



(51) International Patent Classification:

H04N 5/76 (2006.01) H04L 29/06 (2006.01)
H04N 7/173 (2011.01) H04N 21/61 (2011.01)
H04N 21/4147 (2011.01) G11B 20/10 (2006.01)
H04N 21/433 (2011.01) H04N 21/274 (2011.01)

(21) International Application Number:

PCT/IB2019/051561

(22) International Filing Date:

27 February 2019 (27.02.2019)

(25) Filing Language:

Italian

(26) Publication Language:

English

(30) Priority Data:

102018000003105 27 February 2018 (27.02.2018) IT

(71) Applicant: SKY ITALIA S.R.L. [IT/IT]; Via Monte Penice, 7, 20138 Milano (IT).

(72) Inventors: UBERTINI, Gabriele; c/o Sky Italia S.r.L., Via Monte Penice, 7, 20138 Milano (IT). COLELLA, Stefano; c/o Sky Italia S.r.L., Via Monte Penice, 7, 20138 Milano (IT).

(74) Agent: HOFFMANN EITL PATENT- UND RECHTSANWÄLTE PARTMBB, ASSOCIATION NO. 151; Arabellastraße 30, 81925 Munich (DE).

(81) Designated States (unless otherwise indicated, for every kind of national protection available): AE, AG, AL, AM, AO, AT, AU, AZ, BA, BB, BG, BH, BN, BR, BW, BY, BZ, CA, CH, CL, CN, CO, CR, CU, CZ, DE, DJ, DK, DM, DO, DZ, EC, EE, EG, ES, FI, GB, GD, GE, GH, GM, GT, HN, HR, HU, ID, IL, IN, IR, IS, JO, JP, KE, KG, KH, KN, KP, KR, KW, KZ, LA, LC, LK, LR, LS, LU, LY, MA, MD, ME,

(54) Title: APPARATUS, METHOD AND SYSTEM FOR MULTIPLE AUDIO-VIDEO STREAMS RECEPTION

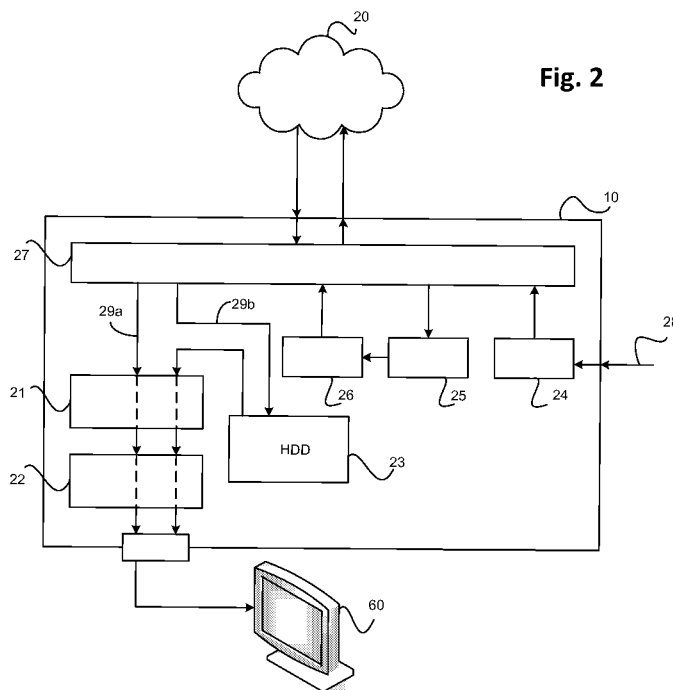


Fig. 2

(57) Abstract: A terminal for enjoying at least an audio and/or video content provided by a providing entity through a network via a linear channel comprises: requesting means for sending a first request for a content item to said providing entity, receiving means for receiving from the providing entity, in response to the first request, a first list including a plurality of first information elements, each first information element of the first list relating to a first segment of content, wherein an assembly of the first segments constitutes a content portion corresponding to the current instant of the event represented by the content in the show schedule of the linear channel, and content acquisition and reproduction means suitable for acquiring from the providing entity said first segments of content by using said first information elements included in the first list. The requesting means are configured to send, in response to a command received from a terminal user, a second request to the providing entity in order to obtain a second list including a plurality of second information



MG, MK, MN, MW, MX, MY, MZ, NA, NG, NI, NO, NZ,
OM, PA, PE, PG, PH, PL, PT, QA, RO, RS, RU, RW, SA,
SC, SD, SE, SG, SK, SL, SM, ST, SV, SY, TH, TJ, TM, TN,
TR, TT, TZ, UA, UG, US, UZ, VC, VN, ZA, ZM, ZW.

(84) Designated States (*unless otherwise indicated, for every kind of regional protection available*): ARIPO (BW, GH, GM, KE, LR, LS, MW, MZ, NA, RW, SD, SL, ST, SZ, TZ, UG, ZM, ZW), Eurasian (AM, AZ, BY, KG, KZ, RU, TJ, TM), European (AL, AT, BE, BG, CH, CY, CZ, DE, DK, EE, ES, FI, FR, GB, GR, HR, HU, IE, IS, IT, LT, LU, LV, MC, MK, MT, NL, NO, PL, PT, RO, RS, SE, SI, SK, SM, TR), OAPI (BF, BJ, CF, CG, CI, CM, GA, GN, GQ, GW, KM, ML, MR, NE, SN, TD, TG).

Published:

— *with international search report (Art. 21(3))*

elements, each second information element relating to a second segment of content, wherein an assembly of the second segments constitutes the entire content corresponding to the current event in the show schedule of the linear channel; the receiving means being configured to receive said second list from the providing entity; the acquisition and reproduction means being configured to acquire from the providing entity the second segments of content by using said second information elements included in the second list.

APPARATUS, METHOD AND SYSTEM FOR MULTIPLE AUDIO-VIDEO STREAMS RECEPTION

DESCRIPTIONFIELD OF THE INVENTION

The present invention relates to methods, devices and systems for delivering content, in particular for delivering audiovisual content by means of streaming techniques in an OTT (over-the-top) environment.

