS 2006, [Online] 25 February 2007 (2007-02-25), pages 1-13, XP002478848 Retrieved from the Internet: URL: http://web.archive.org/web/20070225223803/http://eculturefactory.de/download/eCT-Abstracts.pdf [retrieved on 2008-04-22] page 11, line 3 - line 13 -----	1,2

INTERNATIONAL SEARCH REPORT

Information on patent family members

International application No

PCT/IB2007/001396

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