BACKGROUND OF THE INVENTION

According to conventional techniques, the distribution of television programs is traditionally achieved using radiofrequency (RF) "over the air" (OTA) broadcasting or a cable distribution network. In recent years, however, many service providers have been offering more and more video content to non-traditional devices (e.g. PCs, tablets, smartphones, etc.) using wireless networks or data networks like the Internet.

This technique of distributing television content is also known as OTT (over-the-top).

In the case of content distribution over data networks, service providers generally use adaptive bit rate (ABR) streaming techniques in combination with the Hypertext Transfer Protocol (HTTP) commonly used on the Internet. These solutions include, for example, Apple's HLS (HTTP Live Streaming), Microsoft's Smooth Streaming, and MPEG-DASH (Motion Picture Experts Group Dynamic Adaptive Streaming over HTTP).

In general, ABR streaming is designed to work over a type of network such as the Internet, where resources are not dedicated and guaranteed at every instant for a certain connection. The optimal bit rate is selected according to the current network status. In practical terms, adaptive bit rate streaming works by monitoring the

parameters of the client (such as bandwidth and/or processing capacity) and adjusting the streaming quality (for example, the bit rate and resolution) based on the detected bandwidth and the processing capacity. For this purpose, at the server delivering the content, every original stream is encoded with different levels of quality, for example with different bit rates.

According to the ABR streaming technique, content is generally divided into segments, each of which corresponding to several seconds of the audiovisual content. From a server delivering the service, the client receives a list (also known as a "manifest" or "playlist" in the technical field of reference) which identifies each of these segments with respective levels of quality available for each segment. The client can select the segments with a compatible quality based on bandwidth availability and/or processing capacity, in such a way as to avoid interruptions in the reproduction of the content and maximise the quality of the content reproduced.

A manifest normally refers to a portion of a television program, containing, for example, the URL that can be used to download the segments relating to a part of a program; once the client has processed the portion of content identified by a manifest, the client requests from the server delivering the service a new manifest, which identifies the subsequent segments of the program to be played back to the client.

In the prior art solutions that employ the above-described streaming techniques in a linear OTT channel (i.e. a channel in which the programs follow one another according to a pre-established show schedule), it is not possible, however, to satisfactorily enjoy the personal video recording (PVR) functions, such as, for example, recording a program, rewinding, pausing and so forth.

The object of the present invention is to remedy the problems related to the known techniques and thus to improve the same.

In particular, the present invention has the object of improving the delivery of audiovisual content to clients in an OTT environment. A further object of the invention is to effectively allow the clients of an OTT service to use PVR functions.

According to a first aspect of the invention, there is provided a terminal for exploiting (or acquiring) at least an audio and/or video content provided by means of a network via a linear channel by a providing entity, the terminal comprising:

requesting means for sending a first request for a content item to said providing entity,

receiving means for receiving from the providing entity, in response to the first request, a first list including a plurality of first information elements, each first information element of the first list relating to a first segment of content, wherein an assembly of the first segments constitutes a content portion of a current event in the show schedule of the linear channel, the content portion relating to the current instant,

content acquisition and reproduction means suitable for acquiring from the providing entity said first segments of content by using said first information elements included in the first list;

inputting means configured to receive commands from a terminal user;

wherein said requesting means are configured to send, in response to a command input by the terminal user via said inputting means, a second request to the providing entity in order to obtain a second list including a plurality of second information elements, each second information element relating to a second segment of content, wherein an assembly of the second segments constitutes the entire content corresponding to the entirety of the current event in the show schedule of the linear channel,

the receiving means being configured to receive said second list from the providing entity;

the content acquisition and reproduction means (21, 22, 26) being configured to acquire from the providing entity the second segments of content by using said second information elements included in the second list.

According to the invention, in addition to the playlist of the so-called "rolling" type (the first list), the terminal receives, at the user's request, a second playlist (the second list), which includes information elements configured to retrieve all segments of a current television program. This enables the terminal to download all of the audiovisual content of a television program in a safe and effective manner, while maintaining the reproduction of live programs via the rolling-type playlist.

According to a preferred embodiment, after having acquired the second segments from the providing entity, the acquisition and reproduction means of the terminal are configured to memorize the second segments in a non-volatile memory of the terminal. Thanks to this aspect, the terminal can have at its disposal the entire content of a television program memorized locally in the terminal itself, thus enabling PVR functions such as pausing, rewinding, etc. on the downloaded program.

According to a preferred embodiment, the terminal is configured to receive the second segments in encrypted form and to memorize the second segments in encrypted form in the non-volatile memory. This allows the entire content of a television program to be memorized without tying up processing resources of the terminal to decipher the content. In this manner, the reproduction of the live stream obtained through the playlist of a rolling type is not hindered or slowed.

According to a preferred embodiment, the first list is of the ABR-type (adaptive bit rate), wherein the first segments have a resolution which can vary between a maximum resolution and a minimum resolution, while the

second list is at the maximum bit rate, wherein all the second segments have a constant maximum resolution. This allows the entire content of a television program to be downloaded at the maximum quality, thus improving the PVR functions of the terminal.

According to a preferred embodiment, while the acquisition and reproduction means of the terminal acquire the second segments of content from the providing entity, the acquisition and reproduction means are configured to reproduce another content item provided by the providing unit via the linear channel and acquired by using the first list. In this manner, the content of the television program downloaded by using the second list is downloaded in the background, without affecting the reproduction of the live programs downloaded via the playlist of a rolling type.

According to a further aspect of the invention, there is provided a providing entity for providing at least an audio and/or video content to a terminal by means of a communication network via a linear channel, said entity comprising:

generation means configured to generate a first list of first information elements, each first information element relating to a first segment of content, wherein an assembly of the first segments constitutes a content portion of a current event in the show schedule of the linear channel, the content portion relating to the current instant;

receiving means configured to receive, from the terminal, a first request for a list of first information elements;

sending means configured to send, in response to said first request, a response comprising the first list of information elements,

wherein the receiving means are configured to receive a second request from the terminal,

wherein the generation means are configured to generate, in response to said second request, a second list including a plurality of second information elements, each

second information element relating to a second segment of content, wherein an assembly of the second segments constitutes the entire content corresponding to the entirety of the current event in the show schedule of the linear channel,

the providing entity comprising means configured to make the first and second segments of content available to the terminal for acquisition by the terminal.

According to a further aspect, there is provided, according to the invention, a method for enjoying, by means of a terminal, at least an audio and/or video content provided by a providing entity through a communication network via a linear channel, comprising the steps of:

sending, by means of the terminal, a first request for a content item to said providing entity,

receiving, via the terminal, from the providing entity in response to the first request, a first list including a plurality of first information elements, each first information element of the first list relating to a first segment of content, wherein an assembly of the first segments constitutes a content portion of a current event in the show schedule of the linear channel, the content portion relating to the current instant,

acquiring, via the terminal, said first segments of content from the providing entity by using said first information elements included in the first list;

in response to a command received from a terminal user, sending, via the terminal, a second request to the providing entity in order to obtain a second list including a plurality of second information elements, each second information element relating to a second segment of content, wherein an assembly of the second segments constitutes the entire content corresponding to the entirety of the current event in the show schedule of the linear channel,

acquiring, by means of the terminal, from the providing entity, the second segments of content by using said second information elements included in the second list.

LIST OF FIGURES

- Figure 1 shows a terminal and a content providing entity according to the invention;
- figure 2 shows a functional block diagram of a terminal according to one embodiment of the invention;
- figure 3 shows a diagram which shows the operation of the streaming technique according to one embodiment of the invention;
- figure 4 shows a functional block diagram of a providing entity according to one embodiment of the invention;
- figure 5 shows a block diagram of a computer capable of implementing the present invention according to one embodiment.

DETAILED DESCRIPTION

Figure 1 shows a system 1 for enjoying audio and/or video content, such as, for example, a television program. The system 1 comprises a terminal 10 and a providing entity for providing the audio and/or video content 30, connected to each other by means of a communication network 20. The system 1 forms an OTT system for distributing audio and/or video content via a linear channel.

“Linear channel” here means a channel that provides for the broadcasting of television programs (or events) according to a pre-established sequence (show schedule) by means of the IP network, in a manner that is similar to traditional radio-frequency broadcasting of television programs.

The terminal 10 is advantageously produced in the form of an IPTV set-top box (STB) or an IP box, to be installed, for example, in the homes of end users who acquire the audio-video content. Alternatively, the

terminal 10 could also be produced in the form of a tablet, a smart TV or a smartphone. Advantageously, the terminal 10 is configured to decipher content received in encrypted form. Furthermore, the terminal 10 is advantageously configured to decompress the content received in compressed form, for example in accordance with the MPEG/AVC standard. According to a preferred embodiment, the terminal 10 can be connected to a display or television set (for example by means of an HDMI cable), to which it sends the signals for viewing after deciphering and decompression.

The communication network 20 can comprise one or more networks, which include Internet networks and/or wireless networks, for data transmission.

The providing entity 30 can be made up of one or more distributed servers, although it is represented in the figures as a single block for the sake of simplicity.

In order to achieve distribution of the audio and/or video content via streaming, the providing entity 30 and the terminal 10 can implement any known streaming technique, such as, for example, HLS, Microsoft SS, MPEG - DASH, etc.

The providing entity 30 is capable of providing the terminal 10 with a first list (live playlist, or rolling-type playlist) of first information elements, each relating to a first segment of content to be provided, wherein the first segments constitute a content portion corresponding to the current instant of the event represented by the content item in the show schedule of the linear channel.

For the purpose of carrying out the function of acquiring the audio/video content of the linear channel by using a rolling-type playlist, the terminal 10 comprises:

- requesting means for sending a first request for a content item to the providing entity 30,
- receiving means for receiving from the providing entity 30, in response to the first request, the first list

(rolling-type playlist) including the plurality of first information elements, and
-content acquisition and reproduction means suitable for acquiring from the providing entity 30 the segments of content by using the information elements included in the rolling-type list.

The first list (rolling-type playlist) refers to a time window that includes the current instant. In other words, by using the rolling-type list, the terminal 10 is able to download a portion of the audio/video content of the linear channel currently received by the terminal 10 in real time. The linear channel currently received by the terminal 10 can be selected by the terminal user by using known inputting means, for example a remote control. When the first rolling-type list becomes obsolete (for example, when the terminal 10 has acquired all the segments described in the current rolling-type list), the terminal 10 can automatically send a subsequent request for a new first list to the providing entity 30 in order to obtain new information elements to be used to download new segments of audio/video content of the linear channel currently received.

Advantageously, the information elements included in the first list comprise network addresses and/or resource identifiers, such as, for example, URLs that can be used by the terminal 10 to download the segments of audio/video content.

According to the invention, the requesting means of the terminal 10 are configured to send, in response to a command received from a terminal user, a second request to the providing entity 30 in order to obtain a second list including a plurality of second information elements, each relating to a second segment of content, wherein an assembly of the second segments constitutes the entire content corresponding to the entirety of the current event in the show schedule of the linear channel. In other words, the second list refers to the entirety of the current television program. In one embodiment, the first

segments and second segments refer to the same television program (or event) broadcast via the same linear channel currently received by the terminal 10. In any case, as discussed below, during the downloading of the second segments it is possible to change the linear channel received in real time by the terminal 10 using the first list; in such a case the first and second segments can refer to different television programs (or events) broadcast via two distinct linear channels.

The receiving means of the terminal 10 are configured to receive said second list of the providing entity 30, and the acquisition and reproduction means of the terminal 10 are configured to acquire from the providing entity 30 all of the second segments of content, by using the information elements included in the second list. The second list covers an entire television program from the start to the end, including information elements relating to segments that constitute an entire television event. Accordingly, the generation means of the providing entity 30 are configured to generate the second list including information elements that can be used by the terminal 10 to retrieve segments of the program which constitute the entire content of the current event of the linear channel. Advantageously, the information elements included in the second list comprise network addresses and/or resource identifiers, such as, for example, the URLs that can be used by the terminal 10 to download the segments of audio or video content.

Figure 2 shows a functional diagram of the terminal 10 produced, in an example embodiment of the invention, as an IPTV set-top box or an IP box.

In figure 2, the requesting means for requesting the first and second lists are represented by the number 24. The requesting means 24 are configured to send a request for a first rolling-type list and a request for a second list in response to a command 28 input by the user (for example by means of a remote control or, more in general, via inputting means of the terminal 10). The request for a

first and a second list are transmitted to the providing entity 30 via a transmission interface 27, which transmits and receives the data by means of the IP communication network 20.

The receiving means of the terminal 10 configured to receive the first and second lists from the providing entity 30 are represented in figure 2 by the reference number 25. The receiving means 25 receive the first and second lists from the providing entity 30 by means of the IP network 20 and the communication interface 27. The receiving means 25 provide the first and second lists of information elements to the acquisition means 26.

The acquisition and reproduction means according to the invention comprise the acquisition means 26 and reproduction means 21 and 22 as represented in figure 2. The acquisition means 26 control the download, via the IP network 20, of the segments of content to which the information elements (for example URLs) contained in the lists received by the receiving means 25 refer. The segments of content are received by the terminal 10 in an IP transmission format via the interface 27.

In particular, the first segments of content obtained by using the information elements contained in the first rolling-type list are indicated by the reference number 29a and are sent to the reproduction means 21, 22 as soon as they are received, then to be reproduced in real time by means of the television 60 connected to the terminal 10.

The reproduction means 21, 22 comprise a decipherer 21 capable of deciphering the signals relating to the segments of content received in encrypted form. The decrypted signals are sent by the decipherer 21 to the decompressor 22, which decompresses the signals relating to the first segments of content and then sends the signals to an output of the terminal towards the television set 60. The decompressor 22 can operate according to known standards such as, for example, the MPEG/AVC standard.

Advantageously, the first segments of content obtained by using the rolling-type list are saved in a buffer as they are received by the terminal 10, so that they can then be deciphered and decompressed at the appropriate moment in the process of reproducing the content in real time.

The television set 60 connected to the terminal 10, for example by means of an HDMI cable and connection, is also represented in figure 2. The terminal 10, following deciphering and decompression, sends the audiovisual signal to the television set 60 for viewing thereof by the terminal user.

In an advantageous embodiment of the invention, the second segments of content 29b received by the terminal 10, by using the second list of information elements, are received in an encrypted form and saved in a non-volatile memory 23 of the terminal 10 in encrypted form, thus without being sent to the decipherer 21 and decompressor 22. For example, the second segments are saved on a hard disk 23 of the terminal 10. Preferably, for each second segment (or chunk) received by the terminal 10, this segment is memorized on the hard disk 23, possibly with the addition of the metadata necessary for then reproducing the recorded content by means of reproduction software of the terminal 10. Thanks to the fact that the second segments 29b of content are recorded in an encrypted form, it is possible not to tie up the reproduction means 21-22 during the acquisition of the second segments of content, thus enabling the terminal user 10 to view other content also of another linear channel while recording of an entire program takes place in the background, by using the second list of information elements. For example, while the terminal 10 downloads and memorizes the content obtained by using the second list in the non-volatile memory 23, the terminal can acquire the first segments of content by using the rolling-type list and reproduce the live content of the linear channel by using the reproduction means 21-22. When the content

recorded in the memory 23 must then be reproduced, the content is sent to the reproduction means 21-22 for deciphering and decompression before being sent to the display 60.

Here it is desired to point out that the representation of figure 2 constitutes a functional diagram of the terminal 10 for illustrative purposes, and that the different means 24, 25, 26, 21 and 22 can be produced with distinct or joint hardware components and/or with different software modules.

According to a preferred embodiment, the first list of information elements is of the ABR-type (adaptive bit rate), so the first segments downloaded by the terminal 10 can have a variable resolution. In other words, the quality of the segments obtained by using the first list differ from segment to segment, since the first list includes the information elements which allow the terminal to retrieve the first segment in a desired resolution (or bit rate), according to the availability of resources (reception bandwidth and/or processing capacity) at the terminal 10. The second list of information elements, by contrast, is a list at the maximum bit rate, wherein all the segments of the second list have a maximum resolution, that is, a constant maximum resolution for all the segments of the second list. In other words, the information elements of the second list allow the terminal 10 to download the content at the maximum possible resolution, which corresponds to the maximum resolution at which the content is available at the providing entity. In a specific example, the information elements of the second list include URLs that can be used to download only segments at the maximum resolution. Alternatively, the second list of information elements is a list at a variable bit rate, wherein the segments of the second list have a variable resolution ranging between a maximum and a minimum.

According to a preferred embodiment, the providing entity 30 also performs a function of making the first and

second segments available for downloading by the terminal 10 via the IP network 20, making the first and second segments available for downloading by using the information elements (e.g. URLs) of the first and second lists. Advantageously, the entity 30 maintains the second segments of content available for acquisition by the terminal for a pre-established amount of time also after the end of the event (or program) represented by the content according to the show schedule of the linear channel. This allows the terminal 10 to complete the download of the complete event even if the program in the linear channel has already ended according to the show schedule.

Figure 3 shows a diagram showing the operations of the terminal 10 and of the providing entity 30 according to a possible operating mode of the present invention.

At the instant t1, the reception and reproduction of a linear channel 40 is started at the terminal 10, for example by means of a command given by the user by means of a remote control. Starting from the instant t1, the terminal 10 downloads and reproduces the program 41 of the linear channel 40 by means of a stream 11, using a first rolling-type list of information elements to retrieve the first segments of content of the linear channel. During reproduction of the program 41 of the linear channel 40, at the instant t2 the terminal user 10 gives a command to record the program.

At the instant t2, the terminal 10 sends the request 13 to the providing entity 30 in order to obtain a second list including a plurality of second information elements relating to an assembly of the second segments, which constitutes the entire content of the program (or event) 41 in the show schedule of the linear channel 40. At the instant t3, the terminal 10 receives the second list of information elements 14 from the providing entity 30.

Starting from the instant t3, in parallel with the stream 11 downloaded by using the first rolling-type list, the terminal 10 starts a second process of acquiring the

content by using the second list of information elements, indicated in the figure by the reference number 12. The downloading of the entire content relating to the program 41 can also last beyond the instant t_4 at which the program 41 ends according to the show schedule of the linear channel 40. Advantageously, after the end of the current program 41, the second segments are kept available for downloading by the terminal 10 for a length of time equal to X hours, where X is greater than or equal to 4 or, more preferably, where X is greater than or equal to 12. At the instant t_5 , the process 12 of acquiring the content of the entire program by using the second list is concluded. At this point, the entire program 41 is available for reproduction, having been saved in the fixed memory of the terminal 10. It is noted that, during the process of downloading the program 41 via streaming 12, the terminal user 10 could also change the channel and view another channel other than the channel 40 by using a first rolling-type list in the streaming operation. Therefore, the program 41 can be downloaded in the background, without affecting, hindering or slowing down in any way the obtainment and reproduction of the live content of the linear channel. Furthermore, the program 41 downloaded by means of the downloading process via streaming 12 using the second list, can also be reproduced at a later time, paused or rewound, thus achieving a PVR function in the OTT system.

The providing entity 30 can be made up of a single device or, alternatively, a set of mutually interconnected devices, and can in particular be implemented in hardware, software or a combination thereof, in either a concentrated or distributed form; the same applies for the means included therein. Examples of a providing entity are a server, a server farm, a software solution implemented on a cloud platform, etc.

Figure 4 shows a functional diagram of the providing entity 30. In particular, the providing entity 30 comprises receiving means 82 configured to receive a first

request for a first list or a second request for a second list from the terminal 10 by means of the communication network 20. The providing entity 30 comprises generation means 81 configured to generate the first or second list in response to the request of the terminal 10. The providing entity 30 further comprises sending means 83 configured to send the first and the second list generated by the generation means 82 to the terminal 30 via the IP network 20. The providing entity 30 further comprises means for making the first and second segments available so as to be able to be downloaded by the terminal (not shown in the figure), for example by making the segments of content available for downloading where there are network resources identified by the elements of the first and second lists. The means for making the content available can be made up of one or more distributed IP servers.

According to one embodiment, there is further provided a computer program configured to perform, when the program is run on a computer, any function or combination of functions of the terminal 10 or of the providing entity 30 described with reference to the embodiment of figures 1-5. Figure 5 illustrates a block diagram exemplifying a computer 600 capable of running the aforesaid program. In particular, the computer 600 comprises a memory 630 for storing the program instructions and/or data necessary for the execution thereof, a processor 620 for executing the instructions themselves and an input/output interface 610.

In the light of the foregoing description, the advantages of the present invention appear evident. In fact, by means of a simple command input by the terminal user, it is possible to start and make a complete recording of a television program in the terminal 10 in an OTT environment. The content is downloaded and saved locally in the terminal 10 at the maximum possible resolution in a fixed memory of the terminal. This makes it possible to achieve, in a simple and effective manner,

a PVR (personal video recording) function also in the case of an IP (OTT) type of receiver, such as an IP box or an IPTV set-top box. Furthermore, the terminal user 10 can continue to view other programs during recording, enabling the flexibility of use of the device to be increased.

CLAIMS

1. Terminal (10) for enjoying at least an audio content and/or a video content provided by means of a communication network (20) via a linear channel (40) by a providing entity (30), the terminal (10) comprising: requesting means (24) for sending to said providing entity a first request for a content, receiving means (25) for receiving from the providing means, in response to the first request, a first list including a plurality of first information elements, each first information element of the first list relating to a first segment of the content, wherein an assembly of the first segments constitutes a content portion of a current event in the show schedule of the linear channel, the content portion relating to the current instant, content acquisition and reproduction means (21, 22, 26) suitable for acquiring from the providing entity said first segments of content by using said first information elements included in the first list; characterized in that said requesting means (24) are configured for, in response to a command (28) received from a terminal user, sending a second request (13) to the providing entity (30) for obtaining a second list (14) including a plurality of second information elements, each second information element relating to a second segment of the content, wherein an assembly of the second segments constitutes a content corresponding to the entirety of the current event (41) in the show schedule of the linear channel (40), the receiving means (25) being configured for receiving said second list from the providing entity; the content acquisition and reproduction means (21, 22, 26) being configured for acquiring from the providing entity (30) the second segments of contents by using said second information elements included in the second list.

2. The terminal according to claim 1, characterized in that, after having acquired the second segments from the

providing entity (30), the content acquisition and reproduction means (21, 22, 26) are configured for memorizing the second segments in a non-volatile memory (23) of the terminal (10).

3. The terminal according to claim 2, characterized by being configured for receiving the second segments in an encrypted form and for memorizing the second segments in an encrypted form on the non-volatile memory (23).

4. The terminal according to any one of the preceding claims, characterized in that the first list is of the ABR-type (Adaptive Bit Rate), wherein the first segments have a resolution which can vary between a maximum resolution and a minimum resolution; and in that the second list is at maximum bit rate, wherein all the second segments have a maximum resolution.

5. The terminal according to any one of the preceding claims, characterized in that, while the content acquisition and reproduction means (21, 22, 26) acquire the second segments of content from the providing entity (30), the content acquisition and reproduction means (21, 22) are configured for reproducing another content provided from the providing unit (30) via the linear channel (40) and acquired by using the first list.

6. The terminal according to any one of the preceding claims, characterized in that the content acquisition and reproduction means (21, 22, 26) are configured for memorizing the first segments in a buffer of the terminal (10).

7. The terminal according to any one of the preceding claims, characterized in that said first and second information elements comprise web addresses and/ or resource identifiers.

8. Entity providing (30) at least an audio content and/or a video content to a terminal (10) via a linear channel (40) by means of a communication network (20), said entity (30) comprising:

generation means configured for generating a first list of first information elements, each first information element relating to a first segment of the content, wherein an assembly of the first segments constitutes a content portion of a current event in the show schedule of the linear channel, the content portion relating to the current instant;

receiving means (25) configured for receiving, from the terminal (10), a first request for a list of first information elements;

sending means configured to send, in response to said first request, a response comprising the first list of information elements,

characterized in that the receiving means are configured for receiving a second request (13) from the terminal (10),

wherein the generation means are configured for generating, in response to said second request (13), a second list (14) including a plurality of second information elements, each second information element relating to a second segment of the content, wherein an assembly of the second segments constitutes a content corresponding to the entirety of the current event in the show schedule of the linear channel,

the providing entity including means being configured for making available to the terminal (10) the first and the second segments of the content for the acquisition by the terminal.

9. Entity according to claim 8, characterized in that it comprises a single device or a plurality of distributed devices.

10. Entity according to claim 8 or 9, characterized in that the entity keeps said second segment available for being acquired by the terminal for a predetermined amount of time after the end of the current event (41) according to the show schedule of the linear channel.

11. System comprising a terminal according to any one of claims from 1 to 7 and a providing entity according to any one of claims from 8 to 10.

12. Method for enjoying, by means of a terminal (10), at least an audio content and/ or a video content provided from a providing entity (30) by means of a communication network (20) via a linear channel (40), comprising the steps of:

sending, by means of the terminal, to said providing entity a first request for a content,

receiving, via the terminal, from the providing entity in response to the first request, a first list including a plurality of first information elements, each first information element of the first list relating to a first segment of the content, wherein an assembly of the first segments constitutes a content portion of a current event in the show schedule of the linear channel, the content portion relating to the current instant,

acquiring, via the terminal, from the providing entity said first segments of content by using said first information elements included in the first list;

characterized in that it comprises the steps of:

in response to a command received from a terminal user, sending, via the terminal, a second request to the providing entity for obtaining a second list including a plurality of second information elements, each second information element relating to a second segment of the content, wherein an assembly of the second segments constitutes the entire content corresponding to the entirety of the current event in the show schedule of the linear channel,

acquiring, by means of the terminal, from the providing entity the second segments of the content by using said second information elements included in the second list.

Fig. 1

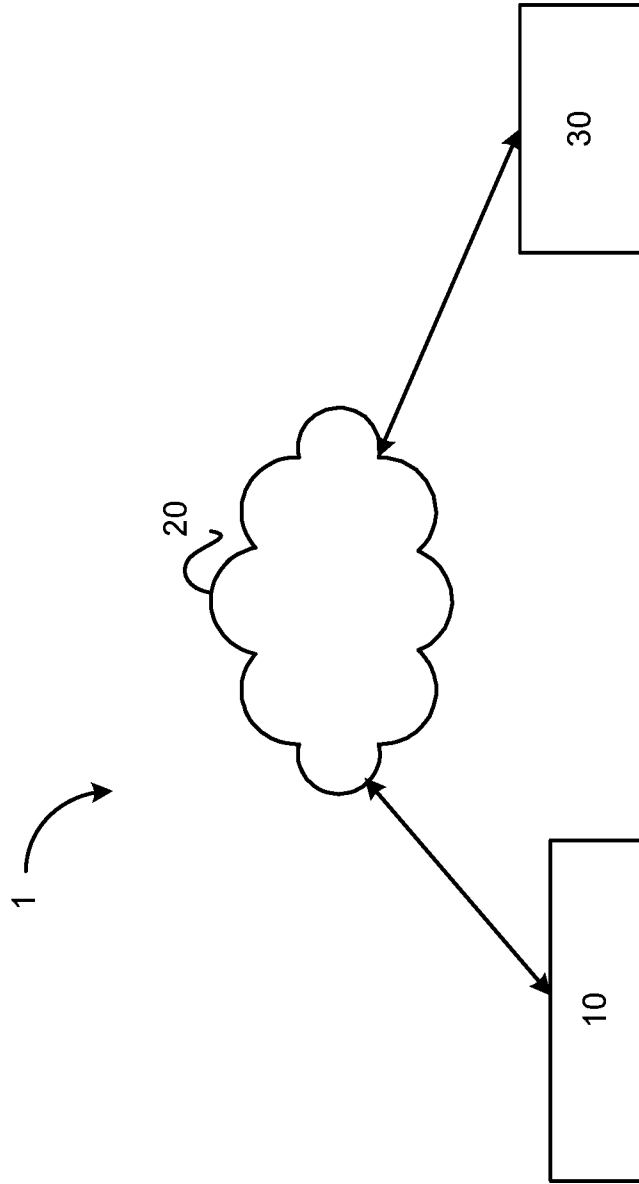


Fig. 2

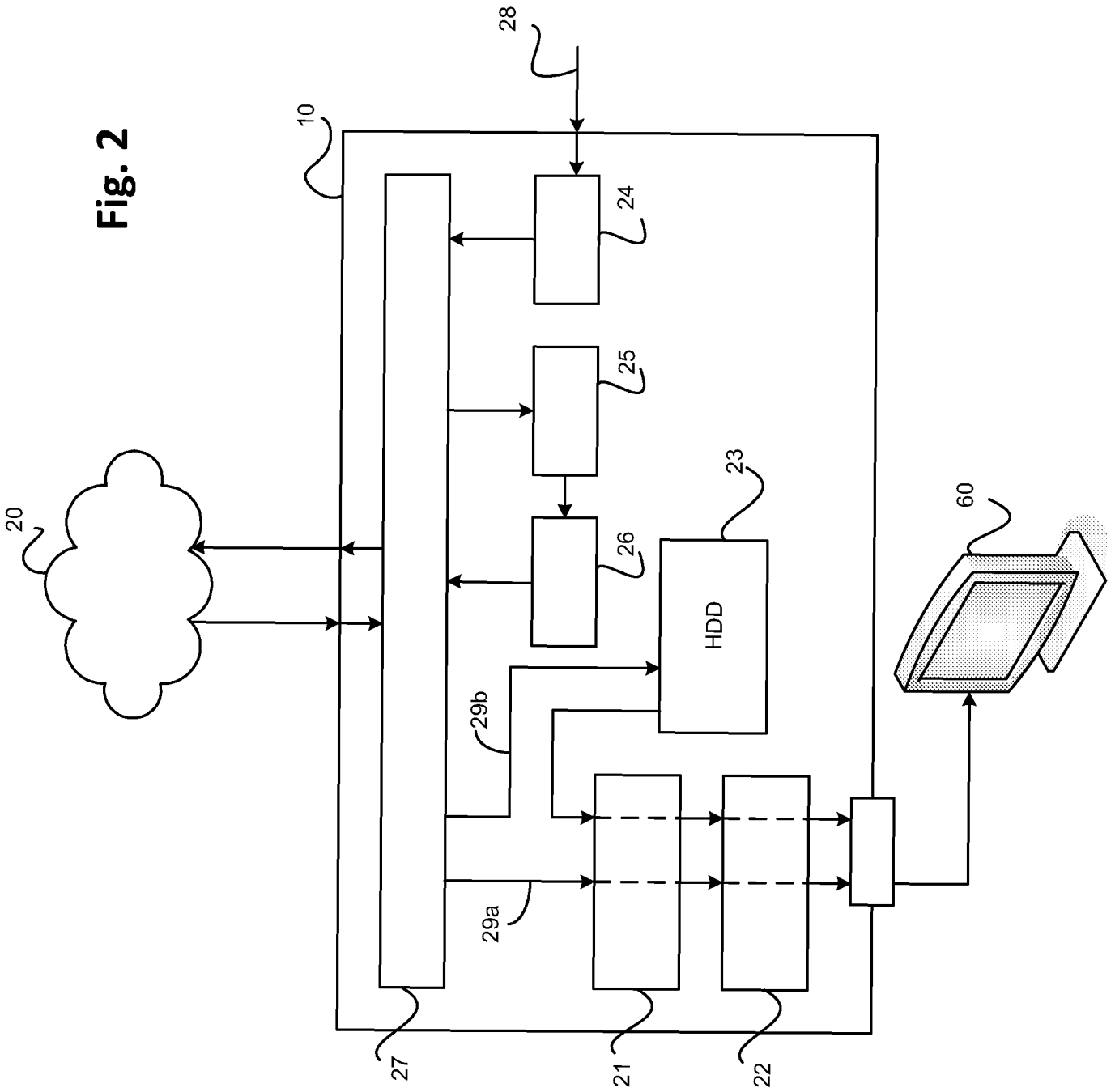


Fig. 3

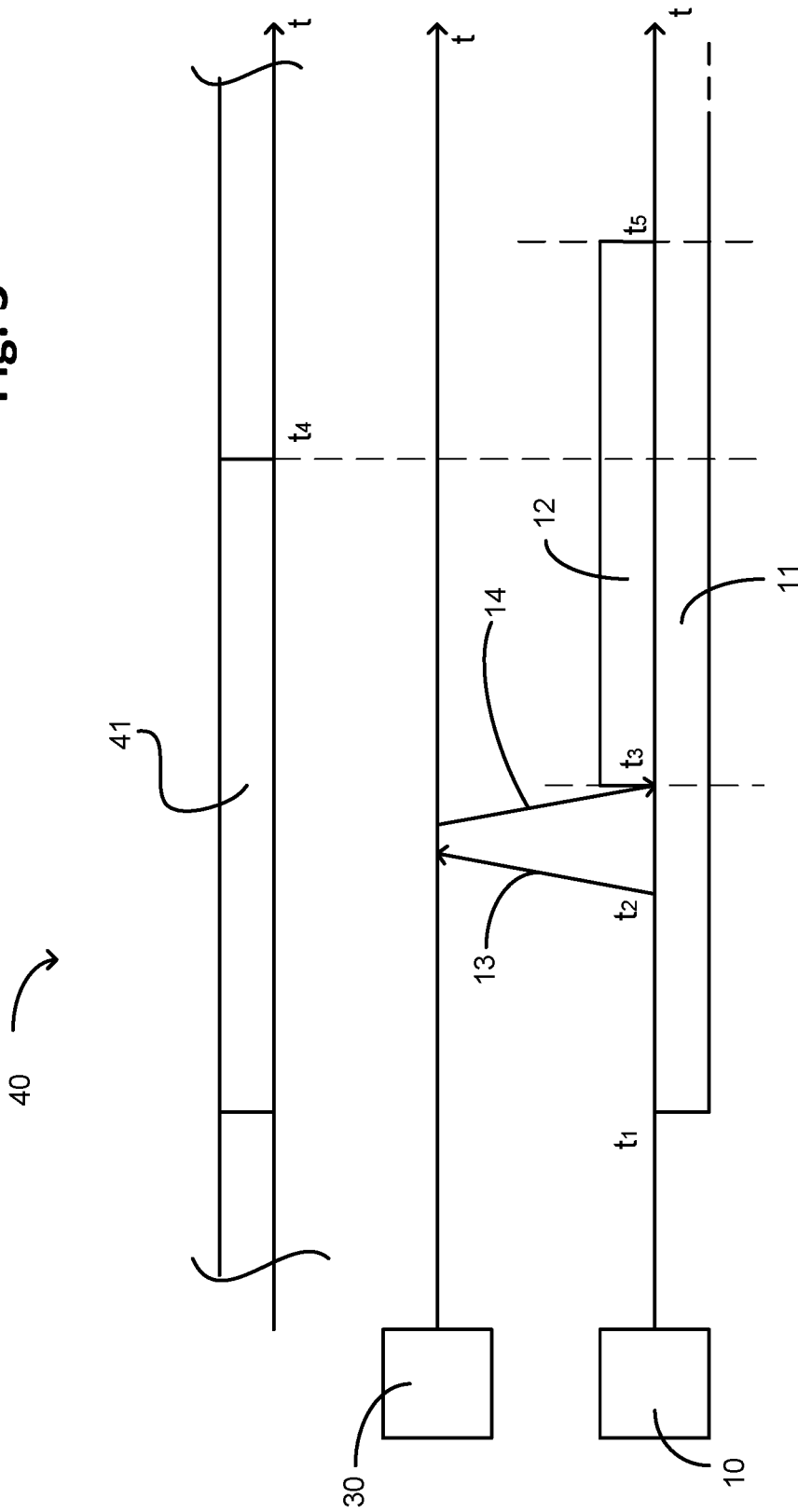


Fig. 4

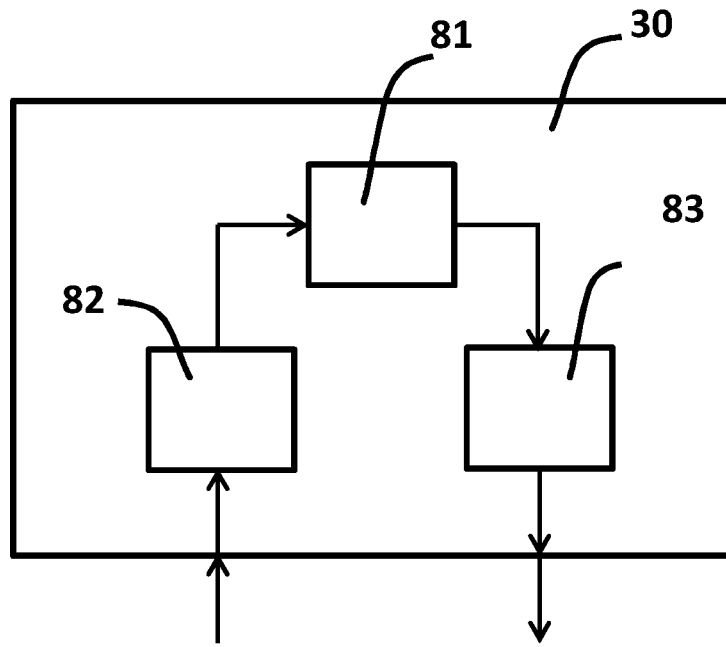
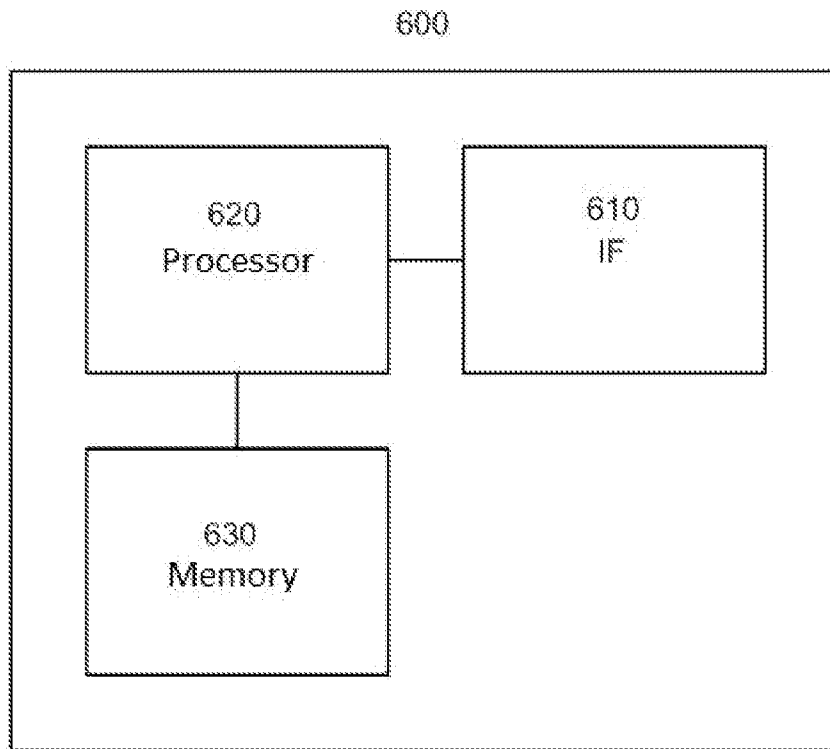


Fig. 5



INTERNATIONAL SEARCH REPORT

International application No
PCT/IB2019/051561

A. CLASSIFICATION OF SUBJECT MATTER
 INV. H04N5/76 H04N7/173 H04N21/4147
 ADD. H04N21/433 H04L29/06 H04N21/61 G11B20/10 H04N21/274

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 G11B H04L

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 practicable, search terms used)
 EPO-Internal, WPI Data

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	EP 2 954 683 A2 (ARRIS TECHNOLOGY INC [US]) 16 December 2015 (2015-12-16) abstract figures 1,3 paragraphs [0001] - [0005] paragraphs [0011], [0020] paragraphs [0036] - [0070] -----	1-12
A	WO 2013/173554 A1 (MOTOROLA MOBILITY LLC [US]) 21 November 2013 (2013-11-21) abstract figure 1B paragraphs [0004] - [0011] paragraphs [0036] - [0044] ----- -/--	1,5-8, 11,12

Further documents are listed in the continuation of Box C.

See patent family annex.

* Special categories of cited documents :

"A" document defining the general state of the art which is not considered to be of particular relevance

"E" earlier application or patent but published on or after the international filing date

"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)

"O" document referring to an oral disclosure, use, exhibition or other means

"P" document published prior to the international filing date but later than the priority date claimed

"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

"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

"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

"&" document member of the same patent family

Date of the actual completion of the international search 18 April 2019	Date of mailing of the international search report 26/04/2019
--	--

Name and mailing address of the ISA/ European Patent Office, P.B. 5818 Patentlaan 2 NL - 2280 HV Rijswijk Tel. (+31-70) 340-2040, Fax: (+31-70) 340-3016	Authorized officer Thollot, Julien
--	---

INTERNATIONAL SEARCH REPORT

International application No
PCT/IB2019/051561

C(Continuation). DOCUMENTS CONSIDERED TO BE RELEVANT		
Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
A	EP 2 456 202 A1 (ZTE CORP [CN]) 23 May 2012 (2012-05-23) abstract claims 1,2 paragraphs [0001] - [0017] -----	2,5
A	US 2001/033343 A1 (YAP ADRIAN [US] ET AL) 25 October 2001 (2001-10-25) abstract paragraphs [0003] - [0027] paragraphs [0043] - [0045] paragraph [0055] paragraphs [0116] - [0117] paragraph [0143] -----	2-6,9

INTERNATIONAL SEARCH REPORT

Information on patent family members

International application No

PCT/IB2019/051561

Patent document cited in search report	Publication date	Patent family member(s)	Publication date	
EP 2954683	A2	16-12-2015	BR 112015022239 A2	19-12-2017
			CA 2903273 A1	25-09-2014
			CN 105165015 A	16-12-2015
			EP 2954683 A2	16-12-2015
			MX 350232 B	29-08-2017
			US 2014280781 A1	18-09-2014
			WO 2014152047 A2	25-09-2014

WO 2013173554	A1	21-11-2013	CN 104871551 A	26-08-2015
			EP 2850844 A1	25-03-2015
			US 2013311670 A1	21-11-2013
			US 2017150190 A1	25-05-2017
			WO 2013173554 A1	21-11-2013

EP 2456202	A1	23-05-2012	CN 101635828 A	27-01-2010
			EP 2456202 A1	23-05-2012
			RU 2012108663 A	20-10-2013
			US 2012159545 A1	21-06-2012
			WO 2011020377 A1	24-02-2011

US 2001033343	A1	25-10-2001	NONE	
